

## AT\&T System 85

Release 2, Versions 1 and 2

## Maintenance

Service Manual

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## INTRODUCTION

## PURPOSE

This service manual describes maintenance of the System 85 switch and switch related components. It is intended for use primarily by personnel trained in the maintenance of digital switching equipment. It may be used by others having a working knowledge of digital switching equipment while under the control and direction of a remote maintenance facility such as Remote Maintenance, Administration, and Traffic System (RMATS II).

The service manual is intended for use by maintenance personnel using the Maintenance and Administration Panel (MAAP). The manual as well as the switch maintenance process is keyed to the use of the MAAP connected to the switch.
Both R2V1 and R2V2 versions of the Release 2 switch are covered in this service manual.
This issue replaces all previous issues of this document. Reasons for reissue include addition of:

- Information on recovery of the switch.
- PROC 613 - Duplicate Processor Control and Test for R2V2.
- PROC 625 - Synchronization Reference Monitor for R2V1 and R2V2.
- PROC 647 - Automatic Transmission Measurement System (ATMS) Tests.
- Information on the RMI cabinet, DS-1/MFAT carrier, and the RMI carrier.
- Replacement information on the High Capacity Mini-Recorder (HCMR).
- Replacement information on the DC fan and fan assembly.
- Replacement information on the alarm panel and the AEH4 alarm board.


## HOW TO USE THIS MANUAL

It is recommended that you become familiar with the contents and organization of this manual. Read the sections entitled SWITCH MAINTENANCE OVERVIEW and HUMAN INTERFACES to become familiar with the maintenance processes, aids, and types of troubles you may encounter.
Read the section entitled TROUBLE CLEARING to become familiar with the trouble locating process and the methods for isolating a failure.

The detailed information on the maintenance procedure (PROC) flip charts is arranged in numerical sequence with the procedure identified at the top of the page.

Observe the switch alarm panel to identify the lighted indicator. Some indicators on the alarm panel are marked to associate the fault indicator with a particular PROC. Always start with PROC 600 (alarm causes/error $\log$ ) to determine the maintenance procedure used to isolate that failure, then go to the referenced procedure for detailed information.

The failure identification and clearing process is progressive. Unless vou are certain of the failure cause, always start with Test 1 (when applicable) and progress through all tests of the referenced procedure given for that failure.
If you are providing on site support for a remote maintenance facility, use the Index to locate the instruction for performing the action or replacing the component identified by the remote facility.

## ORGANIZATION

This service manual is divided into the following sections:

1. Switch Maintenance Overview - provides an overview of the error logging software and stored maintenance programs. Faults, errors, and failures are defined in their relationship to the maintenance process.
2. Human Interfaces - describes the functions of the switch alarm panel and the MAAP. Use of switch microdiagnostic testing capabilities, LEDs on circuit packs, tools and test equipment, and preventive maintenance are also covered.
3. Trouble Clearing - describes the recommended method of handling alarm, user reported, and no response from the switch trouble conditions.
4. Maintenance Procedures - contains the detailed instructions for using the maintenance procedures for failure analysis and trouble clearing.
5. Switch Component Replacement - provides description of the switch cabinets and carriers and contains instructions for checking option settings and replacing circuit packs and components.
6. SMDR Component Replacement - provides instructions for replacing circuit packs and components. Adjustments required as a result of circuit pack replacement are also provided.
7. Auxiliary Cabinet Component Replacement - provides a description of the auxiliary cabinet and contains instructions on replacing auxiliary cabinet components.
8. Maintenance and Administration Panel (MAAP) - provides a description of the MAAP and how to use it.

Common procedures (opening cabinet doors, removing rear covers, etc.) are assumed and not illustrated or covered in the component replacement procedures.

This issue of the maintenance service manual is compatible with MAAP flip charts comcode 844179267 , Issue 9 (for R2V1) and comcode 844176776, Issue 2 (for R2V2). The flip chart illustrations in this manual are not drawn to scale and should not be reproduced for use as replacements on your MAAP.

## SWITCH MAINTENANCE OVERVIEW

## GENERAL

Switch maintenance uses built-in maintenance capabilities, error logging software programs, and stored diagnostic maintenance procedures.

The self-diagnostic ability and the various fault handling capabilities programmed into switch software are used as the basis for the analysis and trouble clearing processes presented.

Maintenance objectives are the fault detection, isolation, and repair of defective equipment.
Major alarms are faults affecting more than (or equal to) 64 time slots and minor alarms are faults affecting less than 64 time slots.

Faults, errors, and failures are detected and identified when they occur.
a. A fault is a physical defect of the switch hardware that causes improper circuit operation. Some faults are intermittent because they have no predictable or regular frequency of occurrence. Others are considered solid. Possible causes of intermittent faults are noise, deterioration, and critical timing.
b. An error is a single occurrence of an incorrect event or response and can be either hardware or software in nature. An error is the result of a fault, noise, a software bug, or an irregularity.
c. A failure is when the number of detected errors exceeds a predetermined threshold. The signal that this threshold is exceeded is an alarm(s). The level of alarm shows the effect of the failure on the quality of service.

Tests are used for both detection and diagnosis. A test is a sequence of stimuli applied to a circuit, a group of circuits, or a software function, with the expected output or results.

A detection test determines the existence of a fault or an abnormal software condition; i.e., it indicates whether or not the circuit(s) or function(s) appears to operate correctly.

A diagnostic test analyzes the nature of detected errors and isolates the source of each. There are two subsets of diagnostic tests: identification and analytical.
a. Identification tests provide information for the error $\log$ when an error is detected: e.g., circuit identity and error code.
b. Analytical tests perform higher level analysis of recorded errors: e.g., patterning, manually initiated testing, and repair analysis.

## ERROR DETECTION

Error detection routines determine whether or not specific circuits or system functions are operating correctly. Detection of errors can occur during an integrity check, an operational check and/or a demand test.
a. Integrity Check: A test which is scheduled to be executed on either a periodic or timeavailable basis in order to verify the integrity of the system.
b. Operational Check: A check which is performed when the switch carries out one of its assigned operations. The check can be done by hardware (e.g., a parity check) or by software (e.g., verification of data consistency by the call processing routines).
c. Demand Test: A test which is executed upon demand via a maintenance procedure. Demand tests include the set of tests that are used for integrity checks.
Once an error is detected, a diagnostic routine may be used to analyze the nature of the error and to determine its source. The error is then recorded in the error log, and if necessary appropriate recovery action is initiated.

Detection tests check the integrity of the switch's hardware components and some of the software functions on an on-going basis. These tests are scheduled either as periodic or time-available tasks and are designed to detect both hardware and software errors.
The integrity of selected portions of the switch can be verified by running corresponding demand tests. Integrity checks, as well as operation checks, record errors in the Periodic Maintenance Information Data Structure (PMIDS) while demand tests record errors in the Demand Maintenance Information Data Structure (DMIDS).
Operational checks are made to detect abnormal conditions and/or correct results that might arise during switch operation. Detection of these errors is provided by special hardware and software.
a. For hardware detectable errors, circuitry on the circuit packs is used to find faults such as parity or data errors. Most of the errors cause a bit to be set in a special error register that is polled every second by the network (TMS and/or module) processor.
b. A 1 -second periodic task in the common control processor requests the error information from the network (TMS and/or module) processor and takes appropriate action. Other faults cause an interrupt to be sent to the module processor for immediate processing.

## ERROR LOGGING

## Overview

To allow for automatic detection of defective circuits, and to provide information that might be required in the analysis and repair of switch problems, especially intermittent ones, each occurrence of a detected circuit malfunction is recorded in the switch error log. This error log is maintained in a portion of the common control memory called PMIDS.

When a periodic test detects an error in the operation of a circuit or functional area, an entry describing the presence and nature of the detected malfunction is made in PMIDS to record that fact. Data stored in PMIDS is used by the alarm thresholding algorithms to flag switch failures.

## Periodic Maintenance Information Data Structure (PMIDS)

PMIDS is composed of a set of eight tables, containing a particular type of information about an error entry. The eight tables collectively characterize the malfunction of a particular circuit or function. The eight tables for each function or circuit type are:
a. Circuit identification.
b. Error rate and duration.
c. Time count.
d. Fault signature and alarm information.
e. Beginning time stamp.
f. Alarm time stamp.
g. Ending/resolved time stamp.
h. Error count.

Entries in PMIDS are categorized as new, active, inactive, alarmed, or resolved.
a. New entries are those where no entry for the circuit exists in PMIDS.
b. Active entries are those where errors are recently detected.
c. Inactive entries are those where the time since the most recent error exceeds 20 minutes.
d. Alarmed entries are those where a circuit failure is detected and an alarm sent.
e. Resolved entries are those that represent circuits that were alarmed but are repaired or the alarm manually turned off.
In a system with duplicated processors, there are two distinct PMIDS. This allows detection and identification of processor dependent problems. Most periodic tasks which update PMIDS do not run on the off-line processor. However, the addition of time stamps to PMIDS permanently establishes the time of errors, even in the off-line processor.
A facility is provided to allow the manual clearing of entries from the error log. It is possible to selectively clear the entire PMIDS, all entries for a particular circuit type, or an entry for a specific circuit. This capability is provided through two maintenance procedures.

PROC 600 (alarm causes/error log) allows individual entries or all entries for a particular'unit type to be cleared (zeroed), and PROC 612 (initialization causes) allows the clearing (zeroing) of all failure history (entries) in PMIDS.
The ability to manually clear (zero) entries in PMIDS is provided as a maintenance aid.
a. This aid is not intended to be used in the normal course of performing switch maintenance as it destroys all failure history for the entries which are cleared (zeroed).
b. The capability is provided when it is desirable to start with a clean failure history after correcting major problems that caused many alarms and at other times (i.e., installation).
The preferred method for clearing alarms is to resolve them using the appropriate maintenance procedure and its associated verification test after performing any necessary repairs.
Manual capabilities for clearing (zeroing) PMIDS entries are not provided in any of the other maintenance procedures.

Resolving of alarms can be accomplished in two ways.
a. The preferred and normal method for clearing alarm causes is to resolve them by using the appropriate maintenance procedure, performing isolation of failures, making necessary repairs, and performing the associated verification test to ensure that the failure is corrected.
b. A manual capability of turning off alarms and resolving the alarm causes is available by using the CLEAR DATA; EXECUTE sequence in most maintenance procedures.

Both of the above methods have the same result, they turn off the alarm indicator and update the alarmed entry in PMIDS as resolved. As can be determined by analyzing the above two methods, the alarm is resolved as far as the error log is concerned, but the cause of the alarm has not been determined nor repaired using the manual capability (i.e., CLEAR DATA; EXECUTE sequence). In addition, the alarm returns in a matter of minutes unless the cause of the alarm is eliminated.

## Demand Maintenance Information Data Structure (DMIDS)

DMIDS is used when demand tests are active. DMIDS records detailed information (in a temporary buffer) concerning the nature of errors when associated maintenance procedures are performed.
Demand tests do not update or in any way alter the contents of PMIDS except for resolving alarmed entries for circuits that pass the demand test.
The information recorded by DMIDS for failing circuits may consist of a unit type, circuit identification, and specific fault code.

The specific fault code contains information that uniquely identifies the point in the decision algorithm at which the diagnosis was completed (diagnosis stopped because of a failure).

## ALARM PLAN

The alarm plan is the strategy for notifying the user that a circuit or functional block of the switch is malfunctioning. When the information in PMIDS indicates that a malfunction occurred, this is considered a failure and an alarm is raised to serve notice of this condition.
An alarm may be indicated in several ways. It may be a lighted alarm or fault indicator on the alarm panel, a lighted alarm indicator on the attendant console, an immediate automatic call to a remote maintenance facility (if applicable), an affirmative response to a maintenance poll from the user or a remote maintenance facility, or any combination of these.

Alarms are generated for failures detected by operational error processing, periodic tests, time available tests, and/or call processing. Failures detected during maintenance procedure diagnostic testing are not alarmed.
There are two alarm thresholds which may be exceeded. The first, which is intended to flag hard failures, is one error detected in each of 3 consecutive minutes. The second, which is aimed at detecting intermittent failures, is achieved when the error rate (peg count) exceeds a set number (typically five errors in 2 hours).

The threshold value is defined in a table by the switch software for each circuit type or functional area. These values may be altered by issuing a patch to the switch tape. There is no translation or maintenance procedure which allows modification of the threshold table. The ability to modify this table of threshold values allows flexibility to vary the sensitivity of certain types of circuits as experience warrants.
In those situations where duplicated circuitry exists, a malfunctioning circuit may need to be alarmed (for a switch of equipment) much more quickly than the normal thresholding algorithms allow. In such cases the normal alarming mechanism may be bypassed and an immediate failure declared.
The routing of alarm indicators is a function of the alarm level. The routing for each alarm level is:
a. Major or minor alarm - Turns on indicator lights at the attendant's console and the alarm panel, and automatically makes a call to a remote maintenance facility (if applicable) to report the failure.
b. Warning alarm - Turns on an indicator light on the alarm panel only and waits for the user or a remote maintenance facility (if applicable) to poll the switch before reporting the failure.

## HUMAN INTERFACES

## PRECAUTIONS

When performing maintenance or translation procedures on System 85 switch equipment, certain precautions must be observed by user personnel.

Cautions, warnings, and danger statements contained within the service manual must be observed to prevent loss of service, possible equipment damage, and possibility of personnel injury.

In addition, the following precautions regarding electromagnetic interference and static electricity must be observed.
a. Electromagnetic Interference: This equipment generates, uses, and can radiate radio frequency energy. Electromagnetic fields radiating from the switch may cause noise to be introduced into the customer's equipment. If the equipment is not installed and used in accordance with the instruction manual, interference to radio communications may be caused.

WARNING: To maintain the Electromagnetic lnterference (EMI) integrity of the System 85 switch, maintenance personnel (after performing any translation or maintenance activities) must ensure that all cabinet panels, covers, etc. are firmly secured in place prior to leaving the customer's premises.
b. Static Electricity: To prevent or reduce electrostatic discharge, maintenance personnel must always attach wrist grounding straps before working on switch components or handling circuit packs.

Caution: Electrostatic discharge can damage or destroy circuit packs containing integrated circuits (ICs).

The electromagnetic compatibility (EMC) wrist strap and cable assembly (ce900698226) is placed in the bottom of the module control cabinet in a poly bag (cc900492372) next to the AC distribution unit.

Note: This wrist strap is to be used whenever troubleshooting or performing maintenance or handling any circuit packs associated with the System 85 switch.

The EMC wrist strap assembly is used in the following manner:
a. Attach the wrist strap to either wrist.
b. Connect the alligator clip to the cabinet frame.

A good ground connection for the alligator clip is:
a. In equipment coded cabinets which have removable sides, attach the alligator clip to any convenient screw head that fasten the hinges to the cabinet or to the screws that fasten the door latch to the frame.
b. In equipment coded cabinets which have intergrated sides, the front and rear cabinet formed faces (front door area or back area when viewed in an open position) which are coated with a conductive paint; the alligator clip may be attached to any of these surfaces.
c. In either case an area close to the vertical center of the cabinet should be selected for the alligator clip allowing a more central position from which to operate.

## MAINTENANCE AND ADMINISTRATION PANEL (MAAP)

The MAAP, (Figure 1), is the primary interface used by maintenance personnel at the customer's premises to perform maintenarice tasks. The stored maintenance programs are represented on the MAAP by a series of flip charts.


Figure 1. MAAP

The MAAP provides access to maintenance procedures to perform interrogation, testing, and fault isolation.

When the switch is duplicated, it may be necessary to examine both the on-line and off-line side to determine the maintenance procedure to be performed. The problem that exists could have caused a switch to the healthier common control. When the problem is corrected, both the on-line and offline sides should be examined to determine if potential problems exist.
For further information on a description of the MAAP and how to use it, read the section entitied MAINTENANCE AND ADMINISTRATION PANEL (MAAP).

## ALARM PANEL

The alarm panel (Figures 2 and 3 ) is located at the top of the common control cabinet.
The alarm panel provides an indication of the seriousness of system problems by displaying the alarm level (major, minor, or warning) of any active alarm. A general indication of the hardware (processor/memory, environment, network, etc.) area that caused the alarm is also displayed.

The system's state of health is provided through the use of alarm and equipment failure indicators. Equipment failure indicators are grouped functionally by their potential importance to system operation and call processing integrity.
The alarm panel permits effective use of the maintenance fault isolation and repair procedures. Some indicators on the alarm panel are associated with a number in parentheses adjacent to the indicators. This number designates a PROC which may be used to access specific information about system problems, such as the location of faulty equipment or the exact cause of a problem.

Troubleshooting the main processing unit can be done from the alarm panel. Troubleshooting the main processor is accomplished with microdiagnostic tests of the main processor and memory. The results are displayed by PASS and FAIL indicators on the alarm panel.


Figure 2. Unduplicated Common Control Alarm Panel

In addition to troubleshooting capabilities, the alarm panel provides:
a. Manual control of the emergency transfer capability.
b. Go/halt control of the common control processor.
c. Control over which processor is on-line in a duplicated common control system.
d. Reset of the suicide timer after time-out.


Figure 3. Duplicated Common Control Alarm Panel

A description of each alarm panel indicator is given in Table A. A description of each alarm panel switch and connector is given in Table B.

TABLE A.

| ALARM PANEL INDICATORS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| SECTION | indication | color | definition | ORIGIN |
| CONTROL | GUARD | red | Warns that processor is halted. | hardware |
| ALARMS | MAJOR | red | Indicates a major alarm is active. | both |
|  | MINOR | red | Indicates a minor alarm is active. | both |
|  | WARNING | red | Indicates a warning alarm is active. | software |
| PROCESSOR/ MEMORY | PROC | red | A processor failure has been detected. | hardware |
|  | MEM | red | A memory failure has been detected. | hardware |
|  | DIAG PROC | red | Indicates that the diagnostic processor has failed. | hardware |
|  | CC PWR | red | Indicates that common control power has been interrupted. | hardware |
|  | PASS | green | This LED is used as a system "heartbeat". It also indicates that the processor passed the selected microdiagnostic test. | software |
|  | FAIL | red | Indicates that the processor failed the selected microdiagnostic test or CC suicide. | software |
| ENVIRON | PWR/TEMP <br> AIR FLOW | red | A power, temperature, or airflow failure has been detected. | software |
| COMMON <br> CONTROL | TAPE | red | Indicates that tape errors of some kind have been found. | software |
|  | CACHE MEMORY | red | Indicates that cache memory errors have been detected. | software |
|  | I/O CHANNEL | red | Indicates a failure in a CC I/O channel. | software |
| NETWORK | SWITCH | red | Indicates a failure in a digital network module. | software |
|  | PORT | red | Indicates a failure in a port circuit. | software |
|  | PERIPH EQPT | red | Indicates a network peripheral (e.g., terminal) problem. | software |

TABLE A. (Contd)

| alarm panel indicators (Contd) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| SECTION | indication | COIOR | DEFINITION | ORIGIN |
| APPL PROCR | AP INTER | red | Indicates a DCIU or applications processor (adjunct) link failure. | software |
|  | EXT PROC | red | Indicates an external processor problem. | hardware |
| OTHER | OTHER FAILS | red | Indicates some software detected problem not covered by the equipment failure LEDs listed above. | software |
|  | EXT EQPT | red | Indicates a failure outside the system proper which is not detectable by software. | hardware |
| EMERGENCY <br> TRANSFER | INHIB | yellow | Indicates that an automatic switch to the emergency transfer condition is inhibited. | hardware |
|  | ACT | red | Indicates emergency transfer has been activated. | both |
| CC ACTIVE | CCO | green | Indicates common control 0 is on-line. | software |
|  | $\mathrm{CC1}$ | green | Indicates common control 1 is on-line. | software |
| $\begin{aligned} & \text { LOCK ON } \\ & \text { LINE } \end{aligned}$ | CC0 | yellow | Indicates common control 0 has been locked online. | hardware |
|  | $\mathrm{CC1}$ | yellow | Indicates common control 1 has been locked online. | hardware |
| MAAP | SMT IN USE | red | Indicates System Management Terminal (SMT) is connected to the switch which locks out RMATS or MAAP operation. | hardware |
|  | $\begin{aligned} & \text { RMATS DIAG } \\ & \text { IN USE } \end{aligned}$ | red | Indicates Remote Maintenance, Administration and Traffic System (RMATS) is connected to the switch and is executing microdiagnostic test. | hardware |

## TABLE B.

| alarm panel controls |  |  |  |
| :---: | :---: | :---: | :---: |
| section | CONTROL/ CONNNECTOR | COMPONENT TYPE | REASON FOR USE |
| CONTROL | GO/HALT | switch | Normally in the GO position for system operation. Halts the common control processor when pressed to HALT position. |
|  | RESET | button | Allows the suicide timer in the common control to be reset. |
| PROCESSOR/ MEMORY | MICRO DIAGNOSTIC TES'T SELECT | thumbwheel switch | Allows a microdiagnostic test to be selected for execution. |
|  | ENABLE | switch | Causes the microdiagnostic test selected to be executed. |
| SYSTEM | EMERGENCY TRANSFER | switch | Allows the emergency transfer capability to be manually activated or inhibited. |
|  | $\begin{aligned} & \text { CC LOCK } \\ & \text { ON LINE } \end{aligned}$ | switch | Allows one or the other common control, in a duplicated system, to be locked on-line, which prevents a software switch between common controls. |
| MAAP | MAAP | connector | This is the connector between the MAAP and a common control processor. In a duplicated system there is one connector for each common control and one connector for whichever processor is currently on-line. |

## MICRODIAGNOSTICS

## Overview

Microdiagnostics is a series of test programs used by the processor for fault detection and isolation of the main processor and its associated components.
Microdiagnostics are performed because:
a. The switch is down (indicated by MJ, PROC, and FAIL indicators being lighted).
b. Emergency transfer is indicated on the alarm panel.
c. The generic or XRAY tape can not be loaded.
d. To ensure that the main processor and its associated circuitry is in proper working condition.
e. PROC 612 (initialization causes) indicates the cache is off for recovery (fault code 37) and it is desired to test the cache memory (microdiagnostic test 14).
f. A more complete test of the cache in an off-line common control of a duplicated common control switch is desired (microdiagnostic test 14).
g. PROC 600 (alarm causes/error $\log$ ) indicates diagnostic processor failures (unit type 60) and it is desired to test the diagnostic processor (microdiagnostic test 0 ).
h. Of unusual circumstances in which hardware or software causes for problems are equally likely.

Note: For these cases, successful pass of microdiagnostics indicates that hardware in the common control switch is less likely the cause of these types of problems.
i. When a tape is reloaded and the current memory is not desired.
j. After replacing an X-ray tape with a generic tape.

Caution: When a tape is reloaded or an X-ray tape is replaced with a generic tape, performing microdiagnostic test 15 does not clear MSTAT memory. False alarms may be service affecting and emergency transfer can occur. Perform all microdiagnostic tests ( 0 through 15) when reloading a tape or replacing an $X$ ray tape with a generic tape.

Sixteen microdiagnostic tests are provided. With the exception of Test 0 , each test uses circuits tested by the previous test. The 16 tests are run in numerical order starting with Test 0 and progressing to Test 15.

In testing a particular part of the main processor, each test uses parts outside the area under test. A test may fail and the fault lie outside the part of the main processor under test.
Microdiagnostic tests are described according to increasing interdependencies. Execution of the microdiagnostic tests should follow this same ordering scheme. Microdiagnostic tests invoked from the alarm panel are:
a. Test 0 - Diagnostic processor circuit pack demand test.
b. Test 1 - Maintenance bus demand test.
c. Test 2-Alarm interface circuit pack demand test.
d. Test 3-Spare (reserved for future use).
e. Test 4-Spare (reserved for future use).
f. Test 5 - Spare (reserved for future use).
g. Test 6 - Spare (reserved for future use).
h. Test 7-501CC processor circuit packs demand test.
i. Test 8 - System bus and buffered bus demand test.
j. Test 9-501CC instruction set demand test.
k. Test 10-Tape subsystem demand test.
l. Test 11 - Main memory system demand test.
m. Test 12-Memory protect circuit pack demand test.
n. Test 13-Spare (reserved for future use).
o. Test 14 - Cache memory circuit pack demand test.
p. Test 15 - An abbreviated test and a forced load.

Microdiagnosties is performed starting with Test 0 and progressing in numerical order to Test 15. If a failure is indicated corrective action is performed and the test is repeated. If the test passes after corrective action, all tests are repeated starting with Test 0 and progressing through Test 15.

## Functional Description

The functions tested by each microdiagnostic test are covered in the following paragraphs.
Test 0 checks the diagnostic processor circuit pack and parts of the remote interface. The diagnostic processor performs self-tests to verify the CRC checksum of the ROM, conducts a memory test of its RAM and data RAM, tests the status register and I/O registers, and performs a preliminary test of the maintenance bus control interface.
Test 1 checks the maintenance bus. The maintenance bus test begins by lighting the RED LEDs on all circuit packs in the common control for approximately 3 seconds. The test continues with an inventory of the circuit packs in the common control carrier, writes and reads back the complement of each circuit pack board-select number, tests for stuck-at faults and performs a test of the board select leads.

Test 2 checks the alarm interface circuit pack and the alarm panel. During this test the alarm panel LEDs may momentarily change. As part of the test the INIT* lead is set and cleared (causing and canceling the suicide condition). The software controlled alarm register and external alarm register are also tested.
Tests 3 through 6 are spare tests reserved for future use.
Note: When Tests 3 through 6 are selected and executed, an immediate PASS indication on the alarm panel is provided.

Test 7 checks the 501 CC processor circuit packs. The 501 CC processor test consists of four Signature Accumulator Chip (SAC) tests, one for each processor circuit pack.
Test 8 checks the ability of the 501 CC circuit packs to communicate. Major portions of UN153, TN404, and TN491 are tested. Faults are detected on 501 CC circuits that affect the ability to communicate over the system and buffered bus.

Test 9 cherks the 501 CC instruction set. The function of the 501 CC instruction set test is to exercise the emulation microcode, verify the correct operation of most of the instruction set, and verify the correct operation of the 501 CC at full speed.
Test 10 checks the tape subsystem. The test of the tape subsystem and tape interface (TN430) is performed by a call to the subsystem to perform its own self-tests.
a. Information concerning the success or failure of these self-tests is made available in a status register. The status register bits indicate which part of the tape subsystem is faulty.
b. The MAAP displays the value of the status register bits.

Test 11 checks the main memory sustem. The functions of main memory are tested by performing a main memory test, an Error Correction Circuitry (ECC) test, a memory fabric test, and parity tests.
a. Main Memory Test: The main memory test reads the ID chip on each memory circuit pack, translates the code into a memory circuit pack density and decides if ECC is to be tested.

1. RED and GREEN LEDs on the memory circuit packs light momentarily as part of the ID chip tests.
2. If the ID chip contains a code that is not in the testable range, the main memory test fails immediately.
3. If an empty memory slot between two occupied memory slots exists, the main memory test fails immediately.
4. The common control carrier must not contain memory circuit packs of different densities, as this also causes the main memory test to fail.

## b. Memory Fabric Test:

Note: The memory fabric test destroys all information in the memory configuration, including the MSTAT data.

1. The memory fabric test checks many functions on the equipped memory circuit packs in a series (i.e., one function is tested on all circuit packs before testing the next function).
2. During two of the memory fabric sub-tests the GREEN LED on the memory circuit pack currently being tested is lighted to indicate test progression.
c. ECC and Parity Tests:
3. The test of the error correcting circuitry involves testing the RAM used to store the six check bits.
4. The GREEN LED on the memory circuit pack currently being tested is lighted to indicate test progression.

Test 12 checks the memory protect circuit pack. The memory protect circuit pack (TN368) contains the system write-protect circuit, the system fetch-protect circuit, the system bus mastershiparbitration circuit, the I/O SANITY1 timer, and the power-on and clear flip-flops.
Test 13 is a spare test reserved for future use.
Note: When Test 13 is selected and executed, an immediate PASS indication on the alarm panel is provided.

Test 14 checks the cache memory circuit pack (TN369) and the bus interface circuit pack (UN153) to the cache memory.
Test 15 performs an abbreviated test and a forced load. When the abbreviated test and forced load sequence is selected, the system is cycled through a number of tests before the load is attempted. Test 15 does not clear MSTAT memory.
a. The diagnostic processor circuit pack requests the 501 CC to perform the SAC tests (microdiagnostic test 7). Each of the four SAC tests is executed and the results verified,
b. The system bus and buffered bus tests (microdiagnostic test 8) are performed interactively between the 501 CC and the diagnostic processor circuit pack.
c. The 501 CC instruction set test (microdiagnostic test 9 ) is performed.
d. If any of these tests fail, the load from tape is aborted and the diagnostic processor circuit pack forces suicide.
e. The forced load is now executed.

Note: The forced load procedure does not interrogate main memory before it makes a decision whether or not to load from tape. It assumes main memory has been corrupted and initiates a load from tape.

## CIRCUIT PACK LEDS

## Overview

Except for the DC/DC converter boards, each circuit pack in the digital network and common control carriers contain an ID chip.
a. The ID chip has provision for driving RED and GREEN LEDS on the circuit pack edge. When lighted the RED LED indicates that the circuit pack is defective (failed) and the GREEN LED indicates that the circuit pack is good (passed).
b. There may also be a GREEN pilot LED, and possibly one or more YELLLOW in-use LEDs on the circuit pack edge.

## LED Strategy

The RED and GREEN maintenance LEDs are useful in the demand verification mode, and in the periodic detection mode when the MAAP is connected to the switch.

Demand Verification Mode: The two kinds of demand verification are normal and automatic.
a. Normal Verification: Maintenance personnel are able to run a verification test on a given circuit pack by using appropriate maintenance procedures.

1. When the verification test is complete, the results are displayed on the MAAP and the RED or GREEN LED on the circuit pack tested is lighted depending on the outcome of the test; i.e., GREEN for pass, RED for fail.
2. The lighting of the circuit pack's LED provides additional feedback to maintenance personnel on the outcome of the verification test and aids in locating the faulty circuit pack.
b. Automatic Verification: When the diagnostic analysis and verification test is run from appropriate maintenance procedures, a faulty circuit location is displayed that points to the circuit pack to replace.
3. At the same time the RED LED on that circuit pack's edge is lighted.
4. While a circuit pack's RED LED is lighted in this mode, the circuit pack is scanned at a high rate to determine when it is unseated, and a circuit pack reseated or replaced.
5. After the circuit pack is reseated or replaced a verification sequence is run on the circuit pack, and the results are displayed. The appropriate LED on the circuit pack edge is lighted.

Periodic Mode: Feedback on the frequency and coverage of periodic tests in the digital network is valuable for isolating serious software problems in the field. Feedback is only provided when the MAAP is connected to the switch.
a. To provide this feedback, each periodic test associated with the digital network recognizes when the MAAP is connected and lights the GREEN LED on the edge of the main circuit pack under test. The LED is left on until the conclusion of the test.
b. This use of the GREEN LSED provides a maintenance heartbeat that indicates the frequency and coverage of periodic test routines in the network.

## Green Pilot LEDs:

a. Green pilot LEDs are used to denote that a circuit pack has power and is operational. The power supply boards, High Capacity Mini-recorder (HCMR), and 20 Hz ringing generators have GREEN pilot LEDs.
b. The tape interface circuit pack (TN430) has a GREEN LED which provides a heartbeat that indicates the state of the tape subsystem. A fast heartbeat ( 5 Hz ) indicates when TN430 is off the bus. A slow heartbeat ( 1 Hz ) indicates when TN430 is allowed on the bus.

Yellow In-Use LEDs: Yellow in-use LEDs are used to denote that a circuit pack is in an idle or an in-use state. The following circuit packs contain YELLOW in-use LED indicators:
a. TMS or module control channel (MCC) circuit pack (TN401): The MCC has two YELLOW LEDs; one flashes when the MCC is communicating with CCO, and the other flashes when the MCC is communicating with CCl .
b. Duplication channel circuit pack (TN530): The duplication channel circuit pack has one YELLOW LED to indicate if it is in the on-line side of the common control carrier.
c. Light guide interface circuit pack (TN481): The light guide interface circuit pack has one YELLOW LED to indicate if it is in the on-line side of the module control carrier.
d. Port circuit packs: Except for the tone plant and the touch tone dialing senders and receivers, each port circuit pack has one YELLOW LED that is the OR of activity in any of the ports on the circuit pack.

1. If any one of the ports on a port circuit pack are in-use, then the YELLOW LED is lighted. Removal of the circuit pack when the YELLOW LED is lighted disrupts service on the circuit(s) in-use.
2. The touch tone dialing sender and receiver circuit packs have one YELLOW LED per port (four per circuit pack).
System clock synchronizer (SCS) circuit pack (TN463)
The SCS circuit pack has eight LEDs which consist of:
a. A yellow LED in positions one and two which are dedicated to the primary and secondary synchronization reference sources respectively. If either of these LEDs are lighted, it indicates the associated reference is unusable (out of lock).
b. A yellow LED in positions 14, 15, and 16 that indicate when lighted, which reference is online.

LED position 14 is for the internal High Accuracy Clock (HAC); position 15 is for the primary synchronization reference; and position 16 is for the secondary synchronization reference.
c. A yellow LED in position 17 is used for duplicated module control (single module system) or duplicated TMS (multi-module system) carrier applications. When lighted, it indicates that the synchronization reference is receiving clock reference from the synchronization reference in the on-line duplicated carrier. This LED should always be lighted in the off-line carrier.
d. A red and green LED in positions 18 and 19 indicating when lighted the FAIL and PASS status of the circuit pack when a diagnostic test is performed.

## Remote Module Interface (RMI) Circuit Pack (TN456)

The RMI circuit pack has seven LEDs which consist of:
a. A yellow LED in position 7 indicating the on-line status when lighted.
b. A yellow LED in position 9 indicating the MAAP in-use status when lighted.
c. A red LED in position 11 indicating the LFAIL status when lighted.
d. A green LED in position 14 indicating the transmit (FTA) status when lighted.
e. A green LED in position 16 indicating the receive (FRA) status when lighted.
f. A red and green LED in positions 18 and 19 indicating when lighted the FAIL and PASS status of the circuit pack when a diagnostic test is performed.

## DS-1 Circuit Pack (ANN11)

The DS-1 circuit pack has five LEDs which consist of:
a. A green LED in position 7 indicating a red alarm if not lighted.
b. A green LED in position 8 indicating a yellow alarm if not lighted.
c. A yellow LED in position 9 indicating initialization or busy when lighted.
d. A red and green LED in positions 18 and 19 indicating when lighted the FAIL and PASS status of the circuit pack when a diagnostic test is performed.

## Physical Placement of LEDs

There are 19 LED positions on the edge of each circuit pack. The positions start from the top of the circuit pack (as it sits in a carrier), and extend most of the way down to the circuit pack's connector. The position at the top is number one, and at the bottom is number 19.

The standard configuration places the maintenance ID chip RED and GREEN LEDs in positions 18 and 19 , respectively. When there is a single YELLOW in-use LED it is placed in position nine. If there are several YELLOW LEDs they are placed from position one down to as many contiguous positions as are needed. GREEN pilot LEDs are placed in position one to prevent confusing the pilot LED with the GREEN maintenance LED.

## TOOLS AND TEST EQUIPMENT

Tools and test equipment required for maintenance of the System 85 switch consist of:
a. Alarm Panel.
b. MAAP.
c. Digital multimeter KS-20599, L4 or equivalent.
d. Looparound test fixtures.
e. Touch-tone telephone set.
f. Rotary dial telephone set.
g. W1AP test cords. (2)
h. 249A adapter.
i. Telephone set.
j. 1013 type hand set.
k. ANI Data Link Test Set (J59204AJ) and connector cable (List 4).

The alarm panel and MAAP are used with the switch as on-site maintenance tools.
a. The alarm panel provides LED indicators to denote the state of health of the system. The LEDs are used to identify the problem area(s) when a switch failure occurs. The alarm panel also provides controls for processor operation and emergency transfer.
b. The MAAP is the basic interface between maintenance personnel and the switch. It provides access to maintenance procedures which are used for interrogation, testing, and fault isolation.
c. The alarm panel and MAAP are covered in detail in other sections of this service manual.

A digital multimeter $\mathrm{KS}-20599$, LA or equivalent is required when performing PROC 601 (environmental tests) to measure voltages at test points to determine corrective action to be performed.
Looparound test fixtures are required when performing PROC 611 (common control tests) and PROC 650 (DCIU) to perform manual external looparound tests.

A touch-tone telephone set, rotary dial telephone set, W1AP test cords and 249A adapter are required when making terminal-to-terminal test calls and testing rotary digit collection. These tools are used in performing PROC 641 (terminal-to-terminal test call).

A telephone set with W1AP test cords and a 249A adapter or a 1013 hand test set and 249A adapter are required when making terminal-to-trunk test calls or listening to transmitted tones at the test line. These tools are used in performing PROC 642 (terminal-to-trunk test call), PROC 643 (terminal-to-tone test call), and PROC 644 (terminal-to-auxiliary tone test call).

The ANI Data Link Test Set (J59204AJ) and connector cable (List 4) are required when running Tests 2 through 4 of PROC 623 (ANI failures) to prevent test messages being sent to the central office. A diagram of the test configuration is shown in Figure 4.

## PREVENTIVE MAINTENANCE

Preventive maintenance tasks should be performed as part of the maintenance visit. Maintenance tasks are determined by the user of the switch.

As a minimum, the following maintenance tasks should be performed after maintenance activities are completed.
a. Check with the user of the switch to determine if any type of intermittent problems exist. Perform corrective action as appropriate.
b. Examine the switch error $\log$ of the on-line and off-line side (if duplicated) using PROC 600 Test 2 , to determine if potential problems exist. Take corrective action as necessary.
c. If backup batteries are provided, check replacement date(s) and replace batteries if required.
d. Replace Gates batteries comeode 403736291 in the J87462A power unit at least once every 2 years.
e. Clean high capacity minirecorder tape head.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on cleaning the high capacity minirecorder tape head.


Figure 4. ANI Data Link Test Set

## TROUBLE CLEARING

## GENERAL

## Overview

There are four ways of indicating a trouble within the switch. The indications may be investigated locally or by a remote maintenance facility. The trouble indications are:
a. Alarmed troubles.
b. User reported troubles.
c. No response from the switch.
d. Maintenance polling.

Trouble clearing is based on the type of indication received and is covered in the paragraphs entitled: Alarmed Troubles; User Reported Troubles; and No Response from the Switch.

All of the trouble indications may initially be investigated by user personnel or a remote maintenance facility (depending on the status of the switch).

It is recommended that you read the paragraph entitled: Recovery prior to performing trouble clearing on System 85.

## Items Affecting Trouble Clearing

1. The customer order document is required to identify the system assignments necessary to perform trouble clearing procedures.
2. Trouble clearing is directed to troubles within the System 85 switch. When troubles involve terminals or trunks, it is assumed that equipment and circuitry external to System 85 is functioning and the trouble is isolated to the System 85 switch.
3. The System 85 service manual is not intended to solve all levels of trouble. It is limited to troubles that can be solved by using the MAAP, common test equipment, and component replacements. When the limit of the trouble clearing analysis is reached and the trouble is still not cleared, the user is directed to a source of further trouble clearing information.
4. The equipment frame of the cabinet should always be touched before touching wiring, circuit packs or components to prevent electrostatic damage.

WARNING: All personnel who handle circuit packs, components, or wiring should be properly grounded. When using a ground wrist strap, the strap should not be worn over clothing but should touch the individual's skin.
5. The electromagnetic compatibility (EMC) wrist strap and cable assembly (cc900698226) is placed in the bottom of the module control cabinet in a poly bag (ce900492372) next to the AC distribution unit.

Note: This wrist strap is to be used when troubleshooting or performing maintenance or handling any circuit packs associated with the System 85 switch.
6. The EMC wrist strap assembly is used in the following manner:
a. Attach the wrist strap to either wrist.
b. Connect the alligator clip to the cabinet frame.
7. A good ground connection for the alligator clip is:
a. In equipment coded cabinets which have removable sides, attach the alligator clip to any convenient screw head that fasten the hinges to the cabinet or to the screws that fasten the door latch to the frame.
b. In equipment coded cabinets which have intergrated sides, the front and rear cabinet formed faces (front door area or back area when viewed in an oper position) which are coated with a conductive paint; the alligator clip may be attached to any of these surfaces.
c. In either case an area close to the vertical center of the cabinet should be selected for the alligator clip allowing a more central position from which to operate.
8. Option settings (as appropriate) on original and replacement circuit packs must be verified prior to replacement.
9. The service manual assumes that all replacement items and test equipment used are correct and functional, to simplify trouble clearing analysis.
10. When replacement of equipment does not clear the trouble, the original equipment should be installed.
11. The $A C$ circuit breakers on all cabinet power supplies should be checked prior to performing trouble clearing analysis.
12. The $\mathrm{DC} / \mathrm{DC}$ converter handle should not be toggled when replacing circuit packs in the TMS and/or module control carriers.

## Trouble Clearing Priority

When more than one category of trouble is either indicated or reported, the no response from switch trouble must be cleared first, followed by alarmed troubles, and then user reported troubles.

## Maintenance Polling

Prior to maintenance personnel leaving the user's premises the switch should be polled to determine if potential problems exist. This polling can be accomplished by examining Test 2 of PROC 600 to determine if any alarms or recorded errors exist for any circuit or unit type.

1. The data displayed for each unit type and circuit should be recorded and maintained for future use.
2. When the entry for a particular unit type and circuit is determined to be severe, the maintenance procedure for that unit type and circuit should be entered and the associated trouble analysis procedure performed.

When the switch is duplicated, both the on-line and off-line side should be examined.

## RECOVERY

## Overview

System 85 has built in recovery software to restore the switch integrity and availability after power failures and hardware failures.

When some of the longer recovery processes are being executed, maintenance personnel may be tempted to take such actions as operating the GO/HALT switch, forcing a reload by depressing the ENABLE switch, etc.

Note: If such actions are taken the recovery process may be prolonged. In addition, test equipment (i.e., TN514 scamper) can interfere with the recovery process.

The estimated time for recovery software to rebuild is approximately 15 seconds per module or a maximum of 5 minutes for a large switch.

Maintenance personnel should wait the appropriate amount of time when the switch is not providing service before taking additional (or premature) trouble clearing actions in the following areas:
a. Short power failures.
b. Long power failures.
c. Use of GO/HALT switch or RESET switch.

## Short Power Failures

When short power failures (less than 10 minutes) are experienced in systems without optional holdover, the common control continues to operate but the modules and TMS processors stop operating after power is removed for more than 100 ms .

In duplicated 501 CC switches, the common controls attempt a soft switch.
a. The soft switch takes about a minute in switches with 2 megawords of memory.
b. The modules initialize when power to modules are restored. .

Note: Maintenance personnel should observe the module processors (TN380) for a heartbeat indicating initialization.
c. Initialization of the modules takes less than 20 seconds for the switch.
d. A rebuild takes place following TMS/module processor initialization.

Note: Maintenance personnel should observe the yellow LED on the on-line module control channels (TN401) which indicates the rebuild is taking place.

## Long Power Failures

For long power failures, (longer than 312A holdover capacity - approximately 10 to 30 minutes), the switch recovers by loading from tape and initializing hardware.
The time for the tape load depends on the configuration of the switch and initialization takes approximately another minute or so. Maintenance personnel should wait approximately 5 minutes before taking any additional action.

The tape load should be monitored by plugging the MAAP into the appropriate connector and observing the LEDs on TN430 in the common control carrier.
a. The RED LED in position 2 of TN430 and the YELLOW LED at the middle of the circuit pack are lighted to indicate the beginning of the tape load.
b. Next, the GREEN LED in position 1 of TN430 starts flashing (indicating tape interface is being initialized).
c. Then the GREEN LED in position 1 goes either steady on or off while the tape is moved to a load position.
d. Next, data is read from tape and the MAAP is updated. (Encodes 1 through 4.)
e. When the tape load is completed and successful, the PASS indicator on the tape alarm panel flashes at a 1 -second on, 1 -second off rate.

Note: There may be a small delay before the heartbeat appears.
Initialization of the modules takes less than 20 seconds for the switch.
Note: Maintenance personnel should observe the module processors (TN380) for a heartbeat indicating initialization.

## GO/HALT Switch and RESET Switch

When the system is halted using the GO/HALT switch the recovery action takes approximately 20 seconds when the switch is returned to the GO position.
The same recovery action is taken when the system is removed from suicide or emergency transfer by depressing RESET and no serious hardware faults are experienced.

If serious hardware faults are experienced, recovery may take the rebuilding or reloading actions described above.
Before taking additional trouble clearing action, maintenance personnel should try to determine what the switch is doing by:
a. Observing MAAP indications.
b. Observing LEDS on the alarm panel, module control carriers (i.e., TN380 and TN401), and critical port circuits (i.e., touch-tone receivers).
c. Waiting the appropriate time for the automatic recovery actions to take place.

## ALARM TROUBLES

## Overview

Alarms can be visually observed by maintenance personnel on the customer's premises via the alarm panel or on the customer's attendant consoles. In addition, major and minor alarms are automatically reported to a remote maintenance facility (if provided).
The alarm panel contains alarm and fault indicators which are used for determining system status. Various alarms are displayed on the panel such as major, minor, and warning. Fault indicators are associated with major functional areas of the system.

## Retiring Alarms

Alarms are retired by investigating, isolating, and repairing the cause of the alarm condition. After making a repair the appropriate verification test is run using the maintenance procedure associated with testing the circuit to ensure that the problem is corrected.

1. When the circuit verification test is successfully run without a failure, the alarmed entry in PMIDS is automatically resolved and the associated fault indicator is turned off (if no other alarmed entries are affecting the same fault indicator).
2. When more than one alarm cause exists at a particular level, all alarm causes must be resolved before the fault indicator is automatically turned off.
3. When it is necessary to further isolate an alarm cause, PROC 600 (alarm causes/error log) may be used to manually turn off one or all fault indicators while retaining the failure history. The fault indicator is reactivated by any subsequent errors that cause an alarm threshold to be exceeded.

## Trouble Clearing of Alarmed Troubles

Alarms are generated by hardware and/or software detection.

1. Maintenance diagnostics, which are an integral part of the system software, monitor system parameters and turn on alarm indicators when unacceptable limits are exceeded.
2. Specific on- and off-line maintenance procedures which are designated near the fault indicators are used to isolate the cause of the fault indicator being lighted.
3. When multiple fault indicators are lighted on the alarm panel it is difficult for maintenance personnel to determine where to start. One lighted fault indicator may affect or be the cause of other fault indicators being lighted.
4. Therefore, the primary maintenance aid for investigating and isolating the cause of the lighted fault indicator is PROC 600, Test 1 which provides the sequence of maintenance procedures to be performed.
Test 1 of PROC 600 provides a display of alarms by order of severity and by priority (functional areas) within alarm levels.
5. All major alarms are displayed first, then minor alarms, and last is warning alarms. Each level of alarm is displayed by importance of functional area.
6. When two or more alarms of the same level are displayed, the functional area that is most important to the operation of the switch is displayed first. This alarmed entry is investigated first as its cause may affect the rest of the alarmed entries.
7. The maintenance procedure referenced in Field 15 of PROC 600 is used to diagnose and isolate the cause of the alarm trouble.
Maintenance procedures (in general) consist of at least three types of tests:
8. Failure history - this test displays the results of on-line routine maintenance testing which is active during normal call processing. It is the starting point for alarm indicator trouble analysis. The failing circuits are recorded and maintained for comparison of results in later tests.
9. Active diagnostic testing of all circuits - these tests which are under the control of maintenance personnel can check all circuits of the same type. A list of maintenance failures (if any) is recorded and maintained to determine the corrective action required to clear the alarm indicator. Corrective action to be taken is based upon failure codes, failure patterns, and/or failing circuits.
10. Continuous testing of individual circuits - the primary purpose of this test is to check for intermittent failures and to facilitate checking of wiring problems. Circuits recorded in the failure history, but not in active diagnostic testing, should be checked using this test.

Comparison of results - when corrective action is taken (replacement of circuit pack, etc.) as a result of active diagnostic testing, the active diagnostic test is repeated to determine if the failure is corrected and to turn off the alarm indicator.

1. When failures still exist a comparison must be made to determine if the same failure code, failure pattern, or failing circuit is the problem. This is required because all circuits of the same type may be tested.
2. The comparison can be accomplished by recording each failure and comparing the new list against the original list, or by using NEXT CIRCUIT (or another appropriate key) and comparing the failures displayed against those initially recorded.
3. Further corrective action is dependent upon the results of the comparison.

## Duplicated common control switches, TMS/network control complexes

When troubles exist in both common controls, the alarm indicator(s) lighted on the active (on-line) common control should be cleared first, unless the maintenance procedure referenced in Field 15 of PROC 600 Test 1 can be performed off-line.
PROCs 600 (Alarm causes/error log), 610 (Tape tests), 611 (Common control tests), 612 (Initialization causes), 615 (MAAP test), 616 (Alarm panel test), and 650 (DCIU tests) can be performed on-line and off-line.

When alarm troubles in a duplicated TMS/network complex are indicated, tests should be performed off-line by soft locking the TMS/network complex on-line to prevent unexpected switches (if possible); repair action taken; test on-line (after releasing the soft lock) to verify the trouble is cleared; then switch to best side of the TMS/network complex (if appropriate or required).
Prior to leaving the user's premises, maintenance personnel should investigate both common controls in a duplicated common control switch by using PROC 600 Test 2 to determine if potential problems exist. Corrective action as necessary should be performed when conditions are such that the problem could affect customer service.

## Release of Busied Out Circuits

When the BUSY OUT LED is lighted on the MAAP, the use of RLS BUSY OUT may release busied out circuits, trunk groups, or carriers if the capability is provided by the maintenance procedure entered.

1. If the capability is not provided by the maintenance procedure or the BUSY OUT LED remains on because some other type of circuit may be busied out, PROCs 630, 631, and 632 can be used as necessary to release busy out circuits, trunk groups, or carriers.
2. PROCs 630, 631, and 632 (as necessary) should be entered to determine the type and number of circuits, trunk groups, or carriers busied out.
3. If circuits, trunk groups, or carriers are maintenance busied, the reason for their status must be determined and corrective action taken (if required) before they are released from busy.
4. If the BUSY OUT indicator on the MAAP is still lighted after all terminals, trunk groups, or carriers are released from busy the cause is probably a soft lock of the TMS or network duplication channel or a DCIU link.
a. PROC 621 should be entered to determine the soft lock status of the TMS or network duplication channel.
b. PROC 650 Test 3 should be entered to determine the busy out status of DCIU links.

## USER REPORTED TROUBLES

## Overview

User reported troubles are normally generated as the result of troubles encountered and reported by the user. Reported troubles are normally those problems that concern a single instrument or a service. Some examples of user reported troubles are: loss of dial tone, disconnect, no ringing, or poor transmission.

The user reported trouble can also be caused by an inadvertent translation change, or be of an intermittent nature.
User trouble reports are divided into four separate types of failures: basic call failures (such as terminal or trunk), data module failures, failures of features provided by the switch, and attendant console.

Several methods are used to determine the cause of the user's reported trouble.

1. Determining if errors are recorded against the suspect circuit by using the alarm causes/error $\log$ maintenance procedure PROC 600, Test 2. The circuit may have errors recorded against it in Test 2 which do not exceed the threshold to raise an alarm.
2. Using the appropriate maintenance procedure for the suspect circuit and testing the circuit on a continuous basis to determine if the reported trouble is intermittent.
3. Performing a functional test of the user's reported trouble, e.g., call terminal extension (if possible).
4. Checking translation to determine if the suspect circuit is properly administered.
5. Using the following PROCs at the user's premises to determine the usability of the equipment:
PROC 641 - Terminal-to-terminal test call.
PROC 642 - Terminal-to-trunk test call.
PROC 643 - Terminal-to-tone test call.
PROC 644 - Terminal-to-auxiliary tone test call.
6. Performing self-tests (if available) for the suspect equipment. The self-test must be performed at the customer's premises.

## 72 and 74 Series Terminals

When troubles with terminals connected to the switch are reported by the user, perform the following steps as appropriate.

## No dial tone

Use PROC 622 Test 1 to check for errors recorded against the terminal and perform PROC 622 Test 3 to isolate the trouble.

## Cannot dial

Replace the terminal.

## Cannot receive calls

Use PROC 622 Test 1 to check for errors recorded against the terminal and perform PROC 622 Test 3 to isolate the trouble.

## Does not ring

Assuming that there are no other indications of an incoming call, perform the dial-up test for ringer.

1. If the ringer dial-up test does not pass, replace the 74 Series terminal or 72 Series terminal.
2. Repeat the ringer dial-up test. If the ringer dial-up test fails again, use PROC 620 Test 4 to check the associated port circuit. Replace the port circuit as necessary.

## Indicator does not light

Perform the dial-up test for indicator. In addition, (for MFAT or MFDT sets) perform a self test. If the indicator dial-up test or self test fails, replace the terminal.

## Buttons do not work

Perform the dial-up test for buttons. If the button dial-up test fails, replace the terminal. If the button dial-up test passes, check translation of the buttons assigned to the terminal.

## Cannot hear

Replace the handset or terminal.

## Cannot be heard

Replace the handset or terminal.

## Intermittent troubles

If intermittent troubles are suspected or reported by the user, perform the following steps:

1. Determine if errors are recorded against the suspect circuit by using PROC 600, Test 2. The circuit may have errors recorded against it in Test 2 which do not exceed the threshold to raise an alarm.
2. Use the appropriate maintenance procedure for the suspect circuit and test the circuit on a continuous basis.

Take corrective action as necessary.
3. Use the following PROCs to determine the usability of the equipment:

PROC 641 - Terminal-to-terminal test call.
PROC 642 - Terminal-to-trunk test call.
PROC 643 - Terminal-to-tone test call.

PROC 644 - Terminal-to-auxiliary tone test call.

## Data Modules

When troubles with data modules PDM, TDM, or DTDM are reported by the user, perform the following steps as appropriate.

## Cannot originate calls

Run a self test on the data module and 74 Series terminal (if DTDM).

1. If the self test fails, replace the data module or 74 Series terminal.
2. If the self test passes, use PROC 622 Test 1 to check for errors recorded against the data module or 74 Series terminal. Use PROC 622 Test 3 to isolate the trouble.

## Cannot receive calls

Run a self test on the data module and 74 Series terminal (if DTDM).

1. If the self test fails, replace the data module or 74 Series terminal.
2. If the self test passes, use PROC 622 Test 1 to check for errors recorded against the data module or 74 Series terminal. Use PROC 622 Test 3 to isolate the trouble.

## Data call is apparently set up, but no data can be sent or received

Run the following local tests (Steps 1 through 3) on the data module.

1. Self test - If this test fails, replace the data module.
2. Local loop back - If this test fails, there is a problem between the user's terminal equipment and the data module.
If data module is optioned for terminal dialing, try to set up a data call. If dialed characters are echoed, connection is good between data module and terminal.
3. Remote loop back or remote loop back and self test combined.

Note: If a remote loop back test using the user's terminal equipment can be performed, it is the preferred test.

Set up a connection to the remote data terminal and operate the remote loop back button.
Note: For DTL mode 0 and 1 operation, the remote loop back button must be operated before the call is set up.

Perform a remote loop back test or operate the self test button.
If the test fails, the trouble could be in either data module or in any of the circuits between the data modules.

## Intermittent troubles

If intermittent troubles are suspected or reported by the user, perform the following steps:

1. Determine if errors are recorded against the suspect data module by using PROC 600, Test 2. The data module may have errors recorded against it in Test 2 which do not exceed the threshold to raise an alarm.
2. Use the appropriate maintenance procedure for the suspect circuit and test the circuit on a continuous basis.

Take corrective action as necessary.

## PDM or TDM Self Tests

The PDM is a DCE-type device used to transmit and receive serial data over a 4 -wire DTL link in the System 85. It provides an interconnection (without a voice terminal) between the system and customer-provided data terminal equipment.

The TDM serves as a data terminal equipment (DTE) to interface the System 85 data capabilities to a private line data channel via a data set or a data service unit, using an RS-232C interface.
Self tests on PDM (refer to Figure 5) or TDM (refer to Figure 6) data modules are performed as follows.

Caution: Operating the SELF TEST switch without operating the REMOTE LOOP BACK switch during a call terminates the call.


Figure 5. Processor Data Module (PDM)

## Self Test

1. Place the SELF TEST switch in the SELF TEST position.

The internal circuits of the PDM or TDM are checked.
2. During the test, the TEST IN PROGRESS indicator stays on.
3. The TEST RSLT indicator is steadily ON if the internal circuits test passes.

The TEST RSLT indicator flashes if the internal circuits test fails.
4. If the PDM or TDM passes the internal circuits test; a known bit sequence is looped through the internal data path and checked for errors.

Any bit error causes the TEST RSLT indicator to flutter momentarily.
If no bit errors occur, the TEST RLST indicator is steadily ON.
5. At the end of the test, place the SELF TEST switch in the OFF position.

The TEST IN PROGRESS and TEST RSLT indicators are turned OFF.


Figure 6. Trunk Data Module (TDM)

## Local Loop Test

Caution: If a PDM or TDM is placed in a local loop back mode while a call is in progress, the call is terminated.

Note: A DTE is required for PDM testing which provides an internal loop back prior to DTL link interface. A data terminal and a data set or data service unit is required for TDM testing which provides an internal loop back prior to DTL link interface.

1. Place the LOC LOOP/REM LOOP switch in the LOC LOOP position.

The EIA interface is active in this mode and the data transmitted by the terminal is looped back to the terminal.
2. During the test, the TEST IN PROGRESS indicator is on.
3. Check the data transmitted against the data displayed on the DTE.

The test passes if no errors are found.
4. At the end of the test, place the LOC LOOP/REM LOOP switch in the OFF position.

The TEST IN PROGRESS indicator is turned OFF.

## Remote Loop Test

1. Place the LOC LOOP/REM LOOP switch in the REM LOOP position during a call.

Data transmitted by the local DTE is looped back from the remote module prior to its EIA interface.
2. During the test, the TEST IN PROGRESS indicators on both the local and remote modules are lighted and the remote module is disabled for data transmission and reception.
3. Check the data transmitted against the data displayed on the DTE

The test passes if no errors are found.
4. The remote module, if necessary, terminates the call by turning the CD interface lead (data terminal ready) OFF.
5. Data transmission can be restored by placing the LOC LOOP/REM LOOP switch in the OFF position.

Caution: The call is terminated if the switch is placed in the LOC LOOP position.

The TEST IN PROGRESS indicator is turned OFF.

## Remote Loop back/Self Test

1. Place the LOC LOOP/REM LOOP switch in the REM LOOP position after a call is set up to put the remote module into remote loop.
2. Place the SELF TEST switch in the SELF TEST position.
3. The module generates a known bit sequence and transmits it to the remote module where the data is looped back prior to the EIA interface of the remote module.

The local module, upon receiving the bit sequence, checks it with the transmitted bit sequence for error.
4. The TEST RSLT indicator flashes every time an error is detected and stays steadily ON if no error bit is detected.

## Caution: If the REM LOOP switch is placed in the OFF position before the SELF TEST switch is placed in the OFF position, any call is terminated.

5. After test completion, place the SELF TEST switch in the OFF position.
6. Place the REM LOOP switch in the OFF position.

## DTDM Self Tests

The DTDM (Figure 7), is a data communications equipment (DCE) type device used to transmit and receive serial customer data from an EIA RS-232C interface over a 4 -wire DTL link in the System 85.


Figure 7. Voice Terminal with a Digital Terminal Data Module (DTDM)
The DTDM provides an interconnection between the System 85 and customer-provided data terminal equipment (DTE). The DTDM serves as an adjunct module to a digital voice terminal.
The digital voice terminal provides the interconnect function to the DTL link interface. The digital voice terminal and the DTDM integrate both voice and data communications onto the same link allowing for simultaneous transmission.
Self tests on DTDM data modules (refer to Figure 8) are performed as follows.


Figure 8. Digital Terminal Data Module (DTDM) with Side Door Open

All incoming calls or call origination requests are not accepted while switches are in the test position. The DTDM TEST IN PROGRESS indicator remains on for the duration of each test.

## Caution: Established calls are disconnected when test switches are moved from their OFF position.

Note: Placing the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position does not disconnect an established call.

## Self Test

1. Place the SELF TEST switch in the SELF TEST position.

This test first checks the DTDM integrity.
2. If the test fails, the TEST RESULTS indicator flashes continuously.

If the test passes, the TEST RESULTS indicator comes on
3. After the DTDM integrity test passes, the self test continues.

A known bit sequence is looped through the internal data path and checks for errors:
4. Any errors detected cause the TEST RESULTS indicator to momentarily flutter.
5. If the data is looped back without any detected errors, the TEST RESULTS indicator comes on.
6. The indicator remains on until the SELF TEST switch is returned to the OFF position.

## Local Loop Test

1. Place the LOCAL LOOP/REMOTE LOOP switch in the LOCAL LOOP position. This test checks the data path prior to the DTL link interface.
2. Enter several D'TE keyboard characters.

The DTE display should show the same characters as entered.
3. When the test is complete, return the LOCAL LOOP/REMOTE LOOP switch to the OFF position.

## Remote Loop Test

1. Place a call to another data module.
2. Place the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position. This test checks the data path from the DTE to the EIA interface of the called module.
3. Enter several DTE keyboard characters.

The DTE display should show the same characters as entered.
4. When the test is complete, return the LOCAL LOOP/REMOTE LOOP switch to the OFF position.

## Remote Loop/Self Test

1. Place a call to a data module.
2. Place the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position.
3. Place the SELF TEST switch in the SELF TEST position.

A known bit sequence is looped through the data path from the DTDM to the EIA interface of the called module and checks for errors.
4. Any errors detected cause the TEST RESULTS indicator to momentarily flutter.

If the data is looped back without any detected errors the indicator comes on.
5. The indicator remains on until the SELF TEST switch is returned to the OFF position.

## Caution: The SELF TEST switch must be returned to the OFF position before the REMOTE LOOP switch is returned to the OFF position or the call is terminated.

## Features

When troubles with features provided by the switch are reported by the user, perform the following steps:

1. Determine if the feature trouble is isolated to a single terminal or experienced by all terminals.

If the feature trouble is isolated to a single terminal, proceed to Step 3.
If the feature trouble is experienced by all terminals, proceed to Step 2.
2. Check the customer order document to determine if the feature is a valid feature.

If the feature is not valid, check with customer assistance or notify the user.
If the feature is valid, check switch translation and administer as necessary.
3. Check switch translation for the terminal experiencing the trouble.

Administer the feature as necessary.
If the feature is administered, determine from the user if the trouble is intermittent.
4. If the trouble is not intermittent, replace the terminal.

If the trouble is intermittent, proceed to Step 5.
5. Determine if errors are recorded against the suspect circuit by using PROC 600, Test 2. The circuit may have errors recorded against it in Test 2 which do not exceed the threshold to raise an alarm.
6. Use the appropriate maintenance procedure for the suspect circuit and test the circuit on a continuous basis.

Take corrective action as necessary.

## Attendant Console

When a continuous audible tone at the attendant console is reported by the user (caused by a system power interruption or the attendant console headset is plugged in), perform the following:

Operate the test switch on the left side of the attendant console to remove the tone.
Note: The test switch is located on the front panel of the storage area containing the card for attendant use.

## NO RESPONSE FROM SWITCH

## Overview

Trouble clearing when there is no response from the switch depends on the symptoms of the total switch failure.

No dial tone, can't dial out, etc., reported by the customer or loss of communications between the switch and a remote maintenance facility (if provided) are types of total switch failure.

If no dial tone is reported and the common control appears to have the normal heartbeat, a condition of multiple simultaneous seizures that are not followed by dialing may be occurring.

PROC 420 allows maintenance personnel to display processor occupancy to further verify that the lack of dial tone is not the result of an overloaded processor.
If the system has alarmed DS-1 circuit packs, maintenance personnel should consider busying out the alarmed DS-1 circuit packs to eliminate a potential source of multiple seizures.
Contact with the user and examination of the alarm panel helps to determine how the switch is functioning and the type of trouble clearing procedure to perform.
If no LEDs on the alarm panel are lighted, a total switch failure has probably occurred. Perform the trouble clearing steps listed under System Down - No LEDs Lighted to restore the switch.
If the switch is in emergency transfer (EMERGENCY TRANSFER ACT indicator lighted), perform the trouble clearing steps listed under Emergency Transfer - Processor Suicide Suspected to restore the switch.
If a remote maintenance facility (if provided) cannot communicate with the switch, perform the trouble clearing steps listed under Communications with Remote Maintenance Facility Lost to restore communications.

## System Down - No LEDs Lighted

1. Verify ac power is on at customer provided ac panel.

If ac power is available, proceed to Step 2.
If ac power is not available, contact the customer.
2. Visually inspect all fuses, circuit breakers, and power cables.

If no problem is found with fuses, circuit breakers, and power cables, proceed to Step 3.
If a problem is found, replace the fuse(s), reset circuit breaker(s), or replace power cable(s).
3. Check $\mathrm{DC} / \mathrm{DC}$ converter and rectifier output voltages.

If all voltages are within acceptable limits, proceed to Step 4.
If abnormal voltages are noted, replace DC/DC converter circuit packs, DC/DC converter, or rectifier as appropriate.
4. Perform Microdiagnostic Testing.

## Emergency Transfer - Processor Suicide Suspected

1. Inspect the alarm panel.

If the EMERGENCY TRANSFER ACT indicator is on and the PASS indicator is flashing, ensure that the EMERGENCY TRANSFER switch is set to OFF and proceed to Step 6.
If the EMERGENCY TRANSFER ACT and MAJOR indicators are on, and the CC PWR indicator is off, proceed to Step 2.
If the EMERGENCY TRANSFER ACT, MAJOR, and CC PWR indicators are on, proceed to Step 4.
2. Inspect network cabinets for tripped circuit breakers and/or blown fuses.

If no problem is found with circuit breakers and fuses, proceed to Step 3.
If a problem is found, reset the circuit breakers and/or replace blown fuses.
3. At network cabinets, measure DC/DC converter circuit pack and rectifier output voltages.

If all voltages are within acceptable limits, proceed to Step 6.
If some voltages are out of acceptable limits, replace DC/DC converter circuit packs, rectifier or associated circuit packs, or wiring (as appropriate) to restore voltages to within acceptable limits. Proceed to Step 6.
4. Inspect common control cabinet for tripped circuit breakers and/or blown fuses.

If no problem is found with circuit breakers and fuses, proceed to Step 5.
If a problem is found, reset the circuit breakers and/or replace blown fuses.
5. At common control cabinet measure $\mathrm{DC} / \mathrm{DC}$ converter output voltages.

If all voltages are within acceptable limits, proceed to Step 6.
If some voltages are out of acceptable limits, replace DC/DC converter circuit packs, rectifier or associated circuit packs, or wiring (as appropriate) to restore voltages to within acceptable limits. Proceed to Step 6.
6. At alarm panel, depress RESET, and momentarily set HALT/GO switch to HALT, then to GO.
If the PASS indicator is flashing, and the CC PWR, MAJOR and ACT indicators are off, the processor suicide trouble is corrected. Perform PROC 600 Test 1 and 2 to determine the health of the switch.

If the PASS indicator is not flashing, proceed to Step 7.
7. Perform Microdiagnostic Testing.

## Communications with Remote Maintenance Facility Lost

1. At common control carrier, verify that circuit breaker CB2 is not tripped.

If circuit breaker CB2 is not tripped, proceed to Step 3.
If circuit breaker CB2 is tripped, reset the circuit breaker and proceed to Step 2.
2. Determine if contact with the remote maintenance facility is established.

If contact is established, corrective action is complete.
If contact is not established, proceed to Step 3.
3. At data set associated with the remote maintenance facility, verify that power is provided and appropriate LEDs are lighted.

If power to the data set is provided and appropriate LEDs are lighted, proceed to Step 5.
If power to the data set is not available or appropriate LEDs are not lighted, correct the problem and proceed to Step 4.
4. Determine if contact with the remote maintenance facility is established.

If contact is established, corrective action is complete.
If contact is not established, proceed to Step 5.
5. At cross connect field, visually inspect wiring for the remote maintenance facility.

If wiring is correct, proceed to Step 7.
If wiring is not correct, correct wiring and proceed to Step 6 .
6. Determine if contact with the remote maintenance facility is established.

If contact is established, corrective action is complete.
If contact is not established, proceed to Step 7.
7. Replace TN492 and proceed to Step 8.
8. Determine if contact with the remote maintenance facility is established.

If contact is established, corrective action is complete.
If contact is not established, proceed to Step 9.
9. Replace the data set associated with the remote maintenance facility and proceed to Step 10.
10. Determine if contact with the remote maintenance facility is established.

If contact is established, corrective action is complete.
If contact is not established, check the wiring between the circuit breaker, cross connect field, TN492, and data set.

## Microdiagnostics - General

Microdiagnostic test execution requires that the common control carrier is operable and can perform the tests.
a. Tests 0 through 6 require power from $\mathrm{DC} / \mathrm{DC}$ converters in the common control power carrier (slots 1 and 2 for CC0 and slots 4 and 5 for CC1).
b. Tests 7 through 15 require power from all three $\mathrm{DC} / \mathrm{DC}$ converters for each common control (slots 0,1 , and 2 for CC0 and slots 3, 4, and 5 for CC1).
c. The HALT/GO switch associated with the common control being tested must be set to the GO position.

Microdiagnostics is performed starting with Test 0 and progressing in numerical order to Test 15. If a failure is indicated corrective action is performed and the test is repeated. If the test passes after corrective action, all tests are repeated starting with Test 0 and progressing through Test 15.

Microdiagnostic Tests 3 through 6 and 13 are spare tests which are reserved for future use. Each spare test is executed in microdiagnostic test sequence.

Test 7 requires coordination between vintages of UN151, UN152, UN153, TN370, and TN491 circuit packs.
a. Before replacing a circuit pack, check the vintage of the circuit packs.
b. The maintenance control location should be contacted if the corresponding vintages are not known.

Test 10 tests the tape subsystem. For this test, a tape is placed in the transport and the MAAP is connected for consultation on failures.

Test 15 provides an abbreviated subset of tests (7,8, and 9) and a memory load of the data on the tape. For this test, a tape is placed in the transport and the MAAP is connected to determine the progress of the memory load.
Test execution is accomplished by:
a. Selecting the test to be executed.
b. Momentarily depressing the RESET switch.
c. Momentarily depressing the ENABLE switch.

Test execution starts by clearing most of the alarm panel LEDs and lighting the LEDs related to the test.
a. The PASS and FAIL LEDs are cleared until the test result is determined.
b. If a test passes, the PASS LED on the alarm panel is lighted.
c. If a test fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is most likely the cause of the fault.

Other circuit packs that could be causing the test to fail are listed in Table C, Microdiagnostics Circuit Pack Replacement Sequence, in the order of their likelihood as causes of the problem.
a. CKT 1 in Table $C$ is the failing circuit with the RED LED lighted.
b. The second most likely circuit pack is indicated as CKT 2 in Table C.
c. In some cases one of the circuit packs listed in Table $C$ may be the same as the circuit pack with the RED LED lighted.
d. When a circuit pack is listed in Table $C$ as a replacement which has already been replaced, the sequence in Table C to be followed is the lowest circuit pack not replaced.

Requirement: If circuit pack 4 (CKT 4) has been replaced, replace CKT 3, then CKT 5, etc.

If a test fails and the circuit pack replacements listed in Table $C$ do not correct the problem, the following is performed:
a. Table D, Circuit Packs Required to Perform Microdiagnostic Tests, is checked to determine which circuit packs are required to perform the failing test.
b. Circuit packs not required to perform the test are unseated and the test repeated.
c. If the test passes, the circuit packs are reseated one-at-a-time, repeating the failing test until the failing circuit pack(s) are located.

Microdiagnostic tests 0 through 10,13 , and 14 can be executed and call processing can be restarted from INITA by rocking the HALT/GO switch after the test is performed. A reload of the switch is not performed by rocking the HALT/GO switch if Test 15 is not performed. This method of testing is not the preferred method of microdiagnostic testing but is helpful to isolate unique problems without taking the switch down.

Caution: Transient calls (calls not fully established) are lost when this method of testing is performed. Do not use this method of testing when performing microdiagnostic tests 11, 12, and 15 as memory is destroyed or a forced reload is performed taking the switch down.

TABLE C.

| MICRODIAGNOSTICS CIRCUIT PACK REPLACEMENT SEQUENCE |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| test | CKT 1 | CKT 2 | CKT 3 | CKT 4 | CKT 5 | CKI 6 | CKT 7 | CKT 8 |
| 0 | [1] | TN491 <br> Slot 31 | TN492 <br> Slot 32 | TN490 <br> Slot 22 |  |  |  |  |
| 1 | $\begin{aligned} & {[1]} \\ & {[2]} \end{aligned}$ | TN491 <br> Slot 31 | TN492 <br> Slot 32 | TN490 <br> Slot 22 |  |  |  |  |
| 2 | [1] | TN490 <br> Slot 22 | TN491 <br> Slot 31 | TN492 <br> Slot 32 |  |  |  |  |
| 3 | [1] | TN491 <br> Slot 31 | TN492 <br> Slot 32 | $\begin{aligned} & \text { TN490 } \\ & \text { Slot } 22 \end{aligned}$ |  |  |  |  |
| 4 | [1] | TN491 <br> Slot $31^{*}$ | TN492 <br> Slot 32 | TN490 <br> Slot 22 | . |  |  |  |
| 5 | [1] | TN491 <br> Slot 31 | TN492 <br> Slot 32 | TN490 <br> Slot 22 |  |  |  |  |
| 6 | [1] | TN491 <br> Slot 31 | TN492 <br> Slot 32 | $\begin{aligned} & \text { TN490 } \\ & \text { Slot } 22 \end{aligned}$ |  |  |  |  |
| 7 | [1] | UN152 <br> Slot 02 | TN491 <br> Slot 31 | TN370 <br> Slot 00 |  |  |  |  |
| 8 | [1] | TN404 <br> Slot 21 | UN153 <br> Slot 03 | TN491 <br> Slot 31 | TN368 <br> Slot 06 |  |  |  |

TABLE C. (Contd)

| MICRODIAGNOSTICS CIRCUIT PACK REPLACEMENT SEQUENCE (Contd) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| test | CKT 1 | CKT 2 | ckt 3 | Скт 4 | CKI 5 | ckr 6 | CKI 7 | скт 8 |
| 9 | [1] | $\begin{aligned} & \text { UN152 } \\ & \text { Slot } 02 \end{aligned}$ | UN153 <br> Slot 03 | $\begin{aligned} & \text { TN370 } \\ & \text { Slot } 00 \end{aligned}$ | UN151 <br> Slot 01 | TN392 Slot 07 | TN404 Slot 21 | TN368 Slot 06 |
| 10 | [1] | TN430 <br> Slot 20 | UN153 <br> Slot 03 | TN392 <br> Slot 07 | TN368 <br> Slot 06 |  |  |  |
| 11 | [1] | TN368 Slot 06 | TN404 <br> Slot 21 | $\begin{aligned} & \text { UN153 } \\ & \text { Slot } 03 \end{aligned}$ | $\begin{gathered} \text { TN370 } \\ \text { Slot } 00 \end{gathered}$ |  |  |  |
| 12 | [1] | TN368 Slot 06 | TN404 <br> Slot 21 | UN153 <br> Slot 03 | TN370 <br> Slot 00 | . |  |  |
| 13 | [1] | TN370 <br> Slot 00 | TN491 <br> Slot 31 | $\begin{aligned} & \text { TN492 } \\ & \text { Slot } 32 \end{aligned}$ |  |  |  |  |
| 14 | [1] | TN369 <br> Slot 04 <br> [3] | UN152 <br> Slot 02 | TN490 <br> Slot 22 | UN153 <br> Slot 03 | $\begin{gathered} \text { TN370 } \\ \text { Slot } 00 \end{gathered}$ |  |  |

$[1]=$ Circuit pack with RED LED lighted.
[2] = For Test 1, replace all circuit packs with RED LED lighted and all circuit packs with no LEDs lighted.
[3] = Replace TN369 (Slot 04) if installed.

## Microdiagnostic Testing

## Test 0-Diagnostic processor circuit pack demand test

To execute microdiagnostic Test 0;

1. Set TEST SELECT switch to 0 .
2. Depress RESET, ENABLE.

Note: While Test 0 is executing, the MAJOR and DIAG PROC indicators are lighted.
3. If Test 0 fails to affect alarm panel LEDS, power and cabling should be checked.

Note: Test 0 requires power from DC/DC converters in the common control power carrier (slots 1 and 2 for CC0 and slots 4 and 5 for CC1).
4. If the PASS indicator turns on, Test 0 executed successfully.

Note: The DIAG PROC indicator is also lighted when Test 0 passes.
Continue with microdiagnostic Tests 1 through 15.
5. If Test 0 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, continue with microdiagnostic Tests 1 through 15.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 0.
7. Depress RESET, ENABLE.

If the PASS indicator turns on, continue with microdiagnostic Tests 1 through 15.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test. 0.
8. Repeat Step 7 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 0 are replaced.
9. If Test 0 continues to fail and all circuit pack replacements listed in Table $C$ for Test 0 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 1 - Maintenance bus demand test

To execute microdiagnostic Test 1 :

1. Set TEST SELECT switch to 1.
2. Depress RESET, ENABLE.

Note: While Test 1 is executing, the MAJOR indicator is lighted.
3. In Test 1 the RED and GREEN LEDs (positions 18 and 19 respectively) are lighted on all common control carrier circuit packs.

Note: After the ENABLE switch is depressed, the RED LED is lighted for approximately 3 seconds and the GREEN LED is on until another test is selected.
4. If any circuit packs fail to light or remain with a RED LED lighted in position 18 , the circuit pack(s) should be replaced.

Note: If a circuit pack was replaced in Step 4, repeat all microdiagnostic tests starting with Test 0.
5. If the PASS indicator turns on, Test 1 executed successfully.

Continue with microdiagnostic Tests 2 through 15.
6. If Test 1 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.

Replace the circuit pack with the RED LED lighted.
7. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 1.
8. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 1.
9. Repeat Step 8 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test. 1 are replaced.
10. If Test 1 continues to fail and all circuit pack replacements listed in Table $C$ for Test 1 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 2 - Alarm interface circuit pack demand test

To execute microdiagnostic Test 2 :

1. Set TEST SELECT switch to 2.
2. Depress RESET, ENABLE.

Note: While Test 2 is executing, the MAJOR and PROC indicators are lighted.
3. If the PASS indicator turns on, Test 2 executed successfully.

Note: The PROC indicator is also lighted when Test 2 passes.
Continue with microdiagnostic Tests 3 through 15.
4. If Test 2 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
5. Depress RESETT, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 2.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 2.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 2 are replaced.
8. If Test 2 continues to fail and all circuit pack replacements listed in Table C for Test 2 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 3-Spare (reserved for future use)

Note: Test 3 is reserved for future use but should be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 3:

1. Set TEST SELECT switch to 3.
2. Depress RESET, ENABLE.
3. The PASS indicator is always turned on indicating Test 3 executed successfully.

Continue with microdiagnostic Tests 4 through 15.

## Test 4-Spare (reserved for future use)

Note: Test 4 is reserved for future use but should be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 4:

1. Set TEST SELECT switch to 4.
2. Depress RESET, ENABLE.
3. The PASS indicator is always turned on indicating Test 4 executed successfully.

Continue with microdiagnostic Tests 5 through 15.

## Test 5-Spare (reserved for future use)

Note: Test 5 is reserved for future use but should be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 5:

1. Set TEST SELECT switch to 5 .
2. Depress RESET, ENABLE.
3. The PASS indicator is always turned on indicating Test 5 executed successfully.

Continue with microdiagnostic Tests 6 through 15 .

## Test 6 - Spare (reserved for future use)

Note: Test 6 is reserved for future use but should be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 6:

1. Set TEST SELECT switch to 6 .
2. Depress RESET, ENABLE.
3. The PASS indicator is always turned on indicating Test 6 executed successfully.

Continue with microdiagnostic Tests 7 through 15.

## Test 7-501CC processor circuit packs demand test

To execute microdiagnostic Test 7:

1. Set TEST SELECT switch to 7.
2. Depress RESET, ENABLE.

Note: While Test 7 is executing, the MAJOR and PROC indicators are lighted.
3. If the PASS indicator turns on, Test 7 executed successfully.

Note: The PROC indicator is also lighted when Test 7 passes.
Continue with microdiagnostic Tests 8 through 15.
4. If Test 7 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
Note: Check that the circuit pack being replaced is the correct vintage and type.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table C, Microdiagnostics Circuit Pack Replacement Sequence, for Test 7.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table C, Microdiagnostics Circuit Pack Replacement Sequence, for Test 7.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 7 are replaced.
8. If Test 7 continues to fail and all circuit pack replacements listed in Table $C$ for Test 7 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 8 - System bus and buffered bus demand test

To execute microdiagnostic Test 8:

1. Set TEST SELECT switch to 8 .
2. Depress RESET, ENABLE.

Note: While Test 8 is executing, the MAJOR and I/O CHANNEL indicators are lighted.
3. If the PASS indicator turns on, Test 8 executed successfully.

Note: The I/O CHANNEL indicator is also lighted when Test 8 passes.
Continue with microdiagnostic Tests 9 through 15.
4. If Test 8 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.

Replace the circuit pack with the RED LED lighted.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table C, Microdiagnostics Circuit Pack Replacement Sequence, for Test 8.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table C, Microdiagnostics Circuit Pack Replacement Sequence, for Test 8.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 8 are replaced.
8. If Test 8 continues to fail and all circuit pack replacements listed in Table C for Test 8 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 9-501CC instruction set demand test

To execute microdiagnostic Test 9:

1. Set TEST SELECT switch to 9 .
2. Depress RESET, ENABLE.

Note: While Test 9 is executing, the MAJOR and PROC indicators are lighted.
3. If the PASS indicator turns on, Test 9 executed successfully.

Note: The PROC indicator is also lighted when Test 9 passes.
Continue with microdiagnostic Tests 10 through 15.
4. If Test 9 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 9.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 9.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 9 are replaced.
8. If Test 9 continues to fail and all circuit pack replacements listed in Table C for Test 9 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 10 - Tape subsystem demand test

To execute microdiagnostic Test 10 :

1. Ensure that a tape is in the High Capacity Mini-Recorder (HCMR) and is firmly seated.
2. Plug the MAAP into the MAAP connector for an unduplicated common control switch or connector CCO or CCl for the common control being tested in a duplicated common control switch.
3. Set TEST SELECT switch to 10 .
4. Depress RESET, ENABLE.

Note: While Test 10 is executing, the MAJOR and TAPE indicators are lighted.
5. Test 10 takes approximately 50 to 75 seconds to complete. The LEDs on TN430 can be used to monitor progress of Test 10.
Initially the RED LED in position 2 on TN430 is lighted.
Next, the GREEN LED in position 1 on TN430 is lighted providing a heartbeat while the tape is read.
6. If the PASS indicator turns on, Test 10 executed successfully.

Note: The TAPE indicator is also lighted when Test 10 passes.
Continue with microdiagnostic Tests 11 through 15.
7. If Test 10 fails, the FAIL LED on the alarm panel is lighted.
8. The left side of the MAAP displays 8 digits which are designated 1 through 8 reading from left to right.
9. If there is no display (blanked) on the MAAP, replace TN403 in Slot 23 and proceed to Step 22.
10. If all 8 digits display 00000000 , perform the following:

Verify the tape is in the transport.
Inspect power and cabling to the HCMR.
Proceed to Step 22.
Caution: If multiple failures are indicated on the MAAP display, a 1 in more than 1 field, perform the following steps in the order listed. Do not replace the HCMR until all circuit packs within the HCMR are replaced when multiple failures are displayed.
11. If digit 1 or digit 8 display a 1 , replace TN430 in Slot 20 and proceed to Step 22.

Caution: Prior to replacing circuit packs in the HCMR, the power to the circuit packs must be removed or damage to the tape pin connectors or components on the circuit pack being replaced (or other circuit packs) can occur. Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of HCMR circuit packs.
12. If digit 6 displays a 1 , replace SN 446 (power supply) in the HCMR and proceed to Step 20.
13. If digit 2 displays a 1 , replace $\operatorname{SN441}$ (controller) in the HCMR and proceed to Step 20.
14. If digit 5 displays a 1 , replace SN 442 (data electronics) in the HCMR and proceed to Step 20.
15. If digit 4 displays a 1 , replace SN 443 (tape transport and preamp) in the HCMR and proceed to Step 20.
16. If digit 3 displays a 1 , replace SN 445 (servo) in the HCMR and proceed to Step 20.
17. If digit 7 displays a 1 , perform the following:

Reinsert tape.
Depress RESET, ENABLE and proceed to Step 18.
18. If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .

If the FAIL indicator turns on, replace the tape.
Depress RESET, ENABLE and proceed to Step 19.
19. If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .

If the FAIL indicator turns on, replace SN443 (tape transport and preamp) in the HCMR and proceed to Step 20.
20. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the HCMR and proceed to Step 21.
21. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, check the wiring between the HCMR and the common control , carrier.
22. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 10 and proceed to Step 23.'
23. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 10 and proceed to Step 24.
24. Repeat Step 23 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 10 are replaced.
25. If Test 10 continues to fail and all circuit pack replacements listed in Table $\mathbf{C}$ for Test 10 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 11 - Main memory system demand test

Note: TN392 (1 megaword) in slots 08 through 14 are tested if installed.
To execute microdiagnostic Test 11:

1. Set TEST SELECT switch to 11 .
2. Depress RESET, ENABLE.

Note: While Test 11 is executing, the MAJOR and MEM indicators are lighted.
3. If the PASS indicator turns on, Test 11 executed successfully.

Note: The MEM indicator is also lighted when Test 11 passes.
Continue with microdiagnostic Tests 12 through 15.
4. If Test 11 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 11.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 11.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 11 are replaced.
8. If Test 11 continues to fail and all circuit pack replacements listed in Table $C$ for Test 11 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 12 - Memory protect circuit pack demand test

Note: TN 392 (1 megaword) in slots 08 through 14 are tested if installed.

To execute microdiagnostic Test 12 :
Note: If installed, remove TN514 (scamper) prior to performing Test 12.

1. Set TEST SELECT switch to 12.
2. Depress RESET, ENABLE.

Note: While Test 12 is executing, the MAJOR and MEM indicators are lighted.
3. If the PASS indicator turns on, Test 12 executed successfully.

Note: The MEM indicator is also lighted when Test 12 passes.
Continue with microdiagnostic Tests 13 through 15.
4. If Test 12 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.

Replace the circuit pack with the RED LED lighted.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table C , Microdiagnostics Circuit Pack Replacement Sequence, for Test 12.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 12.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 12 are replaced.
8. If Test 12 continues to fail and all circuit pack replacements listed in Table C for Test 12 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 13-Spare (reserved for future use)

Note: Test 13 is reserved for future use but should be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 13:

1. Set TEST SELECT switch to 13.
2. Depress RESET, ENABLE.
3. The PASS indicator is always turned on indicating Test 13 executed successfully.

Continue with microdiagnostic Tests 14 and 15.

## Test 14 - Cache memory circuit pack demand test

Note: TN369 (cache memory) in slot 04 is tested if installed.
To execute microdiagnostic Test 14:

1. Set TEST SELECT switch to 14.
2. Depress RESET, ENABLE.

Note: While Test 14 is executing, the MAJOR and CACHE MEMORY indicators are lighted.
3. If the PASS indicator turns on, Test 14 executed successfully.

Note: The CACHE MEMORY indicator is also lighted when Test 14 passes.
Continue with microdiagnostic Test 15.
4. If Test 14 fails, the FAIL LED on the alarm panel is lighted and a RED LED is lighted on position 18 of the circuit pack that is failing.
Replace the circuit pack with the RED LED lighted.
5. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0.
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 14.
6. Depress RESET, ENABLE.

If the PASS indicator turns on, repeat all microdiagnostic tests starting with Test 0 .
If the FAIL indicator turns on, replace the next circuit pack listed in Table $C$, Microdiagnostics Circuit Pack Replacement Sequence, for Test 14.
7. Repeat Step 6 until the PASS indicator turns on, or until all circuit packs listed in Table C for Test 14 are replaced.
8. If Test 14 continues to fail and all circuit pack replacements listed in Table C for Test 14 do not correct the problem, perform additional corrective action as listed under Repair Guide for Microdiagnostic Testing (after Test 15).

## Test 15 - Abbreviated test and forced load

Caution: If microdiagnostic test 15 is executed without performing microdiagnostic tests 0 through 14 during a reload of tape, false alarms and emergency transfer can occur which may be service affecting. MSTAT memory is not cleared by test 15.

To execute microdiagnostic Test 15:

1. Ensure that a tape is in the High Capacity Mini-Recorder (HCMR) and is firmly seated.
2. Plug the MAAP into the MAAP connector for an unduplicated common control switch or connector CC0 or CC1 for the common control being tested in a duplicated common control switch.
3. Set TEST SELECT switch to 15 .
4. Depress RESET, ENABLE.

Note: While Test 15 is executing, the MAJOR, PROC and TAPE indicators are lighted.
5. Test 15 provides an abbreviated subset of tests ( 7 through 9 ).

If tests 7 through 9 pass, memory is loaded with the data on the tape.
6. The first signs of a passing sequence is the LEDs on TN430.

The RED LED in position 2 and the YELLOW LED at the middle of the circuit pack are lighted.
Next, the GREEN LED in position 1 of the circuit pack starts flashing (indicating tape interface is being initialized).
Then the GREEN LED in position 1 goes either steady on or off while the tape is moved to a load position.
7. Next, data is read from tape and the MAAP is updated.
8. The area currently being read from tape is indicated in the procedure number field of the MAAP as follows:

Encode $0=$ Directory information is being read from tape.
Encode 1 = Program information is being read from tape and is being written to memory.
Encode $2=$ Translation information is being read from tape and is being written to memory.
Encode $3=$ Patch information is being read from tape and is being written to memory.
Encode $4=$ The reading of information from tape is complete and hardware is being tested and initialized.
Encode 5 = Hardware tests failed.
Encode $6=$ Tape subsystem was successfully initialized but load attempt failed because an uncorrectable error was encountered (e.g., bad tape, no tape, bad cable to HCMR, etc.).
Encode $7=$ Failed tape subsystem initialization (either HCMR, TN430, or both), of if encode 7 is seen only momentarily followed by an encode 9 then incomplete load.

Encode $8=$ Not enough memory or memory bad.
Encode $9=$ Too many reloads attempted or interrupts during load process after load counter incremented.
9. When the tape load is completed and successful, the PASS indicator on the alarm panel flashes at a 1 -second on, 1 -second off rate.
In addition, the GREEN LED in position 2 of TN430 is flashing (indicating a heartbeat).
Note: There is a slight delay prior to the heartbeat appearing.
10. If the tape load is not successful, failure indicators MAJOR, PROC and TAPE are lighted. The PASS indicator does not flash.
11. If the PASS indicator does not flash or if any of the failure cases (Encodes 5 through 9) are displayed in the procedure number field of the MAAP, microdiagnostic tests 0 through 14 must be executed in order to find the cause of the failure.

## Repair Guide For Microdiagnostic Testing

1. Determine from Table D, Circuit Packs Required to Perform Microdiagnostic Tests, which circuit packs are required to perform the microdiagnostic test being executed.
2. Unseat all circuit packs in the common control carrier that are not required to perform the microdiagnostic test being executed.
3. Depress RESET, ENABLE.

If the FAIL indicator turns on, reseat all circuit packs and proceed to Step 11.
If the PASS indicator turns on, reseat one circuit pack.
4. Depress RESET, ENABLE.

If the FAIL indicator turns on, proceed to Step 5.
If the PASS indicator turns on, proceed to Step 8.
5. Replace the reseated circuit pack, and depress RESET, ENABLE.

If the FAIL indicator turns on, proceed to Step 6.
If the PASS indicator turns on, proceed to Step 8.
6. Replace the circuit pack in the same slot.

Requirement: Do not replace more than 2 circuit packs in the same slot.
Proceed to Step 7.
7. Depress RESET, ENABLE.

If the FAIL indicator turns on, reseat any unseated circuit packs and proceed to Step 11.
If the PASS indicator turns on, proceed to Step 8.
8. Determine if other circuit packs are to be reseated.

If all circuit packs are reseated, proceed to Step 10.
If any circuit packs are unseated, reseat the next circuit pack and proceed to Step 9.
9. Depress RESET, ENABLE.

If the FAIL indicator turns on, go to step 5.
If the PASS indicator turns on, repeat Step 8.
10. Determine if any circuit pack(s) were replaced in Steps 4 through 9.

If no circuit packs were replaced, proceed to Step 11 and suspect an intermittent trouble.
If a circuit pack was replaced, repeat all microdiagnostic tests starting with Test 0 .
11. If the circuit pack replacements or the power and cabling checks do not reveal the source of the problem, check the backplane wiring.

TABLE D.

| CIRCUIT PACKS REQUIRED TO PERFORM MICRODIAGNOSTIC TESTS |  |
| :---: | :---: |
| TEST | CIRCUIT PACKS Required for test to execute |
| 0 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 1 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 2 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 3 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 4 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 5 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 6 | TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 7 | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 8 | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 9 | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN392 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 10 | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN392 (Slot 07), TN430 (Slot 20), TN404 (Slot 21), TN490 (Slot 22), TN403 (Slot 23), TN491, (Slot 31), and TN492 (Slot-32). |
| $\begin{gathered} 11 \\ {[1]} \end{gathered}$ | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN392 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| $\begin{gathered} 12 \\ {[1]} \end{gathered}$ | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN392 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| 13 | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |
| $\begin{gathered} 14 \\ {[2]} \end{gathered}$ | TN370 (Slot 00), UN151 (Slot 01), UN152 (Slot 02), UN153 (Slot 03), TN368 (Slot 06), TN404 (Slot 21), TN490 (Slot 22), TN491 (Slot 31), and TN492 (Slot 32). |

[1] $=$ TN392 in slots 08 through 14 are tested (if installed).
$[2]=$ TN369 in slot 04 is tested (if installed).

## MAINTENANCE PROCEDURES

## PROCEDURAL FORMAT AND CONTENT

Maintenance procedures presented in this section are divided into three to five parts depending upon the content and purpose of the procedure. The five parts of the procedure, preceded by a flip chart, consist of: purpose, field definitions and codes, test equipment required, operation of procedure, and repair guide. Each procedure consists of at least three parts; i.e., purpose, field definitions and codes, and operation of procedure.

## Purpose

States the purpose of the procedure in general terms and briefly covers the contents and purpose of each test.

## Field Definitions and Codes

Defines each field and the allowable values that are entered or displayed by the fields.

## Test Equipment Required

States the test equipment required in order to execute one or more of the tests. The test equipment is not necessarily required for repair activities, but is required for operation of the procedure.

## Operation of Procedure

Provides simplified instructions for calling up and running the procedure. Describes each test that can be run and presents the possible results, including indications that the test ran successfully.

## Repair Guide

Based on the failure response provided by the test, this part lists the recommended corrective action to be taken.
a. The recommended corrective action does not represent an exhaustive isolation procedure, but serves as a guide to isolate and repair the suspected items.
b. Isolation and repair of elusive troubles are based primarily on switch familiarity (e.g, applicable schematic diagrams, circuit descriptions, etc.) and is not contained in the repair guide.
c. The repair guide for some maintenance procedures includes a repair procedure table. For a given failure code or indication, a list of corrective action steps are provided. The steps are to be performed in the order listed.

Requirement: When the corrective action lists a circuit pack to be replaced, the first action is to reseat the original circuit pack; repeat the applicable test; and based on the results, replace the circuit pack (if necessary).
d. Each replacement of a component must be followed by a rerun of the applicable test.
e. When replacement of a circuit pack or component does not clear the failure, the original circuit pack or component is reinstalled.

## MAINTENANCE PROCEDURE SELECTION

## Overview

There are two methods of selecting maintenance procedures. One is the use of alarm causes/error $\log$ maintenance procedure (PROC 600) and the other is visual inspection of the alarm panel.

## Alarm causes/error log

Maintenance procedure selection is directly related to the contents of PMIDS. Therefore, the starting point to determine which procedure to perform first for alarmed conditions and recorded errors is PROC 600 (Alarm causes/error log).
a. The reason for starting with PROC 600 is that PROC 600 dictates maintenance procedure sequencing (which maintenance procedure to perform and the order in which to perform them) by sorting the contents of PMIDS.
b. PROC 600 displays the contents of PMIDS by alarm severity and in the order of priority dictated by the importance of the functional area(s) (unit types) which are alarmed. All alarms are displayed; first, major alarms within priority order; second, minor alarms in priority order; and last, warning alarms by priority order.
c. In addition, PROC 600 provides by unit number (functional area) errors recorded for each circuit identified in PMIDS. This information may be of particular interest in isolating user reported troubles and during maintenance polling.
d. PROC 600 references the maintenance procedure (if any) to perform in order to investigate and isolate the cause of alarmed conditions and recorded errors. Also identified is the circuit location (if applicable) of the probable cause for each displayed entry.

PROC 600 is also valid as the starting point for user reported troubles and maintenance polling. Maintenance polling should be accomplished prior to maintenance personnel leaving the customer's premises to determine the health of the switch.

## Alarm Panel

The fault indicators in the ALARM, ENVIRON, COMMON CONTROL, NETWORK, APPL PROC, and OTHER sections of the alarm panel furnish reference to:
a. Maintenance procedures for diagnosis and repair of the failure. For example, the SWITCH fault indicator references PROC 620.
b. Maintenance procedures that serve as a pointer to other procedures for diagnosis and repair. For example, the OTHER FAILS fault indicator references PROC 600 which in turn references other procedures.

PROC 620 (network) investigates and isolates multiple unit types and functional areas. As indicated on the alarm panel, PROC 620 is referenced by two fault indicators: SWITCH, and PORT.

The OTHER FAILS fault indicator references PROC 600 which in turn references other procedures to isolate the cause of the lighted fault indicator. Such causes can be: SMDR, ANI, calling number display, Force Administration Data System (FADS), real time clock synchronizer, attendant console, etc.

## General

The maintenance procedures that are not alarm panel oriented are used primarily to test a particular facility, busy out or release busied-out circuits, or make test calls.

The following PROCs can be performed both on- and off-line in a duplicated common control switch.
a. PROC 600-Alarm causes/error log.
b. PROC 610-Tape tests.
c. PROC 611 - Common control I/O tests.
d. PROC 612 - Initialization causes.
e. PROC 615-MAAP test.
f. PROC 616-Alarm panel test.
g. PROC 650-DCIU tests.

When the switch is duplicated, it may be necessary to examine both the on-line and off-line side to determine the maintenance procedure to be performed. The problem that exists could have caused a switch to the healthier common control. When the problem has been corrected, both the on-line and off-line sides should be examined to determine if potential problems exist.

## MAINTENANCE PROCEDURE DESCRIPTION

## Overview

Organization of the maintenance procedures is based on:
a. Procedures relating to the entire switch.
b. Procedures organized by functional area according to the area's importance to continued call processing integrity.
Each of the maintenance procedures is briefly described under the following titles:

- General switch procedures.
- Common control procedures.
- Network procedures.
- Common control peripherals procedures.
- Connection status procedures.
- Other procedures.


## General Switch Maintenance Procedures

This group of maintenance procedures deals with the entire switch or with switch components that are concerned with the entire switch. General switch maintenance procedures include PROC 600 and PROC 601.
PROC 600-Alarm Causes/Error Log displays the contents of the current PMIDS error log.
a. The unit type, present alarm status of the circuit, number of failures recorded for the circuit, time of the first and last errors recorded, and time the circuit was alarmed or resolved are displayed.
b. The maintenance procedure used to run further tests on a circuit that is alarmed or has errors recorded is also displayed.
c. PROC 600 allows entries in the error $\log$ to be cleared (zeroed- out) from PMIDS singly or by unit type. Alarmed entries, either resolved or unresolved, can be cleared individually or as a whole.

PROC 601 - Environmental Test displays information as to whether the alarm is caused by a cabinet or TMS/module control carrier power, fuse/circnit breaker, DC/DC converter, frequency generator, memory holdover, airflow, or temperature problem. PROC 601 displays the location of the trouble and provides other information to assist maintenance personnel in investigating, isolating, and repairing the alarm cause.

## Common Control Maintenance Procedures

This group of maintenance procedures tests the common control and associated components. Common control procedures include PROC 610 through PROC 616.
PROC 610 - Tape Tests displays the failure history for tape errors, performs an ID chip test and parity checker/generator function test of TN430, resets TN430, and diagnoses the High Capacity Mini-Recorder (HCMR).
PROC 611 - Common Control I/O Tests is used to test the I/O capabilities of the common control and to display the failure history associated with these capabilities. The I/O capabilities tested include the 4 MHz data channels and the dual-speed data channels. A test of cables associated with the 4 MHz I/O channels is also performed.
PROC 612 - Initialization Causes displays the failures which caused the common control processor to be initialized. In addition, all error log data (the entire PMIDS table) can be cleared (zeroed-out) when maintenance personnel consider it necessary to further isolate potential troubles.
PROC 613 - Duplicate Processor Control \& Test displays the failures associated with processor duplication and tests the common control duplication channel. PROC 613 allows memory updating in the off-line processor so that a soft switch can be attempted, and performs the soft switch when allowed. The health code indicators of the duplicate processors are displayed as well as the present status of the processor currently being used for testing.
PROC 614 - Memory Read/Memory Match Tests displays the recorded failure history and allows alarmed entries in the error log to be marked resolved. PROC 614 tests identical areas of memory in both processors of a duplicated switch and provides the ability to test all or any part of main or cache memory. In addition, PROC 614 reads and displays the contents of one or more memory locations in one processor whether the switch is duplicated or unduplicated.

PROC 615 - MAAP Test is used to test all functions of the MAAP which can be tested through the common control and provides indications of the severity and extent of any problems with the MAAP.

PROC 616 - Alarm Panel Test is used to test all software controlled LED indicators on the alarm panel and the ACK indicator on the attendant console.

## Network Area Maintenance Procedures

This group of maintenance procedures deals with the digital network and its peripheral devices. Included are testing and recording capabilities for much of the hardware. Some of the network procedures are general purpose types; i.e., busy out procedures, and test calls. Network procedures include PROC 620 through PROC 625, PROC 630 through PROC 632, PROC 640 through PROC 644, PROC 646, and PROC 647.

PROC 620-Network Procedure displays the failure history, resolves alarmed entries, turns off alarms, and runs a test or diagnostic on any part of the network down through the port level. Each functional group of circuit packs in the network is assigned a 2-digit designation called the unit type. These unit types correspond with the unit types used in PROC 600.
PROC 621 - Network Duplication Channel displays the last seven switches, performs transparent soft switches (transparent to voice users), and performs hard switches of the TMS or module control complex. A re-initialization of the TMS or network module control complex can be performed whether or not the TMS or network module control complex is duplicated. Either side of a TMS or network module control complex can be soft locked off-line.

PROC 622-Network Peripherals displays the failure history of network peripheral devices and resolves the alarmed entries. Tests necessary for fault isolation and verification of correct equipment operation can be performed.

PROC 623 - ANI Failures displays failure history for and tests ANI circuits. All available information which assists in fault isolation and repair is given.

PROC 624 - Contact Interface Test is a manual test used to determine if a contact interface circuit pack is defective. Any or all relay contacts on a selected contact interface circuit pack can be tested. Verification of relay operation must be visually observed at the customer's premises by monitoring associated LEDs on the circuit pack faceplate.

PROC 625 - Synchronization Reference Monitor displays the time and cause of the last eight reference switches and allows the monitoring of health for all DS-1 trunk interface circuit packs including the synchronization references. PROC 625 provides the capability to switch between synchronization reference sources, and allows the disabling or re-enabling of the automatic reference switching by both software and hardware.

PROC 630 - Busy Out/Release Busy Out displays the busy out status and provides for the busy out or release busy out of terminals, trunks, and tone plants.
PROC 631 - Trunk Group Busy displays the busy out status for any trunk or trunk group and provides for the busy out or release busy out of trunks individually or by trunk group.

PROC 632 - Carrier Busy is used to busy out or release busy out circuits by the entire carrier or individually within a carrier. PROC 632 also searches for and displays carriers which are completely or partially busied out.

PROC 640 - Trunk Failures displays failure history for trunks and allows the resolving of alarmed entries singly or as a whole. PROC 640 also provides dynamic recording and concurrent or later display of single trunk data. Trunk dial access code, type of data on the trunk when a failure occurred, and the trunk equipment location is provided to aid in isolating a trouble.
PROC 641 - Terminal-to-Terminal Test Call is used for testing of touch tone dialing registers and rotary digit collection. Single registers or all registers in the switch may be tested.
PROC 642 - Terminal-to-Trunk Test Call is used to test trunks by placing test calls from a specific terminab to the trunk being tested. Trunks can be tested singly, on the basis of dial access code, or on the basis of a trunk group.

PROC 643-Terminal-to-Tone Test Call is used to transmit tones from the tone plant to the test line to aid in diagnosing user reported tone failures. All tones generated by the tone plant or a selected set of these tones can be sent sequentially.
PROC 644 - Terminal-to-Auxiliary Tone Test Call is used to transmit tones from the auxiliary tone circuit to the test line to aid in diagnosing user reported atxiliary tone failures. All tones generated by the auxiliary tone circuit or a selected set of these tones can be sent sequentially.

PROC 646 - Modem Pooling and Facility Testing is used to test the Analog/Digital Facility (ADFTC) test circuit, perform detection and diagnostic lests on modem pool members, digital facilities, EIA and CP interfaces and display the test results.
PROC 647 - Automatic Transmission Measurement System (ATMS) displays failure history from PMIDS and performs demand transmission and supervision testing. Measurement and test results for each trunk tested is displayed.

## Common Control Peripherals Maintenance Procedures

This group of maintenance procedures tests any equipment which can directly communicate with the common control through a nonnetwork path. Common control peripheral procedures include PROC 650 and PROC 652 through PROC 656.

PROC 650 - DCIU Tests is used to display the DCIU failure history, perform an ID chip and parity checker/generator function test on the DCIU circuit packs and execute loop around testing on DCIU data links. A demand re-initialization of the DCIU can also be performed.

PROC 652-Time-of-Day Clock Synchronizer displays failure history for the time-of-day clock and allows alarmed error log entries to be resolved. The hardware and software clocks can be tested, their boundary conditions checked, and alarms reset if the clocks test good. In addition, the time-of-day clock can be set.
PROC 653 - Attendant Console Tests displays failure history for attendant consoles, allows alarmed error log entries to be resolved and tests all attendant consoles.

PROC 654 - Display Terminals Test displays failure history associated with display terminals, allows alarmed error log entries to be resolved, and tests the display terminals.
PROC 655 - Station Message Detail Recorder (SMDR) Test is used to test the SMDR function and its hardware components connected to the switch only. PROC 655 also displays failure history associated with the SMDR equipment and resolves alarmed error $\log$ entries.

PROC 656 - Network Control Operations Support System (NCOSS) Port Test provides the capability to test NCOSS on demand and display the results to assist in fault isolation and repair.

## Connection Status Maintenance Procedures

This group of maintenance procedures displays the connection status and provides the capability to trace a call through the switch. Connection status procedures include PROC 960 through PROC 962.

PROC 960 - Queue Activity displays queue information for a particular equipment location or the equipment locations associated with a particular queue.

PROC 961 - Connection Activity displays connection information; i.e., connection number, accumulator number, and equipment location.
PROC 962 - Facility Connection displays the trunk number linkages for line records and the facility and conference facility linkages for trunk records.

## Other Maintenance Procedures

To assist in trouble shooting memory problems, PROC 999 is provided as an aid in displaying the data contents of a memory address via the software tables.

## PROC 600 - ALARM CAUSES/ERROR LOG




The flipcharts shown are for R2V2. The R2V1 flipcharts are similar except that unit types 52 and 68 through 72 are not included in R2V1.

## Purpose

PROC 600 is the starting point for all maintenance activities.
PROC 600 is used to display the contents of the current PMIDS error log.

Each entry displayed identifies:
a. Unit type.
b. Present alarm status.
c. Number of recorded errors.
d. A time stamp for the first or last recorded error or when the entry was alarmed or resolved.
e. A reference to the maintenance procedure (if applicable) to perform to determine the cause of the error.

PROC 600 dictates maintenance procedure sequencing by sorting the contents of PMIDS, displaying the results in alarm severity order and then by errors recorded.

PROC 600 is used to:

1. Display alarmed entries in descending order with major alarmed entries displayed first, followed by minor alarmed entries, and warning alarmed entries displayed last.
2. Display entries within each alarm category corresponding to the most important functional area to the least important functional area of the switch.

Note: Alarmed entries are not displayed in numerical order by unit type. The most important functional area unit type is displayed first no matter what the unit type number may be.
3. Display circuits with errors recorded by unit type in numerical order.
4. Display resolved alarm entries by unit type in numerical order.
5. Resolve alarmed entries, individually or all at once (which turns off the associated fault indicator, or turns off all alarms and fault indicators).
6. Clear (zero) the failure history in PMIDS for all entries in a given unit type, or an individual entry for a particular unit type.
7. Clear (zero) resolved alarmed entries, individually or all at once.

When the switch is duplicated, both the on-line and off-line side should be examined using PROC 600, Test 2 to determine if potential problems exist.

## Field Definitions and Codes

Each field of PROC 600 flipchart and the possible displays for the fields during execution of the different tests are defined in Table E, PROC 600 - Field Definitions and Codes.

Field 2 is an optional entry field to enter the unit type to be investigated (Test 2 or 3 only) or to enter a null unit (Test 3 only).

Note: Unit types 52 and 68 through 72 are not included in R2V1.

TABLE E.

| PROC 600 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELO | CODE | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number | $\stackrel{2}{(\mathrm{Contd})}$ | 18 | Cache |
| 2 | 1-72 | Unit Type: Number designation of the functional unit of equipment which is being displayed |  | 19 | Data communications interface unit (DCIU) |
|  |  |  |  | 20 | Station message detail recorder (SMDR) |
|  | 1 | Environment |  | 21 | Automatic number identification (ANI) |
|  | 2 | Tape |  |  |  |
|  | 3 | Initialization causes |  | 22 | Processor duplication (501CC) |
|  | 4 | Common control I/O |  | 23 | TMS or network duplication channel |
|  | 5 | Memory |  |  |  |
|  | 6. | Module control channel |  | 24 | Touch-tone sender |
|  |  | (MCC) |  | 25 | Touch-tone receiver |
|  | 7 | TMS or module processor |  | 26 | Network I/O |
|  | 8 | Maintenance interface |  | 27 | General purpose port (GPP) |
|  | 9 | Module clock |  |  |  |
|  | 10 | Time slot interchanger$(\mathrm{TSI})-\mathrm{ALU}$ |  | 28 | 72 Series (MFET) port |
|  |  |  |  | 29 | Line circuit |
|  | 11 | Time slot interchanger (TSI) - PSTORE |  | 30 | Even port peripherals |
|  | 12 | I/O bus interface (IOBI) |  | 31. | Auxiliary tone plant |
|  | 13 | Port data store (PDS) |  | 32 | CO trunk (hardware) |
|  | 14 | Port control interface (PCI) |  | . 33 | DID trunk (hardware) |
|  |  |  |  | 34 | TIE trunk/data port (hardware) |
|  | 15 | Port data interface (PDI) |  |  |  |
|  | 16 | Tone plant |  | 35 | Digital trunk |
|  | 17 | Attendant console |  | 36 | Digital user problem |

TABLEE. (Contd)

| $\text { PROC } 600$ <br> FIELD DEfinitions and codes (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD <br> 2 <br> (Contd) | CODE | definition |
| $\stackrel{2}{\text { (Contd) }}$ | 37 | Calling number display | $\begin{gathered} 2 \\ \text { (Contd) } \end{gathered}$ | 56 | Intermodule data store (IDS) |
|  | 38 | Real time clock synchronizer |  | 57 | Light guide interface (LGI) |
|  | 39 | Force administration display system (FADS) |  | 58 | Fan in (FI) |
|  | 40 | Non-network peripherals |  | 59 | TMS maintenance (TMIF) |
|  | 41 | Trunk, software |  | 60 | Diagnostic processor/ remote interface |
|  | 42 | Calls aborted |  |  |  |
|  | 43 | Status memory audits |  | 61 | Configuration audits |
|  | 44 | Attendant console inter- |  | 62 | Analog/digital facility test (ADF'TC) |
|  |  |  |  | 63 | External equipment |
|  | 45 | Auxiliary trunk |  | 64 | External processor |
|  | 46 | Attendant conference |  |  |  |
|  | 47 | Facility test circuit |  | 65 | Modem pooling |
|  |  |  |  | 66 | Tone detector 2 |
|  | 48 | Odd port peripherals |  | 67 | Undefined exception FIFO |
|  | 49 | Maintenance and Administration panel (MAAP) |  |  | errors |
|  |  |  |  | 68 | DS-1 trunk interface |
|  |  | (TCO) |  | 69 | Multifunctional analog terminal (MFAT) |
|  | 51 | Local clock termination (LCT) |  | 70 | Automatic transmission |
|  | 52 | System Clock Synchronizer (SCS) |  |  | measurement system (ATMS) |
|  | 53 | Multiplexer (MPX) |  | 71 | Remote Module Interface (RMI) |
|  | 54 | Fan out (FO) |  | 72 | EIA Interface |
|  | 55 | Module interface (MI) |  |  |  |

PROC 600

TABLE E. (Contd)

| PROC 600FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | defintion | FIELD | CODE | definition |
| 3-7 |  | Equipment location of PMIDS error log entry | $3-7$ 3 | 1-32 | External equipment error: <br> Unit number of external equipment |
| $3-7$ 3 6 | 1-31 | Status memory error: <br> Status memory audit encode | 4 | $1-8$ Dashed | equipment <br> External equipment encode <br> Not applicable for external equipment entries |
| 4, $5 \& 7$ | $0-99$ <br> Dashed | Status memory audit fault code <br> Not applicable for status memory entries | $3-7$ 3 | 1-32 | External processor error: <br> Unit number of external processor |
| $3-7$ 3 | $0-30$Dashed | Undefined exception FIFO error: | $4-7$ | Dashed | Not applicable for external processor entries |
| 4-5 |  | Not applicable for undefined exception FIFO entries | 3-7 | 0-99 | Configuration audit errors: <br> Configuration audit fault code |
| 6 7 | 1-12 Dashed | Undefined exception FIFO encode | 4-7 | Dashed | Not applicable for configuration audit errors |
|  |  | Not applicable for undefined exception FIFO entries | 3-7 | 0-30 | All other PMIDS error log entries: |
| $3-7$ 3 | 0-30 | Diagnostic processor error: <br> Module number | 3 |  | Network cabinet module number |
| 4 5 | $0-7$ $0-3$ | Cabinet number |  | 99 | Common control cabinet module number |
| 6 | 22, 31, | Slot number <br> Not applicable for diagnostic processor entries | 4 | 0-7 | Cabinet number <br> Carrier number |
|  | or 32 |  | 5 | 0-3 |  |
| 7 | Dashed |  | 6 7 | $0-32$ $0-7$ | Slot number <br> Circuit number <br> or <br> Dashed |

TABLE E. (Contd)

| PROC 600FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | Field | CODE | definition |
| 8 | 0-5 | Alarm status of displayed error log entry | $\stackrel{11}{(\mathrm{Contd})}$ | 2 | Time of the first recorded error for the displayed error log entry |
|  | 0 | No errors recorded |  | 3 | Time when the displayed error log entry was alarmed |
|  | 1 | Major |  |  |  |
|  | 2 | Minor |  |  |  |
|  | 3 | Warning | 12-14 |  | Time stamp: A time stamp showing the day of the month, hour, and minute when the first or last error occurred, or when the alarm was activated or resolved for the displayed error log entry. |
|  | 4 | Errors recorded |  |  |  |
|  | 5 | Alarm resolved |  |  |  |
| 9 | 0-999 | Total failures recorded for displayed error log entry |  |  |  |
| 10 | -0-99 | Circuit entry index: Summary of total number of alarmed circuits (Test 1); circuits with recorded errors (Test 2); resolved alarmed entries (Test 3) | 12 | 1-31 | Day of the month |
|  |  |  | 13 | 0-23 | Hour of the day |
|  |  |  | 14 | 0-59 | Minute |
|  |  |  | 15 | 01-56 | PROC reference: The two digits displayed are the last two digits of a maintenance procedure (PROC 6XX) to be performed in order to obtain detailed information about the cause of the displayed error log entry. |
| 11 | 1-3 | Stamp Index (Time Stamp Index) |  |  |  |
|  | 1 | Latest time the displayed error $\log$ entry failed a test (Test 1 or Test 2) or time alarm was resolved for the dislayed error log entry (Test 3) |  |  |  |

## PROC 600 Test 1

## Operation of Procedure

## Overview

PROC 600 can display which entries are alarmed (causing alarm and fault indicators to be turned on), entries with errors recorded against them, and/or resolved alarm entries.

To call in PROC 600 perform the following:

1. Depress PROC NO; 600; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Alarm order display.
2. Test 2 - Unit type display.
3. Test 3 - Resolved alarm entry display.

## Test 1

Test 1 of PROC 600 is used locally or remotely to investigate an alarmed condition or a user reported trouble.
Test 1 of PROC 600 is also performed prior to maintenance personnel leaving the customer's premises to ensure that all alarmed conditions (including warning alarms) are cleared.

When Test 1 is executed, any unacknowledged alarms are acknowledged by PROC 600 causing the attendant console acknowledge (ACK) indicator to be turned on.

1. When EXECUTE is depressed in Test 1 of PROC $\mathbf{6 0 0}$ the system alarm status (alarm level indicators on the alarm panel) is checked for a MAJOR and/or MINOR alarm.
2. If the MAJOR and/or MINOR alarm indicators are lighted the ACK indicator on the attendant console is turned on (if not already lighted).
3. The ACK indicator on the attendant console can only be turned off by clearing or resolving the cause of the alarms in PMIDS.

Test 1 displays PMIDS error $\log$ data for alarmed entries.

1. Alarmed entries are displayed in descending order with major alarmed entries displayed first, entries with minor alarms second, and entries with warning alarms last.
2. Within each alarm category entries are displayed by unit type priority.
3. Unit type priority is assigned according to the order of their importance to service to the customer (most important to least important functional area) and are not in numerical order.
4. Within each unit type and alarm category, (circuits with the same unit type and alarm), alarmed entries are displayed as most recent first.

Test 1 allows for all alarmed entries or an individual alarmed entry to be manually resolved.
Resolving individual alarmed entries or all alarmed entries results in an individual fault indicator or all alarms and fault indicators being turned off.

Test 1 does not allow clearing (zeroing) of alarmed entries from the PMIDS error log.

1. Test 1 is the default test when entering PROC $\mathbf{6 0 0}$ or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. To start Test 1, depress EXECUTE.

The PMIDS error $\log$ is sorted and a summary of the total number of alarmed entries is displayed.
3. If no alarmed entries exist, the following summary is displayed:

Field 1-1.
Field 10-0 (Indicating no alarmed entries).
4. If any alarmed entries exist, the summary displays a 1 in Field 1 and the total number of alarmed entries in Field 10.
5. Depressing NEXT CIRCUIT displays the first alarmed entry as follows:

Field 1-1.
Field 2 - Unit type of alarmed entry (number designation of the type of equipment - See Table E, PROC 600 - Field Definitions and Codes).

Note: Unit types 52 and 68 through 72 are not displayed for R2V1.
Field 3 - Dashed, unit number of external equipment/processor, or module number of alarmed entry.

- Field 4 - Dashed, external equipment encode, or cabinet number of alarmed entry.

Field 5 - Dashed or carrier number of alarmed entry.
Field 6 - Dashed or slot number of alarmed entry.
Field 7 - Dashed or circuit number of alarmed entry.
Field 8 - Alarm status of displayed entry $(1=$ major, $2=$ minor, $3=$ warning $)$.
Field 9 - Total number of times alarmed entry failed.
Field 10-Total number of alarmed entries.
Field 11-3 (Indicating that Fields 12 through 14 display the time when the entry was alarmed).

Fields 12 through 14-Day, hour, and minute the displayed entry was alarmed.
Field 15 - Dashed or a 2-digit reference to a maintenance procedure.
6. Further diagnosis of the displayed alarmed entry is performed by using the maintenance procedure referenced in Field 15 (if any) to isolate and repair the cause of the alarmed entry displayed in Fields 2 through 7.

The two digits referenced in Field 15 are preceded by a 6 to determine the maintenance procedure to be performed. (Example: 20 displayed in Field 15 indicates that PROC 620 is the maintenance procedure to be performed.)

Note: When a displayed entry does not reference a maintenance procedure to be performed (Field $15=$ dash) refer to the Repair Guide part of PROC 600 to determine the type of diagnosis or repair action to be performed (if any).

## PROC 600 Test 1

7. Depressing NEXT DATA changes the stamp index and time stamp. Field 11 (stamp index) displays a 2 indicating that the time displayed in Fields 12 through 14 is the time the first error was recorded for the alarmed entry displayed in Fields 2 through 7.

Depressing NEXT DATA once more changes the stamp index and time stamp. Field 11 (stamp index) displays a 1 indicating that the time displayed in Fields 12 through 14 is the time the last error was recorded for the alarmed entry displayed in Fields 2 through 7.

Depressing NEXT DATA again cycles back to the initial display providing a stamp index of 3 in Field 11, and the time the entry was alarmed in Fields 12 through 14.
8. Depressing NEXT CIRCUIT repeatedly displays the remaining alarmed entries in the PMIDS error log.
Each time NEXT CIRCUIT is depressed, Field 10 is decremented by 1 to show the number of remaining alarmed entries to be displayed.

The circuit entry index (Field 10) includes in its count the alarmed entry currently being displayed.
9. Depressing NEXT CIRCUIT after all alarmed entries are displayed dashes Fields 2 through 15.

Depressing NEXT CIRCUIT again causes the display sequence to start over beginning with the summary.
10. The CLEAR DATA; EXECUTE sequence can be used to resolve individual alarmed entries or all alarmed entries after EXECUTE is used to initiate Test 1.

Note: When alarmed entries are resolved the circuits' failure history is not deleted from the PMIDS error log. The failure history is updated to show that the alarm status now equals 5 (alarm resolved).
11. To resolve individual alarmed entries, (turn off its associated fault indicator - when no other alarmed entries affect the same fault indicator), perform the following:
Use NEXT CIRCUIT to display the alarmed entry on the MAAP.
Requirement: The alarmed entry cannot be resolved or the fault indicator turned off unless the alarmed entry is displayed on the MAAP.

Depress CLEAR DATA; EXECUTE.
12. Field 8 (alarm status) displays a 5 indicating the alarmed entry is resolved.

The fault indicator associated with the alarmed entry is turned off if no other alarmed entries affecting the same fault indicator exist.
13. All alarmed entries can be resolved when the summary is initially displayed, i.e., upon entry to PROC 600 Test 1, and after displaying and recording all alarmed entries and then using NEXT CIRCUIT to display the summary.

Caution: The alarmed entries should be displayed and recorded prior to resolving the alarmed entries and turning off their associated alarm and fault indicators in order that a record of the causes of the alarmed entries are available for maintenance personnel.
14. After entering Test 1 and depressing EXECUTE (summary is displayed), depress CLEAR DATA; EXECUTE

The alarmed entries are resolved and all alarms and fault indicators are turned off.
Field 10 displays a 0 indicating no alarmed entries exist.
15. After displaying and recording all alarmed entries, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.
All alarmed entries are resolved and all alarms and fault indicators are turned off.
Field 10 displays a 0 indicating no alarmed entries exist.
16. When an alarmed entry equipment location is left displayed in Test 1, the entry can be passed to other maintenance procedures as a default equipment location for further testing.

Note: Only PROC 601, PROC 611, PROC 620, PROC 622, PROC 646, and PROC 647 have the capability to accept default equipment locations passed to them by PROC 600.

## Test 2

Test 2 of PROC 600 is used to investigate user reported troubles or to determine if further analysis of potential troubles are to be performed.
Test 2 of PROC 600 is also performed prior to maintenance personnel leaving the customer's premises to ensure that all potential troubles are investigated and cleared to eliminate future alarm conditions.

Test 2 displays alarmed circuits and circuits with errors recorded against them by unit type in numerical order.

Alarmed circuits are displayed within a unit type, therefore, all of the same type of alarms (i.e., major, minor, or warning) are not displayed by alarm category as in Test 1.
Individual entries within a unit type or all entries for a single unit type may be cleared (zeroed out) from the PMIDS error log. When entries are cleared (zeroed out) the circuit(s) failure history is deleted from the PMIDS error $\log$.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. To start Test 2, depress EXECUTE.
3. The PMIDS error $\log$ is sorted and a summary of the total number of circuits with recorded errors for all unit types is displayed.
4. If no circuits with recorded errors exist, the following summary is displayed:

Field 1-2.
Field 10-0 (Indicating no circuits with recorded errors).
5. If any circuits with recorded errors exist, the summary displays a 2 in Field 1 and the total number of entries with recorded errors in Field 10.

Note: A display of 99 in Field 10 indicates that 99 or more entries with recorded errors exist in the error log.

## PROC 600 Test. 2

6. When the initial summary is displayed, Field 2 (unit type) is flashed indicating it is an optional entry field. To select a particular unit type of interest, enter the following:
(Unit type); ENTER.
Note: Unit types 52 and 68 through 72 are not included in R2V1.
Proceed to Step 8.
7. A particular unit type of interest may also be selected by use of NEXT UNIT.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
Depress NEXT UNIT until the unit type of interest is displayed in Field 2.
Proceed to Step 9.
8. Depress EXECUTE.

Note: EXECUTE must be depressed to display the contents for the unit type entered.
9. The first entry (if any) for the unit type entered is displayed. See Step 11 below for the description of the display.
Field 10 (circuit entry index) decreases to show the number of remaining entries to be displayed (if any) from the unit type entered, including the entry presently displayed.

If no recorded entries exist for the unit type entered, Fields 3 through 7, 9, and 11 through 15 are dashed.

Field 8 (alarm status) displays a 0 and Field 10 displays the number of remaining entries (if any) to be displayed.
10. When the summary is displayed and a particular unit of interest is not selected, use of NEXT CIRCUIT or NEXT UNIT displays the first PMIDS entry with recorded errors.

NEXT CIRCUIT is used to step through all individual circuit entries or all entries within a unit type.

NEXT UNIT is used to step to the first entry of the next unit type in numerical sequence.
Note: Unit types 52 and 68 through 72 are not included in R2V1.
11. The first entry with recorded errors is displayed as follows:

Field 1-2.
Field 2 - Unit type of entry with recorded errors (number designation of the type of equipment - See Table E, PROC 600 - Field Definitions and Codes).

Note: Unit types 52 and 68 through 72 are not included in R2V1.
Field 3 - Dashed, status memory audit encode, configuration audit fault code, unit number of external equipment/processor, or module number of entry with recorded errors.

Field 4 - Dashed, external equipment encode, or cabinet number of entry with recorded errors.

Field 5 - Dashed or carrier number of entry with recorded errors.
Field 6 - Dashed, status memory audit fault code, undefined exception FIFO encode, or slot number of entry with recorded errors.

Field 7 - Dashed or circuit number of entry with recorded errors.
Field 8 - Alarm status of entry with recorded errors ( $1=$ major, $2=$ minor, $3=$ warning, $4=$ errors recorded).

Field 9 - Total number of times entry with recorded errors failed.
Field 10 - Total number of entries with recorded errors.
Fjeld 11-1 (Indicating that Fields 12 through 14 display the time when the last error was recorded for the displayed entry).

Fields 12 through 14 - Day, hour, and minute of the last error recorded for the displayed entry.

Field 15 - Dashed or a 2-digit reference to a maintenance procedure.
12. Further diagnosis of the displayed entry can be performed by using the maintenance procedure referenced in Field 15 (if any) to isolate and repair the cause of the entry displayed in Fields 2 through 7.

The two digits referenced in Field 15 are preceded by a 6 to determine the maintenance procedure to be performed. (Example: 20 displayed in Field 15 indicates that PROC 620 is the maintenance procedure to be performed.)

Note: When a displayed entry does not reference a maintenance procedure to be performed (Field $15=$ dash), refer to the Repair Guide part of PROC 600 to determine the type of diagnosis or repair action to be performed (if any).
13. Depressing NEXT DATA changes the stamp index and time stamp. Field 11 (stamp index) displays a 2 indicating that the time displayed in Fields 12 through 14 is the time the first error was recorded for the entry displayed in Fields 2 through 7.

If the displayed entry is an alarmed PMIDS entry (indicated by a 1,2 , or 3 in Field 8) depressing NEXT DATA once more changes the stamp index and time stamp. Field 11 (stamp index) displays a 3 indicating that the time displayed in Fields 12 through 14 is the time the entry was alarmed.

If the displayed entry is not an alarmed PMIDS entry (or after displaying the time the entry was alarmed) depressing NEXT DATA cycles back to the initial display providing a stamp index of 1 in Field 11, and the time of the last recorded error for the entry in Fields 12 through 14.
14. Depressing NEXT CIRCUIT or NEXT UNIT displays the next entry with recorded errors in display order or another unit type of interest can be selected for display.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
15. To select another unit type of interest after the first anit type is selected or NEXT CIRCUIT or NEXT UNIT is depressed, perform the following:

## CHANGE FIELD; 2; ENTER; (Unit type); ENTER

EXECUTE must be depressed to display the contents of the unit type selected.

## PROC 600 Test 2

16. Each time NEXT CIRCUIT is depressed, Field 10 is decremented by 1 to show the number of remaining entries with recorded errors to be displayed.
The circuit entry index (Field 10) includes in its count the entry currently being displayed.
17. Field 10 is decremented by a multiple corresponding to the number of entries within a unit type when NEXT UNIT is used to step from unit to unit without examining the entries within a unit type or a unit type of interest is selected by the CHANGE FIELD sequence.

The circuit entry index (Field 10) includes in its count the entry currently being displayed.
18. When the last entry in a unit is currently displayed, depressing NEXT CIRCUIT or NEXT UNIT displays the first entry of the next unit with recorded errors.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
19. Depressing NEXT CIRCUIT or NEXT UNIT after all entries with recorded errors are displayed dashes Fields 2 through 15.

Depressing NEXT CIRCUIT or NEXT UNIT again causes the display sequence to start over beginning with the summary.
20. The CLEAR DATA; EXECUTE sequence can be used to clear (zero out) individual entries with recorded errors or all entries with recorded errors in a particular unit type after EXECUTE is used to initiate Test 2.

Note: When an entry with recorded errors is an alarmed entry (indicated by a 1, 2, or 3 displayed in Field 8) the fault indicator associated with that entry is turned off if no other entries affecting the same fault indicator exist.
21. To clear (zero out) individual entries with recorded errors from the PMIDS error log, perform the following:

Use NEXT CIRCUIT and/or NEXT UNIT to display the entry to be cleared.
Requirement: The entry with recorded errors cannot be cleared (zeroed out) from the PMIDS error $\log$ unless the entry is displayed on the MAAP.

Note: Unit types 52 and 68 through 72 are not included in R2V1.

## Depress CLEAR DATA; EXECUTE.

22. Field 8 (alarm status) displays a 0 indicating the entry is cleared from PMIDS.

Fields 9 and 11 through 15 are dashed.
Field 10 displays the number of remaining entries (if any) to be displayed.
23. All entries with recorded errors within a unit type are cleared (zeroed out) in two ways; when the summary is initially displayed, and after displaying and recording the entries with recorded errors in the unit type to be cleared.

Caution: The entries with recorded errors should not be cleared (zeroed out) for a unit type until all entries are displayed and recorded in order that a record of the causes of the entries are available for maintenance personnel.
24. After entering Test 2, depress EXECUTE to display the summary, enter the unit type to be cleared (zeroed out) in Field 2 and depress CLEAR DATA; EXECUTE:
(Unit type); ENTER; CLEAR DATA; EXECUTE.
25. Field 8 displays a 0 indicating no entries with recorded errors exist for the unit type displayed in Field 2.

Fields 9 and 11 through 15 are dashed.
Field 10 displays the number of remaining entries (if any) to be displayed.
26. After displaying and recording all entries with recorded errors in the unit type to be cleared (zeroed out), use the CHANGE FIELD sequence to enter the unit type in Field 2, and depress CLEAR DATA; EXECUTE:
CHANGE FIELD; 2; ENTER; (Unit type); ENTER; CLEAR DATA; EXECUTE.
Field 8 displays a 0 indicating no entries with recorded errors exist for the unit type displayed in Field 2.

Fields 9 and 11 through 15 are dashed.
Field 10 displays the number of remaining entries (if any) to be displayed.
27. When an entry with recorded errors is left displayed in Test 2, the equipment location of the entry can be passed as a default equipment location to other maintenance procedures for further testing.

Note: Only PROC 601, PROC 611, PROC 620, PROC 622, PROC 646, and PROC 647 have the capability to accept default equipment locations passed to them by PROC 600.

## Test 3

Test 3 of PROC 600 is used to investigate which entries in the PMIDS error log are resolved.
Resolved alarmed entries in the PMIDS error $\log$ are identical whether an alarmed entry is resolved by isolating, repairing, and testing the circuit or by manually resolving the alarmed entry using CLEAR DATA; EXECUTE in Test 1.

Test 3 of PROC 600 is performed by maintenance personnel to obtain an archive of alarmed entries from the PMIDS error $\log$ which are resolved.

1. The resolved alarmed entries display such information as the unit type, circuit identification, time the entry was resolved, time the entry was alarmed, and the time of the first recorded error for the displayed entry.
2. Such information can be beneficial when the same entry is later displayed as an alarmed entry or as an entry with recorded errors.

Test 3 displays resolved alarmed entries by unit type in numerical order.
Individual resolved alarmed entries or all resolved alarmed entries may be cleared (zeroed out) from the PMIDS error log. When entries are cleared (zeroed out) the circuit(s) failure history is deleted from the PMIDS error log.

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3.

## PROC 600 Test 3

2. To start Test 3, depress EXECUTE.
3. The PMIDS error log is sorted and a summary of the total number of resolved alarmed entries is displayed.
4. If no resolved alarmed entries exist, the following summary is displayed:

Field 1-3.
Field 10-0 (Indicating no resolved alarmed entries).
5. If any resolved alarmed entries exist, the summary displays a 3 in Field 1 and the total number of resolved alarmed entries is displayed in Field 10.
6. When the initial summary is displayed, Field 2 (unit type) is flashed indicating it is an optional entry field. To select a particular unit type of interest, enter the following:
(Unit type); ENTER.
Note: Unit types 52 and 68 through 72 are not included in R2V1.
Proceed to Step 8.
7. A particular unit type of interest may also be selected by use of NEXT UNIT.

Depress NEXT UNIT until the unit type of interest is displayed in Field 2.
Note: Unit types 52 and 68 through 72 are not included in R2V1.
Proceed to Step 9.
8. Depress EXECUTE.

Requirement: EXECUTE must be depressed to display the contents for the unit type entered.
9. The first entry (if any) for the unit type entered is displayed. See Step 11 below for the description of the display.
Field 10 (circuit entry index) decreases to show the number of remaining entries to be displayed in order (if any) from the unit type entered, including the entry presently displayed.
If no recorded entries exist for the unit type entered, Fields 3 through 7, 9, and 11 through 15 are dashed.

Field 8 (alarm status) displays a 0 and Field 10 displays the number of remaining entries (if any) to be displayed.
10. When the summary is displayed and a particular unit of interest is not selected, use of NEXT CIRCUIT or NEXT UNIT displays the first PMIDS resolved alarmed entry.

NEXT CIRCUIT is used to step through all individual resolved alarmed entries or all entries within a unit type.

NEXT UNIT is used to step to the first entry of the next unit type in numerical sequence.
Note: Unit types 52 and 68 through 72 are not included in R2V1.

## PROC 600 Test 3

11. The first resolved alarmed entry is displayed as follows:

Field 1-3.
Field 2 - Unit type of resolved alarmed entry (number designation of the type of equipment See Table E, PROC 600-Field Definitions and Codes).

Note: Unit types 52 and 68 through 72 are not included in R2V1.
Field 3 - Dashed, unit number of external equipment/processor, or module number of resolved alarmed entry.

Field 4 - Dashed, external equipment encode, or cabinet number of resolved alarmed entry.
Field 5 - Dashed or carrier number of resolved alarmed entry.
Field 6 - Dashed or slot number of resolved alarmed entry.
Field 7 - Dashed or circuit number of resolved alarmed entry.
Field 8-5 (Indicating alarmed entry is resolved).
Field 9 - Total number of times resolved alarmed entry failed.
Field 10 - Total number of resolved alarmed entries.
Field 11-1 (Indicating that Fields 12 through 14 display the time when the alarmed entry was resolved).

Fields 12 through 14 - Day, hour, and minute the displayed entry was resolved.
Field 15 - Dashed.
12. Depressing NEXT DATA changes the stamp index and time stamp. Field 11 (stamp index) displays a 3 indicating that the time displayed in Fields 12 through 14 is the time the entry was alarmed.

Depressing NEXT DATA once more changes the stamp index and time stamp. Field 11 (stamp index) displays a 2 indicating that the time displayed in Fields 12 through 14 is the time the first error was recorded for the resolved alarmed entry displayed in Fields 3 through 7.

Depressing NEXT DATA again cycles back to the initial display providing a stamp index of 1 in Field 11, and the time the alarmed entry was resolved in Fields 12 through 14.
13. Depressing NEXT CIRCUIT or NEXT UNIT displays the next resolved alarmed entry in display order or another unit type of interest can be selected for display.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
14. To select another unit type of interest after the first unit type is selected or NEXT CIRCUIT or NEXT UNIT is depressed, perform the following:

CHANGE FIELD; 2; ENTER; (Unit type); ENTER.
EXECUTE must be depressed to display the contents of the unit type selected.
15 . Each time NEXT CIRCUIT is depressed, Field 10 is decremented by 1 to show the number of remaining resolved alarmed entries.

The circuit entry index (Field 10) includes in its count the entry currently being displayed.

## PROC 600 Test 3

16. Field 10 is decremented by a multiple corresponding to the number of entries within a unit type when NEXT UNIT is used to step from unit to unit without examining the entries within a unit type or a unit type of interest is selected by the CHANGE FIELD sequence.

The circuit entry index (Field 10) includes in its count the entry currently being displayed.
17. When the last entry in a unit is currently displayed, depressing NEXT UNIT or NEXT CIRCUIT displays the first entry of the next unit with resolved alarmed entries.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
18. Depressing NEXT CIRCUIT or NEXT UNIT after all resolved alarmed entries are displayed, dashes Fields 2 through 15.

Depressing NEXT CIRCUIT or NEXT UNIT again causes the display sequence to start. over beginning with the summary.
19. The CLEAR DATA; EXECUTE sequence can be used to clear (zero out) individual resolved alarmed entries or all resolved alarmed entries from PMIDS after EXECUTE is used to initiate Test 3.

## Caution: The resolved alarmed entries should not be cleared (zeroed out) until all entries are displayed and recorded in order to provide an archive of resolved alarmed entries.

20. To clear (zero out) individual resolved alarmed entries from the PMIDS error $\log$, perform the following:
Use NEXT CIRCUIT and/or NEXT UNIT to display the entry to be cleared.
Requirement: The resolved alarmed entry can not be cleared (zeroed out) from the PMIDS error log unless the entry is displayed on the MAAP.

Note: Unit types 52 and 68 through 72 are not included in R2V1.
Depress CLEAR DATA; EXECUTE.
21. Field 8 (alarm status) displays a 0 indicating the entry is cleared from PMIDS.

Fields 9 and 11 through 15 are dashed.
Field 10 displays the number of remaining entries (if any) to be displayed.
22. If the CLEAR DATA; EXECUTE sequence is performed when the summary is displayed or when a null unit is entered in Field 2, all resolved alarmed entries are cleared (zeroed out) from the PMIDS error log.
23. To clear (zero out) all resolved alarmed entries using the null unit method, perform the following:
CHANGE FIELD; 2; ENTER; ENTER; CLEAR DATA; EXECUTE.
Field 10 displays a 0 indicating that no resolved alarmed entries exist.
24. All resolved alarmed entries can be cleared (zeroed out) when the summary is initially displayed, i.e., upon entry to PROC 600 Test 3, and after displaying and recording all resolved alarmed entries.
25. After entering Test 3 and depressing EXECUTE (summary is displayed), depress CLEAR DATA; EXECUTE.

Field 10 displays a 0 indicating no resolved alarmed entries exist.
26. After displaying and recording all resolved alarmed entries, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.

Field 10 displays a 0 indicating no resolved alarmed entries exist.

## Repair Guide

PROC 600 displays a dash in Field 15 for several unit type entries. A dash in Field 15 indicates that a maintenance procedure is not available to diagnose and isolate these failures.

In general, unit types $42,43,60,61,63,64$, and 67 are the only unit types that display a dash in Field 15.

## Unit Types 60, 63, and 64:

Unit type 60 (diagnostic processor), unit type 63 (external equipment), and unit type 64 (external processor) raise an alarm but do not reference a maintenance procedure. Entries for these unit types are displayed in Test 1 and 2 of PROC 600 and Field 15 is dashed.

The following corrective action should be taken when entries in unit types 60,63 , and 64 are displayed by Test 1 or 2 .

## Unit type 60 (diagnostic processorj:

1. At the equipment location displayed in Fields 3 through 6, check to ensure that the data set is plugged in.

If the data set is plugged in, proceed to Step 5.
If the data set is not plugged in, connect the data set and proceed to Step 2.
2. Clear the alarmed entry by depressing CLEAR DATA, EXECUTE when the entry is displayed in Fields 3 through 6.

Wait at least 5 to 10 minutes.
3. Enter PROC 600 test 1 and depress EXECUTE.

Determine if the same entry for unit type 60 is displayed.
4. If the same entry is not displayed, corrective action is complete.

If the same entry is displayed, proceed to Step 5.
5 . Record the slot number (22, 31, or 32) displayed in Field 6.
6. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
7. Clear the alarmed entry by depressing CLEAR DATA, EXECUTE when the entry is displayed in Fields 3 through 6.
Wait at least 5 to 10 minutes.
8. Enter PROC 600 test 1 and depress EXECUTE.

Determine if the same entry for unit type 60 is displayed.

## PROC 600

9. If the same entry is not displayed, corrective action is complete.

If the same entry is displayed, determine if slot 22, or 32 is displayed in Field 6.
10. If slot 22 or 32 is not displayed, proceed to Step 14.

If slot 22 or 32 is displayed, replace TN491 in slot 31 at the equipment location displayed in Fields 3 through 5 .
11. Clear the alarmed entry by depressing CLEAR DATA, EXECUTE when the entry is displayed in Fields 3 through 6.
Wait at least 5 to 10 minutes.
12. Enter PROC 600 test 1 and depress EXECUTE.

Determine if the same entry for unit type 60 is displayed.
13. If the same entry is not displayed, corrective action is complete.
14. If the same entry is displayed, check the UART cable E26-E26 and the wiring associated with the circuit pack(s) replaced or perform microdiagnostic test 0 in the off-line side of a duplicated common control switch. If the switch is unduplicated, perform microdiagnostic testing only when traffic permits as microdiagnostic testing takes the switch down.
15. Repeat Steps 1 through 14 for each diagnostic processor entry (Unit type 60) displayed in Test 1.

## Unit type 63 (external equipment):

1. Record the unit number of the external equipment and the external equipment encode displayed in Fields 3 and 4 of each unit type 63 entry displayed in Test 1.
2. Determine from local records if you are at the customer's premises associated with the unit number displayed in Field 3.
3. If you are at the customer's premises, determine what corrective action to take depending on the external equipment encode displayed in Field 4.
4. External equipment encodes displayed in Field 4 are defined as follows:
$1=$ The auxiliary cabinet battery holdover circuit alarm is active.
$2=$ The auxiliary cabinet temperature limit sensor alarm is active.
$3=$ The auxiliary cabinet fan power alarm is active.
$4=$ The auxiliary cabinet circuit breaker/fuse alarm is active.
$5=$ The auxiliary cabinet frequency generator alarm is active.
$6=$ The auxiliary cabinet rectifier alarm is active.
$7=$ The external equipment major or minor alarm is active.
$8=$ Type of trouble is unknown (multiple errors). .

## Unit type 64 (external processor):

1. Record the unit number of the external processor displayed in Field 3 of each unit type 64 entry displayed in Test 1.
2. Determine from local records if you are at the customer's premises associated with the unit number displayed in Field 3.
3. If you are at the customer's premises, perform corrective action on the external processor or refer the problem to the appropriate personnel.

## Unit Types 42, 43, 61, and 67:

Unit type 42 (calls aborted), unit type 43 (status memory audit), unit type 61 (configuration audits), and unit type 67 (undefined exception FIFO code) do not raise an alarm or :cference a maintenance procedure. Entries for these unit types are displayed in Test 2 of PROC 600 and Field 15 is dashed.

The following corrective action should be taken when entries in unit types $42,43,61$, and 67 are displayed by Test 2 .

## Unit type 42 (calls aborted):

1. Record the information displayed in Fields 2 through 14 of each entry displayed in Test 2 and clear (zero out) the unit type (42) from PMIDS.
2. When excessive entries (based on experience) for unit type 42 are noted, refer the problem to switch software engineers for further diagnosis.

## Unit type 43 (status memory audits):

1. Record the status memory encode displayed in Field 3 and the related information displayed in Fields 9 through 14 of each entry displayed in Test 2, and clear (zero out) the unit type (43) from PMIDS.
2. Table F, PROC 600 - Status Memory Audit Encodes, provides a definition for each status memory encode presently being used.
3. Refer these type of software errors to the switch software engineers for further diagnosis.

Note: The remainder of the fault signature data for each status nemory audit entry is not displayed in PROC 600.

## Unit type 61 (configuration audits):

1. Record the configuration audit fault code displayed in Field 3 and the related information displayed in Fields 9 through 14 of each entry displayed in Test 2, and clear (zero out) the unit type (61) from PMIDS.
2. Table G, PROC 600 - Configuration Audit Fault Codes, provides a definition for each configuration audit fault code presently being used.
3. Refer these type of software errors to the switch software engineers for further diagnosis.

Note: The remainder of the fault signature data for each configuration audit entry is not displayed in PROC 600.

TABLE F.

| PROC 600 <br> STATUS MEMORY AUDIT ENCODES |  |  |
| :---: | :---: | :---: |
| FIELD 1 ENCODE | FIELD 6 ENCODE | DEFINITITON |
| 1 | 1 | Error Bad Look |
| 2 | $\begin{aligned} & 4 \\ & 1 \end{aligned}$ | Bad Linkage Digit Error Bad Linkage |
| 3 | 1 | Error No Activity |
| 4 | 1 | Error Stuck Connection Number |
| 5 | 1 | Error Stuck Accumulator |
| 6 | 1 | Error Electronic Telephone Tone |
| 7 | 1 | Error Electronic Telephone Status |
| 8 | 8 | DCIU Hardware Error |
| 9 | 8 | DCIU Software Error |
| 10 | $\begin{array}{r} 1 \\ 4 \\ 2 \\ 16 \end{array}$ | Bad Port Audit <br> Bad Port Digit <br> Bad Port Information <br> Initialization Translation Error |
| 11 | 1 | Bad Time Slot Interchanger Count |
| 12 | $\begin{aligned} & 2 \\ & 1 \end{aligned}$ | Bad Port Equipment Number Bad Port Equipment Number Audit |
| 13 | 1 | Accumulator Zero Error |
| 14 | 16 | Input/Output Selection Error |
| 15 | 4 | Digit Collection Message Error |
| 16 | 4 | Digit Send Error |
| 17 | 4 | Busy Trunk Digit |
| 18 | $\begin{array}{r} 2 \\ 32 \end{array}$ | Bad originating number Invalid module FIFO 15 code |
| 19 | 2 | Bad scanner message |
| 20 | 1 | Queue fault |
| 21 | 1 | Bad Blind Map |
| 22 | 1 | Accumulator inconsistent |
| 23 | 1 | Bad TMS Link error |
| 24 | 32 | Invalid TMS FIFO 15 code |

TABLE G.

|  | PROC 600 |
| :---: | :--- |
| CONFIGURATION AUDIT FAULT CODES |  |

## Unit type 67 (undefined exception FIFO code):

1. Record the module number displayed in Field 3, the undefined exception FIFO encode displayed in Field 6, the related information displayed in Fields 9 through 14 of each entry displayed in Test 2 and clear (zero out) the unit type (67) from PMIDS.
2. Table H, PROC 600 - Exception FIFO Encodes, provides a definition for each exception FIFO encode presently being used.
3. Refer these type of software errors to the switch software engineers for further diagnosis.

Note: The remainder of the fault signature data for each undefined exception FIFO entry is not displayed in PROC 600.

TABLE $H$.

|  | PROC 600 - EXCEPTION FIFO ENCODES |  |
| :---: | :--- | :--- |
| ENCODE | DEFINITION |  |
| 1 | PXF_BAD_SPN | Port type incompatible with error code |
| 2 | PXF_BAD_CODE | Error code not defined |
| 3 | PXF_TTD_SNDR | Touch-tone digit send error |
| 4 | PXF_NET_ORD | Network order error |
| 5 | PXF_DIG_CCLL | Digit collecting on for an inappropriate board <br> type |
| 6 | PXF_RING_TYP | Ringing is on for an inappropriate board type |
| 7 | MXF_BAD_MIN | Invalid module interface number reported |
| 8 | MXF_BAD_CODE | Error code not defined |
| 9 | MXF_ILEG_CON | Illegal connection |
| 10 | MXF_ILEG_BSY | Illegal busy out |
| 11 | MXF_ADMIN_ER | Administration error |
| 12 | MXF_NET_ORD | Network order error |

## PROC 601-ENVIRONMENTAL TESTS



## Purpose

PROC 601 is used when referenced from PROC 600 (Alarm causes/error log) or when the ENVIRON PWR/TEMP AIR FLOW and MAJOR or MINOR alarm indicators on the alarm panel are lighted.

PROC 601 is used to:

1. Display environmental failure history for the switch cabinets (System control (TMS and common control) and network cabinets).

Note: Auxiliary cabinets or any cabinet (other than TMS and common control cabinets) not containing port or module control carriers are not covered by PROC 601.
2. Display environmental alarm causes from all equipped cabinets or a selected cabinet in the switch.

The alarm causes consist of cabinet power, fuse, breaker, DC-DC converter, frequency generator, air flow, temperature, nominal or extended holdover, and module control carrier power trouble conditions.
3. Display environmental alarm causes from both on-line and off-line module control channels (TMS and network) when duplicated module control channels are provided.
4. Automatically turn off the ENVIRON PWR/TEMP AIR FLOW fault indicator when all cabinets pass Test 2 and the MAJOR or MINOR alarm indicator(s) if no other major or minor alarm source(s) exist.

Note: Environmental alarmed circuit entries in PMIDS are marked as resolved.

## Field Definitions and Codes

Each field of PROC 601 flip chart and the possible displays for the fields during execution of the different tests are defined in Table I, PROC 601 - Field Definitions and Codes.

## PROC 601

Optional input fields are:

1. Field 2 - Select a specific module to be tested (Test 2 only).
2. Fields 2 and 3 - Select a specific module and cabinet to be tested (Test 2 only).

TABLE I.

| PROC 601 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | Code | definition | Fleid | CODE | definition |
| 1 | 1-2 | Test number | 15 | 0-5 | Alarm status of displayed equipment location |
| 2-3 | 0-30 | Equipment location of displayed cabinet |  | 0 | No errors recorded |
| 2 |  | Network cabinet module number |  | 1 | Major |
|  | 99 | System control cabinet module number |  | 2 | Minor |
| 3 | 0-7 | Cabinet number |  | 3 | Warning |
| 4 | 0-1 | Status of module control channel |  | 4 | Errors recorded |
|  |  |  |  | 5 | Alarm resolved |
|  | 0 | Off-line | 16 | 0-999 | Total number of cabinets in switch or number of cabinets tested |
|  | 1 | On-line |  |  |  |
| 5-14 | 0-1 | Cabinet alarm cause failure code | 17 | 0-999 | Total number of failed cabinets |
|  | 0 | Pass | 18 | 0-999 | Index into failure table |
|  | 1 | Alarm condition present |  |  |  |

## Operation of Procedure

## Overview

PROC 601 is used to determine the cause of the ENVIRON PWR/TEMP AIR FLOW and MAJOR or MINOR alarm indicators being lighted resulting from an environmental failure.

To call in PROC 601, perform the following:

1. Depress PROC NO; 601; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and Field 16 displays the total number of cabinets in the switch. All other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Displays failure history by order of alarm severity.
2. Test 2 - Tests all cabinets or a range of cabinets for environmental alarm conditions.

## Test 1

Test 1 provides a failure history of the environmental alarm causes detected by the on-line software.
Test 1 is also used to manually turn off the ENVIRON PWR/TEMP AIR FLOW fault indicator.

1. Test 1 is the default test when entering PROC 601, or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, Field 1 displays a 1, and Field 16 displays the total number of cabinets in the switch.
3. To start Test 1, depress EXECUTE.
4. The environmental failure history is sorted and a summary is displayed.
5. If no environmental failures exist, the following summary is displayed:

Field 1-1.
Field 16 - Total number of cabinets in the switch.
Field 17-0 (Indicating no failures).
6. If any environmental failures exist, the summary displays a 1 in Field 1, the total number of cabinets in the switch in Field 16, and the total number of cabinet failures in Field 17.
7. Depressing NEXT CIRCUIT displays the first failure in order of severity, as follows: Field 1-1.

Fields 2 and 3 - Equipment location of failing cabinet.
Field 4 - Dashed.
Fields 5 through $14-0$ or 1 (cabinet alarm cause $-0=$ passed, $1=$ alarm condition present).
Field 15 - Alarm status of failing cabinet.
Field 16 - Total number of cabinets in switch.
Field 17-Total number of failed cabinets.
Field 18-1 (Indicating the first failing cabinet).
8. Depressing NEXT CIRCUIT repeatedly displays the remaining failing cabinets in order of severity, i.e., major alarm status first, followed by minor alarm status, and errors recorded but not alarmed.

Each time NEXT CIRCUIT is depressed, Field 18 (failure index) is incremented by 1.
The failure index includes in its count, the failing cabinet currently being displayed.
9. After the last failing cabinet is displayed (indicated by Field 17 equaling Field 18) depressing NEXT CIRCUIT again dashes Fields 2 through 18.
Depressing NEXT CIRCUIT once more displays the summary, and the failure history can be stepped through again by use of NEXT CIRCUIT.

## PROC 601 Test 1 and Test 2

10. The CLEAR DATA; EXECUTE sequence can be used to manually resolve individual environmental failures or all environmental failures after EXECUTE is used to initiate Test 1.

The failures that are resolved are those failures with an alarm status of 1 or 2 displayed in Field 15.

## Caution: The environmental failures should be displayed and recorded prior to resolving the environmental circuit alarmed entries in order that a record of the equipment location and cause of the failure(s) is available for maintenance personnel.

11. To resolve individual environmental failures with an alarm status of 1 or 2 , perform the following:
Use NEXT CIRCUIT to display the failing cabinet with an alarm status of 1 or 2 on the MAAP.

Requirement: Individual environmental failures cannot be resolved unless the failing cabinet is displayed on the MAAP.

Depress CLEAR DATA; EXECUTE.
12. Field 15 (alarm status) displays a 5 indicating that the failing cabinet is resolved.

The ENVIRON PWR/TEMP AIR FLOW fault indicator is turned off if no other environmental failures exist.
13. All environmental failures with an alarm status of 1 or 2 can be resolved when the summary is initially displayed, i.e., upon entry to PROC 601 Test 1 , and after displaying and recording all environmental failures and then using NEXT CIRCUIT to display the summary.
14. After entering Test 1 and depressing EXECUTE the summary is displayed.

## Depress CLEAR DATA; EXECUTE.

All environmental failures with an alarm status of 1 or 2 are marked as resolved in PMIDS and the ENVIRON PWR/TEMP AIR FLOW fault indicator is turned off.
15. After displaying and recording all environmental failures, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.

All environmental failures with an alarm status of 1 or 2 are marked as resolved in PMIDS and the ENVIRON PWR/TEMP AIR FLOW fault indicator is turned off.
16. The MAJOR or MINOR alarm indicator is also turned off when no other sources affecting the MAJOR or MINOR alarm indicator are present.

## Test 2

Test 2 reads the alarm signals from each on-line MCC circuit pack and displays the status of those alarms for each of the MCC's associated cabinets.

Test 2 also reads the off-line module control channel status (TMS and network) when duplicated module control channels are provided.

In addition, Test 2 reads the alarm signals from on-line common controls' alarm interface (TN490).
Test 2 automatically turns off the ENVIRON PWR/TEMP AIR FLOW fault indicator when all cabinets that raised an alarm pass Test 2.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. When Test 2 is initially called in, a default equipment location may be displayed in Fields 2 and 3, and the total number of cabinets in the switch is displayed in Field 16.
Field 2 is blinking, indicating an optional entry field.
The default equipment location can be the last equipment location displayed in Test 1 of PROC 601 or can be passed from PROC 600 (Alarm causes/error log) while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.
3. The entire switch, a range of cabinets, a specific cabinet, or the default equipment location can be selected for testing.
4. To test the default equipment location displayed in Fields 2 and 3, proceed to Step 8.
5. A specific cabinet can be selected for testing by use of NEXT CIRCUIT or by entering the module and cabinet numbers in Fields 2 and 3 as follows.

Depress NEXT CIRCUIT to step through the cabinets until the cabinet to be tested is displayed in Fields 2 and 3.

Enter the module and cabinet numbers in Fields 2 and 3 whether or not a default equipment location is displayed:
(Module number of cabinet to be tested); ENTER; (Cabinet number); ENTER.
Proceed to Step 8.
6. To select a range of cabinets to be tested a module number must be entered in Field 2.

If Fields 2 and 3 are dashed (no default equipment location displayed), enter the module number as follows:
(Module number to be tested); ENTER.
If a default equipment location is displayed, enter the module number as follows:
(Module number to be tested); ENTER; CLEAR ENTRY; ENTER.
All cabinets in the module selected are tested.
Proceed to Step 8.
7. To select the entire switch to be tested, Fields 2 and 3 must not contain an equipment location.

If no default equipment location is displayed, proceed to Step 8. If a default equipment location is displayed, perform the CHANGE FIELD sequence as follows:

## CHANGE FIELD; 2; ENTER.

Field 2 is blanked and Field 3 is dashed.
Test 2 starts with the first module and first cabinet in the switch and runs until the last cabinet in the switch is tested.

Proceed to Step 8.
8. To start Test 2, depress EXECUTE.

Test 2 operation and display of test results is different when a specific cabinet or default equipment location is tested and when the entire switch or a range of cabinets is tested.

## PROC் 601 Test 2

9. For test operation and display of test results for a default equipment location or a specific cabinet, proceed to Step 10.
For test operation and display of test results for the entire switch or a range of cabinets, proceed to Step 14.
10. When the test is completed for a default equipment location or a specific cabinet, the following is displayed:

Field 1-2.
Fields 2 and 3 - Equipment location of cabinet being tested.
Field 4-1 (Indicating on-line module control channel was read).
Fields 5 through 14 - Cabinet alarm cause ( $0=$ passed, $1=$ alarm condition present).
Field 15-Alarm status of cabinet tested.
Field 16-1 (Indicating the cabinet selected was tested).
Field 17-0 (Indicating no failures were detected for the cabinet tested) or 1 (Indicating that the cabinet failed the test).
Field 18 - Dashed.
11. When testing a specific cabinet or default equipment location, dcpressing NEXT UNIT causes the off-line module control channel's status registers to be read for the cabinet displayed in Fields 2 and 3.

Note: Depressing NEXT UNIT when a duplicated module control channel is not provided, results in error code 74 (equipment not part of system) being displayed, or error code 06 (wrong key, press right key and continue) being displayed when a duplicated common control cabinet is displayed in Fields 2 and 3.

Field 4 changes from 1 to 0 when NEXT UNIT is depressed.
EXECUTE must be depressed to read the off-line status registers.
12. Depressing NEXT UNIT again reverts back to the on-line status registers (Field $4=1$ ) when EXECUTE is depressed.

Note: NEXT UNIT cannot be used to read the off-line MCC status registers when testing a range of cabinets.
13. When another cabinet is to be tested, the CHANGE FIELD sequence must be used to select the specific cabinet:
CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet number); ENTER.

EXECUTE must be depressed to test the specific cabinet selected for testing.
14. When the entire switch or a range of cabinets is being tested for environmental failures the WAIT indicator is turned on and the following fields are incremented momentarily:
Fields 2 and 3 - Equipment location being tested.
Field 16 - Number of cabinets tested.
Field 17 - Total failures (if any).
15. STOP can be depressed when the entire switch or a range of cabinets is being tested.

Depressing STOP displays the next equipment location to be tested in Fields 2 and 3, the number of cabinets tested in Field 16, and the number of failures detected in Field 17. The WAIT indicator is turned off.
16. If no failures are detected for the cabinets tested when STOP is depressed, a 0 is displayed in Field 17.

If any failures are detected for the cabinets tested when STOP is depressed, proceed to Step 20.
17. When STOP is depressed while testing the entire switch or a range of cabinets (halting the test before all cabinets are tested), the range of cabinets or the entire switch must be reentered by using the CHANGE FIELD sequence in order to complete the test.
18. When the entire switch or a range of cabinets is tested, the WAIT indicator is turned off and a summary is displayed.
19. If no cabinets failed, the following summary is displayed:

Field 1-2.
Field 16 - Number of cabinets tested.
Field 17-0 (Indicating no failures).
20. If any cabinets failed, the summary displays a 2 in Field 1, the total number of cabinets tested in Field 16, and the total number of failures in Field 17.
21. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-2.
Fields 2 and 3 - Equipment location of failing cabinet.
Field 4-1 (Indicating on-line module control channel was read).
Fields 5 through $14-0$ or 1 (Cabinet alarm cause $-0=$ passed, $1=$ alarm condition present).
Field $15=$ Alarm status of failing cabinet.
Field 16 - Total number of cabinets tested.
Field 17 - Total number of failed cabinets.
Field 18-1 (Indicating the first failing cabinet).
22. Depressing NEXT CIRCUIT repeatedly displays the remaining failing cabinets.

Each time NEXT CIRCUIT is depressed, Field 18 (failure index) is incremented by 1.
The failure index includes in its count, the failing cabinet currently being displayed.
23. After the last failing cabinet is displayed (indicated by Field 17 equaling Field 18) depressing NEXT CIRCUIT again dashes Fields 2 through 18.
Depressing NEXT CIRCUIT once more displays the summary, and the failing cabinets can be stepped through again by use of NEXT CIRCUIT.
24. To select another range of cabinets to test, the CHANGE FIELD sequence must be used:

CHANGE FIELD; 2; (Module number); ENTER.
All cabinets in the module entered in Field 2 are tested when EXECUTE is depressed.

## PROC 601 Test 2

25. The ENVIRON PWR/TEMP AIR FLOW fault indicator is automatically turned off when Test 2 is completed with no failures detected for all cabinets that had an alarm status of 1 or 2 (major or minor).

Note: Environmental circuit alarmed entries in PMIDS are marked as resolved.
26. The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting the major or minor alarm indicators.

## Repair Guide

## Overview

When the ENVIRON PWR/TEMP AIR FLOW and MAJOR or MINOR alarm indicators on the alarm panel are lighted (indicating an environmental failure) or when PROC 601 is referenced from PROC 600 (Alarm causes/error log) as a potential problem, the following steps should be performed in the order listed to isolate and repair the faulty unit.

1. Execute Test 1 and manually record the failure history generated by the on-line maintenance software.

Determine which failures have an alarm status code of 1 or 2 (major or minor).
2. Execute Test 2.

Test 2 runs a variable length of time depending on the number of cabinets being tested, e.g., the entire switch, a range of cabinets, a specific cabinet, or the default equipment location.
Test 2 must be run for each equipment location recorded in Test 1 with an alarm status of 1 or 2 (major or minor) and for the default equipment location passed from PROC 600 Test 1 or 2.
3. The alarm(s) are turned off if no failures are detected in Test 2 from all of the locations for which the alarm status was recorded in Test 1 as 1 or 2 (major or minor).
4. If any failures are detected in Test 2, step through the failures and record the equipment locations and cabinet alarm cause(s).

The cabinet alarm cause fields (Fields 5 through 14) indicate which function is detected as failing by displaying a 1 in the appropriate cabinet alarm cause field.
5. When more than one cabinet alarm cause is displayed for the failing cabinet, the alarm causes are isolated and repaired from left to right (Field 5 through Field 14).

One cabinet alarm cause may affect other cabinet alarm causes for the failing cabinet.
6. When multiple cabinet alarm causes exist and the first cabinet alarm cause is corrected, the other causes may not be valid.

Maintenance personnel must determine the effect one cabinet alarm cause has on other cabinet alarm causes and the appropriate repair action to be taken (if any).

When repeating Test 2 for one cabinet alarm cause, it may be possible that the other multiple cabinet alarm causes no longer exist.
7. Isolation and repair steps for the cabinet alarm causes are detailed in:

Cabinet Power AC.
Cabinet Power 48 Volts.
Fuse/Breaker.
DC/DC Converter.
Frequency Generator.
Air Flow.
Temperature.
Holdover.
Module Control Carrier Power (Left or Right).
Other Repair Steps.
8. After making the necessary repair, repeat Test 2 for the appropriate equipment location.
9. In order to turn off the ENVIRON PWR/TEMP AIR FLOW fault indicator, all failing cabinets with an alarm status of 1 or 2 (major or minor) must pass Test 2.
10. The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting the major or minor alarm indicator.

## Cabinet Power AC

The cabinet power AC alarm cause usually indicates that the power source's internal circuitry is not functioning properly.

1. Determine the type of power source installed in the equipment location displayed in Fields 2 and 3.
If the equipment location is a duplicated common control cabinet, a Time Multiplexed Switch (TMS) cabinet, or a Remote Module Interface (RMI) cabinet, the power source is a 334 A power unit.

If the equipment location is a module control cabinet or a port cabinet, the power source is a 309A/310A power supply.
2. At the equipment location displayed in Fields 2 and 3, determine if the circuit breaker on the power source is tripped.
If the circuit breaker is tripped, proceed to Step 3.
If the circuit breaker is not tripped, proceed to Step 8.
3. Reset the circuit breaker.

If the circuit breaker trips again, perform Steps 4 through 7 (as required).
If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, refer to isolation repair step Other Repair Steps.
If Test 2 does not fail, corrective action is complete.

## PROC 601

4. Replace the AEN1 circuit pack in the 334 A power unit or 310 A power supply, by performing the following:

Set the AC circuit breaker on the 334 A power unit or 309 A power supply (as appropriate) to OFF.

Remove 2 screws ( 1 on each side) from the front panel of the 334 A power unit or 310 A power supply (as appropriate).
Unplug AEN1 circuit pack and remove the circuit pack from the 334 A power unit or 310 A power supply (as appropriate).

Replace the AEN1 circuit pack.
Secure the 334 A power unit or 310 A power supply front panel (as appropriate) with the 2 screws.
Set the circuit breaker on the 334A power unit or 309A power supply (as appropriate) to ON.
5. If the circuit breaker trips again after replacing the AEN1 circuit pack, proceed to Step 6. If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, proceed to Step 6.

If Test 2 does not fail, corrective action is complete.
6. Replace the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
7. If the circuit breaker trips again after replacing the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate), check the wiring associated with the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).
If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, refer to isolation repair step Other Repair Steps.

If Test 2 passes, corrective action is complete.
8. Determine if the proper AC power to the power source is present.

If $A C$ power to the power source is absent, proceed to Step 9 .
If AC power to the power source is present, proceed to Step 10 .
9. If AC power to the power source is absent, correct the problem and measure the power source output voltages at the test points using a digital multimeter.

If the power source voltages are not within tolerance, proceed to Step 11.
If the power source voltages are within tolerance, repeat Test 2.
If Test 2 fails again, refer to isolation repair step Other Repair Steps.
If Test 2 does not fail, corrective action is complete.
10. Measure the power source output voltages at the test points using a digital multimeter.

If the power source voltages are not within tolerance, proceed to Step 11.
If the power source voltages are within tolerance, repeat Test 2.
If Test 2 fails again, refer to isolation repair step Other Repair Steps.
If Test 2 does not fail, corrective action is complete.
11. Replace the AEN1 circuit pack in the 334 A power unit or 310 A power supply, by performing the following:

Set the AC circuit breaker on the 334A power unit or 309A power supply (as appropriate) to OFF.

Remove 2 screws ( 1 on each side) from the front panel of the 334 A power unit or 310A power supply (as appropriate).
Unplug AEN1 circuit pack and remove the circuit pack from the 334A power unit or 310A power supply (as appropriate).

Replace the AEN1 circuit pack.
Secure the 334 A power unit or 310 A power supply front panel (as appropriate) with the 2 screws.
Set the circuit breaker on the 334 A power unit or 309 A power supply (as appropriate) to ON.
12. Repeat Test 2.

If Test 2 fails again, proceed to Step 13.
If Test 2 does not fail, corrective action is complete.
13. Replace the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
14. Measure the power source output voltages.

If the voltages are not within tolerance, check the wiring associated with the power source.
If the voltages are within tolerance, repeat Test 2.
If Test 2 passes, corrective action is complete.
If Test 2 fails again, check the wiring associated with the power source.

## Cabinet Power 48 Volts

A green pilot LED located on the front panel of the power source is on when the power source is producing -48 volts on its output.
The green pilot LED does not indicate that the output voltage is within regulation limits.
Appropriate test points are available on the front panel of the power source for measuring the output voltage and determining the power source performance.

1. Determine the type of power source installed in the equipment location displayed in Fields 2 and 3.

If the equipment location is a duplicated common control cabinet, a Time Multiplexed Switch (TMS) cabinet, or a Remote Module Interface (RMI) cabinet, the power source is a 334A power unit.
If the equipment location is a module control cabinet or a port cabinet, the power source is a 309A/310A power supply.

## PROC 601

2. At the equipment location displayed in Fields 2 and 3, determine if the green pilot LED is on at the power source.

If the green pilot LED is not on, proceed to Step 3.
If the green pilot LED is on, proceed to Step 9.
3. At the equipment location displayed in Fields 2 and 3, determine if the circuit breaker on the power source is tripped.
If the circuit breaker is tripped, proceed to Step 4.
If the circuit breaker is not tripped, proceed to Step 9.
4. Reset the circuit breaker.

If the circuit breaker trips again, perform Steps 5 through 8 (as required).
If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, proceed to Step 9.
If Test 2 does not fail, corrective action is complete.
5. Replace the AEN1 circuit pack in the 334 A power unit or 310 A power supply, by performing the following:

Set the AC circuit breaker on the 334 A power unit or 309 A power supply (as appropriate) to OFF.
Remove 2 screws ( 1 on each side) from the front panel of the 334 A power unit or 310 A power supply (as appropriate).
Unplug AEN1 circuit pack and remove the circuit pack from the 334 A power unit or 310 A power supply (as appropriate).

Replace the AEN1 circuit pack.
Secure the 334 A power unit or 310 A power supply front panel (as appropriate) with the 2 screws.
Set the circuit breaker on the 334A power unit or 309A power supply (as appropriate) to ON.
6. If the circuit breaker trips again after replacing the AEN1 circuit pack, proceed to Step 7.

If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, proceed to Step 7.
If Test 2 does not fail, corrective action is complete.
7. Replace the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
8. If the circuit breaker trips again after replacing the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate), check the wiring associated with the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).
If the circuit breaker does not trip, repeat Test 2. If Test 2 fails again, refer to isolation repair step Other Repair Steps.
If Test 2 passes, corrective action is complete.
9. Measure the power source output voltages at the test points using a digital multimeter to determine if voltages are within tolerance, marginal, or fluctuating.

If all voltages are within tolerance without fluctuation, refer to isolation and repair step Other Repair Steps.
If the voltages are marginal or fluctuating, proceed to Step 10.
10. Replace the AEN1 circuit pack in the 334A power unit or 310 A power supply, by performing the following:
Set the AC circuit breaker on the 334A power unit or 309A power supply (as appropriate) to OFF.

Remove 2 screws ( 1 on each side) from the front panel of the 334 A power unit or 310 A power supply (as appropriate).
Unplug AENl circuit pack and remove the circuit pack from the 334A power unit or 310A power supply (as appropriate).

Replace the AEN1 circuit pack.
Secure the 334 A power unit or 310 A power supply front panel (as appropriate) with the 2 screws.

Set the circuit breaker on the 334 A power unit or 309 A power supply (as appropriate) to $\mathbf{O N}$.
11. Repeat Test 2.

If Test 2 fails again, proceed to Step 12.
If Test 2 does not fail, corrective action is complete.
12. Replace the 334 A power unit or $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply (as appropriate).

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
13. Measure the power source output voltages.

If the voltages are not within tolerance or fluctuate, check the wiring associated with the power source.
If the voltages are within tolerance, repeat Test 2.
If Test 2 passes, corrective action is complete.
If Test 2 fails again, check the wiring associated with the power source.

## Fuse/Breaker

Fuses and circuit breakers provide visual indications when they operate.

1. At the equipment location displayed in Fields 2 and 3, determine if any fuses are blown or circuit breakers tripped.

If no fuses are blown or circuit breakers tripped, refer to isolation and repair step Other Repair Steps.

If any fuse is blown or circuit breaker tripped, proceed to Step 2.
2. Replace the blown fuse, or reset the circuit breaker.

If the fuse does not blow again or circuit breaker trip, repeat Test 2.
If the fuse blows again or circuit breaker trips, proceed to Step 3.

## PROC 601

3. The corrective action to be taken depends on the blown fuse or tripped circuit breaker.

If the circuit breaker is associated with the DC/DC converter, perform isolation and repair step DC/DC Converter.

If the fuse is associated with the frequency generator, perform isolation and repair step Frequency Generator.

If the circuit breaker is associated with the fans, perform isolation and repair step Air Flow.
If the fuse is part of the port carrier, perform Steps 4 through 6 below.
If the fuse is associated with the consoles, perform Steps 7 through 9 below.
4. Disconnect all circuit packs associated with the blown fuse.

Replace the blown fuse.
5. Reconnect one circuit pack at a time observing the associated fuse.

If the fuse blows again, replace the faulty circuit pack.
6. Replace the blown fuse.

If the fuse does not blow again, reconnect all circuit packs and repeat Test 2.
If the fuse blows again, check the wiring associated with the faulty circuit pack.
7. Disconnect the console mounting cord associated with the blown fuse.

Replace the blown fuse.
If the fuse does not blow again, replace the console and repeat Test 2.
8. If the fuse blows again, disconnect the console connector cable from the common control connector.
9. Replace the blown fuse.

If the fuse blows again, check the wiring between the fuse and the associated console.

## DC/DC Converter

The faulty DC/DC converter is identified within a cabinet by its illuminated RED LED.
In the event of protective shutdown a reset toggle switch is located behind the front panel faceplate of the $\mathrm{DC} / \mathrm{DC}$ converter.

1. Check the circuit breaker associated with the DC/DC converter.

If the circuit breaker is tripped, proceed to Step 2.
If the circuit breaker is not tripped, proceed to Step 3.
2. Reset the circuit breaker.

If the circuit breaker does not trip, repeat Test 2.
If the circuit breaker trips again, check the wiring between the circuit breaker and the DC/DC converter.
3. At the equipment location displayed in Fields 2 and 3, measure the output voltage using a Digital Voltmeter (DVM) at the test points of the failing DC/DC converter with the RED LED lighted.

If the voltage reading is greater than 0 , perform Steps 4 through 6 .
If the voltage reading is 0 , perform Steps 7 through 11 .
4. Replace the DC/DC converter and repeat Test 2.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $\mathrm{DC} / \mathrm{DC}$ converter.
5. If Test 2 fails again, the problem could be in the program resistors on the circuit packs in the $1 / 2$ carrier served by the DC/DC converter.

Replace circuit packs one-at-a-time in the $1 / 2$ carrier served by the DC/DC converter, repeating Test 2 after each circuit pack is replaced.
6. If Test 2 passes, install the original circuit packs that did not cause the trouble.

If Test 2 does not pass, install all the original circuit packs and check the wiring associated with the $\mathrm{DC} / \mathrm{DC}$ converter.
7. Unseat all circuit packs in the $1 / 2$ carrier associated with the failing DC/DC converter.

Caution: Ensure that the toggle switch is in the up position before reseating the handle.

Activate the reset toggle switch by pulling the DC/DC converter handle halfway out without unseating the DC/DC circuit board, and then reseating the handle.
8. Measure the output voltage at the $\mathrm{DC} / \mathrm{DC}$ converter.
9. If the voltage reading is 0 , reseat all circuit packs, replace the $\mathrm{DC} / \mathrm{DC}$ converter, and repeat Test 2.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $\mathrm{DC} / \mathrm{DC}$ converter.

If trouble remains after replacing the converter, check the backplane wiring for a short causing overcurrent shatdown.
10. If the voltage reading is greater than 0 , reseat the circuit packs one at a time.

The RED LED lights on the DC/DC converter when the faulty circuit pack is seated.
Replace the faulty circuit pack, reseat any disconnected circuit packs and repeat Test 2.
11. If Test 2 fails again, check the wiring associated with the faulty circuit pack.

## Frequency Generator

1. Check the fuse associated with the frequency generator.

If the fuse is blown, proceed to Step 2.
If the fuse is not blown, proceed to Step 3.
2. Replace the blown fuse.

If the fuse does not blow, repeat Test 2.
If the fuse blows again, check the wiring between the fuse and the frequency generator.

## PROC 601

3. At the equipment location displayed in Fields 2 and 3, replace the frequency generator.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the frequency generator.
4. Repeat Test 2.

If Test 2 fails again, replace alarm board AEH4 at the back of the cabinet.
Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of alarm board AEH4.
5. Repeat Test 2.

If Test 2 fails again, check the wiring associated with the frequency generator.

## Air Flow

Insufficient air flow for cooling the cabinet may be caused by dirty air filters or improperly operating fans.

1. At the equipment location displayed in Fields 2 and 3, inspect for restriction in air flow or a dirty filter.

If a restriction in air flow or a dirty filter is found, proceed to Step 2.
If no restrictions are found and the filter is clean, proceed to Step 3.
2. Clear the restriction or replace the filter.

Allow sufficient time for cabinet interior to cool and repeat Test 2.
3. Determine if the fans are running.

If no fans are running, proceed to Step 5.
If fans are running, proceed to Step 4.
4. Determine if all fans are operating properly.

If all fans are operating properly, refer to isolation and repair step Other Repair Steps.
Replace any defective fan, allow sufficient time for cabinet interior to cool, and repeat Test 2.
Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of fans.
5. Check the circuit breakers associated with the fans (located on the AC distribution unit).

If any circuit breaker is tripped, proceed to Step 6.
If the circuit breakers are not tripped, refer to isolation and repair step Other Repair Steps.
6. Reset the circuit breaker.

If the circuit breaker does not trip again, allow sufficient time for cabinet interior to cool and repeat Test 2.
7. If the circuit breaker trips again, replace the fan associated with the circuit breaker.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of fans.
8. Reset the circuit breaker, allow sufficient time for the cabinet interior to cool, and repeat Test 2.

## Temperature

An overtemperature alarm cause signifies that a predetermined cabinet temperature is exceeded.

1. At the equipment location displayed in Fields 2 and 3, determine if fans are provided.

If no fans are provided, proceed to Step 7.
If fans are provided, proceed to Step 2.
2. Determine if fans are running.

If no fans are running, proceed to Step 4.
If fans are running, proceed to Step 3.
3. Determine if all fans are operating properly.

If all fans are operating properly, refer to isolation and repair step Other Repair Steps.
Replace any defective fan and allow sufficient time for cabinet interior to cool before repeating Test 2.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of fans.
4. Check the circuit breakers associated with the fans (located on the AC distribution unit).

If any circuit breaker is tripped, proceed to Step 5.
If no circuit breaker is tripped, it may be possible for excessive heat in the room to cause the temperature alarm. Proceed to Step 7.
5. Reset the circuit breaker.

If the circuit breaker does not trip again, allow sufficient time for cabinet interior to cool and repeat Test 2.
If the circuit breaker trips again, replace the fan associated with the circuit breaker.
Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of fans.
6. Reset the circuit breaker, allow sufficient time for cabinet interior to cool, and repeat Test 2 .
7. When no fans are provided, or excessive heat in the room is suspected, determine if environmental temperature is above maximum for the switch.
If the environmental temperature is above the maximum, leave the cabinet open to allow cooling, and refer the problem to local engineering.
If the environmental temperature is not above the maximum, refer to isolation and repair step Other Repair Steps.

## PROC 601

## Holdover

Nominal or extended holdover is provided by a 312 power unit or a J87462A power unit (consisting of a charger and battery system).
The holdover alarm is detected by software when RSV FAIL or BTY ON LINE on the 312 power unit or when RSV ALM or BTY ON LINE on the J87462A power unit is active.

The LEDs on the 312 power unit or J87462A power unit determine whether the switch failed or is drawing battery power because cabinet AC voltage is absent.

Appropriate test points are available on the 312 power unit or J87462A power unit for determining the power unit's performance.

1. Determine the type of holdover power unit installed in the equipment location displayed in Fields 2 and 3.
2. Determine the type of power source installed in the equipment location displayed in Fields 2 and 3.

If the equipment location is a duplicated common control cabinet, a Time Multiplexed Switch (TMS) cabinet, or a Remote Module Interface (RMI) cabinet, the power source is a 334A power unit.
If the equipment location is a module control cabinet or a port cabinet, the power source is a $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
3. At the equipment location displayed in Fields 2 and 3, determine the cause of the holdover alarm by checking the LEDs on the appropriate power unit.

If the BTY ON LINE LED is lighted, check the cabinet AC voltage (the cabinet is being powered from the battery system of the appropriate power unit).
4. If the RSV FAIL or RSV ALM LED is lighted, use the test points on the appropriate power unit to determine the cause of the problem.

Check for -48 volts using a digital voltmeter connected between test points -48 V and GRD.
Check for BTY ( -48 volts) using a digital voltmeter connected between test points - BTY and GRD.
5. If -48 volts is present but BTY is not, proceed to Step 6.

If -48 volts is absent, check the wiring between the appropriate power unit and the voltage source.
6. Replace the CP1 circuit pack (charger and alarm board) in the 312 power unit or the AMC-1 circuit pack (power board) in the J87462A power unit by performing the following.

Note: If the AMC-1 circuit pack in the J87462A power unit has a AMD-1 circuit pack (logic board) attached to it, replace both circuit packs as a set.

Set the battery circuit breaker on the 312 power unit or J87462A power unit (as appropriate) to OFF

Set the AC circuit breaker on the 334 A power unit or 309 A power supply (as appropriate) to OFF.

Disconnect the AC power cord from the 334 A power unit or 309 A power supply (as appropriate).

## PROC 601

Remove 4 screws from the front panel of the 312 power unit or J87462A power unit (as appropriate).

Note: Do not disconnect the grounding wire from the panel of the J87462A power unit.
Unplug the CP1 or AMC-1 circuit pack (as appropriate) and remove the circuit pack from the 312 power unit or the J87462A power unit (as appropriate).

Replace the CP1 or AMC-1 circuit pack (as appropriate).
Secure the 312 power unit or J87462A power unit front panel (as appropriate) with the 4 screws.

Connect the AC power cord to the 334A power unit or 309A power supply (as appropriate).
Set the circuit breaker on the 334A power unit or 309A power supply (as appropriate) to ON.
Set the battery circuit breaker on the 312 power unit or J87462A power unit (as appropriate) to ON.
7. Repeat Test 2.

If Test 2 fails again, proceed to Step 8.
If Test 2 does not fail, corrective action is complete.
8. If the nominal or extended holdover is a 312 A or 312 C power unit, or a J87462A List 6 or List 7 power unit, repeat Steps 6 through 8 for the other CP1 or AMC-1 circuit pack.
If the nominal or extended holdover is a 312 B power unit or a $J 87462 \mathrm{~A}$ List 5 power unit, proceed to Step 9.

If both CP1 or AMC-1 circuit packs are replaced, proceed to Step 9.
9. At the equipment location displayed in Fields 2 and 3, replace the 312 power unit or J87462A power unit (as appropriate).
10. Repeat Test 2.

If Test 2 fails again, check the wiring associated with the 312 power unit or J87462A power unit (as appropriate).

If Test 2 passes, corrective action is complete.

## Module Control Carrier Power

The module control carrier power (left or right) cabinet alarm cause indicates that a change in the power to the module control carrier occurred.

1. At the equipment location displayed in Fields 2 and 3, measure the output voltage using a DVM at the test points of the left or right DC/DC converter associated with the cabinet alarm cause (left or right) to determine if the voltages are marginal or fluctuating.
2. If all voltages are within tolerance without fluctuation, refer to isolation and repair step Other Repair Steps.
If the voltages are marginal or fluctuating, proceed to Step 3.
3. Replace the DC/DC converter and measure the output voltages.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the $\mathrm{DC} / \mathrm{DC}$ converter.

## PROC 601

4. If all voltages are within tolerance and do not fluctuate, repeat Test 2.

If voltages are not within tolerance, or fluctuate, check the wiring associated with the $\mathrm{DC} / \mathrm{DC}$ converter.

## Other Repair Steps

1. In the event an alarm cause is present but the equipment associated with the alarm cause is functioning properly, (or unable to function because of a suspected sensor or detector malfunction), the sensor, detector or alarm board corresponding to the cabinet alarm cause is probably faulty.
2. At the rear of the failing cabinet, replace alarm board AEH4.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of alarm board AEH4.
3. Repeat Test 2.

If Test 2 fails again, proceed to Step 4.
4. Check the sensor or detector and replace as appropriate.

Repeat Test 2 (as applicable). If Test 2 passes, the failure is corrected.
5. If the sensor or detector is functioning correctly or after replacement of the sensor or detector the failure still exists, the wiring between the sensor or detector and the module control channel may be at fault.
6. A correlation of the TMS/module control carrier backplane lead names to the sensor or detector corresponding to the cabinet alarm causes displayed in Fields 5 through 14 are listed below:

Field 5 - Cabinet power AC $=\operatorname{RCTALM}\left(\mathrm{n}^{*}\right)$.
Field 6 - Cabinet power 48 Volts $=$ L48ALM ( $\mathrm{n}^{*}$ ).
Field 7 - Fuse/breaker $=$ FUSALM ( $\mathrm{n}^{*}$ ).
Field $8-$ DC/DC converter $=$ CNVALM ( $n^{*}$ ).
Field 9 - Frequency generator $=$ FGNALM ( $\mathrm{n}^{*}$ ).
Field 10 - Air flow $=$ FANALM ( $\mathrm{n}^{*}$ ).
Field 11 - Temperature $=$ OTPALM ( $\mathrm{n}^{*}$ ).
Field $12-$ Holdover $=\operatorname{HVRALM}\left(\mathrm{n}^{*}\right)$.
Field 13 - Module control carrier power left $=\operatorname{PFAILL}\left(\mathrm{n}^{*}\right)$.
Field 14 - Module control carrier power right $=\operatorname{PFAILR}\left(\mathrm{n}^{*}\right)$. $\mathrm{n}^{*}=$ Cabinet number 0 through 7.

## PROC 610-TAPE TESTS



## Purpose

PROC 610 is used when referenced from PROC 600 (Alarm causes/error log) or when the COMMON CONTROL TAPE and MAJOR or MINOR fault indicators on the alarm panel are lighted.

PROC 610 is used to:

1. Display failures associated with the tape subsystem.
2. Manually resolve the COMMON CONTROL TAPE fault indicator.

Note: Tape alarmed entries in PMIDS are marked as resolved.
3. Test the tape subsystem. The tape subsystem consists of:

TN430 - Tape interface circuit pack.
Cable between the tape interface circuit pack and the High Capacity Mini-Recorder (HCMR).
SN441-HCMR controller circuit pack.
SN442-HCMR data electronics circuit pack.
SN443-HCMR transport circuit pack.
SN445-HCMR servo circuit pack.
SN446-HCMR power circuit pack.
Tape cartridge.
4. Automatically turn off the COMMON CONTROL TAPE fault indicator when the tape subsystem passes Test 2.

Note: Tape alarmed entries in PMIDS are marked as resolved.

## PROC 610

## Field Definitions and Codes

Each field of PROC 610 flip chart and the possible displays for the fields during execution of the different tests are defined in Table J, PROC 610 - Field Definitions and Codes.

There are no optional input fields for PROC 610.

TABLE J.

| PROC 610 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FiELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1-2 | Test number. | 10 |  | Number of failures recorded. |
| $2-8$ 2 | $\begin{gathered} \overline{1} \\ 1-3 \end{gathered}$ | Equipment. <br> Tape interface: Not applicable. Indicates failure (Test 1). Indicates replacement sequence number (Test 2). |  | $0-6$ $0-9$ | Number of failures recorded by the periodic test (Test 1). Number of failures recorded by the demand test (Test 2). |
| 3-7 | - | High Capacity Mini-recorder (HCMR): <br> Not applicable. Indicates failure (Test.1). Indicates replacement sequence number (Test 2). | 11 | 0-9 | Index. <br> Number of failure being displayed (Test 1 or Test 2). |
|  | 1-3 |  | 12 | 0-970 | Specific fault code. |
| 8 |  | Cartridge: <br> Not applicable. Indicates failure (Test 1). Indicates replacement sequence number (Test 2). | 13-15 |  | Time stamp of displayed failure (Test 1 only). |
|  | $\overline{1}$ |  | 13 | 1-31 | Day of month failure was recorded. |
|  | 1-3 |  | 14 | 0-23 | Hour of day failure was recorded. |
| 9 | 1-5 | Alarm status of displayed failure (Test 1 only). | 15 | 0-59 | Minute of hour failure was recorded. |
|  | 1 | Major | 16 | 0-99 | Hours since last run tape (99 indicates 99 hours or more). |
|  | 2 | Minor. |  |  |  |
|  | 3 | Warning. |  |  |  |
|  | 4 | Errors recorded. |  |  |  |
|  | 5 | A larm resolved. |  |  |  |

## Operation of Procedure

## Overview

PROC 610 is used to determine the cause of the COMMON CONTROL TAPE and MAJOR or MINOR fault indicators being lighted resulting from a tape failure.
To call in PROC 610, perform the following:

1. Depress PROC NO; 610; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Displays the alarmed tape failures and manually turns off the fault indicator.
2. Test 2 - Performs an ID chip test on TN430 and a parity checker/generator function test. Resets TN430 and performs one iteration testing of the tape subsystem.

## Test 1

Test 1 provides a failure history of the tape alarm causes detected by periodic on-line software.
Test 1 is also used to manually turn off the COMMON CONTROL TAPE fault indicator.

1. Test 1 is the default test when entering PROC 610, or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. To start Test 1, depress EXECUTE.
3. The tape failure history is sorted and a summary is displayed.
4. If no tape failures exist, the following summary is displayed:

Field 1-1.
Field 10-0 (Indicating no failures).
Field 16 - Hours since last run tape operation.
5. If any tape failures exist, the summary displays a 1 in Field 1, the total number of failures in Field 10, and the number of hours since last run tape operation in Field 16.
6. Depressing NEXT CIRCUIT displays the first failure in order of severity, as follows

Field 1-1.
Fields 2 through 8 - Dashed or 1 (indicating equipment failure area).
Field 9 - Alarm status of displayed failure.
Field 10 - Number of failures recorded.
Field 11 - Index (number of fault codes for displayed failure).
Field 12 - Specific fault code.

Fields 13 through 15 - Beginning time stamp of displayed failure (indicates day, hour, and minute when the failure was first recorded by periodic on-line software).
Field 16 - Hours since last run tape operation.
7. Depressing NEXT DATA displays the ending time stamp (indicates day, hour, and minute when the failure was last recorded by periodic on-line software).

Depressing NEXT DATA again displays the beginning time stamp.
8. Depressing NEXT CIRCUIT repeatedly displays the remaining failures in order of severity. Each time NEXT CIRCUIT is depressed, Field 10 (number of failures) decrements by 1.
Depressing NEXT DATA steps through the beginning and ending time stamp associated with the failure displayed.
9. Depressing NEXT CIRCUIT after all failures are displayed dashes Fields 2 through 16.

Depressing NEXT CIRCUIT once more displays the summary, and the failure history can be stepped through again by use of NEXT CIRCUIT and NEXT DATA.
10. The CLEAR DATA; EXECUTE sequence can be used to manually resolve individual tape failures or all tape failures after EXECUTE is used to initiate Test 1.

The tape failures that are resolved are those failures with an alarm status of 1 or 2 displayed in Field 9.
11. To manually resolve individual tape failures with an alarm status of 1 or 2 , perform the following:
Use NEXT CIRCUIT to display the tape failure with an alarm status of 1 or 2 on the MAAP.

Requirement: Individual tape failures cannot be resolved unless the tape failure is displayed on the MAAP.

## Depress CLEAR DATA; EXECUTE.

Field 9 (alarm status) displays a 5 indicating the tape failure is resolved in PMIDS.
The COMMON CONTROL TAPE fault indicator is turned off if no other tape failures exist.
12. All tape failures with an alarm status of 1 or 2 can be manually resolved when the summary is initially displayed, i.e., upon entry to PROC 610 Test 1, and after displaying and recording all tape failures and then using NEXT CIRCUIT to display the summary.

Caution: The tape failures should be displayed and recorded prior to resolving all tape failure alarmed entries in order that a record of the cause of the failure(s) is available for maintenance personnel.
13. After entering Test 1 and depressing EXECUTE the summary is displayed.

Depress CLEAR DATA; EXECUTE.
All tape failures with an alarm status of 1 or 2 are marked as resolved in PMIDS and the COMMON CONTROL TAPE fault indicator is turned off.
14. After displaying and recording all tape failures, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.

All tape failures with an alarm status of 1 or 2 are marked as resolved in PMIDS and the COMMON CONTROL TAPE fault indicator is turned off.
15. The MAJOR or MINOR alarm indicator is also turned off when no other sources affecting the MAJOR or MINOR alarm indicator are present.

## Test 2

Test 2 performs an ID chip test on the tape interface (TN430). The GREEN and RED LEDs are checked for shorts and opens. A parity/checker function is performed on TN430. TN430 is reset and the tape subsystem is initialized. A diagnose opcode with read/write option is invoked and self-tests are performed on the tape subsystem.

Test 2 automatically turns off the COMMON CONTROL TAPE fault indicator when all alarmed tape failures pass Test 2.

Requirement: Ensure that a tape cartridge is in the HCMR prior to performing Test 2 or the test fails and an invalid replacement sequence is indicated in Fields 2 through 8.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. To start Test 2, depress EXECUTE.

The WAIT indicator is turned on.
3. When Test 2 is completed, the WAIT indicator turns off and a summary is displayed.
4. If no tape failures exist, the following summary is displayed:

Field 1-2.
Field 10-0 (Indicating no failures).
5. If any tape failures exist, the summary displays a 2 in Field 1 and the total number of failures in Field 10.
6. Depressing NEXT CIRCUIT displays the first failure as follows:

Field 1-2.
Fields 2 through 8 - replacement sequence of failing equipment (1, 2, or 3 if appropriate).
Field 9 - Dashed.
Field 10 - Number of failures recorded.
Field 11 - Index (number of fault codes for displayed failure).
Field 12 - Specific fault code.
Fields 13 through 16 - Dashed.
7. Depressing NEXT CIRCUIT repeatedly displays the remaining failures.

## PROC 610 Test 2

8. Depressing NEXT CIRCUIT after all failures are displayed dashes Fields 2 through 16.

Depressing NEXT CIRCUIT once more displays the summary, and the failure history can be stepped through again by use of NEXT CIRCUIT.
9. The COMMON CONTROL TAPE fault indicator is automatically turned off when Test 2 is completed with no failures detected for all failures that had an alarm status of 1 or 2 .

Note: Tape alarmed entries in PMIDS are marked as resolved.
10. The MAJOR or MINOR alarm indicator is also turned off when no other sources affecting the alarm indicator(s) is present.

## Repair Guide

When the COMMON CONTROL TAPE and MAJOR or MINOR fault indicators on the alarm panel are lighted (indicating a tape failure) or when PROC 610 is referenced from PROC 600 (Alarm causes/error $\log$ ) as a potential problem, the following steps should be performed, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1.

Step through the failure history and record the specific fault code for each failure.
Requirement: Ensure that a tape cartridge is in the HCMR prior to performing Test 2 or the test fails and an invalid replacement sequence is indicated in Fields 2 through 8.
2. Execute Test 2 and record the test results including the specific fault code for each tape failure.

If no tape failures exist, the COMMON CONTROL TAPE fault indicator is turned off.
Note: Tape alarmed entries in PMIDS are marked as resolved.
If alarmed tape entries are displayed in Test 1 and no failures are detected in Test 2, perform microdiagnostic 10 when traffic permits to determine if intermittent tape failures exist.
3. If any failures are detected in Test 2, display the tape failure on the MAAP.

Note: If TN430 (tape interface) is failing, the RED LED in position 18 of TN430 is lighted.
4. Fields 2 through 8 indicate the replacement sequence to be performed in correcting the tape failure by displaying a 1,2 , and 3 in the appropriate fields.

Note: The replacement sequence for tape failures may not have 3 units to replace.
5. Replace the type of equipment indicated by a 1 displayed in one of the equipment type fields (2 through 8).
6. Repeat Test 2.

If Test 2 passes, the COMMON CONTROL TAPE fault indicator is turned off and the tape alarmed entries in PMIDS are marked as resolved.
7. If Test 2 fails, replace the next type of equipment (if any) indicated by a 2 displayed in one of the equipment type fields (2 through 8).
If no other replacements are indicated, proceed to Step 10.
8. Repeat Test 2.

If Test 2 passes, the COMMON CONTROL TAPE fault indicator is turned off and the tape alarmed entries in PMIDS are marked as resolved.
9. If Test 2 fails, replace the next type of equipment (if any) indicated by a 3 displayed in one of the equipment type fields (2 through 8).
If no other replacements are indicated, proceed to Step 10.
10. Replace the HCMR.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the HCMR.
11. Repeat Test 2.

If Test 2 passes, the COMMON CONTROL TAPE fault indicator is turned off and the tape alarmed entries in PMIDS are marked as resolved.
12. If Test 2 fails, further isolation of a tape failure may be accomplished by analyzing the specific fault codes recorded from Test 1 (PMIDS) and Test 2 (DMIDS).
Determine from Table K, PROC 610 - Specific Fault Code Definitions, if any additional corrective action can be performed (i.e., cabling, connectors, ete.).

Check the wiring associated with the circuit pack(s) replaced (point to point depending upon specific fault code(s) recorded) and the cabling between the tape interface (TN430) and the HCMR.

PROC 610

TABLE K.

| PROC 610 - SPECIFIC FAULT CODE DEFINITIONS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 791 | SN443 | SN445 | SN442 | TAPE FAILED TO OPEN |
| 792 | TN430 |  |  | WAITING FOR READ DIRECTORY FOLLOWING AN AUTO OPEN |
| 793 | CART |  |  | TAPE CARTRIDGE NOT FULLY INSERTED |
| 794 | TN430 |  |  | DIAGNOSE OPCODE TIMED OUT, NO RESPONSE |
| 795 | TN430 |  |  | INIT_TAP OPCODE TIMED OUT, DID NOT INITIALIZE |
| 796 | TN430 |  |  | TN430 MAILBOX NOT INITIALIZED |
| 797 | TN430 |  |  | WRITE WITH GOOD PARITY FAILED |
| 798 | TN430 |  |  | CMD WITH BAD PARITY ON HIGH BYTE FAILED |
| 799 | TN430 |  |  | CMD WITH BAD PARITY ON LOW BYTE FAILED |
| 800 | TN430 |  |  | ACCESS TO TN430 FAILED OVER MAINTENANCE BUS |
| 801 | TN430 |  |  | ACCESS TO TN430 FAILED OVER SYSTEM BUS |
| 802 | TN430 |  |  | ACCESS DENIED TO TAPE MONITOR |
| 803 | -TN430 |  |  | TAPE SUBSYSTEM IS SHUTDOWN |
| 804 | TN430 |  |  | TAPE SUBSYSTEM RECOVERY IN PROGRESS |
| 805 | TN430 |  |  | INITIALIZATION FAILED |
| 806 | TN430 |  |  | INIT_TAP OPCODE NOT PRECEDED BY RESET |
| 807 | TN430 |  |  | WRITE PROTECT CHECK FAILED IN INITIALIZATION |
| 808 | TN430 |  |  | PARITY CHECK FAILED IN INITIALIZATION |
| 809 | TN430 |  |  | MAILBOX TEST FAILED IN INITIALIZATION |
| 810 | TN430 |  |  | MEMORY MAPPER FAILED IN INITIALIZATION |
| 811 | TN430 |  |  | TN430 BIT SET IN MAINTENANCE REGISTER |
| 812 | SN441 | SN446 |  | HCMR CONTROLLER BIT SET IN MAINTENANCE REGISTER |
| 813 | SN445 | SN443 |  | HCMR SERVO BIT SET IN MAINTENANCE REGISTER |

TABLE K. (Contd)

| PROC 610 - SPECIFIC fault Code definitions (Contd) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 814 | SN443 | CART | SN445 | HCMR TRANSPORT BIT SET IN MAINTENANCE REGISTER |
| 815 | SN442 | SN441 |  | HCMr data electronics bit set in register |
| 816 | SN446 |  |  | HCMR POWER BIT SET IN MAINTENANCE REGISTER |
| 817 | CART |  |  | TAPE PRESENT BIT IS SET |
| 818 | TN430 |  |  | MAINTENANCE REGISTER COPIES DO NOT MATCH |
| 819 | TN430 |  |  | NO REPLY FROM HCMR FROM DIAGNOSE OPCODE |
| 820 | TN430 |  |  | ERROR IN HCMR FROM DIAGNOSE OPCODE |
| 920 | TN430 |  |  | MONITOR DETECTED ERROR IN TN403 WHILE PROCESSING TAPE REQUEST |
| 921 | TN430 |  |  | MONITOR I/O FAILURE, TIMEOUT, OR TOO MANY RESETS ATTEMPTED |
| 922 | SN441 |  |  | MONITOR DETECTED ERROR IN HCMR WHILE PROCESSING TAPE REQUEST |
| 923 | CART |  |  | MONITOR DETECTED ERROR WITH TAPE CARTRIDGE WHILE PROCESSING TAPE REQUEST |
| 924 | TN430 |  |  | Patch Run TAPE FAILED |
| 925 | TN430 |  |  | RUN TAPE FAILED (ON- OR OFF-LINE) |
| 940 | TN430 | SN441 |  | ILLEGAL COMMAND TO HCMR. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 941 | CART | SN443 | SN442 | ERROR IN BLOCK HEADER |
| 942 | CART |  |  | BLOCK NUMBER ERROR. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 943 |  | SN441 | TN430 | HCMR BUS PARITY ERROR. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 944 | CART | SN443 | SN445 | TAPE MOTION ERROR |
| 945 | SN441 | SN442 | SN443 | HCMR DIAGNOSTIC ERROR |

## PROC 610

TABLEK. (Contd)

| PROC 610 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| fAULT <br> CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 946 | CART | SN445 | SN443 | CORRECTABLE DATA ERROR ON TAPE |
| 947 | CART | SN445 | SN443 | REREAD WAS DONE |
| 948 | CART |  |  | UNCORRECTABLE DATA ERROR ON TAPE |
| 949 |  | CART |  | UNABLE TO LOCATE BLOCK. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 950 | SN441 | SN443 | SN445 | TAPE OPENING FAILURES |
| 951 |  |  |  | RETENSIONS SINCE TN430 RESET |
| 952 | SN446 | SN441 | TN430 | NO REPLY FROM HCMR TO A COMMAND |
| 953 | SN441 | TN430 |  | HCMR RESETS |
| 954 | SN446 | TN430 | SN441 | HCMR POWER SUPPLY OUT OF TOLERANCE |
| 955 |  | TN430 |  | SYSTEM BUS TIMEOUTS 1. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 956 |  | TN430 |  | SYSTEM BUS SINGLE 1-BYTE PARITY ERROR. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 957 | TN392 | SYSBUS |  | SYSTEM BUS DOUBLE 1-BYTE PARITY ERROR. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 958 | TN430 |  |  | TN430 SANITY TIMEOUTS 1 |
| 959 |  | TN430 |  | SYSTEM BUS WRITE ABORTS 1. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 960 |  | TN430 |  | ILLEGAL OPCODE FROM SYSTEM. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 961 |  | TN430 |  | ILLEGAL BLOCK RANGE. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 962 |  | TN430 |  | INCONSISTENT BLOCK RANGE. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 963 | CART | SN445 | SN443 | RETENSIONS IN EXCESS OF LIMITS |

TABLE K. (Contd)

| PROC 610 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 964 |  | TN430 |  | OPCODE ABORTED. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |
| 965 | TN430 | TN392 |  | COMPARSION FAILURES BETWEEN SHARED BUFFER AND SWITCH PROCESSOR MEMORY |
| 966 | SN443 |  |  | TAPE INSERTIONS SINCE RESET |
| 967 | TN430 |  |  | TIMER AUDIT ERRORS |
| 968 | TN430 | CART | SN443 | DIRECTORY AUDIT ERRORS |
| 969 | TN430 |  |  | MEMORY MAPPER AUDIT ERRORS |
| 970 | SN446 | TN430 |  | HCMR POWER UP FAILURES. PROBLEM MAY NOT BE IN TAPE SUBSYSTEM |

## PROC 611

## PROC 611. COMMON CONTROL TESTS



## Purpose

PROC 611 is used when referenced from PROC 600 (Alarm causes/error log) or when the COMMON CONTROL I/O CHANNEL and MAJOR fault indicators on the alarm panel are lighted.
PROC 611 is used to:

1. Display the failure history for 4 MHz channels and dual-speed data channels.
2. Manually turn off the fault indicator(s) activated because of 4 MHz channel and/or dual-speed data channel failures.

Note: Common control I/O alarmed circuit entries in PMIDS are marked as resolved.
3. Perform good data test with loop around; serial parity test with loop around; serial parity test with no loop around; and good data test with no loop around on 4 MHz channels and dualspeed data channels.
4. Display 4 MHz and dual-speed data channel failures and indict the I/O buffer circuit when over 50 percent of translated I/O channels fail the tests.
5. Continuously test a specific 4 MHz channel or dual-speed data channel to determine if intermittent failures exist.
6. Automatically turn off the COMMON CONTROL I/O CHANNEL fault indicator when all circuits pass Test 2.

Note: Common control I/O alarmed circuit entries in PMIDS are marked as resolved.
Maintenance personnel must be on the customer's premises to isolate failures associated with 4 MHz cables. Loop around fixtures (ED-1E422-10 Group 5 and ED-1E122-10 Group 8) must be connected in order to determine if TN402 or the 4 MHz cable is failing.

PROC 611

## Field Definitions and Codes

Each field of PROC 611 flip chart and the possible displays for the fields during execution of the different tests are defined in Table L, PROC 611 - Field Definitions and Codes.

Optional input fields are: Fields 2 through 6 - Select equipment location of 4 MHz channel or dualspeed data channel to be tested continuously (Test 3 only).

## TABLE $L$.

| PROC 611 <br> FIELD DEFINITONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | 8 | 1-3 | Circuit type. |
| 2-6 | 0-99 | Equipment location. <br> Module number. |  | 1 | 4 MHZ channel. |
| 2 |  |  |  | 2 | Dual speed channel. |
| 3 | 0-7 | Module number. <br> Cabinet number |  | 3 | I/O buffer board. |
| 4 | 0-3 | Carrier number. | 9 | 0-64 | Failure index. |
| 5 | $\begin{gathered} 21, \\ 23-30 \end{gathered}$ | Slot number. |  | 0-6 | Index into PMIDS failures (Test 1 only). |
| 6 | $\begin{gathered} \text { Dash, } \\ 0-15 \end{gathered}$ | Channel number. |  | 0-64 | Index into DMIDS failures (Test 2 only). |
| 7 | 0-5 | Alarm status. | 10 | 0-912 | Specific fault code. |
|  | 0 | No errors recorded. | 11 | 0-128 | Number of translated I/O Channels (Test 1 only). |
|  | 1 | Major. |  | 0-999 | Number of times tested (Test 3 only). |
|  | 2 | Minor. |  |  |  |
|  | 3 | Warning. | 12 | 0-9 | Number of I/O channel circuit packs installed (Test 1 only). |
|  | 4 | Errors recorded. |  | 0-99 |  |
|  | 5 | Alarm resolved. |  |  | Number of times failed (Test 3 only). |

## Test Equipment Required **

Two loop around fixtures, (loop back plug ED-1E422-10 Group 5 and loop back plug ED-1E422-10 Group 8), are required to isolate failures associated with the 4 MHz cable connecting the TN402 and the MCC.

## PROC 611 Test 1

## Operation of Procedure

## Overview

PROC 611 is used to determine the cause of the COMMON CONTROL I/O CHANNEL and MAJOR fault indicators being lighted resulting from a common control 4 MHz channel and/or dual-speed data channel failure.

To call in PROC 611, perform the following:

1. Depress PROC NO; 611; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Displays failure history.
2. Test 2 - Tests all 4 MHz channels and dual-speed data channels.
3. Test 3 - Tests a specific 4 MHz channel or dual-speed data channel continuously.

## Test 1

Test 1 provides a failure history of 4 MHz channels, dual-speed data channels, and I/O buffer failures. The failure history is recorded by the on-line periodic software tests.
Test 1 is also used to manually turn off the COMMON CONTROL I/O CHANNEL fault indicator.

1. Test 1 is the default test when entering PROC 611, or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. To start Test 1, depress EXECUTE.
3. The failure history is sorted first by alarm status and then by circuit type, and a summary is displayed.
4. If no failures occurred, the summary displays a 1 in Field 1, a 0 in Field 9 (indicating no channel failures), the total number of translated channels in Field 11, the total number of I/O circuit packs in Field 12, and all other fields are dashed.
5. If one or more failures occurred, the following summary is displayed:

## Field 1-1.

Fields 2 through 8 - Dashed.
Field 9 - Total number of channel failures (maximum of 6 ).
Field 10 - Dashed.
Field 11 - Total number of translated channels.
Field 12 - Total number of 4 MHz and dual-speed circuit packs.
6. Depressing NEXT CIRCUIT displays the first failure in order of severity, as follows: Field 1-1.

Fields 2 through 6 - Equipment location of the first failing channel.
Note: If the failure displayed is the I/O buffer circuit pack, Field 6 is dashed.
Field 7-Alarm status of failing channel.
Field 8 - Circuit type ( $1=4 \mathrm{MHz}$ channel, $2=$ dual-speed data channel, $3=1 / 0$ buffer).
Field 9 - Failure index (total number of failures recorded in PMIDS).
Field 10 - Specific fault code recorded for the failing channel.
Field 11 - Total number of channels translated.
Field 12 - Total number of 4 MHz and dual-speed circuit packs.
7. Depressing NEXT CIRCUIT repeatedly displays the failure histories of the remaining failing channels.
Each time NEXT CIRCUIT is depressed, Field 9 (failure index) is decremented by one.
8. Depressing NEXT CIRCUIT after all failing channels are displayed, dashes all fields except Field 1.

Depressing NEXT CIRCUIT once more causes Test 1 to be executed, reading and sorting the failure history in PMIDS, and displaying a new summary.
9. The CLEAR DATA; EXECUTE sequence can be used to manually resolve individual common control I/O channel failures or all common control I/O channel failures after EXECUTE is used to initiate Test 1.

The failures that are resolved are those failures with an alarm status of 1,2 , or 3 displayed in Field 7.
10. To resolve individual common control $I / O$ channel failures with an alarm status of 1,2 , or 3, perform the following:
Use NEXT CIRCUIT to display the failing common control I/O channel with an alarm status of 1,2 , or 3 on the MAAP.

Requirement: Individual common control I/O channel failures cannot be resolved unless the failing common control channel is displayed on the MAAP.

Depress CLEAR DATA; EXECUTE.
11. Field 7 (alarm status) displays a 5 indicating that the failing common control $I / O$ channel is resolved.

The COMMON CONTROL I/O CHANNEL fault indicator is turned off if no other common control channel failures exist.
12. All common control $I / O$ channel failures with an alarm status of 1 , 2 , or 3 can be resolved when the summary is initially displayed, i.e., upon entry to PROC 611 Test 1, and after displaying and recording all common control I/O channel failures and then using NEXT CIRCUIT to display the summary.

Caution: The common control I/O channel failures should be displayed and recorded prior to resolving the common control I/O channel alarmed entries in order that a record of the equipment location and specific fault code of the failure(s) is available for maintenance personnel.
13. After entering Test 1 and depressing EXECUTE the summary is displayed.

## Depress CLEAR DATA; EXECUTE.

14. All common control I/O channel failures with an alarm status of 1,2 , or 3 are marked as resolved in PMIDS and the COMMON CONTROL I/O CHANNEL fault indicator is turned off.

Field 9 (failure index) displays a 0 indicating no alarmed common control $Y 0$ failures exist.
15. After displaying and recording all common control I/O channel failures, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.
16. All common control I/O channel failures with an alarm status of 1,2 , or 3 are marked as resolved in PMIDS and the COMMON CONTROL I/O CHANNEL fault indicator is turned off.
Field 9 (failure index) displays a 0 indicating no alarmed common control $Y O$ failures exist.
17. The MAJOR alarm indicator is also turned off when no other sources affecting the alarm indicator are present.

## Test 2

Test 2 performs the following tests to determine the status of 4 MHz channels and dual-speed data channels.

1. Good data test with loop around (data with accurate parity is looped from output to input on the circuit pack without affecting the peripheral) on 4 MHz channels and dual-speed data channels.
2. Serial data-channel parity test with loop around (bad parity is generated and sent with serial data while loop around is in effect) on 4 MHz channels and dual-speed data channels.
3. Good data test with no loop around (correct parity is generated and sent with serial data through the peripheral) on 4 MHz channels only.
4. Serial data-channel parity test with no loop around (bad parity is generated and sent with serial data when loop around is not in effect) on 4 MHz channels only.
5. Buffered bus parity check test with loop around (bad parity is forced on the system and buffered busses) on 4 MHz channels and dual-speed data channels.
6. ID chip test on all 4 MHz channels and dual-speed data channels.

Test 2 also indicts the I/O buffer circuit when over 50 percent of translated channels fail the tests.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. To start Test 2, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
3. While the WAIT indicator is on, Test 2 can be halted by depressing STOP.

The WAIT indicator is turned off and the results of the test up to the time STOP was depressed are available beginning with a summary.
Proceed to Step 5.
4. When Test 2 completes, the WAIT indicator is turned off and a summary is displayed.

Note: The GREEN LED is turned on for any circuit pack that passes Test 2 (TN402, TN403, and/or TN404) if the I/O buffer circuit pack is not failing.
5. If no failures occurred, the summary displays a 2 in Field 1, a 0 in Field 9 (indicating no channel failures), and all other fields are dashed.
6. If one or more failures occurred, the following summary is displayed:

Field 1-2.
Fields 2 through 8 - Dashed.
Field 9 - Total number of channel failures.
Fields 10 through 12 - Dashed.
7. Depressing NEXT CIRCUIT displays the first failure as follows:

Field 1-2.
Fields 2 through 6 - Equipment location of the first failing channel.
Note: If the failure displayed is the I/O buffer circuit pack, Field 6 is blank.
Field 7 - Dashed.
Field 8 - Circuit type ( $1=4 \mathrm{MHz}$ channel, $2=$ dual-speed data channel, $3=\mathrm{I} / \mathrm{O}$ buffer).
Field 9 - Failure index (total number of failures recorded in DMIDS).
Field 10 - Specific fault code recorded for the failing channel.
Fields 11 and 12 - Dashed.
8. While the failing channel is displayed on the MAAP, the RED LED on the failing circuit pack is turned on. The RED LED is turned off when the display on the MAAP no longer corresponds to it.

Note: If over 50 percent of the translated channels fail Test 2, the RED LED on the I/O buffer circuit pack is turned on instead of the RED LEDs on the channels that failed because of the failing $\mathrm{I} / \mathrm{O}$ buffer circuit pack.
9. Depressing NEXT CIRCUIT repeatedly displays the remaining failing channels.

Note: The RED LED on the original circuit pack is turned off and the RED LED on the displayed circuit pack in Fields 2 through 5 is turned on. The RED LED is turned off when the display on the MAAP no longer corresponds to it.

Each time NEXT CIRCUIT is depressed, Field 9 (failure index) is decremented by one.
10. Depressing NEXT CIRCUIT after all failing channels are displayed, dashes all fields except Field 1.

Depressing NEXT CIRCUIT once more causes the failure summary information to be displayed again.
11. The COMMON CONTROL 1/O CHANNEL fault indicator is automatically turned off (indicating the common control $1 / O$ alarm cause is resolved) when all common control channels pass Test 2.

Note: Common control I/O alarm entries in PMIDS are marked as resolved.
12. When no other alarm sources affecting the MAJOR alarm indicator are present in the switch, the alarm indicator is also turned off.

## Test 3

Test 3 is used to continuously test any 4 MHz channel or dual-speed data channel suspected of having intermittent failures, when using test equipment to further isolate a problem, or to trace wiring problems.

Note: I/O buffer circuit packs are not tested in Test 3.

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3.
2. When Test 3 is initially called in, a default equipment location may be displayed in Fields 2 through 6.

The alarm status and specific fault code associated with the default equipment location may be displayed in Fields 7 and 10.
Field 2 (module) is blinking, indicating an optional entry field.
3. The default equipment location can be the last equipment location displayed in Tests 1 and 2 of PROC 611 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.

Either the default equipment location can be tested, or another 4 MHz channel or dual-speed data channel can be selected for testing.
4. A specific 4 MHz channel or dual-speed data channel can be selected for testing by entering the equipment location in Fields 2 through 6 whether or not a default equipment location is displayed:
(Module number of 4 MHz channel or dual-speed data channel to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Channel number to be tested); ENTER.
Proceed to Step 7.
5. A specific 4 MHz data channel or dual-speed data channel can also be selected for testing by use of NEXT CIRCUIT.

Depress NEXT CIRCUIT until the 4 MHz channel or dual-speed channel to be tested is displayed in Fields 2 through 6.

Proceed to Step 7.
6. To test the default equipment location displayed in Fields 2 through 6, proceed to Step 7.
7. To start Test 3 after selecting the 4 MHz channel, dual-speed data channel, or default equipment location to be tested, depress EXECUTE.

The WAIT indicator is not turned on during Test 3 execution.
8. When a default equipment location, 4 MHz channel, or dual-speed data channel is being tested continuously in Test 3, the following fields are updated:

Field 10 - Specific fault code (if any).
Field 11- Number of times the 4 MHz channel or dual-speed data channel is tested.
Note: If the circuit is tested more than 999 times, Field 11 starts counting over from 0 (i.e., 998, 999, 0, 1, 2, etc.).

Field 12 - Number of times the 4 MHz channel or dual-speed data channel failed Test 3 (if any).

Note: Test 3 stops automatically if the 4 MHz channel or dual-speed data channel tested reaches 99 failures.
9. While Test 3 is executing, the RED and GREEN LEDs on the circuit pack corresponding to the 4 MHz channel or dual-speed data channel being tested is updated.
If Test 3 continues to pass, the GREEN LED is turned on.
At the first failure detected, the RED LED is turned on.
If the channel being tested passes Test 3 after failing, the GREEN LED is turned on.
Note: Only one LED is lighted at a time. If the channel being tested is failing intermittently, the RED and GREEN LEDs turn on and off to correspond with the failing and passing interactions of each test (as appropriate).
10. The testing interval is determined by maintenance personnel performing the test and is ended by depressing STOP.
11. When Test 3 stops automatically (after 99 failures) or after depressing STOP while testing a default equipment location, a specific 4 MHz data channel, or dual-speed data channel, the following summary is displayed:

Field 9 - Failure index (number of failure records if any).
Field 11 - Number of times the 4 MHz channel or dual-speed data channel is tested.
Field 12 - Number of times the 4 MHz channel or dual-speed data channel failed Test 3 (if any).

Note: The GREEN LED is lighted on the corrésponding circuit pack if the 4 MHz channel or dual-speed data channel passed Test 3.
12. When the 4 MHz channel or dual-speed data channel fails Test 3 (indicated by Fields 9 and 12), depressing NEXT FAULT displays the first failure record as follows:

Field 1-3.
Fields 2 through 6 - Equipment location of 4 MHz channel or dual-speed data channel tested.
Field 7 - Dashed.

## PROC 611 Test 3

Field 8 - Circuit type ( $1=4 \mathrm{MHz}$ channel, $2=$ dual-speed data channel ).
Field 9 - Failure index (number of failure records).
Field 10 - Specific fault code.
Field 11 - Number of times the 4 MHz channel or dual-speed data channel was tested.
Field 12 - Number of times the 4 MHz channel or dual-speed data channel failed Test 3.
Note: The RED LED is lighted on the corresponding circuit pack if the 4 MHz channel or dual-speed data channel failed Test 3 .
13. Depressing NEXT FAULT repeatedly displays all the failure records for the 4 MHz channel or dual-speed data channel being tested.
Field 9 (failure index) is decremented each time NEXT FAULT is depressed.
14. Depressing NEXT FAULT after all failure records are displayed dashes Fields 9 through 12.

Depressing NEXT FAUL'T once more displays the summary information (failure index, number of times tested, and number of times failed).
15. When another 4 MHz channel or dual-speed data channel is to be continuously tested, NEXT CIRCUIT or the CHANGE FIELD sequence can be used to select the specific circuit:
Depress NEXT CIRCUIT until the 4 MHz channel or dual-speed data channel to be tested is displayed in Fields 2 through 6.
CHANGE FIELD; 2; ENTER; (Module number of 4 MHz channel or dual-speed data channel to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Channel number to be tested); ENTER.
16. EXECUTE must be depressed to test the 4 MHz channel or dual-speed data channel selected for testing.

## Repair Guide '

When the COMMON CONTROL I/O CHANNEL and MAJOR fault indicators on the alarm panel are lighted (indicating a common control channel failure) or when PROC 611 is referenced from PROC 600 (Alarm causes/error log) as a potential problem, the following steps should be performed, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1.

Step through the failure history and record the specific fault code for each failure.
2. Execute Test 2 and record the test results including the specific fault code for each common control I/O channel failure.
3. If all common control $I / O$ channels pass Test 2 the common control $I / O$ channel alarm cause(s) is resolved, and the COMMON CONTROL I/O CHANNEL fault indicator is turned off.

Note: Common control I/O channel alarmed entries in PMIDS are marked as resolved.
When Test 2 passes and 4 MHz channel or dual-speed data channel failures are recorded in Test 1 with an alarm status of 1,2 , or 3 (major, minor, or warning) proceed to Step 11 for further testing to ensure that no intermittent failures exist.
4. If any failures are detected in Test 2, display the common control I/O channel failure on the MAAP.

Note: While the failing channel is displayed on the MAAP, the RED LED on the failing circuit pack is turned on.
5. If over 50 percent of the translated channels fail Test 2, the RED LED on the I/O buffer circuit pack is turned on instead of the RED LEDs on the channels that failed because of the failing I/O buffer circuit pack.
6. Replace the circuit pack with the RED LED lighted.
7. Repeat Test 2.

If Test 2 passes, the COMMON CONTROL I/O CHANNEL fault indicator is turned off.
Note: Common control I/O channel alarmed entries in PMIDS are marked as resolved.
8. If Test 2 fails, step through the failures to determine if the same failure exists.

If different failures exist, repeat Steps 3 through 7 (as appropriate).
9. If the same failure exists, determine if the failure is a 4 MHz channel (Slots 27 through 30 in

- Field 5).

If the same failure is not a 4 MHz channel, proceed to Step 13.
10. If the same failure is a 4 MHz channel, determine if the 4 MHz cable is a potential problem (specific fault codes 827 through 845 , or 900 through 903 displayed in Field 10).

If the 4 MHz cable is not a potential problem, proceed to Step 13.
If the 4 MHz cable is a potential problem, perform 4 MHz Cable Isolation Procedure listed below.
11. Execute Test 3 and continuously test the suspect 4 MHz channel or dual-speed data channel to determine if it fails.

If the 4 MHz channel or dual-speed data channel passes Test 3, corrective action is complete.
If the 4 MHz channel or dual-speed data channel fails Test 3 , replace the circuit pack with the RED LED lighted at the equipment location displayed in Fields 2 through 5.
12. Repeat Test 3.

If Test 3 passes, repeat Test 2 to retire the cause of the COMMON CONTROL I/O CHANNEL fault indicator.

If Test 3 fails, proceed to Step 13.
13. If Tests 2 or $\overline{3}$ fails, further isolation of a common control channel failure may be accomplished by analyzing the specific fault codes recorded from Test 1 (PMIDS) and Test 2 (DMIDS).

Determine from Table M, PROC 611 - Specific Fault Code Definitions, if any additional corrective action can be performed (i.e., cabling, connectors, etc.).
Check the wiring associated with the circuit pack(s) replaced (point to point depending upon specific fault code (s) recorded).

## PROC 611

TABLE M.

| PROC 611 - SPECIFIC FAULT COde definitions |  |
| :---: | :---: |
| fault CODE | definition |
| 0 | NO FAILURE |
| 1 | SIO ERROR FROM A MAINTENANCE ROUTINE |
| 826 | INVALID SOFTWARE GENERATED FAULT |
| 827 | CANNOT SET BOARD TEST STATUS FOR GOOD Data test with loop-around |
| 828 | CANNOT CLEAR BOARD TEST STATUS FOR GOOD Data test With loop-around |
| 829 | CANNOT WRITE TEST VECTOR FOR GOOD DATA TEST WITH LOOP-AROUND |
| 830 | ECHO CHECK FAILURE FOR GOOD Data test with loop-around |
| 831 | CANNOT READ STATUS REGISTER FOR GOOD DATA TEST WITH LOOP-AROUND |
| 832 | READ FAILED FROM DATA NOT READY FOR GOOD DATA TEST WITH LOOP-AROUND |
| 833 | READ FAILED FROM UNKNOWN CAUSE FOR GOOD DATA TEST WITH LOOParound, however, the data echo check was good |
| 834 | READ FAILED FROM UNKNOWN CAUSE FOR GOOD DATA TEST WITH LOOP-AROUND and the data echo check was bad |
| 835 | READ FAILED FROM SERIAL PARITY ERROR FOR GOOD DATA TEST WITH LOOPAROUND, HOWEVER, THE DATA ECHO CHECK WAS GOOD |
| 836 | read failed from serial parity error for good data test with looparound and the data echo check was bad |
| 837 | CANNOT SET BOARD TEST STATUS FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |
| 838 | CANNOT CLEAR BOARD TEST STATUS FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |
| 839 | Cannot write test vector for serial data channel parity test with LOOP-AROUND |
| 840 | READ DID NOT FAIL FOR SERIAL DATA CHANEL PARITY TEST WITH LOOP-AROUND |
| 841 | CANNOT READ STATUS REGISTER FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |

TABLE M. (Contd)

| PROC 611 - SPECIFIC FAULT CODE definitions (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 842 | READ FAILED FROM DATA NOT READY FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |
| 843 | READ FAILED FROM UNKNOWN CAUSE FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND, HOWEVER, THE DATA ECHO CHECK WAS GOOD |
| 844 | READ FAILED FROM UNKNOWN CAUSE FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND AND THE DATA ECHO CHECK WAS BAD |
| 845 | ECHO CHECK FAILED FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOPAROUND |
| 846 | CANNOT SET BOARD TEST STATUS FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND |
| 847 | CANNOT CLEAR BOARD TEST STATUS FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND |
| 848 | CANNOT WRITE TEST VECTOR FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND |
| 849 | CANNOT READ STATUS REGISTER FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND |
| 850 | READ DID NOT FAIL FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOPAROUND |
| 851 | READ FAILED FROM DATA NOT READY FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND |
| 852 | READ FAILED FROM UNKNOWN CAUSE FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND, HOWEVER, THE DATA ECHO CHECK WAS GOOD. |
| 853 | READ FAILED FROM UNKNOWN CAUSE FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOP-AROUND AND THE DATA ECHO CHECK WAS BAD |
| 854 | ECHO CHECK FAILED FOR SERIAL DATA CHANNEL PARITY TEST WITH NO LOOPAROUND |
| 855 | CANNOT SET BOARD TEST STATUS FOR GOOD DATA TEST WITH NO LOOP-AROUND |
| 856 | CANNOT CLEAR BOARD TEST STATUS FOR GOOD DATA TEST WITH NO LOOPAROUND |

## PROC 611

TABLE M. (Contd)

| PROC 611 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 857 | CANNOT WRITE TEST VECTOR FOR GOOD DATA TEST WITH NO LOOP-AROUND |
| 858 | ECHO CHECK FAILURE FOR GOOD DATA TEST WITH NO LOOP-AROUND |
| 859 | CANNOT READ STATUS REGISTER FOR GOOD DATA TEST WITH NO LOOP-AROUND |
| 860 | READ FAILED FROM DATA NOT READY GOOD DATA TEST WITH NO LOOP-AROUND |
| 861 | READ FAILED FROM UNKNOWN CAUSE FOR GOOD DATA TEST WITH NO LOOPAROUND, HOWEVER, THE DATA ECHO CHECK WAS GOOD |
| 862 | READ FAILED FROM UNKNOWN CAUSE FOR GOOD DATA TEST WITH NO LOOPAROUND AND THE DATA ECHO CHECK WAS BAD |
| 863 | READ FAILED FROM SERIAL PARITY ERROR FOR GOOD DATA TEST WITH NO LOOPAROUND, HOWEVER, THE DATA ECHO CHECK WAS GOOD |
| 864 | READ FAILED FROM SERIAL PARITY ERROR FOR GOOD DATA TEST WITH NO LOOPAROUND AND THE DATA ECHO CHECK WAS BAD |
| 865 | CANNOT SET BOARD TEST STATUS FOR BUFFERED BUS PARITY CHECK TEST WITH LOOP-AROUND |
| 866 | CANNOT CLEAR BOARD TEST STATUS FOR BUFFERED BUS PARITY CHECK TEST WITH LOOP-AROUND |
| 867 | BUFFERED BUS LOW BYTE ERROR NOT DETECTED |
| 868 | BUFFERED BUS HIGH BYTE ERROR NOT DETECTED |
| 869 | BUFFERED BUS BOTH BYTES IN ERROR NOT DETECTED |
| 898 | COMMON CONTROL CARRIER I/O BUFFER BOARD FAILURE |
| 900 | CONTROL STATUS REGISTER READ FAILURE FOR GOOD DATA TEST WITH LOOPAROUND |
| 901 | CONTROL STATUS REGISTER ECHO CHECK FAILURE FOR GOOD DATA TEST WITH LOOP-AROUND |
| 902 | CONTROL STATUS REGISTER READ FAILURE FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |
| 903 | CONTROL STATUS REGISTER ECHO CHECK FAILURE FOR SERIAL DATA CHANNEL PARITY TEST WITH LOOP-AROUND |

TABLE M. (Contd)

|  | PROC 611 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| FAULT <br> CODE | DEFINITION |
| 904 | CONTROL STATUS REGISTER READ FAILURE FOR SERIAL DATA CHANNEL PARITY <br> TEST WITH NO LOOP-AROUND |
| 905 | CONTROL STATUS REGISTER ECHO CHECK FAILURE FOR SERIAL DATA CHANNEL <br> PARITY TEST WITH NO LOOP-AROUND |
| 906 | CONTROL STATUS REGISTER READ FAILURE FOR GOOD DATA TEST WITH NO LOOP- <br> AROUND |
| 907 | CONTROL STATUS REGISTER ECHO CHECK FAILURE FOR GOOD DATA TEST WITH <br> NO LOOP-AROUND |
| 908 | CONTROL STATUS REGISTER READ FAILURE FOR BUFFERED BUS TEST |
| 909 | CONTROL STATUS REGISTER ECHO CHECK FAILURE FOR BUFFERED BUS TEST |
| 910 | BUFFERED BUS LOW BYTE ECHO FAILURE |
| 911 | BUFFERED BUS HIGH BYTE ECHO FAILURE |
| 912 | BUFFERED BUS BOTH BYTES ECHO FAILURE |

## 4 MHz Cable Isolation Procedure

Caution: Performance of the following procedure can affect switch performance. Care must be taken to ensure that multiple modules are not affected. Isolating 4 MHz cable problems should be performed when traffic conditions permit.

To isolate 4 MHz channel (TN402) failures with a specific fault code of 827 through 845 , or 900 through 903 displayed in Field 10 when the 4 MHz cable is suspected of failing, perform the following tests (as appropriate).

## Test A:

1. Disconnect the other end of the GRP 844 MHz cable from the backplane of the module control carrier corresponding to the MCC connected to the TN402 being tested.

Note: The term GRP 844 MHz cable refers to the cable running from the backplane connection attached to an TN402 on the common control to the corresponding MCC connection on the module control carrier.
2. When testing a duplicated module control carrier, disconnect the end of the cable that is connected to the on-line side of the module control carrier. If duplicated common controls are being tested, disconnect the end of the cable that is connected to the module control carrier associated with the TN402 being tested (on-line or off-line - CCO or CC1).

## Caution: Only one loop around fixture should be placed on the MCC side of the GRP 844 MHz cable at a time.

3. Connect a loop around fixture (loop back plug ED-1E422-10 Group 5) directly to the connector end of the GRP 844 MHz cable (MCC side).
4. Execute Test 2.

Note: Passing means that specific fault code 863 was displayed in Field. 10 for the TN402 being tested. Failing means that specific fault code 860 was displayed in Field 10 for the TN402 being tested. Other nonrelated specific fault codes for the TN402 being tested or other failing channels can be occurring and displayed in Test 2.
5. If Test 2 passes (specific fault code 863 displayed), the GRP 844 MHz cable is good. Connect the GRP 844 MHz cable to the backplane of the module control carrier.
6. If Test 2 fails (specific fault code 860 displayed), proceed to Test B.

## Test B:

1. Disconnect the GRP 844 MHz cable from the backplane of the common control carrier corresponding to the TN402 to be tested. (Duplicated or unduplicated - on-line or off-line.)

Note: The term GRP 844 MHz cable refers to the cable running from the backplane connection attached to an TN402 on the common control to the corresponding MCC connection on the module control carrier.
2. Connect a loop around fixture (loop back plug ED-1E422-10 Group 8) directly to the common control backplane connection of the TN402 being tested.
3. Execute Test 2.

Note: Passing means that specific fault code 860 was displayed in Field 10 for the TN402 being tested. Failing means that specific fault code 863 was displayed in Field 10 for the TN402 being tested. Other nonrelated specific fault codes for the TN402 being tested or other failing channels can be occurring and displayed in Test 2.
4. If Test 2 passes (specific fault code 860 displayed), the GRP 844 MHz cable is good. Connect the GRP 844 MHz cable to the backplane of the common control and module control carriers.

Proceed to Test C.
5. If Test 2 fails (specific fault code 860 displayed), replace the GRP 844 MHz cable.

## Test C:

If Test B above passes, the probable cause of the TN402 failing is the MCC or translation. Perform. the following:

1. Use PROC 620 to test the MCC (unit type 6).
2. Check translation to determine if the MCC is administered.

If the MCC is not administered, add the correct translation.
If the MCC is administered, add the MCC circuit pack to the slot in the common control carrier.

## PROC 612-INITIALIZATION CAUSES



The flipchart shown is for R2V2. The R2V1 flipchart is similar except that initialization cause codes 40 through 42 are not included in R2V1.

## Purpose

PROC 612 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS, MEM and/or CACHE fault indicator(s) resulting from an initialization cause.
PROC 612 is used to:

1. Display the reasons that caused the common control processor to be initialized.
2. Manually turn off the OTHER FAILS, MEM and/or CACHE fault indicator(s).
3. Clear all maintenance data (failure history) in memory, and turn off all lighted fault indicators (if any) and the MAJOR, MINOR, and/or WARNING alarm indicators if lighted.

Caution: PROC 612 provides a special feature to clear (zero) all maintenance data (failure history) in the PMIDS portion of memory. Use of this feature removes all failure indications that would normally be investigated by the procedure associated with the failure. This feature is not used in normal troubleshooting activities.

## Field Definitions and Codes

Each field of PROC 612 flip chart and the possible displays for the fields during execution of the procedure are defined in Table N, PROC 612-Field Definitions and Codes.

Field 1 is an optional input field for clearing the maintenance data in PMIDS.

TABLE N.

| PROC 612 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | Filelo | CODE | DEFINITITON |
| 1 | $\begin{gathered} 0 \\ 1-18 \\ 99 \end{gathered}$ | Initialization number: <br> Summary. <br> Different causes. Used only to clear all failure history in PMIDS | $\begin{gathered} 3 \\ \text { (Contd) } \end{gathered}$ | $\begin{aligned} & 18 \\ & 19 \\ & 20 \\ & 21 \\ & 22 \end{aligned}$ | 501CC diagnostic register loaded while 501 CC running. Recovery from suicide. Hold/Get overflow. Long power failure. Microdiagnostic Test 15 executed. |
| 2 | $\begin{gathered} 3 \\ 5 \\ 18 \end{gathered}$ | Unit Type <br> Initialization <br> Main Memory <br> Cache |  | $\begin{aligned} & 24 \\ & 25 \\ & 26 \\ & 27 \end{aligned}$ | or underflow. <br> Branch to zero error. <br> Interrupt area. <br> False identification. <br> Two processors (common control) on line. |
| 3 | $\begin{array}{r} 1 \\ 2 \\ 3 \\ 4 \\ \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ \\ 12 \\ 13 \\ \\ 14 \\ \\ 15 \\ 16 \\ 17 \end{array}$ | Fault code: <br> Initialization causes associated with codes 1 through 18 in field 1 : <br> Short power failure. <br> Micro memory parity. <br> Sanity time out. <br> Input/output sanity time out. <br> Memory parity-low <br> Memory parity-high <br> Memory partiy-both <br> Illegal operation code. <br> Fetch abort. <br> Write protect. <br> Illegal micro <br> instruction. <br> Bus time out. <br> Duplication channel receive. <br> Duplication illegal instruction. <br> Cache parity-low. <br> Cache parity-high. <br> Cache parity-both. |  | 29 <br> 30 <br> 31 <br> 32 <br> 33 <br> 34 <br> 35 <br> 36 <br> 37 <br> 38 <br> 39 <br> 40 <br> 41 <br> 42 | Processor (common control) suicide. <br> Five short <br> initializations. <br> Duplication memory match failure. <br> Parity error during audit. <br> X-ray program detected processor failure. <br> X-ray program detected memory failure. <br> Microdiagnostic detected failure. <br> Processor (common control) switch. <br> Halt/Go. <br> Cache turned off for recovery. <br> Memory error correction turned off for recovery. <br> Emergency transfer. <br> Network test con- <br> troller. <br> Duplication channel bad. <br> I/O. |

TABLE N. (Contd)

| PROC 612FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FieLD | code | definition |
| 4 | 0-77 | Failed memory block location. | 9 | 0-5 | Count to reload: An indicator of the seriousness of the initialization causes leading to a reload of memory. |
| 5 | 0-777777 | Octal address in memory block. |  |  |  |
| 6-8 |  | Time stamp: A beginning |  |  |  |
|  |  | time stamp showing the day of the month, hour, and minute when the first error occurred for the fault logged in PMIDS. | 10 | 0 | Processor health status: <br> No failure. <br> Codes 1 through 3 apply to duplicated systems only. |
| 6 | 1-31 | Day of the month |  |  |  |
| 7 | 0-123 | Hour of the day. |  | 1 2 | Software A failure: <br> Minor <br> Software B failure: Possible problem in switching processors. <br> Hardware failure. |
| 8 | 0-59 | Minute. |  | 2 |  |

## Operation of Procedure

PROC 612 is used to determine the cause of the OTHER FAILS, MEM and/or CACHE fault indicator(s) being lighted resulting from an initialization cause.
To call in PROC 612, perform the following:

1. Depress PROC NO; 612; ENTER.
2. A 0 is displayed in Field 1, and all other fields are dashed.

Note: There is no test selection in this procedure.

## PROC 612

## Determining Initialization Causes

Depressing EXECUTE takes a summary of the failure history and displays it on the MAAP.

1. If no failures occurred, Fields 1 and 10 display a 0.
2. If one or more failures occurred, the following is displayed:

Field 1 - Init fault number $=1$.
Field 10 - Processor health ( $0=$ pass, $1=$ Soft $A, 2=$ Soft B, $3=$ Hardware ).
3. Depressing NEXT FAULT updates the display as follows:

Field 1 - Init fault number $=1$.
Field 2 - Unit type ( $3=$ initialization, $5=$ main memory, $18=$ cache ).
Field 3 - Fault code (initialization cause).
Field 4 - Memory block location (or dashed).
Field 5 - Octal address in memory block (or dashed).
Note: Only certain types of initialization causes display memory block location and octal address in Fields 4 and 5.

Field 6 - Day of the month when the initialization fault code displayed in Field 3 began.
Field 7 - Hour of the day when the initialization fault code displayed in Field 3 began.
Field 8 - Minute of the hour when the initialization fault code displayed in Field 3 began.
Field 9 - Count to reload (indication of the seriousness of the initialization fault code displayed in Field 3 in leading to a reload of memory).
Field 10 - Processor health ( $0=$ Pass, $1=$ Soft A, $2=$ Soft B, $3=$ Hardware ).
4. Depressing NEXT FAULT displays additional initialization fault codes if more than 1 was logged for the init fault number displayed in Field 1.
Depressing NEXT FAULT after all initialization fault codes are displayed, dashes Field 3.
Depressing NEXT FAULT once more displays the first initialization fault code starting the sequence over.
5. Depressing NEXT FAULT repeatedly sequences the display through the init fault numbers, in chronological order, until the last one is displayed.
Depressing NEXT FAULT after all init fault numbers are displayed dashes the display.
Depressing NEXT FAULT once more starts the sequence over with the failure history summary.

## Turning Off Fault Indicator

To manually turn off the OTHER FAILS, MEM and/or CACHE fault indicator(s) (assuming no other sources are affecting the OTHER FAILS fault indicator), perform the following:
Depress CLEAR DATA; EXECUTE.
Fields 1 and 10 display a 0 and all other fields are dashed.
Note: Initialization causes are marked as resolved in PMIDS.

## Clear all Maintenance Data

Failure history contained in PMIDS can be cleared (zeroed) when PROC 612 is loaded from tape without first depressing EXECUTE, or when initialized by RESET, or after investigating the initialization causes.

Caution: Using the following sequence removes all failure indications (alarmed entries and entries with recorded errors) that would normally be investigated with the procedure associated with the failure. This sequence is not used in normal troubleshooting activities.

To clear (zero) maintenance data from PMIDS, perform the following:

1. For RESET and after initialization causes are investigated use:

CHANGE FIELD; 1; ENTER; 99; ENTER; CLEAR DATA; EXECUTE.
2. Prior to entering PROC 612 use:

PROC NO; 612; ENTER; CHANGE FIELD; 1; ENTER; 99; ENTER; CLEAR DATA; EXECUTE.
3. The WAIT indicator turns off when the maintenance data is cleared from memory - several seconds after depressing CLEAR DATA; EXECUTE.
4. The MAAP displays a 0 in Field 10 (processor health status) and all other fields are dashed indicating the maintenance data is cleared from PMIDS.
All lighted fault indicators (if any) and the MAJOR, MINOR, or WARNING alarm indicators (if lighted) are turned off.
5. The only code that can be entered in Field 1 is 99.

Attempting to enter other codes causes special error code 03 (data wrong) to be displayed in the MAAP error code field.

## Repair Guide

Initialization causes do not usually point to a faulty circuit pack.

1. Maintenance personnel should be aware of what has recently occurred in the switch to determine the corrective action to be taken.
2. Some causes of initialization may be a result of other repair action taken.

In such cases, no repair action is required and the alarm cause may be resolved, after recording pertinent maintenance data using PROC 612, by performing the CLEAR DATA; EXECUTE sequence.
3. For those situations when further investigation is required for the initialization causes, primary and secondary suspect circuit packs, or other possibilities that should be investigated are listed in Table O, PROC 612 - Initialization Causes Repair Procedure.

## PROC 612

TABLE 0.

| PROC 612Initialization Causes Repair procedure |  |  |  |
| :---: | :---: | :---: | :---: |
| initialization |  | PRIMARY SUSPECT | secondary SUSPECT |
| fault CODE | Cause |  |  |
| 1 | Short power failure | Primary dropout |  |
| 2 | Micro memory parity | TN370, UN151, UN152, UN153 | Software |
| 3 | Sanity time-out | UN152 | Software |
| 4 | 1/O sanity time-out | TN368 |  |
| 5 | Memory parity - low | TN392 |  |
| 6 | Memory parity - high | TN392 |  |
| 7 | Memory parity - both | TN392 |  |
| 8 | Illegal operation code | TN370, UN151, UN152, UN153 |  |
| 9 | Fetch abort | Look for other init causes | Software, TN368 |
| 10 | Write protect | Look for other init causes | Software, TN368 |
| 11 | Illegal micro instruction | TN370, UN151, UN152, UN153 |  |
| 12 | Bus time out | UN153, (anything on bus) | Software |
| 13 | Duplication channel receive | UN158 | Cable between channels |
| 14 | Duplication illegal instruction | Software |  |
| 15 | Cache parity - low | TN369 | UN153 |
| 16 | Cache parity - high | TN369 | UN153 |
| 17 | Cache parity - both | TN369 | UN153 |

TABLE O. (Contd)

| PROC 612initialization CAUSES REPAIR PROCEDURE (Contd) |  |  |  |
| :---: | :---: | :---: | :---: |
| intialization |  | PRIMARY SUSPECT | SECONDARY SUSPECT |
| fault <br> CODE | Cause |  |  |
| 18 | 501CC diagnostic register loaded while 501CC running | TN491. |  |
| 19 | Recovery from suicide | Look for other init causes |  |
| 20 | Hold/Get overflow | Software | UN151 |
| 21 | Long power failure | Power outage | Power supply |
| 22 | Microdiagnostic Test 15 | Reload from microdiagnostic Test 15 |  |
| 23 | Hold get area underflow | Software | UN151 |
| 24 | Branch to zero error | Software | TN370, UN151, UN152, UN153 |
| 25 | Interrupt area | Software | TN370, UN151, UN152, UN153 |
| 26 | Falsë identification | Software | TN370, UN151, UN152, UN153 |
| 27 | Two processors (common control) on-line | UN158 | TN490 |
| 28 | Processor (common control) suicide | Look for other init causes* |  |
| 29 | Five short initializations (Init B) | Look for other init causes |  |
| 30 | Duplication memory match failure | Software (i.e., patches not in both machines, etc.) | TN390, UN158 |
| 31 | Parity error during audit | TN392 | TN370, UN151, UN152, UN153 |
| 32 | XRAY program detected processor failure | TN370, UN151, UN152, UN153 |  |

TABLE O. (Contd)

| PROC 612initialization Causes repair procedure (Contd) |  |  |  |
| :---: | :---: | :---: | :---: |
|  | initialization | PRIMARY SUSPECT | SECONDARY SUSPECT |
| fault code | CAUSE |  |  |
| 33 | XRAY program detected memory failure | TN392 | TN368 |
| 34 | Microdiagnostic detected failure | TN370, UN151, UN1.52, UN153 |  |
| 35 | Processor (common control) switch | 23-Hour switch | Manual switch <br> (PROC 613 Test 3), software recovery (Refer to PROC 600) |
| 36 | Halt/Go | Switch toggled |  |
| 37 | Cache turned off for recovery | TN369 | UN153 |
| 38 | Memory error correction turned off for recovery | Look for other init causes | No other init causes, refer to PROC 600 |
| 39 | Emergency transfer | Ensure module processor is working | Ensure TMS is working |
| 40 | Network test controller | Software error | Sanity time out |
| 41 | Duplication channel bad | Check duplication circuit pack UN158 |  |
| 42 | I/O | Check SIO or TPIO failure | Check circuit pack indicated by address displayed in PROC 612, or check circuit pack TN404 |
| * Processor suicide is caused by: <br> Entering long initialization four times, two processors (common controls) on-line, or I/O failures in at least 75 percent of the cabinets |  |  |  |

PROC 613 - DUPLICATE PROCESSOR CONTROL AND TEST (R2V1 Only)


## Purpose

PROC 613 is used when referenced from PROC 600 (Alarm causes/error $\log$ ) to verify and turn off the OTHER FAILS fault indicator resulting from a duplicate processor control and test failure.

PROC 613 is used to:

1. Display duplication channel failures.
2. Perform various tests on the duplication circuitry in both processors.
3. Initiate a soft switch from the on-line processor.

## Field Definitions and Codes

Each field of PROC 613 flipchart and the possible displays for the fields during execution of the different tests are defined in Table P, PROC 613 - Field Definitions and Codes.
Field I is an optional input field for changing the test number to be executed.

## Operation of Procedure

## Overview

PROC 613 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a duplicate processor control and test failure.
To call in PROC 613, perform the following:

1. Depress PROC NO; 613; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 , and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

TABLE $P$.

PROC 613
FIELD DEFINITIONS AND CODES

| FIELD | CODE | definition | FIELD | CODE | definition |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1-3 | Test number. | $\begin{gathered} 9 \\ \text { (Contd) } \end{gathered}$ | 1-9 | Failure codes (Contd). <br> Processor status: |
| 2 |  | Processor status: |  |  |  |
|  | 0 | Off-line. On-line. |  | 1 | Processor status inconsistency. Unused. |
| 3 |  | Health code (hardware): |  |  |  |
|  | 0 |  |  | 11-19 | Double write flip-flop: <br> Double write FF cannot be cleared (CDBL fails). <br> Double write FF cannot be set (SDBL fails). <br> Unused. |
|  | 1 | Bad hardware. |  | 11 |  |
| 4 |  | Health code (soft B): |  |  |  |
|  | 0 1 | Healthy. <br> Major software problem. |  | 12 |  |
| 5 |  | Health code (soft A): <br> Healthy. <br> Minor software problem. |  | 13-19 |  |
|  |  |  |  | 21-29 | Memory update flip-flop: |
|  | 0 1 |  |  |  |  |
| 6 |  | Health code of other |  | $\begin{aligned} & 20 \\ & 21 \end{aligned}$ | Unused. <br> Memory update FF CF $=0$ after CMU. |
|  |  | processor (hardware): |  | 22 | Memory update FF cannot be cleared (CMU fails). |
|  | 0 | Healthy. |  |  |  |
|  | 1 | Bad hardware. |  | 23 | Memory update FF $\mathrm{CF}=0$ after SMU . |
| 7 |  | Health code of other processor (soft B): |  | 24 | Memory update FF cannot be set (SMU fails). |
|  | 01 | Healthy. <br> Major software problem. |  | 25-29 | Unused. |
|  |  |  |  | 31-39 | Read/write: |
| 8 |  | Health code of other processor (soft A): |  | 31 | Read double word $\mathrm{CF}=0$ on RWD of data X(5555). <br> Read double word $\mathrm{CF}=0$ on RWD of data X(AAAA). <br> Read double word CF $=0$ on RWD of data X(FFFF). |
|  | 0 | Healthy. |  | 32 |  |
|  | 1 | Minor software problem. |  |  |  |
| 9 | $0-99$ 0 | Failure codes. No failures. |  | 33 |  |

PROC 613 (R2V1 Only)

TABLE P. (Contd)

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FiEID | CODE | definition |
| $\begin{gathered} 9 \\ \text { (Contd) } \end{gathered}$ | 31-39 <br> 34 <br> 35 <br> 36 | Failure codes (Contd). <br> Read/write (Contd): <br> Read double word CF $=0$ on RWD of data X (0000). <br> Read double word data does not match X (5555). <br> Read double word data does not match | $\stackrel{9}{\text { (Contd) }}$ | 61-69 <br> 62 <br> 63 64-69 | Failure codes (Contd): <br> Parity (Contd): <br> Parity checker/generator failed on bad parity low byte test. <br> Parity checker/generator failed on bad parity high byte test. <br> Unused. |
|  |  | X (AAAA). |  | 70-96 | Unused. |
|  |  | does not match X (FFFF). |  | 97 | Unresolved duplication failure. |
|  |  | $\begin{aligned} & \text { does not match } \\ & \mathrm{X}(0000) . \end{aligned}$ |  | 98 | Duplication status register failure |
|  | 41-49 | Block transfer: |  | 99 | Off-line processor in process of reloading. |
|  | 42 <br> 43 | after DBLK. <br> Cannot read CF $=0$ <br> after RWD. <br> Data mismatch | 10 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Switch status: <br> Switch permitted. Switch not permitted. |
|  |  | off-line memories. Unused. | 11 |  | Failure per hour: |
|  | $\begin{gathered} 51-59 \\ 51 \\ 52-59 \end{gathered}$ | ID chip: <br> ID chip test failure. Unused. |  | 0-99 | Failure summary Sum of approximate number of failures per hour for all failing circuits. |
|  | $\begin{gathered} 61-69 \\ 61 \end{gathered}$ | Parity: <br> Parity checker/generator failed on good parity test. |  | 0-99 | Failure history Approximate number of failures per hour for displayed circuit. |

## PROC 613 (R2V1 Only) Test 1

TABLE P. (Contd)

| PROC 613FIELD DEFINITIONS AND CODES (Contd) |  |  |
| :---: | :---: | :---: |
| FIELD | CODE | definition |
| 12 | 0-17 | Failures began (hours ago): <br> Failure summary - Number of hours since the oldest individual failure (to the nearest hour). <br> Individual failure history Number of hours since failures started in the displayed circuit (to the nearest hour). |
| $\begin{gathered} 13-14 \\ 13 \\ 14 \end{gathered}$ | $\begin{gathered} 0-136 \\ 0-59 \end{gathered}$ | Most recent failure: <br> Hours ago. <br> Minutes ago. |
| 15 | $\begin{aligned} & 0 \\ & 1 \\ & 2 \\ & 3 \\ & 4 \end{aligned}$ | Failure code (periodic): <br> Passed. <br> Near end failure. Either end failure. Double write failure. Switch attempt failure. |

Three tests are available:

1. Test 1 - Displays failure history.
2. Test 2 - Displays processor status and health code of both processors, and tests the duplication channel.
3. Test 3-Allows updating of the memory and performs a soft switch of processors.

## Test 1

Test 1 provides a failure history of duplicate processor control and test failures.
Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 613, or is selected by use of NEXT TEST or the CHANGE FIELD sequence:
CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. A summary of the failure history is displayed.
4. If one or more failures occurred, the following is displayed:

Field 1-1.
Field 2 - Processor status ( $0=$ off-line, $1=$ on-line $)$.
Fields 11 through 14 - Failure history.
Field 15 - Failure code detected during periodic test.
5. To manually turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator) after Test 1 is executed at least once, perform the following:
Depress CLEAR DATA; EXECUTE
Note: Duplicate control and test alarmed entries in PMIDS are marked as resolved.
6. The OTHER FAILS fault indicator is turned off if no other sources affecting the same fault indicator exist.

## Test 2

Prior to performing Test 2, verify the following:

1. The MAAP is connected to the processor that is on-line, i.e., CCO or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 2 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF position.

Test 2 tests the duplication channel with five diagnostic tests.
Caution: The off-line processor may reload if a procedure is requested in the off-line processor while Test 2 is executing.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. To start Test 2, depress EXECUTE.
3. Depressing EXECUTE begins the diagnostic tests and brings up the following display:

Field 1-2.
Field 2 - Processor status ( $0=$ off-line, $1=$ on-line ).
Fields 3 through 8 - Health codes of both processors.
Field 9 - Failure code (if any).
4. Test 2 can be stopped and restarted by depressing:

## STOP; EXECUTE.

## PROC 613 (R2V1 Only) Test 2 and Test 3

5. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
6. When STOP is depressed, the results of the test are displayed in Field 9.

Zero (0) displayed in Field 9 - Indicates the test passed.
One (1) through 99 displayed in Field 9 - Indicates the test failed.
Note: If 99 is displayed in Field 12, Test 2 should be repeated when the off-line processor completes reloading.
7. The OTHER FAILS fault indicator is automatically turned off (indicating the duplicate processor alarm cause is resolved) when Test 2 passes and all other sources of the OTHER FAILS fault indicator are cleared.

## Test 3

Prior to performing Test 3 , verify the following:

1. The MAAP is connected to the processor that is on-line, i.e., CC0 or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 3 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF position.

Test 3 allows for the memory updating of the off-line processor and the soft switching of processors.
Caution: The off-line processor may reload if a procedure is requested in the off-line processor while Test 3 is executing.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. To start Test 3, depress EXECUTE.
3. Depressing EXECUTE allows operation of NEXT UNIT and displays the following: Field 1-3.

Field 2 - Processor status ( $0=$ off-line, $1=$ on-line $)$.
Fields 3 through 8 - Health code of both processors.
Field 9 - Failure code (if any).
Field 10 - Processor switch status.
4. Depressing NEXT UNIT enables a processor switch if the switch status displayed in Field 10 allows a switch to be made.
5. To perform a soft switch of processors, check the switch status in Field 10.

If Field 10 equals 1 , a soft switch cannot be performed.
Note: If a switch of processors is still required, a hard switch using the HALT/GO switch on the alarm panel must be used.

Caution: A hard switch causes a disruption of service.
6. If Field 10 equals 0 , a soft switch of processors is possible.

Depress NEXT UNIT to initiate the switch.
Note: Special error code 09 (PROC must run on on-line processor) is displayed in the MAAP error code field if NEXT UNIT is depressed while the MAAP is connected to the off-line processor. Special error code 80 (illegal switch attempt) is displayed in the MAAP error code field if NEXT UNIT is depressed and the off-line processor is unhealthy.
7. The WAIT indicator on the MAAP is lighted while the status memory is being transferred from the on-line memory to the off-line memory.
The PASS indicator (heartbeat) of the off-line common control goes off while the status memory is being transferred.
8. If, after the WAIT indicator turns off, the switch status in Field 10 equals 0 and Fields 2 through 8 and 12 are dashed, the switch is successful.

The PASS indicators on both common controls are flashing and the CC active indicator changes to the new on-line processor.
9. The processor is now off-line and the OTHER FAILS fault indicator is automatically turned off if a switch failure was its only cause.
10. The original off-line MAAP (if provided and connected to the alarm panel) displays PROC 613 Test 3 with a 1 displayed in Field 2 (processor status), 0's displayed in Fields 3 through 5 (health codes), and a 0 displayed in Field 10 (switeh status).

Note: The now on-line MAAP is operational, however any translation or mathtenance procedure (including PROC 613) to be used must be called in.
11. If the switch failed, indicated by a 1 displayed in Fields 2 and 12 (processor status and failure code) the off-line processor is probably reloading.

After the off-line processor has reloaded (as the result of a switch failure), select Test 2 , depress EXECUTE and check the status of the duplication channel.

## Repair Guide

When a duplicate processor control and test failure is indicated, PROC 613 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, or when a soft switch is attempted and fails, perform the following steps, in the order listed, to isolate and repair the faulty unit.

## PROC 613 (R2V1 Only)

Prior to performing the repair procedure, verify the following:

1. The MAAP is connected to the processor that is on-line, i.e., CCO or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 2 or 3 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF position.

Caution: The off-line processor may reload if a procedure is requested in the off-line processor while Test 2 or 3 is executing.

## Duplicate processor control and test failure indicated

1. Execute Test 1 and record the failure history including the specific fault code for each failure.
2. Execute Test 2 and record the failure codes (if any).
3. If no failures are recorded in Test 2, attempt a soft switch of processors using Test 3.

If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).

If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
4. If the soft switch fails, proceed to Step 2 of the Soft switch failure indicated repair procedure (listed below).
5. When failures are recorded, refer to Table Q, PROC 613 - Duplicate Processor Control and Test Repair Procedure, and perform the corrective action indicated for the failure code recorded.
6. After circuit pack replacement, use PROC 612 to clear the health code of the off-line processor.
7. Enter PROC 613 Test 3, and attempt a soft switch.
8. If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).

If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
9. If Test 2 or the soft switch fails, repeat Steps 5 through 8 until all circuit packs listed in Table Q, PROC 613 - Duplicate Processor Control and Test Repair Procedure for the failure code recorded are replaced.

If the soft switch still fails, and Test 2 passes, perform Steps 2 through 6 of the Soft switch failure indicated repair procedure (listed below).

If Test 2 still fails, check the wiring associated with the circuit packs replaced and the alarm panel.

TABLE $\mathbf{Q}$.

| PROC 613 <br> DUPLICATE PROCESSOR CONTROL AND test repair procedure |  |
| :---: | :---: |
| fallure CODE | CORRECTIVE ACtion |
| 1 | Replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. UN158 in the off-line processor. <br> B. UN158 in the on-line processor. <br> C. Cabling between the UN158 circuit packs. <br> D. TN491 in the on-line processor. |
| $\begin{gathered} 11,12, \\ 51,61 \\ \text { through } \\ 63, \\ \text { and } 98 \end{gathered}$ | Replace UN158 in the on-line processor. |
| $\begin{gathered} 21 \\ \text { through } \\ 24 \end{gathered}$ | Replace UN151 in the on-line processor. |
| 31 through 34, 41, and 42 | Perform the necessary checking, then replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. Investigate off-line common control failures using PROC 600 (Unit type 4). Take corrective action as appropriate. <br> B. UN158 in the off-line processor. <br> C. UN158 in the on-line processor. <br> D. Cabling between the UN158 circuit packs. |
| 35 <br> through <br> 38,43 , <br> and 97 | Replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. UN158 in the off-line processor. <br> B. UN158 in the on-line processor. <br> C. Cabling between the UN158 circuit packs. |
| 99 | Stop and re-execute Test 2 after the off-line processor has completed reloading. |

## PROC 613 (R2V1 Only)

## Soft switch failure indicated

1. Execute Test 2 and record the results.

If Test 2 fails, perform steps 4 through 9 of the Duplicate processor control and test failure indicated repair procedure (above).
2. If the fault was not found in Test 2, replace the following circuit packs in the order listed:

UN158 - In the off-line processor.
UN158 - In the on-line processor.
3. After each circuit pack replacement, use PROC 612 to clear the health code of the off-line processor.
4. Enter PROC 613 Test 3, and attempt a soft switch.
5. If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).

If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
6. If Test 2 or the soft switch fails, repeat Steps 3 through 5 until all circuit packs listed in Step 2 are replaced.
If Test 2 or the soft switch still fails, refer to Specific Fault Codes for further isolation techniques.

## Soft A or Soft B

After all repair actions are performed and soft A or soft B failure indications are still displayed (1 in Fields 4, 5, 7, and/or 8), execute PROC 600 Test 2 to determine if any common control problems exist.

PROC 613 (R2V2 Only)

## PROC 613 - DUPLICATE PROCESSOR CONTROL AND TEST (R2V2 ONLY)



\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline \multicolumn{18}{|l|}{FLIPCHART ISSUE 2} \\
\hline \multicolumn{5}{|l|}{TEST 1: DISPLAYS FAILURE HISTGRY. USE 'CLEAR DATA'. 'execute to retire alarm. USE 'NEXT FAULI' to display NEXT FAILURE, USE 'NEXT data' to display strap index.} \& \multicolumn{5}{|l|}{\begin{tabular}{l}
TEST 2: TESTS THE DUPLICATION CHANNEL AND DISPLAYS FAILURE CODE IN FIELD 12. USE ONLY IN ONL INE PROCESSOR. \\
test 3: displays health code of BOTH PROCESSORS. USE 'NEXT UNIT' TO SWITCH PROCESSORS IF SHITCH STATUS PERMITS.
\end{tabular}} \& \multicolumn{6}{|l|}{} \& \multicolumn{2}{|l|}{\[
\begin{aligned}
\hline 97= \& \text { UNRESOLVED } \\
\& \text { DUPLICAION } \\
\& \text { FAILURE } \\
98= \& \text { DUPLICATION SIATUS } \\
\& \text { REGISIER } \\
\mathbf{9 9}= \& \text { OFFLINE PRGCESSOR } \\
\& \text { RELOAD }
\end{aligned}
\]} \\
\hline  \&  \& TH C \& ODE \&  \&  \&  \&  \&  \& FAIL
cod

1 \& + 12 \& TIMES
FAILES \&  \& DAY

1 \& Strap \& Minute \& \& COMMON CONTROL TESTS 613 <br>
\hline
\end{tabular}

## Purpose

PROC 613 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from a duplicate processor control and test failure.
PROC 613 is used to:

1. Display duplication channel failures.
2. Perform various tests on the duplication circuitry in both processors.
3. Initiate a soft switch from the on-line processor.

## Field Definitions and Codes

Each field of PROC 613 flipchart and the possible displays for the fields during execution of the different tests are defined in Table R, PROC 613 - Field Definitions and Codes.

Field 1 is an optional input field for changing the test number to be executed.

## PROC 613 (R2V2 Only)

TABLER.

| PROC 613 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | $\begin{gathered} 9 \\ \text { Contd } \end{gathered}$ | 2 | Minor. |
| 2 | 01 | Processor status: <br> Off-line. <br> On-line. |  | 3 | Warning. |
|  |  |  |  | 4 | Errors recorded. |
| 3 |  |  |  | 5 | Alarm resolved. |
|  | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Health code (hardware): <br> Healthy. <br> Bad hardware. | 10 | 01 | Switch status: <br> Switch permitted. <br> Switch not permitted. |
| 4 |  | Health code (soft B): <br> Healthy. <br> Major software problem. |  |  |  |
|  | $0$ |  | 11 | 1-6 | Fault index: <br> Index into failure table. |
| 5 |  | Health code (soft A): <br> Healthy. <br> Minor software problem. |  |  |  |
|  | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ |  | 12 | $\begin{aligned} & 899- \\ & 988 \end{aligned}$ | Specific fault code (Test 1 only). |
| 6 | 01 | Health code of other processor (hardware): <br> Healthy. <br> Bad hardware. |  | 0-99 | Failure codes (Test 2 and 3 Only). |
|  |  |  |  | 0 | No failures. |
|  |  |  |  | 1-9 | Processor status: |
| 7 | 0 | Health code of other processor (soft B): <br> Healthy. <br> Major software problem. |  | 1 2-9 | Processor status inconsistency. Unused. |
|  | 1 |  |  | 11-19 | Double write flip-flop: |
| 8 | $0$ | Health code of other processor (soft A): <br> Healthy. <br> Minor software problem. |  | 11 | Double write FF cannot be cleared (CDBL fails). <br> Double write FF cannot be set (SDBL fails). <br> Unused. |
| 9 | $\begin{gathered} 1-5 \\ 1 \end{gathered}$ | Alarm status. Major. |  | 13-19 |  |

TABLER. (Contd)

| $\text { PROC } 613$ <br> FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | DEFINITION |
| 12 <br> Contd | 21-29 <br> 21 <br> 22 <br> 23 <br> 24 <br> 25-29 | Failure codes (Contd). <br> Memory update flip-flop: <br> Memory update FF $\mathrm{CF}=0$ after CMU. <br> Memory update FF cannot be cleared (CMU fails). <br> Memory update FF CF $=0$ after SMU. <br> Memory update FF cannot be set (SMU fails). <br> Unused. | $\begin{gathered} 12 \\ \text { Contd } \end{gathered}$ | $\begin{gathered} 41-49 \\ 41 \\ 42 \\ 43 \\ \\ 44-49 \\ \hline 51-59 \\ 51 \\ 52-59 \end{gathered}$ | Block transfer: <br> Block XFER CF $=0$ after DBLK. <br> Cannot read $\mathrm{CF}=0$ after RWD. <br> Data mismatch between on-line and off-line memories. <br> Unused. <br> ID chip: <br> ID chip test failure. <br> Unused. |
|  | 31-39 <br> 31 <br> 32 <br> 33 <br> 34 | Read/write: <br> Read double word CF $=0$ on RWD of data X(5555). <br> Read double word $C F=0$ on RWD of data X(AAAA). <br> Read double word $\mathrm{CF}=0$ on RWD of data X(FFFF). <br> Read double word $\mathrm{CF}=0$ on RWD of data X (0000). <br> Read double word data does not match X (5555). <br> Read double word data does not match X (AAAA). <br> Read double word data does not match X (FFFF). <br> Read double word data does not match X (0000). <br> Unused. |  | 61-69 <br> 61 <br> 62 <br> 63 64-69 | Parity: <br> Parity checker/generator failed on good parity test. <br> Parity checker/generator failed on bad parity low byte test. <br> Parity checker/generator failed on bad parity high byte test. <br> Unused. |
|  | 35 |  |  | 71-95 | Unused. |
|  | 36 |  |  | 96 | Off-line DCIU not initialized |
|  | 37 |  |  | 97 | Unresolved duplication failure. |
|  | 38 |  |  | 98 | Duplication status register failure. |
|  | 39 |  |  | 99 | Off-line processor in process of reloading. |

PROC 613 (R2V2 Only)

TABLE R. (Contd)

| FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :--- | :---: | :---: | :--- |

## Operation of Procedure

## Overview

PROC 613 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a duplicate processor control and test failure.
To call in PROC 613, perform the following:

1. Depress PROC NO; 613; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1-Displays failure history.
2. Test 2 - Displays processor status and health code of both processors, and tests the duplication channel.
3. Test 3 - Allows updating of the memory and performs a soft switch of processors.

## Test 1

Test 1 provides a failure history of duplicate processor control and test failures.
Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 613, or is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. A summary of the failure history is displayed.

If no failures (or entries with errors recorded) occurred, the summary displays a 1 in Field 1, a 0 in Field 11 (fault index), and all other fields are dashed.

If one or more failures (or entries with errors recorded) occurred, the summary displays a 1 in Field 1, the total number of failures in Field 11, and all other fields are dashed.
4. The failure history is displayed in alarm order severity. All major alarm failures are displayed first, then entries with errors recorded are displayed.
5. Depressing NEXT FAULT displays the first failure (or entry with errors recorded) as follows:

Field 1-1.
Field 2-Processor status ( $0=$ off-line, $1=$ on-line $)$.
Fields 3 through 8 - Dashed.
Field 9 - Alarm status of displayed failure ( $1=$ major or $4=$ errors recorded).
Field 10 - Dashed.
Field 11 - Total number of failures (maximum of 6).
Field 12 - Specific fault code.
Field 13 - Total number of times the specific fault code displayed in Field 12 occurred.
Field 14-Stamp index of 1 if alarmed status displayed in Field $9=4$ (errors recorded) or 3 if alarmed status displayed in Field $9=1$ (major).

Note: A 1 in Field 14 indicates that Fields 15 through 17 display the time the last error was recorded for the displayed failure. A 3 in Field 14 indicates that Fields 15 through 17 display the time the failure was alarmed.

Fields 15 through 17 - Day, hour, änd minute the last error for the displayed failure was recorded in PMIDS or the displayed failure was alarmed.
6. Depressing NEXT DATA changes the stamp index and time stamp. Field 14 (stamp index) displays a 2 indicating that the time displayed in Fields 15 through 17 is the time the first error was recorded for the displayed failure.

If the displayed failure is alarmed (indicated by a 1 displayed inn Field 9), depressing NEXT DATA once more changes the stamp index and time stamp. Field 14 (stamp index) displays a $l$ indicating that the time displayed in Fields 15 through 17 is the time the last error was recorded for the displayed failure.

## PROC 613 (R2V2 Only) Test 1 and Test 2

If the displayed failure is not alarmed, depressing NEXT DATA again cycles back to the initial display providing a stamp index of 1 or 3 in Field 14, and the time the last error was recorded or the displayed failure was alarmed in Fields 15 through 17.
7. Depressing NEXT FAULT repeatedly displays the remaining failures in the PMIDS error log.

Each time NEXT FAULT is depressed, Field 11 is decremented by 1 to show the number of remaining failures to be displayed.
The fault index (Field 11) includes in its count the failure currently being displayed.
8. NEXT DATA can be used to display the stamp index for each failure in the PMIDS error $\log$.
9. Depressing NEXT FAULT after all failures are displayed dashes Fields 2 through 17.

Depressing NEXT FAULT again causes the display sequence to start over beginning with the summary.
10. The CLEAR DATA, EXECUTE sequence is used to manually resolve individual alarmed duplicate processor control failures after EXECUTE is used to initiate Test 1.

Note: When alarmed failures are resolved the circuits' failure history is not deleted from the PMIDS error log. The failure history is updated to show that the alarm status now equals 5 (alarm resolved).
11. To resolve individual alarmed failures with an alarm status of 1 , perform the following:

Use NEXT FAULT to display the alarmed failure on the MAAP.
Requirement: Individual duplicate processor control failures cannot be resolved unless the failure is displayed on the MAAP.

Depress CLEAR DATA; EXECUTE.
12. Field 9 (alarm status) displays a 5 indicating that the duplicate processor control failure in PMIDS is marked as resolved.

The OTHER FAILS fault indicator is turned off if no other sources affecting the same fault indicator exist.

## Test 2

Prior to performing Test 2, verify the following:

1. The MAAP is connected to the processor that is oflline, i.e., CCO or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 2 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF positi,n.

Test 2 tests the duplication channel with five diagnostic tests.
Caution: The off-line processor may reload if a procedure is requested in the off-line processor while Test 2 is executing.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 2; ENTER.

2. To start Test 2, depress EXECUTE.
3. Depressing EXECUTE begins the diagnostic tests and brings up the following display:

Field 1-2.
Field 2 - Processor status ( $0=$ off-line, $1=$ on-line ).
Fields 3 through 8 - Health codes of both processors.
Field 12 - Dashed or failure code.
4. Test 2 can be stopped and restarted by depressing:

STOP; EXECUTE.
5. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
6. When STOP is depressed, the results of the test are displayed in Field 12.

Zero (0) displayed in Field 12 - Indicates the test passed.
One (1) through 99 displayed in Field 12 - Indicates the test failed.
Note: If 99 is displayed in Field 12, Test 2 should be repeated when the off-line processor completes reloading.
7. The OTHER FAILS fault indicator is automatically turned off (indicating the duplicate processor alarm cause is resolved) when Test 2 passes and all other sources of the OTHER FAILS fault indicator are cleared.

## Test 3

Prior to performing Test 3 , verify the following:

1. The MAAP is connected to the processor that is on-line, i.e., CCO or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 3 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF position.

Test 3 allows for the memory updating of the off-line processor and the soft switching of processors.

## Caution: The off-line processor may reload if a procedure is requested in the off-line

 processor while Test 3 is executing.1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. To start Test 3, depress EXECUTE.
3. Depressing EXECUTE allows operation of NEXT UNIT and displays the following:

Field 1-3.
Field 2 - Processor status ( $0=$ off-line, $1=$ on-line ).
Fields 3 through 8 - Health code of both processors.
Field 10 - Processor switch status.
Field 12 - Dashed or failure code.
4. Depressing NEXT UNIT enables a processor switch if the switch status displayed in Field 10 allows a switch to be made.
5. To perform a soft switch of processors, check the switch status in Field 10.

If Field 10 equals 1 , a soft switch cannot be performed.
Note: If a switch of processors is still required, a hard switch using the HALT/GO switch on the alarm panel must be used.

Caution: A hard switch causes a disruption of service.
6. If Field 10 equals 0 , a soft switch of processors is possible.

Depress NEXT UNIT to initiate the switch.
Note: Special error code 09 (PROC must run on on-line processor) is displayed in the MAAP error code field if NEXT UNIT is depressed while the MAAP is connected to the off-line processor. Special error code 80 (illegal switch attempt) is displayed in the MAAP error code field if NEXT UNIT is depressed and the off-line processor is unhealthy.
7. The WAIT indicator on the MAAP is lighted while the status memory is being transferred from the on-line memory to the off-line memory.
The PASS indicator (heartbeat) of the off-line common control goes off while the status memory is being transferred.
8. If, after the WAIT indicator turns off, the switch status in Field 10 equals 0 and Fields 2 through 8 and 12 are dashed, the switch is successful.

The PASS indicators on both common controls are flashing and the $\mathbf{C C}$ active indicator changes to the new on-line processor.
9. The processor is now off-line and the OTHER FAILS fault indicator is automatically turned off if a switch failure was its only cause.
10. The original off-line MAAP (if provided and connected to the alarm panel) displays PROC 613 Test 3 with a 1 displayed in Field 2 (processor status), 0's displayed in Fields 3 through 5 (health codes), and a 0 displayed in Field 10 (switch status).

Note: The now on-line MAAP is operational, however any translation or maintenance procedure (including PROC 613) to be used must be called in.
11. If the switch failed, indicated by a 1 displayed in Fields 2 and 12 (processor status and failure code) the off-line processor is probably reloading.

After the off-line processor has reloaded (as the result of a switch failure), select Test 2, depress EXECUTE and check the status of the duplication channel.

## Repair Guide

When a duplicate processor control and test failure is indicated, PROC 613 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, or when a soft switch is attempted and fails, perform the following steps, in the order listed, to isolate and repair the faulty unit.

Prior to performing the repair procedure, verify the following:

1. The MAAP is connected to the processor that is on-line, i.e., CCO or CC1.
2. The off-line processor is not halted.
3. An off-line procedure is not in the off-line processor.

Note: Test 2 or 3 may block transfer into the off-line processor's MAAP procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.
4. The LOCK ON LINE switch on the alarm panel is set to the OFF position.

Caution: The off-line processor may reload if a procedure is requested in the off-line processor while Test 2 or 3 is executing.

## Duplicate processor control and test failure indicated

1. Execute Test 1 and record the failure history including the specific fault code for each failure.
2. Execute Test 2 and record the failure codes (if any).
3. If no failures are recorded in Test 2, attempt a soft switch of processors using Test 3.

If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).
If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
4. If the soft switch fails, proceed to Step 2 of the Soft switch failure indicated repair procedure (listed below).
5. When failures are recorded, refer to Table S, PROC 613 - Duplicate Processor Control and Test Repair Procedure, and perform the corrective action indicated for the failure code recorded.

PROC 613 (R2V2 Only)

TABLE $S$.

| DUPLICATE PROCESSOR CONTROL AND TEST REPAIR PROCEDURE |  |
| :---: | :---: |
| fallure CODE | CORrective action |
| 1 | Replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. UN158 in the off-line processor. <br> B. UN158 in the on-line processor. <br> C. Cabling between the UN158 circuit packs. <br> D. TN491 in the on-line processor. |
| 11, 12, <br> 51, 61 <br> through 63 , and 98 | Replace UN158 in the on-line processor. |
| $\stackrel{21}{\text { through }}$ $24$ | Replace UN151 in the on-line processor. |
| 31 through 34, 41, and 42 | Perform the necessary checking, then replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. Investigate off-line common control failures using PROC 600 (Unit type 4). Take corrective action as appropriate. <br> B. UN158 in the off-line processor. <br> C. UN158 in the on-line processor. <br> D. Cabling between the UN158 circuit packs. |
| 35 through 38,43 , and 97 | Replace the following components in the order listed, testing after each replacement, until the failure is corrected: <br> A. UN158 in the off-line processor. <br> B. UN158 in the on-line processor. <br> C. Cabling between the UN158 circuit packs. |
| 96 | Check off-line DCIU status using PROC 650. |
| 99 | Stop and re-execute Test 2 after the off-line processor has completed re-loading. |

6. After circuit pack replacement, use PROC 612 to clear the health code of the off-line processor.
7. Enter PROC 613 Test 3, and attempt a soft switch.
8. If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).

If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
9. If Test 2 or the soft switch fails, repeat Steps 5 through 8 until all circuit packs listed in Table S, PROC 613 - Duplicate Processor Control and Test Repair Procedure for the failure code recorded are replaced.

If the soft switch still fails, and Test 2 passes, perform Steps 2 through 6 of the Soft switch failure indicated repair procedure (listed below).

If Test 2 still fails, refer to Specific Fault Codes for further isolation techniques.

## Soft switch failure indicated

1. Execute Test 2 and record the results.

If Test 2 fails, perform steps 4 through 9 of the Duplicate processor control and test failure indicated repair procedure (above).
2. If the fault was not found in Test 2, replace the following circuit packs in the order listed:

UN158 - In the off-line processor.
UN158 - In the on-line processor.
3. After each circuit pack replacement, use PROC 612 to clear the health code of the off-line processor.
4. Enter PROC 613 Test 3, and attempt a soft switch.
5. If the soft switch is successful, repeat Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator).

If Test 2 passes, corrective action is complete and the duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
6. If Test 2 or the soft switch fails, repeat Steps 3 through 5 until all circuit packs listed in Step 2 are replaced.
If Test 2 or the soft switch still fails, refer to Specific Fault Codes for further isolation techniques.

## Soft A or Soft B

After all repair actions are performed and soft $A$ or soft $B$ failure indications are still displayed (1 in Fields 4, 5, 7, and/or 8), execute PROC 600 Test 2 to determine if any common control problems exist.

## Specific Fault Codes

A specific fault code is a number used to provide a description of a failure.

1. This description provides more detail about the failure associated with a circuit.
2. Specific fault codes are recorded during periodic or time available testing in PMIDS.

## PROC 613 (R2V2 Only)

Table T, PROC 613 - Specific Fault Code Definitions, lists the specific fault codes in numerical sequence with a definition for each specific fault code.

Further isolation of a failure may be accomplished as follows:

1. Analyze the specific fault codes recorded from PMIDS.
2. Determine from the specific fault codes recorded (using Table T, PROC 613-Specific Fault Code Definitions), if any additional corrective action can be performed (i.e., cabling, connectors, etc.).
3. Check the wiring associated with the circuit pack(s) and/or components replaced (point to point depending upon specific fault codes recorded).

PROC 613 (R2V2 Only)

TABLE T.

| PROC 613 - SPECIFIC FAULT CODE DEFINITIONS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| fault CODE | скт ${ }^{1}$ | CKT 2 | ckt 3 | definition |
| 899 | UN158 |  |  | UNABLE TO SWITCH COMMON COMMONS |
| 934 | UN158 |  |  | PERIODIC SWITCH OF COMMON CONTROL FAILED |
| 974 | UN158 |  |  | APPEMPT TO SWITCH BECAUSE OF I/O FAILURES FAILED |
| - 975 | $\begin{aligned} & \text { UN158/F } \\ & {[1]} \end{aligned}$ | UN158/N <br> [2] | CABLE | UN158 DOUBLE WRITE FAILURE ERROR FLAG FOUND BY THE MAINTENANCE PERIODIC TEST |
| - 976 | $\begin{gathered} \text { UN158/F } \\ {[1]} \end{gathered}$ | UN158/N <br> [2] | CABLE | UN158 INSTRUCT FAR PROCESSOR FAILURE OR READ DOUBLE WORD FAILURE ERROR FLAG FOUND BY THE MAINTENANCE PERIODIC TEST |
| - 977 | $\begin{aligned} & \text { UN158/F } \\ & {[1]} \end{aligned}$ | UN158/N <br> [2] | CABLE | UN158 NEAR END FAILURE ERROR FLAG FOUND BY THE MAINTENANCE PERIODIC TEST |
| 978 | $\begin{gathered} \mathrm{UN} 158 / \mathrm{F} \\ {[1]} \end{gathered}$ | UN158/N <br> [2] | CABLE | UN158 DOUBLE WRITE FAILURE ERROR FLAG SET BY THE MAINTENANCE PERIODIC TEST |
| 979 | $\begin{gathered} \text { UN158/F } \\ \hline \text { [1] } \end{gathered}$ | UN158/N <br> [2] | CABLE | UN158 INSTRUCT FAR PROCESSOR FAILURE OR READ DOUBLE WORD FAILURE ERROR FLAG SET BY THE MAINTENANCE PERIODIC TEST |
| 980 | $\begin{gathered} \text { UN158/F } \\ {[1]} \end{gathered}$ | UN158/N <br> [2] | CABLE | UN158 NEAR END FAILURE ERROR FLAG SET BY THE MAINTENANCE PERIODIC TEST |
| 981 | UN158/N <br> [2] |  |  | UNABLE TO SET DOUBLE WRITE CAPABILITY |
| - 982 | $\underset{[2]}{\mathrm{UN} 158 / \mathrm{N}}$ | $\begin{aligned} & \text { UN158/F } \\ & \text { [1] } \end{aligned}$ | CABLE | READ DOUBLE WORD INSTRUCTION FAILED BY RETURNING A CONDITION FLAG OF ZERO |
| 983 | $\begin{gathered} \mathrm{UN} 158 / \mathrm{F} \\ {[1]} \end{gathered}$ | UN158/N <br> [2] | CABLE | READ DOUBLE WORD INSTRUCTION FAILED TO EXECUTE PROPERLY, SETTING THE READ DOUBLE WORD FAILURE ERROR FLAG |
| 984 | $\begin{gathered} \text { UN158/F } \\ {[1]} \end{gathered}$ | UN158/N <br> [2] | CABLE | DOUBLE WRITTEN TEST VECTOR FAILED THE ECHO CHECK |
| 985 | UN158/N $[2]$ |  |  | UNABLE TO CLEAR THE STATUS REGISTER |

PROC 613 (R2V2 Only)

TABLE T. (Contd)

| PROC 613 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| faut CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 986 | UN158/N [2] |  |  | UN158 CONTROL REGISTER AND STATUS REGISTER DISAGREE AS TO DOUBLE WRITE STATUS |
| 987 | $\begin{gathered} \text { UN158/N } \\ {[2]} \end{gathered}$ |  |  | UNABLE TO READ THE UN158 DOUBLE WRITE SELECT REGISTER |
| 988 | UN158/N <br> [2] |  |  | UNABLE TO WRITE TO THE UN158 DOUBLE WRITE SELECT REGISTER |

[1] $F=F A R$ END OF THE DUPLICATION CHANNEL (MOST LIKELY IN THE OFF-LINE COMMON CONTROL)
[2] $\mathrm{N}=\mathrm{NEAR} \mathrm{END} \mathrm{OF} \mathrm{THE} \mathrm{DUPLICATION} \mathrm{CHANNEL} \mathrm{(MOST} \mathrm{LIKELY} \mathrm{IN} \mathrm{THE} \mathrm{ON-LINE}$ COMMON CONTROL)

PROC 614 - MEMORY READ/MEMORY MATCH TESTS



## Purpose

PROC 614 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the MEM and/or CACHE MEMORY fault indicator(s) resulting from a memory and/or cache failure.

PROC 614 is used when the mismatch flag is set or to read the contents of a memory location.

## PROC 614

The mismatch flag is set when any of the following conditions exist:

1. The on-line memory comparison test detects a mismatched memory condition.
2. A double write operation fails to function correctly.
3. The run tape program detects a mismatch.

PRÓC 614 tests main and cache memory subsystems:

1. All main memory circuit packs and the processor memory interface are tested.
2. The cache memory circuit pack is tested.

## Field Definitions and Codes

Each field of PROC 614 flipchart and the possible displays for the fields during execution of the different tests are defined in Table U, PROC 614 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 and 3 - Select a specific memory block and address within the memory block to begin testing (Tests 3 through 5 only).
3. Field 3 - Select a specific cache superset to test (Test 6) only.
4. Field 4 - Select a specific memory block to end the test (Tests 4 and 5 only).

## Operation of Procedure

## Overview

PROC 614 is used to determine the cause of the MEM and/or CACHE MEMORY fault indicator(s) being lighted resulting from a memory or cache failure.

To call in PROC 614, perform the following:

1. Depress PROC NO; 614; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 , and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Six tests are available:

1. Test 1 - Displays main memory and cache memory failures detected by the on-line memory read/memory match and cache memory programs.
2. Test 2 - Provides a picture of the switch's overall memory (main and cache) health.
3. Test 3 - Provides specific groups of unbroken failure blocks and displays the contents of each of the failed main memory locations within the failed block for each processor.
4. Test 4 - Allows continuous testing of a specified range of main memory locations.
5. Test 5 - Reads the contents of any main memory location, or any range of main memory locations, for each processor in a duplicated switch.
6. Test 6 - Tests a specified range of supersets of cache memory.

TABLE U.

| PROC 614 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FiELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1-6 | Test number. | $\begin{gathered} 7 \\ \text { (Contd) } \end{gathered}$ | 67 | Patch and translation. Program, patch, and translation. Other. |
| 2 | 0-77 | Octal memory block number $(1 \text { block }=256 \mathrm{~K}) \text {. }$ |  |  |  |
| 3 | $\begin{gathered} 0- \\ 777777 \\ 0-255 \end{gathered}$ | Octal address within the memory block of field 2 . <br> Cache superset failing in decimal. |  | $\begin{array}{r} 8 \\ 9 \\ 10 \\ 11 \end{array}$ | Program and other. Patch and other. Program, patch and other. |
| 4 | 0-77 | Octal memory block number $(1 \text { block }=256 \mathrm{~K}) .$ |  | 14 | Translation and other. Program, translation and other. <br> Patch, translation and other. <br> Program, patch, translation and other. |
| 5 |  | Processor memory is being read from: |  | 15 |  |
|  | 0 1 | On-line common control. <br> Off-line common control. | 8 | 0-77 | Total failed blocks (Test 2); total failed blocks which are displayed at the completion of the test (Test 3 ). |
| 6 | 016777215 <br> 0 177777 | Total number of failed words in decimal (Test 2); total number of failed words in decimal which displays upon test completion (T'est 3). <br> Octal contents of memory location in fields 2 and 3 are displayed when NEXT DATA is pressed (Test 3); octal contents of memory location in fields 2 and 3 are displayed when EXECUTE or NEXT DATA is pressed (Test 5). |  | $\begin{array}{r} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \end{array}$ | Failure code (Tests 1, 3, 4, and 6): <br> No failures. <br> Memory mismatches. <br> Parity errors. <br> Memory scrub error. <br> Duplication channel <br> errors. <br> Memory I/O errors. Memory ID chip errors. Parity check errors. Hard failure. ECC turned off. Cache not present. Cache turned off. Cache ID chip error. |
| 7 | $\begin{aligned} & 1 \\ & 2 \\ & 3 \\ & 4 \\ & 5 \end{aligned}$ | Memory area code: <br> Program only. <br> Patch only. <br> Program and patch. <br> Translation only. <br> Program and translation. |  | 13 <br> 14 <br> 15 <br> 16 <br> 17 | Less than $50 \%$ supersets failed. <br> $50 \%$ or more supersets failed. <br> Tag/valid error counter failure. <br> Cache I/0 failure. Cache invalidation failure. |

## PROC 614 Test 1

Tests 2 and 3 perform an ID chip and parity check test on each memory circuit pack.
Tests 2 through 4 (memory match tests) compare the contents of corresponding locations in duplicated common controls. The range of memory compared in Tests 2 through 4 is restricted to the program, patch, and translation areas.

In addition, Tests 2 through 4 perform a hard fault test over the full range of main memory.
Test 5 is not restricted and displays the contents of memory to be read over the full range of main memory.
All tests can be executed on an unduplicated switch. For an unduplicated switch, Tests 2 through 4 do not perform the memory comparison test.

## Test 1

Test 1 provides a history of all failed memory locations (main and cache) recorded by the on-line memory read/memory match and cache memory programs.
Test 1 can also be used to manually turn off the MEM and/or CACHE MEMORY fault indicator(s).

1. Test 1 is the default test when entering PROC 614, or is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. To start Test 1, depress EXECUTE.
3. If the on-line program has not detected memory (main and cache) failures, a 0 is displayed in Field 8.
4. If failures are recorded, the following summary is displayed:

Field 1-1.
Fields 2 through 7 - Dashed.
Field 8 - Total failed blocks recorded.
5. Depressing NEXT FAULT displays the first failure as follows:

Field 1-1.
Field 2 - Starting block number or dashed.
Field 3-0 (main memory location for block number displayed in Field 2) or 1-255 (cache superset indicator).

Fields 4 through 7 - Dashed.
Field 8 - Failure code.
Note: Main memory failures are displayed first then cache memory failures. If no main memory failures are recorded, the initial display is a cache failure.
6. Depressing NEXT FAULLT repeatedly displays the remaining failures.

When all failures are displayed, Fields 2 through 8 are dashed.
Depressing NEXT FAULT once more starts the sequence over displaying the failure summary.
7. Depressing NEXT UNIT when the summary is displayed or after displaying the first main memory failure (etc.) displays cache memory failures (if any).

Depressing NEXT UNIT when the summary is displayed decrements Field 8 corresponding to the number of main memory failures passed over (if any).

NEXT FAULT is used to display the cache memory failures.
8. To manually turn off the MEM and/or CACHE MEMORY fault indicator(s) after Test 1 is executed at least once, perform the following:
Depress NEXT FAULT until a summary is displayed (Field $]=1$, Field $8=$ total number of failures and all other fields are dashed).

Depress CLEAR DATA; EXECUTE.

Note: Memory read/memory match failures are marked as resolved in PMIDS.

## Test 2

Test 2 performs an ID chip and parity check test, then runs a single pass test of all testable main memory. If the common control is duplicated, a comparison of the two memories is performed by Test 2.

A memory area code (Field 7) indicates the area of memory where the failures occurred (i.e., program, patch, translation, other, or any combination of the four areas).
Test 2 automatically turns off the MEM and/or CACHE MEMORY fault indicator(s) when all testable main memory locations are tested successfully.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 2; ENTER.

2. When Test 2 is initially called in, Fields 2 and 3 display a 0 (first block and address in memory) and Field 4 displays the last memory block in the switch.
3. To start Test 2, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
Note: Test 2 takes approximately 5 minutes to test each block of 256 K words. The total amount of time for Test 2 depends on the memory configuration of the switch (i.e., approximately 5 minutes times the number of 256 K blocks).
4. While Test 2 is executing, Field 3 (address within the main memory block being tested) is updated every second.
5. The following fields are updated every second if failures occur:

Field 6 - Number of failed words.
Field 7 - Area of memory where the failure occurred.
Field 8 - Number of failed blocks.
Note: Field 2 (memory block) is updated when a memory block is tested (approximately every 5 minutes).

## PROC 614 Test 2 and Test 3

6. When Test 2 is completed, the WAIT indicator turns off and the following summary is displayed:

## Field 1-2.

Fields 2 and 3 - Memory location of last location tested (block number and address in block).
Field 4 - Last memory block tested (equal to last memory block in the switch configuration).
Field 5 - Dashed.
Field 6 - Total number of failed words (if any).
Field 7 - Area of memory where the failure occurred (if any).
Field 8 - Total number of failed blocks (if any).
Note: Special error code 74 (memory match test not performed) is displayed in the MAAP error code field when Test 2 is performed on an unduplicated switch, indicating that tests other than the memory match test was performed.
7. If all testable memory locations are tested successfully 0 s are displayed in Fields 6 and 8.
8. Special error code 82 (use PROC 613 to clear duplication channel failures) is displayed in the MAAP error code field after Test 2 completes if failure code 4 (duplication channel error) is detected.

Note: PROC 613 is used to correct duplication channel errors.
9. Depressing STOP, while Test 2 is executing, halts the test and displays the last memory block and memory address in the block tested in Fields 2 and 3. Field 4 displays the last testable memory block in the switch configuration.
Field 6 displays the total number of failed words (if any), and Field 8 displays the total number of failed blocks (if any).
10. Depressing EXECUTE after depressing STOP starts Test 2 over from the beginning of memory.
11. The MEM and/or CACHE MEMORY fault indicator(s) is automatically turned off when Test 2 completes with no failures detected for all testable main memory locations.

## Test 3

Test 3 is used to test all main memory locations of the program, patch, translation, and other areas from the first memory location to the end of testable memory. Test 3 also performs an ID chip and parity check test.
Test 3 stops when a contiguous block of failed main memory locations is identified. (A contiguous block may be as small as one memory location or as large as all of testable main memory.)

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. When Test 3 is initially called in, Fields 2 and 3 display a 0 (first block and address in memory) and Field 4 displays the last memory block in the switch configuration.

Field 2 is blinking indicating an optional entry field.
3. A starting memory block and memory location can be selected for testing or the entire main memory can be tested.

To test the entire main memory, proceed to Step 5.
Note: Test 3 takes approximately 5 minutes to test each block of 256 K words. The total amount of time for Test 3 depends on the memory configuration of the switch (i.e., approximately 5 minutes times the number of 256 K blocks).
4. A specific starting memory block and memory location can be selected for testing by performing one of the following:
(Starting memory block to be tested); ENTER; (Memory location); ENTER.
CHANGE FIELD; 2; ENTER; (Starting memory block to be tested); ENTER; (Memory location); ENTER.

Note: Special error code 80 (location out of memory range) is displayed in the MAAP error code field after EXECUTE is depressed if the specific memory block and memory location is not in the range of testable memory.

Proceed to Step 5.
5. To start Test 3 after selecting the main memory to be tested, depress EXECUTE.
6. While Test 3 is executing, Field 3 (address within the main memory block being tested) is updated every second.

Note: Field 2 (memory block) is updated when a memory block is tested (approximately every 5 minutes).
7. When the first failure is located the data in Fields 2 and 3 remains constant displaying the first memory location of the failed block.
8. Test 3 continues to execute until the end of the failed block is identified and then stops.
9. Special error code 82 (use PROC 613 to clear duplication channel failures) is displayed in the MAAP error code field after Test 3 stops if failure code 4 (duplication channel error) is detected.

Note: PROC 613 is used to correct duplication channel errors.
10. When Test 3 stops, after a failure is detected, the following is displayed:

Field 1-3
Field 2 - Block number of failing block.
Field 3 - Last memory location to fail in the block.
Field 4 - Ending block number.
Fields 5 and 6 - Dashed.
Field 7 - Area of memory where the failure occurred.
Field 8 - Type of failure found (failure code).

## PROC 614 Test 3

11. Depressing NEXT FAULT causes Test 3 to continue from the location displayed in Field 4, plus one.
12. When Test 3 is completed (after the starting block and memory location entered, or the entire main memory is tested) the following is displayed:
Field 6-0 or total number of failed words.
Field 7-0 or memory area of failure.
Field 8-0 or total number of failed memory blocks.
Note: Special error code 74 (memory match test not performed) is displayed in the MAAP error code field when Test 3 is performed on an unduplicated switch, indicating that tests other than the memory match test was performed.
13. Depressing STOP while Test 3 is executing, halts the test.

If Test 3 is halted, by use of the STOP key in the middle of a failed block of memory locations, Field 4 displays the last testable memory block number for the switch configuration and Field 8 defines the type of failure detected.
14. If Test 3 is halted by use of the STOP key and no failures are detected, a dash is displayed in Field 8.

Field 4 displays the last testable main memory block location for the switch configuration and Fields 2 and 3 display the last tested memory location.
15. Depressing NEXT FAULT any time after Test 3 stops on its own (failure detected) causes the test to continue from where it was halted.

Note: If STOP is depressed to halt Test 3, EXECUTE must be depressed to restart Test 3. Test 3 will start from the beginning of memory after the STOP; EXECUTE sequence is used
16. Depressing NEXT DATA after a failed block is identified displays the contents of the first failing memory location within a block of contiguous failures beginning at the memory location displayed in Fields 2 and 3.

The contents of the failing memory location for the on-line common control (indicated by a 0 in Field 5) are displayed in Field 6.
17. Depressing NEXT DATA again, displays (in Field 6) the contents of the off-line common control (indicated by a 1 in Field 5) for the same memory location.
18. Depressing NEXT DATA once more steps to the next failing memory location.

Field 6 displays the contents of the memory location alternating between the on-line common control ( 0 in Field 5) and the off-line common control ( 1 in Field 5) each time NEXT DATA is depressed.
19. When all failing main memory locations are displayed, depressing NEXT DATA once more dashes the display.
Depressing NEXT DATA again, starts the display over from the first failing main memory location.

## Test 4

Test 4 is used to continuously test a specific range of main memory locations of the program, patch, translation, and other areas.

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
2. When Test 4 is initially called in, a default range of main memory may be displayed in Fields 2 through 4. Field 2 is blinking indicating an optional entry.

Either the default range of memory can be tested, or another range of memory can be selected for testing.

Note: The default memory locations are the last block of failures displayed in Test 3.
To test the default range of memory, proceed to Step 5.
3. If no failures are found in Test 3 , Fields 2 through 4 display the entire range of testable memory. Field 2 is blinking indicating an optional entry.

If starting and ending memory locations are not entered, Test 4 tests the entire range of testable main memory (i.e., program, patch, translation, and other areas).
4. A specific range of main memory can be selected for testing by entering the following:
(Starting memory block); ENTER; (Starting address); ENTER; (Ending memory block); ENTER.

Note: Special error code 80 (location out of memory range) is displayed in the MAAP error code field after EXECUTE is depressed if the specific memory block, memory location, and ending block selected is not in the range of testable memory.

Proceed to Step 5.
5. To start Test 4, depress EXECUTE.

Note: Test 4 takes approximately 5 minutes to test each block of 256 K words. The total amount of time for Test 4 depends on the memory configuration of the switch (i.e., approximately 5 minutes times the number of 256 K blocks).
6. While Test 4 is executing, Fields 7 and 8 (memory area and failure code) are updated after every pass through the range of memory selected for testing.
7. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.

Note: Special error code 74 (memory match test not performed) is displayed in the MAAP error code field when Test 4 is performed on an unduplicated switch, indicating that tests other than the memory match test was performed.
8. Special error code 82 (use PROC 613 to clear duplication channel failures) is displayed in the MAAP error code field when Test 4 is stopped if failure code 4 (duplication channel error) is detected.

Note: PROC 613 is used to correct duplication channel errors.

## PROC 614 Test 4 and Test 5

9. If no failures are detected, Fields 2 through 4 display the original range selected for testing, and Fields 7 and 8 display a 0.
10. If any failures are detected, the following is displayed:

Field 1-4.
Fields 2 and 3 - Lowest failed memory location within the range of memory selected for testing.

Field 4 - Highest failed memory block within the range of memory selected for testing.
Fields 5 and 6 - Dashed.
Field 7 - Area of memory where the failure occurred.
Field 8 - Failure code for the failed memory location.
11. Test 4 can be repeated from the same range of main memory entered by depressing EXECUTE or another range of main memory can be selected for testing by using the CHANGE FIELD sequence and depressing EXECUTE.

## Test 5

Test 5 is used to read the contents of a single main memory location, or any range of main memory locations.

Test 5 can be used with either duplicated or unduplicated common controls.

1. Test 5 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 5; ENTER.
2. When Test 5 is initially called in, a default range of main memory may be displayed in Fields 2 through 4. Fields 2 and 3 (memory block and address) are blinking indicating an optional entry.

Either the default range of memory can be tested, or another range of memory can be selected for testing.

Note: The default memory locations are the last block of failures displayed in Test 3.
To test the default range of nemory, proceed to Step 5.
3. If no failures are found in Test 3 or if an unduplicated switch is being tested, Fields 2 through 4 display the entire range of testable memory.

If starting and ending memory locations are not entered, Test 5 will test the entire range of testable memory.
4. A specific range of main memory can be selected for testing by entering the following:
(Starting memory block); ENTER; (Starting address); ENTER; (Ending memory. block); ENTER.

Note: Special error code 80 (location out of memory range) is displayed in the MAAP error code field after EXECUTE is depressed if the specific memory block, memory location, and ending block selected is not in the range of testable memory.
5. To start Test 5, depress EXECUTE.
6. When EXECUTE is depressed, the contents of the first memory location selected for testing is displayed in Field 6 for the on-line common control (indicated by a 0 in Field 5). The memory area of the memory location is displayed in Field 7.
7. Special error code 82 (use PROC 613 to clear duplication channel failures) is displayed in the MAAP error code field if failure code 4 (duplication channel error) is detected.

Note: PROC 613 is used to correct duplication channel errors.
8. Depressing NEXT DATA displays (in Field 6) the contents of the off-line common control (indicated by a 1 in Field 5 ) for the same memory location.

Note: If the switch is unduplicated, only the on-line common control can be read.
9. Depressing NEXT DATA steps through the memory range selected for testing (displayed in Fields 2 through 4) one at a time, alternating between the on-line common control ( 0 in Field 5 ) and the off-line common control ( 1 in Field 5), each time NEXT DATA is depressed.
10. When all main memory locations selected for testing are displayed, depressing NEXT DATA once more dashes Fields 2 and 3 . Field 4 displays the ending memory block selected for testing.
Depressing NEXT DATA again, starts the display over at the first memory location selected for testing.

## Test 6

Test 6 performs an ID chip test then tests the supersets of cache memory continuously.

1. Test 6 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 6; ENTER.
2. When Test 6 is initially called in, Field 3 displays a 0 .

Field 3 is blinking indicating an optional entry field.
3. A starting cache superset can be selected for testing or the entire cache superset can be tested.
To test the entire cache superset, proceed to Step 5.
4. To start Test 6 from a specific cache superset, perform one of the following:

ENTER; (Starting cache superset to be tested); ENTER.
CHANGE FIELD; 3; ENTER; (Starting cache superset to be tested); ENTER.
Note: Test 6 starts from the cache superset entered and tests the remainder of the cache superset. If no failures are detected, Test 6 starts over from the beginning of the cache superset ( 0 ) and continuously tests the entire cache superset.

Proceed to Step 5.
5. To start Test 6 after selecting the cache superset to be tested, depress EXECUTE.
6. The testing interval is determined by maintenance personnel performing the test (as long as ño failures are detected), and is ended by depressing STOP.

## PROC 614 Test 6

7. While Test 6 is executing and no failures are detected, Field 3 is updated with the number of times the entire cached superset is tested and Field 8 displays a 0 (indicating no failures).
8. If a cache superset failure is detected, Test 6 is stopped automatically and the following is displayed:

Field 1-6.
Field 2 - Dashed.
Field 3 - Cache superset failing.
Fields 4 through 7 -Dashed.
Field 8 - Failure code.
9. Depressing EXECUTE starts Test 6 from the failing cache superset displayed in Field 6.

If the same cache superset fails again, Test 6 stops. Field 3 displays the failing cache superset and Field 8 displays the failure code associated with the failing cache superset.
10. If the same cache superset does not fail, Test 6 continues testing the entire cache superset until a failure is detected, or until Test 6 is halted by depressing STOP.
Field 3 is updated with the number of times the entire cache superset is tested without a failure detected.

## Repair Guide

When a memory read/memory match failure is indicated, PROC 614 referenced from PROC 600 as the cause for the MEM and/or CACHE MEMORY fault indicator(s) being lighted, perform the following steps, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1 and record the failure history generated by the on-line periodic maintenance software.
2. Execute Test 2.

Test 2 runs a variable length of time depending on the switch memory configuration.
3. If Test 2 passes, perform Test 4 (continuous test) on each memory block and address displayed in Test 1 to ensure no intermittent failures exist.
4. If Test 2 fails, perform Test 3 on the area of memory where the failure occurred (i.e., patch, program, translation, other, or any combination of the four areas).
5. Record the failure code displayed in Field 8 for the failed memory block and location detected in Test 3.
6. Isolation and repair steps for the failure codes are detailed in:

## Failure Code 1.

Failure Codes 2, 3, 6, 7, or 8 .
Failure Code 4.
Failure Code 5 or 16.
Failure Codes 10 through 15.

## Failure Code 1 (Memory mismatch).

The repair guide for failure code 1 is presented in two parts; the translation repair guide (memory area encodes 4 through 7 or 12 through 15 ) and the patch/program repair guide (memory area encodes 1 through 3 or 9 through 11).

## Good customer service is defined as follows:

1. The most recent changes made to the switch are added and are working properly.
2. No trouble reports exist.
3. Attendant consoles are not malfunctioning.
4. An abnormal number of status memory audit peg counts do not exist (refer to PROC 600 Test 2, Unit type 43 to investigate status memory audit peg counts).
5. There are no initialization problems (refer to PROC 612 to determine status of initialization problems).

## Translation Repair Guide

1. Determine the status of customer service.

If customer service is good, proceed to Step 2.
If customer service is not good, proceed to Step 6.
2. Perform a run tape in the on-line processor and proceed to Step 3.
3. Load the off-line processor with the on-line tape by performing the following:

Remove the tape cartridge from the on-line minirecorder and install the tape cartridge into the off-line minirecorder.

Set the off-line processor's TEST SELECT switch to 1.5 , depress the off-line processor's RESET, ENABLE and wait until the off-line processor completes reloading.
Remove the tape cartridge from the off-line minirecorder and install the tape cartridge into the on-line minirecorder.
4. Execute PROC 614 Test 2, and check for a memory mismatch.

If the two processors match, proceed to Step 5.
If the two processors do no match, perform PROC 610 (tape test) in both processors to correct the problem.
5. Perform a run tape on the off-line tape by performing the following:

Install the original off-line tape cartridge into the off-line minirecorder.
Depress RUN TAPE, EXECUTE.
The MEM and/or CACHE MEMORY fault indicator is turned off when the memories match and no other failures are detected in Test 2.
6. Switch service to the off-line processor, by performing a hard switch.

Caution: A hard switch of common controls results in loss of service.
A hard switch of common controls is accomplished by setting the on-line common control's GO/HALT switch to HALT.

## PROC 614

7. Set the new off-line processor's GO/HALT switch to the GO position.
8. Determine the status of customer service in the new on-line processor.

If customer service is good, go to Step 2 above.
If customer service is not good, proceed to Step 9.
9. Reload the new off-line processor by performing the following:

Set the off-line processor's TEST SELECT switch to 15 , depress the off-line processor's
RESET, ENABLE and wait until the off-line processor completes reloading.

## Caution: A hard switch of common controls results in loss of service.

10. Perform a hard switch of common controls by setting the on-line common control GO/HALT switch to HALT.

Set the new off-line processor's GO/HALT switch to the GO position.
11. Determine the status of customer service in the new on-line processor.

If customer service is good, go to Step 3 above.
If customer service is not good, proceed to Step 12.
12. Reload the new off-line processor by performing the following:

Set the off-line processor's TEST SELECT switch to 15 , depress the off-line processor's RESET, ENABLE and wait until the off-line processor completes reloading.

## Caution: A hard switch of common controls results in loss of service.

13. Perform a hard switch of common controls by setting the on-line common control GO/HALT switch to HALT.

Set the new off-line processor's GO/HALT switch to the GO position.
14. Determine the status of customer service in the new on-line processor.

If customer service is good, go to Step 3 above.
If customer service is not good, proceed to Step 15.
15. At this point both processors are reloaded independently without achieving good customer service.

Start at Step 3 with backup tapes in an attempt to provide good customer service.

## Patch and Program Repair Guide

Customer service must be good before proceeding with the patch and program repair guide. If customer service is not good, perform the translation repair guide first.

If customer service is good or if the translation repair guide fails to provide good customer service, proceed with Step 1 below.

1. Find the total number of patches on both the on-line and off-line common control tapes by using PROC 490.

If both tapes have the same number of patches, proceed to Step 5.
If both tapes do not have the same number of patches, proceed to Step 2.
2. Add the missing patches to the appropriate tape using PROC 490.
3. Reload the appropriate common control by performing the following:

Set the TEST SELECT switch to 15 , depress RESET, ENABLE and wait until the processor completes reloading.
4. Execute PROC 614 Test 2, and check for a memory mismatch.

If a mismatch still exists, use PROC 610 (tape test) to isolate the problem to the tape or minirecorder area.

If there are no mismatches, repair is complete.
The MEM and/or CACHE MEMORY fault indicator is turned off when the memories match and no other failures are detected in Test 2.
5. If the problem is in the program memory area only (encode 1 displayed in Field 7), proceed to Step 6.
If the problem is in the patch memory area only (encode 2 displayed in Field 7) or in the program and patch memory area (encode 3 displayed in Field 7), proceed to Step 14.
6. Acquire second level maintenance assistance to determine which processor is in error.

Correct the failing processor using PROC 999.
7. Reload the appropriate common control by performing the following:

Set the TEST SELECT switch to 15 , depress RESET, ENABLE and wait until the processor completes reloading.
8. Execute PROC 614 Test 3 , and check for a memory mismatch.

If there are no mismatches, proceed to Step 11.
If a mismatch still exists, proceed to Step 9.
9. Reload the incorrect common control with the tape from the correct common control by performing the following:
Remove the tape cartridge from the correct common control minirecorder and install the tape cartridge into the incorrect common control minirecorder.

Set the TEST SELECT switch to 15 , depress RESET, ENABLE and wait until the processor completes reloading.

Remove the tape cartridge from the incorrect common control minirecorder and install the tape cartridge into the correct common control minirecorder.
10. Execute PROC 614 Test 3, and check for a memory mismatch.

If there are no mismatches, the tape in the incorrect common control is probably defective. Replace the tape and rerun the test from the beginning.

If a mismatch still exists, use PROC 610 (tape test) to isolate the problem to the tape or minirecorder area on the incorrect common control.
11. Execute PROC 614 Test 4 on the failed memory locations.

If the two tapes match, the error was probably intermittent and repair is complete.
If the two tapes mismatch, proceed to Step 12.

## PROC 614

12. Replace the defective memory board.

The memory block displayed in Field 2 indicates which memory board to replace, i.e., if Field $2=0$, replace memory board in Slot 07 of the common control.
13. Reload the tape and execute PROC 614 Test 2 to resolve the memory mismatch cause of the MEM and/or CACHE MEMORY fault indicator.
14. Execute PROC 614 Test 3 and determine which patch is missing from the defective tape by counting the number of failed locations.
15. Add the missing patch to the defective tape by using PROC 490.
16. Reload both tapes, and execute PROC 614 Test 2 to check for a memory mismatch.

If both tapes match, repair is complete.
The MEM and/or CACHE MEMORY fault indicator is turned off when the memories match and no other failures are detected in Test 2.
17. If the two tapes still mismatch, execute PROC 610 (tape test) on both common controls.

Suspect a defective tape drive.

## Failure Codes 2, 3, 6, 7, or 8 (Memory failures).

1. Replace circuit pack TN392 associated with the memory block displayed in Field 2.

Memory circuit packs in the common control carrier correspond to block numbers as listed in Step 2.
2. Block numbers and slot numbers are on a 4 to 1 basis when TN392 is installed in the common control carrier. Block numbers 0 through 31 displayed in Field 2 correspond to slot numbers 07 through 14 in the common control carrier.

Note: If the block number displayed in Field $2=4$ through 7 , the slot number of the TN392 circuit pack to be replaced in the common control carrier $=08$.
3. Repeat Test 3 on the memory block and location that failed with a failure code of $2,3,6,7$, or 8.
4. If Test 3 passes, perform Test 2 of PROC 614 to turn off the MEM and/or CACHE MEMORY fault indicator(s).
5. If Test 3 fails, check the wiring associated with the replaced circuit pack.

## Failure Code 4 (Parity error).

1. Record the memory block and location displayed in Fields 2 and 3.
2. Perform PROC 613 (Duplicate processor control and test) to determine the cause of the parity error.

## Failure Code 5 or 16 ( $1 / 0$ failures).

1. Perform PROC 600 (Alarm causes/error log) Test 2, and check for common control I/O failures (unit type 4).
2. Perform PROC 611 (Common control tests) Test 2, on the circuits displayed in Test 1 or 2 of PROC 600.
3. Perform corrective action (as appropriate) on failing $I / O$ circuits.
4. Enter PROC 614 Test 4 and continuously test the memory block and location that failed Test 3 with a failure code of 5 or 16 .
5. If the memory block and location now passes, perform Test 2 of PROC 614 to turn off the MEM and/or CACHE MEMORY fault indicator(s).

If the memory block and location fails, check the wiring between the memory or cache circuit and the common control interface.

## Failure Codes 10 through 15 (Cache failures).

1. Replace TN369 in slot 04 . of the common control carrier.

Repeat Test 3 on the memory block and location that failed with a failure code of 10 through 15.
2. If Test 3 passes, perform Test 2 of PROC $\mathbf{6 1 4}$ to turn off the MEM and/or CACHE MEMORY fault indicator(s).
3. If Test 3 fails, replace UN153 in slot 03 of the common control carrier.

Repeat Test 3 on the memory block and location that failed with a failure code of 10 through 15.
4. If Test 3 passes, perform Test 2 of PROC 614 to turn off the MEM and/or CACHE MEMORY fault indicator(s).
5. If Test 3 fails, check the wiring associated with the replaced circuit packs.

## PROC 615

PROC 615 - MAAP TEST


## Purpose

PROC 615 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from a transmission failure from or to the MAAP.

PROC 615 may also be used when a malfunction is suspected while using the MAAP.

## Field Definitions and Codes

Each field of PROC 615 flipchart and the possible displays for the fields during execution of the different tests are defined in Table V, PROC 615 - Field Definitions and Codes.

There are no optional input fieids for PROC 615.

## Operation of Procedure

## Overview

PROC 615 is used to test the MAAP or its interface.
To call in PROC 615, perform the following:

1. Depress PROC NO; 615; ENTER.
2. Test. 1 is automatically selected.

Field 1 displays a 1 and all other fields (including the error code field) are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

TABLE V.

| PROC 615 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Fieto | CODE | definition | FIELD | CODE | definition |
| 1 | 0-9 | Digital Display (Test 1) | 8 | 0-9 | Digital display (Test 1). |
|  | 1-5 | Test Number. |  |  |  |
| 2 | 0-9 | Digital Display (Test 1). |  |  | CLEAR DATA control key display (Test 2): |
| Field | 3 thro | gh 25: |  | 1 | Pass test. |
|  | est 5: | through 4: 0 (after key pressed) $=$ default or test failure. <br> = OTHER FAILS alarm not set. |  | 6 | Dial key 6 display (Test 3): <br> Pass test. |
|  |  | OTHER FAILS alarm set | 9 | 0-9 | Digital display (Test 1). |
| 3 | 0-9 | Digital display (Test 1). |  |  | Dial key 7 display (Test 3): |
|  |  | Dial key 1 display (Test 3): |  | 7 | Pass test. |
|  |  |  | 10 | 0-9 | Digital display (Test 1). |
| 4 | 0-9 | Digital key 1 display (Test 1): |  |  | Dial key 8 display (Test 3 ): |
|  |  | Dial key 2 display (Test 3): |  | 8 | Pass test. |
|  |  |  | 11 | 0-9 | Digital display (Test 1). |
| 5 | 0-9 | Digital display (Test 1). |  |  | WORD NO control key display |
|  | 3 | Dial key 3 display (Test 3): Pass test. |  | 1 | (Test 2): <br> Pass test. |
| 6 | 0-9 | Digital display (Test 1). |  |  | Dial key 9 display (Test 3): |
|  |  | Dial key 4 display (Test 3): |  | 9 | Pass test. |
|  | 4 | Pass test. | 12 | 0-9 | Digital display (Test 1). |
| 7 | 0-9 | Digital display (Test 1). |  |  | Dial key CLEAR ENTRY display (Test 3): |
|  | 1 | STOP control key display (Test 2): <br> Pass test. |  | 1 | Pass test. |
|  | 5 | Dial key 5 display (Test 3): Pass test. |  |  |  |

TABLE V. (Contd)

| PROC 615 <br> field definitions and codes (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Fieto | CODE | defintion | FIELD | CODE | definition |
| 13 | 0-9 | Digital display (Test 1). | $\begin{gathered} 19 \\ \text { (Contd) } \end{gathered}$ |  | NEXT UNIT control key display (Test 2): Pass test |
|  | 1 | RLS BUSY OUT control key display (Test 2): <br> Pass test. |  | 1. |  |
|  |  |  | 20 | 0-9 | Digital display (Test 1) |
|  | 1 | Dial key 0 display (Test 3 ): Pass test. |  | 1 | NEXT FAULT control key display (Test 2): <br> Pass test |
| 14 | 0-9 | Digital display (Test 1). |  |  |  |
|  | 1 | BUSY OUT control key display (Test 2): <br> Pass test. | 21 | 0-9 | Digital display (Test 1) |
|  |  |  |  | 1 | CHANGE control key display (Test 2): <br> Pass test |
|  |  | Dial key ENTER display (Test 3): <br> Pass test. |  |  |  |
|  |  |  | 22 | 0-9 | Digital display (Test 1). |
|  |  |  |  | 1 | DISPLAY control key display (Test 2): <br> Pass test |
| 15 | 0-9 | Digital display (Test 1). |  |  |  |
|  |  | REMOVE control key display (Test 2): <br> Pass test. |  |  |  |
|  |  |  | 23 | 0-9 | Digital display (Test 1) |
| 16 |  |  |  | 1 | EXECUTE control key display (Test 2): <br> Pass test |
|  | 0-9 | Digital display (Test 1) |  |  |  |
|  |  | ADD control key display (Test 2): <br> Pass test |  |  |  |
|  |  |  | 24 | 0-9 | Digital display (Test 1) |
|  |  |  |  | 1 | NEXT DATA control key display (Test 2): <br> Pass test |
| 17 | 0-9 | Digital display (Test 1) |  |  |  |
| 18 | 0-9 | Digital display (Test 1) |  |  |  |
|  |  | CHANGE FIELD control key | 25 | 0-9 | Digital display (Test 1) |
|  | 1 | display (Test 2): <br> Pass test |  | 1 | NEXT CIRCUIT control key display (Test 2): |
| 19 | 0-9 | Digital display (Test 1) |  |  | Pass test |

Five tests are available:

1. Test 1 - Tests MAAP digital readouts.
2. Test 2 - Tests MAAP control keys.
3. Test 3 - Tests MAAP dial keys.
4. Test 4 - Tests MAAP indicators BUSY OUT, WAIT, SEE NOTE, and IN USE.
5. Test 5-Tests for a transmission failure.

## Test 1

Test 1 displays all digits in Fields 1 through 25, and two digits in the error code field.

1. Test 1 is the default test when entering PROC 615 or is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. To start Test 1, depress EXECUTE.

When EXECUTE is depressed, 0s are displayed in all MAAP fields including the error code field.
3. Depressing NEXT DATA increments the display to all 1 s .

Each depression of NEXT DATA increments the display from all 0s through all 9 s .
4. Depressing NEXT DATA after all 9s are displayed causes Test 1 to be executed, starting the sequence over. Field 1 displays a 1 and all other fields (including the error code field) are dashed.

## Test 2

Test 2 tests all control keys except PROC NO, RESET, and NEXT TEST.
Caution: Do not attempt to test RUN TAPE using this procedure.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. To start Test 2, depress EXECUTE.

Depressing EXECUTE displays a 1 in Field 23 to indicate proper operation of the EXECUTE key, and displays 0 s in the other control key fields (Fields 7, 8, 11, 13 through 16, 18 through 22, 24 and 25).
3. Depress the other control keys in the following order and note the transition from 0 to 1 , in the appropriate field, which indicates proper operation of the control keys.

Note: Special error code 06 is displayed in the error code field when keys other than control keys are depressed.

## STOP - Field 7

CLEAR DATA - Field 8.

## PROC 615 Test 2 and Test 3

WORD NO - Field 11.
RLS BUSY OUT - Field 13.
BUSY OUT - Field 14.
REMOVE - Field 15.
ADD - Field 16.
CHANGE FIELD - Field 18.
NEXT UNIT - Field 19.
NEXT FAULT - Field 20.
CHANGE - Field 21.
DISPLAY - Field 22.
NEXT DATA - Field 24.
NEXT CIRCUIT - Field 25.

## Test 3

Test 3 tests all dial keys.

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3 .
2. To start Test 3, depress EXECUTE.

Zeros (0s) are displayed in Fields 3 through 14 after EXECUTE is depressed.
3. Depress each of the dial keys. If the dial key depressed operates properly, the correct number is displayed in the appropriate field as follows:

Dial key 1 - Field 3 display $=1$.
Dial key 2 - Field 4 display $=2$.
Dial key 3 -Field 5 display $=3$.
Dial key 4 - Field 6 display $=4$.
Dial key 5 - Field 7 display $=5$.
Dial key 6 - Field 8 display $=6$.
Dial key 7 - Field 9 display $=7$.
Dial key 8 - Field 10 display $=8$.
Dial key 9 - Field 11 display $=9$.
Dial key CLEAR ENTRY - Field 12 display $=1$.
Dial key $0-$ Field 13 display $=1$.
Dial key ENTER - Field 14 display $=1$.

## Test 4

Test 4 tests the IN USE, SEE NOTE, BUSY OUT, and WAIT indicators.

1. Test 4 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 4.
2. To start Test 4, depress EXECUTE.

When EXECUTE is depressed, the IN USE, SEE NOTE, BUSY OUT, and WAIT indicators on the MAAP turn on.
3. Depressing NEXT DATA alternately turns the MAAP indicators on and off.
4. When exiting Test 4, the indicators return to their original state.

## Test 5

Test 5 displays the MAAP alarm status and can be used to turn off the OTHER FAILS fault indicator.

1. Test 5 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 5 .
2. To start Test 5, depress EXECUTE.
3. When EXECUTE is depressed:

Ones (1s) are displayed in all fields if the OTHER FAILS fault indicator is set because of a MAAP failure.

Zeros ( 0 s) are displayed in all fields if the OTHER FAILS fault indicator is not caused by a MAAP failure.

Note: The OTHER FAILS fault indicator can be turned on by other failures in the system.
4. To turn off the OTHER FAILS fault indicator when 1 s are displayed in all fields (assuming no other sources are affecting the OTHER FAILS fault indicator) after Test 5 is executed at least once, perform the following:

Depress CLEAR DATA; EXECUTE.
Note: The MAAP alarmed entries in PMIDS are marked as resolved.

## PROC 615

## Repair Guide

When a transmission failure is indicated, PROC 615 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following steps in the order listed.

1. Replace TN403 (dual-speed data channel) associated with the MAAP.
2. Execute Tests $\mathbf{1}$ through 4 to verify correct operation of the MAAP.
3. Execute Test 5 to determine if the OTHER FAILS fault indicator is still set.
4. If a failure is still indicated, check the cabling and wiring between TN403 and the MAAP connector.
When a malfunction of the MAAP is suspected, perform the following steps in the order listed.
5. At the alarm panel, check the MAAP circuit breaker.

If the circuit breaker is not tripped, proceed to Step 3.
If the circuit breaker is tripped, proceed to Step 2.
2. Reset the MAAP circuit breaker.

If the circuit breaker trips again, check the cabling and wiring between the MAAP connector and the circuit breaker.
3. Execute Tests 1 through 4 to verify the extent of the problem.

If a limited number of failures is indicated, replace the MAAP.
If complete failure is indicated, replace the TN403 associated with the MAAP. Repeat Tests 1 through 4. If a failure is still indicated, replace the MAAP.
4. Repeat Tests 1 through 5. If a failure is still indicated, check the cabling and wiring between TN403 and the MAAP connector.

## PROC 616 - ALARM PANEL TEST



## Purpose

PROC 616 is used when there is a suspected malfunction in one or more of the software controlled alarm panel indicators.
PROC 616 displays the test states of the alarms (major, minor, warning), and processor/memory, attendant console, environment, common control, network, applications processor, and other fault indicators.

Maintenance personnel must be at the customer's premises to determine if the indicators are actually lighted when this maintenance procedure is executed.

The Automatic Alarm Origination Feature (AAOF) and the diagnostic background tests are disabled when performing PROC 616.

## Field Definitions and Codes

Each field of PROC 616 flipchart and the possible displays for the fields during execution of the different tests are defined in Table W, PROC 616 - Field Definitions and Codes.

Optional input fields are:

1. Field 1-Change test number.
2. Fields 2 through 25 - Select indicator to be tested (Test 2 only).

Note: Field 17 is unused.

TABLE W.

| PROC 616 <br> FIELD DEFINITIONS AND CODES  <br> FIELD  <br> 1  CODE |  |  |
| :---: | :---: | :--- |
| 1,2 | DEFINITION |  |
| $2-16$ |  |  |
| and |  |  |
| $18-25$ | 0 | Test number. |
|  | 1 | Indicator is off. <br> Test 1: <br> Indicator is on. <br> Test 2: <br> Indicator is flashing. |
| 17 | dash | Alarm indicator is under <br> on-line control. |

## Operation of Procedure

## Overview

PROC 616 is used to test the alarm panel indicators.
To call in PROC 616, perform the following:

1. Depress PROC NO; 616; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Simultaneously tests all software controlled indicators.
2. Test 2 - Individually tests any or all of the software controlled indicators.

## Test 1

Test 1 displays the status when testing all indicators simultaneously. The status is displayed in Fields 2 through 25.

1. Test 1 is the default test when entering PROC 616, or is selected by use of NEXT TEST or the CHANGE FIELD sequence:
CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.

A 1 is displayed in Fields 2 through 16, a dash in Field 17, a 1 in Fields 18 through 25 and the alarm panel indicators corresponding to the fields on the flipchart are turned on.
3. MAAP display fields are grouped by alarm panel areas as follows:

Fields 2 through $4=$ ALARMS.
Fields 5 through $10=$ PROCESSOR/MEMORY.
Fields 11 and $12=$ Attendant console.
Note: The ACK indicator is located on the attendant console and not on the alarm panel.

## Field 13 = ENVIRONMENT.

Fields 14 through $16=$ COMMON CONTROL .
Note: Field 17 is unused.
Fields 18 through $20=$ NETWORK.
Fields 21 and $22=$ APPLICATIONS PROCESSOR.
Field 23 through $25=$ OTHER.
4. Depressing NEXT DATA turns off all the alarm panel indicators and a 0 is displayed in Fields 2 through 16, and 18 through 25.

Note: When NEXT DATA is depressed a dash is displayed in Field 17 which is unused.

Depressing NEXT DATA again turns on all the indicators and a 1 is displayed in Fields 2 through 16, and 18 through 25.
5. Depressing NEXT DATA repeatedly alternates between 0 and 1 in each field and turns the indicators off and on.

Note: While the indicators are off, PROC 616 allows brief flashes of the normal indicator outputs from the on-line programs.
6. Test 1 is stopped by depressing NEXT TEST or RESET.
7. When Test 1 is exited, all indicator outputs are restored to their previous state and the AAOF and background tests are enabled.

## Test 2

Test 2 tests a specific indicator. Testing status is displayed in Fields 2 through 25.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence: CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is selected, a flashing 1 is displayed in Field 2 indicating an optional entry field and all other fields contain 0s.

Note: Field 17 which is unused displays a dash.

## PROC 616 Test 2

3. Either the indicator associated with Field 2 can be tested or another indicator can be selected in one of three ways (Steps 4 through 6).

To test the indicator displayed in Field 2, proceed to Step 7.
4. Using NEXT DATA to increment to the indicator to be tested.

Note: A 1 is placed in the next field and the previous field changes to a 0 each time NEXT DATA is depressed.

Proceed to Step 7.
5. Depressing ENTER repeatedly to select the field corresponding to the indicator to be tested and entering a 1 as follows:

## 1, ENTER.

Note: A 0 is placed in Field 1 when the indicator to be tested is selected by use of ENTER.

Proceed to Step 7.
6. Using the change field sequence:

CHANGE FIELD; (Field number of indicator to be tested); ENTER; 1; ENTER.
Note: A 0 is placed in Field 1 when the indicator to be tested is selected by use of the CHANGE FIELD sequence.

Proceed to Step 7.
7. To start Test 2, after selecting the indicator to be tested, depress EXECUTE.

The associated indicator on the alarm panel turns on and off at a $1 / 2$-second on, $1 / 2$-second off rate.
8. While the selected indicator is off, PROC 616 allows brief flashes of the normal indicator outputs from the on-line programs.
9. Depressing NEXT DATA repeatedly, after EXECUTE is depressed, causes the alarm panel indicators to be tested in the sequence shown on the flipchart beginning with the indicator after the one that was selected initially for testing.
10. Depressing NEXT DATA after all indicators are cycled through using NEXT DATA dashes Fields 2 through 25.

Depressing NEXT DATA again without depressing EXECUTE, begins the sequence over with the indicator associated with Field 2.
11. To select another indicator to test using the change field sequence requires the EXECUTE key to be depressed again to initiate the test for the new indicator.

Note: The previous field selected for testing is changed to a 0.
12. Test 2 is stopped by depressing NEXT TEST or RESET.
13. When Test 2 is exited, all indicator outputs are restored to their previous state and the AAOF and background tests are enabled.

## Repair Guide

When an alarm panel malfunction is suspected, the following steps should be performed, in the order listed, to isolate and repair the faulty component.

1. Execute Test 1 to determine whether all the indicators respond to on/off control.
2. If interaction between two or more indicators is suspected, execute Test 2 and observe their individual operation.
3. If failures are observed, replace TN490 and repeat the appropriate test(s).

Caution: Replacement of the alarm panel takes the entire switch down.
4. If a failure is still indicated, tag the appropriate indicator(s) and replace the alarm panel when traffic permits.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the alarm panel.
5. When the alarm panel is replaced and failures still exist check the wiring between TN490 and the alarm panel.

When Test 1 is executed, or the ack and external ack fault indicators are tested in Test 2, check the ACK indicator on the attendant console.

1. If the ACK indicator is not lighted, replace TN490 and repeat the appropriate test(s).
2. If a failure is still indicated, tag the $\mathbf{A C K}$ indicator and replace console component lamp control and carrier when traffic permits.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of console components.
3. Repeat the appropriate test(s).

If a failure is still indicated, replace the console when traffic permits.
4. Repeat the appropriate test(s).

If a failure is still indicated, check the wiring between TN490 and the console.

## PROC 620

## PROC 620 - NETWORK PROCEDURE




The flipcharts shown are for R2V2. The R2V1 flipcharts are similar except that unit types 69, 71, and 72 are not included in R2V1.

In addition, Test 1 is not enabled for R2V1.

## Purpose

PROC 620 is used when referenced from PROC 600 (Alarm causes/error log) or when the NETWORK SWITCH and/or PORT and MAJOR, and/or MINOR alarm indicators on the alarm panel are lighted.

The hardware tested by PROC 620 includes all of the digital network below the 4 MHZ data channel down to and including the ports and the TMS.

## PROC 620 is used to:

1. Display failure history for any circuit in the digital network.
2. Provide the capability to manually turn off the fault indicator(s) activated because of digital network failures.

Network alarmed circuit failures in PMIDS are marked as resolved.
3. Test one or more circuits once and display the test results.
4. Test one or more circuits in a continuous cycle and display the test results.
5. Start with a specific equipment location and diagnose a problem to determine the true location of the fault.
6. Perform a verification test on a specific equipment location and turn the circuit packs' RED or GREEN LED on to indicate whether or not the problem is corrected.
7. Automatically turn off the fault indicator(s) when all circuits that raised an alarm are tested as good.

Note: Network alarmed circuit failures in PMIDS are marked as resolved.

## Field Definitions and Codes

Each field of PROC 620 flipchart and the possible displays for the fields during execution of the different tests are defined in Table X, PROC 620 - Field Definitions and Codes.

Note: Unit types 69, 71, and 72 are not displayed in R2V1.

Optional input fields are:

1. Field 1-Change test number.
2. Field 2 - Select unit type (number designation of the functional unit of equipment) to be tested or displayed.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
3. Fields 3 through 7 - Select equipment location of a specific circuit, range of circuits, or all circuits in a unit type to be tested (Tests 2 through 5 only).

## Operation of Procedure

## Overview

PROC 620 is used to determine the cause of the NETWORK SWITCH and/or PORT and MAJOR or MINOR alarm indicators being lighted resulting from a digital network failure.

To call in PROC 620, perform the following:

1. Depress PROC NO; 620; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

PROC 620

TABLE $X$.

| PROC 620 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| field | CODE | definition | field | CODE | definition |
| 1 | 1-5 | Test number | $\stackrel{2}{(\text { Contd })}$ | 27 | General purpose port (GPP) |
| 2 | 6-99 | Unit Type: Number designation of the functional unit of equipment to be tested, or which is being displayed |  | 28 | 72 Series (MFET) port |
|  |  |  |  | 29 | Line circuit |
|  |  |  |  | 31 | Auxiliary tone plant |
|  | 6 | TMS or module control channel |  | 32 | CO trunk (hardware) |
|  | 7 | TMS or module processor (scanner) |  | 33 | DID trunk (hardware) |
|  | 8 | (scanner) |  | 34 | TIE trunk/data port (hardware) |
|  | 9 | Module clock |  | 44 | Attendant console interface |
|  | 10 | Time slot interchanger (TSI) - ALU |  | 45 | Auxiliary trunk |
|  | 11 | Time slot interchanger (TSI) - PSTORE |  | 46 | Attendant conference |
|  |  |  |  | 47 | Facility test circuit |
|  | 12 | I/O bus interface (IOBI) |  | 50 | TMS clock oscillator(TCO) |
|  | 13 | Port data store (PDS) |  |  |  |
|  | 14 | Port control interface (PCI) |  | 51 | Local clock termination (LCT) |
|  | 15 | Port data interface (PDI) |  | 52 | System clock synchronizer (SCS) |
|  | 16 | Tone plant |  | 53 | Multiplexer (MPX) |
|  | 23 | TMS or network duplication channel |  | 54 | Fan out (FO) |
|  | 24 | Touch-tone dialing sender |  | 55 | Module interface (MI) |
|  |  | Touch-tone dialing receiver |  | 56 | Intermodule data store (IDS) |
|  | 25 |  |  | 57 | Light guide interface (LGI) |
|  | 26 | Network I/O |  |  |  |

TABLE X. (Contd)

| PROC 620FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FieLd | CODE | definition |
| $\begin{gathered} 2 \\ \text { (Contd) } \end{gathered}$ | 58 | Fan in (FI) | $\begin{gathered} 8 \\ \text { (Contd) } \end{gathered}$ | 3 | Warning |
|  | 59 | TMS maintenance interface (TMIF) |  | 4 | Errors recorded |
|  |  |  |  | 5 | Alarm resolved |
|  | 62 | Analog/Digital facility test circuit (ADFTC) | 9 | 0-4 | Circuit status of circuit being displayed |
|  | 66 | Tone detector 2 |  | 0 | Idle |
|  | 68 | DS-1 trunk interface |  | 1 | On-line and in-use |
|  | 69 | Multifunction analog terminal (MFAT) |  | 2 | Off-line |
|  | 71 | Remote module interface (RMI) |  | 3 | Maintenance busy |
|  |  |  |  | 4 | Not plugged in or unable to communicate |
|  | 72 | EIA interface |  |  |  |
|  | 98 | TMS fabric (TMSF) | 10 |  | Fault code index: |
|  | 99 | Time slot interchanger (TSI) |  | 1 | Specific fault code |
|  |  |  | 11 | 0-999 | Specific fault code |
| $3-7$ 3 | 0-30 | Equipment location of displayed circuit |  | 9999 | Failure detected on other than the tested circuit (Test 5) |
| 4 | $\begin{gathered} 0-7 \\ 0-3 \\ 0-27 \\ 0-7 \end{gathered}$ | Cabinet number <br> Carrier number <br> Slot number <br> Circuit number (if any) | 12 | 0-9999 | Number of circuits tested or number of times single circuit has been tested |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  | 13 | 0-99 | Number of circuits failed in a multicircuit test <br> OR <br> Number of times that an individual circuit has failed a test <br> OR <br> Fault list index for an individual circuit during continuous testing |
| 8 | 0-5 | Alarm status of circuit being displayed |  |  |  |
|  | 0 | No errors recorded |  |  |  |
|  | 1 | Major |  |  |  |
|  | 2 | Minor |  |  |  |

## PROC 620 Test 1

## Five tests are available:

1. Test 1 - Displays failure history by severity of alarm, then within alarm level by unit type, and within unit type by circuit location.
Test 1 is also used to manually resolve individual digital network alarmed failures or all digital network alarmed failures which turns off the associated fault indicator(s).
2. Test 2 - Tests one or more circuits, an individual unit type, or a range of circuits one time.
3. Test 3 - Tests one or more circuits, an individual unit type, or a range of circuits continuously.
4. Test 4 - Performs a diagnostic analysis and verification test on a specific equipment location.
5. Test 5 - Performs a verification test on a specific equipment location.

## Test 1

## Test 1 is not enabled and cannot be executed for R2V1.

Test 1 provides a failure history of the digital network failures detected by on-line software.
Failures are displayed in alarm order serverity. Alarmed failures are displayed in descending order with major alarmed failures displayed first, entries with minor alarms second, and failures with warning alarms last. Entries in the failure history with errors recorded are displayed after all. alarmed failures.

1. Within each alarm category failures are displayed by unit type priority.

Note: Entries with errors recorded are also displayed by unit type priority.
2. Unit type priority is assigned according to the order of their importance to service to the customer (most important to least important functional area) and are not in numerical order.
Test. 1 is also used to manually turn off the NETWORK SWITCH and/or PORT fault indicator(s).

1. Test 1 is the default test when entering PROC 620 or is selected by using NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. To start Test 1 , depress EXECUTE.
3. The PMIDS error $\log$ is sorted and a summary of the failures and/or entries with errors recorded are displayed.
4. If no failures and/or entries with errors recorded exist, the following summary is displayed:

Field 1-1.
Field 12-0 (Indicating no failures and/or entries with errors recorded).
5. If any failures and/or entries with errors recorded exist, the summary displays a 1 in Field 1 and the total number of failures and/or entries with errors recorded in Field 12.
6. Depressing NEXT CIRCUIT displays the first failure or entry with errors recorded as follows:

Field 1-1.

- Field 2 - Unit type of displayed circuit.

Fields 3 through 7 - Equipment location of displayed circuit.
Field 8 - Alarm status of displayed circuit ( $1=$ major, $2=$ minor, $3=$ warning, $4=$ errors recorded).

Fields 9 and 10 - Dashed.
Field 11 - Specific fault code.
Field 12 - Total number of failures and/or entries with errors recorded.
Field 13 - Total number of times the circuit in Fields 2 through 7 failed or had errors recorded.

Note: Field 12 includes in its count the entry currently being displayed.
7. Failures for unit type 26 (Network I/O) are logged in PMIDS by ORing the current fault code with the one, if any, already logged for the specific location.

Table Y, PROC 620 - Unit Type 26 (Network I/O) Specific Fault Code Definitions, defines the meaning of the current fault code, or the ORed fault code logged in PMIDS for unit type 26.

Note: The specific fault code displayed in Field 11 for unit type 26 (Network I/O) is not passed to Tests 2, 3, 4, or 5.

TABLE Y.

| $\text { PROC } 620$ <br> UNIT TYPE 26 - NETWORK I/O SPECIFIC FAULT CODE DEFINITIONS (SFC) |  |  |
| :---: | :---: | :---: |
| SfC. | definition |  |
| 3 | SCAN_TSK_ERR | Scan task error |
| 129 | CALL_PROC_ERR | Call processing error |
| 131 | SCAN_TSK_ERR; CALL_PROC_ERR | Scan task error and call processing error |
| 257 | NACK_RESPONSE | Negative acknowledgment response |
| 259 | SCAN_TSK_ERR; NACK_RESPONSE | Scan task error and negative acknowledgment response |
| 385 | CALL_PROC_ERR; NACK_RESPONSE | Call processing error and negative acknowledgment response |
| 387 | SCAN_TSK_ERR; CALL_PROC_ERR; NACK_RESPONSE | Scan task error, call processing error, and negative acknowledgment response |

## PROC 620 Test 1

8. Depressing NEXT CIRCUIT repeatedly displays the remaining digital network failures and/or entries with errors recorded in the PMIDS error log.
Each time NEXT CIRCUIT is depressed, Field 12 is decremented by 1 to show the number of remaining failures and/or entries with errors recorded to be displayed.

Field 12 includes in its count the failure and/or entry with errors recorded being displayed.
9. Depressing NEXT CIRCUIT after all failures and/or entries with errors recorded are displayed dashes Fields 2 through 13.

Depressing NEXT CIRCUIT again causes the display sequence to start over beginning with the summary.
10. The CLEAR DATA; EXECUTE sequence is used to manually resolve individual alarmed digital network failures or all alarmed digital network failures after EXECUTE is used to initiate Test 1.

Note: When alarmed failures are resolved the circuits' failure history is not deleted from the PMIDS error log. The faiture history is updated to show that the alarm status now equals 5 (alarm resolved).

The digital network failures which are resolved are those failures with an alarm status of 1,2 , or 3 displayed in Field 8.
11. To resolve individual digital network failures with an alarm status of 1 , 2 , or 3 , perform the following:

Use NEXT CIRCUIT to display the alarmed failure on the MAAP.
Requirement: Individual digital network failures cannot be resolved unless the failing digital network circuit is displayed on the MAAP.

## Depress CLEAR DATA; EXECUTE.

12. Field 8 (alarm status) displays a 5 indicating that the failing digital network circuit in PMIDS is marked as resolved.
The NETWORK SWITCH or PORT fault indicator associated with the failing digital network circuit is turned off if no other sources affecting the same fault indicator exist.
13. All digital network failures with an alarm status of 1,2 , or 3 can be resolved when the summary is initially displayed, i.e., upon entry to PROC 620 Test 1 , and after displaying and recording all alarmed digital network failures and then using NEXT CIRCUIT to display the summary.

Caution: The alarmed digital network failures should be displayed and recorded prior to resolving the alarmed failures and turning off their associated alarm and fault indicators in order that a record of the causes of the alarmed failures are available for maintenance personnel.
14. After entering Test 1 and depressing EXECUTE the summary is displayed.

Depress CLEAR DATA; EXECUTE.
15. Field 12 (total number of failures and/or entries with errors recorded) changes to indicate the number of digital network failures with an alarm status of 1,2 , or 3 which are resolved.

Alarmed digital network failures are marked as resolved in PMIDS and the NETWORK SWITCH and/or PORT fault indicator(s) is turned off.
16. After displaying and recording all digital network failures, depress NEXT CIRCUIT until the summary is displayed.
Then, depress CLEAR DATA; EXECUTE.
17. Field 12 (total number of failures and/or entries with errors recorded) changes to indicate the number of digital network failures with an alarm status of 1,2 , or 3 which are resolved.

Alarmed digital network failures are marked as resolved in PMIDS and the NETWORK SWITCH and/or PORT fault indicator(s) is turned off.
18. The MAJOR and/or MINOR alarm indicator(s) is also turned off when no other sources affecting the MAJOR and/or MINOR alarm indicator(s) is present.

## Test 2

Test 2 is used to test one mir more circuits in the digital network once and display the results of the test.
Circuits can be selecter for testing by unit type, a range of equipment locations, or on a single circuit basis.

Test 2 automatically furns off the NETWORK SWITCH and/or PORT fault indicator(s) when all circuits that raised an alarm pass Test 2. Network circuit alarmed failures in PMIDS are marked as resolved.

## Test 2 Data Entry

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is initially called in, a default equipment location and unit type may be displayed in Fields 2 through 7.

The alarm status, circuit status, and specific fault code associated with the default equipment location are displayed in Fields 8, 9, and 11.
F'ield 2 (unit type) is blinking, indicating an optional entry field.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
3. The default equipment location can be the last equipment location displayed in Tests 1 , or 3 through 5 of PROC 620 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.

The default equipment location can also be passed from other maintenance procedures, i.e.: PROC 621, PROC 622, PROC 625, PROC 646, and PROC 647 as long as the equipment location is a network digital circuit and is still displayed in PROC 621, PROC 622, PROC 625, PROC 646, or PROC 647 when it is passed.
4. All digital network circuits, a range of circuits, all circuits within a unit type, a combination of unit type and range (i.e., all circuit locations of a unit type in the range specified), a specific digital network circuit, or the default equipment location can be tested.

## PROC 620 Test 2

5. When attendant console interface circuits (unit type 44) are tested during range testing, the associated headset(s) or handset(s) must be unplugged or the circuits fail.
6. When unit type 45 (auxiliary trunks) is selected during range testing, one-way incoming and one-way outgoing auxiliary trunks will fail with a specific fault code of 316 (insufficient 600 ohm termination reflection possibly caused by an open transmission option switch).
7. When unit type 68 (DS-1) is selected during range testing, all DS-1 circuit packs not busied out will fail with a specific fault code of 785 (DS-1 not maintenance busy) unless each individual DS-l circuit pack is busied out.

To select unit type 68 (DS-1) for range testing, proceed to Step 35.
8. To select the entire switch to be tested, Fields 2 through 7 must be dashed.

If no default equipment location is displayed, depress ENTER.
If a default equipment location is displayed, depress CHANGE FIELD; 2; ENTER; ENTER

Test 2 starts with the first module, first cabinet and carrier and runs until all digital network circuits in the switch are tested.
Proceed to Step 1 of Test 2 Execution.
9. In addition to testing all network circuits in the entire switch, a range of digital network circuits (all network circuits in a module, cabinet, carrier, or slot) can also be selected for testing.
10. Selection of a range of circuits to be tested depends on whether or not a default equipment location is displayed.
If a default equipment location is displayed, the CHANGE FIELD sequence must be used.
If no default equipment location is displayed, ENTER or the CHANGE FIELD sequence is performed to select the range of circuits to be tested.
11. To select all network circuits in a module for testing, perform one of the following depending on whether or not a default equipment location is displayed:

## ENTER; (Module number to be tested); ENTER.

## CHANGE FIELD; 2; ENTER; ENTER; (Module number to be tested); ENTER.

Test 2 starts with the first network circuit in the module selected and runs until all digital network circuits in the module are tested.

Proceed to Step 1 of Test 2 Execution.
12. To select all network circuits in a cabinet for testing, perform one of the following depending on whether or not a default equipment location is displayed:
ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.
CHANGE FIELD; 2; ENTER; ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Test 2 starts with the first network circuit in the cabinet selected and runs until all digital network circuits in the cabinet are tested.

Proceed to Step 1 of Test 2 Execution.
13. To select all network circuits in a carrier for testing, perform one of the following depending on whether or not a default equipment location is displayed:
ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER

CHANGE FIELD; 2; ENTER; ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER

Test 2 starts with the first network circuit in the carrier selected and runs until all digital network circuits in the carrier are tested.

Proceed to Step 1 of Test 2 Execution.
14. To select all network circuits in a slot for testing, perform one of the following depending on whether or not a default equipment location is displayed:

ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

Note: When a slot is specified to be tested, either all circuits on the circuit pack are tested, or if the circuit pack has no circuits, then the circuit pack is tested.

Test 2 starts with the first network circuit on the circuit pack selected and runs until all digital network circuits on the circuit pack are tested.
Proceed to Step 1 of Test 2 Execution.
15. To select all circuits within a unit type to be tested, the appropriate unit type must be entered in Field 2.

Note: Refer to Table Z, PROC 620 - Unit Type to Circuit Pack Identification, to determine which circuit pack(s) is tested for a particular unit type.
16. A unit type can be selected in several ways, i.e.: by depressing NEXT UNIT until the correct unit type is displayed, or by entering the unit type and depressing ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
17. When unit type 44 (attendant console interface) is selected for testing, the associated headset(s) or handset(s) must be unplugged or the circuits fail.
18. When unit type 45 (auxiliary trunks) is selected during range testing, one-way incoming and one-way outgoing auxiliary trunks will fail with a specific fault code of 316 (insufficient 600 ohm termination reflection possibly caused by an open transmission option switch).

TABLE Z.

| PROC 620 <br> unit type to circuit pack identification |  |  |
| :---: | :---: | :---: |
| UNIT <br> TYPE | DEFINTITION | $\begin{aligned} & \text { CIRCUIT } \\ & \text { PACK } \end{aligned}$ |
| 6 | TMS or module control channel (MCC) | TN401 |
| 7 | TMS or module processor | TN381 or TN380 |
| 8 | Maintenance interface (MIF) | TN444 |
| 9 | Modute clock | TN460 |
| 10 | Time slot interchanger (TSI) - ALU | TN446 |
| 11 | Time slot interchanger (TSI) - PSTORE | TN445 |
| 12 | I/O bus interface (IOBI) | TN400 |
| 13 | Port data store (PDS) | TN440 |
| 14 | Port control interface (PCI) | TN452 |
| 15 | Port data interface (PDI) | TN454 |
| 16 | Tone plant | SN250 |
| 23 | TMS or network duplication/update channel | TN530 |
| 24 | Touch-tone dialing sender | SN252 |
| 25 | Touch-tone dialing receiver | SN251 |
| 26 | Network 1/O | Not applicable |
| 27 | General purpose port (GPP) | SN270 |
| 28 | 72 Series (MFET) port | SN224 |
| 29 | Line circuit | SN228 or SN229 |
| 31 | Auxiliary tone plant | SN253. |
| 32 | CO trunk (hardware) | SN230 |
| 33 | DID trunk (hardware) | SN232 |
| 34 | TIE trunk/data port (hardware) | SN233 or SN243 |

TABLE Z. (Contd)

|  | PROC 620 <br> UNIT TYPE TO CIRCUIT PACK IDENTIFICATION (Contd) |  |
| :--- | :--- | :--- |
| UNIT <br> TYPE | DEFINIION | CIRCUIT <br> PACK |
| 44 | Attendant console interface | SN233 |
| 45 | Auxiliary trunk (hardware) | SN231 |
| 46 | Attendant conference | SN254 |
| 47 | Facility test circuit | SN260 |
| 50 | TMS clock oscillator (TCO) | TN461 |
| 51 | Local clock termination (LCT) | TN462 |
| 52 | System clock synchronizer (SCS) | TN463 |
| 53 | Multiplexer (MPX) | TN470 |
| 54 | Fan out (FO) | TN473 |
| 55 | Module interface | TN480 |
| 56 | Intermodule data store | TN441 |
| 57 | Light guide interface (LGI) | TN481 |
| 58 | Fan in (FI) | UN150 |
| 59 | TMS maintenance interface (TMIF) | TN482 |
| 62 | Analog/Digital facility test circuit (ADFTC) | SN261 |
| 66 | Tone detector 2 | SN255 |
| 68 | DS-1 trunk interface | ANN11 |
| 69 | Multifunction analog terminal (MFAT) | ANN17 |
| 71 | Remote module interface (RMI) | SN238 |
| 72 | EIA interface |  |

19. When unit type 68 (DS-1) is to be selected for testing, proceed to Step 35.

Do not perform steps 20 through 25 to select unit type 68 (DS-1) to test all unit type 68 circuit packs in the switch, module, cabinet, carrier, or slot.

Note: When unit type 68 (DS-1) is selected during range testing, all DS-1 circuit packs not busied out will fail with a specific fault code of 785 (DS-1 not maintenance busy) unless each individual DS-1 circuit pack is busied out.
20. If no default equipment location is displayed, enter the unit type (except unit type 68) to be tested in Field 2 and depress ENTER or use NEXT UNIT to step through the unit types in numerical sequence until the unit type to be tested is displayed in Field 2.
If a default equipment location is displayed, enter the unit type (except unit type 68) to be tested in Field 2 and depress ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Test 2 starts with the first module, first cabinet and carrier, and runs until all digital network circuits of the unit type selected are tested.
Proceed to Step 1 of Test 2 Execution.
21. In addition to testing all network circuits in a specified unit type, a range of circuits for the unit type (all circuits for a unit type in a module, cabinet, carrier, or slot) can also be selected for testing.
22. To select all network circuits for a unit type (except unit type 68) in a module for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Unit type to be tested); ENTER; (Module number to be tested); ENTER.
CHANGE FIELD; 2; ENTER; (Unit type to be tested); ENTER; (Module number to be tested); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Test 2 starts with the first network circuit of the unit type specified, in the module selected, and runs until all digital network circuits of the unit type in the module are tested.
Proceed to Step 1 of Test 2 Execution.
23. To select all network circuits for a unit type (except unit type 68) in a cabinet for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Unit type to be tested); ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.
CHANGE FIELD; 2; ENTER; (Unit type to be tested); ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Test 2 starts with the first network circuit of the unit type specified, in the cabinet selected, and runs until all digital network circuits of the unit type in the cabinet are tested.
Proceed to Step 1 of Test 2 Execution.
24. To select all network circuits for a unit type (except unit type 68) in a carrier for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Unit type to be tested); ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Unit type to be tested); ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Test 2 starts with the first network circuit of the unit type specified, in the carrier selected, and runs until all digital network circuits of the unit type in the carrier are tested.

Proceed to Step 1 of Test 2 Execution.
25. To select all network circuits for a unit type in a slot (except unit type 68) for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: When a slot is specified to be tested, either all circuits on the circuit pack are tested, or if the circuit pack has no circuits, then the circuit pack is tested.
(Unit type to be tested); ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Unit type to be tested); ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Test 2 starts with the first network circuit of the unit type specified, in the slot selected, and runs until all digital network circuits of the unit type in the slot are tested.

Proceed to Step 1 of Test 2 Execution.
26. A specific network circuit can be selected for testing by performing one of the following depending on whether or not a default equipment location is displayed:
(Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
If the specific network circuit selected for testing is a unit type 68 circuit pack (DS-1) the maintenance busy out procedure listed in Steps 30 through 34 must be performed.
Proceed to Step 30.

## PROC 620 Test 2

27. The unit type field is an optional input field to test a specific network circuit.

If the unit type is unknown, CLEAR ENTRY; ENTER is used to clear any unit type displayed in Field 2, or ENTER is depressed when no unit type is displayed.
28. A specific network circuit can also be selected for testing whether or not a default equipment location is displayed by use of NEXT UNIT and NEXT CIRCUIT.
Depress NEXT UNIT until the unit type of the circuit to be tested is displayed in Field 2.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Depress NEXT CIRCUIT until the circuit to be tested is displayed in Fields 3 through 7.
If the specific network circuit selected for testing is a unit type 68 circuic (DS-1) the maintenance busy out procedure listed in Steps 30 through 34 must be performed.

Proceed to Step 30.
29. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 30.

If the default equipment location displayed in Fields 2 through 7 is a unit type 68 circuit pack (DS-1) the maintenance busy out procedure listed in Steps 30 through 34 must be performed.

Proceed to Step 30.
30. When a specific network circuit, default equipment location, or DS-1 circuit pack is to be tested, check the circuit status in Field 9.
If Field 9 equals 1 (on-line and in-use) Test 2 cannot be performed for port circuits. Wait until the circuit is not in-use or perform tests on other circuits.

Note: Port circuits that cannot be tested while in-use are unit types 24, 25, 27, 28, 29, 32, $33,34,44$ through $47,62,66,68,69,71$, and 72.

If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 31.
If Field 9 does not equal 4, proceed to Step 32.
31. If Test 2 is being performed remotely, proceed to Step 32.

- If Test 2 is being run locally (or with maintenance personnel on the customer's premises), determine if the circuit pack being tested is plugged in.

If the circuit pack is not plugged in or the slot is empty, reseat or install the circuit pack, then proceed to Step 32.

If the circuit pack is firmly seated, proceed to Step 32.
Caution: Busying out a port circuit results in loss of customer calls when the port circuit is in use. Busying out a DS-1 circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.
32. Individual port circuits or DS-1 circuit packs can be placed in maintenance busy out status for testing by checking the circuit status in Field 9.
33. If Field 9 equals 1 (on-line and in-use) individual port circuits should not be busied out as Test 2 results may not be valid.

Note: Port circuits that should not be busied out while in-use are unit types $24,25,27$, $28,29,32,33,34,44$ through $47,62,66,68,69,71$, and 72.
34. If the circuit status $=3$, proceed to Step 1 of Test 2 Execution.

If the circuit status does not equal 3, depress BUSY OUT and proceed to Step 1 of Test 2 Execution.

Note: If the circuit within a unit type cannot be busied out, special error code 80 (busy/release busy not allowed for this unit) is displayed in the MAAP error code field.
35. When range testing of unit type 68 (DS-1) is being performed, each DS-1 circuit pack in the range selected for testing must be busied out.

Note: A DS-1 circuit pack that is not busied out fails the test with a specific fault code of 785 (DS-1 not maintenance busy).
36. Enter unit type 68 in Field 2 and depress ENTER.
37. Depress NEXT CIRCUIT.

The first DS-1 circuit pack in the first module is displayed in Fields 3 through 6.

Note: Field 7 (circuit) is dashed for a DS-1 circuit pack.
38. Determine the type of range testing to be performed for unit type 68 (DS-1).

If all DS-1 circuit packs are to be tested, proceed to Step 39.
If all DS-1 circuit packs in a module are to be tested, proceed to Step 43.
If all DS- 1 circuit packs in a cabinet are to be tested, proceed to Step 48.
If all DS-1 circuit packs in a carrier are to be tested, proceed to Step 53.
If a DS-1 circuit pack in a particular slot is to be tested, proceed to Step 58.
39. If all DS-1 circuit packs are to be tested, perform Steps 30 through 34 above to busy out the DS-1 circuit pack displayed in Fields 3 through 6.
40. Depress NEXT CIRCUIT to display the next DS-1 circuit pack.

Note: When all DS-1 circuit packs are displayed, Fields 3 through 7 are dashed.
41. If Fields 3 through 7 are not dashed, repeat Steps 39 through 41.

If Fields 3 through 7 are dashed, proceed to Step 42.
42. Depress CHANGE FIELD; 3; ENTER.

Test 2 starts with the first module, first cabinet and carrier, and runs until all unit type 68 circuit packs are tested.

Proceed to Step 1 of Test 2 execution.
43. Determine if the module displayed in Field 3 is the module to be tested.

If the module displayed in Field 3 is to be tested, proceed to Step 44.
If the module displayed in Field 3 is not to be tested, depress NEXT CIRCUIT until the module to be tested is displayed in Field 3, then proceed to Step 44.
44. Perform Steps 30 through 34 above to busy out the DS-1 circuit pack in the module to be tested.

## PROC 620 Test 2

45. Depress NEXT CIRCUIT to display the next DS-1 circuit pack.

Note: When all DS-1 circuit packs are displayed, Fields 3 through 7 are dashed.
46. Determine if the module being tested is still displayed in Field 3.

If the same module is displayed, repeat Steps 44 through 46.
If the same module is not displayed, proceed to Step 47.
47. Depress CHANGE FIELD; 4; ENTER.

Test 2 starts with the first DS-1 circuit pack in the module selected and runs until all unit type 68 circuit packs in the module are tested.

Proceed to Step 1 of Test 2 execution.
48. Determine if the module and cabinet displayed in Fields 3 and 4 is the module and cabinet to be tested.

If the module and cabinet displayed in Fields 3 and 4 is to be tested, proceed to Step 49 .
If the module and cabinet displayed in Fields 3 and 4 is not to be tested, depress NEXT CIRCUIT until the module and cabinet to be tested is displayed in Fields 3 and 4, then proceed to Step 49.
49. Perform Steps 30 through 34 above to busy out the DS- 1 circuit pack in the module and cabinet to be tested.
50. Depress NEXT CIRCUIT to display the next DS-1 circuit pack.

Note: When all DS-1 circuit packs are displayed, Fields 3 through 7 are dashed.
51. Determine if the module and cabinet being tested is still displayed in Fields 3 and 4.

If the same module and cabinet is displayed, repeat Steps 49 through 51.
If the same module and cabinet is not displayed, proceed to Step 52.
52. Depress CHANGE FIELD; 5; ENTER.

Test 2 starts with the first DS-1 circuit pack in the cabinet selected and runs until all unit type 68 circuit packs in the cabinet are tested.

Proceed to Step 1 of Test 2 execution.
53. Determine if the module, cabinet, and carrier displayed in Fields 3 through 5 is the module, cabinet, and carrier to be tested.

If the module, cabinet, and carrier displayed in Fields 3 through 5 is to be tested, proceed to Step 54.

If the module, cabinet, and carrier displayed in Fields 3 through 5 is not to be tested, depress NEXT CIRCUIT until the module, cabinet, and carrier to be tested is displayed in Fields 3 through 5 , then proceed to Step 54.
54. Perform Steps 30 through 34 above to busy out the DS- 1 circuit pack in the module, cabinet, and carrier to be tested.
55. Depress NEXT CIRCUIT to display the next DS-1 circuit pack.

Note: When all DS-1 circuit packs are displayed, Fields 3 through 7 are dashed.
56. Determine if the module, cabinet, and carrier being tested is still displayed in Fields 3 through 5.

If the same module, cabinet, and carrier is displayed, repeat Steps 54 through 56 .
If the same module, cabinet and carrier is not displayed, proceed to Step 57.
57. Depress CHANGE FIELD; 6; ENTER.

Test 2 starts with the first DS-1 circuit pack in the carrier selected and runs until all unit type 68 circuit packs in the carrier are tested.

Proceed to Step 1 of Test 2 execution.
58. Determine if the module, cabinet, carrier, and slot displayed in Fields 3 through 6 is the module, cabinet, carrier, and slot to be tested.
If the module, cabinet, carrier, and slot displayed in Fields 3 through 6 is to be tested, proceed to Step 59.

If the module, cabinet, carrier, and slot displayed in Fields 3 through 6 is not to be tested, depress NEXT CIRCUIT until the module, cabinet, carrier, and slot to be tested is displayed in Fields 3 through 6, then proceed to Step 59.
59. Perform Steps 30 through 34 above to busy out the DS-1 circuit pack in the module, cabinet, carrier, and slot to be tested.
60. Depress CHANGE FIELD; 7; ENTER.

Proceed to Step 1 of Test 2 execution.

## Test 2 Execution

1. To start Test 2 after selecting the circuit(s) to be tested, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. Test 2 operation and display of test results is different when a specific network circuit, a default equipment location, or a DS-1 circuit pack is tested and when the entire switch or a range of circuits are tested.
3. For test operation and display of test results for a default equipment location, a specific network circuit, or a DS-1 circuit pack proceed to Step 1 of Test 2 Execution and Test Result Display for a Single Circuit.
4. For test operation and display of test results for the entire switch or a range of circuits, proceed to Step 1 of Test 2 Execution and Test Result Display for a Range of Circuits.

## Test 2 Execution and Test Result Display for a Single Circuit

1. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the default equipment location or the specific network digital circuit cannot be tested.
2. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 2. If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7.
3. When special error code 83 (switch resources not available) is displayed, repeat Test 2 until the test is executed or wait until switch resources become available before testing.
4. If special error code 81 or 83 is not displayed, proceed to Step 5.

## PROC 620 Test 2

5. When the test is completed for a default equipment location, a specific circuit, or a DS-1 circuit pack the WAIT indicator is turned off and the following is displayed:
Field 1-2.
Fields 2 through 7 - Unit type and equipment location of circuit tested.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Field 8 - Alarm status of displayed circuit.
Field 9 - Current status of displayed circuit $(0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).
Field 10 - Dashed.
Field 11-Dashed.
Field 12-1 (Indicating one circuit tested).
Field 13-0 (Indicating no failures were found for the circuit tested) or 1 (Indicating that the circuit failed the test).
6. When a specific circuit, a default equipment location, or a DS-1 circuit pack fails Test 2 (indicated by a 1 in Field 13), depressing NEXT CIRCUIT displays the index and specific fault code recorded for the circuit tested in Fields 10 and 11.
7. When the default equipment location, specific circuit, or DS-1 circuit pack previously tested was busied out and the test passed, or the problem was corrected, the circuit, or circuit pack should be released from busy using RLS BUSY OUT.
8. When another specific circuit is to be tested, the CHANGE FIELD sequence must be used to select the specific circuit:
CHANGE FIELD; 2; ENTER; (Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
9. EXECUTE must be depressed to test the specific circuit selected.

## Test 2 Execution and Test Result Display for a Range of Circuits

1. When the entire switch or a range of circuits is being tested for digital network failures, the WAIT indicator is turned on and the following fields are incremented as a circuit is tested:

Field 2 - Unit type of circuit being tested.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit being tested.
Note: When a range of circuits for a particular unit type is being tested and the unit type contains only one circuit pack, the display in Fields 2 through 7 may not be changing.

Field 10 - Index (if any).

Field 11 - Specific fault code (if any).
Field 12 - Number of circuits tested.
Field 13 - Number of circuits failed (if any).
2. The failure information returned in Test 2 is stored in the Demand Maintenance Information Data Structure (DMIDS).
If DMIDS becomes full at any time during the test, Test 2 is stopped and the WAIT indicator is turned off.

The last equipment location tested is displayed in Fields 2 through 7, and special error code 84 (DMIDS overflow) is displayed in the MAAP error code field.
3. Results of the test can be examined at this time (See Steps 14 through 20 below) and Test 2 can be continued from where it was stopped, i.e., from the equipment location displayed in Fields 3 through 7.

## Caution: If Test 2 is continued from where it was stopped by a DMIDS overflow, any test results gathered to that point are lost and only new failure data is retained.

Note: Before depressing EXECUTE to continue Test 2 from where it was stopped because of a DMIDS overflow, the failure data should be examined and recorded.
4. If the test is halted because of a DMIDS overflow, a new range of circuits to be tested can be entered instead of continuing Test 2 from where it was stopped.

The CHANGE FIELD sequence must be used to enter the new range of circuits to be tested.
Refer to Steps 11 through 14 of Test 2 Data Entry above to select a range of digital network circuits to be tested in a module, cabinet, carrier, or slot.

Refer to Steps 22 through 25 of Test 2 Data Entry above to select a range of digital network circuits within a unit type (except unit type 68) to be tested in a module, cabinet, carrier, or slot.
Refer to Steps 35 through 60 of Test 2 Data Entry above to select a range of unit type 68 (DS-1) circuit packs to be tested in a module, cabinet, carrier, or slot.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
5. EXECUTE must be depressed to begin Test 2 from the new range of circuits entered or from where Test 2 was stopped.
6. When more than one circuit is being tested and the test of the circuit cannot be completed because switch resources are not available, special error code 83 (switch resources not available) is displayed in the MAAP error code field.
A fault code indicating resources were not available is stored in DMIDS and the next circuit is tested.
7. When a range of circuits is being tested and a circuit is encountered which is being used by call processing, the IN USE indicator on the MAAP is turned on momentarily when the display is updated and the in-use circuit is stored for a later retry.

## PROC 620 Test 2

8. When the range of circuits specified is tested once, the stored in-use circuit locations are tried again following the same testing sequence as the first pass through the range of circuits.
The in-use list may be reduced to a few circuits which remain in-use by call processing. This condition can be recognized by the IN USE indicator on the MAAP remaining on and the display fields not changing or changing very slowly.
The test of in-use circuits continues until all circuits in the range specified are tested or until maintenance personnel halt Test 2 by depressing STOP.
9. When Test 2 is halted by depressing STOP and in-use circuits still exist, the list of in-use circuits are merged into the failed circuits list and the circuits are marked with a specific fault code of 13 indicating they were in-use.
The WAIT indicator is turned off and the results of the test can be examined at this time. (See Steps 14 through 20 below.)
10. STOP can be depressed when the entire switch or a range of circuits is being tested.

If Test 2 is stopped before one complete testing pass through the range of circuits specified is made, the total number of circuits tested and the total number of circuits failed are displayed in Fields 12 and 13.
The last equipment location tested is displayed in Fields 3 through 7 and special error code 82 (test of range not completed) is displayed in the MAAP error code field.
11. When Test 2 is halted by depressing STOP before the range of circuits is tested at least once, the in-use circuit list (if any) is merged into the failure list.
When Test 2 is continued, the in-use circuit list is added to as necessary and the circuits are retried as described in Step 8.
12. Test result information can be stepped through (as described in Steps 14 through 20 below) when Test 2 is halted using STOP even though the entire range is not tested.
13. To restart the test when Test 2 is halted by use of STOP before the range of circuits is tested at least once, EXECUTE is depressed and Test 2 starts at the equipment location following the last equipment location tested.
Test results gathered after restarting Test 2 are added to the test results previously stored in DMIDS.
14. When the entire switch or a range of circuits is tested, the WAIT indicator is turned off and a summary is displayed.
15. If no digital network circuits failed, the following summary is displayed.

Field 1-2.
Fields 2 through 6 - Equipment location of the range of circuits tested.
Field 12 - Number of circuits tested.
Field 13-0 (Indicating no failures).
16. If any digital network circuits failed, the summary displays a 2 in Field 1, the equipment location of the range of circuits tested in Fields 2 through 6, the total number of circuits tested in Field 12, and the total number of failures in Field 13.
17. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-2.
Field 2 - Unit type of failed circuit.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of failed circuit.
Field 8-Alarm status of failed circuit.
Field 9 - Current status of displayed circuit ( $0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

Field 10 - Index (1).
Field 11 - Specific fault code.
Field 12 - Number of circuits tested.
Field 13 - Number of circuits failed.
18. When one-way incoming and one-way outgoing auxiliary trunks (unit type 45) are tested during range testing they will fail with a specific fault code of 316 (insufficient 600 ohm termination reflection possibly caused by an open transmission option switch).

When DS-1 circuit packs (unit type 68) are tested during range testing, all DS-1 circuit packs not busied out will fail with a specific fault code of 785 (DS-1 not maintenance busy) unless each individual circuit pack(s) is busied out.
19. Depressing NEXT CIRCUIT repeatedly displays the remaining failing digital network circuits.

When more than one unit type is tested, depressing NEXT UNIT causes the first circuit of the next unit type with failures to be displayed.

Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Field 13 decrements, corresponding to the number of failures passed over (if any), when stepping from unit to unit.

NEXT CIRCUIT is used to step through the failures of the displayed unit type.
20. When all failing circuits are displayed, depressing NEXT CIRCUIT or NEXT UNIT dashes Fields 2 through 13.

Depressing NEXT CIRCUIT or NEXT UNIT once more causes the summary to be displayed, and the failing circuits can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
21. When DS-1 circuit packs previously tested were busied out and the test passed, or the problem was corrected, the DS-1 circuit packs should be released from busy using RLS BUSY OUT.
22. To select another range of digital network circuits to test, the CHANGE FIELD sequence must be used.

Refer to Steps 11 through 14 of Test 2 Data Entry above to select a range of digital network circuits to be tested in a module, cabinet, carrier, or slot.

## PROC 620 Test 2 and Test 3

Refer to Steps 22 through 25 of Test 2 Data Entry above to select a range of digital network circuits within a unit type (except unit type 68) to be tested in a module, cabinet, carrier, or slot.

Refer to Steps 35 through 60 of Test 2 Data Entry above to select a range of unit type 68 (DS-1) circuit packs to be tested in a module, cabinet, carrier, or slot.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
23. EXECUTE must be depressed to begin Test 2 from the new range of circuits selected.
24. The NETWORK SWITCH and/or PORT fault indicator(s) is automatically turned off when Test 2 completes with no failures detected for all network digital circuits that raised an alarm.

Note: Network circuit alarmed entries in PMIDS are marked as resolved.
25. The MAJOR and/or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Test 3

Test 3 is used to test one or more circuits in the digital network in a continuous cycle.
Test 3 is mainly used when an intermittent fault is suspected, when using test equipment to further isolate a problem, or to trace wiring problems.

Circuits can be selected for testing by unit type, a range of equipment locations, or on a single circuit basis.

## Test 3 Data Entry

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 3; ENTER.

2. When Test 3 is initially called in, a default equipment location and unit type may be displayed in Fields 2 through 7.
The alarm status, circuit status, and specific fault code associated with the default equipment location are displayed in Fields 8, 9, and 11.
Field 2 (unit type) is blinking, indicating an optional entry field.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
3. Normally, a specific digital network circuit or the default equipment location is tested in Test 3. However, circuit selection for testing in Test 3 is identical to Test 2.

All digital network circuits, a range of circuits, all circuits within a unit type, a combination of unit type and range (i.e., all circuit locations of a unit type in the range specifiedt, a specific digital network circuit, or the default equipment location can be tested continuously in Test 3.
4. When attendant console interface circuits (unit type 44) are tested during range testing, the associated headset(s) or handset(s) must be unplugged or the circuits fail.
5. When unit type 45 (auxiliary trunks) is selected during range testing, one-way incoming and one-way outgoing auxiliary trunks will fail with a specific fault code of 316 (insufficient 600 ohm termination reflection possibly caused by an open transmission option switch).
6. When unit type 68 (DS-1) is selected during range testing, all DS-1 circuit packs not busied out will fail with a specific fault code of 785 (DS-1 not maintenance busy) unless each individual DS-1 circuit pack is busied out.

To select unit type 68 (DS-1) to be tested continuously, refer to Test 2 Data Entry, Step 35.
7. When all circuits in the switch are to be tested continuously, refer to Test 2 Data Entry, Step 8 for circuit selection.

To select all circuits in a specific module to be tested continuously, refer to Test 2 Data Entry, Step 11.
To select all circuits in a specific cabinet to be tested continuously, refer to Test 2 Data Entry, Step 12.

To select all circuits in a specific carrier to be tested continuously, refer to Test 2 Data Entry, Step 13.

To select all circuits in a specific slot to be tested continuously, refer to Test 2 Data Entry, Step 14.
Proceed to Step 1 of Test 3 Execution.
8. When all circuits in a unit type (except unit type 68) are to be tested continuously, refer to Test 2 Data Entry, Steps 15 through 21 for unit type selection.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
To select all circuits of a unit type (except unit type 68) in a specific module to be tested continuously, refer to Test 2 Data Entry, Step 22.
To select all circuits of a unit type (except unit type 68) in a specific cabinet to be tested continuously, refer to Test 2 Data Entry, Step 23.
To select all circuits of a unit type (except unit type 68) in a specific carrier to be tested continuously, refer to Test 2 Data Entry, Step 24.

To select all circuits of a unit type (except unit type 68) in a specific slot to be tested continuously, refer to Test 2 Data Entry, Step 25.
To select unit type 68 (DS-1) to be tested continuously, refer to Steps 35 through 60 of Test 2 Data Entry to select and busy out a range of unit type 68 (DS-1) circuit packs to be tested in a module, cabinet, carrier, or slot.

Note: Do not perform steps 20 through 25 of Test 2 Data Entry to select unit type 68 unit (DS-1) to be tested continuously in the switch, module, cabinet, carrier, or slot. When unit type 68 (DS-1) is selected during range testing, all DS-1 circuit packs not busied out will fail with a specific fault code of 785 (DS-1 not maintenance busy) unless each individual DS- 1 circuit pack is busied out.

Proceed to Step 1 of Test 3 Execution.

## PROC 620 Test 3

9. A specific network circuit can be selected for testing by entering the unit type (optional) and equipment location in Fields 2 through 7 whether or not a default equipment location is displayed:

Note: Specific circuits in unit types 69, 71, and 72 cannot be selected in R2V1.
(Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
If the specific network circuit selected for testing is a unit type 68 circuit (DS-1) the maintenance busy out procedure listed in Steps 13 through 18 must be performed.

Proceed to Step 13.
10. The unit type field is an optional input field to test a specific network circuit.

If the unit type is unknown, CLEAR ENTRY; ENTER is used to clear any unit type displayed in Field 2, or ENTER is depressed when no unit type is displayed.
11. A specific network circuit can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.
Depress NEXT UNIT until the unit type of the circuit to be tested is displayed in Field 2.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Depress NEXT CIRCUIT until the circuit to be tested is displayed in Fields 3 through 7.
If the specific network circuit selected for testing is a unit type 68 circuit (DS-1) the maintenance busy out procedure listed in Steps 13 through 18 must be performed.
Proceed to Step 13.
12. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 13.

If the default equipment location displayed in Fields 2 through 7 is a unit type 68 circuit (DS-1) the maintenance busy out procedure listed in Steps 13 through 18 must be performed.
Proceed to Step 13.
13. When a specific network circuit, a default equipment location, or a DS-1 circuit pack is to be tested, check the circuit status in Field 9.

If Field 9 equals 1 (on-line and in-use) Test 3 cannot be performed for port circuits. Wait until the circuit is not in-use or perform tests on other circuits.

Note: Port circuits that cannot be tested while in-use are unit types $24,25,27,28,29,32$, $33,34,44$ through $47,62,66,68,69,71$, and 72.

If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 14.
IF Field 9 does not equal 4 , proceed to Step 16.
14. If Test 3 is being performed remotely, proceed to Step 16.

If Test 3 is being run locally (or with maintenance personnel on the customer's premises), determine if the circuit pack being tested is plugged in.

## PROC 620 Test 3

15. If the circuit pack is not plugged in or the slot is empty, reseat or install the circuit pack, then proceed to Step 16.
If the circuit pack is firmly seated, proceed to Step 16.

## Caution: Busying out a port circuit results in loss of customer calls when the port circuit is in use. Busying out a DS-I circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.

16. Individual port circuits or DS-1 circuit packs can be placed in maintenance busy out statusif for testing by checking the circuit status displayed in Field 9.
17. If Field 9 equals 1 (on-line and in-use) individual port circuits should not be busied out as Test 3 results may not be valid.

Note: Port circuits that should not be busied out while in-use are unit types 24, 25, 27, $28,29,32,33,34,44$ through $47,62,66,68,69,71$, and 72.
18. If the circuit status $=3$, proceed to Step 1 of Test 3 Execution.

If the circuit status does not equal 3, depress BUSY OUT and proceed to Step 1 of Test 3 Execution.

Note: If the circuit within a unit type cannot be busied out, special error code 80 (busy/release busy not allowed for this unit) is displayed in the MAAP error code field.

## Test 3 Execution

1. To start Test 3 after selecting the circuit(s) to be tested, depress EXECUTE.

The WAIT indicator is not turned on during Test 3 execution.
2. When an in-use circuit is encountered during Test 3 execution (for a range of circuits or for a single circuit) the IN USE indicator is lighted on the MAAP momentarily and the circuit is passed over for that iteration of the test.

The in-use circuit is not stored for a later retry as Test 3 is executed continuously, testing all circuits specified in physical order.
Circuits that are in-use are not merged into the failed circuits list when Test 3 is stopped.
3. When no switch resources are available to test a circuit during execution of Test 3, special error code 83 (switch resources not available) is displayed in the MAAP error code field.
If a single circuit is being tested, a fault code indicating no resources were available is stored in DMIDS and the single circuit is tested again.

If more than one circuit is being tested, a fault code indicating no resources were available is stored in DMIDS and the next circuit is tested.
4. If the DMIDS storage buffer becomes full either during testing of a range of circuits or a single circuit, special error code 84 (DMIDS overflow) is displayed in the MAAP error code field.

Note: Testing is not stopped when the DMIDS buffer becomes full.

## PROC 620 Test 3

5. When multiple circuits are being tested new errors found are discarded. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed. (See Steps 1 through 5 of Test 3 Result Display for a Range of Circuits below).
6. When testing a single circuit new errors found are added to the failure list and the oldest errors are deleted. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed. (See Steps 5 through 9 of Test 3 Result Display for a Single Circuit below.)

Note: Only 40 errors are displayed when the DMIDS buffer becomes full. When multiple circuits are being tested the 40 errors are the oldest errors recorded. When a single circuit is tested the 40 errors are the newest errors recorded.
7. When a default equipment location, a specific circuit, or a DS-1 circuit pack is being tested continuously in Test 3, Field 11 is dashed for 3 seconds and blanked for 3 seconds.
8. When the entire switch or a range of circuits is being tested continuously in Test 3, the following fields are incremented as a circuit is tested:

Field 2 - Unit type of circuit being tested.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit being tested.
Note: When a range of circuits for a particular unit type is being tested and the unit type contains only one circuit pack, the display in Fields 2 through 7 may not be changing.

Field 10 - Index (if any).
Field 11 - Specific fault code (if any) for circuit displayed.
Note: While testing of a circuit displayed in Fields 2 through 7 is being conducted, Field 11 will be dashed for 3 seconds and blanked for 3 seconds.
9. The testing interval is determined by maintenance personnel performing the test and is ended by depressing STOP.
10. Display of test results is different when a specific network circuit, a default equipment location, or a DS-1 circuit pack is tested and when the entire switch or a range of circuits are tested.
11. For display of test results when testing a default equipment location, a specific network circuit, or a DS-1 circuit pack proceed to Step 1 of Test 3 Result Display for a Single Circuit.
12. For display of test results when testing the entire switch or a range of circuits, proceed to Step 1 of Test 3 Result Display for a Range of Circuits.

## Test 3 Result Display for a Single Circuit

1. Special error codes 81 or 83 may be displayed in the MAAP error code field when the default equipment location or the specific network digital circuit cannot be tested.
2. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 3. If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7.
3. When special error code 83 (switch resources not available) is displayed, repeat Test 3 until the test is executed or wait until switch resources become available before testing.
4. If special error code 81 or 83 is not displayed, proceed to Step 5 .
5. When Test 3 is stopped while testing a default equipment location, a specific circuit, or a DS-1 circuit pack the following is displayed:
Field 1-3.
Field 2 - Unit type of displayed circuit.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit tested.
Field 8 - Alarm status of displayed circuit.
Field 9 - Current status of displayed circuit $(0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

Field 10 - Dashed.
Field 11 - Dashed.
Field 12 - Number of times the circuit was tested.
Field 13 - 0 (Indicating no failures were found for the circuit tested) or number of fault information lists for the failing circuit.
6. When a specific circuit, a default equipment location, or a DS-1 circuit pack failed Test 3 (indicated by Field 13), depressing NEXT CIRCUIT displays the index and the specific fault code for the circuit tested in Fields 10 and 11.
7. When more than one fault information list is recorded for a single circuit location that is tested, indicated by Field 13 displaying more than 1 (which is an index to fault information lists when testing single circuits), NEXT FAULT is depressed to step to the next fault information list.

Note: When NEXT FAULT is depressed, Fields 2 through 13 may be dashed. This indicates that all remaining fault information lists contained the same type of data.

Dashing of Fields 2 through 13 can happen at any time when NEXT FAULT is depressed, no matter what number was displayed in Field 13 before NEXT FAULT was depressed.
8. Depressing NEXT FAULT may display a different specific fault code in Field 11 when a new fault information list exists.
9. NEXT FAULT is depressed once more to determine if other fault information lists exist for the circuit tested.

When no new fault information lists exist, Fields 2 through 13 are dashed when NEXT FAULT is depressed.
10. Depressing NEXT FAULT again displays the summary (Fields 10 and 11 are dashed).
11. When the default equipment location, specific circuit, or DS-1 circuit pack previously tested was busied out and the test passed, or the problem was corrected, the circuit, or circuit pack should be released from busy using RLS BUSY OUT.
12. When another specific circuit is to be continuously tested, the CHANGE FIELD sequence must be used to select the specific circuit:
CHANGE FIELD; 2; ENTER; (Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Note: Circuits in unit types 69,71 , and 72 cannot be selected for testing in R2V1.
13. EXECUTE must be depressed to test the specific circuit selected.

## Test 3 Result Display for a Range of Circuits

1. When Test 3 is stopped while testing the entire switch or a range of circuits, a summary is displayed.
If no digital network circuits failed, the following summary is displayed:
Field 1-3.
Fields 2 through 5 - Equipment location of the range of circuits tested.
Field 12 - Number of circuits tested.
Field 13-0 (Indicating no failures).
2. If any digital network circuits failed, the summary displays a 3 in Field 1, the equipment Iocation of the range of circuits tested in Fields 2 through 6, the total number of circuits tested in Field 12, and the total number of circuits failed in Field 13.
3. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-3.
Field 2 - Unit type of failed circuit.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of failed circuit.
Field 8 - Alarm status of failed circuit.
Field 9 - Current status of displayed circuit $(0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).
Field 10 - Index (1).
Field 11 - Specific fault code.
Field 12 - Number of circuits tested.
Field 13 - Number of circuits failed.
Note: Only one fault information list exists for each failing circuit when multiple circuits are tested.
4. Depressing NEXT CIRCUIT repeatedly displays the remaining failing digital network circuits.
5. When more than one unit type is tested, depressing NEXT UNIT cause the first circuit of the next unit type with failures to be displayed.

Note: Unit types 69, 71, and 72 are not displayed in R2V1.
When NEXT UNIT is used to step from unit to unit, without examining the circuits within the unit, Field 13 is decremented by the number of failures passed over (if any).

NEXT CIRCUIT is used to step through the failures of the displayed unit type.
6. When all failing circuits are displayed, depressing NEXT CIRCUIT dashes Fields 2 through 13.

Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing circuits can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
7. When DS-1 circuit packs previously tested were busied out and the test passed, or the problem was corrected, the DS-1 circuit packs should be released from busy using RLS BUSY OUT.
8. Test 3 can be restarted without changing the equipment location originally entered for testing by depressing EXECUTE.

The same equipment location or range of circuits is used as the basis for the new execution of Test 3.

Any data gathered in the last execution of Test 3 is lost when EXECUTE is depressed.
9. To select another range of digital network circuits to be continuously tested, the CHANGE FIELD sequence must be used.

Refer to Steps 11 through 14 of Test 2 Data Entry above to select a range of digital network circuits to be tested in a module, cabinet, carrier, or slot.

Refer to Steps 22 through 25 of Test 2 Data Entry above to select a range of digital network circuits within a unit type (except unit type 68) to be tested in a module, cabinet, carrier, or slot.

Refer to Steps 35 through 60 of Test 2 Data Entry above to select a range of unit type 68 (DS-1) circuit packs to be tested in a module, cabinet, carrier, or slot.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
10. EXECU'TE must be depressed to begin Test 3 from the new range of circuits selected.

## Test 4

Test 4 provides a diagnostic analysis on a single circuit or circuit pack, beginning with the specific equipment location of the circuit or circuit pack, to determine where a fault actually is located in the digital network.
Test 4 automatically runs a verification test on any circuit pack that is reseated or replaced (without any MAAP operations by maintenance personnel) to ensure that the problem is corrected.
Verification tests are destructive tests in that they automatically busy out all circuits on a port circuit pack (except DS-1 port circuit packs). After the port circuit pack is tested, all circuits on the port circuit pack are released from busy by the verification test whether or not the circuits had been引jevifusly busied out by other software routines.

Test 4 provides alternate circuit pack replacements (if any) when the first circuit pack replaced does not correct the problem.
When alternate circuit packs are replaced, Test 4 runs a verification test on the alternate circuit pack. If the alternate circuit pack passes the test, the first circuit pack replaced is also verified to be sure that it now passes, and the original failing test is executed to ensure that the problem is corrected.
Test 4 provides visual feedback to maintenance personnel on whether a problem is corrected by the use of RED and GREEN LEDS on the faceplate of the circuit pack that was reseated or replaced.

## Test 4 Data Entry

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
2. When Test 4 is initially called in, a default equipment location and unit type may be displayed in Fields 2 through 7.
The alarm status, circuit status, and specific fault code associated with the default equipment location are displayed in Fields 8, 9, and 11.
Field 2 (unit type) is blinking, indicating an optional entry field.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
3. Either the default equipment location can be tested, or another digital network circuit can be selected for testing.

Caution: Diagnosis of specific fault codes 607, 612, 630, or 638 displayed in Field 11 against unit type 57 (light guide interface) may affect service for approximately the last 6 seconds of Test 4 when unit type 57 is tested.

Note: A normal passing test for unit type 57 lasts approximately 2 to 3 minutes.
4. A specific digital network circuit can be selected for testing by entering the equipment location and unit type (optional) in Fields 2 through 7 whether or not a default equipment location is displayed:

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
(Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Note: No entry is required for the circuit number field if there are no circuits on the circuit pack.

If the specific network circuit selected for testing is a unit type 68 circuit pack (DS-1) the maintenance busy out procedure listed in Steps 12 through 18 must be performed.
Proceed to Step 8.
5. The unit type field is an optional input field to test a specific network circuit.

If the unit type is unknown, CLEAR ENTRY; ENTER is used to clear any unit type displayed in Field 2, or ENTER is depressed when no unit type is displayed.
6. A specific network circuit can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.

Depress NEXT UNIT until the unit type of the circuit to be tested is displayed in Field 2.
Note: Unit types 69,71 , and 72 cannot be selected in R2V1.
Depress NEXT CIRCUIT until the circuit to be tested is displayed in Fields 3 through 7.
If the specific network circuit selected for testing is a unit type 68 circuit. (DS-1) the maintenance busy out procedure listed in Steps 12 through 18 must be performed.
Proceed to Step 8.
7. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 8.

If the default equipment location displayed in Fields 2 through 7 is a unit type 68 circuit pack (DS-1) the maintenance busy out procedure listed in Steps 12 through 18 must be performed.

Proceed to Step 8.
8. When an attendant console interface circuit (unit type 44) is selected for testing, the associated headset or handset must be unplugged or the circuit fails the diagnostic test.
Proceed to Step 12.
9. When a 1-way incoming or 1-way outgoing auxiliary trunk circuit (unit type 45) is selected for testing the option settings must be set for 2 -way transmission or the circuit fails the diagnostic test.
10. To test an auxiliary trunk circuit, perform the following:

Remove the auxiliary trunk circuit pack (SN231) and check the option settings on the circuit to be tested.

If the auxiliary trunk circuit is 2-way transmission (option $Q$ - switches 2 and 3 in the up position), proceed to Step 12.

If the auxiliary trunk circuit is a 1-way incoming (option $S$ - switch 2 up and switch 3 down) or a 1-way outgoing (option $R$ - switch 2 down and switch 3 up) record the switch settings and set both switches (2 and 3) to the up position, then proceed to Step 12.

Note: After the test has passed (corrective action taken if necessary), ensure the switch settings are correctly positioned (recorded above) for the type of transmission required (1-way incoming or 1 -way outgoing) on the auxiliary trunk circuit tested.
11. When a DS-1 circuit (unit type 68) is selected for testing, the circuit pack must be busied out or the circuit pack fails the diagnostic test.

To test a DS- 1 circuit, the maintenance busy out procedure listed in Steps 12 through 18 must be performed.
Proceed to Step 12.
12. When a specific network circuit or default equipment location is to be tested, check the circuit status in Field 9.

## PROC 620 Test 4

13. If Field 9 equals 1 (on-line and in-use) Test 4 cannot be performed for port circuits. Wait until the circuit is not in-use or perform tests on other circuits.

Note: Port circuits that cannot be tested while in-use are unit types 24, 25, 27, 28, 29, 32, $33,34,44$ through $47,62,66,68,69,71$, and 72.
14. If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 15.

If Field 9 does not equal 4, proceed to Step 16.
15. If Test 4 is being performed remotely, proceed to Step 16.

If Test 4 is being run locally (or with maintenance personnel on the customer's premises), determine if the circuit pack being tested is plugged in.
If the circuit pack is not plugged in or the slot is empty, reseat or install the circuit pack, then proceed to Step 16.
If the circuit pack is firmly seated, proceed to Step 16.
Caution: Busying out a port circuit results in loss of customer calls when the port circuit is in use. Busying out a DS-1 circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.
16. Individual port circuits or DS-1 circuit packs can be placed in maintenance busy out status for testing by checking the circuit status displayed in Field 9.
17. If Field 9 equals 1 (on-line and in-use) individual port circuits should not be busied out as Test 4 results may not be valid.

Note: Port circuits that should not be busied out while in-use are unit types $24,25,27$, $28,29,32,33,34,44$ through $47,62,66,68,69,71$, and 72.
18. If the circuit status $=3$, proceed to Step 1 of Test 4 Execution.

If the circuit status does not equal 3, depress BUSY OUT and proceed to Step 1 of Test 4 Execution.

Note: If the circuit within a unit type cannot be busied out, special error code 80 (busy/release busy not allowed for this unit) is displayed in the MAAP error code field.

## Test 4 Execution

1. To start Test 4 after selecting the circuit to be tested, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the default equipment location or the specific network digital circuit cannot be tested.
3. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 4. If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7.
4. When special error code 83 (switch resources not available) is displayed, repeat Test 4 until the test is executed or wait until switch resources become available before testing.
5. If special error code 81 or 83 is not displayed, proceed to Step 6.
6. During execution of Test 4 , Fields 2 through 7 display the unit type and equipment location of the circuit being tested. Field 1 displays a 4, and all other fields are dashed.

Note: Unit types 69, 71, and 72 are not displayed in R2V1.
7. If STOP is depressed while Test 4 is executing, the test is returned to its configuration just before EXECUTE was depressed, i.e.: circuit selected for testing is displayed in Fields 2 through 7.
Any data gathered during testing prior to STOP being depressed is lost.

## Test 4 Result Display

1. When Test 4 is completed for a default equipment location, a specific circuit, or a DS-1 circuit pack the WAIT indicator is turned off.
2. When the specific circuit, default equipment, or DS-1 circuit pack passes Test 4, the following is displayed:
Field 1-4.
Field 2 - Unit type of circuit tested.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit tested.
Field 8 - Alarm status of circuit tested.
Field 9 - Current status of displayed circuit $(0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

Fields 10 through 13 - Dashed.
Note: The GREEN LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack passed Test 4.
3. When the specific circuit, default equipment location, or DS-1 circuit pack fails Test 4, the following is displayed:

Field 1-4.
Field 2 - Unit type of failing circuit pack.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of failing circuit pack.
Note: The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. The diagnostic analysis may isolate the problem to a circuit pack which interfaces with the circuit pack selected for testing.

Field 8 - Alarm status of failing circuit.
Field 9 - Current status of displayed circuit $0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

## PROC 620 Test 4

Field 10 - Index (1).
Field 11 - Specific fault code.
Fields 12 and 13 - Dashed.
Note: The RED LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack failed Test 4.
4. When Test 4 is performing the diagnostic test upon depressing EXECUTE only one fault information list is recorded.

Note: Depressing NEXT FAULT displays special error code 00 (key not allowed at this time) in the MAAP error code field.
5. When a circuit pack is reseated or replaced an automatic verification test is performed.
6. If the DMIDS storage buffer becomes full during the verification test, special error code 84, (DMIDS overflow) is displayed in the MAAP error code field.

Note: Testing is not stopped when the DMIDS buffer becomes full.
New errors found are added to the failure list, and the oldest errors are deleted.
Note: Only 40 errors are displayed when the DMIDS buffer becomes full.
7. During the verification test more than one fault information list may be recorded (if the circuit pack fails the verification test) for the circuit pack being tested (indicated by Field 13 displaying more than 1 ).
8. Depressing NEXT FAULT steps to the next fault information list.

Note: When NEXT FAULT is depressed, Fields 2 through 13 may be dashed. This indicates that all remaining fault information lists contained the same type of data.
9. Dashing of Fields 2 through 13 can happen at any time when NEXT FAULT is depressed no matter what number was displayed in Field 1.3 before NEXT FAULT was depressed.
10. Depressing NEXT FAULT may display a different specific fault code in Field 11 when a new fault information list exists.

NEXT FAULT is depressed once more to determine if other fault information lists exist for the circuit tested.

When no new fault information lists exist, Fields 2 through 13 are dashed when NEXT FAULT is depressed.

Depressing NEXT FAULT again displays the original fault information list.
11. Depressing NEXT CIRCUIT displays an alternate circuit pack (if any) to be replaced.

The RED LED on the original circuit pack is turned off and the RED LED on the displayed circuit pack in Fields 2 through 7 is turned on.
12. Depressing NEXT CIRCUIT again displays the last alternate circuit pack (if any) to be replaced.
The RED LED on the first alternate circuit pack is turned off and the RED LED on the displayed circuit pack in Fields 2 through 7 is turned on.
13. When all alternate circuit packs are displayed, depressing NEXT CIRCUIT once more dashes Fields 2 through 13.
Depressing NEXT CIRCUIT again displays the first circuit pack in the replacement sequence.
14. When the default equipment location, specific circuit, or DS-1 circuit pack previously tested was busied out and the test passed, or the problem was corrected, and the circuit status in Field $9=3$ the circuit should be released from busy using RLS BUSY OUT
15. When another specific circuit is to be tested, the CHANGE FIELD sequence must be used to select the specific circuit:

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
CHANGE FIELD; 2; ENTER; (Unit type of circuit to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Note: No entry is required for the circuit number field if there are no circuits on the circuit pack.
16. EXECUTE must be depressed to test the circuit selected.
17. The NETWORK SWITCH and/or PORT fault indicator is turned off when Test 4 completes with no failures detected for all network digital circuits that raised an alarm.

Note: Network circuit alarmed entries in PMIDS are marked as resolved.
18. Test 4 must be repeated for each network digital circuit alarmed entry in PROC 600 Test 1 or PROC 620 Test 1 before the fault indicator can be turned off.
19. The MAJOR and/or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Test 5

Test 5 runs a verification test sequence on a circuit pack, testing all circuits (if any). The verification sequence indicates the status of the circuit pack, i.e., the circuit pack passed, the circuit pack is good but that another circuit pack is faulty, or the circuit pack failed.

Verification tests are destructive tests in that they automatically busy out all circuits on a port circuit pack (except DS-1 port circuit packs). After the port circuit pack is tested, "all circuits on the port circuit pack are released from busy by the verification test whether or not the circuits had been previously busied out by other software routines.

Test 5 provides visual feedback to maintenance personnel on whether a problem is corrected by the use of RED and GREEN LEDs on the faceplate of the circuit pack that is reseated or replaced.

## Test 5 Data Entry

1. Test 5 is selected by use of NEXT TEST or the CHANGE FIELD sequence: CHANGE FIELD; 1; ENTER; 5; ENTER.
2. When Test 5 is initially called in, a default equipment location and unit type may be displayed in Fields 2 through 7.

## PROC 620 Test 5

3. The alarm status, circuit status, and specific fault code associated with the default equipment location are displayed in Fields 8, 9, and 11.
Field 2 (unit type) is blinking, indicating an optional entry field.
Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
4. Either the default equipment location can be tested, or another digital network circuit pack can be selected for testing.
5. A specific digital network circuit pack can be selected for testing by entering the equipment location and unit type (optional) in Fields 2 through 6 whether or not a default equipment location is displayed:

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
(Unit type of circuit pack to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER.

Note: All circuits (if any) on a circuit pack are tested in Test 5.
If the specific network circuit selected for testing is a unit type 68 circuit pack (DS-1) the maintenance busy out procedure listed in Steps 12 through 16 must be performed.
Proceed to Step 9.
6. The unit type field is an optional input field to test a specific network circuit pack.

If the unit type is unknown, CLEAR ENTRY; ENTER is used to clear any unit type displayed in Field 2, or ENTER is depressed when no unit type is displayed.
7. A specific network circuit pack can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.
Depress NEXT UNIT until the unit type of the circuit pack to be tested is displayed in Field 2.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
Depress NEXT CIRCUIT until the circuit pack to be tested is displayed in Fields 3 through 6.

Note: All circuits (if any) on a circuit pack are tested in Test 5.
If the specific network circuit selected for testing is a unit type 68 circuit (DS-1) the maintenance busy out procedure listed in Steps 12 through 16 must be performed.

Proceed to Step 9.
8. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 7.

If the default equipment location displayed in Fields 2 through 7 is a unit type 68 circuit pack :(DS-1) the maintenance busy out procedure listed in Steps 12 through 16 must be performed.
Proceed to Step 9.
9. When an attendant console interface circuit pack (unit type 44) is selected for testing, the associated headsets or handsets must be unplugged or the circuit pack fails.
10. When an auxiliary trunk circuit pack (unit type 45) is selected for testing the option settings must be set for 2 -way transmission on all circuits or the circuit pack fails.
11. To test an auxiliary circuit pack, perform the following:

Remove the auxiliary trunk circuit pack (SN231) and check the option settings on all four circuits.

If the auxiliary trunk circuits are 2 -way transmissions (option $Q$ - switches 2 and 3 in the up position) proceed to Step 1 of Test 5 Execution.
If any of the auxiliary trunk circuits are 1 -way incoming (option S - switch 2 up and switch 3 down) or 1 -way outgoing (option $R$ - switch 2 down and switch 3 up) record the switch settings for each circuit and set the switches ( 2 and 3 ) to the up position for each circuit as required, then proceed to Step 1 of Test 5 Execution.

Note: After the test has passed (corrective action taken if necessary), ensure the switch settings for each circuit are correctly positioned (recorded above) for the type of transmission required (1-way incoming or 1-way outgoing) on the auxiliary trunk circuit pack tested.
12. When a DS-1 circuit pack is to be tested, check the circuit status in Field 9.

If Field 9 equals 1 (on-line and in-use) Test 5 cannot be performed for DS-1 circuit packs. Wait until the circuit pack is not in-use or perform tests on other circuits.
If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 13.
If Field 9 does not equal 4, proceed to Step 14.
13. If Test 5 is being performed remotely, proceed to Step 14.

If Test 5 is being run locally (or with maintenance personnel on the customer's premises), determine if the DS-1 circuit pack being tested is plugged in.

If the DS-1 circuit pack is not plugged in or the slot is empty, reseat or install the circuit pack, then proceed to Step 14.
If the DS-1 circuit pack is firmly seated, proceed to Step 14.

## Caution: Busying out a DS-1 circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.

14. DS-1 circuit packs can be placed in maintenance busy out status for testing by checking the circuit status displayed in Field 9.
15. If Field 9 equals 1 (on-line and in-use) individual DS-1 circuit packs should not be busied out as Test 5 results may not be valid.
16. If the circuit status $=3$, proceed to Step 1 of Test 5 Execution.

If the circuit status does not equal 3, depress BUSY OUT and proceed to Step 1 of Test 5 Execution.

Note: If the circuit within a unit type cannot be busied out, special error code 80 (busy/release busy not allowed for this unit) is displayed in the MAAP error code field.

## Test 5 Execution

Caution: All port circuits are automatically busied out when verification tests are performed. Established calls and data transmission for all port circuits on the port circuit pack being tested are aborted.

1. To start Test 5 after selecting the circuit pack to be tested, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the default equipment location or the specific ne work digital circuit pack cannot be tested.
3. When special error code 81 (message transmission to TMS or mocule processor failed) is displayed, repeat Test 5. If special error code 81 is displayed aga $n$, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7 .
4. When special error code 83 (switch resources not available) is displayid, repeat Test 5 until the test is executed or wait until switch resources become available befur : testing.
5. If special error code 81 or 83 is not displayed, proceed to Step 6.
6. During execution of Test 5, Field 11 (specific fault code) is updated wi $h$ the latest value received from the test.
7. If STOP is depressed while Test 5 is executing, the test is returned to its onfiguration just before EXECUTE was depressed, i.e.: circuit or circuit pack selected for tes ing is displayed in Fields 2 through 7.
Any data gathered during testing prior to STOP being depressed is lost.
8. If the DMIDS storage buffer becomes full, special error code 84 (DMIDS (verflow), is displayed in the MAAP error code field.

Note: Testing is not stopped when the DMIDS buffer becomes full.
New errors found are added to the failure list, and the oldest errors are deleted.
Note: Only 40 errors can be displayed when the DMIDS buffer becomes full.

## Test 5 Result Display

1. When Test 5 is completed for a default equipment location, a specific circuit pack, or a DS-1 circuit pack the WAIT indicator is turned off.
2. When the specific circuit pack, default equipment location, or DS-1 circuit pack passes Test 5, the following is displayed:
Field 1 - 5.
Field 2 - Unit type-of-circuit pack tested:
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit pack tested.
Field 8 - Dashed or alarm status of circuit tested.

Field 9 - Dashed or current status of displayed circuit $0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

Field 10 - Dashed.
Field 11-0 (circuit pack passed the test) or 9999 (failure is detected on other than tested circuit pack).
Fields 12 and 13 - Dashed.
Note: The GREEN LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack passed Test 5.
3. When 9999 is displayed in Field 11 the circuit pack tested passed Test 5 and the GREEN LED is lighted on the circuit pack. However, a failure has been detected on another circuit pack that interfaces with the circuit pack tested.

Note: Test 4 should be executed on the circuit pack displaying 9999 to find the failing circuit pack that interfaces with the circuit pack tested.

Field 10 (index) and Field 13 (fault list index) display dashes.
Depressing NEXT FAULT displays a 1 in Field 10, the specific fault code in Field 11, and the number of fault information lists that are recorded in Field 13.
Proceed to Step 5.
4. When the specific circuit pack, default equipment location, or DS-1 circuit pack fails Test 5 , the following is displayed:

Field 1 - 5.
Field 2 - Unit type of circuit pack tested.
Note: Unit types 69, 71, and 72 are not displayed in R2V1.
Fields 3 through 7 - Equipment location of circuit pack tested.
Field 8 - Dashed or alarm status of circuit tested.
Field 9 - Dashed or current status of displayed circuit $(0=$ idle, $1=$ on-line and in-use, $2=$ off-line, $3=$ maintenance busy, $4=$ not plugged in or unable to communicate).

Field 10 - Index (1).
Field 11 - Specific fault code.
Field 12 - Dashed.
Field 13 - Index to the fault information lists recorded.
Note: The RED LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack failed Test 5 .
5. When more than one fault information list is recorded, indicated by Field 13 displaying more than 1 (which is an index to fault information lists), NEXT FAULT is depressed to step to the next fault information list.

Note: When NEXT FAULT is depressed, Fields 2 through 13 may be dashed. This indicates that all remaining fault information lists contained the same type of data.

## PROC 620 Test 5

Dashing of Fields 2 through 13 can happen at any time when NEXT FAUL $\dot{\mathbf{T}}$ is depressed, no matter what number was displayed in Field 13 before NEXT FAULT was depressed.
6. Depressing NEXT FAULT may display a different specific fault code in Field 11 when a new fault information list exists.
NEXT FAULT is depressed once more to determine if other fault information lists exist for the circuit tested.

When no new fault information lists exist, Fields 2 through 13 are dashed when NEXT FAULT is depressed.

Depressing NEXT FAULT again displays the original fault information list (last list recorded).
7. When DS-1 circuit packs previously tested were busied out and the test passed, or the problem was corrected, the DS-1 circuit packs should be released from busy using RLS BUSY OUT.
8. When another specific circuit pack is to be tested, the CHANGE FIELD sequence must be used to select the specific circuit pack:

CHANGE FIELD; 2; ENTER; (Unit type of circuit pack to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER.

Note: Unit types 69, 71, and 72 cannot be selected in R2V1.
9. EXECUTE must be depressed to test the circuit pack selected.
10. Test 5 must be repeated for each network digital circuit pack alarmed entry in PROC 600 Test 1 or PROC 620 Test 1 before the fault indicator can be turned off.

All alarmed entries for a circuit pack do not have to be tested in Test 5 if the circuit pack passes Test 5. All alarmed entries for the circuit pack are resolved when the circuit pack passes Test 5.
11. The NETWORK SWITCH and/or PORT fault indicator is turned off when Test 5 completes with no failures detected for all network digital circuits that raised an alarm.

Note: Network circuit alarmed entries in PMIDS are marked as resolved.
12. The MAJOR and/or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Repair Guide

## Overview

When the NETWORKSWITCH añd/or PORT and MAJOR and/or MHNOR atarm-indicators on the alarm panel are lighted (indicating a digital network failure) or when PROC 620 is referenced from PROC 600 (Alarm causes/error $\log$ ) as a potential problem, the following steps should be performed in the order listed to isolate and repair the faulty unit.
'The starting point for isolation and repair of digital network circuit failures is Test 1 of PROC 600 or Test 1 of PROC 620.

To isolate a digital network failure displayed in Test 1 of PROC 600 or Test 1 of PROC 620, Test 4 of PROC 620 is executed to determine where a fault actually is located in the digital network.

Test 4 of PROC 620 performs a diagnostic analysis on the failing digital network circuit beginning at the specified circuit location.

If the circuit fails, other tests may be executed on the circuit pack and the paths leading into the circuit pack (i.e., data, I/O, maintenance interface, etc.), to determine if a fault lies inside the circuit pack or along one of the interface paths.

If the fault lies outside of the circuit pack, Test 4 continues testing until the fault is isolated.
If the failure is found to be on another circuit pack than the one originally specified, this circuit pack is indicated as the failure.
Test 4 of PROC 620 also provides alternate circuit pack replacements (if any).
The alternate circuit packs are replaced in order of decreasing probability until the possibilities (maximum of three -2 alternate circuit packs) are replaced, or the failure is corrected.

1. Execute Test 1 of PROC 600 or Test 1 of PROC 620 to determine which digital network circuits are alarmed, indicated by a 1,2 , or 3 (major, minor, or warning) displayed in Field 8, the severity of the alarms, and the order in which the digital network unit types (functional areas) are displayed.

Record the failing digital network circuits and unit types displayed in Test 1 of PROC 600 or Test 1 of PROC 620.
2. Determine from the digital network sircuits recorded if a pattern exists that would assist in determining the type of corrective action required.
3. Isolation and repair steps for digital network circuit failures are detailed in:

## One digital network circuit failure.

Digital network circuit failures in different unit types.
Multiple digital network circuit failures in the same unit type.
Multi-module Switch Alarms with more than one Unit Type 13 (Port Data Store) with specific fault code 70 and more than one Unit Type 53 (Multiplexer) with specific fault code 611 failure caused by network test flag faults.

DS-1 Interface (unit type 68) failures.
Remote module interface (unit type 71) failures.
Time Slot Interchanger (TSI) demand test (if applicable).
Special error code 88.
Specific fault codes.

## One Digital Network Circuit Failure

Assumption: Test 1 of PROC 600 or Test 1 of PROC 620 displays only one alarmed digital network circuit failure.

1. Display the failing circuit in Test 1 of PROC 600 or Test 1 of PROC 620.

If the failing circuit is a DS-1 circuit pack (unit type 68) refer to isolation and repair step DS-1 Interface (Unit Type 68) Failures for further diagnosis of the trouble.

If the failing circuit is a remote module interface (unit type 71), refer to isolation and repair step Remote Module Interface (Unit Type 71) Failures for further diagnosis of the trouble.

If the failing circuit is not a unit type 68 or unit type 71 trouble, proceed to Step 2 .
2. Enter PROC 620 Test 4.

Note: The alarmed circuit that was displayed in Test 1 of PROC 600 or Test 1 of PROC 620 is the default equipment location displayed in Test 4 of PROC 620.
3. Record the specific fault code displayed in Field 11 which was detected by on-line periodic software tests and logged in PMIDS.

Caution: Diagnosis of specific fault codes 607, 612, 630, or 638 displayed in Field 11 against unit type 57 (light guide interface) may affect service for approximately the last 6 seconds of Test 4 when unit type 57 is tested in an unduplicated TMS/network module complex.

Note: A normal passing test for unit type 57 lasts approximately 2 to 3 minutes.
4. When an attendant console interface circuit (unit type 44) is selected for testing, the associated headset or handset must be unplugged or the circuit fails the diagnostic test.
5. When a 1 -way incoming or 1-way outgoing auxiliary trunk circuit (unit type 45) is selected for testing, the option settings must be set for 2 -way transmission or the circuit fails the diagnostic test.
6. To test an auxiliary trunk circuit perform the following:

Remove the auxiliary trunk circuit pack (SN231) and check the option settings on the circuit to be tested.

If the auxiliary trunk circuit is a 2-way transmission (option $Q$ - switches 2 and 3 in the up position) proceed to Step 7.
If the auxiliary trunk circuit is a 1 -way incoming (option $S$ - switch 2 up and switch 3 down) or a 1-way outgoing (option $R$ - switch 2 down and switch 3 up) record the switch settings and set both switches (2 and 3) to the up position, then proceed to Step 7.

Note: After the test passes (corrective action taken if necessary), ensure the switch settings are correctly positioned (recorded above) for the type of transmission required (1-way incoming or 1-way outgoing) on the auxiliary trunk circuit tested.
7. Check the circuit status displayed in Field 9.

If Field 9 equals 1 (on-line and in-use), Test 4 cannot be performed for port circuits. Wait until the circuit is not in-use or perform tests on other circuits.

Note: Port circuits that cannot be tested while in-use are unit types 24, 25, 27, 28, 29, 32, $33,34,44$ through $47,62,66,68,69,71$, and 72.

If Field 9 equals 4 (unable to communicate or not plugged-in), proceed to Step 8.
Note: A possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 is displayed in Field 9 before Test 4 is executed.

If Field 9 does not equal 4 , proceed to Step 9.
8. If Test 4 is being run remotely, proceed to Step 9.

If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
If the circuit pack is not plugged in, or the slot is empty, reseat or replace the circuit pack, then proceed to Step 9.

If the circuit pack is firmly seated, proceed to Step 9.

## Caution: Busying out a port circuit results in loss of customer calls when the port circuit is in use.

9. Individual port circuits can be placed in maintenance busy out status for testing by checking the circuit status displayed in Field 9.

If Field 9 equals 1 (on-line and in-use) individual port circuits should not be busied out as Test 4 results may not be valid.

Note: Port circuits that should not be busied out while in-use are unit types 24, 25, 27, $28,29,32,33,34,44$ through $47,62,66,68,69,71$, and 72.

If the circuit status $=3$, proceed to Step 10 .
If the circuit status does not equal 3, depress BUSY OUT and proceed to Step 10.
Note: If the circuit within a unit type cannot be busied out, special error code 80 (busy/release busy not allowed for this unit) is displayed in the MAAP error code field.
10. Depress EXECUTE.
11. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the network digital circuit cannot be tested.

If special error code 81 or 83 is not displayed, proceed to Step 14.
12. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 4.

If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7 and depressing EXECUTE.
If TN380 or TN381 fails, perform Steps 25 through 44 below (as appropriate).
If TN380 or TN381 passes, check the wiring associated with the circuit pack that displayed special error code 81.
13. When special error code 83 (switch resources not available) is displayed, repeat Test 4 until the test is executed or wait until switch resources become available before testing.
14. If special error code 88 (refer to documentation for replacement of circuit packs) is displayed in the MAAP error code field, refer to isolation and repair step Special Error Code 88.
15. If unit type 6 (module control channel) is being tested check the specific fault code displayed in Field 11.

If specific fault code 23 is displayed in Field 11, proceed to Step 16.
If specific fault code 23 is not displayed in Field 11, proceed to Step 23.

## PROC 620

16. Check the translation for TN530 (duplication/update channel).

If TN530 is not translated, either remove TN530 or translate the circuit and repeat Test 4.
If TN530 is translated, proceed to Step 23.
17. If unit type 27 (GPP) is being tested check the specific fault code displayed in Field 11.

If specific fault code 353 (fuse blown) is displayed in Field 11, proceed to Step 18.
If specific fault code 353 is not displayed in Field 11, proceed to Step 23.
18. At the equipment location displayed in Fields 3 through 6, determine the type of GPP circuit pack installed.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

If SN270 is installed, replace the blown fuse and proceed to Step 27.
If SN270B is installed, replace the circuit pack and proceed to Step 30.
Note: All versions of the GPP circuit pack (SN270 and SN270B) can have specific fault code 353 displayed in Field 11. SN270B does not have fuses mounted on the circuit pack and is replaced instead of replacing a blown fuse.
19. If unit type 72 (EIA interface) is being tested check the specific fault code displayed in Field 11.

If specific fault code 995 is displayed in Field 11, proceed to Step 20.
If specific fault code 995 is not displayed in Field 11, proceed to Step 23.
20. Perform Test 1 of PROC 646 on the equipment location displayed in Fields 3 through 7.

If the EIA interface fails Test 1 of PROC 646, replace circuit pack SN 238 at the equipment location displayed in Fields 7 through 11 of PROC 646.
21. Repeat Test 1 of PROC 646.

If Test 1 of PROC 646 passes, return to Test 4 of PROC 620 to retire the cause of the fault indicator.

If Test 1 of PROC 646 fails again check the option settings on the terminal associated with the equipment location displayed in Fields 7 through 11 of PROC 646.
22. Repeat Test 1 of PROC 646.

If Test 1 of PROC 646 passes, return to Test 4 of PROC 620 to retire the cause of the fault indicator.

If Test 1 of PROC 646 fails again check the wiring between the SN238 and the associated terminal.
23. Determine the status of the circuit by observing the LEDs on the faceplate of the circuit pack displayed in Fields 3 through 6.

Note: The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test which may isolate the problem to a circuit pack which interfaces with the circuit pack selected for testing.
24. If the circuit passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Check the circuit status displayed in Field 9. If the circuit status $=4$ (unable to communicate or not plugged in) a faulty ID chip on the circuit pack is the problem. Proceed to Step 59.

Note: When the circuit was alarmed in Test 1 of PROC 600 or Test 1 of PROC 620 and passes the diagnostic analysis test in Test 4 of PROC 620, further analysis of the problem should be performed by running a continuous test of the circuit in Test 3 of PROC 620 to ensure that the failure is not intermittent.

If the circuit status does not equal 4, proceed to Step 50 .
25. If the circuit fails, indicated by a specific fault code displayed in Field 11 and the RED LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 11 which is detected by the demand diagnostic test and logged in DMIDS.

## Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

26. At the equipment location displayed in Fields 3 through 6, reseat the circuit pack.

Note: When a circuit in unit type 33 - Direct Inward Dialing (DID) trunk - is being tested, check the dip switch settings on SN232 prior to reseating the circuit pack. Each pair of switches for each circuit must be positioned one up, and one down or the test fails.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
27. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

Note: A verification test is automatically performed by Test 4 on the circuit pack reseated or replaced without any steps performed by maintenance personnel, other than reseating or replacing the circuit pack.
28. If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Check the circuit status displayed in Field 9. If the circuit status $=4$ (unable to communicate or not plugged in) a faulty ID chip on the circuit pack is the problem. Proceed to Step 59.

If the circuit status does not equal 4, proceed to Step 60.
29. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack.

At the equipment location displayed in Fields 2 through 6, replace the circuit pack.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
30. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.
Proceed to Step 60.
31. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack.

Depress NEXT CIRCUIT to determine if an alternate circuit pack replacement is available.
If Fields 2 through 13 are dashed, no alternate circuit pack is available for replacement.
Refer to isolation and repair step Specific Fault Codes for further isolation techniques.

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32. If an alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.
The RED LED on the original circuit pack is turned off, and the RED LED on the alternate circuit pack is turned on.
33. At the equipment location displayed in Fields 3 through 6, reseat the alternate circuit pack.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
34. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.

Proceed to Step 60.
35. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.
At the equipment location displayed in Fields 3 through 6, replace the alternate circuit pack. Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
36. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.
Proceed to Step 60.
37. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.

Depress NEXT CIRCUIT to determine if another alternate circuit pack replacement is available.

If Fields 2 through 13 are dashed, no other alternate circuit pack is available for replacement.
Refer to isolation and repair step Specific Fault Codes for further isolation techniques.
38. If another alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.

The RED LED on the first alternate circuit pack is turned off, and the RED LED on the second alternate circuit pack is turned on.
39. At the equipment location displayed in Fields 3 through 6, reseat the second alternate circuit pack.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
40. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.

Proceed to Step 60
41. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.

At the equipment location displayed in Fields 3 through 6, replace the second alternate circuit pack.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
42. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.

Proceed to Step 60.
43. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.
44. Determine if unit type 53 (multiplexer) is being tested.

If unit type 53 is being tested and specific fault code 686 is displayed in Field 11, proceed to Step 45.

If unit type 53 is not being tested, or specific fault code 636 is not displayed in Field 11 for unit type 53, refer to isolation and repair step Specific Fault Codes for further isolation techniques.
45. Use NEXT TEST to step to Test 3 of PROC 620.

Note: The multiplexer circuit that was displayed in Test 4 is the default equipment location displayed in Test 3.

At Slot 23 of the TMS carrier, reseat TN530.
46. Depress EXECUTE.

Allow Test 3 to execute for a period of time (or antil a specific fault code is indicated in Field 11) and depress STOP.

If the multiplexer circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.

If the multiplexer circuit fails Test 3 (indicated by a 1 displayed in Field 13), replace TN530 in Slot 23 of the TMS carrier.
47. Depress EXECUTE.

Allow Test 3 to execute for the same period of time (or longer) and depress STOP.
If the multiplexer circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.

If the multiplexer circuit fails Test 3 (indicated by a 1 displayed in Field 13), reseat TN462 at Slot 11 of the TMS carrier.

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## 48. Depress EXECUTE.

Allow Test 3 to execute for a period of time (or until a specific fault code is indicated in Field 11) and depress STOP.

If the multiplexer circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.
If the multiplexer circuit fails Test 3 (indicated by a 1 displayed in Field 13), replace TN462 in Slot 11 of the TMS carrier.
49. Depress EXECUTE.

Allow Test 3 to execute for the same period of time (or longer) and depress STOP.
If the multiplexer circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.
If the multiplexer circuit fails Test 3 (indicated by a 1 displayed in Field 13), refer to isolation and repair step Specific Fault Codes for further isolation techniques.
50. Use NEXT TEST to step to Test 3 of PROC 620.

Note: The circuit that was displayed in Test 4 is the default equipment location displayed in Test 3.
51. Depress EXECUTE.

Allow Test 3 to execute for a period of time (or until a specific fault code is indicated in Field 11) and depress STOP.

If the circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.
52. If the circuit fails Test 3, reseat the circuit pack at the equipment location displayed in Fields 3 through 6.
53. Depress EXECUTE.

Allow Test 3 to execute for the same period of time (or longer) and depress STOP.
54. If the circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.
55. If the circuit fails Test 3, record the specific fault code displayed in Field 11 which is detected by the demand diagnostic test and logged in DMIDS.
56. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
57. Depress EXECUTE.

Allow Test 3 to execute for the same period of time (or longer) and depress STOP.
58. If the circuit passes Test 3 (indicated by a 0 displayed in Field 13), repeat Test 4 to turn off the NETWORK SWITCH or PORT fault indicator.

If the circuit fails Test 3, refer to isolation and repair step Specific Fault Codes for further isolation techniques.

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59. When a circuit status of 4 indicates a faulty ID chip, perform the following:

At the equipment location displayed in Fields 2 through 6, replace the circuit pack.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
Observe the RED and GREEN LEDs on the faceplate of the circuit pack.
If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack. Proceed to Step 60.
If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack. Check the wiring associated with the circuit pack replaced.
60. When any circuit packs for the following unit types are replaced, isolation and repair step TSI Demand Test should be run before leaving the customer's premises.
Unit type 8 - Maintenance Interface (MIF).
Unit type 9 -Module clock.
Unit type 10 -TSI ALU.
Unit type 11 - TSI PSTORE.
Unit type 13-PDS.
Unit type 15 - PDI.
61. The NETWORK SWITCH or PORT fault indicator is turned off when the circuit passes Test 4.

The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Digital Network Circuit Failures in Different Unit Types

Assumption: Test 1 of PROC $\mathbf{6 0 0}$ or Test 1 of PROC $\mathbf{6 2 0}$ displays network circuit failures in different unit types.
In Test 1 of PROC 600 or Test 1 of PROC 620 alarmed failures are displayed in order of severity, i.e.: major alarm failures first, followed by minor alarm failures, with warning alarm faitlures displayed last.
Within each alarm category, i.e.: major, minor, or warning, alarmed failures are displayed by unit types (functional areas) corresponding to the most important functional area to the least important functional area of the switch.

1. Record all alarmed failures in Test 1 of PROC 600 or Test 1 of PROC 620.
2. Display the first failing circuit in Test 1 of PROC $\mathbf{6 0 0}$ or Test 1 of PROC 620.

Note: The first failing circuit is the highest alarmed failure (i.e.: major, minor, or warning) recorded in the most important functional area (unit type).
3. If the failing circuit is a DS-1 circuit pack (unit type 68) refer to isolation and repair step DS-1 Interface (Unit Type 68) Failures for further diagnosis of the trouble.

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4. If the failing circuit is a remote module interface (unit type 71), refer to isolation and repair step Remote Module Interface (Unit Type 71) Failures for further diagnosis of the trouble.

If the failing circuit is not a unit type 68 or unit type 71 trouble, proceed to Step 5.
5. Perform Steps 2 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure for the first failure displayed in Test 1 of PROC 600 or Test 1 of PROC 620.
6. When the first failure displayed is repaired and/or passes, analyze the remaining alarmed failures to determine if the first failure could have affected the remaining failures.

Example: A failure in a PCI or PDI can have some bearing on port failures.
Perform one of the following steps (7 through 9) depending on what is determined by the analysis.
7. Enter Test 1 of PROC 600 or Test 1 of PROC 620 and display the next alarmed failure in order of severity, then step to Test 4 of PROC 620 and perform Steps 3 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure.
8. Enter the next recorded failure (in alarm severity order) in Fields 2 through 7 of Test 4 using the CHANGE FIELD sequence and perform Steps 3 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure.
9. Perform Test 2 of PROC 620 for each alarmed failure recorded in Test 1 of PROC 600 or Test 1 of PROC 620 to test the alarmed circuit or to turn off the fault indicator.
10. When an attendant console interface circuit (unit type 44) is selected for testing, the associated headset or handset must be unplugged or the circuit fails the diagnostic test.
11. When a 1 -way incoming or 1 -way outgoing auxiliary trunk circuit (unit type 45) is selected for testing the option settings must be set for 2 -way transmission or the circuit fails the diagnostic test.
12. To test an auxiliary trunk circuit, perform the following:

Remove the auxiliary trunk circuit pack (SN231) and check the option settings on the circuit to be tested.

Record the positions of switches 2 and 3 .
Set both switches (2 and 3) to the up position (2-way transmission) to test the auxiliary trunk circuit.

Note: After the test passes (corrective action taken if necessary), ensure the switch settings on the auxiliary trunk circuit tested are correctly positioned as recorded above.
13. When Test 2 of PROC 620 indicates a failure for the circuit entered (indicated by a 1 displayed in Field 13), Steps 2 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure must be performed to correct the problem.
14. When all alarmed circuits displayed in Test 1 of PROC 600 or Test 1 of PROC 620 are repaired and/or pass, the NETWORK SWITCH and/or PORT fault indicator is turned off.
The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Multiple Digital Network Circuit Failures in same Unit Type

Assumption: Test 1 of PROC 600 or Test 1 of PROC 620 displays multiple alarmed digital network circuit failures within the same unit type and that no other failures in other unit types are alarmed.

1. When Test 1 of PROC 600 or Test 1 of PROC 620 displays more than one digital network circuit of the same unit type with failures, execute Test 2 of PROC 600 for the same unit type to determine if other digital network circuits within the same unit type have errors recorded against them.
Record the unit type and digital network circuits with errors recorded against them displayed in Test 1 of PROC 620 or Test 2 of PROC 600.
2. Analyze the failures recorded in Test 1 and 2 of PROC 600 or Test 1 of PROC 620 to determine if the failures could have been caused by a common interface.

Example: A failure in an Input/Output Bus Interface (IOBI) circuit pack can affect several PCIs; a failure in a Pori Data Store (PDS) can affect several PDIs; etc.

Depending upon what is determined from the analysis of the circuits recorded in Test 1 and 2 of PROC 600 or Test 1 of PROC 620 perform Step 3 or 4 .
3. When the analysis does not indicate a common interface, perform Steps 1 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure starting with the first failing circuit displayed in Test 1 of PROC 600 or Test 1 of PROC 620.

After the first failing circuit is repaired and/or passes, repeat Steps 1 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure for each alarmed failure recorded in Test 1 of PROC 600 or Test 1 of PROC 620.

When all alarmed failures recorded in Test 1 of PROC 600 or Test 1 of PROC 620 pass Test 4 of PROC 620 the NETWORK or PORT fault indicator is turned off.

The MAJOR and/or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.
4. When the analysis indicates a common interface as the potential problem, enter the common interface equipment location in Fields 2 through 7 of PROC 620 Test 4 using the CHANGE FIELD sequence.
Perform Steps 3 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure.
5. When the common interface circuit is repaired and/or passes, perform Test 2 of PROC $\mathbf{6 2 0}$ for the unit type recorded in Test 1 of PROC 600 or Test 1 of PROC 620 with alarmed failures in order to turn off the fault indicator and resolve the alarmed entries.

When Test 2 of PROC 620 indicates a failure for the unit type tested, Steps 2 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure must be performed for each failure displayed in Test 2 of PROC 620
6. When all alarmed failures recorded in Test 1 of PROC 600 or Test 1 of PROC 620 pass Test 2 or 4 of PROC 620 the NETWORK or PORT fault indicator is turned off.

The MAJOR and/or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.

## Multi-module Switch Alarms with more than one Unit Type 13 (Port Data Store) with specific fault code 70 and more than one Unit Type 53 (Multiplexer) with specific fault code 611 failures caused by Network Test Flag Faults

Assumption: Test 1 of PROC $\mathbf{6 0 0}$ or Test 1 of PROC $\mathbf{6 2 0}$ displays more than one Unit Type 13 (Port Data Store) alarmed failure with specific fault code 70 and more than one Unit Type 53 (Multiplexer) alarmed failure with specific fault code 611.
If either of these conditions is not true, the failures should be analyzed using other isolation and repair steps.

Under some failure conditions, these alarmed failures only appear while the switch is running traffic. The switch runs alarm free and passes all demand tests out of hours.

Note: This is a strong indication that the fault is in a port carrier.
If both conditions are true (more than one unit type 13 alarmed failure with specific fault code 70 and more than one unit type 53 alarmed failure with specific fault code 611), perform the following steps to determine the module that is the true source of the alarms.

1. Use Test 2 of PROC 620 to test all unit type 57 (LGI) circuits in the switch.
2. Expect many unit type 57 circuits to fail with fault code 611.

Unit type 57 (LGI) circuits that fail with a fault code other than 611 indicate the source of the network test flags.
3. Display a unit type 57 circuit (LGI) with a fault code other than 611 in Test 2.

Step to Test 4 of PROC 620.
Note: The circuit displayed in Test 2 is now displayed in Test 4 of PROC 620.
4. Depress EXECUTE.
5. If a circuit pack in the TMS or the LGI is indicted, it is the failing circuit pack. Perform corrective action as necessary to clear the problem.
6. If a circuit pack in the TMS or the LGI is not indicted, the failure is coming from within the same module as the LGI being tested.
Failures in a module control are generally diagnosed correctly and there should be few alarms in the failing module. If there are many alarms in the failing module, the fault is probably in a port carrier.
Port carrier failures cause alarms no matter which module control is on-line. Failures in the port carrier often require the presence of traffic to raise alarms. Demand tests on port carriers executed out of hours often pass.

## DS-1 Interface (Unit Type 68) Failures

System level fault isolation for DS-1 interface (unit type 68) failures is defined as the isolation of faults among the various subsystems:
a. System 85 DS-1 circuit packs.
b. Channel Division Multiplexer (CDM).
c. Channel Expansion Multiplexer (CEM).
d. Network Channel Terminating Equipment (NCTE).
e. Other associated equipment (i.e., on-site wiring, facility, and any special service equipment).

Fault isolation for DS-1 interface failures consist of:
a. Fault Isolation for CEM.
b. Fault Isolation for DS-1 Interface Alarms.
c. Fault Isolation Techniques for CEM, CDM, and NCTE.

## Fault Isolation for CEM

1. Enter PROC 600 Test 1 and examine unit type 63 (external equipment) to determine if a CEM alarm associated with the DS-1 interface failure exists.

Note: Local records must be used to determine the external equipment encode for CEMs and the associated DS-1 interface equipment location.
2. Enter PROC 620 Test 1 and display the original DS-1 interface failure.
3. If a CEM alarm does not exist for the associated DS-1 interface failure, proceed to isolation and repair step Fault Isolation for DS-1 Interface Alarms for further diagnosis of the trouble.
4. If a CEM alarm is present, there is a problem in the CEM.

On-site repair actions on the CEM must be taken.
The CEM maintenance procedures are specified in AT\&T practice 365-287-100.
In general, the CEM circuit pack with the RED LED lighted is first choice.
If none are lighted, power should be checked at the test points on the power unit.
Following the repair the CEM reset button must be depressed to clear the alarm condition.
5. Enter PROC 625 Test 1 and check the health status of the DS- 1 facility.
6. If the health status indicates that the DS-1 facility is presently operational, the alarms should be retired in PROC 600 Test 1 or PROC 620 Test 1 and no destructive testing of the DS-1 facility should be performed.
7. If the health status indicates that the DS-1 facility is not healthy or if you desire to verify that the DS- 1 facility is functioning use one of the following test calls prior to testing the DS-1 using PROC 620.
Make an ATMS supervision call using PROC 647, Test 3 on the DS-1.
Make a TVS call using the DS-1.
Make a terminal-to-trunk test call using PROC 642 on the DS-1.
Caution: The DS-1 tests executed by PROC 620, Tests 2 through 5 are service affecting and should only be executed during periods of low traffic, during out-of-hours, or after a service outage has already occurred and is verified using one of the above tests. PROC 625, Test 1 should always be used when the current health of a DS-1 digital service is in question.
8. After repair of the CEM, the DS-1 interface circuit must be tested to clear the alarmed entry in PMIDS.

## Caution: Busying out a DS-1 circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.

Busy out the DS-1 interface circuit by depressing BUSY OUT in PROC 620 Test 4. One circuit cannot be busied out by PROC 620. If all 24 circuits on the DS-1 circuit pack are busied out in any busy out procedure, testing can be performed.

Note: If the DS-1 circuit pack is not busied out the test will fail with a specific fault code of 13 or 785 (DS-1 not maintenance busy).

Perform Steps 2 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure to retire the alarm cause.

## Fault Isolation for DS-1 Interface Alarms

The DS-1 interface alarms represent conditions that could result from either on or off-site faults.
A RED alarm (specific fault code 734) is initiated by a digital switch or digital transmission equipment when the incoming DS-1 transmission bit stream on a particular facility is lost or framing for the incoming bit stream is lost. Upon initiation of a RED alarm, the switch or digital transmission equipment sends a yellow alarm code on the outgoing DS- 1 transmission bit stream for that particular facility.

A YELLOW alarm (specific fault code 730) is transmitted to an "other end" switch or digital transmission equipment to indicate that the DS-1 transmission bit stream incoming from the "other end" has been lost or framing on the incoming bit stream from the "other end" is lost. The YELLOW alarm code employed is dependent on the type of framing (D4 or Fe) and signaling (Rob Bit or 24 th Channel) employed. For D4 framing with Rob Bit signaling, the YELLOW alarm code is recognized as a zero for bit 2 in each time slot (channel) for a least two full frames ( 48 consecutive time slots).

A BLUE alarm is transmitted to an "other end" switch or digital transmission equipment to indicate that testing is being done locally which interrupts communication with the "other end". One example is running a maintenance PROC on System 85 which executes a looparound test on the DS-1. circuit pack itself. While this test is being performed, the BLUE alarm code is sent to the "other end". The BLUE alarm is recognized as a continuous stream of ones with no provisions for framing or signaling.

1. Check the specific fault code displayed in Field 11.

If specific fault code $729,730,734,762,773$, or 786 is displayed in Field 11, you have a facility problem. Proceed to Step 3.
If any other specific fault code is displayed in Field 11, proceed to Step 2.
Caution: If this DS-1 interface is a primary or secondary reference, then busying out the DS-1 circuit pack and testing it may be service affecting to other digital facilities because the capability to communicate at a digital rate would be lost for the duration of the test.
2. Busy out the DS-1 interface circuit by depressing BUSY OUT in PROC 620 Test 4. One circuit cannot be busied out. The entire DS-1 circuit pack is busied out by depressing BUSY oUT.

Caution: Busying out a DS-1 circuit pack disrupts calls in progress on all 24 ports of the DS-1 circuit pack.

Note: If the DS-1 circuit pack is not busied out the test will fail with a specific fault code of 785 (DS-1 not maintenance busy).

Perform Steps 2 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure for the failing DS-1 circuit pack.
3. Enter PROC 625 Test 1 and check the health status of the DS-1 facility.
4. If the health status indicates that the DS-1 facility is presently operational, the alarms should be retired in PROC 600 Test 1 or PROC 620 Test 1 and no destructive testing of the DS-1 facility should be performed.
5. If the status indicates that the DS-1 facility is not healthy or if you desire to verify that the DS-1 facility is functioning use one of the following test calls prior to testing the DS1 using PROC 620.
Make an ATMS supervision call using PROC 647, Test 3 on the DS-1.
Make a TVS call using the DS-1.
Make a terminal-to-trunk test call using PROC 642 on the DS-1.
Caution: The DS-1 tests executed by PROC 620, Tests 2 through 5 are service affecting and should only be executed during periods of low traffic, during out-of-hours, or after a service outage has already occurred and is verified using one of the above tests. PROC 625, Test 1 should always be used when the current health of a DS-1 digital service is in question.
6. Specific fault codes $729,730,734,762,773$, or 786 displayed in Field 11 indicate a red or yellow alarm indicting the facility.

The DS-1 port, the CEM's and CDM's, the on-site wiring, the NCTE, or the facility could be the problem.
7. To isolate problems with the CEM's, CDM's, NCTE, or the DS-1 port, refer to isolation and repair step
Fault Isolation Techniques for CEM, CDM, and NCTE.
Fault Isolation Techniques for CEM.
Step 8 for DS-1 port test.
8. Enter PROC 620 Test 4.

Note: The alarmed circuit that was displayed in Test 1 of PROC 600 or Test 1 of PROC 620 is the default equipment location displayed in Test 4 of PROC 620.
9. Record the specific fault code displayed in Field 11 which was detected by on-line periodic software tests and logged in PMIDS.
10. Check the circuit status displayed in Field 9.

If Field 9 equals 1 (on-line and in-use), Test 4 cannot be performed for the DS-1 port circuit. Wait until the circuit is not in-use or perform tests on other circuits.
If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 11.
Note: A possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 is displayed in Field 9 before Test 4 is executed.

If Field 9 does not equal 4, proceed to Step 12.
11. If Test 4 is being run remotely, proceed to Step 12.

If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
If the circuit pack is not plugged in, or the slot is empty, reseat or replace the circuit pack, then proceed to Step 12.
If the circuit pack is firmly seated, proceed to Step 12.
12. Depress EXECUTE.
13. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the network digital circuit cannot be tested.

If special error code 81 or 83 is not displayed, proceed to Step 16.
14. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 4.
If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7 and depressing EXECUTE.
If TN380 or TN381 fails, perform Steps 19 through 37 below (as required).
If TN380 or TN381 passes, check the wiring associated with the circuit pack that displayed special error code 81.
15. When special error code 83 (switch resources not available) is displayed, repeat Test 4 until the test is executed or wait until switch resources become available before testing.
16. Determine the status of the circuit by observing the LEDs on the faceplate of the circuit pack displayed in Fields 3 through 6.

Note: The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test which may isolate the problem to a circuit pack which interfaces with the circuit pack selected for testing.
17. If the circuit passes, the GREEN LED is lighted on the faceplate of the circuit pack.
18. If the DS-1 interface circuit passes, facility vendor tests or on-site action is required to isolate the problem. Refer to isolation and repair step Fault Isolation Techniques for CEM, CDM, and NCTE for recommended procedures.
19. If the circuit fails, indicated by a specific fault code displayed in Field 11 and the RED LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 11 which is detected by the demand diagnostic test and logged in DMIDS.

Caution: 1. If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

Caution: 2. Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.
20. At the equipment location displayed in Fields 3 through 6, reseat the circuit pack.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
21. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

Note: A verification test is automatically performed by Test 4 on the circuit pack reseated or replaced without any steps performed by maintenance personnel, other than reseating or replacing the circuit pack.
22. If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Proceed to Step 38.
23. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack.

Caution: If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
24. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.
Proceed to Step 38.
25. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack.

Caution: If the DS-1 circuit pack code is $A N N-11 B, R E D$ and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

Depress NEXT CIRCUIT to determine if an alternate circuit pack replacement is available.
If Fields 2 through 13 are dashed, no alternate circuit pack is available for replacement.
Refer to DS-1 circuit pack LEDs described in Step 39 and isolation and repair step Specific Fault Codes for further isolation techniques.

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26. If an alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.

The RED LED on the original circuit pack is turned off, and the RED LED on the alternate circuit pack is turned on.
27. At the equipment location displayed in Fields 3 through 6, reseat the alternate circuit pack.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
28. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.

Proceed to Step 38.
29. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.

> Caution: If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

At the equipment location displayed in Fields 3 through 6, replace the alternate circuit pack.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
30. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.
Proceed to Step 38.
31. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.

Caution: If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

Depress NEXT CIRCUIT to determine if another alternate circuit pack replacement is available.

If Fields 2 through 13 are dashed, no other alternate circuit pack is available for replacement.
Refer to DS-1 circuit pack LEDs described in Step 39 and isolation and repair step Specific Fault Codes for further isolation techniques.
32. If another alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.

The RED LED on the first alternate circuit pack is turned off, and the RED LED on the second alternate circuit pack is turned on.
33. At the equipment location displayed in Fields 3 through 6, reseat the second alternate circuit pack.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
34. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.
Proceed to Step 38.
35. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.

Caution: If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-11C.)

At the equipment location displayed in Fields 3 through 6, replace the second alternate circuit pack.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
36. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.

Proceed to Step 38.
37. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.

Caution: If the DS-1 circuit pack code is ANN-11B, RED and GREEN alarms will result from running a test. A minimum of 15 seconds is required for these alarms to clear. After waiting 15 seconds re-run Test 4 to get valid results. (This problem does not occur on DS-1 circuit pack code ANN-1 1C.)

Refer to DS-1 circuit pack LEDs described in Step 39 and isolation and repair step Specific Fault Codes for further isolation techniques.
38. The NETWORK SWITCH or PORT fault indicator is turned off when the circuit passes Test 4.

Note: The far end DS-1 will be in a RED alarm state following the termination of Test 4. Fifteen seconds must elapse before this alarm state clears and the DS-1 circuit packs resume normal operation. (With one exception this alarm state is indicated by the GREEN LED in position 8 being off. The exception is when the circuit is optioned for D4 framing and 24-th channel signaling.)

The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.
39. The LEDS on the DS-1 circuit pack may assist in isolating problems with DS-1 interface alarms.
40. Examine the LEDs on the DS-1 circuit pack.

Under normal conditions, the two GREEN LEDs in positions 7 and 8 are lighted. This indicates the DS-1 link is up and framing is accomplished.

If the GREEN LED in position 7 is off (not lighted), a RED alarm is indicated. This implies that the incoming DS-1 bit stream is lost or that framing is lost on the incoming bit stream. Under these conditions, the GREEN LED in position 8 is a don't care state and may be on of off. On rare occasion the position 7 LED flutters. This indicates that the ANN11 circuit pack is not able to frame on the incoming signal. The problem could be either the signal coming from the facility, the ANN11 circuit pack, or System 85 circuitry distributing control signals to the ANN11.

If the GREEN LED in position 7 is lighted and the GREEN LED in position 8 is off (not lighted), a YELLOW alarm has been received from the other end. This indicates that the "other end" has lost incoming framing or transmission and is in a RED alarm state. A yellow alarm condition may exist even though the GREEN LED is lighted. Use PROC 625 to determine if a network alarm exists.
The YELLOW LED in position 9 is on (lighted) during initialization of the DS-1 circuit pack. It will turn off (not lighted) after approximately 4 seconds indicating initialization is complete. Thereafter, the YELLOW LED will be on (lighted) when at least one trunk channel on the DS-1 link is in use and serves as a busy indicator.

## Fault Isolation Techniques for CEM, CDM and NCTE

1. On-site isolation among the units that are provided between the DS-1 port and the span line interface is performed by activating built-in tests on individual units and by using patch cords to provide external looparound and to bypass equipment external to the DS-1 port.
2. On-site tests for the specific unit should be run as needed in accordance with the maintenance documentation (or other vendor documentation) provided for the specific unit.
3. External looparound should be performed by changing Field 11 of PROC 260 to a 1 and executing PROC 620 Test 2 on the DS-1 circuit pack.
Test 2 performs external looparound on the DS-1 circuit pack to the first looparound on the DS-1 link outside the switch.
4. When CEM's are provided, a preferred looparound is on a patch field such as the ED-2C780 Jack Panel (X IN to X OUT or Y IN to Y OUT).

Note: The CEM switches looparound data back to the CEM on all three DS- 1 interfaces. The switches do not loop data back towards the switch.
5. If a CDM is also provided, the CDM should be bypassed by manually forcing it into . looparound.
6. If Test 2 fails the DS-1 circuit pack should be replaced and the tests repeated.

If Test 2 still fails, check the wiring between the DS-1 circuit pack and the associated units.
7. If Test 2 passes, activate the CEM loop switches and observed that no equipment alarm exists on the CEM.

If no alarms are observed, loop the data at the NCTE (X IN to X OUT patch cord) and remove the line Z loop on the CEM via the loop control switch.
8. Observe that the CEM runs alarm free after reset is depressed.

If the CEM displays alarms, trouble with the NCTE and the wiring to the NCTE probably exist.

If the CEM does not display alarms, trouble with the facility probably exists.

## Additional DS-1 Troubleshooting Techniques

In some cases where extra-ordinary measures are needed for trouble shooting DS-1 failures, such as for infrequently occurring problems, or during facility transmission setting alignment and verification it may be desirable to connect stand-alone test equipment to the facility.

The following list of documents describe equipment which may be applicable depending upon circumstances encountered.

1. The AT\&T 365 series of practices include general information about DS-1 facilities and specific guidance on use of some of the test equipment.
2. AT\&T practice 103-245-100-J1C140A Digital Access Time Slot Selector; a unit that allows access to two of the voice channels multiplexed on the facility.
3. AT\&T practice $103-488-105$ - J68435AH equipment to measure errored seconds.
4. AT\&T practices $103-493-\mathrm{xxx}$ through $103-494-\mathrm{xxx}$ - a number of units including outside suppliers equipment with various capabilities.

In addition to the equipment included in the above list, other equipment with varying capabilities are available in the industry. TEKELEC model TE-820A and VENATOR model VENCAT-24 are two examples of these.

## Remote Module Interface (Unit Type 71 ) Failures

Fault isolation of Remote Module Interface (RMI) circuit failures depends on whether the RMI is the central (switch end) or the remote RMI.

The equipment location displayed in Fields 2 through 6 (Field 7 is dashed) for the RMI (TN456) is always the central RMI equipment location.
Specific fault codes displayed in Field 11 assist in determining whether the TN456 to be replaced is a central or remote RMI. Reference to Unit Type 71 in Table AB, PROC 620 - Fault Code Definitions by Unit Type, lists the central or remote TN456 to replace, depending on whether it is the first, second, or third (as appropriate) circuit pack to replace.

Perform the following procedure to isolate RMI failures.

1. Enter PROC 620 Test 4.

Note: The alarmed circuit that was displayed in Test 1 of PROC 600 or Test 1 of PROC 620 is the default equipment location displayed in Test 4 of PROC 620.
2. Record the specific fault code displayed in Field 11 which was detected by on-line periodic software tests and logged in PMIDS.
3. Check the circuit status displayed in Field 9.

If Field 9 equals 1 (on-line and in-use), Test 4 cannot be performed for the RMI circuit. Wait until the circuit is not in-use or perform tests on other circuits.

If Field 9 equals 4 (unable to communicate or not plugged in), proceed to Step 4.
Note: A possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 is displayed in Field 9 before Test 4 is executed.

If Field 9 does not equal 4, proceed to Step 5.
4. If Test 4 is being run remotely, proceed to Step 5.

If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
If the circuit pack is not plugged in, or the slot is empty, reseat or replace the circuit pack, then proceed to Step 5.
If the circuit pack is firmly seated, proceed to Step 5.
5. Depress EXECUTE.
6. Special error codes 81 or 83 may be displayed in the MAAP error code field and the test is terminated when the network digital circuit cannot be tested.

If special error code 81 or 83 is not displayed, proceed to Step 9.
7. When special error code 81 (message transmission to TMS or module processor failed) is displayed, repeat Test 4.
If special error code 81 is displayed again, test TN380 (module processor) or TN381 (TMS processor) by entering unit type 7 and depressing EXECUTE.

If TN380 or TN381 fails, perform Steps 11 through 29 below (as required).
If TN380 or TN381 passes, check the wiring associated with the circuit pack that displayed special error code 81.
8. When special error code 83 (switch resources not available) is displayed, repeat Test 4 until the test is executed or wait until switch resources become available before testing.
9. Determine the status of the circuit by observing the LEDs on the faceplate of the circuit pack displayed in Fields 3 through 6.

Note: The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test which may isolate the problem to a circuit pack which interfaces with the circuit pack selected for testing.
10. If the circuit passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Check the circuit status displayed in Field 9. If the circuit status $=4$ (unable to communicate or not plagged in) a faulty ID chip on the circuit pack is the problem. Proceed to Step 30.
If the circuit status does not equal 4, proceed to Step 35 .
11. If the circuit fails, indicated by a specific fault code displayed in Field 11 and the RED LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 11 which is detected by the demand diagnostic test and logged in DMIDS.

## Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

12. Check the specific fault code displayed in Field 11.

If the specific fault code displayed in Field 11 is 396 , reseat the remote RMI circuit pack. Otherwise, reseat the circuit pack at the equipment location displayed in Fields 3 through 6.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
13. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

Note: A verification test is automatically performed by Test 4 on the circuit pack reseated or replaced without any steps performed by maintenance personnel, other than reseating or replacing the circuit pack.
14. If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Check the circuit status displayed in Field 9. If the circuit status $=4$ (unable to communicate or not plugged in) a faulty ID chip on the circuit pack is the problem. Proceed to Step 30.

If the circuit status does not equal 4 , proceed to Step 35 .
15. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack. Check the specific fault code displayed in Field 11.
If the specific fault code displayed in Field 11 is 396 , replace the remote RMI circuit pack. Otherwise, replace the circuit pack at the equipment location displayed in Fields 2 through 6.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
16. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.
Proceed to Step 35.
17. If the circuit pack fails again, the RED LED is lighted on the faceplate of the circuit pack.

Depress NEXT CIRCUIT to determine if an alternate circuit pack replacement is available.
If Fields 2 through 13 are dashed, no alternate circuit pack is available for replacement.
Refer to RMI circuit pack LEDs described in Step 36 and isolation and repair step Specific Fault Codes for further isolation techniques.
18. If an alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.
The RED LED on the original circuit pack is turned off, and the RED LED on the alternate circuit pack is turned on.
19. Check the specific fault code displayed in Field 11.

If the specific fault code displayed in Field 11 is 393,394 , or 397 reseat the remote RMI circuit pack. Otherwise, reseat the circuit pack at the equipment location displayed in Fields 3 through 6 .

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
20. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.

Proceed to Step 35.
21. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.
Check the specific fault code displayed in Field 11.
If the specific fault code displayed in Field 11 is 393,394 , or 397 , replace the remote RMI circuit pack. Otherwise, replace the circuit pack at the equipment location displayed in Fields . 2 through 6.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
22. Observe the RED and GREEN LEDs on the faceplate of the alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the alternate circuit pack.

Proceed to Step 35.
23. If the circuit pack fails again, the RED LED is lighted on the faceplate of the alternate circuit pack.
Depress NEXT CIRCUIT to determine if another alternate circuit pack replacement is available.

If Fields 2 through 13 are dashed, no other alternate circuit pack is available for replacement.
Refer to RMI circuit pack LEDs described in Step 36 and isolation and repair step Specific Fault Codes for further isolation techniques.
24. If another alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 3 through 6.
The RED LED on the first alternate circuit pack is turned off, and the RED LED on the second alternate circuit pack is turned on.
25. Check the specific fault code displayed in Field 11.

If the specific fault code displayed in Field 11 is 395 , reseat the remote RMI circuit pack. Otherwise, reseat the circuit pack at the equipment location displayed in Fields 3 through 6.

Caution: Wait several seconds after unseating the circuit pack before reseating it in its slot or the verification test is not performed.

Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
26. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.
Proceed tọ Step 35.
27. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.
Check the specific fault code displayed in Field 11.
If the specific fault code displayed in Field 11 is 395 , replace the remote RMI circuit pack. Otherwise, replace the circuit pack at the equipment location displayed in Fields 2 through 6.
Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs.
28. Observe the RED and GREEN LEDs on the faceplate of the second alternate circuit pack.

If the circuit pack passes, the GREEN LED is lighted on the faceplate of the second alternate circuit pack.

Proceed to Step 35.
29. If the circuit pack fails again, the RED LED is lighted on the faceplate of the second alternate circuit pack.
Refer to RMI circuit pack LEDs described in Step 36 and isolation and repair step Specific Fault Codes for further isolation techniques.
30. When a circuit status of 4 indicates a faulty ID chip, perform Steps 31 through 34 .
31. Check the specific fault code displayed in Field 11.

If the specific fault code displayed in Field 11 is 396 , replace the remote RMI circuit pack. Otherwise, replace the circuit pack at the equipment location displayed in Fields 3 through 6.
32. Wait until the WAIT lamp on the MAAP goes off before checking the status of the LEDs. Observe the RED and GREEN LEDs on the faceplate of the circuit pack.
33. If the circuit pack passes, the GREEN LED is lighted on the faceplate of the circuit pack.

Proceed to Step 35.
34. If the circuit pack fails, the RED LED is lighted on the faceplate of the circuit pack. Check the wiring associated with the circuit pack replaced.
35. The NETWORK SWITCH fault indicator is turned off when the circuit passes Test 4.

The MAJOR or MINOR alarm indicator is also turned off if no other sources are affecting both alarm indicators.
36. The LEDs on the RMI circuit pack may assist in isolating problems with RMI failures.

The RED LED (LFAIL indicator) in position 11 of the RMI circuit pack when lighted indicates the channel between the RMI central and remote RMI is not in communication.

The GREEN LED (FTA indicator) in position 14 of the RMI circuit pack when lighted indicates transmission to the remote RMI over the fiber.

The GREEN LED (FRA indicator) in position 16 of the RMI circuit pack when lighted indicates reception from the remote RMI over the fiber.
37. Examine the LEDs on the RMI circuit pack.

If the RED LED in position 11 is not lighted, than communication between the central and remote RMIs is good. Proceed to Step 38.
If the RED LED in position 11 is lighted, check the communication path between the central and remote RMIs.

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38. Examine the GREEN LEDs in positions 14 and 16 of the RMI circuit pack.

Perform corrective action based on whether transmission or reception is failing.

## TSI Demand Test

To run the TSI demand test, perform the following steps:

1. Step to Test 2 of PROC 620.
2. Use the CHANGE FIELD sequence to enter unit type 99 in Field 2:

CHANGE FIELD; 2; ENTER; 99; ENTER.
Note: Unit type 99 cannot be stepped to by using NEXT UNIT.
3. Depress EXECUTE.

If Test 2 passes the TSI demand test, all corrective action is complete.
If Test 2 fails the TSI demand test, proceed to Step 4.
4. Enter Test 4 and test the following unit types in the order listed by using NEXT UNIT and NEXT CIRCUIT (as applicable) to select the unit type and circuit pack to be tested. Perform Steps 3 through 60 (as required) of isolation and repair step One Digital Network Circuit Failure for each unit type and circuit pack (as applicable) that fails.

Unit type 11 - TSI PSTORE.
Unit type 13 - PDS (test all PDS circuit packs, 0 through 5).
Unit type 15 - PDI (test all PDI circuit packs, 0 through 23).
Unit type 9 - Module clock.
Unit type 8-MIF.
Unit type 10 - TSI ALU.
5. When all unit types pass Test 4, corrective action is complete.

## Special Error Code 88

Assumption: PROC 620 Test 4 displays special error code 88 when testing the MCC or a trouble exists where the common control cannot communicate with a network module.

The problem lies somewhere above the MCC or in the cabling between the MCC and the 4 MHZ channels.

1. Execute Test 2 of PROC 611 (Common control I/O tests).
2. If Test 2 of PROC 611 fails, perform the corrective action listed in the repair guide part of PROC 611 until Test 2 passes.
3. Perform Test 4 of PROC 620 and test the MCC (unit type 6).

If Test 4 passes, corrective action is complete.
If Test 4 fails, check the cabling and wiring between the MCC and the common control.

## Specific Fault Codes

A specific fault code is a number used to provide a description of a failure.

1. This description provides more detail about the failure associated with a circuit.
2. The failure is directly observed at a hardware sensor point or is the result of processing data observed at several hardware sensor points.
Specific fault codes are-recorded during periodic or time available testing in PMIDS. Demand testing specific fault codes are recorded in DMIDS.

Both the PMIDS and DMIDS specific fault codes (normally the same) are available for display during testing.

A list of the specific fault codes is provided in 2 tables.

1. Table AA, PROC 620 - Specific Fault Code Definitions, lists the specific fault codes in numerical sequence with a definition for each specific fault code.
2. Table AB, PROC 620 - Specific Fault Code Definitions By Unit Type, lists the specific fault codes displayed when testing a circuit within the unit type listed. In addition, Table AB provides other circuits that could cause (with lower probability) the same failure.

Further isolation of a failure may be accomplished as follows:

1. Analyze the specific fault codes recorded from PMIDS (first specific fault code recorded before executing Test 4) and DMIDS (second specific fault code recorded after Test 4 failed).
2. Determine from the specific fault codes recorded (using Table AA, PROC 620 - Specific Fault Code Definitions, or Table $\mathrm{AB}, \mathrm{PROC} 620$ - Specific Fault Code Definitions By Unit Type) if any additional corrective action can be performed (i.e., cabling, connectors, etc.).

Note: The circuit packs listed as circuits 1, 2, and 3 probably have been replaced as the primary candidate and the alternate circuit packs for the failure being investigated.
3. Check the wiring associated with the circuit pack(s) replaced (point to point depending upon specific fault code(s) recorded).

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TABLE AA.

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 0 | NO FAILURE |
| 2 | TPIO ERROR FROM A MAINTENANCE ROUTINE |
| 3 | NO RESPONSE TO AN EOM FROM A MAINTENANCE ROUTINE |
| 4 | DATA PARITY ERROR ON A MAINTENANCE OR SCANNER BUS WRITE |
| 5 | OTHER NON-SYSIO ERROR ON A MAINTENANCE OR SCANNER BUS WRITE |
| 6 | NO POSITIVE ACKNOWLEDGE USING QUI_PORT, INIT_TSI, OR SCANNER BUS WRITE |
| 7 | DISTRIB DATA AFTER BYTE INCORRECT TO A PDI |
| 8 | DISTRIB DATA AFTER BYTE INCORRECT TO A PCI |
| 9 | DISTRIB DATA AFTER BYTE INCORRECT TO A PORT |
| 10 | NO POSITIVE ACKNOWLEDGE AFTER MAINTENANCE ORDER TO TMS PROCESSOR |
| 11 | BUS PROBLEM CAUSED MODULE (OR TMS) PROCESSOR SHUTDOWN - ALL TN400 BOARDS IN CARRIER, TN530, TN445, AND TN380 (TN381) ARE ALSO SUSPECT |
| 12 | TIME SLOT UNAVAILABLE |
| 13 | CIRCUIT IN USE BY CALL PROCESSING |
| 14 | ID CHIP FAILURE |
| 15 | MAJOR SCANNER FAILURE - NO SWITCH REQUIRED |
| 16 | MAJOR FAILURE FOUND IN SCANNER TEST |
| 17 | MAJOR DUPLICATION/UPDATE FAILURE IN SCANNER TEST |
| 18 | MAJOR SCANNER FAILURE |
| 19 | MINOR SCANNER FAILURE |
| 21 | BAD MCC/MP COMMUNICATIONS |
| 22 | MODULE PROCESSOR ADDRESS PARITY FAILURE |
| 23 | CANNOT MANIPULATE MCC STATUS REGISTER BITS |
| 24 | CRITICAL MCC CIRCUIT FAILURE |
| 27 | CANNOT MANIPULATE MCC STATUS REGISTER BITS OR AEH4 ALARM DISTRIBUTION AND AIR FLOW MONITOR |

TABLE AA. (Contd)

| - PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 28 | SAME AS SPECIFIC FAULT CODE (SFC) 11 |
| 29 | CIRCUIT PACK PULLED OR 4-MHZ CABLE DISCONNECTED |
| 30 | INCORRECT CLOCK OUTPUT SEQUENCE (INCORRECT SAC) |
| 31 | MAINTENANCE INTERFACE FAILURE CAUSED INCORRECT SAC READOUT |
| 32 | GPP DATA CLOCK LOST MOMENTARILY (INCORRECT DCE READOUT) |
| 33 | MAINTENANCE INTERFACE FAILURE CAUSED INCORRECT DCE READOUT |
| 34 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE |
| 35 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE |
| 36 | MIF FAILURE CAUSED INCORRECT OOL READOUT, MODULE ON-LINE |
| 37 | MIF FAILURE CAUSED INCORRECT OOL READOUT, MODULE OFF-LINE |
| 38 | CLOCK FREQUENCY GENERATOR FAILED |
| 39 | MIF FAILURE CAUSED INCORRECT DCE OOL READOUT |
| 40 | OFF-LINE CLOCK APPEARS AS MASTER WITH NO SCS/LGI PRESENT |
| 41 | MIF FAILURE CAUSED OFF-LINE CLOCK TO APPEAR AS MASTER WITH NO SCS/LGI PRESENT |
| 42 | CLOCK APPEARS AS MASTER WITH SCS/LGI PRESENT |
| 43 | MIF FAILURE CAUSED CLOCK TO APPEAR AS MASTER WITH SCS/LGI PRESENT |
| 44 | ON-LINE CLOCK APPEARS AS SLAVE WITH NO SCS/LGI PRESENT |
| 45 | MIF FAILURE CAUSED MAINTENANCE INTERFACE APPEARANCE OF ON-LINE CLOCK AS SLAVE WITH NO SCS/LGI PRESENT |
| 50 | TSI PSTORE RESOURCES NOT AVAILABLE |
| 51 | PORT RESOURCES NOT AVAILABLE |
| 52 | TSI PSTORE INTERMITTENTLY REPORTS INVALID NETWORK TEST ACTIVITY |
| 53 | A ZERO VALUE CANNOT BE READ OVER THE PST MAINTENANCE BUS PATH |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAUIT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 54 | INTERMITTENT ADDRESSING FAULT WITHIN THE TSI |
| 55 | A NON-ZERO VALUE CANNOT BE READ OVER THE PST MAINTENANCE BUS PATH |
| 56 | AT LEAST ONE PDS IS RECEIVING PCM Data from a double-CONNECT |
| 57 | INTERMODULE DATA STORE OR MODULE CLOCK OUT OF LOCK CAUSED TSI TEST FAILURE |
| 58 | TEST VECTOR 128-255 OUTPUT FROM MIF INCORRECT (BAD TEST VECTORS CAUSED BY POWER FAILURE ARE RESTORED AFTER REPORTING THIS SFC) |
| 59 | PDS DATA OR ADDRESSING IN OUTPUT STORE INCORRECT |
| 60 | PDI ADDRESSING OR CONTROL INCORRECT |
| 61 | ALU RECEIVES INCORRECT DATA FROM PDS |
| 62 | PDI OUTPUT DATA INCORRECT |
| 63 | INTERMITTENT FAULT IN PCM DATA PATH |
| 64 | INTERMITTENT PDI READ ERROR OVER PORT COMMAND BUS |
| 65 | INTERMITTENT ALU READ ERROR OVER MAINTENANCE BUS PATH |
| 66 | INTERMITTENT PDS READ ERROR OVER MAINTENANCE BUS PATH |
| 67 | PST ERRONEOUSLY REPORTS NETWORK TEST ACTIVITY |
| 68 | MIF OUTPUTS TEST VECTORS WHEN SHUT OFF |
| 69 | PDS OUTPUT STORE GENERATES NETWORK TEST FLAGS ON PORTS NOT PRESENTLY IN-USE |
| 70 | PDS InPut store generates network test flags |
| 71 | PDI GENERATES NETWORK TEST FLAGS |
| 73 | Mif TEST VECTOR CIRCUITRY FAULTY |
| 74 | MIF TVB CONTENTS INCORRECT (BAD TEST VECTORS CAUSED BY POWER FAILURE ARE RESTORED AFTER REPORTING THIS SFC) |
| 75 | BAD PST MEMORY PARITY |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 76 | PST NOT CYCLING |
| 77 | INTERMITTENT PDS READ ERROR OVER MAINTENANCE BUS PATH |
| 78 | ALU ADDRESS PROCESSING SUSPECTED |
| 79 | PDS ADDRESS PROCESSING SUSPECTED |
| 80 | PDI LOOP-AROUND OR DATA FAILURE |
| 81 | PDS INPUT STORE ADDRESSING OR DATA FAILURE |
| 82 | PST INSTRUCTION ADDRESSING FAULT |
| 83 | PDS INTERNAL ADDRESSING FAULT |
| 84 | PST ADDRESS OR MEMORY FAULT |
| 85 | PST MEMORY OR OUTPUT FAULT |
| 86 | alu address processing fault |
| 87 | ALU PCM Data fault |
| 88 | ald data fault (also CaUsed by Faulty interface on PCM Bus by TN440 PDS OR TN441 IDS) |
| 90 | FAILED THE MP BASED DUP_TST |
| 92 | DUP BOARD STATUS BITS WOULD NOT SET OR CLEAR |
| 93 | ON LINE TN530 ERROR FLAG WAS SET |
| 94 | OFF LINE TN530 ERROR FLAG WAS SET |
| 95 | State of health comparator test failed |
| 96 | DOUBLE WRITE CONTROL TEST FAILED |
| 97 | DOUBLE WRITE WITH BAD PARITY TEST FAILED |
| 98 | DUPLICATION CHANNEL DID NOT DETECT BAD PARITY |
| 100 | NON-ZERO IDLE PORT CONTROL REGISTER |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) <br> CODE <br> $[1]$ | definition |
| :---: | :--- |
| 101 | DEFECTIVE GATE ARRAY A |
| 102 | DEFECTIVE GATE ARRAY B |
| 103 | DEFECTIVE GATE ARRAY C |
| 104 | FAULTY PORT SELECT IN GATE ARRAY A |
| 105 | FAULTY PORT SELECT IN GATE ARRAY B |
| 106 | FAULTY PORT SELECT IN GATE ARRAY C |
| 109 | FAULTY SET OF LA FLIP-FLOP |
| 110 | FAULTY SET OF CPU FLIP-FLOP |
| 118 | FAULTY CLEAR OF LA FLIP-FLOP |
| 120 | VALID TONE PRESENT BIT STUCK ACTIVE IN SUMMARY BOARD SCAN |
| 121 | VALID TONE PRESENT NOT INDICATED IN SUMMARY BOARD SCAN (REORDER OR <br> DATA ANSWER TONE USED) |
| 122 | VALID TONE PRESENT NOT INDICATED IN TONE REGISTER (REORDER OR DATA <br> ANSWER TONE USED) |
| 123 | TONE NOT DETECTED IN TONE REGISTER (REORDER OR DATA ANSWER TONE |
| 124 | USED) |
| 125 | OFF-HOLTY CLEAR OF CPU FLIP-FLOP |
| 126 | OFF-HOOK ERROR FROM BAD LA CLEAR OR ATTACHED STATION |
| 128 | RING DETECTION ERROR POSSIBLY FROM ATTACHED CO OR MODULE FAILED TO <br> INITIALIZE OR DUPLICATION SWITCH FAILURE |
| 139 | GND DETECTION ERROR POSSIBLY FROM EXTERNAL CIRCUIT SIGNALING |
| 130 | ACTIVE SEZD* ERROR POSSIBLY FROM BUSY CODE CALL CKT |
|  | TERMINATED LINE FAILED TO INDICATE OFF-HOOK |

TABLE AA. (Contd)

| FRULT <br> CODE <br> I1 | DEFIITION |
| :---: | :--- |
| 133 | OFF-HOOCIFIC FAULT CODE DEFINITIONS (Contd) |
| 134 | CPT REFLECTION DETECTOR FAILED TO STABILIZE |
| 135 | CPT TONE TEST DETECTION FAILED TO STABILIZE |
| 136 | CPT REFLECTION DATA READY FLAG STUCK ACTIVE |
| 137 | CPT TONE TEST DATA READY FLAG STUCK ACTIVE |
| 138 | NORM CURRENT DETECTOR STUCK ACTIVE |
| 139 | GROUND DETECTOR FAILED TO DETECT GROUND |
| 140 | GS RELAY STUCK OPERATED |
| 141 | REV CURRENT DETECTOR STUCK ACTIVE |
| 143 | CODE CALL DIGIT DONE* IMPROPERLY ACTIVE |
| 144 | CODE CALL DIGIT DONE* IMPROPERLY INACTIVE |
| 145 | FAULTY CODE CALL CHIME PERIOD |
| 146 | FAULTY DIGITAL SIGNAL PROCESSOR |
| 147 | CODE CALL SEZD* IMPROPERLY INACTIVE |
| 149 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
| 150 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
| 151 | INSUFFICIENT 440-HZ OFF-HOOK REFLECTION |
| 152 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |
| 153 | EXCESSIVE SIGNAL AT OTHER THAN 440-HZ |
| 154 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
| 155 | CODEC POWER UP STUCK ACTIVE |
| 156 | FAULTY FIRST TONE TEST FREQUENCY IDLE INDICATION |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fauti CODE 11 | definition |
| 157 | FAULTY SECOND TONE TEST FREQUENCY IDLE INDICATION |
| 158 | FAULTY FIRS' TONE TEST QUIET TIME IDLE INDICATION |
| 159 | FAULTY SECOND TONE TEST QUIET TIME IDLE INDICATION |
| 160 | FAULTY 440-HZ FREQUENCY |
| 161 | FAULTY DIAL TONE FIRST TONE FREQUENCY OR TONE TEST NON-IDLE INDICATION |
| 162 | FAULTY DIAL TONE SECOND TONE FREQUENCY OR TONE TEST NON-IDLE INDICATION |
| 163 | FAULTY FIRST TONE TEST QUIET TIME NON-IDLE INDICATION |
| 164 | FAULTY SECOND TONE TEST QUIET TIME NON-IDLE INDICATION |
| 165 | FAULTY INTERRUPTED DIAL TONE FIRST TONE FREQUENCY |
| 166 | FAULTY INTERRUPTED DIAL TONE SECOND TONE FREQUENCY |
| 167 | FAULTY INTERRUPTED DIAL TONE FIRST TONE QUIET TIME |
| 168 | FAULTY INTERRUPTED DIAL TONE SECOND TONE QUIET TIME |
| 169 | FAULTY AUDIBLE RING FIRST TONE FREQUENCY |
| 170 | FAULTY AUDIBLE RING SECOND TONE FREQUENCY |
| 171 | FAULTY AUDIble ring first tone quiet time |
| 172 | FAULTY AUDIBLE RING SECOND TONE QUIET TIME |
| 173 | FAULTY SPECIAL AUDIBLE RING FIRST TONE FREQUENCY |
| 174 | FAULTY SPECIAL AUDIBLE RING SECOND TONE FREQUENCY |
| 175 | FAULTY SPECIAL AUDIBLE RING FIRST TONE QUIET TIME |
| 176 | FAULTY SPECIAL AUDIbLE RING SECOND TONE QUIET TIME |
| 177 | FAULTY INTERCEPT FIRST TONE FREQUENCY |
| 178 | FAULTY INTERCEPT SECOND TONE FREQUENCY |

TABLE AA. (Contd)

|  | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :--- | :--- |
| faut <br> COE |  |
| 179 | FAULTY INTERCEPT FIRST TONE QUIET TIME |
| 180 | FAULTY INTERCEPT SECOND TONE QUIET TIME |
| 181 | FAULTY BUSY FIRST TONE FREQUENCY |
| 182 | FAULTY BUSY SECOND TONE FREQUENCY |
| 183 | FAULTY BUSY FIRST TONE QUIET TIME |
| 184 | FAULTY BUSY SECOND TONE QUIET TIME |
| 185 | FAULTY REORDER FIRST TONE FREQUENCY |
| 186 | FAULTY REORDER SECOND TONE FREQUENCY |
| 187 | FAULTY REORDER FIRST TONE QUIET TIME |
| 188 | FAULTY REORDER SECOND TONE QUIET TIME |
| 189 | FAULTY 440-HZ REFLECTION DETECTOR IDLE INDICATION |
| 190 | FAULTY BROAD BAND REFLECTION DETECTOR IDLE INDICATION |
| 191 | FAULTY 440-HZ REFLECTION DETECTOR NON-IDLE INDICATION |
| 192 | FAULTY BROAD BAND REFLECTION DETECTOR NON-IDLE INDICATION |
| 193 | FAULTYY RECEPTION OF AUXILIARY IMMEDIATE RINGBACK TONE |
| 194 | BATTERY FEED REVERSAL STUCK ACTIVE OR IDLE CIRCUIT INDICATES LOOP |
| 196 | BATTERY FIELD REVERSAL STUCK INACTIVE |
| 199 | BUSY OUT FAILED |
| 200 | ONLY IDLE |
| 201 | DEFECTIVE GATE ARRAY D |
| 202 | FAULTY PORT SELECT IN GATE ARRAY D |
| 203 | E OR M SIGNAL INDICATOR STUCK ACTIVE |

TABLE AA. (Contd)

| FAUIT <br> CODE <br> $[1]$ | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| 204 | FAILURE OF OP SET |
| 205 | M-SIGNAL SENT INDICATOR STUCK INACTIVE |
| 206 | POSSIBLE EXTERNAL CIRCUIT SIGNALLING |
| 208 | CLEARING LOOP-AROUND FAILS TO REMOVE 440-HZ SIGNAL |
| 211 | OFF-HOOK STATUS (GRND SIGNAL DETECTOR) FAILS TO POWER UP THE CODEC |
| 214 | FAILURE OF GATE ARRAY OR E-SIGNAL RECEIVER |
| 215 | FAILURE OF OP FLIP-FLOP |
| 216 | INCORRECT ENCODE IN TIE TRUNK ID CHIP |
| 218 | NETWORK ORDER FAILED |
| 219 | RELEASE BUSY OUT FAILED |
| 220 | DSP CHECKSUM STUCK ACTIVE |
| 222 | FTC PORT 0 STUCK OFF-HOOK |
| 223 | FTC PORT 1 STUCK OFF-HOOK |
| 227 | FTC PORT 0 STUCK ON-HOOK |
| 228 | FTC PORT 1 STUCK ON-HOOK |
| 230 | NO TRANSMISSION FROM FTC PORT 1 TO PORT 0 |
| 231 | IMPROPER OUTPUT ENERGY AT FTC PORT 0 |
| 232 | IMPROPER TRANSMISSION FROM FTC PORT 0 TO PORT 1 |
| 233 | IMPROPER OUTPUT ENERGY AT FTC PORT 1 |
| 235 | 440-HZ TRANSMISSION FAILURE BETWEEN 2 PORTS |
| 236 | EXCESSIVE SIGNAL OTHER THAN 440-HZ AT SEND PORT |
| 237 | IMPROPER 440-HZ TRANSMISSION FROM RECEIVE INPUT TO SEND OUTPUT ON THE |
| SAME PORT |  |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault <br> CODE <br> 11 | definition |
| 239 | TEST VECTOR 0-127 OUTPUT FROM MIF INCORRECT |
| 240 | MAINTENANCE BUS TO TSI ALU IS BAD |
| 241 | TSI ALU LOSSING/LINEARIZING FAULT |
| 242 | TSI ALU OPCODE FAILURE |
| 243 | TSI ALU ACCUMULATOR FAILURE |
| 244 | TSI ALU ACCUMULATOR ADDRESSING FAULT |
| 245 | ALU/MIF INTERFACE ERROR |
| 246 | IDLE CODE GENERATOR FAILURE |
| 247 | TSI ACCUMULATOR RESOURCES NOT AVAILABLE |
| 264 | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM IOBI |
| 265 | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PCI |
| 266 | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PDI |
| 267 | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
| 268 | MAINTENANCE BUS - BAD TES'T REGISTER VALUE FROM MIF |
| 269 | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
| 270 | PORT COMMAND BUS - BAD SAC VALUE FROM IOBI |
| 271 | PORT COMMAND BUS - BAD SAC VALUE FROM PCI |
| 272 | PORT COMMAND BUS - END OF MESSAGE TIMEOUT |
| 273 | PORT COMMAND BUS - BAD CLOCK ON MIF |
| 274 | PORT COMMAND BUS - IOBI DID NOT FLAG BAD PARITY |
| 275 | PORT COMMAND BUS - BAD (ON/OFF) LINE CONTROL |
| 276 | PORT COMMAND BUS - BAD CONTROL COMPLEX SIGNAL TO TN454 AND TN452 |
| 277 | MAINTENANCE INTERFACE BUS - BAD SAC VALUE |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fAULT CODE [1] | DEFINITION |
| 278 | MAINTENANCE BUS - MIF DID NOT FLAG BAD PARITY |
| 280 | MLP CONTROLLER FAULT |
| 281 | MLP 48-V OVERLOAD |
| 282 | MLP MFET DRIVER CIRCUITRY FAILURE |
| 283 | MLP FAILED TO RETURN ID REQUEST |
| 284 | MLP RESPONDED TO OFF-HOOK TEST WITH SOMETHING BESIDES ON, OFF, OR NO RESPONSE |
| 285 | IDLE SENDER SUM SCAN INDICATES DIAL TONE DETECTED |
| 286 | IDLE SENDER STATUS REG INDICATES PORT BUSY |
| 287 | IDLE SENDER STATUS REG INDICATES DIGIT QUEUE FULL |
| 288 | IDLE SENDER STATUS REG INDICATES TEST TONE NOT SENT |
| 289 | SENDER CKT SUM CHECK FAILURE |
| 290 | SENDER NOT BUSY WHILE TEST TONE BEING SENT |
| 291 | SENDER STATUS REG INDICATES TEST TONE COMPLETE WHILE SENDING |
| 292 | SENDER FAILS TO SEND 440-HZ TES' TONE |
| 293 | NO IDLE RECEIVER FOUND FOR SENDER RETEST |
| 294 | SENDER NOT BUSY WHILE SENDING VALID TONE |
| 295 | SENDER STATUS REG INDICATES TT SIGNAL DONE WHILE BEING SENT |
| 296 | SENDER FAILS TO SEND A VALID TOUCH-TONE |
| 297 | NO TOUCH-TONE DIGIT RECEIVED AT RECEIVER |
| 298 | SENDER FAILS TO DETECT DIAL TONE |
| 299 | SENDER DETECTS DIAL TONE AFTER DIAL TONE REMOVED |
| 300 | NO TRANSMISSION THROUGH RECEIVER, LOW PATH TO HIGH PATH |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault <br> CODE <br> 11 | definition |
| 301 | NO TRANSMISSION THROUGH RECEIVER, HIGH PATH TO LOW Path |
| 302 | NO IDLE SENDER FOUND FOR RECEIVER RETEST |
| 303 | IDLE RECEIVER SUMMARY SCAN INDICATES RECEPTION OF TOUCH-TONE |
| 304 | IDLE RECEIVER PORT CONTROL REGISTER INDICATES RECEPTION OF VALID TOUCH-TONE |
| 305 | RECEIVER FAILS TO RECEIVE LOW LeVEL DIGIT |
| 306 | RECEIVER FAILS TO RECOGNIZE TOUCH-TONE |
| 307 | RECEIVER FAILS TO RECOGNIZE LOW LEVEL DIGIT |
| 308 | RECEIVER RECEIVES FALSE TONE |
| 315 | LOOP CLOSURE DETECTION MAY BE DUE TO CO ATTEMPTING SEIZE |
| 316 | INSUFFICIENT 600-OHM TERMINATION REFLECTION POSSIBLY CAUSED BY OPEN TRANSMISSION OPTION SWITCH |
| 317 | EXCESSIVE 600-OHM TERMINATION REFLECTION |
| 318 | INSUFFICIENT SHORT CIRCUIT TERMINATION REFLECTION |
| 319 | EXCESSIVE SHORT CIRCUIT TERMINATION REFLECTION |
| 330 | TSI PSTORE INSTRUCTION PARITY CHECKING CIRCUITRY FAILED |
| 331 | TSI ALU Data Parity checking circuitry failed |
| 334 | PDI Data parity checking circuitry failed |
| 338 | DATA MODULE DOES NOT RESPOND TO A QUERY |
| 340 | ALL GPP PORTS UNDER THIS UNIT TYPE FAILED THE DATA CLOCK TEST. OTHER INDICTMENTS ARE SN270 GPP BOARDS OR UNPLUGGED DIGITAL INSTRUMENTS IN THE SAME HALF CARRIER AS A FAILING UNIT TYPE 15, TN454 PDI |
| 341 | PDI Data select circuit bad |
| 344 | INSUFFICIENT TOUCH-TONE SIGNAL REFLECTION |
| 345 | EXCESSIVE TOUCH-TONE SIGNAL REFLECTION |
| 350 | GPP DTL FAULT BIT SET |

## PROC 620

TABLE AA. (Contd)

| PROC 620 - SPECIFIC fault Code definitions (Contd) |  |
| :---: | :---: |
| fault CODE [1] | DEFINITITON |
| 351 | GPP OR ADFTC DTL IDLE BIT SET |
| 352 | GPP DTLI AND DTLF TOGETHER OR ADFTC DIGITAL SELF-TEST AND DTLI TOGETHER |
| 353 | GPP 48-VOL BIT SET (FUSE BLOWN) OR ADFTC ANALOG SELF-TEST FAULT |
| 354 | GPP 48-VOL AND DTLF BITS SET OR ADFTC ANALOG AND DIGITAL SELFTEST FAULT TOGETHER |
| 355 | GPP 48-VOL AND DTLI BITS SET OR ADFTC ANALOG SELF-TEST AND DTLI TOGETHER |
| 356 | GPP 48-VOL, DTLI, AND DTLF BITS SET OR ADFTC ANALOG, DIGITAL SELF-TEST FAULT, AND DTLI TOGETHER |
| 357 | ONE S CHANNEL RETRANSMISSION TO THE PORT HAS OCCURRED |
| 358 | MORE THAN ONE S CHANNEL RETRANSMISSION TO THE PORT HAS OCCURRED |
| 359 | GPP TEST RECEIVED NO RESPONSE FROM ASSOCIATED DI AFTER ID REQUEST |
| 360 | GPP TEST FOUND STATE OF HEALTH BIT SET FOR ASSOCIATED DI |
| 361 | FAILURE OF PORT BLA SET |
| 362 | SAC FAILED TO Clear in PORT DTL LOOP-AROUND TEST |
| 363 | INVALID SAC SIGNATURE IN PORT DTL LOOP-AROUND TEST |
| 364 | ERROR IN TDR IN PORT DTL LOOP-AROUND TEST OR TEST VECTOR NOT RECEIVED IN PCM PORT LOOP-AROUND TEST |
| 365 | SOFT SWITCH FAILED |
| 366 | HARD SWITCH FAILED |
| 367 | ON-LINE INITIALIZATION FAILED. ALL BOARDS IN UPPER HALF CARRIER ARE SUSPECT. 4-MHZ CABLE ALSO SUSPECT |
| 368 | OFF-LINE INITIALIZATION FAILED. ALL BOARDS IN UPPER HALF CARRIER ARE SUSPECT. 4-MHZ CABLE ALSO SUSPECT |
| 369 | UNABLE TO READ MODULE HEALTH STATUS DURING INITIALIZATION |
| 370 | UNABLE TO WRITE TO LOAD SIGNAL REGISTER DURING INITIALIZATION |
| 371 | NEGATIVE ACKNOWLEDGE FROM INITIALIZE IOBI ORDER - ALL TN400 BOARDS IN CARRIER ARE SUSPECT |

TABLEAA. (Contd)

| PROC 620 - SPECIFIC faUlt CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| faut CODE [1] | definition |
| 373 | PORT PROCESSOR FAULT |
| 374 | SIGNALING PROCESSOR FAULT |
| 375 | PORT PROCESSOR AND SIGNALING PROCESSOR FAULT |
| 376 | LOSS OF DATA FAULT AND PORT PROCESSOR FAULT |
| 377 | LOSS OF DATA, PORT PROCESSOR, AND SIGNALING PROCESSOR FAULTS |
| 378 | SIGNALING PROCESSOR FAULT, INITIALIZATION SUCCESSFUL |
| 379 | SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION SUCCESSFUL |
| 380 | loss of data, signaling and port processor faults, INITIALIZATION SUCCESSFUL |
| 381 | SIGNALING PROCESSOR FAULT, INITIALIZATION FAILED |
| 382 | SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION FAILED |
| 383 | LOSS OF DATA, SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION FAILED |
| 384 | PORT PROCESSOR FAULT, RESET SUCCESSFUL |
| 385 | LOSS OF DATA FAULT, RESET SUCCESSFUL |
| 386 | PORT PROCESSOR FAULT, RESET FAILED |
| 387 | LOSS OF DATA FAULT, RESET FAILED |
| 391 | UNABLE TO READ REMOTE MODULE INTERFACE (RMI) STATUS |
| 392 | UNABLE TO WRITE RMI CONTROL |
| 393 | RMI LPFAIL BIT FOUND SET, EXPECTED TO BE CLEARED |
| 394 | RMI FRMERR BIT FOUND SET, EXPECTED TO BE CLEARED |
| 395 | 4-MHZ CHANNEL ERROR ON REMOTE END RMI |
| 396 | REMOTE RMI FAILURE |
| 397 | RMI FIBER LINK OR REMOTE RMI POWER FAILURE |

TABLEAA. (Contd)

| PROC 620 - SPECIFIC fault Code definitions (Contd) |  |
| :---: | :---: |
| fault CODE II | definition |
| 398 | 4-MHZ CHANNEL TO CENTRAL RMI FAILURE (RMI STATUS NORMAL) |
| 399 | CENTRAL RMI FAILURE (4-MHZ LOOP-BACK FAILED AND RMI STATUS FAILED) |
| 400 | UNKNOWN FIFO 14 ERROR CODE |
| 401 | TSI SHUTDOWN |
| 402 | MODULE PROCESSOR INTERFACE ERROR |
| 403 | MODULE CLOCK ERROR |
| 404 | INTERMODULE DATA STORE ERROR |
| 405 | MODULE SYSTEM CLOCK SYNCHRONIZER ERROR |
| 406 | TSI PSTORE MEMORY PARITY ERROR |
| 407 | TSI PCM Data Parity error |
| 408 | PDI PCM DATA PARITY ERROR |
| 409 | LIGHT GUIDE INTERFACE ERROR |
| 41.0 | ERROR FIFO DATA OUT OF SYNC |
| 411 | TMS CLOCK OSCILLATOR ERROR (OOL BIT SET) |
| 412 | TMS CLOCK OSCILLATOR ERROR (OTHER) |
| 413 | TMS CLOCK OSCILLATOR AFTER INITIALIZATION ERROR (MFP BIT SET) |
| 414 | TMS CLOCK OSCILLATOR AFTER INITIALIZATION ERROR (OTHER) |
| 415 | LOCAL CLOCK TERMINATION ERROR (ERR BIT SET) |
| 416 | LOCAL CLOCK TERMINATION ERROR (OTHER) |
| 417 | LOCAL CLOCK TERMINATION AFTER INITIALIZATION ERROR (MFP OR ACT BIT SET) |
| 418 | LOCAL CLOCK TERMINATION AFTER INITIALIZATION ERROR (OTHER) |
| 419 | MODULE INTERFACE ERROR |
| 420 | FAILED MPX RAM |

TABLE AA. (Contd)

| FAUIT <br> CODE <br> II |  |
| :--- | :--- |
| 421 | MPX RAM - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| 422 | MPX INITIALIZATION ERIION |
| 423 | MPX INITIALIZATION ALARM |
| 424 | MPX RAM PARITY ERROR |
| 425 | TSI RUNNING BUT INDICATES IT IS SHUTDOWN |
| 426 | RING TRIP CIRCUIT FAILURE |
| 427 | CONTROL/SUMMARY - SCAN REGISTER READ ERROR |
| 429 | PORT DIGITAL SIGNAL PROCESSOR ERROR |
| 430 | TMIF PFAIL/LATE MAKE ALARM |
| 432 | BURST OF TSI PSTORE PARITY ERRORS |
| 433 | MULTIPLE PCM DATA PARITY ERRORS FROM PDI |
| 434 | ALL PORTS OF DVDP BOARD BAD |
| 436 | MLP CONTROLLER FAULT, INTIALIZATION FAILED |
| 437 | DCLOCK SIGNAL DOES NOT GET THROUGH PDS |
| 441 | MLP CONTROLLER FAULT, INTIALIZATION SUCCESSFUL |
| 444 | TSI PSTORE WRITE FAILURE |
| 445 | MIF WRITE FAILURE |
| 446 | IOBI WRITE FAILURE |
| 447 | TMIF WRITE FAILURE |
| 449 | INITIALIZATION TMS MPX RAM TEST ERROR |
| 450 | INITIALIZATION TMS MPX RAM PARITY CHECKER ERROR |
| 451 | TMS INTERFACE ERROR |
| 452 | ILLEGAL MPX RAM ENTRY ERROR |
|  |  |

PROC 620

TABLE AA. (Contd)

| Proc 620 - SPECIFIC fault code definitions (Contd) |  |
| :---: | :---: |
| fault CODE 11] | definition |
| 453 | TMS SYSTEM CLOCK SYNCHRONIZER ERROR |
| 454 | DTLF FAULT ON ADFTC (DIGITAL SELF-TEST) |
| 455 | 48-VOL FAULT ON ADFTC (ANALOG SELF-TEST) |
| 456 | 48-VOL AND DTLF FAULTS TOGETHER ON ADFTC |
| 457 | PROTOCOL ERROR ON ADFTC |
| 458 | DTL IDLE ON ADFTC |
| 459 | BLA BIT ON PORT CONTROL REG FAILED TO CLEAR OR SET |
| 460 | DTLF FAULT ON DVDP |
| 462 | PROTOCOL ERROR ON QEIA |
| 463 | QEIA SIGNALING PROCESSOR FAULT, INITIALIZATION SUCCESSFUL |
| 464 | QEIA SIGNALING PROCESSOR FAULT, INITIALIZATION FAILED |
| 465 | QEIA PORT FAULT, RESET SUCCESSFUL |
| 466 | QEIA PORT FAULT, RESET FAILED |
| 467 | QEIA LOSS OF DATA, RESET SUCCESSFUL |
| 468 | QEIA LOSS OF DATA, RESET FAILED |
| 500 | TMS CLOCK OSCILLATOR MFP FAILURE |
| 501 | SINGLE LOCAL CLOCK TERMINATION MFP FAILURE WITH MORE THAN 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |
| 502 | TWO LOCAL CLOCK TERMINATION MFP FAILURES WITH MORE THAN 2 LOCAL CLOCK TERMINATION CIRCUITS INSTALLED |
| 503 | THREE LOCAL CLOCK TERMINATION MFP FAILURES WITH MORE THAN 3 LOCAL CLOCK TERMINATION CIRCUITS INSTALLED |
| 504 | ALL LOCAL CLOCK TERMINATION CIRCUITS HAVE MFP FAILURES - MORE THAN 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |
| 505 | SINGLE LOCAL CLOCK TERMINATION MFP FAILURE - 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 506 | TMS CLOCK OSCILLATOR MAINTENANCE CIRCUIT HAS MFP FAULT |
| 507 | LOCAL CLOCK TERMINATION MAINTENANCE CIRCUIT HAS MFP FAULT |
| 508 | TMS CLOCK OSCILLATOR STATE DETERMINATION AND DUPLICATION CONTROL INCORRECT |
| 509 | MAINTENANCE INTERFACE FAILURE CAUSED TMS CLOCK OSCILLATOR FAILURE |
| 510 | TMS CLOCK OSCILLATOR OOL ERROR (OFF LINE TMS CLOCK OSCILLATOR FIRST CHOICE) |
| 511 | TMS CLOCK OSCILLATOR PFL ERROR |
| 512 | CANNOT COMPLETE TMS CLOCK OSCILLATOR FORCE ERROR SEQUENCE |
| 513 | LOCAL CLOCK TERMINATION PFL ERROR |
| 514 | IOBI BuS ERror caused local clock termination failure |
| 515 | LOCAL CLOCK TERMINATION ERR BIT SET - RESET WORKED |
| 516 | LOCAL Clock termination err bit SET - CanNot reset |
| 517 | LOCAL CLOCK TERMINATION ACT FAILURE |
| 518 | CANNOT COMPLETE LOCAL CLOCK TERMINATION FORCE ERROR SEQUENCE |
| 520 | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI |
| 521 | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM UPCI |
| 522 | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
| 523 | TMS IOBI BUS -- BAD SAC VALUE FROM UPCI |
| 524 | TMS IOBI BUS - BAD SAC VALUE FROM IOBI |
| 525 | TMS IOBI BUS - END OF MESSAGE TIMEOUT |
| 526 | TMS IOBI BUS - BAD CLOCK ON TMIF |
| 527 | TMS IOBI BUS - IOBI DID NOT FLAG BAD PARITY |
| 528 | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TMIF |

TABLEAA. (Contd)

|  | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| faUt <br> $11]$ | DEFINITION |
| 529 | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
| 530 | TMS MAINTENANCE BUS - BAD SAC VALUE |
| 531 | TMS MAINTENANCE BUS - TMIF DID NOT FLAG BAD PARITY |
| 550 | TMS LIGHT GUIDE INTERFACE PARITY CHECKING CIRCUIT FAILED TO DETECT A <br> 551 |
| 552 | TMS MODULE INTERFACE PARITY CHECKING CIRCUIT FAILED TO DETECT A BAD <br> PARITY WORD |
| 569 | TMS MODULE INTERFACE TIME SLOT INTEGRITY CIRCUIT FAILED TO DETECT A |
| 567 | TMFFER ERROR |

TABLE AA. (Contd)

|  | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| FAUIT <br> IODE | dEFINTION |
| 570 | TMS CLOCK OSCILLATOR MFP ERROR CANNOT BE CLEARED |
| 571 | TMS LOCAL CLOCK TERMINATION ACT ERROR CANNOT BE CLEARED |
| 572 | TMS LOCAL CLOCK TERMINATION ERR ERROR CANNOT BE CLEARED |
| 573 | TMS LOCAL CLOCK TERMINATION MFP ERROR CANNOT BE CLEARED |
| 574 | TMS LIGHT GUIDE INTERFACE OUT OF FRAME ERROR CANNOT BE CLEARED |
| 575 | TMS MODULE INTERFACE OUT OF FRAME ERROR CANNOT BE CLEARED |
| 576 | TMS ABBREVIATED IOBI BUS TEST FAILURE |
| 577 | TMS ABBREVIATED MAINTENANCE BUS TEST FAILURE |
| 582 | TMS MPX RAM HAS 32 OR MORE BUSIED OUT TIME SLOTS |
| 584 | TMS MPX RAM PARITY ERROR RECOVERY FAILURE CORRECTED |
| 585 | TMS MPX RAM PARITY ERROR RECOVERY FAILURE NOT CORRECTED |
| 586 | TMS MPX RAM INITIALIZATION TEST ERROR CORRECTED |
| 587 | TMS MPX RAM INITIALIZATION TEST ERROR NOT CORRECTED |
| 588 | TMS MPX FAILED RAM CORRECTED |
| 589 | TMS MPX FAILED RAM NOT CORRECTED |
| 600 | UNDIAGNOSED MODULE INTERFACE BUFFER ERROR FROM OEP (PERIODIC ONLY) |
| 601 | UNDIAGNOSED MODULE INTERFACE BUFFER ERROR FROM OEP (PERIODIC ONLY) |
| 602 | INTERMODULE DATA STORE INPUT STORE GENERATES NETWORK TEST FLAGS |
| 604 | ALU GENERATES NETWORK TEST FLAGS |
| 605 | TMIF GENERATES TEST VECTORS WHEN SHUT OFF |
| 606 | INTERMODULE DATA STORE OUTPUT STORE GENERATES NETWORK TEST FLAGS |
| 607 | LGLTO MODULE INTERFACE SUSPECTED OF GENERATING NETWORK TEST FLAGS |

TABLEAA. (Contd)

|  | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :--- | :--- |
| FAULT <br> CODE <br> 11 |  |
| 608 | INTERMODULE DATA STORE TRANSMITS NETWORK TEST FLAGS TO TMS |
| 609 | FAN OUT GENERATES NETWORK TEST FLAGS |
| 610 | FAN IN GENERATES NETWORK TEST FLAGS |
| 611 | MPX GENERATES NETWORK TEST FLAGS |
| 612 | LGL TO LIGHT GUIDE INTERFACE SUSPECTED OF GENERATING NETWORK TEST <br> FLAGS |
| 613 | LIGHT GUIDE INTERFACE TRANSMITS NETWORK TEST FLAGS TO MODULES |
| 614 | LIGHT GUIDE INTERFACE OUTPUT TO TMS GENERATES NETWORK TEST FLAGS |
| 615 | LIGHT GUIDE INTERFACE INPUT FROM TMS GENERATES NETWORK TEST FLAGS |
| 616 | LGL TO MODULE INTERFACE GENERATES NETWORK TEST FLAGS |
| 617 | LGL TO LIGHT GUIDE INTERFACE GENERATES NETWORK TEST FLAGS |
| 618 | MODULE INTERFACE OUTPUT GENERATES NETWORK TEST FLAGS |
| 619 | MODULE INTERFACE INPUT GENERATES NETWORK TEST FLAGS |
| 620 | ALU READ ERROR |
| 621 | TMIF READ ERROR |
| 623 | MODULE INTERFACE READ ERROR |
| 624 | LIGHT GUIDE INTERFACE CROSS-COUPLING FAILURE |
| 625 | INTERMODULE DATA STORE CROSS-COUPLING FAILURE |
| 626 | ALU ADDRESSING ERROR |
| 627 | TMIF TEST VECTOR OUTPUT INCORRECT |
| 628 | INTERMODULE DATA STORE READ ERROR |
| 629 | INTERMODULE DATA STORE OUTPUT STORE FAULT |
| 630 | FAULT SUSPECTED IN LGL TO MODULE INTERFACE |
|  |  |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC fault Code definitions (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 631 | INTERMODULE DATA STORE TRANSMIT TO TMS FAULT |
| 632 | FAN OUT READ ERROR |
| 633 | FAN OUT PCM ERROR |
| 634 | FAN IN READ ERROR |
| 635 | FAN IN PCM ERROR |
| 636 | MPX PCM ERROR |
| 637 | LIGHT GUIDE INTERFACE READ ERROR |
| 638 | FAULT SUSPECTED IN LGL TO LIGHT GUIDE INTERFACE |
| 639 | INTERMODULE DATA STORE INPUT STORE FAILURE |
| 640 | LIGHT GUIDE INTERFACE PCM TRANSMIT TO MODULE FAULT |
| 641 | LIGHT GUIDE INTERFACE OUTPUT TO TMS FAULT |
| 642 | LIGHT GUIDE INTERFACE INPUT FROM TMS FAULT |
| 643 | LGL TO MODULE INTERFACE FAULT |
| 644 | LGL TO LIGHT GUIDE INTERFACE FAULT |
| 645 | MODULE INTERFACE INPUT FAULT |
| 646 | MODULE INTERFACE OUTPUT FAULT |
| 701 | HIGH ACCURACY CLOCK - TEMPORARY LOSS OF SIGNAL |
| 702 | MAIN PHASE LOCKED LOOP - TEMPORARY LOSS OF SIGNAL |
| 703 | MAIN PHASE LOCKED LOOP - TEMPORARY OUT OF LOCK |
| 704 | high accuracy clock loss of signal - build out control enabled MAIN PHASE LOCKED LOOP OPERATING CORRECTLY |
| 705 | HIGH ACCURACY CLOCK LOSS OF SIGNAL - BUILD OUT CONTROL HAD TO BE REENABLED - MAIN PHASE LOCKED LOOP OPERATING CORRECTLY |
| ${ }^{\circ} 706$ | MAIN PHASE LOCKED LOOP LOSS OF SIGNAL - SIMPLEX SYSTEM |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE [1] | definition |
| 707 | MAIN PHASE LOCKED LOOP OUT OF LOCK AND THE SYSTEM IS ON THE HIGH ACCURACY CLOCK - SIMPLEX SYSTEM |
| 708 | MAIN PHASE LOCKED LOOP OUT OF LOCK AND GOING TO THE HIGH ACCURACY CLOCK FIXED THE MAIN PHASE LOCKED LOOP - SIMPLEX SYSTEM |
| 709 | MAIN PHASE LOCKED LOOP OUT OF LOCK AND GOING TO THE HIGH ACCURACY CLOCK DID NOT FIX THE MAIN PHASE LOCKED LOOP - SIMPLEX SYSTEM |
| 710 | HIGH ACCURACY CLOCK LOSS OF SIGNAL - MAIN PHASE LOCKED LOOP OK DUPLEX SYSTEM |
| 711 | MAIN PHASE LOCKED LOOP LOSS OF SIGNAL - DUPLEX SYSTEM |
| 712 | MAIN PHASE LOCKED LOOP OUT OF LOCK - DUPLEX SYSTEM |
| 713 | PRIMARY REFERENCE TEMPORARY LOSS OF SIGNAL |
| 714 | ALL TRANSLATED REFERENCES TEMPORARY LOSS OF SIGNAL |
| 715 | SECONDARY REFERENCE TEMPORARY LOSS OF SIGNAL |
| 716 | SECONDARY REFERENCE STEADY LOSS OF SIGNAL - PRIMARY REFERENCE HEALTHY |
| 717 | PRIMARY REFERENCE STEADY LOSS OF SIGNAL - SECONDARY REFERENCE HEALTHY |
| 718 | ALL TRANSLATED REFERENCES STEADY LOSS OF SIGNAL |
| 719 | SECONDARY REFERENCE TEMPORARY OUT OF LOCK |
| 720 | ALL TRANSLATED REFERENCES OUT OF LOCK |
| 721 | SECONDARY REFERENCE STEADY OUT OF LOCK |
| 722 | PRIMARY REFERENCE TEMPORARY OUT OF LOCK |
| 723 | PRIMARY REFERENCE STEADY OUT OF LOCK - SECONDARY REFERENCE HEALTHY |
| 724 | AJLL TRANSLATED REFERENCES STEADY OUT OF LOCK |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions (Contd) |  |
| :---: | :---: |
| FAULT CODE [1] | definition |
| 725 | INVALID DATA IN DS-1 Data facility error fifo |
| 726 | DS-1 TO SCS CABLE(S) DISCONNECTED |
| 727 | DS-1 BOARD PROCESSOR SANITY |
| 728 | LOSS OF SIGNAL OR OUT OF LOCK AT SYSTEM CLOCK SYNCHRONIZER |
| 729 | LOSS OF SIGNAL AT DS-1 |
| 730 | DS-1 YELLOW ALARM RECEIVED |
| 731 | DS-1 BOARD HEALTH |
| 732 | DS-1 MAJOR ERROR RATE |
| 733 | DS-1 MINOR ERROR RATE |
| 734 | DS-1 RED ALARM DETECTED |
| 735 | DS-1 CARRIER GROUP ALARM |
| 736 | DS-1 SLIP RATE EXCEEDED - REFERENCES SWITCHED |
| 737 | DS-1 SLIP RATE THRESHOLD EXCEEDED |
| 738 | MISFRAME THRESHOLD EXCEEDED - SYSTEM HAS ONLY ONE REFERENCE |
| 739 | MISFRAME THRESHOLD EXCEEDED |
| 740 | MISFRAME THRESHOLD EXCEEDED - SECONDARY REFERENCE AVAILABLE |
| 741 | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - HIGH ACCURACY CLOCK ON LINE |
| 742 | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - REFERENCES ARE REVERSED - REFERENCES SWITCHED |
| 743 | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - REFERENCES ARE REVERSED - SWITCH OF REFERENCES CANNOT BE MADE |
| 744 | TMS STATUS BIT NOT CONSISTENT WITH TRANSLATION |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions (Contd) |  |
| :---: | :---: |
| fauti CODE [1] | definition |
| 745 | BOTH SYSTEM CLOCK SYNCHRONIZER ON LINE BITS SET OR CLEARED |
| 746 | BOTH SYSTEM CLOCK SYNCHRONIZER ON LINE BITS BACKWARDS |
| 747 | BUILD OUT CONTROL BIT HAD TO BE RESET |
| 748 | BUILD OUT CONTROL BIT SET AND CANNOT BE CLEARED |
| 749 | REFERENCE SOURCE SELECTION DOES NOT AGREE WITH STATUS MEMORY BUS TEST FAILED |
| 750 | MISFRAME THRESHOLD EXCEEDED ON PRIMARY AND SECONDARY REFERENCES |
| 751 | SYSTEM CLOCK SYNCHRONIZER CIRCUIT PACK PULLED OR ON LINE BIT STUCK |
| . 752 | ON LINE SYSTEM CLOCK SYNCHRONIZER - OFF-LINE SYSTEM CLOCK SYNCHRONIZER HAS OUT OF LOCK CONDITION |
| 753 | SYSTEM CLOCK SYNCHRONIZER CROSS COUPLING SIGNAL INCORRECT |
| 754 | SYSTEM CLOCK SYNCHRONIZER LOSS OF SIGNAL DETECTION CIRCUITRY FAULTY |
| 755 | SYSTEM CLOCK SYNCHRONIZER PRIMARY/SECONDARY LOSS OF SIGNAL DETECTION CIRCUIT FAULTY |
| 758 | LOSS OF SIGNAL IN DS-1 LINK |
| 759 | MAJOR ALARM FROM ERROR RATE AFTER GLOBAL INITIALIZATION |
| 760 | MINOR ALARM FROM ERROR RATE AFTER GLOBAL INITIALIZATION |
| 761 | DAILY LIMIT EXCEEDED FOR MISFRAMES AFTER GLOBAL INITIALIZATION |
| 762 | RED ALARM RAISED AFTER GLOBAL INITIALIZATION |
| 763 | DAILY LIMIT EXCEEDED FOR SLIPS AFTER GLOBAL INITIALIZATION |
| 764 | DS-1 IS NOT ADMINISTERED |
| 765 | LOSS OF DS-1 PROCESSOR SANITY AFTER GLOBAL INITIALIZATION |
| 766 | DS-1 INTERFACE CANNOT BE GLOBALLY INITIALIZED |
| 767 | DS-1 REFERENCE JUST TESTED CANNOT BE SWITCHED ON LINE |
| 768 | HIGH ACCURACY CLOCK COULD NOT BE SWITCHED ON LINE |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE (1] | definition |
| 769 | HEALTH OF REQUESTED DS-1 REFERENCES IS NOT GOOD BEFORE GLOBAL initialization |
| 770 | LOSS OF SIGNAL FROM THE DS-1 TO THE SYSTEM CLOCK SYNCHRONIZER |
| 771 | Daily limit exceeded for slips before global initialization |
| 772 | DAILY LIMIT EXCEEDED FOR MISFRAMES BEFORE GLOBAL INITIALIZATION |
| 773 | READ ALARM RAISED, OUT OF FRAME BEFORE GLOBAL INITIALIZATION |
| 774 | MAJOR ALARM FROM ERROR RATE BEFORE GLOBAL INITIALIZATION |
| 775 | MINOR ALARM FROM ERROR RATE BEFORE GLOBAL INITIALIZATION |
| 777 | MAINTENANCE CONTROL REGISTER IS DEFECTIVE |
| 778 | OPTION CONTROL REGISTER IS DEFECTIVE |
| 779 | SCAN MODE CONTROL REGISTER IS DEFECTIVE |
| 780 | DISABLE SIGNALING CONTROL REGISTER IS DEFECTIVE |
| 781 | PORT CONTROL REGISTER IS DEFECTIVE |
| 782 | PORT STATUS REGISTER IS DEFECTIVE |
| 783 | SUMMARY SCAN STATUS REGISTER IS DEFECTIVE |
| 784 | STATUS RESET CONTROL REGISTER IS DEFECTIVE |
| 785 | DS-1 REFERENCE IS NOT MAINTENANCE BUSY. WARNING: IF THIS INTERFACE IS A REFERENCE, THEN BUSYING OUT THE CIRCUIT AND TESTING IT MAY BE SERVICE AFFECTING TO OTHER DIGITIAL FACILITIES BECAUSE THE CAPABILITY TO COMMUNICATE AT A DIGITAL RATE WOULD BE LOST FOR THE DURATION OF THE TEST. |
| 786 | FAR END LOOPED BACK YELLOW ALARM NOT RECEIVED |
| 787 | NO CARRIER GROUP ALARM FROM YELLOW ALARM RECEIVED |
| 788 | I/O BUS DEFECTIVE |
| 789 | MAINTENANCE BUS DEFECTIVE |

TABLE AA. (Contd)

|  | PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| FAUIT <br> C11 | DEFINIION |
| 995 | USE PROC 646 TO COMPLETE TESTS ON THIS CIRCUIT |
| 996 | DUP BOARD MUST BE TESTED IN OTHER ON-LINE - OFF-LINE MODE TO PASS VERI- <br> FICATION |
| 997 | MODULE SOFT LOCK FAILED OR MODULE ALREADY LOCKED |
| 998 | CANNOT TEST UNTRANSLATED PORT |
| 999 | REQUESTED TEST NOT PROVIDED FOR THIS UNIT |
| 1000 | COULD NOT SEND AN S MESSAGE |
| 1001 | FACILITY NOT TESTED FOR MORE THAN X CYCLES |
| 1005 | NO BITS RECEIVED ON A 1-PORT ADFTC SELF-TEST |
| 1006 | DATA TRANSMISSION INTERRUPTED: 1-PORT ADFTC SELF-TEST |
| 1007 | BIT ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
| 1008 | BLOCK ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
| 1009 | EIA UPDATE FAILURE DURING A 1-PORT ADFTC SELF-TEST |
| 1010 | ERROR OVERFLOW DURING A 1-PORT ADFTC SELF-TEST |
| 1011 | UNDEFINED ERROR DURING A 1-PORT ADFTC SELF-TEST |
| 1012 | NO BITS RECEIVED ON A 2-PORT NORMAL ADFTC SELLF-TEST |
| 1013 | DATA TRANSMISSION INTERRUPTED: 2-PORT NORMAL ADFTC SELF-TEST |
| 1014 | BIT ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
| 1015 | BLOCK ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
| 1016 | EIA UPDATE FAILURE DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1017 | ERROR OVERFLOW DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1018 | UNDEFINED ERROR DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1019 | NO BITS RECEIVED ON A 2-PORT REVERSE ADFFTC SELF-TEST |

TABLE AA. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :--- |
| FAUIT <br> 11 | definion |
| 1020 | DATA TRANSMISSION INTERRUPTED: 2-PORT REVERSE ADFTC SELF-TEST |
| 1021 | BIT ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
| 1022 | BLOCK ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
| 1023 | EIA UPDATE FAILURE DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1024 | ERROR OVERFLOW DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1025 | UNDEFINED ERROR DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1026 | UNSENT STOP MESSAGE RECEIVED BY ADFTC |
| 1027 | DID NOT RECEIVE EXPECTED: TEST ABORTED S MESSAGE |
| 1028 | DID NOT RECEIVE EXPECTED: TEST COMPLETED S MESSAGE |
| 1029 | THE BIT AND/OR BLOCK ERROR RATES WERE NOT RECEIVED |
| 1425 | ADFTC DID NOT RETURN A SETUP (HANDSHAKE) RESULT MESSAGE |
| 1426 | ADFTC DID NOT RECEIVE A SET TEST (START HANDSHAKE) MESSAGE |

[1] SPECIFIC FAULT CODE NUMBERS NOT LISTED IN THE TABLE ARE NOT DISPLAYED BY PROC 620 FOR RELEASE 2.

TABLE AB.

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 6 | 11 | TN401 | TN444 | TN400 | BUS PROBLEM CAUSED MODULE (OR TMS) PROCESSOR SHUTDOWN - ALL TN400 BOARDS IN CARRIER, TN530, TN445, AND TN380 (TN381) ARE ALSO SUSPECT |
|  | 16 | TN401 | TN530 | TN380 | MAJOR FAILURE FOUND IN SCANNER TEST |
|  | 21 | TN401 | TN380 |  | BAD MCC/MP COMMUNICATIONS |
|  | 23 | TN401 |  |  | CANNOT MANIPULATE MCC STATUS REGISTER BITS |
|  | 24 | TN401 |  |  | CRITICAL MCC CIRCUIT FAILURE |
|  | 27 | TN401 | AEH4 |  | CANNOT MANIPULATE MCC STATUS REGISTER BITS OR AEH4 ALARM DISTRIBUTION AND AIR FLOW MONITOR |
|  | 28 | TN401 | TN444 | TN400 | BUS PROBLEM CAUSED MODULE (OR TMS) PROCESSOR SHUTDOWN - ALL TN400 BOARDS IN CARRIER, TN530, TN445, AND TN380 (TN381) ARE ALSO SUSPECT |
|  | 29 | TN401 |  |  | CIRCUIT PACK PULLED OR 4-MHZ CABLE DISCONNECTED |
|  | 128 | TN401 |  |  | MODULE FAILED TO INITIALIZE OR DUPLICATION SWITCH FAILURE |
|  | 269 | TN401 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 370 | TN401 | TN402 | CABLE | UNABLE TO WRITE TO LOAD SIGNAL REGISTER dURING INITIALIZATION |
|  | 402 | TN401 |  |  | MODULE PROCESSOR INTERFACE ERROR |
|  | 529 | TN401 | TN482 |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
| 7 | 2 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ | TN401 | TN402 | TPIO ERROR FROM A MAINTENANCE ROUTINE |
|  | 3 | $\begin{array}{\|c} \hline \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{array}$ | TN401 | TN444 | NO RESPONSE TO AN EOM FROM A MAINTENANCE ROUTINE |

TABLE AB. (Contd)

| Proc 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 7 \\ \text { (Contd) } \end{gathered}$ | 15 | TN380 | TN401 | TN444 | MAJOR SCANNER FAILURE - NO SWITCH REQUIRED |
|  | 18 | TN380 | TN401 | TN444 | MAJOR SCANNER FAILURE |
|  | 19 | TN380 | TN401 | TN530 | MINOR SCANNER FAILURE |
|  | 22 | TN380 | TN401 |  | MODULE PROCESSOR ADDRESS PARITY FAILURE |
|  | 269 | TN380 | TN444 | TN530 | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 367 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN } 381 \end{gathered}$ | TN401 | TN444 | ON-LINE INITIALIZATION FAILED. ALL BOARDS IN UPPER HALF CARRIER ARE SUSPECT. 4-MHZ CABLE ALSO SUSPECT. |
|  | 368 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ | TN401 | TN444 | OFF-LINE INITIALIZATION FAILED. ALL BOARDS IN UPPER HALF CARRIER ARE SUSPECT. 4 -MHZ CABLE ALSO SUSPECT. |
|  | 369 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ | TN401 |  | UNABLE TO READ MODULE HEALTH STATUS DURING INITIALIZATION |
|  | 400 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ |  |  | UNKNOWN FIFO 14 ERROR CODE |
|  | 410 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ |  |  | ERROR FIFO DATA OUT OF SYNC |
|  | 529 | TN381 | TN482 |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
| 8 | 4 | TN444 | TN380 |  | DATA PARITY ERROR ON A MAINTENANCE OR SCANNER BUS WRITE |
|  | 5 | TN444 | TN380 |  | OTHER NON-SYSIO ERROR ON A MAINTENANCE OR SCANNER BUS WRITE |
|  | 58 | TN444 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ |  | TEST VECTOR 128-255 OUTPUT FROM MIF INCORREC'T (BAD TEST VECTORS CAUSED BY POWER FAILURE ARE RESTORED AFTER REPORTING THIS SPECIFIC FAULT CODE) |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | fault CODE | ckt 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 8 \\ \text { (Contd) } \end{gathered}$ | 68 | TN444 |  |  | MIF OUTPU'TS TEST VECTORS WHEN SHUT OFF |
|  | 73 | TN444 | $\begin{array}{\|c} \hline \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{array}$ |  | MIF TEST VECTOR CIRCUITRY FA.ULTY |
|  | 74 | TN444 |  |  | MIF TVB CONTENTS INCORRECT (BAD TEST VECTORS CAUSED BY POWER FAILURE ARE RESTORED AFTER REPORTING THIS SPECIFIC FAULT CODE) |
|  | 239 | TN444 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ |  | TEST VECTOR 0-127 OUTPUT FROM MIF INCORRECT |
|  | 245 | TN444 | TN446 |  | ALU/MIF INTERFACE ERROR |
|  | 246 | TN444 |  |  | IDLE CODE GENERATOR FAILURE |
|  | 268 | TN444 |  |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM MIF |
|  | 269 | TN444 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 273 | TN444 | TN400 | TN380 | PORT COMMAND BUS - BAD CLOCK On MIF |
|  | 277 | TN444 |  |  | MAINTENANCE INTERFACE BUS - BAD SAC VALUE |
|  | 278 | TN444 |  |  | MAINTENANCE BUS - MIF DID NOT FLAG BAD PARITY |
|  | 402 | TN444 |  |  | MODULE PROCESSOR INTERFACE ERROR |
|  | 407 | TN444 |  |  | TSI PCM DATA PARITY ERROR |
|  | 445 | TN444 |  |  | MIF WRITE FAILURE |
| 9 | 32 | TN460 | TN444 |  | GPP DATA CLOCK LOST MOMENTARILY (INCORRECT DCE READOUT) |
|  | 33 | TN460 | TN444 |  | MAINTENANCE INTERFACE FAILURE CAUSED INCORRECT DCE READOUT |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | FAULT CODE | CKT 1 | CKI 2 | CKT 3 | Definition |
| $\begin{gathered} 9 \\ \text { (Contd) } \end{gathered}$ | 34 | TN460 | TN444 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (SIMPLEX, NO SCS) |
|  |  | TN460 | TN460 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (DUPLEX, NO SCS) |
|  |  | TN460 | TN463 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (SIMPLEX WITH SCS) |
|  | 35 | TN460 | TN444 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (SIMPLEX, NO SCS) |
|  |  | TN460 | TN460 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (DUPLEX, NO SCS) |
|  |  | TN460 | TN463 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (SIMPLEX WITH SCS) |
|  | 36 | TN460 | TN444 |  | MIF FAILURE CAUSED INCORRECT OOL READOUT, MODULE ON-LINE |
|  | 37 | TN460 | TN444 |  | MIF FAlLURE CAUSED INCORRECT OOL READOUT, MODULE OFF-LINE |
|  | 38 | TN460 | TN444 |  | CLOCK FREQUENCY GENERATOR FAILED |
|  | 39 | TN460 | TN444 |  | MIF FAILURE CAUSED INCORRECT DCE OOL READOUT |
|  | 40 | TN460 | .TN444 | TN530 | OFF-LINE CLOCK APPEARS AS MASTER WITH NO SCS/LGI PRESENT |
|  | 41 | TN460 | TN444 |  | MIF FAILURE CAUSED OFF-LINE CLOCK TO APPEAR AS MASTER WITH NO SCS/LGI PRESENT |
|  | 42 | TN460 | TN463 | TN444 | CLOCK APPEARS AS MASTER WITH SCS/LGI PRESENT |
|  | 43 | TN460 | TN444 |  | MIF FAILURE CAUSED CLOCK TO APPEAR AS MASTER WITH SCS/LGI PRESENT |
|  | 44 | TN460 | TN444 |  | ON-LINE CLOCK APPEARS AS SLAVE WITH NO SCS/LGI PRESENT |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIt TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | $\begin{aligned} & \text { FAULIt } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | Скт 3 | defintion |
| $\begin{gathered} 9 \\ (\text { Contd }) \end{gathered}$ | 45 | TN460 | TN444 |  | MIF FAILURE CAUSED MAINTENANCE INTERFACE APPEARANCE OF ON-LINE CLOCK AS SLAVE WITH NO SCS/LGI PRESENT |
|  | 57 | TN460 |  |  | INTERMODULE DATA STORE OR MODULE CLOCK OUT OF LOCK CAUSED TSI TEST FAILURE |
|  | 269 | $\begin{array}{\|c\|} \hline \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{array}$ | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 340 | $\begin{array}{\|c\|} \hline \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{array}$ | TN440 | TN454 | ALL GPP PORTS UNDER THIS UNIT TYPE FAILED THE DATA CLOCK TEST. OTHER INDICTMENTS ARE SN270 GPP BOARDS OR UNPLUGGED DIGITAL INSTRUMENTS IN THE SAME HALF CARRIER AS A FAILING UNIT TYPE 15, TN454 PDI. |
|  | 403 | TN460 |  |  | MODULE CLOCK ERROR |
| 10 | 65 | TN446 | TN444 |  | INTERMITTENT ALU READ ERROR OVER MAINTENANCE BUS PATH |
|  | 78 | TN446 | TN445 |  | ALU ADDRESS PROCESSING SUSPECTED |
|  | 86 | TN446 | TN445 |  | ALU ADDRESS PROCESSING FAULT |
|  | 87 | TN446 | TN445 |  | alU PCM Data faUlt |
|  | 88 | TN446 | TN445 |  | ALU DATA FAULT (ALSO CAUSED BY FAULTY INTERFACE ON PCM BUS BY TN440 PDS OR TN441 IDS) |
|  | 240 | TN446 | TN444 |  | MAINTENANCE BUS TO TSI ALU IS BAD |
|  | 241 | TN446 | TN445 |  | TSI ALU LOSSING/LINEARIZING FAULT |
|  | 242 | TN446 | TN445 |  | TSI ALU OPCODE FAILURE |
|  | 243 | TN446 | TN445 |  | 'TSI ALU ACCUMULATOR FAILURE |
|  | 244 | TN446 | TN445 |  | TSI ALU ACCUMULATOR ADDRESSING FAULT |
|  | 247 | TN446 |  |  | TSI ACCUMUL,ATOR RESOURCES NOT AVAILABLE |
|  | 269 | TN446 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | ckt ${ }^{1}$ | CKT 2 | CKT 3 | definition |
| 10 <br> (Contd) | 331 | TN446 |  |  | TSI ALU DATA PARITY CHECKING CIRCUITRY FAILED |
|  | 407 | TN446 |  |  | TSI PCM DATA PARITY ERROR |
|  | 604 | TN446 | TN445 | TN444 | ALU GENERATES NETWORK TEST FLAGS |
|  | 620 | TN446 | TN444 |  | ALU READ ERROR |
|  | 626 | TN446 | TN445 | TN444 | ALU ADDRESSING ERROR |
| 11 | 6 | TN445 | TN380 |  | NO POSITIVE ACKNOWLEDGE USING QUI_PORT, INIT_TSI, OR SCANNER BUS WRITE |
|  | 52 | TN445 | TN444 | TN440 | TSI PSTORE INTERMITTENTLY REPORTS INVALID NETWORK TEST ACTIVITY |
|  | 53 | TN445 | TN444 |  | a zero value cannot be read over the pst MAINTENANCE BUS PATH |
|  | 54 | TN445 | TN446 | TN440 | INTERMITTENT ADDRESSING FAULT WITHIN THE TSI |
|  | 55 | TN445 | TN444 |  | A NON-ZERO VALUE CANNOT BE READ OVER THE PST MAINTENANCE BUS PATH |
|  | 67 | TN445 |  |  | PST ERRONEOUSLY REPORTS NETWORK TEST ACTIVITY |
|  | 75 | TN445 | TN444 |  | BAD PST MEMORY PARITY |
|  | 76 | TN445 | TN441 OR TN460 | TN444 | PST NOT CYCLING |
|  | 82 | TN445 | TN444 |  | PST INSTRUCTION ADDRESSING FAULT |
|  | 84 | TN445 | TN444 |  | PST ADDRESS OR MEMORY FAULT |
|  | 85 | TN445 |  |  | PST MEMORY OR OUTPUT FAULT |
|  | 269 | TN445 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | ckT 1 | скт 2 | скт 3 | definition |
| $\begin{gathered} 11 \\ \text { (Contd) } \end{gathered}$ | 330 | TN445 |  |  | TSI PSTORE INSTRUCTION PARITY CHECKING CIRCUITRY FAILED |
|  | 401 | TN445 |  |  | TSI SHUTDOWN |
|  | 402 | TN445 |  |  | MODULE PROCESSOR INTERFACE ERROR |
|  | 406 | TN445 |  |  | TSI PSTORE MEMORY PARITY ERROR |
|  | 425 | TN445 |  |  | TSI RUNNING, BUT INDICATES IT'S SHUTDOWN |
|  | 432 | TN445 |  |  | BURST OF TSI PSTORE PARITY ERRORS |
|  | 444 | TN445 |  |  | TSI PSTORE WRITE FAILURE |
| 12 | 264 | TN400 |  |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM IOBI |
|  | 269 | TN400 | TN444 |  | maintenance bus - bad test register value FROM TARGET BOARD |
|  | 270 | TN400 |  |  | PORT COMMAND BUS - BAD SAC VALUE FROM IOBI |
|  | 272 | TN400 |  |  | PORT COMMAND BUS - END OF MESSAGE TIMEOUT |
|  | 274 | TN400 |  |  | PORT COMMAND BUS - IOBI DID NOT FLAG BAD PARITY |
|  | 371 | TN400 | TN44 | TN380 | NEGATIVE ACKNOWLEDGE FROM INITIALIZE IOBI ORDER - ALL TN400 BOARDS IN CARRIER ARE SUSPECT |
|  | 402 | TN400 |  |  | MODULE PROCESSOR INTERFACE ERROR |
|  | 446 | T.N400 |  |  | IOBI WRITE FAILURE |
|  | 451 | TN400 |  |  | TMS INTERFACE ERROR |
|  | 514 | TN400 | TN462 |  | IOBI BUS ERROR CAUSED LOCAL CLOCK TERMINATION FAILURE |
|  | 520 | TN400 |  |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI |
|  | 524 | TN400 |  |  | TMS IOBI BUS - BAD SAC VALUE FROM IOBI |

PROC 620

TABLE AB. (Contd)

| Proc 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | скт 2 | скт 3 | Definition |
| $\begin{gathered} 12 \\ \text { (Contd) } \end{gathered}$ | 525 | TN400 |  |  | TMS IOBI BUS - END OF MESSAGE TIMEOUT |
|  | 527 | TN400 |  |  | TMS IOBI BUS - IOBI DID NOT FLAG BAD PARITY |
|  | 529 | TN400 | TN482 |  | TMS MAINTENANCE BUS - BAD TES' REGISTER VALUE FROM TARGET IOBI BOARD |
| 13 | 56 | TN440 | TN446 |  | AT LEAST ONE PDS IS RECEIVING PCM DATA FROM A DOUBLE-CONNECT |
|  | 59 | TN440 | TN446 | TN444 | pdS data or addressing in output store inCORRECT |
|  | 61 | TN440 | TN454 | TN446 | ALU RECEIVES INCORRECT DATA FROM PDS |
|  | 63 | TN440 | TN446 |  | INTERMITTENT FAULT IN PCM Data Path |
|  | 66 | TN440 | TN444 |  | intermittent pds read error over mainteNANCE BUS PATH |
|  | 69 | TN440 | TN446 |  | PDS OUTPUT STORE GENERATES NETWORK TEST FLAGS ON PORTS NOT PRESENTLY IN-USE |
|  | 70 | TN440 | TN454 | TN446 | PDS INPUT STORE GENERATES NETWORK TEST FLAGS |
|  | 77 | TN440 | TN444 |  | Intermittent pds read error over mainteNANCE BUS PATH |
|  | 79 | TN440 | TN446 |  | PDS ADDRESS PROCESSING SUSPECTED |
|  | 81 | TN440 | TN446 | TN454 | PDS INPUT STORE ADDRESSING OR DATA FAILURE |
|  | 83 | TN440 | TN446 |  | PDS INTERNAL ADDRESSING FAULT |
|  | 269 | TN440 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 276 | TN440 | TN380 | CABLE | PORT COMMAND BUS - BAD CONTROL COMPLEX SIGNAL TO TN454 AND TN452 |
|  | 340 | TN440 | TN454 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ | ALL GPP PORTS UNDER THIS UNIT TYPE FAILED THE DATA CLOCK TEST. OTHER INDICTMENTS ARE SN270 GPP BOARDS OR UNPLUGGED DIGITAL INSTRUMENTS IN THE SAME HALF CARRIER AS A FAILING UNIT TYPE 15, TN454 PDI. |

PROC 620

TABLE AB. (Contd)

| Proc 620 - SPECIFIC fault code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAUIT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 13 \\ \text { (Contd) } \end{gathered}$ | 407 | TN440 |  |  | TSI PCM DATA PARITY ERROR |
|  | 437 | TN440 |  |  | DCLOCK SIGNAL DOES NOT GET THROUGH PDS |
| 14 | 8 | TN452 | TN400 |  | DISTRIB DATA AFTER BYTE INCORRECT TO A PCI |
|  | 265 | TN452 | TN400 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PCI |
|  | 271 | TN452 | TN400 |  | PORT COMMAND BUS - BAD SAC VALUE FROM PCI |
|  | 275 | TN452 | TN440 | TN380 | PORT COMMAND BUS - BAD (ON/OFF) LINE CONTROL |
|  | 521 | TN452 | TN400 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM UPCI |
|  | 523 | TN452 | TN400 |  | TMS IOBI BUS - BAD SAC VALUE FROM UPCI |
| 15 | 7 | TN454 | TN452 | TN400 | DISTRIB DATA AFTER BYTE INCORRECT TO A PDI |
|  | 60 | TN454 | TN440 | TN452 | PDI ADDRESSING OR CONTROL INCORRECT |
|  | 62 | TN454 | TN440 |  | PDI OUTPUT DATA INCORRECT |
|  | 64 | TN454 | TN452 |  | INTERMITTENT PDI READ ERROR OVER PORT COMMAND BUS |
|  | 71 | TN454 | TN440 |  | PDI GENERATES NETWORK TEST FLAGS |
|  | 80 | TN454 | TN440 | TN452 | PDI LOOP AROUND OR DATA FAILURE |
|  | 266 | TN454 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PDI |
|  | 334 | TN454 | TN446 |  | Pdi data parity checking circuitry failed |
|  | 340 | TN454 | TN440 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ | ALL GPP PORTS UNDER THIS UNIT TYPE FAILED THE DATA CLOCK TEST. OTHER INDICTMENTS ARE SN270 GPP BOARDS OR UNPLUGGED DIGITAL INSTRUMENTS IN THE SAME HALF CARRIER AS A FAILING UNIT TYPE 15, TN454 PDI |
|  | 341 | TN454 | PORT |  | PDI Data select circuit bad |
|  | 408 | TN454 |  |  | PDI PCM DATA PARITY ERROR |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNit <br> TYPE | fault CODE | CKT 1 | скт 2 | ckt 3 | definition |
| $\begin{gathered} 15 \\ \text { (Contd) } \end{gathered}$ | 426 | TN454 |  |  | RING TRIP CIRCUIT FAILURE |
|  | 433 | TN454 |  |  | MULTIPLE PCM DATA PARITY ERRORS FROM PDI |
| 16 | 12 | SN250 | . |  | TIME SLOT UNAVAILABLE |
|  | 134 | SN250 | TN454 | TN452 | CPT REFLECTION DETECTOR FAILED TO STABILIZE |
|  | 135 | SN250 | TN454 | TN452 | CPT TONE TEST DETECTION FAILED TO STABILIZE |
|  | 136 | SN250 | TN454 | TN452 | CPT REFLECTION DATA READY FLAG STUCK ACTIVE |
|  | 1.37 | SN250 | TN454 | TN452 | CPT TONE TEST DATA READY FLAG STUCK ACTIVE |
|  | 156 | SN250 | TN454 |  | FAULTY FIRST TONE TEST FREQUENCY IDLE INDICATION |
|  | 157 | SN250 | TN454 |  | FAULTY SECOND TONE TEST FREQUENCY IDLE INDICATION |
|  | 158 | SN250 | TN454 |  | FAULTY FIRST TONE TEST QUIET TIME IDLE INDICATION |
|  | 159 | SN250 | TN454 |  | FAULTY SECOND TONE TEST QUIET TIME IDLE INDICATION |
|  | 161 | SN250 | TN454 |  | FAULTY DIAL TONE FIRST TONE FREQUENCY OR TONE TEST NON-IDLE INDICATION |
|  | 162 | SN250 | TN454 |  | FAULTY DIAL TONE SECOND TONE FREQUENCY OR TONE TEST NON-IDLE INDICATION |
|  | 163 | SN250 | TN454 |  | FAULTY FIRST TONE TEST QUIET TIME NON-IDLE INDICATION |
|  | 164 | SN250 | TN454 |  | FAULTY SECOND TONE TEST QUIET TIME NON-IDLE INDICATION |
|  | 165 | SN250 | TN454 |  | FAULTY INTERRUPTED DIAL TONE FIRST TONE FREQUENCY |
|  | 166 | SN250 | TN454 |  | FAULTY INTERRUPTED DIAL TONE SECOND TONE FREQUENCY |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | FAULT CODE | CKT 1 | CKI 2 | CKI 3 | definition |
| 16 <br> (Contd) | 167 | SN250 | TN454 |  | FAULTY INTERRUPTED DIAL TONE FIRST TONE QUIET TIME |
|  | 168 | SN250 | TN454 |  | FAULTY INTERRUPTED DIAL TONE SECOND TONE QUIET TIME |
|  | 169 | SN250 | TN454 |  | FAULTY AUDIBLE RING FIRST TONE FREQUENCY |
|  | 170 | SN250 | TN454 |  | FAULTY AUDIBLE RING SECOND TONE FREQUENCY |
|  | 171 | SN250 | TN454 |  | FAULTY AUDIBLE RING FIRST TONE QUIET TIME |
|  | 172 | SN250 | TN454 |  | FAULTY AUDIBLE RING SECOND TONE QUIET TIME |
|  | 173 | SN250 | TN454 |  | FAULTY SPECIAL AUDIBLE RING FIRST TONE FREQUENCY |
|  | 174 | SN250 | TN454 |  | FAULTY SPECIAL AUDIBLE RING SECOND TONE FREQUENCY |
|  | 175 | SN250 | TN454 |  | FAULTY SPECIAL AUDIBLE RING FIRST TONE QUIET TIME |
|  | 176 | SN250 | TN454 |  | FAUL TY SPECIAL AUDIBLE RING SECOND TONE QUIET TIME |
|  | 177 | SN250 | TN454 |  | FAULTY INTERCEPT FIRST TONE FREQUENCY |
|  | 178 | SN250 | TN454 |  | FAULTY INTERCEPT SECOND TONE FREQUENCY |
|  | 179 | SN250 | TN454 |  | FAULTY INTERCEPT FIRST TONE QUIET TIME |
|  | 180 | SN250 | TN454 |  | FAULTY INTERCEPT SECOND TONE QUIET TIME |
|  | 181 | SN250 | TN454 |  | FAULTY BUSY FIRST TONE FREQUENCY |
|  | 182 | SN250 | TN454 |  | FAULTY BUSY SECOND TONE FREQUENCY |
|  | 183 | SN250 | TN454 |  | FAULTY BUSY FIRST TONE QUIET TIME |
|  | 184 | SN250 | TN454 |  | FAULTY BUSY SECOND TONE QUIET TIME |
|  | 185 | SN250 | TN454 |  | FAULTY REORDER FIRST TONE FREQUENCY |
|  | 186 | SN250 | TN454 |  | FAULTY REORDER SECOND TONE FREQUENCY |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT tYPE | fault CODE | CKI I | CKT 2 | скт 3 | DEFINITION |
| $\begin{gathered} 16 \\ \text { (Contd) } \end{gathered}$ | 187 | SN250 | TN454 |  | FAULTY REORDER FIRST TONE QUIET TIME |
|  | 188 | SN250 | TN454 |  | FAULTY REORDER SECOND TONE QUIET TIME |
|  | 189 | SN250 | TN454 |  | FAULTY 440-HZ REFLECTION DETECTOR IDLE INDICATION |
|  | 190 | SN250 | TN454 |  | FAULTY BROAD BAND REFLECTION DETECTOR idle indication |
|  | 191 | SN250 | TN454 |  | FAULTY 440-HZ REFLECTION DETECTOR NON-IDLE Indication |
|  | 192 | SN250 | TN454 |  | FAULTY BROAD BAND REFLECTION DETECTOR NON-IDLE INDICATION |
|  | 199 | SN250 |  |  | BUSY OUT FAILED |
|  | 218 | SN250 |  |  | NETWORK ORDER FAILED |
|  | 219 | SN250 |  |  | RELEASE BUSY OUT FAILED |
|  | 267 | SN250 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 429 | SN250 |  |  | PORT DIGITAL SIGNAL PROCESSOR ERROR |
| 23 | 17 | TN530 | TN401. | TN380 | MAJOR DUPLICATION/UPDATE FAILURE IN SCANNER TEST |
|  | 90 | TN530 | TN400 | TN380 | FAILED THE MP BASED DUP_TST |
|  | 92 | TN530 | TN530 | TN380 | DUP BOARD STATUS BITS WOULD NOT SET OR CLEAR |
|  | 93 | TN530 | TN530 | TN380 | ON-LINE TN530 ERROR FLAG WAS SET |
|  | 94 | TN530 | TN445 | TN380 | OFF-LINE TN530 ERROR FLAG WAS SET |
|  | 95 | TN530 | TN530 | TN400 | STATE OF HEALTH COMPARATOR TEST FAILED |
|  | 96 | TN530 | TN530 | TN400 | DOUBLE WRITE CONTROL TEST FAILED |
|  | 97 | TN530 | TN530 | TN380 | DOUBLE WRITE WITH BAD PARITY TEST FAILED |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | FAULT CODE | CKT 1 | CKT 2 | CKT 3 | DEFINITION |
| 23 <br> (Contd) | 98 | TN530 | TN530 | TN380 | DUPLICATION CHANNEL DID NOT DETECT BAD PARITY |
|  | 269 | TN530 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 365 | TN530 |  | TN401 | SOFT SWITCH FAILED |
|  | 366 | TN530 | $\begin{gathered} \text { TN380 } \\ \text { OR } \\ \text { TN381 } \end{gathered}$ | TN401 | HARD SWITCH FAILED |
|  | 402 | TN530 |  |  | MODULE PROCESSOR INTERFACE ERROR |
|  | 529 | 'TN530 | TN482 |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
|  | 996 |  |  |  | DUP BOARD MUST BE TESTED IN OTHER ON-LINE -OFF-LINE MODE TO PASS VERIFICATION |
|  | 997 |  |  | $\because$ | MODULE SOFT-LOCK FAILED OR MODULE ALREADY LOCKED |
| 24 | 12 | SN252 |  |  | TIME SLOT UNAVAILABLE |
|  | 13 | SN252 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN252 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 199 | SN252 |  |  | BUSY OUT FAILED |
|  | 200 | SN252 |  |  | ONLY IDLE |
|  | 285 | SN252 | TN452 | TN400 | IDLE SENDER SUM SCAN INDICATES DIAL TONE DETECTED |
|  | 286 | SN252 | TN452 | TN400 | IDLE SENDER STATUS REG INDICATES PORT BUSY |
|  | 287 | SN252 | TN452 | TN400 | IDLE SENDER STATUS REG INDICATES DIGIT QUEUE FULL |
|  | 288 | SN252 | TN452 | TN400 | IDLE SENDER STATUS REG INDICATES TEST TONE NOT SENT |

PROC 620

TABLEAB. (Contd)

| Proc 620 - SPECIFIC fallt Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { fauty } \\ & \text { CODE } \end{aligned}$ | ckt 1 | CKT 2 | CKT 3 | DEFINTITON |
| $\begin{gathered} 24 \\ \text { (Contd) } \end{gathered}$ | 289 | SN252 | TN452 | TN400 | SENDER CKT SUM CHECK FAILURE |
|  | 290 | SN252 | SN250 | TN452 | SENDER NOT BUSY WHILE TEST TONE BEING SENT |
|  | 291 | SN252 | SN250 | TN452 | SENDER STATUS REG INDICATES TEST TONE COMPLETE WHILE SENDING |
|  | 292 | SN252 | SN250 | TN454 | SENDER FAILS TO SEND 440-HZ TEST TONE |
|  | 293 | SN252 |  |  | NO IDLE RECEIVER FOUND FOR SENDER RETEST |
|  | 294 | SN252 | SN251 | TN454 | SENDER NOT BUSY WHILE SENDING VALID TONE |
|  | 295 | SN252 | SN251 | TN454 | SENDER STATUS REG INDICATES TOUCH-TONE SIGNAL DONE WHILE BEING SENT |
|  | 296 | SN252 | SN251 | TN454 | SENDER FAILS TO SEND A VALID TOUCH-TONE |
|  | 297 | SN252 | SN251 | TN454 | NO TOUCH-TONE DIGIT RECEIVED AT RECEIVER |
|  | 298 | SN252 | TN454 | TN400 | SENDER FAILS TO DETECT DIAL TONE |
|  | 299 | SN252 | TN454 | TN400 | SENDER DETECTS DIAL TONE AFTER DIAL TONE REMOVED |
| 25 | 12 | SN251 |  |  | TIME SLOT UNAVAILABLE |
|  | 13 | SN251 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN251 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 199 | SN251 |  |  | BUSY OUT FAILED |
|  | 200 | SN251 |  |  | ONLY IDLE |
|  | 285 | SN251 | SN252 | TN452 | IDLE SENDER SUM SCAN INDICATES DIAL TONE DETECTED |
|  | 286 | SN251 | SN252 | TN452 | IDLE SENDER STATUS REG INDICATES PORT BUSY |
|  | 287 | SN251 | SN252 | TN452 | IDLE SENDER STATUS REG INDICATES DIGIT QUEUE FULL |
|  | 288 | SN251 | SN252 | TN452 | IDLE SENDER STATUS REG INDICATES TEST TONE NOT SENT |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | скт 3 | definition |
| $\stackrel{25}{(\text { Contd })}$ | 297 | SN251 | SN252 | TN454 | NO TOUCH-TONE DIGIT RECEIVED AT RECEIVER |
|  | 300 | SN251 | SN250 | TN454 | NO TRANSMISSION THROUGH RECEIVER, LOW PATH TO HIGH PATH |
|  | 301 | SN251 | SN250 | TN454 | NO TRANSMISSION THROUGH RECEIVER, HIGH PATH TO LOW PATH |
|  | 302 | SN251 |  |  | NO IDLE SENDER FOUND FOR RECEIVER RETEST |
|  | 303 | SN251 | SN252 | TN452 | IDLE RECEIVER SUMMARY SCAN INDICATES RECEPTION OF TOUCH-TONE |
|  | 304 | SN251 | SN252 | TN452 | IDLE RECEIVER PORT CONTROL REG INDICATES RECEPTION OF VALID TOUCH-TONE |
|  | 305 | SN251 | SN252 | TN454 | RECEIVER FAILS TO RECEIVE LOW Level digit |
|  | 306 | SN251 | SN252 | TN454 | RECEIVER FAILS TO RECOGNIZE TOUCH-TONE |
|  | 307 | SN251 | SN252 | TN454 | RECEIVER FAILS TO RECOGNIZE LOW LEVEL DIGIT |
|  | 308 | SN251 | SN252 | TN454 | RECEIVER RECEIVES FALSE TONE |
|  | 427 | SN251 |  |  | CONTROL/SUMMARY - SCAN REGISTER READ ERROR |
| 27 | 199 | SN270 |  |  | BUSY OUT FAILED |
|  | 338 | SN270 |  |  | DATA MODULE DOES NOT RESPOND TO A QUERY |
|  | 350 | SN270 | TN452 | TN400 | GPP DTL FAULT OR ADFTC DIGITAL SELF-TEST FAULT |
|  | 351 | SN270 | TN452 | TN400 | GPP OR ADFTC DTL IDLE BIT SET |
|  | 352 | SN270 | TN452 | TN400 | GPP DTLI AND DTLF TOGETHER OR ADFTC SELFTEST AND DTLI TOGETHER |
|  | 353 | SN270 | TN452 | TN400 | GPP 48-VOL BIT SET (FUSE BLOWN) OR ADFTC ANALOG SELF-TEST FAULT |
|  | 354 | SN270 | TN452 | TN400 | GPP 48-VOL AND DTLF BITS SET OR ADFTC ANALOG AND DIGITAL SELF-TEST FAULT TOGETHER |

TABLEAB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | faUlt CODE | CKT 1 | CKT 2 | CKT 3 | DEFINItIon |
| $27$ <br> (Contd) | 355 | SN270 | TN452 | TN400 | GPP 48-VOL AND DTLI BITS SET OR ADFTC ANALOG SELF-TEST AND DTLI TOGETHER |
|  | 356 | SN270 | TN452 | TN400 | GPP 48-VOL, DTLI, AND DTLF BITS SET OR ADFTC ANALOG, DIGITAL SELF-TEST FAULT, AND DTLI TOGETHER |
|  | 357 | SN270 | TN452 | TN400 | ONE S CHANNEL RETRANSMISSION TO THE PORT HAS OCCURRED |
|  | 358 | SN270 | TN452 | TN400 | MORE THAN ONE S CHANNEL RETRANSMISSION TO THE PORT HAS OCCURRED |
|  | 361 | SN270 | TN452 | TN400 | FAlLURE OF GPP BLA SET |
|  | 362 | SN270 | TN454 |  | SAC FAILED TO CLEAR IN PORT DTL LOOP AROUND TEST |
|  | 363 | SN270 | TN454 |  | INVALID SAC SIGNATURE IN PORT DTL LOOP AROUND TEST |
|  | 36.4 | SN270 | TN454 |  | ERROR IN TDR IN PORT DTL LOOP AROUND TEST |
|  | 434 | SN270 |  |  | ALL PORTS OF DVDP BOARD BAD |
|  | 459 | SN270 |  | . | BLA BIT ON PORT CONTROL REG FAILED TO CLEAR . OR SET |
|  | 460 | SN270 |  |  | DTLF FAULT ON DVDP |
|  | 998 | SN270 |  |  | CANNOT TEST UNTRANSLATED PORT |
| 28 | 13 | SN224 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN224 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 109 | SN224 | TN452 | TN400 | FAULTY SET OF LA FLIP-FLOP |
|  | 110 | SN224 | TN452 | TN400 | FAULTY SET OF CPU FLIP-FLOP |
|  | 118 | SN224 | TN452 | TN400 | FAULJTY CLEAR OF LA FLIP-FLOP |
|  | 124 | SN224 | TN452 | TN400 | FAULTY CLEAR OF CPU FLAP-FLOP |
|  | 125 | SN224 | TN452 | TN400 | OFF-HOOK ERROR, POSSIBLY FROM ATTACHED STATION |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 28 \\ \text { (Contd) } \end{gathered}$ | 131 | SN224 | TN452 | TN400 | terminated line failed to indicate offHOOK |
|  | 149 | SN224 | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | SN224 | TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 152 | SN224 | TN454 | SN250 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |
|  | 154 | SN224 | TN454 | SN250 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
|  | 267 | SN224 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 280 | SN224 | TN452 | TN400 | MLP CONTROLLER FAULT |
|  | 281 | SN224 | TN452 | TN400 | MLP 48-V OVERLOAD |
|  | 282 | SN224 | TN401 |  | MLP DRIVER CIRCUITRY FAILURE |
|  | 283 | SN224 | TN452 | TN400 | MLP FAILED TO RETURN ID REQUEST |
|  | 436 | SN224 |  |  | MLP CONTROLLER FAULT, INITIALIZATION FAILED |
|  | 441 | SN224 |  |  | MLP CONTROLLER FAULT, INITIALIZATION SUCCESSFUL |
|  | 998 | SN224 |  |  | CANNOT TEST UNTRANSLATED PORT |
|  | 999 | SN224 |  |  | REQUESTED TEST NOT PROVIDED FOR THIS UNIT |
| 29 | 12 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | TIME SLOT UNAVAILABLE |
|  | 13 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 100 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| unit TYPE | $\begin{aligned} & \text { fault } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKI 2 | CKI 3 | definition |
| $\begin{gathered} 29 \\ (\mathrm{Contd}) \end{gathered}$ | 101 | $\begin{aligned} & \text { SN228 } \\ & \text { OR } \\ & \text { SN229 } \end{aligned}$ | TN452 | TN400 | DEFECTIVE GATE ARRAY A |
|  | 102 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | DEFECTIVE GATE ARRAY B |
|  | 104 | $\begin{aligned} & \text { SN228 } \\ & \text { OR } \\ & \text { SN229 } \end{aligned}$ | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY A |
|  | 105 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY B |
|  | 125 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | OFF-HOOK ERROR, POSSIBLY FROM ATTACHED STATION |
|  | 126 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | OFF-HOOK ERROR FROM BAD LA CLEAR OR ATTACHED STATION |
|  | 131 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | TERMINATED LINE FAILED TO INDICATE OFFHOOK |
|  | 133 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN452 | TN400 | OFF-HOOK STATUS FAILED TO LATCH |
|  | 149 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 152 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNit TYPE | fault CODE | cki 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 29 \\ \text { (Contd) } \end{gathered}$ | 153 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN $440-\mathrm{HZ}$ |
|  | 154 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
|  | 160 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ | TN454 | SN250 | FAULTY 440-HZ FREQUENCY |
|  | 199 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | BUSY OUT FAILED |
|  | 218 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | NETWORK ORDER FAILED |
|  | 219 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | RELEASE BUSY OUT FAILED |
|  | 267 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN299 } \end{gathered}$ | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 427 | $\begin{gathered} \text { SN228 } \\ \text { OR } \\ \text { SN229 } \end{gathered}$ |  |  | CONTROL/SUMMARY - SCAN REGISTER READ ERROR |
| 31 | 13 | SN253 |  |  | CIRCUIT IN USE BY Call processing |
|  | 51 | SN253 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 130 | SN253 | TN452 | TN400 | ACTIVE SEZD* ERROR, POSSIBLY FROM BUSY CODE CALL CKT |
|  | 143 | SN253 | TN452 | TN400 | CODE CALL DIGIT DONE* IMPROPERLY ACTIVE |
|  | 144 | SN253 | TN452 | TN400 | CODE CALL DIGIT DONE* IMPROPERLY INACTIVE |
|  | 145 | SN253 | TN452 | TN400 | FAULTY CODE CALL CHIME PERIOD |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| unit TYPE | fault CODE | CKT 1 | CKT 2 | CKI 3 | definition |
| $\begin{gathered} 31 \\ \text { (Contd) } \end{gathered}$ | 146 | SN253 | TN452 | TN400 | FAULTY DIGITAL SIGNAL PROCESSOR |
|  | 147 | SN253 | TN452 | TN400 | CODE CALL SEZD* IMPROPERLY INACTIVE |
|  | 193 | SN253 | TN454 | SN250 | FAULTY RECEPTION OF AUXILIARY IMMEDIATE RINGBACK TONE |
|  | 199 | SN253 |  |  | BUSY OUT FAILED |
|  | 219 | SN253 |  |  | RELEASE BUSY OUT FAILED |
|  | 220 | SN253 | TN452 | TN400 | DSP CHECKSUM STUCK ACTIVE |
|  | 267 | SN253 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 429 | SN253 |  |  | PORT DIGITAL SIGNAL PROCESSOR ERROR |
| 32 | 13 | SN230 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN230 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 100 | SN230 | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 101 | SN230 | TN452 | TN400 | DEFECTIVE GATE ARRAY A |
|  | 103 | SN230 | TN452 | TN400 | DEFECTIVE GATE ARRAY C |
|  | 104 | SN230 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY A |
|  | 106 | SN230 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY C |
|  | 128 | SN230 | TN452 | TN400 | RING DETECTION ERROR POSSIBLY FROM ATTACHED CO |
|  | 129 | SN230 | TN452 | TN400 | GND DETECTION ERROR POSSIBLY FROM EXTERNAL CIRCUIT SIGNALING |
|  | 138 | SN230 | TN452 | TN400 | NORM CURRENT DETECTOR STUCK ACTIVE |
|  | 139 | SN230 | TN452 | TN400 | GROUND DETECTOR FAILED TO DETECT GROUND |
|  | 140 | SN230 | TN452 | TN400 | GS RELAY STUCK OPERATED |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT tYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | скт 3 | definition |
| $\begin{gathered} 32 \\ \text { (Contd) } \end{gathered}$ | 141 | SN230 | TN452 | TN400 | REV CURRENT DETECTOR STUCK ACTIVE |
|  | 149 | SN230 | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 153 | SN230 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN $440-\mathrm{HZ}$ |
|  | 155 | SN230 | TN454 | SN250 | CODEC POWER UP STUCK ACTIVE |
|  | 199 | SN230 |  |  | BUSY OUT FAILED |
|  | 200 | SN230 |  |  | ONLY IDLE |
|  | 219 | SN230 |  |  | RELEASE BUSY OUT FAILED |
|  | 267 | SN230 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
| 33 | 9 | SN232 | TN452 | TN400 | DISTRIB DATA AFTER BYTE INCORRECT TO A PORT |
|  | 13 | SN232 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN232 |  |  | PORT RESOURCES NOT A VAILABLE |
|  | 100 | SN232 | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 131 | SN232 | TN452 | TN400 | TERMINATED LINE FAILED TO INDICATE OFFHOOK |
|  | 149 | SN232 | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | SN232 | TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 151 | SN232 | TN454 | SN250 | INSUFFICIENT 440-HZ OFF-HOOK REFLECTION |
|  | . 152 | SN232 | TN454 | SN250 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |
|  | 153 | SN232 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN $440-\mathrm{HZ}$ |
|  | 154 | SN232 | TN454 | SN250 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
|  | 194 | SN232 | TN452 | TN400 | BATTERY FEED REVERSAL STUCK ACTIVE OR IDLE CIRCUIT INDICATES LOOP CLOSURE |
|  | 196 | SN232 | TN452 | TN400 | BATTERY FEED REVERSAL STUCK INACTIVE |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNit TYPE | fault code | ckt 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 33 \\ \text { (Contd) } \end{gathered}$ | 199 | SN232 |  |  | BUSY OUT FAILED |
|  | 200 | SN232 |  |  | ONLY IDLE |
|  | 201 | SN232 | TN452 | TN400 | DEFECTIVE GATE ARRAY D |
|  | 202 | SN232 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY D |
|  | 267 | SN232 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 315 | SN232 |  |  | LOOP CLOSURE DETECTION MAY BE DUE TO CO ATTEMPTING SEIZE |
| 34 | 13 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 100 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 109 | SN233 | TN452 | TN400 | FAULTY SET OF LA FLIP-FLOP |
|  | 110 | SN233 | TN452 | TN400 | FAULTY SET OF CPU FLIP-FLOP |
|  | 124 | SN233 | TN452 | TN400 | FAULTY CLEAR OF CPU FLIP-FLOP |
|  | 125 | SN243 | TN452 | TN400 | OFF-HOOK ERROR, POSSIBLY FROM ATTACHED STATION |
|  | 126 | SN243 | TN452 | TN400 | OFF-HOOK ERROR FROM BAD LA CLEAR OR ATTACHED STATION |
|  | 131 | SN243 | TN452 | TN400 | TERMINATED LINE FAILED TO INDICATE OFFHOOK |
|  | 133 | SN243 | TN452 | TN400 | OFF-HOOK STATUS FAILED TO LATCH |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Unit <br> TYPE | fault CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 34 \\ \text { (Contd) } \end{gathered}$ | 149 | $\begin{aligned} & \text { SN233 } \\ & \text { OR } \\ & \text { SN243 } \end{aligned}$ | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ | 'TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 152 | SN243 | TN454 | SN250 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |
|  | 153 | $\begin{aligned} & \text { SN233 } \\ & \text { OR } \\ & \text { SN243 } \end{aligned}$ | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN 440-HZ |
|  | 154 | SN243 | TN454 | SN250 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
|  | 169 | SN243 | TN454 | SN250 | FAULTY AUDIBLE RING FIRST TONE FREQUENCY |
|  | 170 | SN243 | TN454 | SN250 | FAULTY AUDIBLE RING SECOND TONE FREQUENCY |
|  | 171 | SN243 | TN454 | SN250 | FAULTY AUDIBLE RING FIRST TONE QUIET TIME |
|  | 172 | SN243 | TN454 | SN250 | FAULTY AUDIBLE RING SECOND TONE QUIET TIME |
|  | 199 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ |  |  | BUSY OUT FAILED |
|  | 200 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ |  |  | ONLY IDLE |
|  | 201 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ | TN452 | TN400 | DEFECTIVE GATE ARRAY D |
|  | 202 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY D |
|  | 203 | SN233 | TN454 | SN250 | E OR M SIGNAL INDICATOR STUCK ACTIVE |
|  | 204 | SN233 | TN454 | SN250 | FAILURE OF OP SET |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | скт 2 | скт 3 | definition |
| $\begin{gathered} 34 \\ (\text { Contd) } \end{gathered}$ | 205 | SN233 | TN452 | TN400 | M-SIGNAL SENT INDICATOR STUCK INACTIVE |
|  | 206 | SN233 | TN454 | SN250 | POSSIBLE EXTERNAL CIRCUIT SIGNALING |
|  | 208 | SN233 | TN454 | SN250 | CLEARING LOOPAROUND FAILS TO REMOVE 440-HZ SIGNAL |
|  | 211 | SN233 | TN454 | SN250 | OFF-HOOK STATUS (GRND SIGNAL DETECTOR) FAILS TO POWER UP THE CODEC |
|  | 214 | SN233 | TN452 | TN400 | FAILURE OF GATE ARRAY OR E-SIGNAL RECEIVER |
|  | 215 | SN233 | TN452 | TN400 | FAILURE OF OP FLIP-FLOP |
|  | 216 | SN233 | TN452 | TN400 | INCORRECT ENCODE IN TIE TRUNK ID CHIP |
|  | 219 | SN243 |  |  | RELEASE BUSY OUT FAILED |
|  | 267 | $\begin{gathered} \text { SN233 } \\ \text { OR } \\ \text { SN243 } \end{gathered}$ | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
| 44 | 13 | SN233 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN233 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 100 | SN233 | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 109 | SN233 | TN452 | TN400 | FAULTY SET OF LA FLIP-FLOP |
|  | 110 | SN233 | TN452 | TN400 | FAULTY SET OF CPU FLIP-FLOP |
|  | 124 | SN233 | TN452 | TN400 | FAULTY CLEAR OF CPU FLIP-FLOP |
|  | 149 | SN233 | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | SN233 | TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 153 | SN233 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN 440-HZ |
|  | 201 | SN233 | TN452 | TN400 | DEFECTIVE GATE ARRAY D |
|  | 202 | SN233 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY D |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNit TYPE | fault CODE | скт 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 44 \\ \text { (Contd) } \end{gathered}$ | 203 | SN233 | TN454 | SN250 | E OR M SIGNAL INDICATOR STUCK ACTIVE |
|  | 204 | SN233 | TN454 | SN250 | FAILURE OF OP SET |
|  | 205 | SN233 | TN452 | TN400 | M-SIGNAL SENT INDICATOR STUCK INACTIVE |
|  | 206 | SN233 | TN454 | SN250 | POSSIBLE EXTERNAL CIRCUIT SIGNALING |
|  | 208 | SN233 | TN454 | SN250 | CLEARING LOOPAROUND FAILS TO REMOVE 440-HZ SIGNAL |
|  | 214 | SN233 | TN452 | TN400 | FAILURE OF GATE ARRAY OR E-SIGNAL RECEIVER |
|  | 215 | SN233 | TN452 | TN400 | FAILURE OF OP FLIP-FLOP |
|  | 216 | SN233 | TN452 | TN400 | INCORRECT ENCODE IN TIE TRUNK ID CHIP |
|  | 267 | SN233 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
| 45 | 13 | SN231 |  |  | CIRCUIT IN USE BY Call Processing |
|  | 51 | SN231 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 100 | SN231 | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 101 | SN231 | TN452 | TN400 | DEFECTIVE GATE ARRAY A |
|  | 102 | SN231 | TN452 | TN400 | DEFECTIVE GATE ARRAY B |
|  | 104 | SN231 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY A |
|  | 105 | SN231 | TN452 | TN400 | FAULTY PORT SELECT IN GATE ARRAY B |
|  | 129 | SN231 | TN452 | TN400 | GND DETECTION ERROR POSSIBLY FROM EXTERNAL CIRCUIT SIGNALING |
|  | 141 | SN231 | TN452 | TN400 | REV CURRENT DETECTOR STUCK ACTIVE |
|  | 153 | SN231 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN $440-\mathrm{HZ}$ |
|  | 199 | SN231 |  |  | BUSY OUT FAILED |
|  | 200 | SN231 |  |  | ONLY IDLE |

TABLE AB. (Contd)

| Proc 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | скт 2 | CKт 3 | DEFINITION |
| $\stackrel{45}{(\text { Contd })}$ | 219 | SN231 |  |  | RELEASE BUSY OUT FAILED |
|  | 267 | SN231 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 316 | SN231 | TN454 | SN250 | INSUFFICIENT 600-OHM TERMINATION REFLECTION POSSIBLY CAUSED BY OPEN TRANSMISSION OPTION SWITCH |
|  | 317 | SN231 | TN454 | SN250 | EXCESSIVE 600-OHM TERMINATION REFLECTION |
|  | 318 | SN231 | TN454 | SN250 | INSUFFICIENT SHORT CIRCUIT TERMINATION REFLECTION |
|  | 319 | SN231 | TN454 | SN250 | EXCESSIVE SHORT CIRCUIT TERMINATION REFLECTION |
| 46 | 13 | SN254 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | SN254 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 153 | SN254 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN 440-HZ |
|  | 199 | SN254 |  |  | BUSY OUT FAILED |
|  | 219 | SN254 |  |  | RELEASE BUSY OUT FAILED |
|  | 235 | SN254 | TN454 | SN250 | 440-HZ TRANSMISSION FAILURE BETWEEN 2 PORTS |
|  | 236 | SN254 | TN454 | SN250 | EXCESSIVE SIGNAL OTHER THAN $440-H Z$ AT SEND PORT |
|  | 237 | SN254 | TN454 | SN250 | IMPROPER 440-HZ TRANSMISSION FROM RECEIVE INPUT TO SEND OUTPUT ON THE SAME PORT |
|  | 267 | SN254 | TN452 |  | PORT COMMAND BUS - BAD TES'T REGISTER VALUE FROM PORT |
| 47 | 13 | SN260 |  |  | CIRCUIT IN USE BY CALL Processing |
|  | 51 | SN260 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 146 | SN260 | TN452 | TN400 | FAULTY DIGITAL SIGNAL PROCESSOR |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $47$ <br> (Contd) | 218 | SN260 |  |  | NETWORK ORDER FAILED |
|  | 222 | SN260 | TN452 | TN400 | FTC PORT 0 STUCK OFF-HOOK |
|  | 223 | SN260 | TN452 | TN400 | FTC PORT 1 STUCK OFF-HOOK |
|  | 227 | SN260 | TN452 | TN400 | FTC PORT 0 STUCK ON-HOOK |
|  | 228 | SN260 | TN452 | TN400 | FTC PORT 1 STUCK ON-HOOK |
|  | 230 | SN260 | TN454 | SN250 | NO TRANSMISSION FROM FTC PORT 1 TO PORT 0 |
|  | 231 | SN260 | TN454 | SN250 | IMPROPER OUTPUT ENERGY AT FTC PORT 0 |
|  | 232 | SN260 | TN454 | SN250 | IMPROPER TRANSMISSION FROM FTC PORT 0 TO PORT 1 |
|  | 233 | SN260 | TN454 | SN250 | IMPROPER OUTPUT ENERGY AT FTC PORT 1 |
|  | 267 | SN260 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
| 50 | 411 | TN461 |  |  | TMS CLOCK OSCILLATOR ERROR (OOL BIT SET) |
|  | 4.12 | TN461 |  |  | TMS CLOCK OSCILLATOR ERROR (OTHER) |
|  | 413 | TN461 |  |  | TMS CLOCK OSCILLATOR AFTER INITIALIZATION ERROR (MFP BIT SET) |
|  | 414 | TN461 |  |  | TMS CLOCK OSCILLATOR AFTER INITIALIZATION ERROR (OTHER) |
|  | 500 | TN461 | CABLE |  | TMS CLOCK OSCILLATOR MFP FAILJURE |
|  | 504 | TN461 | CABLE |  | ALL LOCAL CLOCK TERMINATION CIRCUITS HAVE MFP FAILURES - MORE THAN 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |
|  | 506 | TN461 | CABLE |  | TMS CLOCK OSCILLATOR MAINTENANCE CIRCUIT HAS MFP FAULT |
|  | 508 | TN461 | CABLE |  | TMS CLOCK OSCILLATOR STATE DETERMINATION AND DUPLICATION CONTROL INCORRECT |

TABLE AB. (Contd)

| Proc 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | Скт 3 | definition |
| $\begin{gathered} 50 \\ \text { (Contd) } \end{gathered}$ | 510 | TN461 | TN461 |  | TMS CLOCK OSCILLATOR OOL ERROR (OFF-LINE TMS CLOCK OSCILLATOR FIRST CHOICE) |
|  | 511 | TN461 |  |  | TMS CLOCK OSCILLATOR PFL ERROR |
|  | 512 | TN461 |  |  | CANNOT COMPLETE TMS CLOCK OSCILLATOR FORCE ERROR SEQUENCE |
|  | 529 | TN461 | TN482 |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
|  | 554 | TN461 |  |  | TMS CLOCK OSCILLATOR MFP CHECKING CIRCUIT FAILED TO DETECT A MISSING FRAME PULSE |
|  | 570 | TN461 |  |  | TMS CLOCK OSCILLATOR MFP ERROR CANNOT BE CLEARED |
|  | 577 | TN461 | TN482 |  | TMS ABBREVIATED MAINTENANCE BUS TEST FALLURE |
| 51 | 415 | TN462 |  |  | LOCAL CLOCK TERMINATION ERROR (ERR BIT SET) |
|  | 416 | TN462 |  |  | LOCAL CLOCK TERMINATION ERROR (OTHER) |
|  | 417 | TN462 |  |  | LOCAL CLOCK TERMINATION AFTER INITIALIZATION ERROR (MFP OR ACT BIT SET) |
|  | 418 | TN462 |  |  | LOCAL CLOCK TERMINATION AFTER INITIALIZATION ERROR (OTHER) |
|  | 501. | TN462 | Cable | TN461 | SINGLE LOCAL CLOCK TERMINATION MFP FAILURE WITH MORE THAN 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |
|  | 502 | Cable | TN462 | TN461 | TWO LOCAL CLOCK TERMINATION MFP FAILURES WITH MORE THAN 2 LOCAL CLOCK TERMINATION CIRCUITS INSTALLED |
|  | 503 | Cable | TN462 | TN461 | THREE LOCAL CLOCK TERMINATION MFP FAILURES WITH MORE THAN 3 LOCAL CLOCK TERMINATION CIRCUITS INSTALLED |
|  | 505 | TN462 | CABLE | TN461 | SINGLE LOCAL CLOCK TERMINATION MFP FAILURE - 1 LOCAL CLOCK TERMINATION CIRCUIT INSTALLED |

## PROC 620

TABLE AB. (Contd)

| Proc 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fautt CODE | скт 1 | скт 2 | ckt 3 | DEFINITION |
| $\begin{gathered} 51 \\ \text { (Contd) } \end{gathered}$ | 507 | TN462 | CABLE |  | LOCAL CLOCK TERMINATION MAINTENANCE CIRCUIT HAS MFP FAULT |
|  | 513 | TN462 |  |  | LOCAL CLOCK TERMINATION PFL ERROR |
|  | 515 | TN462 |  |  | LOCAL CLOCK TERMINATION ERR BIT SET - RESET WORKED |
|  | 516 | TN462 |  |  | LOCAL CLOCK TERMINATION ERR BIT SET - CANNOT RESET |
|  | 517 | TN462 | TN461 |  | LOCAL CLOCK TERMINATION ACT FAILURE |
|  | 518 | TN462 | TN461 | CABLE | CANNOT COMPLETE LOCAL CLOCK TERMINATION FORCE ERROR SEQUENCE |
|  | 522 | TN462 | TN452 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
|  | 555 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION ACT CHECKING CIRCUIT FAILED TO DETECT NO ACTIVITY ERROR |
|  | 556 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION ERR CHECKING CIRCUIT FAILED TO DETECT A CLOCK ERROR |
|  | 557 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION MFP CHECKING CIRCUIT FAILED TO DETECT A MISSING FRAME PULSE |
|  | 571 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION ACT ERROR CANNOT BE CLEARED |
|  | 572 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION ERR ERROR CANNOT BE CLEARED |
|  | 573 | TN462 |  |  | TMS LOCAL CLOCK TERMINATION MFP ERROR CANNOT BE CLEARED |
|  | 576 | TN462 | TN452 | TN400 | TMS ABBREVIATED IOBI BUS TEST FAILURE |
| 52 | 269 | TN463 | TN444 |  | MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET BOARD |
|  | 405 | TN463 |  |  | MODULE SYSTEM CLOCK SYNCHRONIZER ERROR |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | скт 1 | CKt 2 | CKT 3 | definition |
| $\begin{gathered} 52 \\ (\text { Contd }) \end{gathered}$ | 453 | TN463 |  |  | TMS SYSTEM CLOCK SYNCHRONIZER ERROR |
|  | 529 | TN463 | TN482 |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TARGET IOBI BOARD |
|  | 701 | TN463 |  |  | HIGH ACCURACY CLOCK - TEMPORARY LOSS OF SIGNAL |
|  | 702 | TN463 |  |  | MAIN PHASE LOCKED LOOP ~ TEMPORARY LOSS OF SIGNAL |
|  | 703 | TN463 |  |  | MAIN PHASE LOCKED LOOP - TEMPORARY OUT OF LOCK |
|  | 704 | TN463 |  |  | HIGH ACCURACY CLOCK LOSS OF SIGNAL - BUILD OUT CONTROL ENABLED - MAIN PHASE LOCKED LOOP OPERATING CORRECTLY |
|  | 705 | TN463 |  |  | HIGH ACCURRACY CLOCK LOSS OF SIGNAL - BUILD OUT CONTROL HAD TO BE RE-ENABLED - MAIN PHASE LOCKED LOOP OPERATING CORRECTLY |
|  | 706 | TN463 |  |  | MAIN PHASE LOCKED LOOP LOSS OF SIGNAL - SIMPLEX SYSTEM |
|  | 707 | TN463 |  |  | MAIN PHASE LOCKED LOOP OUT OF LOCK AND THE SYSTEM IS ON THE HIGH ACCURACY CLOCK - SIMPLEX SYSTEM |
|  | 708 | TN463 |  |  | MAIN PHASE LOCKED LOOP OUT OF LOCK AND GOING TO THE HIGH ACCURACY CLOCK FIXED THE MAIN PHASE LOCKED LOOP - SIMPLEX SYSTEM |
|  | 709 | TN463 |  |  | MAIN PHASE LOCKED LOOP OUT OF LOCK AND GOING TO THE HIGH ACCURACY CLOCK DID NOT FIX THE MAIN PHASE LOCKED LOOP - SIMPLEX SYSTEM |
|  | 710 | TN463 |  |  | HIGH ACCURACY CLOCK LOSS OF SIGNAL - MAIN PHASE LOCKED LOOP OK - DUPLEX SYSTEM |
|  | 711 | TN463 |  |  | MAIN PHASE LOCKED LOOP LOSS OF SIGNAL - DUPLEX SYSTEM |

TABLEAB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| 52 (Contd) | 712 | TN463 |  |  | MAIN PHASE LOCKED LOOP OUT OF LOCK - DUPLEX SYSTEM |
|  | 714 | TN463 | ANN11 | ANN11 | ALL TRANSLATED REFERENCES TEMPORARY LOSS OF SiGNAL |
|  | 718 | TN463 | ANN11 | ANN11 | ALL TRANSLATED REFERENCES STEADY LOSS OF SIGNAL |
|  | 720 | TN463 | ANN11 | ANN11 | ALL TRANSLATED REFERENCES OUT OF LOCK |
|  | 724 | TN463 | ANN11 | ANN11 | ALL TRANSLATED REFERENCES STEADY OUT OF LOCK |
|  | 726 | TN463 |  |  | DS-1 TO SYSTEM CLOCK SYNCHRONIZER CABLE(S) DISCONNECTED |
|  | 728 | TN463 | ANN11 |  | LOSS OF SIGNAL OR OUT OF LOCK AT SYSTEM CLOCK SYNCHRONIZER |
|  | 741 | TN463 |  |  | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - HIGH ACCURACY CLOCK ON-LINE |
|  | 742 | TN463 |  |  | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - REFERENCES ARE REVERSED - REFERENCES SWITCHED |
|  | 743 | TN463 |  |  | REFERENCE SOURCE SELECTION HARDWARE DOES NOT AGREE WITH STATUS MEMORY - REFERENCES ARE REVERSED - SWITCH OF REFERENCES CANNOT BE MADE |
|  | 744 | TN463 |  |  | TMS STATUS BIT NOT CONSISTENT WITH TRANSLATION |
|  | 745 | TN463 |  |  | BOTH SYSTEM CLOCK SYNCHRONIZERS ON-LINE BITS SET OR CLEARED |
|  | 746 | TN463 |  |  | BOTH SYSTEM CLOCK SYNCHRONIZERS ON-LINE BITS BACKWARDS |
|  | 747 | TN463 |  |  | BUILD OUT CONTROL BIT HAD TO BE RESET |
|  | 748 | TN463 |  |  | BUILD OUT CONTROL BIT SET AND CANNOT BE CLEARED |

TABLE AB. (Contd)

| Proc 620 - SPECIFIC FAULT COdE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | скт 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 52 \\ \text { (Contd) } \end{gathered}$ | 749 | TN463 |  |  | REFERENCE SOURCE SELECTION DOES NOT AGREE WITH STATUS MEMORY - BUS TEST FAILED |
|  | 751 | TN463 |  |  | System clock synchronizer circuit pack PULLED OR ON-LINE BIT STUCK |
|  | 752 | TN463 |  |  | ON-LINE SYSTEM CLOCK SYNCHRONIZER OK - OFFLINE SYSTEM CLOCK SYNCHRONIZER HAS OUT OF LOCK CONDITION |
|  | 753 | TN463 |  |  | SYSTEM CLOCK SYNCHRONIZER CROSS COUPLING SIGNAL INCORRECT |
|  | 754 | TN463 |  |  | SYSTEM CLOCK SYNCHRONIZER LOSS OF SIGNAL DETECTION CIRCUITRY FAULTY |
|  | 755 | TN463 |  |  | SYSTEM CLOCK SYNCHRONIZER PRIMARY/SECONDARY LOSS OF SIGNAL DETECTION CIRCUITRY FAULTY |
|  | 768 | TN463 |  |  | HIGH ACCURACY CLOCK COULD NOT BE SWITCHED ON-LINE |
| 53 | 10 | TN470 | TN381 |  | NO POSITIVE ACKNOWLEDGE AFTER MAINTENANCE ORDER TO TMSP |
|  | 420 | TN470 |  |  | FAILED MPX RAM |
|  | 421 | TN470 |  |  | MPX RAM PARITY ERROR RECOVERY FAILURE |
|  | 422 | TN470 |  |  | MPX INITIALIZATION ERROR |
|  | 423 | TN470 |  |  | MPX INITIALIZATION ALARM |
|  | 424 | TN470 |  |  | MPX RAM PARITY ERROR |
|  | 449 | TN470 |  |  | INITIALIZATION TMS MPX RAM TEST ERROR |
|  | 450 | TN470 |  |  | INITIALIZATION TMS MPX RAM PARITY CHECKER ERROR |
|  | 452 | TN470 |  |  | ILLEGAL MPX RAM ENTRY ERROR |
|  | 522 | TN470 | TN452 |  | TMS IOBI BUS -- BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |

TABLE AB. (Contd)

| Proc 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | скт $\quad$ t | скт 2 | CKT 3 | definition |
| $\stackrel{53}{\text { (Contd) }}$ | 553 | TN470 |  |  | TMS MPX PARITY CHECKING CIRCUIT FAILED TO DETECT A BAD PARITY WORD |
|  | 569 | TN470 |  |  | TMS MPX PARITY ERROR CANNOT BE CLEARED |
|  | 576 | TN470 | TN452 | TN400 | TMS ABBREVIATED IOBI BUS TEST FAILURE |
|  | 582 | TN470 |  |  | TMS MPX RAM HAS 32 OR MORE BUSIED OUT TIME SLOTS |
|  | 584 | TN470 |  |  | TMS MPX RAM PARITY ERROR RECOVERY FAILURE CORRECTED |
|  | 585 | TN470 |  |  | TMS MPX RAM PARITY ERROR RECOVERY FAILURE NOT CORRECTED |
|  | 586 | TN470 |  |  | TMS MPX RAM INITIALIZATION TEST ERROR CORRECTED |
|  | 587 | TN470 |  |  | TMS MPX RAM INITIALIZATION TEST ERROR NOT CORRECTED |
|  | 588 | TN470 |  |  | TMS MPX FAILED RAM CORRECTED |
|  | 589 | TN470 |  |  | TMS MPX FAILED RAM NOT CORRECTED |
|  | 611 | TN470 | $\begin{gathered} \text { TN480 } \\ \text { OR } \\ \text { TN482 } \end{gathered}$ | UN150 | MPX GENERATES NETWORK TEST FLAGS |
|  | 636 | TN470 | $\begin{array}{\|c\|} \hline \text { TN480 } \\ \text { OR } \\ \text { TN482 } \end{array}$ | UN150 | MPX PCM ERROR |
| 54 | 522 | TN473 | TN452 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
|  | 609 | TN473 | TN480 |  | FAN OUT GENERATES NETWORK TEST FLAGS |
|  | 632 | TN473 | TH452 | TN400 | FAN OUT READ ERROR |
|  | 633 | TN473 | $\begin{gathered} \text { TN480 } \\ \text { OR } \\ \text { TN482 } \end{gathered}$ |  | FAN OUT PCM ERROR |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | ckt 1 | скт 2 | CKT 3 | definition |
| 55 | 419 | TN480 |  |  | MODULE INTERFACE ERROR |
|  | 522 | TN480 | TN452 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
|  | 551 | TN480 | TN481 |  | TMS MODULE INTERFACE PARITY CHECKING CIRCUIT FAILED TO DETECT A BAD PARITY WORD |
|  | 552 | TN480 | TN481 | TN441 | TMS MODULE INTERFACE TIME SLOT INTEGRITY CIRCUIT FAILED TO DETECT A BUFFER ERROR |
|  | 559 | TN480 | TN470 |  | TMS MODULE INTERFACE OUT OF FRAME CIRCUIT FAILED TO DETECT A FRAMING ERROR |
|  | 567 | TN480 | TN441 |  | TMS MODULE INTERFACE PARITY ERROR CANNOT BE CLEARED |
|  | 568 | TN480 | TN481 | TN441 | TMS MODULE INTERFACE TIME SLOT INTEGRITY ERROR CANNOT BE CLEARED |
|  | 575 | TN480 | TN470 |  | TMS MODULE INTERFACE OUT OF FRAME ERROR CANNOT BE CLEARED |
|  | 576 | TN480 | TN452 | TN400 | TMS ABBREVIATED IOBI BUS TEST FAILURE |
|  | 600 | TN480 | TN481 |  | UNDIAGNOSED MODULE INTERFACE BUFFER ERROR FROM OEP (PERIODIC ONLY) |
|  | 607 | TN481 | TN480 | TN441 | LGL TO MODULE INTERFACE SUSPECTED OF GENERATING NETWORK TEST FLAGS |
|  | 616 | TN480 | TN481 |  | LGL TO MODULE INTERFACE GENERATES NETWORK TEST FLAGS |
|  | 618 | TN480 | TN482 |  | MODULE INTERFACE OUTPUT GENERATES NETWORK TEST FLAGS |
|  | 619 | TN480 | TN482 | TN470 | MODULE INTERFACE INPUT GENERATES NETWORK TEST FLAGS |
|  | 623 | TN480 | TN452 | TN400 | MODULE INTERFACE READ ERROR |
|  | 630 | TN481 | TN480 | TN441 | FAULT SUSPECTED IN LGL TO MODULE INTERFACE |
|  | 643 | TN480 | TN481 |  | LGL TO MODULE INTERFACE FAULT |
|  | 645 | TN480 | TN482 | TN470 | MODULE INTERFACE INPUT FAULT |
|  | 646 | TN480 | TN482 |  | MODULE INTERFACE OUTPUT FAULT |

TABLEAB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | faUlt CODE | CKT 1 | CKT 2 | CKT 3 | definition |
| 56 | 30 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ | TN444 |  | INCORRECT CLOCK OUTPUT SEQUENCE (INCORRECT SAC) |
|  | 31 | $\begin{gathered} \text { TN441 } \\ \text { OR } \\ \text { TN460 } \end{gathered}$ | TN444 |  | MAINTFNANCF INTERFACE FAILURE CAUSED INCORRECT SAC READOUT |
|  | 32 | TN441 | TN444 |  | GPP DATA CLOCK LOST MOMENTARILY (INCORRECT DCE READOUT) |
|  | 33 | TN441 | TN444 |  | MAINTENANCE INTERFACE FAILURE CAUSED INCORRECT DCE READOUT |
|  | 34 | TN441 | TN444 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (SIMPLEX, NO SCS) |
|  |  | TN441 | TN441 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (DUPLEX, NO SCS) |
|  |  | TN441 | TN463 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (SIMPLEX WITH SCS) |
|  | - | TN441 | TN463 | TN462 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (DUPLEX WITH SCS) |
|  |  | TN441 | TN481 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (SIMPLEX WITH SCS) |
|  |  | TN441 | TN481 | TN462 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE ON-LINE (DUPLEX WITH SCS) |
|  | 35 | TN441 | TN444 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (SIMPLEX, NO SCS) |
|  |  | TN441 | TN441 |  | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (DUPLEX, NO SCS) |
|  |  | TN441 | TN463 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (SIMPLEX WITH SCS) |
|  |  | TN441 | TN463 | 'TN462 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (DUPLEX WITH SCS) |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | скт 2 | CKI 3 | definition |
| $\begin{gathered} 56 \\ \text { (Contd) } \end{gathered}$ | $\begin{array}{\|c\|} 35 \\ \text { (Contd) } \end{array}$ | TN441 | TN481 | TN444 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (SIMPLEX WITH SCS) |
|  |  | TN441 | TN481 | TN462 | CLOCK OUT OF LOCK WITH REFERENCE CLOCK, MODULE OFF-LINE (DUPLEX WITH SCS) |
|  | 36 | TN441 | TN444 |  | MIF FAILURE CAUSED INCORRECT OOL READOUT, MODULE ON-LINE |
|  | 37 | TN441 | TN444 |  | MIF FAILURE CAUSED INCORRECT OOL READOUT, MODULE OFF-LINE |
|  | 38 | TN441 | TN444 |  | CLOCK FREQUENCY GENERATOR FAILED |
|  | 39 | TN441 | TN444 |  | MIF FAILURE CAUSED INCORRECT DCE OOL READOUT |
|  | 40 | TN441 | TN444 | TN530 | OFF-LINE CLOCK APPEARS AS MASTER WITH NO SCS/LGI PRESENT |
|  | 41 | TN441 | TN444 |  | MIF FAILURE CAUSED OFF-LINE CLOCK TO APPEAR AS MASTER WITH NO SCS/LGI PRESENT |
|  | 42 | TN441 | $\begin{aligned} & \text { TN463 } \\ & \text { OR } \\ & \text { TN481 } \end{aligned}$ | TN444 | CLOCK APPEARS AS MASTER WITH SCS/LGI PRESENT |
|  | 43 | TN441 | TN444 |  | MIF FAILURE CAUSED CLOCK TO APPEAR AS MASTER WITH SCS/LGI PRESENT |
|  | 44 | TN441 | TN444 |  | ON-LINE CLOCK APPEARS AS SLAVE WITH NO SCS/LGI PRESENT |
|  | 45 | TN441 | TN444 |  | MIF FAILURE CAUSED MAINTENANCE INTERFACE APPEARANCE OF ON-LINE LOCK AS SLAVE WITH NO SNS/LGI PRESENT |
|  | 57 | TN441 |  |  | INTERMODULE DATA STORE OR MODULE CLOCK OUT OF LOCK CAUSED TSI TEST FAILURE |
|  | 404 | TN441 |  |  | INTERMODULE DATA STORE ERROR |
|  | 407 | TN441 |  |  | TSI PCM Data Parity error |
|  | 601 | TN441 |  |  | UNDIAGNOSED MODULE INTERFACE BUFFER ERROR FROM OEP (PERIODIC ONLY) |

PROC 620

TABLE AB. (Contd)

| Proc 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 56 \\ \text { (Contd) } \end{gathered}$ | 602 | TN441 | TN481 | TN446 | INTERMODULE DATA STORE INPUT STORE GENERATES NETWORK TEST FLAGS |
|  | 606 | TN441 | TN446 |  | INTERMODULE DATA STORE OUTPUT STORE GENERATES NETWORK TEST FLAGS |
|  | 608 | TN441 |  |  | INTERMODULE DATA STORE TRANSMITS NETWORK TEST FLAGS TO TMS |
|  | 625 | TN441 | TN481 | TN446 | INTERMODULE DATA STORE CROSS-COUPLING FAILURE |
|  | 628 | TN441 | TN444 |  | INTERMODULE DATA STORE READ ERROR• |
|  | 629 | TN441 | TN446 |  | INTERMODULE DATA STORE OUTPUT STORE FAULT |
|  | 631 | TN441 |  |  | INTERMODULE DATA STORE TRANSMIT TO TMS FAULT |
|  | 639 | TN441 | TN481 | TN446 | INTERMODULE DATA STORE INPUT STORE FAILURE |
| 57 | 409 | TN481 |  |  | LIGHT GUIDE INTERFACE ERROR |
|  | 550 | TN481 | TN480 |  | TMS LIGHT GUIDE INTERFACE PARITY CHECKING CIRCUIT FAILED TO DETECT A BAD PARITY WORD |
|  | 558 | TN481 | TN441 |  | TMS LIGHT GUIDE INTERFACE OUT OF FRAME CIRCUIT FAILED TO DETECT A FRAMING ERROR |
|  | 566 | TN481 | TN480 |  | TMS LIGHT GUIDE INTERFACE PARITY ERROR CANNOT BE CLEARED |
|  | 574 | TN481 | TN441 |  | TMS LIGHT GUIDE INTERFACE OUT OF FRAME ERROR CANNOT BE CLEARED |
|  | 577 | TN481 | TN444 |  | TMS ABBREVIATED MAINTENANCE BUS TEST FAILURE |
|  | 612 | TN481 | 5N480 | 5N441 | LGL TO LİGHT GUIDE INTEFACE SUSPECTED OF GENERATING NETWORK TEST FLAGS |
|  | 613 | TN481 |  |  | LIGHT GUIDE INTERFACE TRANSMITS NETWORK TEST FLAGS TO MODULES |
|  | 614 | TN481 | TN441 |  | LIGHT GUIDE INTERFACE OUTPUT TO TMS GENERATES NETWORK TEST FLAGS |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | FAULI CODE | скт 1 | CKT 2 | скт ${ }^{\text {3 }}$ | definition |
| $\begin{gathered} 57 \\ \text { (Contd) } \end{gathered}$ | 615 | TN481 | TN441 |  | LIGHT GUIDE INTERFACE INPUT FROM TMS GENERATES NETWORK TEST FLAGS |
|  | 617 | TN481 | TN480 |  | LGL TO LIGHT GUIDE INTERFACE GENERATES NETWORK TEST FLAGS |
|  | 624 | TN441 | TN441 | TN480 | LIGHT GUIDE Interface cross-coupling failURE |
|  | 637 | TN481 | TN444 |  | LIGHT GUIDE INTERFACE READ ERROR |
|  | 638 | TN481 | TN480 | TN441 | FAULT SUSPECTED IN LGL TO LIGHT GUIDE INTERFACE |
|  | 640 | TN481 |  |  | LIGHT GUIDE INTERFACE PCM TRANSMIT TO MODULE FAULT |
|  | 641 | TN481 | TN441 |  | LIGḢT GUIDE INTERFACE OUTPUT TO TMS FAULT |
|  | 642 | TN481 | TN441 |  | LIGHT GUIDE INTERFACE INPUT FROM TMS FAULT |
|  | 644 | TN481 | TN480 |  | LGL TO LIGHT GUIDE INTERFȦCE FAULT |
| 58 | 522 | UN150 | TN452 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
|  | 610 | UN150 | TN473 |  | FAN IN GENERATES NETWORK TEST FLAGS |
|  | 634 | UN150 | TN452 | TN400 | FAN IN READ ERROR |
|  | 635 | UN150 | TN473 |  | FAN IN PCM ERROR |
| 59 | 430 | TN482 |  |  | TMIF PFAIL/LATE MAKE ALARM |
|  | 447 | TN482 |  |  | TMIF WRITE FAILURE |
|  | 451 | TN482 |  |  | TMS INTERFACE ERROR |
|  | 509 | TN482 | TN461 |  | MAINTENANCE INTERFACE FAILURE CAUSED TMS CLOCK OSCILLATOR FAILURE |
|  | 522 | TN482 | TN452 |  | TMS IOBI BUS - BAD TEST REGISTER VALUE FROM IOBI SPACE BOARD |
|  | 526 | TN482 | TN400 | TN381 | TMI IOBI BUS - BUS CLOCK On TMIF |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC fault Code definitions by unit type (Conid) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | ckt | CKT 2 | скт 3 | DEFINITION |
| $\begin{gathered} 59 \\ \text { (Contd) } \end{gathered}$ | 528 | TN482 |  |  | TMS MAINTENANCE BUS - BAD TEST REGISTER VALUE FROM TMIF |
|  | 529 | TN482 | TN482 |  | TMS MAINTENANCE BUS - - BAD TEST REGISTER VALUE FROM TARGET IORI BOARD |
|  | 530 | TN482 |  |  | TMS MAINTENANCE BUS - BAD SAC VALUE |
|  | 531 | TN482 |  |  | TMS MAINTENANCE BUS - TMIF DID NOT FLAG BAD PARITY |
|  | 605 | TN482 |  |  | TMIF GENERATES TEST VECTORS WHEN SHUT OFF |
|  | 621 | TN482 |  |  | TMIF READ ERROR |
|  | 627 | TN482 |  |  | TMIF TEST VECTOR OUTPUT INCORRECT |
| 62 | 12 | SN261 | . |  | TIME SLOT UNAVAILABLE |
|  | 199 | SN261 |  |  | BUSY OUT FAILED |
|  | 218 | SN261 |  |  | NETWORK ORDER FAILED |
|  | 350 | SN261 | TN452 | TN400 | g.p dtl fault or adftc digital self-TEST FAULT |
|  | 351 | SN261 | TN452 | TN400 | GPP OR ADFTC DTL IDLE BIT SET |
|  | 352 | SN261 | TN452 | TN400 | GPP DTLI AND DTLF TOGETHER OR ADFTC DIGITAL SELF-TEST AND DTLI TOGETHER |
|  | 353 | SN261 | TN452 | TN400 | GPP 48-VOL BIT SET (FUSE BLOWN) OR ADFTC ANALOG SELF-TEST FAULT |
|  | 354 | SN261 | TN452 | TN400 | GPP 48-VOL AND DTLF BITS SET OR ADFTC ANALOG AND DIGITAL SELF-TEST FAULT TOGETHER |
|  | 355 | SN261 | TN452 | TN400 | GPP 48-VOL AND DTLI BITS SET OR ADFTC ANALOG SELF-TEST AND DTLI TOGETHER |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT T } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 62 \\ \text { (Contd) } \end{gathered}$ | 356 | SN261 | TN452 | TN400 | GPP 48-vOL, DTLI, AND DTLI BITS SET OR ADFTC ANalog, digital self-test fault, and dtli toGETHER |
|  | 454 | SN261 |  |  | DTLF FAULT ON ADFTC (DIGITAL SELF-TEST) |
|  | 455 | SN261 |  |  | 48-VOL FAULT ON ADFTC (ANALOG SELF-TEST) |
|  | 456 | SN261 |  |  | 48-VOL AND DTLF FAULTS TOGETHER ON ADFTC |
|  | 457 | SN261 |  |  | PROTOCOL ERROR ON ADFTC |
|  | 458 | SN261 |  |  | DTL IDLE ON ADFTC |
|  | 1000 | SN261 |  |  | COULD NOT SEND AN S MESSAGE |
|  | 1001 | SN261 |  |  | FACILITY NOT TESTED FOR MORE THAN X CYCLES |
|  | 1005 | SN261 |  |  | NO BITS RECEIVED ON A 1-PORT ADFTC SELF-TEST |
|  | 1006 | SN261 |  |  | DATA TRANSMISSION INTERRUPTED: 1-PORT ADFTC SELF-TEST |
|  | 1007 | SN261 |  |  | BIT ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
|  | 1008 | SN261 |  |  | BLOCK ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
|  | 1009 | SN261 |  |  | EIA UPDATE FAILURE DURING A 1-PORT ADFTC SELF-TEST |
|  | 1010 | SN261 |  |  | ERROR OVERFLOW DURING A 1-PORT ADFTC SELFTEST |
|  | 1011 | SN261 |  |  | UNDEFINED ERROR DURING A 1-PORT ADFTC SELFTEST |
|  | 1012 | SN261 |  |  | NO BITS RECEIVED ON A 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1013 | SN261 |  |  | DATA TRANSMISSION INTERRUPTED: 2-PORT NORMAL ADFTC SELF-TEST |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC fault Code definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | CKT 2 | CKT 3 | DEFIIITITON |
| $\begin{gathered} 62 \\ \text { (Contd) } \end{gathered}$ | 1014 | SN261 |  |  | BIT ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1015 | SN261 |  |  | BLOCK ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1016 | SN261 |  |  | EIA UPDATE FAILURE DURING A 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1017 | SN261 |  |  | ERROR OVERFLOW DURING A 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1018 | SN261 |  |  | UNDEFINED ERROR DURING A 2-PORT NORMAL ADFTC SELF-TEST |
|  | 1019 | SN261 |  |  | NO BITS RECEIVED ON A 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1020 | SN261 |  |  | DATA TRANSMISSION INTERRUPTED: 2-PORT REVERSE ADF'TC SELF-TEST |
|  | 1021 | SN261 |  |  | BIT ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1022 | SN261 |  |  | BLOCK ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1023 | SN261 |  |  | EIA UPDATE FAILURE DURING A 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1024 | SN261 |  |  | ERROR OVERFLOW DURING A 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1025 | SN261 |  |  | UNDEFINED ERROR DURING A 2-PORT REVERSE ADFTC SELF-TEST |
|  | 1026 | SN261 |  |  | UNSENT STOP MESSAGE RECEIVED BY ADFTC |
|  | 1027 | SN261 |  |  | did not receive expected: test aborted s MESSAGE |
|  | 1028 | SN261 |  |  | DID NOT RECEIVE EXPECTED: TEST COMPLETED S MESSAGE |
|  | 1029 | SN261 |  |  | THE BIT AND/OR BLOCK ERROR RATES WERE NOT RECEIVED |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| unit TYPE | $\begin{aligned} & \text { FAUIT } \\ & \text { CODE } \end{aligned}$ | ckt 1 | скт 2 | CKT 3 | definition |
| $\begin{gathered} 62 \\ \text { (Contd) } \end{gathered}$ | 1425 | SN261 |  |  | ADFTC DID NOT RETURN A SETUP (HANDSHAKE) RESULT MESSAGE |
|  | 1426 | SN261 |  |  | ADFTC DID NOT RECEIVE A SET TEST (START HANDSHAKE) MESSAGE) |
| 66 | 100 | SN255 | TN452 | TN400 | NON-ZERO IDLE PORT CONTROL REGISTER |
|  | 120 | SN255 | TN452 | TN400 | VALID TONE PRESENT BIT STUCK ACTIVE IN SUMMARY BOARD SCAN |
|  | 121 | SN255 | TN454 | $\begin{gathered} \text { SN250 } \\ \text { OR } \\ \text { SN253 } \end{gathered}$ | VALID TONE PRESENT NOT INDICATED IN SUMMARY BOARD SCAN (REORDER OR DATA ANSWER TONE USED) |
|  | 122 | SN255 | TN454 | $\begin{gathered} \text { SN250 } \\ \text { OR } \\ \text { SN253 } \end{gathered}$ | VALID TONE PRESENT NOT INDICATED IN TONE REGISTER (REORDER OR DATA ANSWER TONE USED) |
|  | 123 | SN255 | TN454 | $\begin{gathered} \text { SN250 } \\ \text { OR } \\ \text { SN253 } \end{gathered}$ | TONE NOT DETECTED IN TONE REGISTER (REORDER OR DATA ANSWER TONE USED) |
|  | 146 | SN255 | TN452 | TN400 | FAULTY DIGITAL SIGNAL PROCESSOR |
|  | 427 | SN255 |  |  | CONTROL/SUMMARY - SCAN REGISTER READ ERROR |
| 68 | 364 | ANN11 |  |  | TEST VECTOR NOT RECEIVED IN PCM PORT LOOP AROUND TEST |
|  | 713 | ANN11 | TN463 |  | PRIMARY REFERENCE TEMPORARY LOSS OF SIGNAL |
|  | 715 | ANN11 | TN463 |  | SECONDARY REFERENCE TEMPORARY LOSS OF SIGNAL |
|  | 716 | ANN11 | TN463 |  | SECONDARY REFERENCE STEADY LOSS OF SIGNAL - PRIMARY REFERENCE HEALTHY |
|  | 717 | ANN11 | TN463 |  | PRIMARY REFERENCE STEADY LOSS OF SIGNAL - SECONDARY REFERENCE HEALTHY |
|  | 719 | ANN11 | TN463 |  | SECONDARY REFERENCE TEMPORARILY OUT OF LOCK |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fautt CODE | CKT 1 | CKT 2 | CKT 3 | DEFINITION |
| 68 <br> (Contd) | 721 | ANN11 | TN463 |  | SECONDARY REFERENCE STEADY OUT OF LOCK |
|  | 722 | ANN1I | TN463 |  | PRIMARY REFERENCE TEMPORARILY OUT OF LOCK |
|  | 723 | ANN11 | TN463 |  | PRIMARY REFERENCE STEADY OUT OF LOCK SECONDARY REFERENCE HEALTHY |
|  | 725 | ANN11 |  |  | INVALID DATA IN DS-1 DATA FACILITY ERROR FIFO |
|  | 727 | ANN11 |  |  | DS-1 BOARD PROCESSOR SANITY |
|  | 729 | FAC | ANN11 |  | LOSS OF SIGNAL AT DS-1 |
|  | 730 | FAC | ANN11 |  | DS-1 YELLOW ALARM RECEIVED |
|  | 731 | ANN11 |  |  | DS-1 BOARD HEALTH |
|  | 732 | FAC | ANN11 |  | DS-1 MAJOR ERROR RATE |
|  | 733 | FAC | ANN11 |  | DS-1 MINOR ERROR RATE |
|  | 734 | FAC | ANN11 |  | DS-1 RED ALARM DETECTED |
|  | 735 | FAC | ANN11 |  | DS-1 CARRIER GROUP ALARM |
|  | 736 | FAC | ANN11 |  | DS-1 SLIP RATE EXCEEDED - REFERENCES SWITCHED |
|  | 737 | FAC | ANN11 |  | DS-1 SLIP RATE THRESHOLD EXCEEDED |
|  | 738 | FAC | ANN11 |  | MISFRAME THRESHOLD EXCEEDED - SYSTEM HAS ONLY ONE REFERENCE |
|  | 739 | FAC | ANN11 |  | MISFRAME THRESHOLD EXCEEDED |
|  | 740 | FAC | ANN11 |  | MISFRAME THRESHOLD EXCEEDED - SECONDARY REFERENCE AVAILABLE |
|  | 750 | FAC | ANN11 | ANN11 | MISFRAME THRESHOLD EXCEEDED ON PRIMARY AND SECONDARY REFERENCES |
|  | 758 | ANN11 |  |  | LOSS OF SIGNAL IN DS-1 LINK. |
|  | 759 | ANN11 |  |  | MAJOR ALARM FROM ERROR RATE AFTER GLOBAL INITIALIZATION |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT <br> TYPE | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT 1 | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 68 \\ \text { (Contd) } \end{gathered}$ | 760 | ANN11 |  |  | MINOR ALARM FROM ERROR RATE AFTER GLOBAL INITIALIZATION |
|  | 761 | FAC | ANN11 |  | DAILY LIMIT EXCEEDED FOR MISFRAMES AFTER global initialization |
|  | 762 | FAC | ANN11 |  | RED ALARM RAISED AFTER GLOBAL INITIALIZATION |
|  | 763 | FAC | ANN11 |  | DAILY LIMIT EXCEEDED FOR SLIPS AFTER GLOBAL INITIALIZATION |
|  | 764 | ANN11. |  |  | DS-1 IS NOT ADMINISTERED |
|  | 765 | ANN11. |  |  | LOSS OF DS-1 PROCESSOR SANITY AFTER GLOBAL INITIALIZATION |
|  | 766 | ANN11. |  |  | DS-1 Interface Cannot be globally initialIZED |
|  | 767 | ANN11 |  |  | DS-1 REFERENCE JUST TESTED CANNOT BE SWITCHED ON-LINE |
|  | 769 | ANN11 |  |  | HEALTH OF REQUESTED DS-1 REFERENCES IS NOT GOOD BEFORE GLOBAL INITIALIZATION |
|  | 770 | ANN11 | TN463 |  | LOSS OF SIGNAL FROM THE DS-1 TO THE SYSTEM CLOCK SYNCHRONIZER |
|  | 771 | FAC | ANN11 |  | DAILY LIMIT EXCEEDED FOR SLIPS BEFORE GLOBAL INITIALIZATION |
|  | 772 | FAC | ANN11 |  | DAILY LIMIT EXCEEDED FOR MISFRAMES BEFORE GLOBAL INITIALIZATION |
|  | 773 | FAC | ANN11 |  | READ ALARM RAISED, OUT OF FRAME BEFORE GLOBAL INITIALIZATION |
|  | 774 | FAC | ANN11 |  | MAJOR ALARM FROM ERROR RATE BEFORE GLOBAL INITIALIZATION |
|  | 775 | FAC | ANN11 |  | MINOR ALARM FROM ERROR RATE BEFORE GLOBAL INITIALIZATION |

## PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | FAuIt CODE | CKit | ckt 2 | скт 3 | deitition |
| $\begin{gathered} 68 \\ \text { (Contd) } \end{gathered}$ | 777 | ANN11 |  |  | MAINTENANCE CONTROL REGISTER IS DEFECTIVE |
|  | 778 | ANN11 |  |  | OPTION CONTROL REGISTER IS DEFECTIVE |
|  | 779 | ANN11 |  |  | SCAN MODE CONTROL REGISTER IS DEFECTIVE |
|  | 780 | ANN11 |  |  | DISABLE SIGNALING CONTROL REGISTER IS DEFECTIVE |
|  | 781 | ANN11 |  |  | PORT CONTROL REGISTER IS DEFECTIVE |
|  | 782 | ANN11 |  |  | PORT STATUS REGISTER IS DEFECTIVE |
|  | 783 | ANN11 |  |  | SUMMARY SCAN STATUS REGISTER IS DEFECTIVE |
|  | 784 | ANN11 |  |  | STATUS RESET CONTROL REGISTER IS DEFECTIVE |
|  | 785 | ANN11 |  |  | DS-1 REFERENCE IS NOT MAINTENANCE BUSY WARNING: IF THIS INTERFACE IS A REFERENCE, THEN BUSYING OUT THE CIRCUIT AND TESTING IT MAY BE SERVICE AFFECTING TO OTHER DIGITAL FACILITIES BECAUSE THE CAPABILITY TO COMMUNICATE AT A DIGITAL RATE WOULD BE LOST FOR THE DURATION OF THE TEST |
|  | 786 | ANN11 |  |  | FAR END LOOPED BACK YELLOW ALARM NOT RECEIVED |
|  | 787 | ANN11 |  |  | NO CARRIER GROUP ALARM FROM YELLOW ALARM RECEIVED |
|  | 788 | ANN11 |  |  | I/O BUS DEFECTIVE |
|  | 789 | ANN11 |  |  | MAINTENANCE BUS DEFECTIVE |
| 69 | 13 | ANN17 |  |  | CIRCUIT IN USE BY CALL PROCESSING |
|  | 51 | ANN17 |  |  | PORT RESOURCES NOT AVAILABLE |
|  | 109 | ANN17 | TN452 | TN400 | FAULTY SET OF LA FLIP-FLOP |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC fallt COde definitions by unit type (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT | fault | ckt 1 | CKT 2 | CKT 3 | DEFINITION |
| $\begin{gathered} 69 \\ \text { (Contd) } \end{gathered}$ | 110 | ANN17 | TN452 | TN400 | FAULTY SET OF CPU FLIP-FLOP |
|  | 118 | ANN17 | TN452 | TN400 | FAULTY CLEAR OF LA FLIP-FLOP |
|  | 124 | ANN17 | TN452 | TN400 | FAULTY CLEAR OF CPU FLIP-FLOP |
|  | 125 | ANN17 | TN452 | TN400 | OFF-HOOK ERROR, POSSIBLY FROM ATTACHED STATION |
|  | 131 | ANN17 | TN452 | TN400 | TERMINATED LINE FAILED TO INDICATE OFFHOOK |
|  | 149 | ANN17 | TN454 | SN250 | INSUFFICIENT 440-HZ ON-HOOK REFLECTION |
|  | 150 | ANN17 | TN454 | SN250 | EXCESSIVE 440-HZ ON-HOOK REFLECTION |
|  | 152 | ANN17 | TN454 | SN250 | EXCESSIVE 440-HZ OFF-HOOK REFLECTION |
|  | 153 | ANN17 | TN454 | SN250 | EXCESSIVE SIGNAL AT OTHER THAN $440-\mathrm{HZ}$ |
|  | 154 | ANN17 | TN454 | SN250 | ON-HOOK STATUS FAILED TO POWER DOWN CODEC |
|  | 267 | ANN17 | TN452 |  | PORT COMMAND BUS - BAD TEST REGISTER VALUE FROM PORT |
|  | 280 | ANN17 | TN452 | TN400 | MLP CONTROLLER FAULT |
|  | 281 | ANN17 | TN452 | TN400 | MLP 48-V OVERLOAD |
|  | 282 | ANN17 | TN401 |  | MLP DRIVER CIRCUITRY FAILURE |
|  | 283 | ANN17 | TN452 | TN400 | MLP FAILED TO RETURN ID REQUEST |
|  | 284 | ANN17 | TN452 | TN400 | MLP RESPONDED TO OFF-HOOK TEST WITH SOMETHING BESIDES ON, OFF, OR NO RESPONSE |
|  | 344 | ANN17 | TN454 | SN250 | INSUFFICIENT TOUCH-TONE SIGNAL REFLECTION |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | CKT ${ }^{\text {I }}$ | CKT 2 | CKT 3 | definition |
| $\begin{gathered} 69 \\ (\mathrm{Contd}) \end{gathered}$ | 345 | ANN17 | TN454 | SN250 | EXCESSIVE TOUCH-TONE SIGNAL REFLECTION |
|  | 436 | ANN17 |  |  | MLP CONTROLLER FAULT, INITIALIZATION FAILED |
|  | 441 | ANN17 |  |  | MLF CONTROLLER FAULT, INITIALIZATION SUCCESSFUL |
|  | 998 | ANN17 |  |  | CANNOT TEST UNTRANSLATED PORT |
|  | 999 | ANN17 |  |  | REQUESTED TEST NOT PROVIDED FOR THIS UNIT |
| 71 | 391 | TN456 CENTRAL | TN452 | TN400 | UNABLE TO READ REMOTE MODULE INTERFACE STATUS |
|  | 392 | TN456 CENTRAL | TN452 | TN400 | UNABLE TO WRITE REMOTE MODULE INTERFACE STATUS |
|  | 393 | TN456 CENTRAL | TN456 <br> REMOTE | FIBER | REMOTE MODULE INTERFACE LFAIL BIT FOUND SET, EXPECTED TO BE CLEARED |
|  | 394 | TN456 CENTRAL | TN456 <br> REMOTE | FIBER | REMOTE MODULE INTERFACE FRMERR BIT FOUND SET, EXPECTED TO BE Cleared |
|  | 395 | TN401 | CABLE | TN456 REMOTE | 4-MHZ CHANNEL ERROR ON REMOTE END REMOTE MODULE INTERFACE |
|  | 396 | TN456 <br> REMOTE | TN456 CENTRAL | FIBER | REMOTE RMI FAILURE |
|  | 397 | FIBER | TN456 REMOTE | TN456 CENTRAL | REMOTE MODULE INTERFACE FIBER LINK OR REMOTE RMI POWER FAILURE |
|  | 398 | TN402 | CABLE | TN456 CENTRAL | 4-MHZ CHANNEL TO CENTRAL REMOTE MODULE INTERFACE FAILURE (RMI STATUS NORMAL) |
|  | 399 | TN456 CENTRAL | TN452 | TN400 | CENTRAL REMOTE MODULE INTERFACE FAILURE (4-MHZ LOOP BACK FAILED AND RMI STATUS FAILED) |

PROC 620

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { UNIT } \\ & \text { TYPE } \end{aligned}$ | $\begin{gathered} \text { FAUIT } \\ \text { CODE } \end{gathered}$ | скт : | Скт 2 | CKT 3 | DEFINITION |
| 72 | 13 | SN238 |  |  | CIRCUIT IN USE BY CALL Processing |
|  | 199 | SN238 |  |  | BUSY OUT FAILED |
|  | 357 | SN238 | TN452 | TN400 | ONE S CHANNEL RETRANSMISSION TO THE PORT has occurred |
|  | 358 | SN238 | TN452 | TN400 | MORE THAN ONE S CHANNEL RETRANSMISSION TO THE PORT HAS OCCURRED |
|  | 359 | SN238 |  |  | GPP TEST RECEIVED NO RESPONSE FROM ASSOCIATED DI AFTER ID REQUEST |
|  | 360 | SN238 |  |  | GPP TEST FOUND STATE OF HEALTH BIT SET FOR ASSOCIATED DI |
|  | 373 | SN238 |  |  | PORT PROCESSOR FAULT |
|  | 374 | SN238 |  |  | SIGNALING PROCESSOR FAULT |
|  | 375 | SN238 |  |  | PORT PROCESSOR AND SIGNALING PROCESSOR FAULT |
|  | 376 | SN238 |  |  | LOSS OF DATA FAULT AND PORT PROCESSOR FAULT |
|  | 377 | SN238 |  |  | LOSS OF DATA, PORT PROCESSOR, AND SIGNALING PROCESSOR FAULTS |
|  | 378 | SN238 |  |  | SIGNALING PROCESSOR FAULT, INITIALIZATION SUCCESSFUL |
|  | 379 | SN238 |  |  | SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION SUCCESSFUL |
|  | 380 | SN238 |  |  | LOSS OF DATA, SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION SUCCESSFUL |
|  | 381 | SN238 |  |  | SIGNALING PROCESSOR FAULT, INITIALIZATION FAILED |
|  | 382 | SN238 |  |  | SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION FAILED |

TABLE AB. (Contd)

| PROC 620 - SPECIFIC FAULT CODE DEFINITIONS BY UNIT TYPE (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| UNIT TYPE | fault CODE | CKT 1 | CKT 2 | CKT 3 | DEFINITION |
| 72 <br> (Contd) | 383 | SN238 |  |  | LOSS OF DATA, SIGNALING AND PORT PROCESSOR FAULTS, INITIALIZATION FAILED |
|  | 384 | SN238 |  |  | PORT PROCESSOR FAULT, RESET SUCCESSFUL |
|  | 385 | SN2̇38 |  |  | LOSS OF DATA FAULit, RESET SUCCESSFUL |
|  | 386 | SN238 |  |  | PORT PROCESSOR FAULT, RESET FAILED |
|  | 387 | SN238 |  |  | LOSS OF DATA FAULT, RESET FAILED |
|  | 462 | SN238 |  |  | PROTOCOL ERROR ON QEIA. |
|  | 463 | SN238 |  |  | QEIA SIGNALING PROCESSOR FAULT, INITIALIZATION SUCCESSFUL |
|  | 464 | SN238 |  |  | QEIA SIGNALING PROCESSOR FAULT, INITIALIZATION FAILED |
|  | 465 | SN238 |  |  | QEIA PORT' FAULT, RESET SUCCESSFUL |
|  | 466 | SN238 |  |  | QEIA PORT FAULT, RESET FAILED |
|  | 467 | SN238 |  |  | QEIA LOSS OF DATA, RESET SUCCESSFUL |
|  | 468 | SN238 |  |  | QEIA LOSS OF DATA, RESET FAILED |
|  | 995 | SN238 |  |  | USE PROC 646 TO COMPLETE TESTS ON THIS CIRCUIT |
|  | 998 | SN238 |  |  | CANNOT TEST UNTRANSLATED PORT |

PROC 621 - NETWORK DUPLICATION CHANNEL



## Purpose

PROC 621 is used to determine the current state of health of both sides of the TMS or network duplication channel.

PROC 621 provides the capability to perform a soft or hard switch between sides of the TMS or network module control complex to support maintenance of the digital network.
PROC 621 provides the capability to re-initialize the TMS control or network module carrier, if is duplicated, on-line, off-line, or unduplicated.

PROC 621 is used to:

1. Display the times and causes of the last seven (maximum) switches that occurred in any TMS or module control complex.
2. Display the current state of health for both sides of the TMS or network module.
3. Perform a soft switch of the TMS or network module control complex.
4. Perform a hard switch of the TMS or network module control complex.
5. Prevent a soft switch to the off-line side of a TMS or network module.
6. Re-initialize the TMS control or network module carrier.

## Field Definitions and Codes

Each field of PROC 621 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AC, PROC 621 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Field 2 - Select equipment type (TMS or network module duplication channel) to be tested or displayed.
3. Field 3 - Select a specific module to he tested or displayed (Test 1 only).
4. Fields 3 through 5 - Select a specific equipment location to be tested or displayed (Tests 2 through 4 only).
5. Field 8 - Enable a switch (soft or hard) to be performed (Tests 2 and 3 only) or enable a reinitialization (Test 4 only).

## Operation of Procedure

## Overview

PROC 621 is used to determine the number and cause of switches, the current state of health for both sides of a control complex, to lock a control complex off-line, to perform a soft or hard switch of a control complex, and to perform a re-initialization of control carriers.
To call in PROC 621 perform the following:

## 1. Depress PROC NO; 621; ENTER.

2. If the translation records indicate the TMS/network module is not duplicated, special error code 84 (TMS/module control channel unduplicated - only Test 4 can be used) is displayed in the MAAP error code field immediately upon entry to Test 1 of PROC 621.
Field 1 (test number) is blinking indicating that no key inputs other than depressing NEXT TEST are allowed. However, Test 4 may be used to re-initialize an unduplicated TMS control or network module carrier.
3. For duplicated TMS control or network module complexes Test 1 is automatically selected.

Field 1 displays a 1, Field 2 displays a 1 (defaults to network module duplication channel equipment type) and all other fields are dashed.
4. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

TABLE AC.

| $\text { PROC } 621$ <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | Filio | CODE | definition |
| 1 | 1-4 | Test number | 8 | 0 | Switch/Initialization disabled |
| 2 | 1,2 | Equipment type: |  | 1 | Switch/Initialization enabled |
|  | 1 | Network module duplication channel | 9-14 | $0,1$ | Health Code: <br> $0=$ Condition not present <br> $1=$ Condition present <br> CC - Driven by MCC on command from 501.CC |
|  | 2 | Time multiplex switch (TMS) duplication channel | 9 |  |  |
| $3-5$ 3 | 0-30 | Equipment location of displayed duplication channel: <br> Network module number | 10 | 0,1 | Shutdown - Set when TMS or module processor is stopped |
|  | 99 | TMS module number | 11 | 0,1 | SOFTB - Set by TMS or module processor software |
| $4$ | $0-7$ $0-3$ | Cabinet number <br> Carrier number | 12 | 0,1 | SOFTA1 - Set by 501CC maintenance software |
| 6 | 0-3 | On-line status: | 13 | 0,1 | SOFTA2 - Set by 501 CC maintenance software |
|  | 0 | On-line | 14 | 0,1 | SOFTA3 - Set by 501CC maintenance software |
|  | 1 | On-line \& soft locked |  |  |  |
|  | 2 | Off-line | 15 | 0.7 | Switch index: <br> Index into the switch time and cause table |
|  | 3 | Off-line \& soft locked |  |  |  |
| 7 | 0-2 | Switch status: | $\begin{gathered} 16-18 \\ 16 \\ 17 \\ 18 \end{gathered}$ | $\begin{aligned} & 1-31 \\ & 0-23 \\ & 0-59 \end{aligned}$ | Time switched on-line: <br> Day of month <br> Hour of day <br> Minute of hour |
|  |  |  |  |  |  |
|  | 0 | Soft switch permitted |  |  |  |
|  | 1 | Soft switch permitted but problems exist |  |  |  |
|  | 2 | Soft switch not permitted |  |  |  |

## PROC 621

TABLE AC. (Contd)

| $\text { PROC } 621$ <br> FIELD DEFINITIONS AND CODES (Contd) |  |  |
| :---: | :---: | :---: |
| FIELD | CODE | definition |
| 19 | 1-7 | Switch cause: |
|  | 1 | Automatic hard switch caused by hardware failure |
|  | 2 | Hard switch caused by craft request |
|  | 3 | Automatic soft switch caused by SOFTA1 failure |
|  | 4 | Automatic soft switch caused by SOFTA2 failure |
|  | 5 | Automatic soft switch caused by SOFTA3 failure |
|  | 6 | Periodic soft switch |
|  | 7 | Soft switch caused by craft request |

Four tests are available for duplicated TMS or network module control complexes. Only Test 4 can be used for unduplicated TMS or network control channels.

1. Test 1 - Displays time and cause of last seven switches and clears the switch history.
2. Test 2 - Allows a soft switch of the TMS or network module control complex.

Test 2 is also used to prevent a soft switch from taking place by soft locking the off-line TMS or network module duplication channel.
3. Test 3-Allows a hard switch of the network module control complex.
4. Test 4 - Allows a re-initialization of an unduplicated or duplicated TMS control or network module carrier.

## Test 1

Test $i$ is used to determine the time and cause when the last seven switches occurred for the on-line duplication channel entered in Fields 2 through 5.

Test 1 is also used to clear the table of last seven switches (maximum) for the duplication channel displayed in Fields 2 through 5.

1. Test 1 is the default test when entering PROC 621, or is selected by use of NEXT TEST or the CHANGE FIELD sequence:
CHANGE FIELD; 1; ENTER; 1; ENTER.
2. If the translation records indicate the TMS/network module is not duplicated, special error code 84 (TMS/module control channel unduplicated - only Test 4 can be used) is displayed in the MAAP error code field immediately upon entry to Test 1 of PROC 621.

Field 1 (test number) is blinking indicating that no key inputs other than depressing NEXT TEST are allowed. However, Test 4 may be used to re-initialize an unduplicated TMS control or network module carrier.
3. When Test 1 is initially called in, a default equipment location may be displayed in Fields 2 through 5.

Field 2 is blinking, indicating an optional entry field.
4. The default equipment location can be the last equipment location displayed in Test 2 through 4 of PROC 621 or can be passed from PROC 600 (alarm causes/error log) or PROC 620 (network procedure) while it is still displayed in PROC 600 or PROC 620 when it is passed.
5. A specific TMS or network module duplication channel or the default equipment location can be tested.

To test the default equipment location displayed in Fields 2 through 5, proceed to Step 9.
6. A specific TMS or network module duplication channel can be selected for testing by one of the following methods (Steps 7 and 8) depending on whether or not a default equipment location is displayed.
7. Depress NEXT UNIT until the equipment type to be tested is displayed in Field 2.

Note: Field 2 defaults to a 1 (network module duplication channel equipment type) when Test 1 is entered and no default equipment location is displayed.

Depress NEXT CIRCUIT to step through the duplication channels associated with the equipment type selected until the on-line duplication channel to be tested is displayed in Fields 3 through 5.
Proceed to Step 9.
8. If no default equipment location is displayed, either the duplication channel can be directly entered, or the CHANGE FIELD sequence can be used:
(Equipment type); ENTER; (Module number of duplication channel to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type); ENTER; (Module number of duplication channel to be tested); ENTER.
Proceed to Step 9.

## PROC 621 Test 1

9. To start Test 1, depress EXECUTE.
10. If no switches occurred for the duplication channel selected for testing, the following is displayed:

Field 1-1.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of duplication channel tested.
Field 6 - Dashed.
Fields 7 through 14 - Dashed.
Field 15-0 (Indicating no switches oecurred for the duplication channel tested).
Fields 16 through 19 - Dashed.
11. If any switches occurred for the duplication channel selected for testing, the following is displayed:
Field 1-1.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of duplication channel tested.
Field 6 - On-line status when switched occurred $(0=$ on-line, $1=$ on-line and locked, $2=$ offline, $3=$ off-line and locked).

Fields 7 through 14 - Dashed.
Field 15 - Number of switches that occurred (maximum of 7 ) for the duplication channel tested.

Field 16 - Day of month the switch occurred.
Field 17 - Hour of day the switch occurred:
Field 18 - Minute of day the switch occurred.
Field 19 - Switch cause ( 1 through 7).
Note: Fields 16 through 19 display the latest switch that occurred and the cause of the switch for the duplication channel tested.
12. When Field 15 is greater than 1, depressing NEXT DATA decrements Field 15 and displays (in Fields 16 through 19) when the next to last switch occurred and the cause of the switch for the duplication channel tested.
13. Depressing NEXT DATA repeatedly displays the remaining switches that occurred (and the cause for each switch) for the duplication channel tested.

When the last switch is displayed, depressing NEXT DATA again dashes Fields 7 through 19.

Depressing NEXT DATA once more begins the sequence over starting with the latest switch that occurred for the duplication channel tested.
14. The CLEAR DATA; EXECUTE sequence can be used to clear the table of last 7 switches for the duplication channel displayed in Fields 2 through 5 after EXECUTE is used to initiate Test 1.
15. To clear the table of last 7 switches for the duplication channel displayed in Fields 2 through 5 , perform the following:

## Depress CLEAR DATA; EXECUTE.

Fields 15 through 19 display dashes indicating the table of last 7 switches for the duplication channel displayed in Fields 2 through 5 is cleared.

Note: The tables of last 7 switches for other duplication channels are not affected. Only the table for the duplication channel displayed in Fields 2 through 5 is cleared.
16. When another duplication channel is to be tested, the CHANGE FIELD sequence or NEXT UNIT and NEXT CIRCUIT can be used to select the specific duplication channel to be tested:

CHANGE FIELD; 2; ENTER; (Equipment type); ENTER; (Module number of duplication channel to be tested); ENTER.

Depress NEXT UNIT until the equipment type to be tested is displayed in Field 2. Depress NEXT CIRCUIT to step through the duplication channels associated with the equipment type selected until the on-line duplication channel to be tested is displayed in Fields 3 through 5.
17. EXECUTE must be depressed to test the specific duplication channel selected for testing.

## Test 2

Test 2 is used to perform a user-transparent soft switch of TMS or network module control complexes and updates memory after the switch. The soft switch mey not be transparent to data connections.
Soft switches cannot be performed if the off-line state-of-health is worse than the on-line state-ofhealth.

Problems in the modules affect the module's state-of-health which can affect the soft switch of modules. Problems in the TMS affect the TMS's state-of-health which can affect the soft switch of TMSs.
TN481 (Light Guide Interface) installed in the module control carrier affects the soft switch of the TMS and not the soft switch of the modules.

To assist in troubleshooting network problems, Test 2 is used to prevent a soft switch from taking place by soft locking the off-line TMS or network module duplication channel.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. If the translation records indicate the TMS/network module is not duplicated, special error code 84 (TMS/module control channel unduplicated - only Test 4 can be used) is displayed in the MAAP error code field immediately upon entry to Test 2 of PROC 621.
Field 1 (test number) is blinking indicating that no key inputs other than depressing NEXT TEST are allowed. However, Test 4 may be used to re-initialize an unduplicated TMS control or network module carrier.
3. When Test 2 is initially called in, a default equipment location may be displayed in Fields 2 through 5 .
Field 2 is blinking, indicating an optional entry field.

## PROC 621 Test 2

4. The default equipment location can be the last equipment location displayed in Test 1,3 , or 4 of PROC 621 or can be passed from PROC 600 or PROC 620 while it is still displayed in PROC 600 or PROC 620 when it is passed.
5. A specific on-line TMS or network module duplication channel or the default equipment location can be selected to be soft switched.

To soft switch the default equipment location displayed in Fields 2 through 5, proceed to Step 9.
6. A specific on-line TMS or network module duplication channel can be selected to be soft switched by one of the following methods (Steps 7 and 8) depending on whether or not a default equipment location is displayed.
7. Depress NEXT UNiT until the equipment type to be soft switched is displayed in Field 2.

Depress NEXT CIRCUIT to step through the duplication channels associated with the equipment type selected until the on-line duplication channel to be soft switched is displayed in Fields 3 through 5.

Proceed to Step 9.
8. If no default equipment location is displayed, either the on-line duplication channel can be directly entered, or the CHANGE FIELD sequence can be used:
(Equipment type); ENTER; (Module number of on-line duplication channel to be soft-switched); ENTER.
CHANGE FIELD; 2; ENTER; (Equipment type); ENTER; (Module number of online duplication channel to be soft switched); ENTER.

Proceed to Step 9.
9. To start Test 2, depress EXECUTE.
10. When EXECUTE is depressed, the following is displayed:

Field 1-2.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of duplication channel to be soft-switched.
Field 6 - On-line status ( $0=$ on-line, $1=$ on-line and locked).
Field 7 - Switch status $0=$ soft switch permitted, $1=$ soft switch permitted but problems exist, $2=$ soft switch not permitted).
Field 8-0 (Switch disabled).
Fields 9 through 14 - State of health code for the duplication channel displayed in Fields 2 through 5. ( $0=$ pass, $1=$ condition present.)

Fields 15 through 19 - Dashed.
11. To perform a soft switch of the TMS or network module control complex, check the switch status in Field 7.

If Field 7 equals 2, a soft switch cannot be performed.
Note: If a switch of the TMS or network module control complex is still required, * proceed to Test 3 and perform a hard switch.
12. If Field 7 equals 0 or 1 , a soft switch of the TMS or network module control complex is possible.
Check the on-line status displayed in Field 6.
If Field 6 equals 0 , proceed to Step 15.
If Field 6 equals 1, proceed to Step 13.
Note: A soft switch of the TMS or network module control complex cannot be performed if the off-line side is soft locked.
13. Depress RLS BUSY OUT to release the TMS or network module control complex from the locked condition.

Note: In the event that the state of health for the on-line side is worse than the off-line side, a hard switch may occur. Special error code 82 (hard switch will occur) is displayed in the MAAP error code field.
14. If special error code 82 is not displayed, proceed to Step 15.

Caution: A hard switch causes a disruption of service and effects normal call processing.

If special error code 82 is displayed and a switch of the network control complex is still required, depress RLS BUSY OUT again.

Field 6 displays a 3 for the duplication channel displayed in Fields 2 through 5, indicating that the channel is off-line and locked.
15. To enable the soft switch of the TMS or network module control complex, change Field 8 to a 1 using the CHANGE FIELD sequence:
CHANGE FIELD; 8; ENTER; 1; ENTER.
Note: Prior to a switch of the TMS, the network modules must be working.
16. Depress EXECUTE.

The first time EXECUTE is depressed, the soft switch does not occur.
Note: Special error code 85 (push EXECUTE twice to switch) is displayed in the MAAP error code field indicating that EXECUTE must be depressed twice to perform a soft switch.
17. Depress EXECUTE.

Note: If the soft switch cannot be performed after EXECUTE has been depressed twice, Field 8 displays a 1 (switch enabled) and special error code 80 (switch failed) is displayed in the MAAP error code field.

If a switch of the TMS or network module control complex is still required, proceed to Test 3 and perform a hard switch.
18. The WAIT indicator on the MAAP is lighted while the switch is taking place.
19. When the WAIT indicator turns off and the switch is successful, the following is displayed:

Field 1-2.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of the now off-line duplication channel.
Field 6 - On-line status ( $2=$ off-line).
Field 7 - Switch status ( $0=$ soft switch permitted, $1=$ soft switch permitted but problems exist, $2=$ soft switch not permitted).
Field 8-0 (Switch disabled).
Fields 9 through 14 - State of health conde for the duplication channel displayed in Fields 2 through 5 . $(0=$ pass, $1=$ condition present.)
Fields 15 through 19 - Dashed.
Note: The cause and time of the switch is updated in status memory.
20. If the switch passes but automatically switches back to the previous configuration, some type of failure in the original off-line side occurred to lower its state-of-health. An alarm on the original off-line side may be indicated by PROC 600 Test 1.
21. If the switch failed, indicated by a 1 displayed in Field 8 (switch enabled) and special error code 80 (switch failed) displayed in the MAAP error code field, use PROC 620 Test 4 to test the duplication channel (unit type 23) displayed in Fields 2 through 5. Perform corrective action as required.

An off-line TMS or network module duplication channel can be soft locked to prevent a soft switch from taking place while maintenance personnel are working on the off-line TMS or network module control carrier.
A hardware failure that causes a switch of the TMS or network module control complex overrides a soft lock.
A soft lock of the off-line TMS or network module duplication channel is normally performed after a demand soft switch by maintenance personnel. However, any TMS or network module duplication channel can be soft locked.
A soft lock of an off-line TMS or network module duplication channel is performed as follows:

1. Depress NEXT UNIT until the equipment type to be soft locked is displayed in Field 2.

Depress NEXT CIRCUIT to step through the duplication channels associated with the equipment type selected until the off-line duplication channel to be soft locked is displayed in Fields 3 through 5.
2. Depress EXECUTE.

The on-line status and state of health for the off-line TMS or network module duplication channel is displayed in Fields 6 and 9 through 14.
3. Depress BUSY OUT.

Field 6 changes from a 2 (off-line) to a 3 (off-line and locked).
4. The BUSY OUT indicator on the MAAP is lighted if not already lighted from another circuit that is busied out.


Caution: If PROC 621 is exited with a TMS or network module duplication channel soft locked, a soft switch of the TMS or network module control complex cannot be performed.
5. Prior to exiting PROC 621 release the TMS or network module duplication channel that is soft locked from busy out by depressing RLS BUSY OUT when the TMS or network module duplication channel is displayed in Fields 2 through 5 and EXECUTE is depressed.

Caution: When BUSY OUT is depressed in Test 2 of PROC 621 the busy out
status cannot be released by PROC 630 (Busy out/release busy out).

## Test 3

Test 3 is used to perform a hard switch of TMS or network module control complexes and updates memory after the switch.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. If the translation records indicate the TMS/network module is not duplicated, special error code 84 (TMS/module control channel unduplicated - only Test 4 can be used) is displayed in the MAAP error code field immediately upon entry to Test 3 of PROC 621.

Field 1 (test number) is blinking indicating that no key inputs other than depressing NEXT TEST are allowed. However, Test 4 may be used to re-initialize an unduplicated TMS control or network module carrier.
3. When Test 3 is initially called in, a default equipment location may be displayed in Fields 2 through 5.
Field 2 is blinking, indicating an optional entry field.
4. The default equipment location can be the last equipment location displayed in Test 1 , 2 , or 4 of PROC 621 or can be passed from PROC 600 or PROC 620 while it is still displayed in PROC 600 or PROC 620 when it is passed.
5. A specific on-line TMS or network module duplication channel or the default equipment location can be selected to be hard switched.
To hard switch the default equipment location displayed in Fields 2 through 5, proceed to Step 9.
6. A specific on-line TMS or network module duplication channel can be selected to be hard switched by one of the following methods (Steps 7 and 8) depending on whether or not a default equipment location is displayed.
7. Depress NEXT UNIT until the equipment type to be hard switched is displayed in Field 2.

Depress NEXT CIRCUIT to step through the duplication channels associated with the equipment type selected until the on-line duplication channel to be hard switched is displayed in Fields 3 through 5.
Proceed to Step 9.
8. If no default equipment location is displayed, either the on-line duplication channel can be directly entered, or the CHANGE FIELD sequence can be used:
(Equipment type); ENTER; (Module number of on-line duplication channel to be hard switched); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type); ENTER; (Module number of online duplication channel to be hard switched); ENTER.
Proceed to Step 9.
9. To start Test 3, depress EXECUTE.
10. When EXECUTE is depressed, the following is displayed:

Field 1-3.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of duplication channel to be hard switched.
Field 6 - On-line status $(0=$ on-line, $1=$ on-line and locked $)$.
Field 7 - Dashed.
Field 8-0 (Switch disabled).
Fields 9 through 14 - State of health code for the TMS or network module duplication channel displayed in Fields 2 through 5. $(0=$ pass, $1=$ condition present. $)$
Fields 15 through 19 - Dashed.
11. To perform a hard switch of the TMS or network module control complex, check the on-line status in Field 6.
12. If Field 6 equals 0 , proceed to Step 15.

If Field 6 equals 1, proceed to Step 13.
Note: A hard switch of the TMS or network module control complex cannot be performed if the off-line side is soft locked.
13. Depress RLS BUSY OUT to release the TMS or network module control complex from the locked condition.

Note: In the event that the state of health for the on-line side is worse than the off-line side, a hard switch may occur. Special error code 82 (hard switch will occur) is displayed in the MAAP error code field.
14. If special error code 82 is not displayed, proceed to Step 15.

Caution: A hard switch causes a disruption of service and effects normal call
processing.
If special error code 82 is displayed and a switch of the TMS or network control complex is still required, depress RLS BUSY OUT again.
Field 6 displays a 3 for the TMS or network module duplication channel displayed in Fields 2 through 5 , indicating that the channel is off-line and locked.
15. To enable the hard switch of the TMS or network module control complex, change Field 8 to a :1 using the CHANGE FIELD sequence:
CHANGE FIELD; 8; ENTER; 1; ENTER.
16. Depress EXECUTE.

The first time EXECUTE is depressed, the hard switch does not occur.
Note: Special error code 85 (push EXECUTE twice to switch) is displayed in the MAAP error code field indicating that EXECUTE must be depressed twice to perform a hard switch.
17. Depress EXECUTE.

The WAIT indicator on the MAAP is lighted while the switch is taking place.
18. When the WAIT indicator turns off and the switch is successful, the following is displayed:

Field 1-3.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 -Equipment location of the now off-line duplication channel.
Field 6 - On-line status ( $3=$ off-line and locked).
Note: When a demand hard switch is completed, the now off-line side is automatically soft locked to prevent it from switching back in event the now off-line side's state of health is better than the on-line side.

Field 7 - Dashed.
Field 8-0 (Switch disabled).
Fields 9 through 14 - State of health code for the duplication channel displayed in Fields 2 through 5 . $(0=$ pass, $1=$ condition present.)
Fields 15 through 19 - Dashed.
Note: The cause and time of the switch is updated in status memory.
19. If the switch failed, indicated by a 1 displayed in Field 8 (switch enabled) and special error code 80 (switch failed) displayed in the MAAP error code field, use PROC 620 Test 3 to continuously test the duplication channel displayed in Fields 2 through 5. Suspect a cabling problem. Perform corrective action as required.
In addition, if any soft A or soft B problems exist as indicated by Fields 11 through 14, use PROC 600 Test 2 to determine if any type of network problems exist. Perform corrective action as required.

## Test 4

Test 4 is used to perform an initialization on the TMS or module control carrier.
Test 4 can be used to re-initialize the TMS or module control carrier, if it is duplicated, on-line, offline, or unduplicated.
Test 4 is useful when the state of health bits ( SOH ) indicate the control carrier to be shutdown or when all tests for the TMS or module control carrier in PROC 620 fail.
If the GREEN LED on TN380 (module processor) or TN381 (TMS processor) is not flashing .(no heartbeat), re-initialization should be performed.

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
2. When Test 4 is initially called in, a default equipment location may be displayed in Fields 2 through 5.
Field 2 is blinking, indicating an optional entry field.
3. The default equipment location can be the last equipment location displayed in Test 1 through 3 of PROC 621 or can be passed from PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure) while it is still displayed in PROC 600 or PROC 620 when it is passed.
4. A specific TMS or module control carrier or the default equipment location can be reinitialized.
To re-initialize the default equipment location displayed in Fields 2 through 5, proceed to Step 8.
5. A specific TMS or module control carrier can be selected for re-initialization by one of the following methods (Steps 6 and 7 ) depending on whether or not a default equipment location is displayed.
6. Depress NEXT UNIT until the equipment type to be re-initialize is displayed in Field 2.

Note: Field 2 defaults to a 1 (network module equipment type) when Test 4 is entered and no default equipment location is displayed.

Depress NEXT CIRCUIT to step through the control carriers associated with the equipment type selected until the control carrier to be re-initialized is displayed in Fields 3 through 5.

Proceed to Step 8.
7. If no default equipment location is displayed, either the TMS or module control carrier can be directly entered, or the CHANGE FIELD sequence can be used:
(Equipment type); ENTER; (Module number of TMS or module control carrier to be re-initialized); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type); ENTER; (Module number of TMS or module control carrier to be re-initialized); ENTER.

Proceed to Step 8.
8. To start Test 4, depress EXECUTE.
9. When EXECUTE is depressed, the following is displayed:

Field 1-4.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of control carrier to be re-initialized.
Field 6 - On-line status ( $0=$ on-line, $1=$ on-line and locked, $2=$ off-line, $3=$ off-line and locked).
Field 7 - Dashed.
Field 8-0 (Initialization disabled).
Fields 9 through 14 - State of health code for the control carrier displayed in Fields 2 through 5. $(0=$ pass, $1=$ condition present. $)$

Fields 15 through 19 - Dashed.

Caution: A re-initialization of the TMS or module control carrier causes a disruption of service and effects normal call processing if re-initialization of the TMS or module control carrier is performed on-line. Re-initialization should be performed on the off-line side of the TMS or module control carrier (if duplicated).
10. To enable the re-initialization of the TMS or module control carrier, change Field 8 to a 1 using the CHANGE FIELD sequence:

## CHANGE FIELD; 8; ENTER; 1; ENTER.

11. Depress EXECUTE.

The first time EXECUTE is depressed, re-initialization does not occur.
Note: Special error code 85 (push EXECUTE twice to initialize) is displayed in the MAAP error code field indicating that EXECUTE must be depressed twice to perform re-initialization.
12. Depress EXECUTE.

The WAIT indicator on the MAAP is lighted while re-initialization is taking place.
13. When the WAIT indicator turns off and re-initialization is successful, the following is displayed:
Field 1-4.
Field 2 - Equipment type ( $1=$ network module, $2=$ TMS ).
Fields 3 through 5 - Equipment location of control carrier re-initialized.
Field 6 - On-line status ( $0=$ on-line, $1=$ on-line and locked, $2=$ off-line, $3=$ off-line and locked).

Field 7 - Dashed.
Field 8-0 (Initialization disabled).
Fields 9 through 14 - State of health code for the control carrier displayed in Fields 2 through 5. $(0=$ pass, $1=$ condition present.)

Fields 15 through 19 - Dashed.
14. If the re-initialization failed, indicated by a 1 displayed in Field 8 (initialization enabled) and special error code 86 (initialization failed) displayed in the MAAP error code field, use PROC 620 Test 4 to test unit types 6 (MCC) and 7 (TMS/module processor) on the control carrier displayed in Fields 2 through 5.

PROC 622

PROC 622 - NETWORK PERIPHERALS



The flipcharts shown are for R2V2. The R2V1 flipcharts are similar except that Field 2 is a single digit field and Field 11 is a 2 -digit field.

The statement - USE "NEXT DATA" TO DISPLAY THE NEXT FAULT CODE - is also contained on the R2V1 flipcharts.

In addition, equipment types 8 through 18 are not included in R2V1.

## Purpose

PROC 622 is used when referenced from PROC 600 (Alarm causes/error $\log$ ) or when the NETWORK PERIPH EQPT and MINOR or WARNING alarm indicators on the alarm panel are lighted.

PROC 622 is used to:

1. Display the failure history for network peripherals.

Network peripherals include the Processor Data Module (PDM), 74 Series terminal, Digital Telephone Data Module (DTDM), 72 Series terminal, Trunk Data Module (TDM), Enhanced Processor Data Module (PDM/2), Enhanced Trunk Data Module (TDM/2), Integrated Display Terminal (IDT) Voice Station, IDT Data Module, BCT 510 Voice Station, BCT 510 Data Module, BCT 515 Voice Station, BCT 515 Data Module, Voice Data Station Voice Station, Voice Data Station Data Module, AP32 DCP Interface Even Port Channel, AP32 DCP Interface Odd Port Channel, and Multifunctional Analog Terminal (MFAT) family of data modules.
2. Manually turn off any alarms activated because of a network peripheral failure.

Note: When the alarm indicator is turned off, the alarmed entry for the network peripheral failure causing the alarm to be activated is marked as resolved in PMIDS.
3. Test one or more network peripherals once and display the test results.
4. Test one or more network peripherals in a continuous cycle and display the test results.
5. Continuously test the transmission quality to one or more network peripherals.
6. Automatically turn off the fault indicator when all network peripherals that caused an alarm to be raised are tested as good in Test 2 or 3.

Note: Alarmed network peripheral entries in PMIDS are marked as resolved.

## Field Definitions and Codes

Each field of PROC 622 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AD, PROC 622 - Field Definitions and Codes.

Note: Equipment types 8 through 18 are not displayed in R2V1.
Optional input fields are:

1. Field 2 - Select equipment type to be tested (Tests 2 through 4 only).

Equipment types include: $1=$ PDM, $2=74$ Series terminal, $3=$ DTDM, $4=72$ Series terminal, $5=$ TDM, $6=$ PDM/2, $7=$ TDM/2, $8=$ IDT Voice Station, $9=$ IDT Data Port, $10=$ BCT 510 Voice Station, $11=$ BCT 510 Data Port, $12=$ BCT 515 Voice Station, $13=$ BCT 515 Data Port, $14=$ Voice Data Station, Voice Station, $15=$ Voice Data Station, Data Port, $16=$ AP32 DCP Interface Even Port Channel, 17 = AP32 DCP Interface Odd Port Channel, and 18 $=$ MFAT.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
2. Fields 3 through 7 - Select equipment location of a specific network peripheral, range of network peripherals, or all network peripherals in a equipment type to be tested (Tests 2 through 4 only).
3. Field 10 - Enable the mode of test (non-service affecting or service affecting) to be performed (Tests 2 through 4 only).

## PROC 622

TABLE AD.


TABLE AD. (Contd)

| PROC 622 <br> FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FiEID | Code | definition | FIELD | CODE | definition |
| 11. | 1-9 | Fault code index | $\begin{gathered} 12 \\ (\text { Contd }) \end{gathered}$ | 16 | Three bits set in GPP status register ( 48 -volt overload, DTL idle, and DTL fault) |
| 12 | 0-99 | Fault code: |  |  |  |
|  | 0 | Test passed |  | 17 | Two bits set in MLP status register (MFET and controller failure) |
|  | 1 | In-use |  |  |  |
|  | 2 | 48-volt overload |  | 18 | Two bits set in MLP status register ( 48 -volt overload and controller failure) |
|  | 3 | DTL link idle |  |  |  |
|  | 4 | DTL link fault |  |  |  |
|  | 5 | MFET set failed |  | 19 | Two bits set in MLP status register ( 48 -volt overload and MFET failure |
|  | 6 | MLP controller failure |  |  |  |
|  | 7 | Digital instrument has bad state of health |  | 20 | Three bits set in MLP status register ( 48 -volt overload, MFET and controller failure) |
|  | 8 | Transmission failure to digital instrument |  |  |  |
|  | 9 | DTL looparound failure at digital set |  | 21 | Digital set stuck in DTL looparound |
|  | 10 | DTL looparound failure at GPP |  | 22 | Hyperactive data set or data module receiving too many signals |
|  | 11 | Digital set did not reset correctly |  | 23 | Network peripheral error other than 48 -volt fault |
|  | 12 | No response from digital set |  | 24 | Touch-tone digits sent on MFDT S channel |
|  | 13 | Both bits set in GPP status register (DTL idle and DTL fault) | 13 | 0-9999 | Number of devices tested or number of times device was tested |
|  | 14 | Both bits set in GPP status register ( 48 -volt overload and DTL fault) | 14 | 0-999 | Number of devices failed or number of times device failed |
|  | 15 | Both bits set in GPP status register ( 48 -volt overload and DTL idle) | 15 | 0-99 | Failure index: Index into PMIDS or DMIDS table of the failure record currently displayed |

## PROC 622 Test 1

## Operation of Procedure

## Overview

PROC 622 is used to determine the cause of the NETWORK PERIPH EQPT and MINOR or WARNING alarm indicators being lighted resulting from a network peripheral failure.

To call in PROC 622, perform the following:

1. Depress PROC NO; 622; ENTER.
2. Test 1 is automatically selected.

Fiold 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Four tests are available:

1. Test 1-Displays failure history by severity of alarm, equipment type and/or port equipment location within an equipment type.
Test 1 is also used to manually turn off the NETWORK PERIPH EQPT fault indicator.
Note: Alarmed network peripheral entries in PMIDS are marked as resolved.
2. Test 2 - Tests one or more network peripherals one time.
3. Test 3-Tests one or more network peripherals continuously.
4. Test 4 - Continuously tests the transmission quality to one or more network peripherals.

## Test 1

Test 1 provides a failure history of the network peripheral failures detected by the on-line software.
Failures are displayed in alarm order, i.e., failures with an alarm status of minor followed by failures with an alarm status of warning. Network peripherals with errors recorded against them are displayed by equipment type and then by port equipment location within equipment type.
Test 1 is also used to manually turn off the NETWORK PERIPH EQPT fault indicator and to resolve the network peripheral alarmed entries in PMIDS.

1. Test 1 is the default test when entering PROC 622, or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, Field 1 displays a 1 , and all other fields are dashed.
3. To start Test 1, depress EXECUTE.
4. The network peripheral failure history is sorted and a summary is displayed.
5. If no network peripheral failures exist, the following summary is displayed:

Field 1-1.
Field 14-0 (Indicating no failures).
6. If any network peripheral failures exist, the summary displays a 1 in Field 1, and the total number of network peripherals that failed in Field 14.
7. Depressing NEXT CIRCUIT displays the first failure in order of severity, as follows: Field 1-1.

Field 2 - Equipment type of failing network peripheral.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of failing network peripheral.
Field 8 - Alarm status of failing network peripheral.
Fields 9 and 10 - Dashed. .
Field 11 - Fault code index.
Field 12 - Specific fault code.
Field 13 - Dashed.
Field 14 - Number of times that the network peripheral displayed in Fields 3 through 7 failed.
Field 15 - Failure index.
8. Depressing NEXT CIRCUIT repeatedly displays the remaining failing network peripherals.
9. To step through the failure records for a specific equipment type, depressing NEXT UNIT causes the first failure of the next equipment type with failures to be displayed.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Field 15 decrements corresponding to the number of failures passed over (if any) when stepping from equipment type to equipment type.
NEXT CIRCUIT is used to step through the failures of the displayed equipment type.
10. When all failing network peripherals are displayed, depressing NEXT CIRCUIT or NEXT UNIT dashes Fields 2 through 15.
Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing network peripherals can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
11. The CLEAR DATA; EXECUTE sequence is used to manually resolve individual alarmed network peripheral failures or all alarmed network peripherals failures after EXECUTE is used to initiate Test 1.

The failures which are resolved are those failures with an alarm status of 2 or 3 displayed in Field 8.
12. To resolve individual network peripheral failures with an alarm status of 2 or 3 , perform the following:
Use NEXT CIRCUIT to display the failing network peripheral with an alarm status of 2 or 3 on the MAAP.

Requirement: Individual network peripheral failures cannot be resolved unless the failing network peripheral is displayed on the MAAP.

Note: Specific network peripherals for equipment types 8 through 18 cannot be selected by use of NEXT CIRCUIT in R2V1.

## PROC 622 Test 1 and Test 2

## 13. Depress CLEAR DATA; EXECUTE.

14. Field 8 (alarm status) displays a 5 indicating that the failing network peripheral entry in PMIDS is marked as resolved.

The NETWORK PERIPH EQPT fault indicator is turned off if no other network peripheral failures exist.
15. If the CLEAR DATA; EXECUTE sequence is performed when a dash is displayed in Field 2 (equipment type), all network peripheral failures with an alarm status of 2 or 3 are resolved and the NETWORK PERIPH EQPT fault indicator is turned off.
16. All network peripheral failures with an alarm status of 2 or 3 are resolved when the summary is initially display, i.e., upon entry to PROC 622 Test 1, and after displaying all network peripheral failures and then using NEXT CIRCUIT to display the summary.

Note: When the summary is displayed, Field 2 is dashed.
Caution: The network peripheral failures should be displayed and recorded prior to resolving the failures in order that a record of the equipment location and specific fault code of the network peripheral failures are available for maintenance personnel.
17. After entering Test 1 and depressing EXECUTE the summary is displayed.

Depress CLEAR DATA; EXECUTE.
All network peripheral failures with an alarm status of 2 or 3 are marked as resolved in PMIDS and the NETWORK PERIPH EQPT fault indicator is turned off.
18. After displaying and recording all network peripheral failures, depress NEXT CIRCUIT until the summary is displayed, then depress CLEAR DATA; EXECUTE.

All network peripheral failures with an alarm status of 2 or 3 are marked as resolved in PMIDS and the NETWORK PERIPH EQPT fault indicator is turned off.
19. The MINOR or WARNING alarm indicator is also turned off when no other sources affecting the MINOR or WARNING alarm indicator are present.

## Test 2

Test 2 is used to test one or more network peripherals once and display the results of the test.
Network peripherals can be selected for testing by equipment type, a range of port equipment locations, or on a single circuit basis.
Two modes of testing are provided in Test 2, i.e., service-affecting and non-service-affecting.

1. The use of the non-service-affecting test mode performs only transparent tests on network peripherals without affecting customer's service.
2. The service-affecting test mode provides complete testing of a network peripheral and is destructive, aborting any call in progress to a network peripheral and taking the network peripheral selected for testing out-of-service.
Test 2 automatically turns off the NETWORK PERIPH EQPT fault indicator when all network peripherals that raised an alarm pass Test 2.

## Test 2 Data Entry

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. When Test 2 is initially called in, a default equipment location may be displayed in Fields 3 through 7. Field 8 displays the alarm status, Field 9 displays the circuit status, and Field 10 (test mode) displays a 0 .

Field 2 (equipment type) is blinking, indicating an optional entry field.
Note: Equipment types 8 through 18 cannot be selected in R2V1.
3. The default equipment location can be the last equipment location displayed in Test 1,3 , or 4 of PROC 622 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.

The default equipment location can also be passed from PROC 620 as long as the equipment location is a network peripheral port equipment location and is still displayed in PROC 620 when it is passed.
4. All network peripherals, a range of network peripherals, all network peripherals within an equipment type, a combination of equipment type and range (i.e., all network peripherals of an equipment type in the range specified), a specific network peripheral, or the default equipment location can be tested.
5. To select the entire switch to be tested, Fields 2 through 7 must be dashed

If no default equipment location is displayed, depress ENTER.
If a default equipment location is displayed, depress CHANGE FIELD; 2; ENTER; ENTER.

Test 2 starts with the first module, first cabinet and carrier and runs until all network peripherals in the switch are tested.

Proceed to Step 23.
6. In addition to testing all network peripherals in the entire switch, a range of network peripherals (all network peripherals in a module, cabinet, carrier, or slot) can be selected for testing.

Note: Selection of a range of network peripherals to be tested depends on whether or not a default equipment location is displayed. If a default equipment location is displayed, the CHANGE FIELD sequence must be used. If no default equipment location is displayed, either ENTER or the CHANGE FIELD sequence can be performed to select the range of network peripherals to be tested.
7. To select all network peripherals in a module for testing, perform one of the following depending on whether or not a default equipment location is displayed:

## ENTER; (Module number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; ENTER; (Module number to be tested); ENTER.
Test 2 starts with the first network peripheral in the module selected and runs until all network peripherals in the module are tested.

Proceed to Step 23.
8. To select all network peripherals in a cabinet for testing, perform one of the following depending on whether or not a default equipment location is displayed:
ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Test 2 starts with the first network peripheral in the cabinet selected and runs until all network peripherals in the cabinet are tested.

Proceed to Step 23.
9. To select all network peripherals in a carrier for testing, perform one of the following depending on whether or not a default equipment location is displayed:

ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.
Test 2 starts with the first network peripheral in the carrier selected and runs until all network peripherals in the carrier are tested.
Proceed to Step 23.
10. To select all network peripherals in a slot for testing, perform one of the following depending on whether or not a default equipment location is displayed:

ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER
CHANGE FIELD; 2; ENTER; ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

Test 2 starts with the first network peripheral in the slot selected and runs until all network peripherals in the slot are tested.

Proceed to Step 23.
11. To select all network peripherals within an equipment type to be tested, the appropriate equipment type must be entered in Field 2.
Equipment types include: $1=$ PDM, $2=74$ Series terminal, $3=$ DTDM, $4=72$ Series terminal, $5=\mathrm{TDM}, 6=\mathrm{PDM} / 2,7=\mathrm{TDM} / 2,8=$ IDT Voice Station, $9=$ IDT Data Port, $10=$ BCT 510 Voice Station, $11=$ BCT 510 Data Port, $12=$ BCT 515 Voice Station, $13=$ BCT 515 Data Port, $14=$ Voice Data Station, Voice Station, $15=$ Voice Data Station, Data Port, $16=$ AP32 DCP Interface Even Port Channel, $17=$ AP32 DCP Interface Odd Port Channel, and 18 $=$ MFAT.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
12. An equipment type can be selected in several ways, i.e., by depressing NEXT UNIT until the correct equipment type is displayed, or by entering the equipment type and depressing ENTER.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
13. If no default equipment location is displayed, enter the equipment type to be tested in Field 2 and depress ENTER or use NEXT UNIT to step through the equipment types in numerical sequence until the equipment type to be tested is displayed in Field 2.

If a default equipment location is displayed, enter the equipment type to be tested in Field 2 and depress ENTER.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
Test 2 starts with the first network module, first cabinet and carrier, and runs until all network peripherals of the equipment type selected are tested.

Proceed to Step 23.
14. In addition to testing all network peripherals in a specified equipment type, a range of network peripherals for the equipment type (all network peripherals for an equipment type in a module, cabinet, carrier, or slot) can be selected for testing.
15. To select all network peripherals for an equipment type in a module for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: Equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type to be tested); ENTER; (Module number to be tested); ENTER.
CHANGE FIELD; 2; ENTER; (Equipment type to be tested); ENTER; (Module number to be tested); ENTER.

Test 2 starts with the first network peripheral of the equipment type specified, in the module selected, and runs until all network peripherals of the equipment type in the module are tested.

Proceed to Step 23.
16. To select all network peripherals for an equipment type in a cabinet for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: Equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type to be tested); ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type to be tested); ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Test 2 starts with the first network peripheral of the equipment type specified, in the cabinet selected, and runs until all network peripherals of the equipment type in the cabinet are tested.

Proceed to Step 23.
17. To select all network peripherals for an equipment type in a carrier for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: Equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type to be tested); ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type to be tested); ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

Test 2 starts with the first network peripheral of the equipment type specified, in the carrier selected, and runs until all network peripherals of the equipment type in the carrier are tested.

Proceed to Step 23.
18. To select all network peripherals for an equipment type in a slot for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: Equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type to be tested); ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type to be tested); ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.
Test 2 starts with the first network peripheral of the equipment type specified, in the slot selected, and runs until all network peripherals of the equipment type in the slot are tested.
Proceed to Step 23.
19. A specific network peripheral can be selected for testing by performing one of the following depending on whether or not a default equipment location is displayed:

Note: Specific network peripherals for equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
Proceed to Step 22.
20. A specific network peripheral can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.

Depress NEXT UNIT until the equipment type of the network peripheral to be tested is displayed in Field 2.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Depress NEXT CIRCUIT until the port equipment location of the network peripheral to be tested is displayed in Fields 3 through 7.

Proceed to Step 22.
21. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 22.

Caution: Busying out a port equipment location results in loss of customer calls or data when the port equipment location is in use.
22. Individual port equipment locations can be placed in maintenance busy out status for testing by performing the following:
Check the circuit status displayed in Field 9.
If the circuit status $=2$, proceed to Step 23.
If the circuit status does not equal 2, depress BUSY OUT and proceed to Step 23.
Note: If Fields 3 through 7 are not entered, special error code 88 (fields 3 through 7 must be entered before use of BUSY OUT) is displayed in the MAAP error code field.
23. Prior to starting Test 2, it must be determined if non-service-affecting tests or serviceaffecting tests are to be executed.

Caution: A customer's normal service is aborted when service-affecting tests are performed as the network peripheral (or peripherals) is taken out-of-service while service-affecting tests are being performed.
24. To perform service-affecting tests, Field 10 (test mode) must be changed to a 1 using the CHANGE FIELD sequence:
CHANGE FIELD; 10; ENTER; 1; ENTER.

## Test 2 Execution

1. To start Test 2 after selecting the network peripheral(s) to be tested and the test mode, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. When an in-use network peripheral is encountered during Test 2 execution in the non-serviceaffecting test mode (for a range of network peripherals or for a single network peripheral) the IN-USE indicator is lighted on the MAAP while the transparent test is being performed.
3. Test 2 operation and display of test results is different when a specific network peripheral or default equipment location is tested and when the entire switch or a range of network peripherals are tested.
4. For test operation and display of test results for a default equipment location or a specific network peripheral, proceed to Step 1 of Test 2 Operation and Test Result Display for a Single Circuit.
5. For test operation and display of test results for the entire switch or a range of network peripherals, proceed to Step 1 of Test 2 Operation and Test Result Display for a Range of Circuits.

## Test 2 Operation and Test Result Display for a Single Circuit

1. When Test 2 is completed for a default equipment location or a specific network peripheral, the WAIT indicator is turned off and the following is displayed:
Field 1-2.
Field 2-Equipment type of network peripheral tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral tested.
Field 8-Alarm status of network peripheral tested.
Field 9 - Current circuit status of network peripheral tested ( $0=$ idle, $1=$ in-use, $2=$ busied out).
Field 10 - Test mode (0 or 1).
Fields 11 and 12 - Dashed.
Field 13-1 (Indicating one network peripheral tested).
Field 14-0 (Indicating no failures were found for the peripheral tested) or 1 (Indicating that the network network peripheral failed the test).
Field 15 - Failure index.
2. When a specific network peripheral or the default equipment location fails Test 2 (indicated by a 1 in Field 14), depressing NEXT DATA displays the index and specific fault code recorded for the network peripheral tested in Fields 11 and 12.

Note: When the port equipment location was busied out and the test passed, or the problem was corrected, the circuit should be released from busy using RLS BUSY OUT.
3. When another specific network peripheral is to be tested, the CHANGE FIELD sequence must be used to select the specific network peripheral:

Note: Specific network peripherals for equipment types 8 through 18 cannot be selected in R2V1.

CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
4. EXECUTE must be depressed to test the specific network peripheral selected for testing.

## Test 2 Operation and Test Result Display for a Range of Circuits

1. When the entire switch or a range of circuits is being tested for network peripheral failures, the WAIT indicator is turned on and the following fields are incremented as a circuit is tested:
Field 2 - Equipment type of network peripheral being tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral being tested.
Field 8 - Alarm status of network peripheral being tested.
Field 9 - Current circuit status of network peripheral being tested ( $0=$ idle, $1=$ in-use, $2=$ busied out).

Field 13 - Number of network peripherals tested.
Field 14 - Number of network peripherals failed (if any).
2. The failure information returned in the test is stored in DMIDS.

If DMIDS becomes full at any time during the test, Test 2 is stopped and the WAIT indicator is turned off.

The last network peripheral tested is displayed in Fields 2 through 7, Field 10 displays the test mode, and special error code 82; (DMIDS overflow), is displayed in the MAAP error code field.
3. Results of the test can be examined at this time (See Steps 11 through 15 below) and Test 2 can be continued from where it was stopped, i.e., from the port equipment location displayed in Fields 3 through 7.

Caution: If Test 2 is continued from where it was stopped by a DMIDS overflow, any test results gathered to that point are lost and only new failure data is retained.

Note: Before depressing EXECUTE to continue Test 2 from where it was stopped because of a DMIDS overflow, the failure data should be examined and recorded.
4. If Test 2 is halted because of a DMIDS overflow, a new range of network peripherals to be tested can be entered instead of continuing the test from where it was stopped.
5. The CHANGE FIELD sequence must be used to enter the new range of network peripherals to be tested.

Refer to Steps 7 through 10 of Test 2 Data Entry above to select a range of network peripherals to be tested in a module, cabinet, carrier, or slot.
Refer to Steps 15 through 18 of Test 2 Data Entry above to select a range of network peripherals within an equipment type to be tested in a module, cabinet, carrier, or slot.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
EXECUTE must be depressed to begin Test 2 from the new range of network peripherals entered or from where the test was stopped.
6. STOP can be depressed when the entire switch or a range of network peripherals is being tested.

Note: Test 2 does not stop until the network peripheral being tested is completed. Special error code 86 (wait until test completes) is displayed in the MAAP error code field until the test is completed.
7. If Test 2 is stopped before one complete testing pass through the range of network peripherals specified is made, the total number of network peripherals tested and the total number of network peripherals failed (if any) are displayed in Fields 13 and 14.

The equipment type and port equipment location of the last network peripheral tested is displayed in Fields 2 through 7 , Field 10 displays the test mede, and special error code 83 (test of range not completed) is displayed in the MAAP error code field.
8. Test result information can be stepped through as described in Steps 10 through 15 below when Test 2 is halted using STOP even though the entire range is not tested.
9. To restart the test when Test 2 is halted by use of STOP before the range of network peripherals are tested at least once, EXECUTE is depressed and Test 2 starts at the port equipment location following the last port equipment location tested.

Note: When Test 2 is continued from where it was stopped any test results gathered to that point are lost and only new failure data is retained.
10. When the entire switch or a range of network peripherals are tested, the WAIT indicator is turned off and a summary is displayed.
If no network peripherals failed, the following summary is displayed:
Field 1-2.
Fields 2 through 6 - Equipment type and location of the range of network peripherals tested.
Field 10 - Test mode (0 or 1).
Field 13 - Number of network peripherals tested.
Field 14-0 (Indicating no failures).
11. If any network peripherals failed, the summary displays a 2 in Field 1 , the equipment type and location of the range of network peripherals tested in Fields 2 through 6, the test mode in Field 10, the total number of network peripherals tested in Field 13, and the total number of failures in Field 14.
12. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-2.
Field 2 - Equipment type of failing network peripheral.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of failing network peripheral,
Field 8 - Alarm status of failing network peripheral.
Field 9 - Current circuit status of failing network peripheral ( $0=$ idle, $1=$ in-use, $2=$ busied out).

Field 10 - Test mode (0 or 1).

Field 11 - Fault code index.
Field 12 - Specific fault code.
Field 13 - Number of times the network peripheral was tested.
Field 14 - Number of times the network peripheral failed.
Field 15 - Failure index.
13. Depressing NEXT CIRCUIT repeatedly displays the remaining failing network peripherals.
14. When more than one equipment type is tested, depressing NEXT UNIT causes the first network peripheral of the next equipment type with failures to be displayed.
Field 15 decrements corresponding to the number of failures passed over (if any) when stepping from equipment type to equipment type.
NEXT CIRCUIT is used to step through the failures of the displayed equipment type.
15. When all failing network peripherals are displayed, depressing NEXT CIRCUIT or NEXT UNIT dashes Fields 2 through 9, and 11 through 15.
Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing network peripherals can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
16. To select another range of network peripherals to test, the CHANGE FIELD sequence must be used.

Refer to Steps 7 through 10 of Test 2 Data Entry above to select a range of network peripherals to be tested in a module, cabinet, carrier, or slot.
Refer to Steps 15 through 18 of Test 2 Data Entry above to select a range of network peripherals within a equipment type to be tested in a module, cabinet, carrier, or slot.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
EXECUTE must be depressed to test the range of network peripherals selected for testing.
17. The NETWORK PERIPH EQPT fault indicator is turned off when Test 2 completes with no failures detected for ail network peripherals that had raised an alarm.

Note: Network peripheral alarmed circuit entries in PMIDS are marked as resolved.
18. The MINOR or WARNING alarm indicator is also turned off if no other sources are affecting the alarm indicator.

## Test 3

Test 3 is used to test one or more network peripherals in a continuous cycle.
Two modes of testing are provided in Test 3, i.e., service-affecting and non-service-affecting.

1. The use of the non-service-affecting test mode performs only transparent tests on network peripherals without affecting customer's service.
2. The service-affecting test mode provides complete testing of a network peripheral and is destructive, aborting any call in progress to a network peripheral and taking the network peripheral selected for testing out-of-service.

## PROC 622 Test 3

Test 3 is mainly used when an intermittent fault is suspected, when using test equipment to further isolate a problem, or to trace wiring problems.

Network peripherals can be selected for testing by equipment type, a range of port equipment locations, or on a single circuit basis.

## Test 3 Data Entry

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3.
2. When Test 3 is initially called in, a default equipment location may be displayed in Fields 3 through 7. Field 8 displays the alarm status, Field 9 displays the circuit status, and Field 10 (test mode) displays a 0 .

Field 2 (equipment type) is blinking, indicating an optional entry field.
Note: Equipment types 8 through 18 cannot be selected in R2V1.
3. Normally, a specific network peripheral or the default equipment location is tested in Test 3 . However, network peripheral selection for testing in Test 3 is identical to Test 2.

All network peripherals, a range of network peripherals, all network peripherals within an equipment type, a combination of equipment type and range (i.e., all network peripherals of an equipment type in the range specified), a specific network peripheral, or the default equipment location can be tested.
4. When all network peripherals in the switch are to be tested continuously, refer to Step 5 of Test 2 Data Entry for network peripheral selection.

To select all network peripherals in a specific module to be tested continuously, refer to Step 7 of Test 2 Data Entry.

To select all network peripherals in a specific cabinet to be tested continuously, refer to Step 8 of Test 2 Data Entry.
To select all network peripherals in a specific carrier to be tested continuously, refer to Step 9 of Test 2 Data Entry.
To select all network peripherals in a specific slot to be tested continuously, refer to Step 10 of Test 2 Data Entry.

Proceed to Step 10.
5. When all network peripherals in an equipment type are to be tested continuously, refer to Steps 11 and 12 of Test 2 Data Entry for equipment type selection.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
To select all network peripherals of an equipment type in a specific module to be tested continuously, refer to Step 15 of Test 2 Data Entry.

To select all network peripherals of an equipment type in a specific cabinet to be tested continuously, refer to Step 16 of Test 2 Data Entry.

To select all network peripherals of an equipment type in a specific carrier to be tested continuously, refer to Step 17 of Test 2 Data Entry.

To select all network peripherals of an equipment type in a specific slot to be tested continuously, refer to Step 18 of Test 2 Data Entry.

Proceed to Step 10.
6. A specific network peripheral can be selected for testing by performing one of the following depending on whether or not a default equipment location is displayed:

Note: Specific network peripherals for equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Proceed to Step 9.
7. A specific network peripheral can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.

Depress NEXT UNIT until the equipment type of the network peripheral to be tested is displayed in Field 2.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Depress NEXT CIRCUIT until the port equipment location of the network peripheral to be tested is displayed in Fields 3 through 7.
Proceed to Step 9.
8. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 9.

Caution: Busying out a port equipment location results in loss of customer calls or data when the port equipment location is in use.
9. Individual port equipment locations can be placed in maintenance busy out status for testing by performing the following:
Check the circuit status displayed in Field 9.
If the circuit status $=2$, proceed to Step 10 .
If the circuit status does not equal 2, depress BUSY OUT and proceed to Step 10.
Note: If Fields 3 through 7 are not entered, special error code 88 (fields 3 through 7 must be entered before use of BUSY OUT) is displayed in the MAAP error code field.

## PROC 622 Test 3

10. Prior to starting Test 3 , it must be determined if non-service-affecting tests or serviceaffecting tests are to be executed.

## Caution: A customer's normal service is aborted when service-affecting tests are performed as the network peripheral (or peripherals) is taken out-of-service while service-affecting tests are being performed.

11. To perform service-affecting tests, Field 10 (test mode) must be changed to a 1 using the CHANGE FIELD sequence:

- CHANGE FIELD; 10; ENTER; 1; ENTER.


## Test 3 Execution

1. To start Test 3 after selecting the network peripheral(s) to be tested and the test mode, depress EXECUTE.
The WAIT indicator is not turned on during Test 3 execution.
2. When an in-use network peripheral is encountered during Test 3 execution in the non-serviceaffecting test mode (for a range of network peripherals or for a single network peripheral) the IN USE indicator is lighted on the MAAP while the transparent test is being performed.
3. If the DMIDS storage buffer becomes full, either during testing of a range of network peripherals or a single network peripheral, special error code 82, (DMIDS overflow), is displayed in the MAAP error code field.

Note: Testing is not stopped when the DMIDS buffer becomes full.
4. When multiple network peripherals are being tested, new errors detected are discarded. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed
Refer to Test 3 Result Display for a Range of Circuits below.
5. When testing a single network peripheral, new errors detected are added to the failure list, and the oldest errors are deleted. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed.

Refer to Test 3 Result Display for a Single Circuit below.
6. Only 99 errors can be displayed when the DMIDS buffer becomes full. When multiple network peripherals are being tested, the 99 errors are the oldest errors recorded. When a single network peripheral is tested, the 99 errors are the newest errors recorded.
7. When the entire switch or a range of network peripherals is being tested continuously in Test 3 , the following fields are incremented as an network peripheral is tested:

Field 2 - Equipment type of network peripheral being tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral being tested.
Field 8 - Alarm status of network peripheral being tested.
Field 9 - Current circuit status of network peripheral being tested ( $0=$ idle, $1=$ in-use, $2=$ busied out).
Field 13 - Number of network peripherals tested.
Field 14 - Number of network peripherals failed (if any).
8. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.

Note: Test 3 does not stop until the network peripheral being tested is completed. Special error code 86 (wait until test completes) is displayed in the MAAP error code field until the test is completed.
9. Display of test results is different when a specific network peripheral or default equipment location is tested and when the entire switch or a range of network peripherals are tested.
10. For display of test results when testing a default equipment location or a specific network peripheral, proceed to Step 1 of Test 3 Result Display for a Single Circuit.
For display of test results when testing the entire switch or a range of network peripherals, proceed to Step 1 of Test 3 Result Display for a Range of Circuits.

## Test 3 Result Display for a Single Circuit

1. When Test 3 is stopped while testing a default equipment location or a specific network peripheral, the following is displayed:
Field 1-3.
Field 2 - Equipment type of network peripheral tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral tested.
Field 8 - Alarm status of network peripheral tested.
Field 9 - Current circuit status of network peripheral tested $(0=$ idle, $1 .=$ in-use, $2=$ busied out).
Field 10 - Test mode (0 or 1).
Fields 11 and 12 - Dashed.
Field 13 - Number of times the network peripheral was tested.
Field 14-0 (Indicating no failures were detected for the network peripheral tested) or number of times the network peripheral failed.

Field 15 - Failure index.
2. When a specific network peripheral or the default equipment location failed Test 3 (indicated by Field 14), depressing NEXT DATA displays the index and specific fault code recorded for the network peripheral tested in Fields 11 and 12.
Field 15 displays the number of fault codes recorded against the failing network peripheral.
3. Multiple fault codes may have been recorded for the failing network peripheral displayed in Fields 3 through 7 as indicated by Field 15 displaying more than 1 (which is an index to fault codes).
4. Depressing NEXT FAULT displays in Field 12 the next fault code (if any) recorded against the failing network peripheral and Field 15 is decremented corresponding to the number of fault codes which were the same.

Note: When NEXT FAULT is depressed, Fields 11 through 15 may be dashed. This indicates that all remaining fault codes were the same. Dashing of Fields 11 through 15 can occur at any time when NEXT FAULT is depressed, no matter what number was displayed in Field 15 before NEXT FAULT was depressed.
5. When all fault codes for the failing network peripheral are displayed, depressing NEXT FAULT once more dashes Fields 11 through 15.

Depressing NEXT FAULT again displays the first fault code recorded for the failing network peripheral.
6. When the port equipment location was busied out and the test passed, or the problem was corrected, the circuit should be released from busy using RLS BUSY OUT.
7. When another specific network peripheral is to be tested, the CHANGE FIELD sequence must be used to select the specific network peripheral:

CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
8. EXECUTE must be depressed to test the specific network peripheral selected for testing.

## Test 3 Result Display for a Range of Circuits

1. When Test 3 is stopped while testing the entire switch or a range of network peripherals, a summary is displayed.
2. If no network peripherals failed, the following summary is displayed:

Field 1-3.
Fields 2 through 6 . Equipment type and location of the last network peripheral tested, or the equipment type and location of the range of network peripherals selected for testing.
Field 10 - Test mode ( 0 or 1).
Field 13 - Number of network peripherals tested.
Field 14-0 (Indicating no failures).
3. If any network peripherals failed, the summary displays a 3 in Field 1, the equipment type and location of the last network peripheral tested, or the equipment type and location of the range of network peripherals tested in Fields 2 through 6, the test mode in Field 10, the total number of network peripherals tested in Field 13, and the total number of failures in Field 14.
4. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-3.
Field 2 - Equipment type of failing network peripheral.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of failing network peripheral.
Field 8-Alarm status of failing network peripheral.
Field 9 - Current circuit status of failing network peripheral ( $0=$ idle, $1=$ in-use, $2=$ busied out).

Field 10 - Test mode (0 or 1).
Field 11 - Fault code index.
Field 12 - Specific fault code.
Field 13 - Number of times the network peripheral was tested.
Field 14 - Number of times the network peripheral failed.
Field 15 - Failure index.

Note: Multiple fault codes are not recorded for each failing network peripheral when a range of network peripherals are tested.
5. Depressing NEXT CIRCUIT repeatedly displays the remaining failing network peripherals.
6. When more than one equipment type is tested, depressing NEXT UNIT causes the first network peripheral of the next equipment type with failures to be displayed.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Field 15 decrements corresponding to the number of failures passed over (if any) when stepping from equipment type to equipment type.

NEXT CIRCUIT is used to step through the failures of the displayed equipment type.
7. When all failing network peripherals are displayed, depressing NEXT CIRCUIT or NEXT UNIT dashes Fields 2 through 9, and 11 through 15.
Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing network peripherals can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
8. Test 3 can be restarted without changing the default equipment location or range of network peripherals originally entered for testing by depressing EXECUTE.

The same default equipment location or range of network peripherals is used as the basis for the new execution of Test 3.

Any data gathered in the last execution of Test 3 is lost when EXECUTE is depressed.
9. To select another range of network peripherals to test, the CHANGE FIELD sequence must be used.

Refer to Test 2 Data Entry, Steps 7 through 10 to select a range of network peripherals to be tested in a module, cabinet, carrier, or slot.

Refer to Test 2 Data Entry, Steps 15 through 18 to select a range of network peripherals within a equipment type to be tested in a module, cabinet, carrier, or slot.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
EXECUTE must be depressed to test the range of network peripherals selected for testing.

## PROC 622 Test 3 and Test 4

10. The NETWORK PERIPH EQPT fault indicator is turned off when Test 3 completes with no failures detected for all network peripherals that had raised an alarm.

Note: Network peripheral alarmed circuit entries in PMIDS are marked as resolved.
11. The MINOR or WARNING alarm indicator is also turned off if no other sources are affecting the alarm indicator.

## Test 4

Test 4 is used to continuously test the transmission quality to a specific network peripheral or a range of network peripherais.
Test 4 uses the Digital Transmission Link (DTL) looparound test to detect bit errors over the DTL link.

Test 4 must be performed in the service-affecting test mode.
Network peripherals can be selected for testing by equipment type, a range of port equipment locations, or on a single circuit basis.

## Test 4 Data Entry

1. Test 4 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 4.
2. When Test 4 is initially called in, a default equipment location may be displayed in Fields 3 through 7. Field 8 displays the alarm status, Field 9 displays the circuit status, and Field 10 (test mode) displays a 0 .
Field 2 (equipment type) is blinking, indicating an optional entry field.
Note: Equipment types 8 through 18 cannot be selected in R2V1.
3. Normally, a specific network peripheral or the default equipment location is tested in Test 4. However, network peripheral selection for testing in Test 4 is identical to Test 2.

Caution: Testing a range of network peripherals in the service-affecting test mode affects properly functioning network peripherals.
4. All network peripherals, a range of network peripherals, all network peripherals within an equipment type, a combination of equipment type and range (i.e., all network peripherals of an equipment type in the range specified), a specific network peripheral, or the default equipment location can be tested.
5. When all network peripherals in the switch are to be tested continuously, refer to Step 5 of Test. 2 Data Entry for network peripheral selection.
To select all network peripherals in a specific module to be tested continuously, refer to Step 7 of Test 2 Data Entry.
To select all network peripherals in a specific cabinet to be tested continuously, refer to Step 8 of Test 2 Data Entry.

To select all network peripherals in a specific carrier to be tested continuously, refer to Step 9 of Test 2 Data Entry.

To select all network peripherals in a specific slot to be tested continuously, refer to Step 10 of Test 2 Data Entry.

Proceed to Step 11.
6. When all network peripherals in an equipment type are to be tested continuously, refer to Steps 11 and 12 of Test 2 Data Entry for equipment type selection.

Note: Equipment types 8 through 18 cannot be selected in R2V1.
To select all network peripherals of an equipment type in a specific module to be tested continuously, ref'er to Step 15 of Test 2 Data Entry.
To select all network peripherals of an equipment type in a specific cabinet to be tested continuously, refer to Step 16 of Test 2 Data Entry.
To select all network peripherals of an equipment type in a specific carrier to be tested continuously, refer to Step 17 of Test 2 Data Entry.

To select all network peripherals of an equipment type in a specific slot to be tested continuously, refer to Step 18 of Test 2 Data Entry.

Note: Special error code 87 (equipment type can not be tested in test 4) is displayed in the MAAP error code field if equipment type 4 ( 72 Series terminal) is selected for testing and EXECUTE is depressed.

Proceed to Step 11.
7. A specific network peripheral can be selected for testing by performing one of the following depending on whether or not a default equipment location is displayed:

Note: Specific network peripherals for equipment types 8 through 18 cannot be selected in R2V1.
(Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number̈); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.

Proceed to Step 10.
8. A specific network peripheral can also be selected for testing by use of NEXT UNIT and NEXT CIRCUIT.
Depress NEXT UNIT until the equipment type of the network peripheral to be tested is displayed in Field 2.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Depress NEXT CIRCUIT until the port equipment location of the network peripheral to be tested is displayed in Fields 3 through 7.
Proceed to Step 10.

## PROC 622 Test 4

9. To test the default equipment location displayed in Fields 2 through 7, proceed to Step 10.

Caution: Busying out a port equipment location results in loss of customer calls or data when the port equipment location is in use.
10. Individual port equipment locations can be placed in maintenance busy out status for testing by checking the circuit status displayed in Field 9.
11. If the circuit status $=2$, proceed to Step 13 .
12. If the circuit status does not equal 2, depress BUSY OUT and proceed to Step 13.

Note: If Fields 3 through 7 are not entered, special error code 88 (fields 3 through 7 must be entered before use of BUSY OUT) is displayed in the MAAP error code field.

Caution: A customer's normal service is aborted when service-affecting tests are performed as the network peripheral (or peripherals) is taken out-of-service while service-affecting tests are being performed.
13. To perform Test 4 (service-affecting), Field 10 (test mode) must be changed to a 1 using the CHANGE FIELD sequence:

## CHANGE FIELD; 10; ENTER; 1; ENTER.

Note: Special error code 84 (test 4 must be run in mode 1) is displayed in the MAAP error code field if Field 10 is not changed to a 1 and EXECUTE is depressed.

## Test 4 Execution

1. To start Test 4 after selecting the network peripheral(s) to be tested and test mode 1, depress EXECUTE.
The WAIT indicator is not turned on during Test 4 execution.
2. If the DMIDS storage buffer becomes full, either during testing of a range of network peripherals or a single network peripheral, special error code 82, (DMIDS overflow), is displayed in the MAAP error code field.

Note: Testing is not stopped when the DMIDS buffer becomes full.
3. When multiple network peripherals are being tested, new errors detected are discarded. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed.
Refer to Test 4 Result Display for a Range of Circuits below.
4. When testing a single network peripheral, new errors detected are added to the failure list, and the oldest errors are deleted. Test results can be examined when the DMIDS buffer becomes full and STOP is depressed.
Refer to Test 4 Result Display for a Single Circuit below.
5. Only 99 errors can be displayed when the DMIDS buffer becomes full. When multiple network peripherals are tested, the 99 errors are the oldest errors recorded. When a single network peripheral is tested, the 99 errors are the newest errors recorded.
6. When the entire switch or a range of network peripherals is being tested continuously in Test 4, the following fields are incremented as a network peripheral is tested:

Field 2 - Equipment type of network peripheral being tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral being tested.
Field 8 - Alarm status of network peripheral being tested.
Field 9 - Current circuit status of network peripheral being tested ( $0=$ idle, $1=$ in-use, $2=$ busied out).

Field 13 - Number of network peripherals tested.
Field 14 - Number of network peripherals failed (if any).
7. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.

Note: Test 4 does not stop until the network peripheral being tested is completed. Special error code 86 (wait until test completes) is displayed in the MAAP error code field until the test is completed.
8. Display of test results is different when a specific network peripheral or default equipment location is tested and when the entire switch or a range of network peripherals are tested.
9. For display of test results when testing a default equipment location or a specific network peripheral, proceed to Step 1 of Test 4 Result Display for a Single Circuit.
10. For display of test results when testing the entire switch or a range of network peripherals, proceed to Step 1 of Test 4 Result Display for a Range of Circuits.

## Test 4 Result Display for a Single Circuit

1. When Test 4 is stopped while testing a default equipment location or a specific network peripheral, the following is displayed:
Field 1-4.
Field 2-Equipment type of network peripheral tested.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of network peripheral tested.
Field 8 - Alarm status of network peripheral tested.
Field 9 - Current circuit status of network peripheral tested $(0=$ idle, $1=$ in-use, $2=$ busied out).

Field 10 - Test mode (1).
Fields 11 and 12 - Dashed.
Field 13 - Number of times the network peripheral was tested.
Field 14-0 (Indicating no failures were detected for the network peripheral tested) or number of times the network peripheral failed.
Field 15 - Failure index.
2. When a specific network peripheral or the default equipment location fails Test 4 (indicated by Field 14), depressing NEXT DATA displays the index and specific fault code recorded for the network peripheral tested in Fields 11 and 12.
Field 15 displays the number of fault codes recorded against the failing network peripheral.
3. Multiple fault codes may have been recorded for the failing network peripheral displayed in Fields 3 through 7 as indicated by Field 15 displaying more than 1 (which is an index to fault codes).
4. Depressing NEXT FAULT displays in Field 12 the next fault code (if any) recorded against the failing network peripheral and Field 15 is decremented corresponding to the number of fault codes which were the same.

Note: When NEXT FAULT is depressed, Fields 11 through 15 may be dashed. This indicates that all remaining fault codes were the same. Dashing of Fields 11 through 15 can occur at any time when NEXT FAULT is depressed, no matter what number was displayed in Field 15 before NEXT FAULT was depressed.
5. When all fault codes for the failing network peripheral are displayed, depressing NEXT FAULT once more dashes Fields 11 through 15.
Depressing NEXT FAULT again displays the first fault code recorded for the failing network peripheral.
6. When the port equipment location was busied out and the test passed, or the problem was corrected, the circuit should be released from busy using RLS BUSY OUT.
7. When another specific network peripheral is to be tested, the CHANGE FIELD sequence must be used to select the specific network peripheral:
CHANGE FIELD; 2; ENTER; (Equipment type of network peripheral to be tested); ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number to be tested); ENTER.
Enter test mode 1 and depress EXECUTE.

## Test 4 Result Display for a Range of Circuits

1. When Test 4 is stopped while testing the entire switch or a range of network peripherals, a summary is displayed.
2. If no network peripherals failed, the following summary is displayed:

Field 1-4.
Fields 2 through 6-Equipment type and location of the last network peripheral tested, or the equipment type and location of the range of network peripherals selected for testing.
Field 10 - Test mode (1).
Field 13 - Number of network peripherals tested.
Field 14-0 (Indicating no failures).
3. If any network peripherals failed, the summary displays a 4 in Field J, the equipment type and location of the last network peripheral tested, or the equipment type and location of the range of network peripherals tested in Fields 2 through 6, the test mode in Field 10, the total number of network peripherals tested in Field 13, and the total number of failures in Field 14.
4. Depressing NEXT CIRCUIT displays the first failure, as follows:

Field 1-4.
Field 2 - Equipment type of failing network peripheral.
Note: Equipment types 8 through 18 are not displayed in R2V1.
Fields 3 through 7 - Port equipment location of failing network peripherad.
Field 8 - Alarm status of failing network peripheral.
Field 9 - Current circuit status of failing network peripheral $(0=$ idle, $1=$ in-use, $2=$ busied out).

Field 10 - Test mode (1).
Field 11 - Fault code index.
Field 12 - Specific fault code.
Field 13 - Number of network peripherals tested.
Field 14 - Number of network peripherals failed.
Field 15 - Failure index.
Note: Multiple fault codes are not recorded for each failing network peripheral when a range of network peripherals are tested.
5. Depressing NEXT CIRCUIT repeatedly displays the remaining failing network peripherals.
6. When more than one equipment type is tested, depressing NEXT UNIT cause the first network peripheral of the next equipment type with failures to be displayed.

Note: Equipment types 8 through 18 are not displayed by use of NEXT UNIT in R2V1.
Field 15 decrements corresponding to the number of failures passed over (if any) when stepping from equipment type to equipment type.
NEXT CIRCUIT is used to step through the failures of the displayed equipment type.
7. When all failing network peripherals are displayed, depressing NEXT CIRCUIT or NEXT UNIT dashes Fields 2 through 9 , and 11 through 15 .

Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing network peripherals can be stepped through again by use of NEXT CIRCUIT and NEXT UNIT.
8. Test 4 can be restarted withoat changing the default equipment location or range of network peripherals originally entered for testing by depressing EXECUTE.

The same default equipment location or range of network peripherals is used as the basis for the new execution of Test 4.

Any data gathered in the last execution of Test 4 is lost when EXECUTE is depressed.
9. To select another range of network peripherals to test, the CHANGE FIELD sequence must be used.
Refer to Test 2 Data Entry, Steps 7 through 10 to select a range off network peripherals to be tested in a module, cabinet, carrier, or slot.
Refer to Test 2 Data Entry, Steps 15 through 18 to select a range of network peripherals within a equipment type to be tested in a module, cabinet, carrier, or slot.

Note: Equipment types 8 through 18 cannot be selected in R2V1;
Enter test mode 1 and depress EXECUTE.

## Repair Guide

## Overview

The repair guide for network peripheral troubles is divided into three parts, i.e., Unterminated Terminals, Alarmed Troubles, and User Reported Troubles.

## Unterminated Terminals

Unterminated terminal failures can occur any time up to 30 minutes after a power down.
If unterminated terminals are suspected as the failures, perform the following steps.

1. Delete the alarmed network peripherals associated with the suspected unterminated terminals in PROC 600 Test 1.
2. Wait approximately 10 to 15 minutes.
3. If the same network peripherals are alarmed again, perform the repair guide for Alarmed Troubles below.

## Alarmed Troubles

When the NETWORK PERIPH EQPT, and MINOR or WARNING alarm indicators on the alarm panel are lighted (indicating a network peripheral failure) or when PROC 622 is referenced from PROC 600 (Alarm causes/error log) as a potential problem, the following steps should be performed in the order listed to isolate and repair the faulty unit.

1. Execute Test 1 and manually record the failure history generated by the on-line maintenance software.

Determine which failures have an alarm status code of 2 or 3 (minor or warning).
2. Execute Test 2.

Test 2 runs a variable length of time depending on the number of network peripherals being tested, i.e., the entire switch, a range of network peripherals, a specific network peripheral, or the default equipment location.
3. Test 2 must be run for each network peripheral recorded in Test 1 with an alarm status of 2 or 3 (minor or warning) and for the default equipment location passed from PROC 600 Test 1 or 2 or from PROC 620 (Network procedure).
4. If all network peripherals pass Test 2, the NETWORK PERIPH EQPT fault indicator is turned off.

When Test 2 passes and network peripheral failures are recorded in Test 1 with an alarm status of 2 or 3 (minor or warning) proceed to Step 11 for further testing to ensure that no intermittent failures exist.
5. If any failures are detected in Test 2, display the network peripheral failure on the MAAP.
6. If Test 2 returns a single fault code of 2 ( 48 volt overload), determine the type of GPP circuit pack installed at the equipment location displayed in Fields 3 through 6.

If SN270 is installed, replace the blown fuse and proceed to Step 11.
If SN270B is installed, replace the circuit pack and proceed to Step 11.
7. If Test 2 returns a single fault code of 7 (digital instrument has bad state of health), replace the network peripheral and proceed to Step 11.
8. If Test 2 returns a single fault code of 3 (DTL link idle) or 12 (no response from network peripheral), proceed to Step 9 .
9. When fault code 3 or 12 is displayed, maintenance personnel must go to the location of the suspect network peripheral and check the DTL cable.

Note: PROC 622 is unable to resolve the difference between a dead network peripheral and a severed DTL cable.
10. Check to see if phantom power is being supplied.

If no voltage can be measured, the DTL cable should be inspected and repaired or replaced.
If voltage is present, the network peripheral should be replaced with a network peripheral of the same type.

Proceed to Step 11.
11. Execute Test 3 in a non-service-affecting test mode.

It may be the case that a malfunctioning network peripheral always looks in-use.
If this is true, the non-service-affecting mode of testing does not test the network peripheral. This situation requires the service-affecting mode of testing.

Caution: Testing a large range of network peripherals in the service-affecting mode may affect many properly functioning network peripherals.

Note: It is recommended that service-affecting mode testing be performed on only one network peripheral at-a-time.

When network peripherals always look in-use (results are obtained from Test 2) use the service-affecting mode to test the network peripheral.

The network peripheral being tested is the default equipment location from Test 2 of PROC 622.

## PROC 622

12. Continuously test the suspect network peripheral to determine if it fails.

If the network peripheral passes Test 3 , proceed to Step 15.
If the network peripheral fails Test 3, proceed to Step 13.
13. Use PROC 620 Test 4 (unit type 27 or 28 ) to test the General Purpose Port (GPP) or 72 Series terminal port associated with the failing network peripheral.

If PROC 620 fails, take the appropriate corrective action.
When PROC 620 passes after taking corrective action, repeat Test 3 of PROC 622 to ensure that the failure is corrected.

Proceed to Step 18.
14. If PROC 620 passes, replace the faulty network peripheral and repeat Test 3 of PROC 622.

If Test 3 passes, proceed to Step 15.
If Test 3 fails, check the wiring associated with the port equipment circuit pack and the network peripheral.
15. It may be the case that all network peripherals pass test 2 or 3 , but occasional errors are still recorded in PMIDS or a user reports occasionally garbled data.

Note: These problems may be caused by noise on the DTL lines.
16. Test 4 tests only the transmission of the DTL lines. Test 4 detects single bit errors and thus provides a sensitive indicator of noise on the DTL lines.
17. The location entered for Test 4 should be that of the port circuit connected to the suspect DTL lines.

Note: Equipment locations should be tested one-at-a-time as Test 4 is a serviceaffecting test.
18. Execute Test 4 and operate large electrical appliances and the network peripheral in the vicinity of the DTL lines to see if they influence the noise on the DTL link.
If ambient electrical noise is the problem, the DTH, lines and/or network peripheral may need to be relocated or reoriented.
19. In order to resolve the alarmed entries and turn off the NETWORK PERIPH EQPT fault indicator, all falling network peripherals with an alarm status of 2 or 3 (minor or warning) must pass Test 2 or 3.

Repeat Steps 5 through 17 for each failing network peripheral with an alarm status of 2 or 3 .
20. The MINOR or WARNING alarm indicator is also turned off if no other sources are affecting the alarm indicator.

## User Reported Troubles

When user troubles associated with network peripherals are reported and there are no alarms, perform the following steps (as appropriate) for the type of network peripheral reported as the trouble. Repair guidelines for PDM, TDM, or DTDM data modules, and 72 or 74 Series terminals are listed below.

## PDM, TDM, and DTDM data module repair strategy:

For the following user reported troubles, the following steps are provided.

1. Cannot originate calls.

Ask the user to run a self test on the data module and 74 Series terminal (if DTDM).
If the self test fails, replace the data module or 74 Series terminal.
If the self test passes, use PROC 622 Test 1 to check for errors recorded against the data module or 74 Series terminal. Use PROC 622 Test 3 to isolate the trouble.
2. Cannot receive calls.

Ask the user to run a self test on the data module and 74 Series terminal (if DTDM).
If the self test fails, replace the data module or 74 Series terminal.
If the self test passes, use PROC 622 Test 1 to check for errors recorded against the data module or 74 Series terminal. Use PROC 622 Test 3 to isolate the trouble.
3. Data call is apparently set up, but no data can be sent or received.

Ask the user to run the following local tests (Steps 4 through 6) on the data module.
4. Self test - If this test fails, replace the data module.
5. Local loopback - If this test fails, there is a problem between the user's terminal equipment and the data module.
6. Remote loopback or remote loopback and self test combined.

Note: If the user can perform a remote loopback test using the user's terminal equipment, that is the preferred test.

Set up a connection to the remote data terminal and operate the remote loopback button:

Note: For DTL mode 0 and 1 operation, the remote loopback button must be operated before the call is set up.

Perform a remote loopback test or operate the self test button.
If the test passes, the problem is in the remote data module or the user's remote terminal equipment.

If the test fails, the trouble could be in either data module or in any of the circuits between the data modules.

## 72 and 74 Series terminal repair strategy:

For the following user reported troubles, the following steps are provided.

1. No dial tone.

Use PROC 622 Test 1 to check for errors recorded against the terminal and perform PROC 622 Test 3 to isolate the trouble.
2. Cannot dial.

Replace the terminal.

## PROC 622

3. Cannot receive calls.

Use PROC 622 Test 1 to check for errors recorded against the terminal and perform PROC 622 Test 3 to isolate the trouble.
4. Does not ring.

Assuming that there are no other indications of an incoming call, ask the user to perform the dial-up test for ringer.

If the dial-up test does not pass, replace the 72 or 74 Series terminal.
Repeat the dial-up test. If the dial-up test fails again, use PROC 620 Test 4 to check the associated port circuit. Replace the port circuit as necessary.
5. Indicator does not light.

Ask the user to perform the dial-up test for indicator.
If the dial-up test fails, replace the terminal.
6. Buttons do not work.

Ask the user to perform the dial-up test for buttons.
If the dial-up test fails, replace the terminal.
7. Cannot hear.

Replace the handset or terminal.
8. Cannot be heard.

Replace the handset or terminal.

PROC 623 - ANI FAILURES


## Purpose

PROC 623 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from an ANI failure.
This maintenance procedure must be performed on the customer's premises. The ANI '- Data Link Test Set (J59024AJ) must be connected to the switch and test set-up steps performed prior to executing Tests 2 through 4.
PROC 623 is used to:

1. Display ANI trunk circuit failures.
2. Send messages to test an ANI trunk circuit.
3. Turn off the OTHER FAILS fault indicator when all ANI trunk circuits pass Test 2.

Note: ANI alarmed entries in PMIDS are marked as resolved.

## Field Definitions and Codes

Each field of PROC 623 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AE, PROC 623 -Field Definitions and Codes.
Field 1 is an optional input field for changing the test number to be executed.

## Test Equipment Required

An ANI - Data Link Test Set (J59204AJ) is required to perform Tests 2 through 4 of PROC 623.
The ANI test set verifies the 4 -digit trunk and station number assignment of the switch equipped with automatic number identification.
To set up the ANI test set in order to perform Tests 2 through 4, proceed as follows:

1. Position the test set adjacent to the SN244 trunk circuit pack to be tested.
2. At the test set, set the POWER switch to the OFF position.

TABLE AE.

| PROC 623 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | fiel | CODE | definition |
| 1 | 1-4 | Test Number. | 8 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Failure code: Pass <br> No acknowledgement from TN401 module control chennel in SN244 trunk circuit path. 2 -out-of-5 error code. Always busy. No word shift. No loop current. Wrong channel. Bid error. |
| 2 | 0 1 2 3 | Data message being sent in tests 2, 3, and 4: |  | $\begin{aligned} & 2 \\ & 3 \\ & 4 \\ & 5 \\ & 6 \\ & 7 \end{aligned}$ |  |
| 3 | 0-30 | Module number. | 9 | 0-99 | Failures per hour for all circuits and for individual circuits. |
| 4 | 0-7 | Cabinet number. |  |  |  |
| 5 | 0-3 | Carrier number. |  |  |  |
| 6 | 0-3 | SN244 slot number. | 10 | $\begin{gathered} 0- \\ 60,000 \end{gathered}$ | Number, of ANI calls attempted. |
| 7 | 0, 1 | Circuit number. | 11 | 0-99 | Load errors. |
|  |  |  | 12 | 0-99 | Maximum wait interval exexceeded. |
|  |  |  | 13 | 0-99 | Transmission errors. |
|  |  |  | 14 | 0-99 | Queue overflow errors |

3. Connect the furnished test cable to the ANI test set.
4. Connect the 117 Vac test set line cord to a 117 Vac source.
5. At the ANI test set, set the switches as follows:

ERROR MODE/VERIFY MODE - Set to ERROR MODE.
TRUNK/STATION - Set to STATION.
NORMAL/HOLD - Set to NORMAL.
MODE - Set to ANI OR SLF-CH.
ALARM - Set to OFF.
SELF-CHECK - Set to OFF.
POWER - Set to ON.
6. At the test cable, set the ANI TEST switch to ON.

Prior to checking any ANI trunk circuit, perform the following steps:

1. At the cross-connect field, disconnect the tip and ring leads associated with the ANI trunk circuit to be tested.

Caution: If the ANI trunk circuit being tested is connected to the central office instead of the ANI test set, test messages may be recorded as valid ANI calls.
2. Connect the test cable to the SN244 corresponding to the ANI trunk circuit to be tested.
3. Set the CHANNEL switch on the test cable as follows:

Circuit 0 displayed on the MAAP - Set CHANNEL switch to 9 .
Circuit 1 displayed on the MAAP - Set CHANNEL switch to 8 .
In addition to the display on the MAAP indicating whether the trunk circuit being tested passed or failed, the following steps and observations can be performed at the ANI test set.

1. Observe the TRUNK/STATION MATCH display on the test set.

It sequentially displays the trunk or station numbers listed for Field 2 in Table AE, PROC 623 - Field Definitions and Codes.
2. When an error is detected, the following data may be observed on the ANI test set:

ERROR COUNT advances one count.
The error word(s) on the TRUNK/STATION MATCH display is dashed or shown incorrectly.
3. Reverse the TRUNK/STATION switch to complete the display of the remaining messages.
4. Set the NORMAL/HOLD switch to the HOLD position to lock an error into the display register.
If this is not done before the next message is sent, the new message clears the register.
Note: While the switch is in the HOLD position, succeeding messages are not displayed. However, any message with an error advances the error counter.

## Operation of Procedure

## Overview

PROC 623 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from an ANI trunk circuit failure.

To call in PROC 623, perform the following:

1. Depress PROC NO; 623; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

## PROC 623 Test 1

Four tests are available:

1. Test 1 - Displays failure history.
2. Test 2 - Sends four messages to test each ANI trunk circuit.
3. Test 3 - Sends a single message to test the ANI trunk circuit.
4. Test 4 - Continuously sends each of four messages alternately to each circuit of a selected ANI trunk circuit pack.

## Test 1

Test 1 provides a failure history of ANI trunk circuit failures.
Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 623, or is selected by using NEXT TEST or the CHANGE FIELD sequence:
CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. A summary of the failure history is displayed.
4. If one or more failures occurred, the following summary is displayed:

Field 1-1.
Field 9 - Failures per hour.
Field 10 - ANI attempts (number of ANI calls).
Field 11 - Load errors.
Field 12 - Time out errors (maximum wait interval exceeded).
Field 13 - Transmission errors.
Field 14 - Queue overflow errors.
5. Depressing NEXT CIRCUIT displays the first failing ANI equipment location in Fields 3 through 7, and updates Field 9 (failures per hour).
6. After the first failing circuit is displayed, depressing NEXT CIRCUIT repeatedly displays the failures per hour (Field 9) associated with the ANI trunk circuit failure displayed in Fields 3 through 7.
7. After all failures are displayed, depressing NEXT CIRCUIT dashes all fields except Field 1.

Depressing NEXT CIRCUIT again causes Test 1 to be displayed from the beginning, starting with the summary.
8. To manually turn off the OTHER FAILS fault indicator, assuming no other sources are affecting the OTHER FAILS fault indicator after Test 1 is executed at least once, perform the following:

## Depress CLEAR DATA; EXECUTE.

Note: ANI alarmed entries in PMIDS are marked as resolved.

## Test 2

Test 2 automatically sends four test messages to the ANI trunk circuit displayed in Fields 3 through 7.

Test 2 requires the use of the ANI test set to avoid sending test messages to the central office.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 2; ENTER.

2. Depress NEXT CIRCUIT until the equipment location of the ANI circuit to be tested is displayed in Fields 3 through 7.
3. At the cross-connect field, disconnect the tip ( $T$ ) and ring ( $R$ ) leads of the ANI trunk circuit displayed in Fields 3 through 7.
4. Connect the ANI test cable to the SN244 associated with the equipment location displayed in Fields 3 through 6.
5. At the test cable, set the CHANNEL switch to the setting which corresponds to the circuit number displayed in Field 7.

Circuit 0 displayed on the MAAP - Set CHANNEL switch to 9.
Circuit 1 displayed on the MAAP - Set CHANNEL switch to 8 .
6. To start Test 2, depress EXECUTE.

The WAIT indicator turns on and Field 8 is dashed.
7. After the WAIT indicator turns off, the results of the test are displayed in Field 8 (failure code).

If a 0 is displayed in Field 8, Test 2 passed.
8. When a failure is detected, a failure code is displayed in Field 8.

Depressing NEXT UNIT repeatedly displays additional failure codes associated with the failed circuit.
9. STOP can be used to halt the test any time the WAIT indicator is turned on.
10. All ANI trunk circuits must be tested and pass Test 2 in order to resolve the ANI cause of the OTHER FAILS fault indicator.
11. NEXT CIRCUIT is used to select the next ANI trunk circuit to be tested.

Requirement: The T and R leads from the previously tested circuit should be reconnected at the cross-connect field prior to performing Steps 2 through 10 to test the next ANI trunk circuit.
12. The OTHER FAILS fault indicator is automatically turned off when the ANI alarm cause, and all other alarm sources affecting the OTHER FAILS fault indicator are cleared.

Note: ANI alarmed entries in PMIDS are marked as resolved.

## PROC 623 Test 3

## Test 3

Test 3 sends a selected single test message to the ANI trunk circuit displayed in Fields 3 through 7.
Test 3 requires the use of the ANI test set to avoid sending test messages to the central office.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. Depress NEXT CIRCUIT until the equipment location of the ANI circuit to be tested is displayed in Fields 3 through 7.
3. Depress NEXT DATA to select a test data message to be sent.
4. At the cross-connect field, disconnect the ' I and K leads of the $A N \bar{i}$ trunk circuit displayed in Fields 3 through 7.
5. Connect the ANI test cable to the SN244 associated with the equipment location displayed in Fields 3 through 6.
6. At the test cable, set the CHANNEL switch to the setting which corresponds to the circuit number displayed in Field 7.

Circuit 0 displayed on the MAAP - Set CHANNEL switch to 9.
Circuit 1 displayed on the MAAP - Set CHANNEL switch to 8.
7. To start Test 3, depress EXECUTE.

The WAIT indicator turns on and Field 8 is dashed.
8. At the conclusion of Test 3 , the WAIT indicator turns off, and the results of the test are displayed in Field 8 (failure code).

If a 0 is displayed in Field 8, Test 3 passed.
9. If a failure is detected, the following is displayed:

Field 1-3.
Field 2 - Data message being sent.
Fields 3 through 7 - Equipment location of ANI trunk circuit.
Field 8 - Failure code associated with failed ANI trunk circuit.
10. Depressing NEXT UNIT repeatedly displays additional failure codes associated with the displayed equipment location and the test data message sent.
11. STOP can be used to halt the test any time the WAIT indicator is turned on.
12. NEXT DATA advances the test data message index in Field 2, and another test pattern can be sent by depressing EXECUTE.
13. NEXT CIRCUIT is used to select the next. ANI trunk circuit to be tested.

Requirement: The T and R leads from the previously tested circuit should be reconnected at the cross-connect field prior to performing Steps 2 through 12 to test the next ANI trunk circuit.
14. When Test 3 passes, Test 2 must be repeated for all ANI trunk circuits in order to resolve the ANI cause of the OTHER FAILS fault indicator.

## Test 4

Test 4 sends four messages, first to one circuit on the displayed SN244 circuit pack equipment location, then to the other circuit on the circuit pack.
Test 4 is used to continuously test the ANI trunk circuits suspected of having intermittent failures or to trace wiring problems.
Test 4 requires the use of the ANI test set to avoid sending test messages to the central office.

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 4; ENTER.

2. Depress NEXT CIRCUIT until the equipment location of the SN244 circuit pack to be tested is displayed in Fields 3 through 6.
3. At the cross-connect field, disconnect the $T$ and $R$ leads of the ANI trunk circuits associated with the SN244 circuit pack displayed in Fields 2 through 6.
4. Connect the ANI test cable to the SN244 associated with the equipment location displayed in Fields 3 through 6.
5. At the test cable, set the CHANNEL switch to the setting which corresponds to the circuit number displayed in Field 7.
Circuit 0 displayed on the MAAP - Set CHANNEL switch to 9 .
Circuit 1 displayed on the MAAP - Set CHANNEL switch to 8.
6. To start Test 4, depress EXECUTE.
7. The test runs continuously until a failure is detected or STOP is depressed.

Note: The testing interval for the ANI trunk circuits is determined by maintenance personnel performing the test, and is ended by depressing STOP. This allows maintenance personnel to trace wiring problems associated with the SN244 circuit pack.

If a 0 is displayed in Field 8, Test 4 passed.
8. If a failure is detected, the following is displayed:

Field 1-4.
Fields 3 through 7 - Equipment location of ANI trunk circuit.
Field 8 - Failure code associated with ANI trunk circuit.
Field 10 - ANI attempts (number of ANI calls attempted).
9. Depressing NEXT UNIT repeatedly displays additional failure codes associated with the displayed equipment location.
10. STOP can be used to halt the test.
11. NEXT CIRCUIT is used to select the next ANI trunk circuit pack (SN244) to be tested.

Requirement: The T and R leads from the previously tested circuits should be reconnected at the cross-connect field prior to performing Steps 2 through 10 to test the next ANI trunk circuit pack (SN244).
12. When Test 4 passes, Test 2 must be repeated for all ANI trunk circuits in order to resolve the ANI cause of the OTHER FAILS fault indicator.

## Repair Guide

When an ANI trunk circuit failure is indicated, PROC 623 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following steps in the order listed to isolate and repair the faulty unit.

1. Execute Test 1 and record the failure history.
2. Step to Test 2.
3. Select the ANI trunk circuit to be tested by using NEXT CIRCUIT.
4. At the cross-connect field disconnect the $T$ and $R$ leads of the ANI trunk circuit selected in Step 3.
5. Connect the ANI test set to the trunk circuit pack (SN244) containing the trunk circuit selected for testing.
6. At the test cable, set the CHANNEL switch to the setting which corresponds to the circuit number displayed in Field 7.

Circuit 0 displayed on the MAAP - Set CHANNEL switch to 9.
Circuit 1 displayed on the MAAP - Set CHANNEL switch to 8 .
7. Execute Test 2 and record the results.

Note: Test 3 may be used as an aid which enables maintenance personnel to send the same message to the same circuit each time EXECUTE is depressed, or the test data message pattern can be changed by use of NEXT DATA:
8. When failures are recorded, replace SN244.

Repeat Test 2.
9. When Test 2 is repeated after a circuit pack has been removed and a new (or same) circuit pack inserted, the test may fail because the circuit pack is not initialized properly.

Note: Repeat Test 2 before assuming the corrective action taken has not fixed the problem.
10. If Test 2 fails again, check the failure code displayed in Field 8.

If failure code 1 is displayed, test TN401 (module control channel) using PROC 620 Test 3, Unit type 6.

If any other failure code is displayed, check the wiring associated with SN244.
11. If the test initially passes, or passes after corrective action is performed, connect the $T$ and $R$ leads disconnected in Step 4, and repeat Steps 3 through 9 for all ANI trunk circuits.
12. When intermittent ANI circuit failures or wiring problems are suspected, use Test 4 to continuously test suspect circuits.
13. After all failures are corrected, repeat Test 2 for all ANI trunk circuits in order to resolve the ANI cause of the OTHER FAILS fault indicator.

## PROC 624 - CONTACT INTERFACE TEST



## Purpose

PROC 624 is used when a contact interface circuit pack (SN241) is malfunctioning or suspected of being defective.

PROC 624 must be performed by maintenance personnel on the customer's premises as verification of relay operation is performed by monitoring the associated lamp(s).
Any or all relay contacts on a selected contact interface circuit pack can be tested.
After using PROC 624, all lamps on the System Status Indicators (SSI) are cleared from any previous state and are not reinitialized until further use.

## Field Definitions and Codes

Each field of PROC 624 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AF, PROC 624 - Field Definitions and Codes.
Optional input fields are:

1. Field 1-Change test number.
2. Fields 2 through 5 - Select contact interface circuit pack for testing.
3. Field 6 - Select contact on circuit pack to be tested (Tests 3 and 4 only).

TABLE AF.

| FIELD DEFINITIONS AND CODES |  |  |
| :---: | :---: | :--- |
| FIELD | CODE | DEFINITION |
| 1 | $1-4$ | Test number. |
| 2 | $0-30$ | Module number. |
| 3 | $0-7$ | Cabinet number. |
| 4 | $0-3$ | Carrier number. |
| 5 | $0-21$ | SN241 slot number. |
| 6 | $0-7$ | Contact currently <br> selected for test. |
| $7-14$ | 0 | State of each contact: <br> Open. <br> Closed. |
| 15 | 1 | Failure code: <br> Message transmission <br> to module processor <br> failed. |

## Operation of Procedure

## Overview

PROC 624 is used to test a contact interface circuit pack.
To call in PROC 624, perform the following:

1. Depress PROC NO; 624; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and a default contact interface circuit pack is displayed in Fields 2 through 5.

Field 6 (current contact) displays a 0 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Four tests are available:

1. Test 1 - Automatically sequences through all contacts on a contact interface circuit pack, opening and closing each contact exclusively at a 60 Interruptions Per Minute (IPM) rate for 5 seconds.
2. Test 2-Automatically sequences through all contacts on a contact interface circuit pack.

Each contact remains closed for the entire 5-second interval of the contact's test.
3. Test 3-Manual selection of a contact to be tested.

Each contact selected for testing is tested for any desired interval. The contact opens and closes at a 60 IPM rate.
4. Test 4-Manual selection of a contact to be tested.

Each contact selected for testing is tested for any desired interval. The contact remains closed for the duration of the testing interval.

## Test 1

Test 1 automatically sequences through all contacts on a contact interface circuit pack, opening and closing each contact on the circuit pack at a 60 IPM rate for 5 seconds.

1. Test 1 is the default test when entering PROC 624, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 1; ENTER.
2. When Test 1 is called in, a default contact interface circuit pack is displayed in Fields 2 through 5.

The default contact interface circuit pack can be tested or another contact interface circuit pack can be selected for testing.
3. A contact interface circuit pack can be selected for testing in three ways. Refer to Steps 4 through 6.
4. Upon entry to Test 1 , Field 2 (module) is flashed, indicating it is an optional entry field. To select another contact interface circuit pack, enter its equipment location in Fields 2 through 5:
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
5. By depressing NEXT CIRCUIT until the contact interface circuit pack to be tested is displayed in Fields 2 through 5.
6. By using the CHANGE FIELD sequence:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
7. To start Test 1, depress EXECUTE.
8. A 5 -second test is run on each contact ( 0 through 7) at a 60 IPM rate.

This is evident by the alternating 0 s and 1 s in Fields 7 through 14.
Field 6 displays the current contact on the contact interface circuit pack being tested.
9. Test 1 runs continuously until STOP is depressed or until a new test is called in.

This allows maintenance personnel time to observe the status of the associated lamps.

## PROC 624 Test 2 and Test 3

## Test 2

Test 2 automatically sequences through all contacts on a contact interface circuit pack. The contacts remain closed during the testing interval.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. A contact interface circuit pack can be selected for testing in two ways. Refer to Steps 3 and 4.
3. By depressing NEXT CIRCUIT until the contact interface circuit pack to be tested is displayed in Fields 2 through 5.
4. By using the CHANGE FIELD sequence:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
5. To start Test 2, depress EXECUTE.
6. A 5 -second test is run on each contact ( 0 through 7) at a 601 IPM rate. The closure of each contact is indicated by 1s in Fields 7 through 14.
Field 6 displays the current contact on the contact interface circuit pack being tested.
7. Test 2 runs continuously until STOP is depressed or until a new test is called in.

This allows maintenance personnel time to observe the status of the associated lamps.

## Test 3

Test 3 individually tests a specific contact on a contact interface circuit pack. The contact opens and closes at a 60 IPM rate for the duration of the testing interval.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. A contact interface circuit pack can be selected for testing in two ways. Refer to Steps 3 and 4.
3. By depressing NEXT CIRCUIT until the contact interface circuit pack to be tested is displayed in Fields 2 through 5.
4. By using the CHANGE FIELD sequence:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
5. When Test 3 is called in and a contact interface circuit pack is selected for testing, a default contact ( 0 ) is displayed in Field 6. The default contact can be tested or another contact can be selected for testing.
6. To select another contact for testing, perform the following:

CHANGE FIELD; 6; ENTER; (Contact number to be tested); ENTER.
7. To start Test 3, depress EXECUTE.
8. During the testing interval, alternating $0 s$ and $1 s$ are displayed in the field of the contact selected for testing.
9. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.

This allows maintenance personnel time to observe the status of the associated lamp and to verify existence of intermittent failures.
10. After the first contact is tested, and STOP is depressed, NEXT DATA can be used to select another contact on the same contact interface circuit pack for testing:
NEXT DATA (depressed until desired contact is displayed); EXECUTE.
11. At this time, the displayed contact selected for testing is tested until STOP is depressed or until a new test is called in.

## Test 4

Test 4 tests a specific contact on a contact interface circuit pack. The contact selected for testing emains closed for the duration of the testing interval.

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
2. A contact interface circuit pack can be selected for testing in two ways. Refer to Steps 3 and 4.
3. By depressing NEXT CIRCUIT until the contact interface circuit pack to be tested is displayed in Fields 2 through 5.
4. By using the CHANGE FIELD sequence:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
5. When Test 4 is called in and a contact interface circuit pack is selected for testing, a default contact ( 0 ) is displayed in Field 6. The default contact can be tested or another contact can be selected for testing.
6. To select another contact for testing, perform the following:

CHANGE FIELD; 6; ENTER; (Contact number to be tested); ENTER.
7. To start Test 4, depress EXECUTE.
8. During the testing interval, contact closure is indicated by a 1 in the contact field selected for testing.
9. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
This allows maintenance personnel time to observe the status of the associated lamp and to verify existence of intermittent failures.
10. After the first contact is tested, and STOP is depressed, NEXT DATA can be used to select another contact on the same contact interface circuit pack for testing:

NEXT DATA (depressed until desired contact is displayed); EXECUTE.
11. At this time, the displayed contact selected for testing is tested until STOP is depressed or until a new test is called in.

## PROC 624

## Repair Guide

When faulty operation of a contact interface circuit pack is indicated, perform the following steps in the order listed.

1. Replace SN241.
2. Rerun Tests 1 and 2.
3. If a failure is still indicated, check the operation of the associated remote equipment.

Example: SSI.
4. If the associated remote equipment is not in working order, refer the problem to the proper persounel.
5. If the associated remote equipment is in working order, check the wiring between SN241 and the remote equipment.

PROC 625 (R2V1 Only) - SYNCHRONIZATION REFERENCE MONITOR



## Purpose

PROC 625 is used to determine the current state of health of synchronization references and all DS-1 circuit packs.

PROC 625 provides the capability to switch between the synchronization reference sources to support maintenance of the digital network.
PROC 625 also provides the capability to disable or re-enable the automatic reference switching performed by the synchronization periodic software and by associated hardware.

## PROC 625 (R2V1 Only)

PROC 625 is used to:

1. Display the current state of health and status information for each synchronization reference and DS-1 circuit pack.
2. Display the times and causes of the last eight (maximum) switches that occurred in any synchronization reference.
3. Perform a switch between synchronization references.
4. Prevent automatic reference switching by the synchronization periodic software and associated hardware.

Cauion: Disabing of the autumaite refercice swîthing fature for a prolonged period of time could become service affecting by impairing the recovery mechanism of the switch.

## Field Definitions and Codes

Each field of PROC 625 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AG, PROC 625 - Field Definitions and Codes.

Optional input fields are:

1. Fields 3 through 6 - Select a specific equipment location to be tested or displayed (Test 1 only).
2. Field 8 - Enable a switch of synchronization references (Test 2 only).
3. Field 9 -Enable or disable automatic reference switching of synchronization references (Test 2 only).

## Operation of Procedure

## Overview

PROC 625 is used to determine the number and cause of switches (determined by the state of health); the current state of health for synchronization references and DS-1 circuit packs; to perform a switch of synchronization references; and to disable or re-enable automatic reference switching of synchronization references.
To call in PROC 625 perform the following:

1. Depress PROC NO; 625; ENTER.
2. Test 1 is automatically selected.

Fields 1 and 2 display a 1, Fields 3 trough 6 display the primary reference or the first DS- 1 circuit pack in the switch.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

TABLE AG.

| PROC 625 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| field | Code | definition | fleio | Code | definition |
| 1 | 1,2 | Test number | 9 | 0-2 | Automatic switch enable or disable |
| 2 | 1-7 | Facility type |  |  |  |
|  | 1. | DS-1 trunk interface |  | 0 | Enable automatic switch of reference |
|  | 2-7 | Reserved for future use |  | 1 | Disable software switch of reference |
| 3-6 | 0-30 | Equipment location of displayed reference or DS-1 trunk interface |  |  |  |
|  |  |  |  | 2 | Disable software and hardware switch of reference |
| 3 |  | Module number | 10 | $\begin{gathered} \text { Dash, } \\ 0.9 \end{gathered}$ | Health code of displayed circuit |
| 5 | 0-3 | Cabinet number |  | Dash | Board is healthy |
| 6 | 0-21 | Carrier number |  | 0 | Maintenance busied |
| 7 | Dash, | Reference indication |  | 1 | Board processor sanity |
|  | 0-2 |  |  | 2 | Unusable reference reported by System Clock Synchronizer (SCS) - reference only |
|  | Dash | Nonreference DS-1 |  |  |  |
|  | 0 | High accuracy clock |  | 3 | Loss of signal reported by DS-1 trunk interface |
|  | 1 | Primary reference |  |  |  |
|  | 2 | Secondary reference |  | 4 | Excessive slips |
| 8 | 0-5 | Switch enable and status |  | 5 | Excessive misframes |
|  | 0 | Disable switch of reference |  | 6 | Carrier group alarm (loss of frame) |
|  | 1 | Enable switch of reference |  |  |  |
|  | Encodes 2 through 5 indicate why a switch attempt failed |  |  | 7 | Board health |
|  |  |  |  | 8 | Major error rate alarm |
|  | 2 | I/O failure |  | 9 | Minor error rate alarm |
|  | 3 | Unusable reference | 11 | 0-999 | Number of slips |
|  | 4 | Not administered |  |  |  |
|  | 5 | Maintenance busied |  |  |  |

PROC 625 (R2V1 Only) Test 1

TABLE AG. (Contd)

| PROC 625FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIEID | CODE | definition | fielo | CODE | definition |
| 12 | 0.99 | Number of misframes | $\begin{gathered} 17 \\ \text { (Contd) } \end{gathered}$ | 2 | Unusable reference reported by SCS - reference only |
| 13 | 0-8 | Index: <br> Index into the switch time and cause table |  | 3 | Loss of signal reported by DS-1 truak interface |
| 14-16 | 1-31 <br> 0-23 <br> 0-59 | Switch time: <br> Day of month <br> Hour of day <br> Minute of hour |  | 4 | Excessive slips |
| 14 |  |  |  | 5 | Excessive misframes |
| 15 |  |  |  | 6 | Network alarm |
| 16 |  |  |  | 7 | Board health |
| 17 | 0-9 | Switch cause: |  | 8 | High accuracy clock was placed on-line |
|  | 0 | Craft request |  | 9 | Cause of the last switch has been cleared |
|  | 1 | Board processor sanity |  |  |  |

Two tests are available:

1. Test 1 -Displays time and cause of the last eight switches and clears the switch history.
2. Test 2-Allows a switch of the synchronization references.

Test 2 is also used to prevent an automatic switch of references from taking place by disabling the periodic software and/or hardware switch.

## Test 1

Test 1 is used to determine the health and status of the equipment location displayed in Fields 3 through 6.

Test 1 is also used to determine the time and cause when the last eight switches occurred for the synchronization reference(s).
Test 1 can also be used to clear the table of last eight switches (maximum) for the synchronization reference(s).

1. Test 1 is the default test when entering PROC 625, or is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, the primary reference (if translated) is displayed in Fields 3 through 6. If a primary reference is not translated, Fields 3 through 6 display the first DS-1 circuit pack in the switch (in lowest equipment number order).
3. A specific reference or DS-1 circuit pack or the default equipment location can be tested.

To test the default equipment location displayed in Fields 3 through 5, proceed to Step 5.
4. A specific reference or DS-1 circuit pack can be selected for testing by depressing NEXT CIRCUIT to step through the DS-1 circuit packs until the DS-1 circuit pack to be tested is displayed in Fields 3 through 6.

Note: If a secondary reference is translated, it always follows the primary reference when NEXT CIRCUIT is used to step through the circuit packs in the switch.

Proceed to Step 5.
5. To start Test 1, depress EXECUTE.
6. If the translation records indicate the equipment location entered is not a translated DS-1 circuit pack, special error code 81 (not a translated a DS-1 board) is displayed in the MAAP error code field when EXECUTE is depressed.
7. If the equipment location entered is not a physical DS-1 circuit pack, special error code 82 (not a physical DS-1 board) is displayed in the MAAP error code field when EXECUTE is depressed.
8. Special error code 80 (I/O failure) may be displayed in the MAAP error code field when EXECUTE is depressed indicating that Test 1 cannot be performed.

If special error code 80 is not displayed, proceed to Step 10 .
9. When special error code 80 is displayed, repeat Test 1.

If special error code 80 is not displayed again, proceed to Step 10.
If special error code 80 is displayed again, perform PROC 611 to test the common control I/O channels and/or PROC 620 to test TN380 (module processor) or TN381 (TMS processor).
10. The health and status of the equipment location selected for testing is displayed as follows:

Field 1-1.
Field 2 - Facility type ( $1=$ DS-1 circuit pack).
Fields 3 through 6 - Equipment location of synchronization reference or DS-1 circuit pack tested.

Field 7 - Reference indication (Dash $=$ non-reference, $1=$ primary reference, $2=$ secondary reference).
Fields 8 and 9 - Dashed.
Field 10 - Health code of displayed circuit pack.
Note: A dash displayed in Field 10 indicates the circuit pack displayed in Fields 3 through 6 is healthy.

## PROC 625 (R2V1 Only) Test 1

Field 11-0 or number of slips.
Field $12-0$ or number of misframes.
Field 13 - Dash, 0 , or number of switches that occurred (maximum of 8 ) for the reference displayed in Fields 3 through 6.

Note: If Field 7 displays a 1 or 2 indicating a primary or secondary reference, Fields 13 through 17 indicate the number of switches and the time and cause of the latest switch. If Field 7 displays a dash (indicating a non-reference), Fields 13 through 17 are dashed.

Field 14 - Dash or day of month the switch occurred.
Field 15 - Dash or hour of day the switch oceurred.
Field 16 - Dash or minute of day the switch occurred.
Field 17 - Dash or switch cause (0 through 9).
Note: Fields 14 through 16 displays the time the latest switch occurred. Field 17 indicates the health of the reference just before it was switched off-line or the software/craft request.
11. When Field 13 is greater than 1, depressing NEXT DATA decrements Field 13 and displays (in Fields 14 through 17) when the next to last switch occurred and the cause of the switch.
12. Depressing NEXT DATA repeatedly displays the remaining switches that occurred.

When the last switch is displayed, depressing NEXT DATA again dashes Fields 13 through 17.

Depressing NEXT DATA once more begins the sequence over starting with the latest switch that occurred.
13. The CLEAR DATA; EXECUTE sequence can be used to clear the table of last 8 switches after EXECUTE is used to initiate Test 1.
14. To clear the table of last 8 switches for the reference(s) indicated by a 1 or 2 displayed in Field 7, after EXECUTE is used to initiate Test 1, perform the following:

Note: Fields 13 through 17 must not be dashed. Error code 00 (wrong key) is displayed in the MAAP error code field when CLEAR DATA; EXECUTE is depressed if Fields 13 through 17 are dashed.

## Depress CLEAR DATA; EXECUTE.

Fields 13 through 17 display dashes indicating the table of last 8 switches for the reference(s) is cleared.
15. When another reference or DS-1 circuit pack is to be tested, the CHANGE FIELD sequence or NEXT CIRCUIT can be used to select the specific reference or DS-1 pack to be tested.
16. CHANGE FIELD; 3; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER.
17. Depress NEXT CIRCUIT to step through the DS-1 circuit packs until the DS-1 circuit pack to be tested is displayed in Fields 3 through 6.

Note: If a secondary reference is translated, it always follows the primary reference when NEXT CIRCUIT is used to step through the circuit packs in the switch.
18. EXECUTE must be depressed to test the specific reference or DS-1 circuit pack selected for testing.

## Test 2

Test 2 is used to switch synchronization references when more than one reference is translated.
The System Clock Synchronizer (SCS) circuit pack (TN463) has six yellow LEDs.

1. LED positions one and two are dedicated to the primary and secondary synchronization reference sources respectively. If either of these LEDs are lighted, it indicates the associated reference is unusable.
2. When lighted, LED positions 14,15 , and 16 indicate which reference is on-line.
3. LED position 14 is for the High Accuracy Clock (HAC), position 15 is for the primary reference, and position 16 is for the secondary reference.
4. LED position 17 is used for duplicated TMS carriers. When lighted, it indicates that the synchronization reference in this TMS carrier is being driven by the on-line reference in the on-line TMS carrier.

To assist in troubleshooting network problems, Test 2 can be used to prevent an automatic reference switch by periodic software and/or hardware from taking place by disabling the automatic reference switch.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. When Test 2 is initially called in, Field 1 displays a 2; Field 2 displays a 1 ; the equipment location of the on-line reference is displayed in Fields 3 through 6; 0, 1, or 2 (high accuracy clock, primary reference, or secondary reference) is displayed in Field 7 (yellow LED lighted in position 14,15 , or 16 of TN463); and Fields 8 and 9 display 0 's.

Note: Fields 3 through 7 are updated with a new on-line equipment location and on-line reference should an automatic reference switch occur as a result of the automatic recovery mechanism.
3. Field 8 is blinking, indicating an optional entry field.

To switch the on-line reference displayed in Fields 3 through 6, proceed to Step 4.
4. To enable the switch of references, Field 8 must be changed to a 1. Either ENTER or the CHANGE FIELD sequence can be used:

## 1, ENTER.

CHANGE FIELD; 8; ENTER; 1; ENTER.
5. Depress EXECUTE.
6. Special error code 80 (I/O failure) may be displayed in the MAAP error code field when EXECUTE is depressed indicating that Test 2 cannot be performed.
If special error code 80 is not displayed, proceed to Step 8.

## PROC 625 (R2V1 Only) Test 2

7. When special error code 80 is displayed, repeat Test 2.

If special error code 80 is not displayed again, proceed to Step 8.
If special error code 80 is displayed again, perform PROC 611 to test the common control I/O channels and/or PROC 620 to test TN380 (module processor) or TN381 (TMS processor).
8. When the switch is successful, the following is displayed:

Field 1-2.
Field 2 - Facility type ( $1=$ DS-1 circuit pack).
Fields 3 through 6 -Equipment location of the new on-line reference.
Fieid 7 - Reierence indication ( $\mathrm{i}=$ primary refcrence, 2 - secondary reference),
Field 8 - Switch status ( $0=$ disable switch of reference).
Field 9-0 (if automatic switch of references is allowed).
Fields 10 through 17 - Dashed.
Note: The cause and time of the switch is updated in status memory and the yellow LED in position 15 or 16 of TN463 changes.
9. If the switch failed, Fields 3 through 6 display the original on-line reference, and Field 8 displays an encode indicating the reason the switch failed ( $2=1 / 0$ failure, $3=$ unusable reference, $4=$ not administered, and $5=$ maintenance busied).
Automatic reference switching can be disabled while maintenance personnel are working on the digital network and re-enabled when the tasks are completed.

When disabled, automatic reference switching by software periodics and the hardware SCS circuit pack (TN463) cannot be performed.

Caution: Disabling of the automatic reference switching feature for a prolonged period of time could become service affecting by impairing the recovery mechanism of the switch.

Disabling of the automatic reference switching is performed as follows:

1. Enter Test 2 of PROC 625.
2. Determine the type of automatic reference switching to be disabled; i.e., $1=$ disable software switch, $2=$ disable software and hardware switch.

Note: If Test 2 of PROC 625 is exited with a 2 (software and hardware switch disabled) displayed in Field 9, the automatic switch disable is automatically changed to a 1 (software switch disabled). This allows the hardware to switch to the HAC if the reference is lost or unusable. The change from 2 to 1 is not visible to maintenance personnel.
3. To disable the automatic reference switching, Field 9 must be changed to a 1 (software) or 2 (software and hardware). The CHANGE FIELD sequence must be used to disable automatic reference switching:
CHANGE FIELD; 9; ENTER; (1 or 2); ENTER.

## 4. Depress EXECUTE.

Caution: If PROC 625 is exited with automatic reference switching disabled 1 (software switch disabled) or 2 (software and hardware switch disabled) displayed in Field 9, a soft switch of references cannot be performed.

Note: If Test 2 of PROC 625 is exited with a 2 (software and hardware switch disabled) displayed in Field 9, the automatic switch disable is automatically changed to a 1 (software switch disabled). This allows the hardware to switch to the HAC if the reference is lost or unusable. The change from 2 to 1 is not visible to maintenance personnel.
5. Prior to exiting PROC 625 re-enable the automatic reference switching feature by performing the CHANGE FIELD sequence and depressing EXECUTE:
CHANGE FIELD; 9; ENTER; 0; ENTER; EXECUTE.

## PROC 625 (R2V2 Only) - SYNCHRONIZATION REFERENCE MONITOR




## Purpose

PROC 625 is used to determine the current state of health of synchronization references and all DS-1 circuit packs.

PROC 625 provides the capability to switch between the synchronization reference sources to support maintenance of the digital network.
PROC 625 also provides the capability to disable or re-enable the automatic reference switching performed by the synchronization periodic software and by associated hardware.

PROC 625 is used to:

1. Display the current state of health and status information for each synchronization reference and DS-1 circuit pack.
2. Display the times and causes of the last eight (maximum) switches that occurred in any synchronization'reference.
3. Clear the table of last 8 switches.
4. Clear the misframes count.
5. Perform a switch between synchronization references.
6. Prevent automatic reference switching by the synchronization periodic software and associated hardware.

> Caution: Disabling of the automatic reference switching feature for a prolonged period of time could become service affecting by impairing the recovery mechanism of the switch.

## Field Definitions and Codes

Each field of PROC 625 flip chart and the possible displays for the fields during execution of the different tests are defined in Table AH, PROC 625 - Field Definitions and Codes.

Optional input fields are:

1. Fields 3 through 6 - Select a specific equipment location to be tested or displayed (Test 1 only).
2. Field 8-Enable a switch of synchronization references (Test 2 only).
3. Field 9 - Enable or disable automatic reference switching of synchronization references (Test 2 only).

## Operation of Procedure

## Overview

PROC 625 is used to determine the number and cause of switches (determined by the state of health); the current state of health for synchronization references and DS-1 circuit packs; to perform a switch of synchronization references; and to disable or re-enable automatic reference switching of synchronization references. In addition, misframe counts can be cleared for an individual facility.

To call in PROC 625 perform the following:

1. Depress PROC NO; 625; ENTER.
2. Test 1 is automatically selected.

Fields 1 and 2 display a 1 , Fields 3 trough 6 display the primary reference or the first DS- 1 circuit pack in the switch.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

## PROC 625 (R2V2 Only)

TABLE AH.

| PROC 625 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Fielo | Code | definition | FIELD | CODE | definition |
| 1 | 1,2 | Test number | $\begin{gathered} 8 \\ \text { Contd } \end{gathered}$ | 4 | Not administered |
| 2 | 1-7 | Facility type |  | 5 | Maintenance busied |
|  | 1 | DS-1 trunk interface | 9 | 0-2 | Automatic switch enable or disable |
|  | 2 | Local end of remoted pair |  |  |  |
|  | 3 | Remote end of remoted pair |  | 0 | Enable automatic switch of reference |
|  | 4-9 | Reserved for future use |  | 1 | Disable software switch of reference |
| 3-6 |  | Equipment location of displayed reference or DS-1 |  | 2 | Disable software and hardware switch of reference |
| 3 4 | $0-30$ $0-7$ | Module number <br> Cabinet number | 10 | $\begin{gathered} \text { Dash, } \\ 0-9 \end{gathered}$ | Health code of displayed circuit |
| 5 | 0-3 | Carrier number |  | Dash | Board is healthy |
| 6 | 0-21 | Slot number |  | 0 | Maintenance busied |
| 7 | Dash, | Reference indication |  | 1. | Board processor sanity |
|  | Dash | Nonreference DS-1 |  | 2 | Unusable reference reported by System Clock Synchronizer (SCS) - reference only |
|  | 0 | High accuracy clock |  | 3 | Loss of signal reported by DS-1 |
|  | 1 | Primary reference |  |  | Excessive slips |
|  | 2 | Secondary reference |  | 4 |  |
| 8 | 0-5 | Switch enable and status |  | 5 | Excessive misframes |
|  | 0 | Disable switch of reference |  | 6 | Carrier group alarm (loss of frame) |
|  | 1 | Enable switch of reference |  | 7 | Board health |
|  | Encodes 2 through 5 indicate why a switch attempt failed |  |  | 8 | Major error rate alarm |
|  | 2 | I/O failure |  | 9 | Minor error rate alarm |
|  | 3 | Unusable reference | 11 | 0-999 | Number of slips |

TABLE AH. (Contd)

| FIELD DEFINITIONS AND CODES (Contd) |  |  |  |
| :---: | :---: | :--- | :---: | :---: | :--- |

Two tests are available:

1. Test 1 - Displays the health and status of all DS-1 circuit packs and clears the misframe count.
2. Test 2 - Allows a switch of the synchronization references, displays the time and cause of the last eight switches, and clears the switch history.
Test 2 is also used to prevent an automatic switch of references from taking place by disabling the periodic software and/or hardware switch.

## Test 1

Test 1 is used to determine the health and status of the equipment location displayed in Fields 3 through 6 .

1. Test 1 is the default test when entering PROC 625, or is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, the primary reference (if translated) is displayed in Fields 3 through 6. If a primary reference is not translated, Fields 3 through 6 display the first DS-1 circuit pack in the switch (in lowest equipment number order).

## PROC 625 (R2V2 Only) Test 1

3. A specific reference or DS-1 circuit pack or the default equipment location can be tested.

To test the default equipment location displayed in Fields 3 through 5, proceed to Step 5.
4. A specific reference or DS-1 circuit pack can be selected for testing by depressing NEXT CIRCUIT to step through the DS-1 circuit packs until the DS-1 circuit pack to be tested is displayed in Fields 3 through 6.

Note: If a secondary reference is translated, it always follows the primary reference when NEXT CIRCUIT is used to step through the circuit packs in the switch.

Proceed to Step 5.
5. To start Test 1, depress EXECUTE.
6. If the translation records indicate the equipment location entered is not a translated DS-1 circuit pack, special error code 81 (not a translated a DS-1 board) is displayed in the MAAP error code field when EXECUTE is depressed.
7. If the equipment location entered is not a physical DS-1 circuit pack, special error code 82 (not a physical DS-1 board) is displayed in the MAAP error code field when EXECUTE is depressed.
8. Special error code 80 (I/O failure) may be displayed in the MAAP error code field when EXECUTE is depressed indicating that Test 1 cannot be performed.

If special error code 80 is not displayed, proceed to Step 10.
9. When special error code 80 is displayed, repeat Test 1.

If special error code 80 is not displayed again, proceed to Step 10.
If special error code 80 is displayed again, perform PROC 611 to test the common control I/O channels and/or PROC 620 to test TN380 (module processor) or TN381 (TMS processor).
10. The health and status of the equipment location selected for testing is displayed as follows:

Field 1-1.
Field 2 - Facility type ( $1=$ DS-1 circuit pack).
Fields 3 through 6 - Equipment location of synchronization reference or DS-1 circuit pack tested.
Field 7 - Reference indication (Dash $=$ non-reference, $1=$ primary reference, $2=$ secondary reference).

Fields 8 and 9 - Dashed.
Field 10 - Health code of displayed circuit pack.
Note: A dash displayed in Field 10 indicates the circuit pack displayed in Fields 3 through 6 is healthy.

Field 11-0 or number of slips.
Field 12-0 or number of misframes.
Fields 13 through 17 - Dashed.
11. The CLEAR DATA; EXECUTE sequence can be used to clear the misframes displayed in Field 12, after EXECUTE is used to initiate Test 1.
12. To clear the misframes displayed in Field 12, depress CLEAR DATA; EXECUTE.

Field 12 displays a 0 after EXECUTE is depressed.
13. When another reference or DS-1 circuit pack is to be tested, the CHANGE FIELD sequence or NEXT CIRCUIT can be used to select the specific reference or DS-1 pack to be tested.
14. CHANGE FIELD; 3; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER.
15. Depress NEXT CIRCUIT to step through the DS-1 circuit packs until the DS-1 circuit pack to be tested is displayed in Fields 3 through 6.

Note: If a secondary reference is translated, it always follows the primary reference when NEXT CIRCUIT is used to step through the circuit packs in the switch.
16. EXECUTE must be depressed to test the specific reference or DS-1 circuit pack selected for testing.

## Test 2

Test 2 is used to switch synchronization references when more than one reference is translated.
Test 2 is also used to determine the time and cause when the last eight switches occurred for the synchronization reference(s).

Test 2 can also be used to clear the table of last eight switches (maximum) for the synchronization reference(s).

The System Clock Synchronizer (SCS) circuit pack (TN463) has six yellow LEDs.

1. LED positions one and two are dedicated to the primary and secondary synchronization reference sources respectively. If either of these LEDs are lighted, it indicates the associated reference is unusable.
2. When lighted, LED positions 14,15 , and 16 indicate which reference is on-line.
3. LED position 14 is for the High Accuracy Clock (HAC), position 15 is for the primary reference, and position 16 is for the secondary reference.
4. LED position 17 is used for duplicated TMS carriers. When lighted, it indicates that the synchronization reference in this TMS carrier is being driven by the on-line reference in the on-line TMS carrier.

To assist in troubleshooting network problems, Test 2 can be used to prevent an automatic reference switch by periodic software and/or hardware from taking place by disabling the automatic reference switch.

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. When Test 2 is initially called in, Field 1 displays a 2 ; Field 2 displays the type of DS- 1 circuit pack (dashed for SCS); the equipment location of the on-line reference is displayed in Fields 3 through 6; 0,1 , or 2 (high accuracy clock, primary reference, or secondary reference) is displayed in Field 7 (yellow LED lighted in position 14, 15, or 16 of 'TN463); and Fields 8 and 9 display 0 's.

Note: Fields 3 through 7 are updated with a new on-line equipment location and on-line reference should an automatic reference switch occur as a result of the automatic recovery mechanism.
3. Field 8 is blinking, indicating an optional entry field.

To switch the on-line reference displayed in Fields 3 through 6, proceed to Step 4.
4. To enable the switch of references, Field 8 must be changed to a 1 . Either ENTER or the CHANGE FIELD sequence can be used:

## 1, ENTER

CHANGE FIELD; 8; ENTER; 1; ENTER.
5. Depress EXECUTE.
6. Special error code 80 (I/O failure) may be displayed in the MAAP error code field when EXECUTE is depressed indicating that Test 2 cannot be performed.
If special error code 80 is not displayed, proceed to Step 8.
7. When special error code 80 is displayed, repeat Test 2.

If special error code 80 is not displayed again, proceed to Step 8.
If special error code 80 is displayed again, perform PROC 611 to test the common control I/O channels and/or PROC 620 to test TN380 (module processor) or TN381 (TMS processor).
8. When the switch is successful, the following is displayed:

Field 1-2.
Field 2 - Facility type ( $1=$ DS-1 circuit pack).
Fields 3 through 6 -Equipment location of the new on-line reference.
Field 7 - Reference indication ( $1=$ primary reference, $2=$ secondary reference).
Field 8 - Switch status ( $0=$ disable switch of reference).
Field 9-0 (if automatic switch of references is allowed).
Fields 10 through 12 - Dashed..
Field 13 - Dash, 0, or number of switches that occurred (maximum of 8) for the reference displayed in Fields 3 through 6.
Field 14 - Dash or day of month the switch occurred.
Field 15 - Dash or hour of day the switch occurred.
Field 16 - Dash or minute of day the switch occurred.
Field 17 - Dash or switch cause (0 through 9).
Note: Fields 14 through 16 display the time the latest switch occurred. Field 17 indicates the health of the reference just before it was switched off-line or the software/craft request.
9. The cause and time of the switch is updated in status memory and the yellow LED in position 15 or 16 of TN463 changes when the switch is successful.
10. If the switch failed, Fields 3 through 6 display the original on-line reference, and Field 8 displays an encode indicating the reason the switch failed ( $2=\mathrm{I} / \mathrm{O}$ failure, $3=$ unusable reference, $4=$ not administered, and $5=$ maintenance busied).
11. When Field 13 is greater than 1 , depressing NEXT DATA decrements Field 13 and displays (in Fields 14 through 17) when the next to last switch occurred and the cause of the switch.
12. Depressing NEXT DATA repeatedly displays the remaining switches that occurred.

When the last switch is displayed, depressing NEXT DATA again dashes Fields 13 through 17.

Depressing NEXT DATA once more begins the sequence over starting with the latest switch that occurred.
13. The CLEAR DATA; EXECUTE sequence can be used to clear the table of last 8 switches after EXECUTE is used to initiate Test 2.
14. To clear the table of last 8 switches for the reference(s) after EXECUTE is used to initiate Test 2 , perform the following:

Note: Fields 13 through 17 must not be dashed. Error code 00 (wrong key) is displayed in the MAAP error code field when CLEAR DATA; EXECUTE is depressed if Fields 13 through 17 are dashed.

## Depress CLEAR DATA; EXECUTE.

Fields 13 through 17 display dashes indicating the table of last 8 switches for the reference(s) is cleared.

Automatic reference switching can be disabled while maintenance personnel are working on the digital network and re-enabled when the tasks are completed.
When disabled, automatic reference switching by software periodics and the hardware SCS circuit pack (TN463) cannot be performed.

Caution: Disabling of the automatic reference switching feature for a prolonged period of time could become service affecting by impairing the recovery mechanism of the switch.

Disabling of the automatic reference switching is performed as follows:

1. Enter Test 2 of PROC 625.
2. Determine the type of automatic reference switching to be disabled; i.e., $1=$ disable software switch, $2=$ disable software and hardware switch.

Note: If Test 2 of PROC 625 is exited with a 2 (software and hardware switch disabled) displayed in Field 9, the automatic switch disable is automatically changed to a 1 (software switch disabled). This allows the hardware to switch to the HAC if the reference is lost or unusable. The change from 2 to 1 is not visible to maintenance personnel.
3. To disable the automatic reference switching, Field 9 must be changed to a 1 (software) or 2 (software and hardware). The CHANGE FIELD sequence must be used to disable automatic reference switching:

CHANGE FIELD; 9; ENTER; (1 or 2); ENTER.
4. Depress EXECUTE.

Caution: If PROC 625 is exited with automatic reference switching disabled 1 (software switch disabled) or 2 (software and hardware switch disabled) displayed in Field 9, a soft switch of references cannot be performed.

Note: If Test 2 of PROC 625 is exited with a 2 (software and hardware switch disabled) displayed in Field 9, the automatic switch disable is automatically changed to a 1 (software switch disabled). This allows the hardware to switch to the HAC if the reference is lost or unusable. The change from 2 to 1 is not visible to maintenance personnel.
5. Prior to exiting PROC 625 re-enable the automatic reference switching feature by performing the CHANGE FIELD sequence and depressing EXECUTE:
CHANGE FIELD; 9; ENTER; 0; ENTER; EXECUTE.

## PROC 630 - BUSY OUT/RELEASE BUSY OUT



## Purpose

PROC 630 is used to determine the maintenance busy out status of terminals, trunks, or tone plants.

Both the total number of busied out circuits and the equipment location of each circuit of the current test type is displayed.
In addition, PROC 630 provides the capability to busy out or release from busy terminals, trunks, or tone plants.

When all terminals, trunks, and tone plants are released from busy, the BUSY OUT indicator on the MAAP is turned off.

If the BUSY OUT indicator on the MAAP is still lighted after all terminals, trunks, and tone plants are released from busy the cause is probably a soft lock of the network or TMS duplication channel.

Use PROC 621 Test 2 to release the soft lock of the network or TMS duplication channel and the BUSY OUT indicator on the MAAP should turn off.

## Field Definitions and Codes

Each field of PROC 630 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AI, PROC 630 - Field Definitions and Codes.
Optional input fields are:

1. Field 1-Change test number.
2. Fields 2 through 6, before EXECUTE - Select module, cabinet, carrier, slot, and circuit to determine the maintenance busy out status of a particular terminal (Test 1), or trunk (Test 2).

If more than one circuit of a particular type (terminal or trunk) is busied out, the display defaults to the lowest equipment number of that type busied out upon depressing EXECUTE.

TABLE AI.

| PROC 630 <br> field definitions and codes |  |  |
| :---: | :---: | :---: |
| FiELD | CODE | definition |
| 1 | 1-3 | Test number. |
| 2 | 0-30 | Module number. |
| 3 | 0.7 | Cabinet number. |
| 4 | 0-3 | Carrier number. |
| 5 | 0-21 | Slot number. |
| 6 | 0-7 | Circuit number. |
| 7 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Maintenance busy status: Not busied. Busied. |
| 8 | 0-999 | Number of circuits busied out in the current test. |
| 9 | 1-999 | Indicates which circuit, of a group of busied out circuits, is being displayed. |

3. Fields 4 through 6, before EXECUTE - Select carrier, slot, and circuit to determine the maintenance busy out status of a particular terminal (Test 1), or trunk (Test 2).

If more than one circuit of a particular type (terminal or trunk) is busied out, the display defaults to the lowest equipment number of that type busied out upon depressing EXECUTE.
4. Fields 2 through 5, before EXECUTE - Select module, cabinet, carrier, and slot to determine the maintenance busy out status of a particular tone plant or auxiliary tone plant (Test 3).
If more than one tone plant or auxiliary tone plant is busied out, the display defaults to the lowest equipment number busied out upon depressing EXECUTE.
5. Fields 4 and 5, before EXECUTE - Select carrier and slot to determine the maintenance busy out status of a particular tone plant or auxiliary tone plant (Test 3).
If more than one tone plant or auxiliary tone plant is busied out, the display defaults to the lowest equipment number busied out upon depressing EXECUTE.
6. Fields 2 through 6, after EXECUTE - Select module, cabinet, carrier, slot, and circuit of a particular terminal (Test 1) or trunk (Test 2) to determine the maintenance busy out status or to maintenance busy out the displayed circuit.
7. Fields 2 through 5, after EXECUTE - Select module, cabinet, carrier, and slot of a particular tone plant or auxiliary tone plant (Test 3) to determine the maintenance busy out status or to maintenance busy out the displayed circuit.

## Operation of Procedure

## Overview

PROC 630 is used to determine the status of maintenance busy out circuits, and to busy out or release from busy terminals, trunks, or tone plants/auxiliary tone plants.

To call in PROC 630, perform the following:

1. Depress PROC NO; 630; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Displays busied out terminals and provides the capability to busy out or release from busy terminals.
2. Test 2 - Displays busied out trunks and provides the capability to busy out or release from busy trunks.
3. Test 3-Displays busied out tone plants (including auxiliary tone plants) and provides the capability to busy out or release from busy tone plants and auxiliary tone plants.

## Test 1

Test 1 displays the maintenance busy out status of terminals connected to analog line ports and provides the capability to busy out or release from busy terminals.

Note: Use PROC 632 to determine the busy out status or to busy out terminals connected to digital line ports.

1. Test 1 is the default test when entering PROC 630, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. Field 8 displays a 0 if no terminals are busied out.
4. When terminals are maintenance busied, the first of the busied out terminals (by lowest equipment number) is displayed as follows:

Fields 2 through 6 - Busied out terminal equipment location.
Field 7 - Busy out status.
Field 8 - Total number of busied out terminals.
Field 9-1 (Indicating first busied out terminal).
5. Field 2 flashes indicating an optional entry field.

Either the terminals busied out can be displayed in order using NEXT CIRCUIT or a specific terminal can be selected for display to determine the maintenance busy or IN USE status (See Step 8 below).

## PROC 630 Test 1

6. Repeatedly depressing NEXT CIRCUIT displays each of the busied out terminals.

When all busied out terminals are displayed, depressing NEXT CIRCUIT dashes the display except for Field 1.
Depressing NEXT CIRCUIT again starts Test 1 over.
7. To change the busy out status of an individual terminal, depress RLS BUSY OUT when the terminal is displayed.

To release all busied out terminals, depress CLEAR DATA; EXECUTE.
Note: CLEAR DATA; EXECUTE can only be used after EXECUTE is depressed to initiate Test 1.
8. If the maintenance busy or IN USE status of a particular terminal is to be determined, selection can be made, after EXECUTE is depressed in Step 2 above, using one of the following methods:
CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTTER; NEXT DATA.
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER; NEXT DATA.
9. NEXT DATA displays the maintenance busy or IN USE status of the terminal selected.

Note: When the IN USE indicator on the MAAP is lighted, the displayed terminal is active on a connection. Field 7 displays a 0 indicating the terminal is not maintenance busy. The IN USE indicator is turned on with the operation of NEXT DATA and remains lighted until the displayed terminal becomes idle or BUSY OUT is depressed.
10. After selecting a terminal for display to determine the maintenance busy or IN USE status by using the CHANGE FIELD sequence, or by entering the equipment location, depressing NEXT CIRCUIT displays the first busied out terminal as if EXECUTE had been depressed.
The fields and contents displayed are the same as when Test 1 is first executed.
11. To busy out a terminal:

Execute Test 1.
12. If any terminals are busied out, use NEXT CIRCUIT to determine if the terminal is already busied out.
13. If no terminals are busied out, or the terminal to be busied out is not displayed by use of NEXT CIRCUIT, refer to Step 8 above to select the terminal to be busied out.
14. Depress NEXT DATA to determine if the terminal is in-use.

Requirement: NEXT DATA must be used before BUSY OUT can be used.
15. The IN USE indicator on the MAAP lights if the terminal is in-use.

Caution: Do not busy out a terminal that is not idle unless absolutely necessary. Operation of BUSY OUT busies a terminal that is in use and terminates the connection.
16. Depress BUSY OUT.

## Test 2

Test 2 displays the maintenance busy status of trunks and provides the capability to busy out or release from busy trunks.

1. Test 2 is selected by NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. To start Test 2, depress EXECUTE.
3. Field 8 displays a 0 if no trunks are busied out.
4. When trunks are maintenance busied, the first of the busied out trunks is displayed as follows:

Fields 2 through 6 - Busied out trunk equipment location.
Field 7 - Busy out status.
Field 8 - Total number of busied out trunks.
Field 9-1 (Indicating first busied out trunk).
5. Field 2 flashes indicating an optional entry field.

Either the trunks busied out can be displayed in order using NEXT CIRCUIT or a specific trunk can be selected for display to determine the maintenance busy or IN USE status (See Step 8 below).
6. Repeatedly depressing NEXT CIRCUIT displays each of the busied out trunks.

When all busied out trunks are displayed, depressing NEXT CIRCUIT dashes the display except for Field 1.

Depressing NEXT CIRCUIT again starts Test 2 over.
7. To change the busy out status of an individual trunk, depress RLS BUSY OUT when the trunk is displayed.
8. To release all busied out trunks, depress CLEAR DATA; EXECUTE.

Note: CLEAR DATA; EXECUTE can only be used after EXECUTE is depressed to initiate Test 2.
9. If the maintenance busy or IN USE status of a particular trunk is to be determined, selection can be made, after EXECUTE is depressed in Step 2 above, using one of the following methods:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER; NEXT DATA.
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER; NEXT DATA.
10. NEXT DATA displays the maintenance busy or IN USE status of the trunk selected.

Note: When the IN USE indicator on the MAAP is lighted, the displayed trunk is active on a connection. Field 7 displays a 0 indicating the trunk is not maintenance busy. The IN USE indicator is turned on with the operation of NEXT DATA and remains lighted until the displayed trunk becomes idle or BUSY OUT is depressed.
11. After selecting a trunk for display to determine the maintenance busy or IN USE status by using the CHANGE FIELD sequence, or by entering the equipment location, depressing NEXT CIRCUIT displays the first busied out trunk as if EXECUTE had been depressed.

The fields and contents displayed are the same as when Test 2 is first executed.
12. To busy out a trunk:

Execute Test 2.
13. If any trunks are busied out, use NEXT CIRCUIT to determine if the trunk is already busied out.
14. If no trunks are busied out, or the trunk to be busied out is not displayed by use of NEXT CIRCUIT, refer to Step 8 above to select the trunk to be busied out.
15. Depress NEXT DATA to determine if the trunk is in-use.

Requirement: NEXT DATA must be used before BUSY OUT can be used.
16. The IN USE indicator on the MAAP lights if the trunk is in-use.

Caution: Do not busy out a trunk that is not idle unless absolutely necessary. Operation of BUSY OUT busies a trunk that is in use and terminates the connection.
17. Depress BUSY OUT.

## Test 3

Test 3 displays the maintenance busy out status of tone plants and auxiliary tone plants. Test 3 also provides the capability to busy out or release from busy tone plants and auxiliary tone plants.

1. Test 3 is selected by NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. To start Test 3, depress EXECUTE.
3. Field 8 displays a 0 if no tone plants or auxiliary tone plants are busied out.
4. When tone plants or auxiliary tone plants are maintenance busied, the first of the busied out tone plants or auxiliary tone plants is displayed as follows:

Fields 2 through 5 - Busied out tone plant or auxiliary tone plant equipment location.
Field 7 - Busy out status.
Field 8 - Total number of busied out tone plants and auxiliary tone plants.
Field 9-1 (Indicating first busied out tone plant or auxiliary tone plant).
5. Field 2 flashes indicating an optional entry field.

Either the tone plants/auxiliary tone plants can be displayed in order using NEXT CIRCUIT or a specific tone plant/auxiliary tone plant can be selected for display to determine the maintenance busy status (See Step 9 below).
6. Repeatedly depressing NEXT CIRCUIT displays each of the busied out tone plants/auxiliary tone plants.
7. When all busied out tone plants/auxiliary tone plants are displayed, depressing NEXT CIRCUIT dashes the display except for Field 1.
Depressing NEXT CIRCUIT again starts Test 3 over.
8. To change the busy out status of an individual tone plant/auxiliary tone plant, depress RLS BUSY OUT when the tone plant/auxiliary tone plant is displayed.
9. To release all busied out tone plants/auxiliary tone plants, depress CLEAR DATA; EXECUTE.

Note: CLEAR DATA; EXECUTE can only be used after EXECUTE is depressed to initiate Test 3.
10. If the maintenance busy status of a particular tone plant/auxiliary tone plant is to be determined, selection can be made, after EXECUTE is depressed in Step 2 above, using one of the following methods:

CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; NEXT DATA.
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; NEXT DATA.

Note: To select a tone plant or auxiliary tone plant for display or to busy out a tone plant or auxiliary tone plant, Field 6 (circuit) is not a required entry.
11. NEXT DATA displays the maintenance busy status of the tone plant/auxiliary tone plant selected.

When NEXT DATA is depressed, the IN USE indicator on the MAAP is not lighted.
12. After selecting a tone plant/auxiliary tone plant for display to determine the maintenance busy status by using the CHANGE FIELD sequence, or by entering the equipment location, depressing NEXT CIRCUIT displays the first busied out tone plant/auxiliary tone plant as if EXECUTE had been depressed.

The fields and contents displayed are the same as when Test 3 is first executed.
13. To busy out a tone plant/auxiliary tone plant:

Execute Test 3.
14. If any tone plants/auxiliary tone plants are busied out, use NEXT CIRCUIT to determine if the tone plant/auxiliary tone plant is already busied out.
15. If no tone plants/auxiliary tone plants are busied out, or the tone plant/auxiliary tone plant to be busied out is not displayed by use of NEXT CIRCUIT, refer to Step 8 above to select the tone plant/auxiliary tone plant to be busied out.

Requirement: NEXT DATA must be used before BUSY OUT can be used.
16. When NEXT DATA is depressed, the IN USE indicator on the MAAP is not lighted.

Caution: When a tone plant or auxiliary tone plant is busied out, some capability of generating tones is removed from the system. All tone plants or all auxiliary tone plants should not be busied out at the same time.
17. Depress BUSY OUT.

PROC 631-TRUNK GROUP BUSY OUT


## Purpose

PROC 631 is used to determine the maintenance busy out status of individual trunks in a trunk group or the maintenance busy out status of an entire trunk group.

PROC 631 displays the total number of maintenance busied out trunks and the equipment location of each trunk of the current trunk group and its busied out status.

PROC 631 is used to maintenance busy out or release busy out all trunks in a trunk group or to step through the trunks in a trunk group and selectively busy out or release busy out individual trunks.

## Field Definitions and Codes

Each field of PROC 631 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AJ, PROC 631 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Field 2 - Select trunk group number to determine the maintenance busy status of a particular trunk group (Test 1 only).
3. Fields 8 through 12 - Select individual trunk equipment location to determine the maintenance busy status of a particular trunk (Test 2 only).

## Operation of Procedure

## Overview

PROC 631 is used to determine the maintenance busy out status of trunk groups or individual trunks in a trunk group, and to busy out or release from busy an entire trunk group or individual trunks within a trunk group.

TABLE AJ.

| PROC 631 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | COde | definition |
| 1 | 1-2 | Test number. | 8 | 0-30 | Module number. |
| 2 | 17-255 | Trunk group number. | 9 | 0-7 | Cabinet number. |
| 3 | 1-9 | First digit of dial access code | 10 | 0-3 | Carrier number. |
|  | 11, 12 | Encode 11 equals touch-tone*; 12 equals | 11 | 0-21 | Slot number. |
|  |  | touch-tone\#. | 12 | 0-3 | Circuit number. |
| 4 | 0-9 | Second digit of dial access code. | 13 |  | Maintenance busy status: |
| 5 | 0-9 | Third digit of dial access code. |  | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Not busied out. Busied out. |
| 6 | 0-255 | Number of trunks in trunk group. | 14 | 0-255 | Position of the trunk within the |
| 7 | 0-255 | Number of trunks busied out in the trunk group. |  |  |  |

To call in PROC 631, perform the following:

1. Depress PROC NO; 631; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Fjeld 2 displays the smallest trunk group number, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Displays the busy out status of an entire trunk group and provides the capability to busy out or release from busy an entire trunk group.
2. Test 2 -Displays the busy out status of individual trunks within a trunk group and provides the capability to busy out or release from busy an individual trunk within a trunk group.

## PROC 631 Test 1

## Test 1

Test 1 is used to busy out or release from busy an entire trunk group.

1. Test 1 is the default test when entering PROC 631, or is selected by using NEXT TEST.
2. When Test 1 is selected, the smallest trunk group number in the switch is flashed in Field 2, indicating an optional entry field.
3. Either the trunk group displayed may be used or another trunk group may be selected.

To use the trunk group displayed, ENTER is depressed, causing Field 2 to stop flashing.
4. Selection of another trunk group can be accomplished by one of the following three methods (Refer to Steps 5 through 7).
5. (Trunk group number); ENTER.
6. CHANGE FIELD; 2; ENTER; (Trunk group number); ENTER.
7. Depressing NEXT UNIT to sequence through all the trunk groups in the switch until the trunk group to be tested is displayed in Field 2. When all trunk group numbers are displayed, depressing NEXT UNIT dashes Field 2. Depressing NEXT UNIT once more displays the smallest trunk group number again, starting the sequence over.
8. To start Test 1, select the trunk group to be displayed, and depress EXECUTE.
9. Trunk group information is displayed as follows:

Field 2 - Trunk group number.
Field 6 - Number of trunks in the trunk group.
Field 7 - Number of trunks busied out in the trunk group.
Fields 8 through 12 - Equipment location of the first trunk in the trunk group.
Field 13 - Maintenance busy status of the first trunk.
Field 14 - Trunk position in the trunk group.
10. Depressing BUSY OUT or RLS BUSY OUT changes the status of the selected trunk group.

Note: Special error code 80 may be displayed and is defined as follows: More than 255 trunks are in the trunk group. PROC 631 will not busy out or release from busy more than 255 trunks. Use PROC 630 (Busy out/release busy out) or PROC 632 (Carrier busy) to busy out or release from busy the rest of the trunks.
11. To release the entire trunk group from maintenance busy, depress RLS BUSY OUT.

Caution: Depressing BUSY OUT can drop customer calls in the entire trunk group.
12. To busy out an entire trunk group, depress BUSY OUT.

## Test 2

Test 2 is used to busy out or release from busy individual trunks within a trunk group.
Test 2 can also be used to search for the trunk group number of a trunk circuit.

1. Test 2 is selected by use of NEXT TEST.
2. When Test 2 is entered, either the equipment location of the first trunk in the last trunk group selected in Test 1 is displayed in Fields 8 through 12 or Field 8 is blanked and Fields 9 through 12 are dashed.
3. When an equipment location is displayed, Field 8 is flashed, indicating an optional entry. Either the trunk displayed can be used or another trunk can be selected.
4. Selection of another trunk can be accomplished in two ways (Refer to Steps 5 and 6).
5. Depressing NEXT CIRCUIT to sequence through all the trunks in the trunk group displayed until the trunk to be tested is displayed in Fields 8 through 12. When all the trunks in the trunk group are displayed, depressing NEXT CIRCUIT again dashes Fields 8 through 12. Depressing NEXT CIRCUIT once more starts the sequence over with the first trunk in the trunk group.
6. When Field 8 is flashing, the equipment location of another trunk can be entered in Fields 8 through 12 as follows:
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
7. When Field 8 is blanked, the decimal point in the field is flashed to indicate a mandatory entry.

The equipment location of a trunk must be entered in Fields 8 through 12 as follows:
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.

Note: When Field 8 is blanked, the CHANGE FIELD sequence cannot be used.
8. To start Test 2, select the trunk to be displayed, and depress EXECUTE.
9. Trunk information is displayed as follows:

Field 2 - Trunk group number for the equipment location.
Fields 3 through 5 - Dial access code (if any) for the trunk equipment location.
Fields 8 through 12 - Equipment location of the trunk.
Field 13 - Maintenance busy status of the trunk.
Field 14-Position of the trunk in the trunk group.
10. Depressing BUSY OUT or RLS BUSY OUT changes the status of the selected trunk.

Note: Special error code 80 may be displayed and is defined as follows: More than 255 trunks in the group. Use PROC 630 or PROC 632 to busy out or release busy out the trunk.
11. Trunks that are omitted (when more than 255 trunks are in a trunk group) are those with the higher internal trunk numbers.
12. If an equipment location of a trunk that is omitted is entered in Test 2, the first trunk of that trunk group will be displayed upon depressing EXECUTE.

This indicates that PROC 630 or PROC 632 must be used to busy out or release busy the trunk entered.
13. To release the trunk from maintenance busy, depress RLS BUSY OUT.

Caution: Depressing BUSY OUT can drop a customer's call.
14. To busy out the trunk, depress BUSY OUT.

To search for the trunk group number of a trunk circuit, perform the following:

1. Enter the equipment location of the trunk circuit in Fields 8 through 12 .
2. Depress EXECUTE.
3. Information for the trunk circuit being search is displayed as follows:

Field 2 - Trunk group number for the equipment location.
Fields 3 through 5 - Dial access code (if any) for the trunk equipment location.
Fields 8 through 12 - Equipment location of the trunk.
Field 13 - Maintenance busy status of the trunk.
Field 14-Position of the trunk in the trunk group.

## PROC 632 - CARRIER BUSY



## Purpose

PROC 632 is used to determine the maintenance busy out status of carriers. Both the total number of busied out circuits in a carrier and the total number of carriers with busied out circuits are displayed.

PROC 632 finds carriers that are completely or partially busied out and displays information pertinent to the carriers.

In addition, PROC 632 provides the capability to busy out or release from busy a complete carrier or circuits within a carrier.

The maintenance busy status of tone plants and/or auxiliary tone plants cannot be changed using this procedure. PROC 630 must be used to change the maintenance busy status of tone plants and/or auxiliary tone plants.

## Field Definitions and Codes

Each field of PROC 632 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AK, PROC 632 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 4 - Select a specific carrier in a cabinet of a module to determine the maintenance busy out status or to busy out or release from busy the specific carrier (Test 2 only).
3. Fields 2 through 6 - Select a specific circuit within a carrier to determine the maintenance busy out status or to busy out or release from busy the specific circuit (Test 3 only).

PROC 632

TABLE AK.

| PROC 632 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | DEFINITION | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | 9 | 0-30 | Total modules in system. |
| 2 | 0-30 | Module number. | 10 | 1-8 | Total cabinets in module |
| 3 | 0-7 | Cabinet number. | 11 | 1-4 | Total carriers in cabinet. |
| 4 | 0-3 | Carrier number. | 12 | 1-154 | Total circuits in carrier. |
| 5 | 0-21 | Slot number. | 13 | 1-154 | Total circuits busied out in carrier. |
| 6 | 0-7 | Circuit number. | 14 | 1-700 | Running total of carriers with busy circuits found in Test 1. |
| 7 | 1 | Carrier type: <br> Normal port carrier. |  |  |  |
| $8^{*}$ | 0 1 2 | Maintenance busy status: <br> Not busied out. <br> Busied out. <br> Partially busied out carrier. | * In Test 3, the maintenance busy status refers to the circuit not the carrier. |  |  |

## Operation of Procedure

## Overview

PROC 632 is used to determine the status of maintenance busied out carriers, or maintenance busied out circuits within carriers, and to busy out carriers or circuits within carriers.

To call in PROC 632, perform the following:

1. Depress PROC NO; 632; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Searches for and displays completely or partially busied out carriers.
2. Test 2 - Provides the capability to busy out or release from busy a complete carrier.
3. Test 3 - Provides the capability to busy out or release from busy individual circuits within a carrier.

## Test 1

Test 1 is used to find a carrier that is completely or partially busied out. The carrier can then be released from busy out, or if partially busied out can be completely busied out.

Test 1 is useful for returning a cabinet to service after a total cabinet outage.

1. Test 1 is the default test when entering PROC 632, or is selected by using NEXT TEST.
2. When Test 1 is initially called in, all fields are dashed except for a 1 in the test number field.
3. To start Test 1, depress EXECUTE.

A search for a carrier that is busied out or partially busied out is started.
4. The display on the MAAP is continually updated while the test is executing until a carrier that is busied out or partially busied out is found (if any).
5. If no carriers are found which are completely or partially busied out, the MAAP displays a 1 in Field 1, a 0 in Field 14, and dashes in all other fields.
6. When a carrier is found that is completely busied out or partially busied out, the following information is displayed:
Field 1-1.
Fields 2 through 4 - Equipment location of carrier.
Fields 5 and 6 - Dashed.
Field 7 - Carrier type.
Field 8 - Maintenance busy status of carrier.
Field 9 - Total modules in switch.
Field 10 - Total cabinets in displayed module.
Field 11 - Total carriers in displayed cabinet.
Field 12 - Total circuits in displayed carrier.
Field 13 - Total circuits busied out in displayed carrier.
Field 14-1 (Indicating first carrier found with busied out circuits.)
7. Depressing RLS BUSY OUT releases from busy out the displayed carrier.

RLS BUSY OUT releases all busied out circuits in a carrier or those circuits that are busied out in a partially busied out carrier.

Caution: If a trunk or terminal that is up on a connection is busied out, the connection is dropped.
8. If the displayed carrier is partially busied out, depressing BUSY OUT busies out the rest of the circuits in the carrier.

Note: BUSY OUT can not be used to maintenance busy out a carrier in Test 1 unless the carrier is partially busied out, i.e., only carriers that are busied out or partially busied out are displayed in Test 1.

## PROC 632 Test 1 and Test 2

9. Depressing EXECUTE again with the WAIT indicator off restarts the test and the search.

The count of total carriers with busy circuits (Field 14) begins over when the test is restarted (i.e., 0 until a carrier is found (if any), then a 1 is displayed if a carrier is found).
10. Depressing NEXT UNIT after a busied out carrier is displayed finds the next carrier that is busied out or partially busied out.

Field 14 is incremented if a busied out or partially busied out carrier is found.
11. When the last completely or partially busied out carrier in the system is displayed, depressing NEXT UNIT dashes all fields except the test number and total carriers with busy circuits fields (Fields 1 and 14).

Note: After the entire switch is searched for busy carriers and the display is dashed, depressing BUSY OUT or RLS BUSY OUT causes error code 10 to be displayed.
12. Depressing NEXT UNIT again causes Test 1 to be executed, starting the sequence over with the first equipped carrier that is completely or partially busied out.

The count of the total carriers with busy circuits (Field 14) starts over when the test is restarted (i.e., 0 until a carrier is found (if any), then a 1 is displayed if a carrier is found).

## Test 2

Test 2 is used to busy out an entire carrier or release from busy a completely or partially busied out carrier.

Test 2 is useful for busying out a carrier or all carriers in a cabinet when making a repair that affects the entire carrier or cabinet.

1. Test 2 is selected by NEXT TEST.
2. When Test 2 is called in, a default carrier may be displayed in Fields 2 through 4.

A completely or partially busied out carrier last displayed in Test 1 (if any) is the default carrier for Test 2.
3. If no default carrier from Test 1 is displayed, Field 2 is blanked and the decimal point in Field 2 is flashed indicating a mandatory entry field.
4. To execute Test 2, an equipment location must be entered in Fields 2 through 4.
5. Either the default carrier displayed can be used or another carrier can be selected by entering its location in Fields 2 through 4:
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER.
6. To start Test 2, depress EXECUTE.
7. The status of the selected carrier is displayed as follows:

Field 1-2.
Fields 2 through 4 - Equipment location of carrier.
Fields 5 and 6 - Dashed.
Field 7 - Carrier type.
Field 8 - Maintenance busy status of carrier.

Field 9 - Total modules in switch.
Field 10 - Total cabinets in displayed module.
Field 11 - Total carriers in displayed cabinet.
Field 12 - Total circuits in displayed carrier.
Field 13 - Total circuits busied out in displayed carrier.
Field 14-0 or total carriers with busy circuits.
Note: Total number of carriers with busy out circuits are only displayed in Field 14 if the carriers were found and displayed in Test 1.
8. Depressing RLS BUSY OUT releases from busy the entire carrier displayed (all circuits in the carrier).

Caution: If a trunk or terminal that is up on a connection is busied out, the connection is dropped.
9. Depressing BUSY OUT busies out the entire displayed carrier (all circuits in the carrier).
10. Depressing NEXT UNIT finds the next equipped carrier in the switch and updates the display accordingly.
11. When the last carrier in the switch is displayed, depressing NEXT UNIT dashes all fields except the test number and total carriers with busy circuits fields (Fields 1 and 14).

Note: After the display is dashed, depressing BUSY OUT or RLS BUSY OUT causes error code 10 to be displayed.
12. Depressing NEXT UNIT again causes Test 2 to be executed, starting the sequence over with the first equipped carrier.

## Test 3

Test 3 is used to busy out or release from busy an individual circuit within a carrier.

1. Test 3 is selected by NEXT TEST.
2. When Test 3 is called in, a default, carrier may be displayed in Fields 2 through 4.

A completely or partially busied out carrier last displayed in Test 1 or 2 (if any) is the default carrier for Test 3.

The first circuit within the carrier is displayed in Fields 5 and 6. Fields 7 and 8 display the carrier type and maintenance busy status of the circuit.
3. If no default carrier from Test 1 or 2 is displayed, Field 2 is blanked and the decimal point in Field 2 is flashed indicating a mandatory entry field.
4. To execute Test 3, an equipment location must be entered in Fields 2 through 6.
5. Either the default circuit displayed can be used or another circuit can be selected by entering its equipment location in Fields 2 through 6:
(Module number); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.

## PROC 632 Test 3

6. To start Test 3, depress EXECUTE.
7. The status of the selected circuit is displayed as follows:

Field 1-3.
Fields 2 through 6 - Equipment location of circuit.
Field 7 - Carrier type.
Field 8 - Maintenance busy status of circuit.
Field 9 - Total modules in switch.
Field 10 - Total cabinets in displayed module.
Field 11 - Total carriers in displayed cabinet.
Field 12 - Total circuits in displayed carrier.
Field 13 - Total circuits busied out in displayed carrier.
Field 14-0 or total carriers with busy circuits.
Note: Total number of carriers with busy out circuits are only displayed in Field 14 if the carriers were found and displayed in Test 1.
8. Depressing RLS BUSY OUT releases from busy the displayed circuit location.

Caution: If a trunk or terminal that is up on a connection is busied out, the connection is dropped.
9. Depressing BUSY OUT busies out the displayed circuit location.
10. Depressing NEXT CIRCUIT advances to the next equipped circuit in the carrier displayed and updates the MAAP display with its status.
11. Depressing NEXT UNIT advances the test to the next equipped circuit in the next equipped carrier and updates the MAAP display with its status.
12. When the last circuit in the last carrier in the switch is displayed, depressing NEXT UNIT or NEXT CIRCUIT once more dashes all fields except the test number and the total carriers with busy circuits (Fields 1 and 14).

Note: After the display is dashed, depressing BUSY OUT or RLS BUSY OUT causes error code 10 to be displayed.
13. Depressing NEXT CIRCUIT or NEXT UNIT again causes the first equipped carrier and the first equipped circuit in that carrier to be found and displayed.

## PROC 640-TRUNK FAILURES




## Purpose

PROC 640 is used when referenced from PROC 600 (Alarm causes/error $\log$ ) to verify and turn off the OTHER FAILS fault indicator resulting from a trunk failure.
PROC 640 does not perform any trunk tests.
PROC 640 is used to:

1. Display the trunk failures detected during call processing.
2. Monitor trunk activity.

The data displayed requires extensive call processing documentation for interpretation.

## Field Definitions and Codes

Each field of PROC 640 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AL, PROC 640 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6 - Select equipment location of trunk to be monitored (Tesi 2 only).

TABLE AL.

| PROC 640 <br> FIELD DEFINITIONS AND CODES |  |  |
| :---: | :---: | :---: |
| FIELD | CODE | definition |
| 1 | 1, 2 | Test number. |
| 2 | 0-30 | Module number. |
| 3 | 0-7 | Cabinet number. |
| 4 | 0-3 | Carrier number |
| 5 | 0-21 | Slot number |
| 6 | 0-3 | Number of circuit assigned to trunk. |
| 7 | $\begin{aligned} & 1-9 \\ & 11 \\ & 12 \end{aligned}$ | First digit of dial access code: $1-9$ \# |
| 8 | 0-9 | Second digit of dial access code. |
| 9 | 0-9 | Third digit of dial access code. |
| 10 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Maintenance busy status: <br> Not busied out. <br> Busied out. |
| 11 |  | Failure code: <br> Trunk signaling sequence failure. <br> Call processing failure. <br> Queue audit failure. <br> Trunk falsely active failure. <br> Trunk now in quarantine (T_LIMBO). <br> Failure caused alarm. <br> Sequence initialization. |
| 12 | 0-6 | Number of failures. |
| 13 | 1-6 | Failure index for individual failures. |

TABLE AL. (Contd)

| PROC 640FIELD DEFINITIONS AND CODES (Contd) |  |  |
| :---: | :---: | :---: |
| FIELD | CODE | definition |
| 14 | $\begin{aligned} & 1 \\ & 2 \\ & 3 \\ & 4 \end{aligned}$ | Trunk data type: <br> Trunk signaling sequence failure (Test 1 ). Data when failure occurred (Test 1). Dynamic trunk data (Test 2). Frozen (dynamic) trunk data (Test 2). |
| 15 | $\begin{gathered} 0-7 \\ 8 \end{gathered}$ | Trunk data index (used for trunk data types 2-4). <br> Failing stimulus (Test 1, type 2). 10-MS counter (Test 2). |
| 16 | $\stackrel{0-}{177777}$ | Trunk data code. |
|  |  | Data type 1: When trunk data type is a 1 , the trunk data code is the trunk signaling sequence and sequence step at the time the failure occurred. (The low 2 octal chracters are the sequence step and the next octal characters are the sequence number.) |
|  |  | Data type 2-4, index 0-6: When trunk data types 2-4 are selected, this trunk data code corresponds to the layout of one word of trunk table $0-6$, selected by the index displayed in field 15. |
|  |  | Data type 2-4, index 7: When trunk data index 7 is selected, the trunk data code corresponds to the following scan status encodes (counting digit positions from left to right in field 16): |

TABLE AL. (Contd)

| $\text { PROC } 640$ <br> FIELD DEFINITIONS AND CODES (Contd) |  |  |
| :---: | :---: | :---: |
| FiELD | CODE | definition |
| 16 <br> (Contd) |  | Data type 2-4, index 8: The stimulus from call processing at the time the failure was detected by a trunk signaling sequence, or a call processing routine. The trunk data for index 8 will be 0 for isolated failure codes 3 or 4 (corresponding to audit failures). |
| 17 | 0-9 | Prior code index. <br> Used only for trunk data type 4. When STOP is operated to freeze dynamic data (going from data type 3 to data type 4 ), 0 is displayed. The newest trunk data is displayed in field 16 when the prior code index is 0 . Larger prior code indexes correspond to older data. |

## Operation of Procedure

## Overview

PROC 640 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a trunk failure.

To call in PROC 640, perform the following:

1. Depress PROC NO; 640; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Displays failure history.
2. Test 2 - Monitors trunk activity.

## Test 1

Test 1 provides a failure history of trunk failures (in groups of six) recorded by the on-line maintenance software.

Test 1 can also be used to resolve the cause of the alarmed trunk circuits, one at a time.

1. Test 1 is the default test when entering PROC 640, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. A summary of the failure history is displayed in groups of six.
4. If no failures occurred, Field 1 displays a 1 , Field 12 displays a 0 , and all other fields are dashed.
5. If one or more failures occurred, the following is displayed:

Field 1-1.
Fields 2 through 6-Equipment location of failing trunk circuit.
Fields 7 through 9 - Trunk dial access code of displayed trunk circuit.
Field 10 - Maintenance busy status of displayed trunk circuit.
Field 11 - Lowest failure code for displayed trunk circuit.
Field 12 - Number of failures (first group).
Field 13 - Failure index.
Field 14 - Trunk data type (1, 2, or dashed).
Field 15 - Trunk data index (dashed if Field 14 is dashed).
Field 16 - Trunk data code (dashed if Field 14 is dashed).
Field 17 - Dashed.
6. Depressing NEXT UNIT repeatedly displays the remaining failure codes (if any) associated with the displayed trunk circuit.

Depressing NEXT UNIT after all failure codes are displayed dashes Field 11.
Depressing NEXT UNIT once more displays the lowest failure code again.
7. Depressing NEXT DATA advances through trunk table data and scan status that were recorded when the trunk circuit failed.

Note: The trunk data displayed in Field 16 when trunk data type 2 is displayed in Field 14 requires extensive call processing documentation for interpretation.
8. When trunk data type 2 is displayed in Field 14, indices displayed in Field 15 ranging from 0 to 6 correspond to octal encode trunk table data from TRKTBL0 through TRKTBL6.
9. An index of 7 displayed in Field 15 corresponds to scan status for the trunk circuit at time of failure.

## PROC 640 Test 1

10. The scan status is determined by counting digit positions from left to right in Field 16:

Digit positions 1 and $2=$ Dial mask ( $0-17$ ) contents.
Digit positions 3 and $4=$ Last look ( $0-17$ ) contents.
Digit positions 5 and $6=$ Demand scan ( $0-17$ ) contents.
Note: Zero (0) through 3 is displayed for most trunks.
11. The stimulus from call processing at the time the failure was detected by a trunk signaling sequence or a call processing routine corresponds to an index of 8.

The trunk data for index 8 is 0 for isolated failure codes 3 or 4 (corresponding to audit failures).
12. Depressing NEXT CIRCUIT repeatedly displays the failure histories (maximum of six) of the remaining failed circuits in the first group.

Depressing NEXT CIRCUIT after all failure histories in the group are displayed (indicated by Fields 12 and 13 being equal) dashes the display.
13. When Field 12 (number of failures) equals six, depressing NEXT FAULT freezes the failure histories in groups of six and causes the first failed circuit within the next group to be displayed.

Depressing NEXT CIRCUIT steps through the remainder of the failing circuits within the new group.
14. NEXT FAULT can be used to step to the next group of six failures when the preceding group contained at least six failures.
15. Depressing NEXT FAULT when the preceding group had less then six failures, or when no other failures are recorded by the failure history dashes the display.
16. Depressing NEXT CIRCUIT or NEXT FAULT after all failures are displayed (maximum of 60 ) causes Test 1 to be executed, starting the sequence over with an updated failure history.

Caution: Busying out a trunk when the trunk is in use disrupts service by disconnecting the call.
17. Once a trunk location is displayed, BUSY OUT and RLS BUSY OUT can be used to change the maintenance busy status (Field 10) of the trunk circuit.
18. All trunks busied out during testing should be released from the busied out condition using RLS BUSY OUT before leaving PROC 640.

Note: Field 10 should be used to determine whether the trunks being tested are released from busy out as the BUSY OUT indicator on the MAAP turns off only when all circuits interfacing with the MAAP are no longer busied out.
19. To turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the OTHER FAILS fault indicator) after Test 1 is executed at least once, perform the following for each trunk circuit recorded as failing:
Display the failing circuit in Fields 2 through 6.
Depress CLEAR DATA; EXECUTE.
Note: Trunk circuit alarmed entries are marked as resolved in PMIDS.
20. The OTHER FAILS fault indicator is automatically turned off by Test 1 (indicating the trunk alarm cause is resolved) when the following conditions are met:
All trunk circuit failures are cleared.
All other sources affecting the OTHER FAILS fault indicator are cleared.

## Test 2

Test 2 monitors trunk data for a selected trunk circuit equipment location.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence: CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is called in, a default trunk circuit (last trunk circuit displayed in Test 1) is displayed in Fields 2 through 6, or Fields 2 through 6 are dashed.
Either the default trunk circuit can be tested or another trunk circuit can be selected for testing.
3. The module field of the trunk circuit equipment location (Field. 2) is flashed when Test 2 is initially called in, indicating it is an optional entry field.
4. To select another trunk circuit for testing, enter its equipment location in Fields 2 through 6: (Trunk circuit module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
5. To start Test 2, after selecting a trunk circuit to be tested, depress EXECUTE.
6. While Test 2 is executing, the following information is displayed:

Field 1 - 2.
Fields 2 through 6 - Equipment location of the trunk circuit being tested.
Fields 7 through 9 - Trunk dial access code of trunk circuit being tested.
Field 10 - Maintenance busy status of trunk circuit being tested.
Fields 11 through 13 - Dashes.
Field 14 - Trunk data type (initial value $=3$ ).
Field 15 - Trunk data index (initial value $=0$ ).
Field 16 - Trunk data code (changing).
Field 17 - Prior code index (if applicable).

## PROC 640 Test 2

7. Prior code data is only saved when Test 2 is executing in the dynamic type 3 display mode. When the trunk data selected for display changes, all related trunk data are recorded for later display.
8. The maximum recording rate is approximately one sample per 30 milliseconds (ms). The dynamic type 3 display of the selected trunk data code is updated at a much slower rate.
9. Frozen changes may hold information which was never displayed.
10. Depressing STOP causes the trunk data type 3 (dynamic) in Field 10 to change to 4 (frozen data).

When STOP is depressed all trunk data are recorded and frozen.
11. NEXT DATA can be used to display related frozen trunk data that was recorded at the same time the monitored trunk data change was recorded.

Depressing NEXT DATA advances the trunk data index (Field 15) for either dynamic data type 3 or frozen data type 4 (both in Field 14).

Depressing NEXT DATA continuously advances the trunk data index from 0 through 8 and back to 0 .
12. Depressing NEXT UNIT controls the display of the prior data index in Field 17, and is restricted to the display of frozen data type 4 (Field 14).
13. If NEXT UNIT is depressed once, and at least one change in the dynamic data was recorded, a 1 is displayed in Field 17.

This indicates that the trunk data code in Field 16 corresponds to the contents of the dynamic display field just before it changed to the value displayed when STOP was depressed.
14. Depressing NEXT UNIT continuously increments the prior code index in Field 17 and shows corresponding older trunk data codes in Field 16.

Depressing NEXT UNIT after the oldest prior data is displayed dashes Fields 16 and 17.
Depressing NEXT UNIT again displays the newest frozen data.
15. When type 4 frozen data is displayed, NEXT UNIT is depressed to display older trunk data as indicated by a prior index being displayed in Field 17.
Other data items that were recorded while in the dynamic data mode (type 3), can be displayed by repeatedly depressing NEXT DATA.
The displayed data corresponds to the definition defined in Table AL, PROC 640 - Field Definitions and Codes.
16. The relative timing between two prior data code indexes can be obtained from the two values of the $10-\mathrm{ms}$ octal counter displayed (when trunk data index displayed in Field $15=8$ ).

Convert this octal difference to decimal and multiply by 10 to obtain the difference in milliseconds.
17. When in the dynamic mode (type 3), all trunk data is recorded when the selected data changes.
18. PROC 640 checks for a change about every 30 ms . Therefore, time difference accuracy is about 30 ms .
19. A change in less than 30 ms may not be detected.

Heavy traffic can further degrade the accuracy of these time differences.

## Caution: Busying out a trunk when the trunk is in use disrupts service by disconnecting the call.

20. Once a trunk location is displayed, BUSY OUT and RLS BUSY OUT can be used to change the maintenance busy status (Field 10) of the trunk circuit.
21. All trunks busied out during testing should be released from the busied out condition using RLS BUSY OUT before leaving PROC 640.

Note: Field 10 should be used to determine whether the trunks being tested are released from busy out as the BUSY OUT indicator on the MAAP turns off only when all circuits interfacing with the MAAP are no longer busied out.
22. To select another trunk circuit for testing, after the first trunk circuit is tested, use the CHANGE FIELD sequence:
CHANGE FIELD; 2; ENTER; (Trunk circuit module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
23. EXECUTE must be depressed to test the trunk circuit selected for testing.

## Repair Guide

## Overview

When a trunk failure is indicated, PROC 640 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following repair procedure.

This repair procedure is divided into two general cases:

1. Trunks in a nonidle state (T LIMBO) which are in quarantine - failure code 5 displayed in Field 11.
2. Trunks not in T_LIMBO - no failure code 5 displayed in Field 11.

## General

1. Execute Test 1 to display all trunk failures.
2. Use NEXT UNIT to display all of the failure codes for the first failed trunk selected for repair.
3. If the dial access code displayed in Fields 7 through 9 is dashed, use PROC 100 to determine restrictions on the trunk for making test calls.
The dial access code displayed in Fields 7 through 9 may be an attendant access code that cannot be dialed from a terminal.

## Description of Trunks in T_LIMBO

1. Most trunk failures are trunks that are locked in T_LIMBO by invalid conditions on the tip and ring.
2. One example is a ground on the tip of an SN230 ground start trunk.

When this failure exists, the switch quarantines the trunk from use by call processing by placing it in the T_LIMBO state.
3. Periodic attempts are made to order the T_LIMBO trunk back to its idle state.

The T_LIMBO state (Failure code 5 displayed in Field 11) of a displayed failed trunk in Test 1 is checked each time EXECUTE is operated, or when NEXT CIRCUIT displays the first failed trunk.
4. When a trunk has been in T_LIMBO for more than 15 consecutive minutes, failure code 6 is displayed.
5. Failure codes 5 and $6=$ Trunk failure is the cause for the OTHER FAILS fault indicator being turn on, and trunk is in T_LIMBO.
6. Failure code 5 but not $6=$ Trunk is in T_LIMBO, but not long enough to set the OTHER FAILS fault indicator.
7. Failure code 6 but not $5=$ Trunk was in T_LIMBO for more than 15 consecutive minutes and is the cause for turning on the OTHER FAILS fault indicator, but became idle and is now in service for call processing.

## Trunk Signaling Sequence Failures

1. The Trunk Signaling Sequence Failures Table is used to decode the failure data displayed by Test 1.
2. This table is organized by increasing sequence number shown in octal in column 2.
3. If a trunk signaling sequence failure exit exists, this failure exit step is listed.

If the sequence has no failure exit, no step is listed.
4. The data displayed in Field 16 for a irunk signaling sequence failure is used to match the octal encode in column 1 of the table.

This line in the table defines the failure, or refers to another line that defines the failure.
5. A trunk signaling sequence failure is specified by the following display:

Field 1-1.
Field 14 - Trunk data type.
Field 16 - Trunk data code $=$ Sequence failure number; step used to find the entry in Table AM, PROC 640 - Trunk Signaling Sequence Failures.
6. The range of octal encodes that appear in trunk table 2 (TRKTBL2) for this sequence number are shown in column 4.

The highest character (when set to 1) specifies that a trunk signaling sequence is active. The low 4 octal characters contain the packed sequence number and step.
7. The name of the sequence that controlled signaling for the trunk at the time of failure appears in column 5.

The full descriptive title for this name appears in Table AN, PROC 640 - Trunk Signaling Sequences.

TABLE AM.

| $\text { PROC } 640$ <br> TRUNK SIGNALING SEQUENCE FAILURES |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TEST 1 OCTAL ENCODE | OCTAL SEQUENCE |  | trunk tabie 2 octal range | NAME | TYPE OF FAILURE* | success SCAN dATA | stimulus |  | SUSPECTED FAILURE |
|  | NUMBER | STEP |  |  |  |  | OK | Fall |  |
| (1) GSTKS - Ground Start Trunk (SN230) |  |  |  |  |  |  |  |  |  |
| 103 | 1 | 3 |  | SZGST1 | Invalid Scan Data | 101 | 1 | 17 | $\begin{aligned} & S N 230 \text { if scan } \\ & =2 \text { or } 3 \\ & C O \text { if scan }=0 \end{aligned}$ |
| 107 | 1 | 7 | 100021-100030 | SZGST1 | $\begin{aligned} & \text { 4-second time-out } \\ & \text { before loop } \\ & \text { current. } \end{aligned}$ | $\begin{aligned} & 101 \\ & 103 \end{aligned}$ | 2 | 17 | CO or SN230 if $\operatorname{scan}=0$ SN230 if scan $=2$ |
| 203 | 2 | 3 | 100041-100046 | GSINSZ | 1 minute time out | 203, 0 | 2 | 17 | Ground on tip if $\operatorname{scan}=1$ <br> SN230 if scan $=3$ |
| 405 | 4 | 5 | 100101-100106 | ANSGST | 2-second time-out before loop current. | $\begin{aligned} & 101, \\ & 102 \end{aligned}$ | 2 | 17 | CO if $\operatorname{scan}=0$ SN230 if scan $=1,2$, or 3 |
| 506 | 5 | 6 | 100121-100131 | DISGST | 128-second timeout before idle. | 0 | 0 | 17 | Ground on ring if scan $=1$ CO if $\operatorname{scan}=2$ or 3 . |
| 607 | 6 | 7 |  | DISGS2 | $\begin{aligned} & 128 \text {-second time- } \\ & \text { out before idle } \end{aligned}$ | 0 | 0 | 17 | $\begin{aligned} & \mathrm{SN} 230 \text { if } \mathrm{scan} \\ & =1, \mathrm{CO} \text { if } \mathrm{scan} \\ & =1 \text { or } 3 \end{aligned}$ |
| (2) GSTKP - Ground Start Trunk with Party Test (SN230) |  |  |  |  |  |  |  |  |  |
| 1103 | 11 | 3 |  | SZGSP1 | Same as 103 |  |  |  |  |
| 1107 | 11 | 7 | 100221-100238 | SZGSP1 | 4-second time-out before any scan change. | 102 | 1 | 17 | CO or SN230 if scan $=0$ SN230 if scan $=3$ |

*See Octal Sequence column for "same as" number.

## PROC 640

TABLE AM. (Contd)

*See Octal Sequence column for "same as" number.

TABLEAM. (Contd)

| PROC 640TRUNK SIGNALING SEQUENCE FAILURES (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TESI 1 OCTAL ENCODE | OCTAL SEQUENCE |  | trunk table 2 octal range | NAME | TYPE OF FAILURE* | success SCAN data | Stimulus |  | SUSPECTED FAILURE |
|  | number | STEP |  |  |  |  | ок | FAll |  |
| (4) TITKS - Tie Trunk (SN233) |  |  |  |  |  |  |  |  |  |
| 3102 | 31 | 2 | 100621-100623 | TIEOGS | 1-second time-out before switch offhook. | 202 | 2 | 17 | Far end if scan $=3$ <br> SN233 if scan $=0 \text { or } 1$ |
| 3202 | 32 | 2 | 100641-100643 | TIEINC | 300 ms time-out before distant end off-hook. | 101 | 1 | 17 | $\begin{aligned} & \text { Far end if scan } \\ & =0 \\ & \text { SN } 233 \text { if scan } \\ & =2 \text { or } 3 \end{aligned}$ |
|  | 33 |  | 100661-100665 | TIEDOH |  |  |  |  |  |
|  | 34 |  | 100701-100707 | TIEANS | 1-second timeout before switch off-hook. | 202 | 2 | 17 | Far end if scan $=3$ <br> SN233 if scan $=0$ or 1 |
| 3503 | 35 | 3 | 100721-100724 | TIELDS | 30 -second timeout before switch on-hook. | 0 | 3 | 17 | SN233 if scan <br> $=2$ or 3 <br> Far end if scan $=1$. |
|  | 36 |  | 100000 |  |  |  |  |  | SN233 |
|  | 36 |  | 100741-100743 | TIEDAN |  | 202,303 |  |  |  |
|  | 37 |  | 100761-100766 | TIEMDD |  | 0 |  |  |  |
| (5) CCSATK - CCSA Incoming Wink Start Trunk (SN233) |  |  |  |  |  |  |  |  |  |
| 4102 | 41 | 2 | 101021-101023 | TIEOGS | Same as 31. |  |  |  |  |
| 4204 | 42 | 4 | 101041-101051 | CCSAIN | 300 ms time-out before both ends off-hook. | 303 | 2 | 17 | Far end if scan $=2$ <br> SN233 if scan $=0$ or 1 |
|  | 43 |  | 101061-101065 | TIEDOH | Same as 33. |  |  |  |  |
| 4406 | 44 | 6 | 101101-101107 | TIEANS | Same as 34. |  |  |  |  |
| 4503 | 45 | 3 | 101121-101124 | TIELDS | Same as 35. |  |  |  |  |

*See Octal Sequence column for "same as" number.

TABLE AM. (Contd)

| Proc 640trunk signaling SEQUENCE Fallures (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TEST 1 OCTAL ENCODE | OCTAL SEQUENCE |  | TRUNK TABLE 2 OCTAL RANGE | name | TYPE OF FAILURE* | SUCCESS SCAN DATA | stimutus |  | SUSPECTED fallure |
|  | Number | STEP |  |  |  |  | OK | FAll |  |

(5) CCSATK - CCSA Incoming Wink Start Trunk (SN233) (Contd)

|  | 46 |  | $101141-101143$ | TIEDAN | Same as 36. |  |  | - |  |
| :--- | :---: | :---: | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  | 47 |  | $101161-101166$ | TIEMDD | Same as 37. |  |  |  |  |

(6) ANICT - Automatic Number Identification (ANI) Trunk (SN242)

| 5106 | 51 | 6 | $101221-101227$ | ANI_CO | 175 ms time-out <br> before idle. | 0 | 0 | 17 | Central office <br> SN242 |
| :---: | :---: | :---: | :---: | :---: | :--- | :---: | :---: | :---: | :--- |
| 5206 | 52 | 6 | $101241-101247$ | ANI_CS | 175 ms time-out <br> before idle. | 0 | 0 | 17 | CCSA office <br> SN242 |
|  | 53 |  | $101261-101262$ | ANI2DY |  | $101-C O$, <br> 202-CCSA |  |  |  |
|  | 54 |  |  |  |  |  |  |  |  |
|  | 55 |  |  |  |  |  |  |  |  |
|  | 56 |  |  |  |  |  |  |  |  |

Sequence numbers 61-67 are the same as 51-57.
(7) SPGTK - Auxiliary Trunk (SN231)

| 7102 | 71 | 2 | $101621-101623$ | RLSGSL | 4-second time-out <br> before sleeve <br> grounds detected. | 202 | 2 | 17 | Far end <br> SN231 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 7202 | 72 | 2 | $101641-101643$ | SZAUXT | 4-second time-out <br> before sleeve <br> grounds detected. | 202 | 2 | 17 | Far end <br> SN231 |
|  | 75 |  | $101721-101723$ | RLSAUX |  | 0 |  |  |  |

[^0]TABLE AM. (Contd)

| $\text { PROC } 640$ <br> trunk signaling sequence failures (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TEST I octal encode | octal sequence |  | trunk table 2 octal range | name | tYPE Of FAILURE* | success <br> SCAN <br> dATA | stimutus |  | SUSPECTED fallure |
|  | NUMBER | STEP |  |  |  |  | ок | fall |  |

(8) CCSATKD - CCSA Trunk (SN233)

| 10102 | 101 | 2 | $102021-102023$ | TIEOGS | Same as 31. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :--- | :--- | :--- | :--- | :--- |
| 10202 | 102 | 2 | $102041-102043$ | TIEINC | Same as 32. |  |  |  |  |
|  | 103 |  | $102061-102065$ | TIEDOH | Same as 33. |  |  |  |  |
| 10406 | 104 | 6 | $102101-102107$ | TIEANS | Same as 34. |  |  |  |  |
| 10503 | 105 | 3 | $102121-102124$ | TIELDS | Same as 35. |  |  |  |  |
|  | 106 |  | $102141-102143$ | TIEDAN | Same as 36. |  |  |  |  |
|  | 107 |  | $102161-102166$ | TIEMDD | Same as 37. |  |  |  |  |

(9) CCSASH - CCSA Delay Dial Outgoing Trunk (SN233)

| 11102 | 111 | 2 | $102221-102227$ | CCSDDO | l-second time-out <br> before any scan <br> change (especially <br> switch off-hook) | 20X <br> X=don't <br> care | ANY | 17 | SN233 |
| :---: | :---: | :---: | :---: | :---: | :--- | :--- | :--- | :--- | :--- |
| 11202 | 112 | 2 | $102241-102243$ | TIEINC | Same as 32. |  |  |  |  |
|  | 113 |  | $102261-102265$ | TIEDOH | Same as 33. |  |  |  |  |
| 11406 | 114 | 6 | $102301-102307$ | TIEANS | Same as 34. |  |  |  |  |
| 11503 | 115 | 3 | $102321-102324$ | TIELDS | Same as 35. |  |  |  |  |
|  | 116 |  | $102341-102343$ | TIEDAN | Same as 36. |  |  |  |  |
|  | 117 |  | $102361-102366$ | TIEMDD | Same as 37. |  |  |  |  |

(10) MSCQ - Main Satellite (Unused Sequence Group) (SN233)

Sequence numbers 121-1.30 are unused.
*See ©ctal Sequence column for "same as" number.

TABLE AM. (Contd)

(11) CCSADO2 - CCSA Delay Dial Outgoing, Incoming Wink Start Trunk (SN233)

| 13102 | 131 | 2 | $102621-102627$ | CCSDDO | Same as 111. |  |  |  |  |
| :---: | :---: | :---: | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 13204 | 132 | 4 | $102641-102651$ | CCSAIN | Same as 42. |  |  |  |  |
|  | 133 |  | $102661-102665$ | TIEDOH | Same as 33. |  |  |  |  |
| 13406 | 134 | 6 | $102701-102707$ | TIEANS | Same as 34. |  |  |  |  |
| 13503 | 135 | 3 | $102721-102724$ | TIELDS | Same as 35. |  |  |  |  |
|  | 136 |  | $102741-102743$ | TIEDAN | Same as 36. |  |  |  |  |
|  | 137 |  | $102761-102766$ | TIEMDD | Same as 37. |  |  |  |  |

(12) TIEDDWW - Tie Wink or Delay Dial Outgoing, Delay Dial Incoming Trunk (SN233)

| 14102 | 141 | 2 | $103021-103027$ | TIEWDO | 1-second time-out <br> before any scan <br> change (especially <br> switch off-hook). | 20X <br> X=don't <br> care | ANY | 17 | SN233 |
| :---: | :---: | :---: | :---: | :---: | :--- | :--- | :--- | :--- | :--- |
| 14106 | 141 | 6 | $103021-103027$ | TIEWDO | l-second time-out <br> before distant <br> end on-hook. | 202 | 0 | 17 | Far end if scan <br> $=3$ <br> SN233 if scan <br> or 1 |
| 14204 | 142 | 4 | $103041-103051$ | CCSAIN | Same as 42. |  |  |  |  |
| 14406 | 144 | 6 | $103101-103107$ | TIEANS | Same as 34. |  |  |  |  |
| 14503 | 145 | 3 | $103121-103124$ | TIELDS | Same as 35. |  |  |  |  |
|  | 146 |  | $103141-103143$ | TIEDAN | Same as 36. |  |  |  |  |
|  | 147 |  | $103161-103167$ | TIEMDD | Same as 37. |  |  |  |  |

*See Octal Sequence column for "same as" number.

TABLE AM. (Contd)

| PROC 640TRUNK SIGNALING SEQUENCE FAILURES (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\left\lvert\, \begin{gathered} \text { TEST } 1 \\ \text { OCTAL ENCODE } \end{gathered}\right.$ | $\begin{aligned} & \text { OCTAL } \\ & \text { SEQUENCE } \end{aligned}$ |  | trunk table 2 ocial range | NAME | tYPE OF FALIURE* | success <br> SCAN <br> data | stimulus |  | SUSPECTED fallure |
|  | Number | STEP |  |  |  |  | ок | FAII |  |
| (13) TIETTM - Tie Wink or Delay Dial Outgoing Trunk (SN233) |  |  |  |  |  |  |  |  |  |
| 15102 | 151 | 2 | 103221-103227 | TIEWDO | Same as 141, Step 2. |  |  |  |  |
| 15106 | 151 | 6 | 103221-103227 | TIEWDO | Same as 1.41, Step 6. |  |  |  |  |
| 15202 | 152 | 2 | 103241-103243 | TIEINC | Same as 32. |  |  |  |  |
|  | 153 |  | 103261-103265 | TIEDOH | Same as 33. |  |  |  |  |
| 15406 | 154 | 6 | 103301-103307 | TIEANS | Same as 34. |  |  |  |  |
| 15503 | 155 | 3 | 103321-103324 | TIELDS | Same as 35. |  |  |  |  |
|  | 156 |  | 103341-103343 | TIEDAN | Same as 36. |  |  |  |  |
|  | 157 |  | 103361-103367 | TIEMDD | Same as 37. |  |  |  |  |
| (14) DLTNDET - Dial Tone Detector (SN250) |  |  |  |  |  |  |  |  |  |
| Sequence numbers 161-170 are unused. |  |  |  |  |  |  |  |  |  |
| (15) RLTSODR - Release Link Trunk (SN233) |  |  |  |  |  |  |  |  |  |
| 17102 | 171 | 2 | 103621-103627 | RLTOGS | 1-second time-out before switch off-hook. | 202 | 0 | 17 | $\begin{aligned} & \text { SN233 if scan } \\ & =0 \text { or } 1 \\ & \text { Far end if scan } \\ & =3 \end{aligned}$ |
|  | 172 |  | 103641-103654 | RLTOG2 |  | 3 |  |  |  |
| 17302 | 173 | 2 | 103661-103667 | RLTDOH | i-second time-out before switch on-hook. | 0 | 3 | 17 | SN233 if scan $=2$ or 3 <br> Far end if scan $=1$ |

*See Octal Sequence column for "same as" number.

TABLE AM. (Contd)

| PROC 640 <br> TRUNK SIGNALING SEQUENCE FAILURES (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TEST 1 octal encode | octal sequence |  | trunk table 2 octal range | name | tYPE Of FAILURE* | $\begin{aligned} & \text { SUCCESS } \\ & \text { SCAN } \\ & \text { DATA } \end{aligned}$ | stimutus |  | suspected FAILURE |
|  | number | STEP |  |  |  |  | ок | FAIL |  |

(15) RLTSODR - Release Link Trunk (SN233) (Contd)

| 17306 | 173 | 6 | $103661-103667$ | RLTDOH | 1-second time-out <br> before distant end <br> on-hook. | 0 | 3 | 17 | Far end if scan <br> $=1$ <br> SN233 if scan <br> $=2$ or 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 17504 | 175 | 4 | $103721-103730$ | RLTDSC | 30-second time- <br> out before both <br> ends on-hook. | 0 | 3 | 17 | Far end if scan <br> $=1$ <br> SN233 if scan <br> $=2$ or 3 |
|  | 176 |  | $103741-103743$ | RLTFLH |  | 202,203 |  |  |  |
| 1702 | 177 | 2 | $103761-103770$ | RLTOGR | 1-second time-out <br> before switch <br> off-hook. | 202 | 0 | 17 | SN233 if scan <br> $=0$ or 1 <br> Far end if scan <br> $=3$ |

(16) INCRLTSQ - Incoming Release Link Trunk (SN233)

| 20202 | 202 | 2 | $104041-104043$ | TIEINC | Same as 32. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :--- | :--- | :--- | :--- | :--- |
|  | 203 |  | $104061-104065$ | TIEDOH | Same as 33. |  |  |  |  |
| 20406 | 204 | 6 | $104101-104107$ | TIEANS | Same as 34. |  |  |  |  |
| 20503 | 205 | 3 | $104121-104124$ | TIELDS | Same as 35. |  |  |  |  |
|  | 206 |  | $104141-104147$ | IRLFLH |  |  |  |  |  |

(17) MSIS - Main Satellite Outgoing Trunk (SN233)

| 21102 | 211 | 2 | $104221-104223$ | TIEOGS | Same as 31. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :--- | :---: | :---: | :---: | :---: |
|  | 213 |  | $104261-104277$ | MSFLSH |  | 0 |  |  |  |
| 21406 | 214 | 6 | $104301-104307$ | TIEANS | Same as 34. |  |  |  |  |

*See Octal Sequence column for "same as" number.

TABLE AM. (Contd)

*See Octal Sequence column for "same as" number.

TABLE AM. (Contd)

| TRUNK SIGNALING SEQUENCE FAILURES (Contd) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | OCTAL SEQUENCE |  | trunk tabie 2 octal range | NAME | TYPE OF FAILURE* | Success SCAN DATA | stimulus |  | SUSPECTED fallure |
| OCTAL ENCODE | NUMBER | STEP |  |  |  |  | OK | FAll |  |
| (19) MSDD-Main Satellite Delay Dial Outgoing Trunk (SN233) (Contd) |  |  |  |  |  |  |  |  |  |
| 25202 | 252 | 2 | 105241-105243\| | TIEINC | Same as 32. |  |  |  |  |
|  | 253 |  | 105261-105277 | MSFLSH | Same as 213. |  |  |  |  |
| 25406 | 254 | 6 | 105301-105307 | TIEANS | Same as 34. |  |  |  |  |
| 25504 | 255 | 4 | 105321-105330 | RLTDSC | Same as 175. |  |  |  |  |
|  | 256 |  | 105341-105343 | TIEDAN | Same as 36. |  |  |  |  |
|  | 257 |  | 105361-105366 | TIEMDD | Same as 37. |  |  |  |  |
|  | 260 |  | 105401-105403 | RLTFLH | Same as 176. |  |  |  |  |
|  | 261 |  | 105421-105432 | MSGFLH | Same as 221. |  |  |  |  |
| Sequence numbers 262-310 are unused. |  |  |  |  |  |  |  |  |  |

*See Octal Sequence column for "same as" number.

## Test Calls

1. Test calls when using this maintenance procedure are defined as any way you can make the call to exercise the trunk signaling sequences for the trunk under test.
2. Use PROC 100, and other trunk administrative procedures, to determine any trunk restrictions that may interfere with making test calls.
3. All of the trunk signaling sequences for a trunk type should be exercised (where valid) to ensure complete testing of a trunk when using test calls.
4. PROC 642 can be used to make outgoing test calls, but other methods must be used to check the trunk for incoming calls.

When PROC 642 is being used, PROC 640 cannot monitor the call, but can only be used later to display a possible failure stimulated by PROC 642.
5. Use the trunk verification feature to help select the trunk being tested from many in the trunk group. Make calls to exercise as many trunk sequences for the trunk as possible.
6. PROC 177 can be used to relate the trunk equipment location to the trunk number used by trunk verification.

TABLE AN.

| TRUNK SIGNALING SEQUENCES |  |  |
| :---: | :---: | :--- |
| NUMBER | ABBREVIATION | DEFINIIION |
| 1 | ABDNCL | Abandon Call Search |
| 2 | ANI_CO | ANI for CO |
| 3 | ANI_CS | ANI for CCSA |
| 4 | ANI2DY | ANI Second Dial Tone Relay |
| 5 | ANSGST | Answer Ground Start |
| 6 | CCSAIN | CCSA Wink Start Inseize |
| 7 | CCSDDO | CCSA Delay Dial Outseize |
| 8 | DIDANS | DID Call Answer |
| 9 | DIDCOD | DID CO Disconnect |
| 10 | DIDMDD | DID Mutilated Dialing Disconnect |
| 11 | DIDPDX | DID Local Disconnect |
| 12 | DIDWSS | DID Wink Start Inseize |
| 13 | DISGST | Disconnect Local Ground Start |
| 14 | GSINSZ | Ground Start Inseize |
| 15 | GSTONH | Ground Start CO Disconnect |
| 16 | IRLFLH | Incoming Release Link Trunk Flash |
| 17 | MSFLSH | Main-Satelite Flash |
| 18 | MSGFLH | Main-Satellite Local Flash |
| 19 | MSWSOT | Main-Satellite Wink Start Outgoing |
| 20 | RLSAUX | Release Auxiliary Trunk |
| 21 | RLSGSL | Seize Auxiliary Trunk Without Grounding |
| 22 |  | RLTDOH |
| 23 | RLTDSC | RLT Distant On-Hook |
| 24 | RLTTFLH | RLT Initial Flash Timing |
| 25 | RLTOGR | RLT Outseize With Ring Control |
| 26 | RLTOGS | RLT Outseize |
| 27 | RLTOG2 | RLT Outseize With Ring Control, Wink |

## PROC 640

TABLE AN. (Contd)

| TRUNK SIGNALING SEQUENCES (Contd) |  |  |
| :---: | :---: | :--- |

## Isolation and Repair Steps

Isolation and repair steps for trunk failures are detailed in:

1. Failure Code 5-Trunk is now in T_LIMBO.
2. No Failure Code 5 - Trunk not in T_LIMBO.
3. Failure Codes 1 through 7.

## Failure Code 5 - Trunk is now in T_LIMBO

1. Using Test 1 , select the first failed trunk circuit displaying failure code 5 .
2. Depress NEXT DATA to record the scan data displayed in Field 16 for data type 2 and data index 7 displayed in Fields 14 and 15.
3. Scan data and indications for trunk type SN232 and SN233 are as follows:

Scan data $1=$ Distant end off-hook, switch idle.
Scan data $2=$ Distant end idle, switch off-hook.
Scan data $3=$ Distant end off-hook, switch off-hook.
4. Scan data and indications for trunk type SN231 are as follows:

Scan data $1=$ Reverse loop current (ground on ring) or ground on CO lead.
Scan data $2=$ Ground on AL1. Also, ground on S with SSL switch closed and Ground Sleeve Lead (GSL) relay idle.

Scan data $3=$ Both 1 and 2 above.
5. To check scan data for SN230, the current PMI must be examined in TRKTBLI via the index in Field 15.
6. The PMI, sean data, and indications for SN230 are:

PMI = TRUNK_IDLE:
Scan data $0=$ CO idle.
Scan data $1=$ Ground on tip.
Scan data $3=$ Ground on ring.
PMI $=$ All talk and cut through states:
Scan data $0=$ CO on-hook.
Scan data $1=$ CO off-hook, reverse.
Scan data $2=$ CO off-hook, normal.
PMI = DIAL_CO:
Scan data $0=$ Valid break.
Scan data $1=$ Make.
Scan data $2=$ Make.
7. The idle state is 0 for all of the above circuit packs.

Note: An idle state is not expected for a trunk in T_LIMBO.
8. Off-hook for SN232 and SN233 is either seizure to initiate a call or answer to indicate a call is established.
9. Depress NEXT TEST to select Test 2.

The failed trunk equipment location last displayed by Test 1 will be carried over as a default equipment location for further testing in Test 2.
10. Depress EXECUTE and then NEXT DATA to display data index 7 in Field 15 so that current scan data (sampled every 30 ms ) is being observed.
11. At the cross-connect field, open the signaling leads.

Note: The tip and ring are signaling leads for SN230 and SN232. E \& M leads on SN233 and sleeves on SN231 are used for signaling.
12. If the scan goes to 0 in the low 2 characters of Field 16 , the problem is most likely on the signaling leads external to the circuit pack toward the distant end.

## PROC 640

13. If the scan does not change, replace the circuit pack.

The scan should be 0 when the circuit pack is removed.
14. If opening the signaling leads at the switch removed the problem, reconnecting the signaling leads at the switch and removing the signaling leads at the distant end may further isolate the problem between distant end switching and the wiring between locations.

## No Failure Code 5 - Trunk not in T_LIMBO

1. Using Test 1., select the first failed trunk circuit not displaying failure code 5 .
2. Depress NEXT DATA and record all trunk data.

The most useful data is provided in Field 16 when a trunk signaling sequence failed. This encode is displayed as a default if a sequence failure was detected, indicated by data type 1.
3. Depress NEXT TEST to select Test 2.

The trunk last displayed in Test 1 will appear as a default circuit for further testing.
4. Depress EXECUTE and then NEXT DATA (until 2 is displayed in Field 15) so that TRKTBL2 changes can be observed in Field 16.
Trunk table 2 contains trunk signaling sequence control information including the sequence number and sequence step.
5. Make tests calls as described in Repair Guide Overview.
6. The data displayed in Field 16 from TRKTBL2 (selected by 2 in Field 15) can be used to look up the sequence name in Table AM, PROC 640 - Trunk Signaling Sequencing Failures.
The position of this sequence in the related group of sequences (for example: GSINSZ is the third sequence in the GSTKS group) indicates the type of trunk signaling.
7. The following listing shows the positions of sequence in related groups of sequences, i.e., sequence position equals type of signaling at the switch:
Sequence position $1=$ Outseize (includes distant answer).
Sequence position $2=$ Inseize.
Sequence position $3=$ Distant disconnect.
Sequence position $4=$ Answer.
Sequence position $5=$ Local disconnect.
Sequence position $6=$ Special sequences for DID mutilated dialing disconnect, TIE distant answer, and flash signaling (DIDMDD, TTEDAN, RLTFLH, and IRLFLH).
Sequence position $7=$ Special sequences for abandon call search, TIE mutilated dialing disconnect, mutilated dialing disconnect, and RLT outgoing seize from a CAS branch PBX (ABDNCL, TIEMDD, RLTOGR).

Sequence position $8=$ Special RLT flash sequence (RLTFLH).
Sequence position $9=$ Special main-satellite flash sequence.
8. After the sequence is identified, the sequence steps recorded by Test 2 can be displayed (after STOP is depressed to freeze the data) by using NEXT UNIT to observe up to nine prior changes in the selected data.
9. By using NEXT DATA to select scan data (7 displayed in Field 15), the combined DIAL MASK, LAST LOOK, and DEMAND SCAN data corresponding to each change in TRKTBL2 (trunk table 2) can be displayed.
10. The relative time between changes can be computed by recording the corresponding $10-\mathrm{ms}$ counter data (selected with 8 displayed in Field 15).

Table AO, PROC 640 - Example of Data Recorded in Test 2, provides an example of data recorded for the GSINSZ sequence.

TABLE AO.

| PROC 640 <br> EXAMPLE OF DATA RECORDED IN TEST 2 by MONITORING TRKTBL2 For an szgsti sequence calling via no. 5 ess co |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PRIOR CODE INDEX (FIELD 17) | data from field 16 |  |  |  | computed time |  |  |
|  | "2" IN FIELD 15TRKTBL 2 | "7" IN FIELD 15 |  |  | " 8 " IN FIELD 15 |  |  |
|  |  | dIAL MASK | last look | SCAN | 10 ms octal | counter octal DIFFERENCE | MILISECOND difference |
| 5 (oldest) | 0 | - | - | 0 | 51473 | - | - |
| 4 | 100022 | - | - | 0 | 55621 | 4126 | 23,340 (1) |
| 3 | 100023 | - | - | 0 | 55627 | 6 | 60 (2) |
| 2 | 25 | - | 2 | 02 | 55650 | 21 | 170 (3) |
| 1 | 100027 | - | 2 | 02 | 55653 | 3 | 30 (4) |
| 0 (newest) | 0 | - | 1 | 01 | 55661 | 6 | 60 (5) |

(1) Time between test EXECUTE and start of sequence.
(2) Waited for $50-\mathrm{ms}$ time-out after ground start.
(3) CO responded with ground on tip.
(4) Enabled loop current detector and waited 25 ms .
(5) Loop current detected; sequence is done.
11. Compare the data recorded (as in the example depicted in Table AO, PROC 640 - Example of Data Recorded in Test 2) with the detailed trunk signaling sequence descriptions, found in the software manual, to determine if a malfunction was detected.
12. If the failure corresponds to a specific sequence number and step in Table AM, PROC 640 Trunk Signaling Sequence Failures, the failure cause may be determined by the information given under Suspected Failure.

## PROC 640

## Failure Codes 1 through 7

## Failure Code 1

1. Failure code 1 displayed in Field 11 provides the most specific information because it identifies the trunk signaling sequence and sequence step that failed.
2. When making test calls to verify this failure, focus on the specific sequence.
3. For example, ANSGST is the Answer Ground Start Sequence (the fourth sequence in the ground start trunks family of sequences).
If this sequence failed, testing should focus on answering an incoming call.

## Failure Code 2

1. Failure code 2 indicates that a trunk was not idle and not involved in an active call when the failure occurred.
2. For example, if the tip of a ground start trunk that is 1 -way outgoing is grounded, this invalid incoming seize is detected by call processing and failure code 2 is generated.
3. Furthermore, this trunk is put in T_LIMBO as long as the invalid ground is present to also generate failure code 5 .

## Failure Code 3

1. Failure code 3 occurs when a trunk is not correctly placed in an idle queue.
2. This failure generally points to a software problem or a translation table inconsistency.

## Failure Code 4

1. Failure code 4 indicates that status memory audits have detected this trunk as being falsely active.
2. The status memory audit runs every 20 minutes or slower as traffic increases, so if a trunk with this failure is cleared from the failure history table, it can take up to 20 minutes or longer for this failure to reoccur.
3. An example of this failure is a grounded tip (TP1) for an SN233 tie trunk.

## Failure Code 5

1. Failure code 5 indicates that the trunk is presently in T_LIMBO and is not available for call processing.
2. Repair guides for this condition are described in isolation and repair step Failure Code 5 Trunk is now in T_LIMBO.

## Failure Code 6

1. Failure code 6 means this trunk was in T_LIMBO long enough to set the OTHER FAILS fault indicator.
2. Repair guides for this condition are described in isolation and repair step No Failure Code 5 - Trunk not in T_LIMBO.

## Failure Code 7

1. Failure code 7 indicates that a trunk signaling sequence could not be started for this trunk.
2. Software or translation problems would generally cause this failure.

## PROC 641 - TERMINAL-TO-TERMINAL TEST CALL



## Purpose

PROC 641 is used to test touch tone dialing receivers and rotary digit collection by means of terminal-to-terminal test calls using the test line, terminal equipment, and a destination number.

PROC 641 is normally used when a user reported trouble concerning terminal-to-terminal calls to a particular destination number is not detected by PROC 600 (Alarm causes/error $\log$ ) and PROC 620 (Network procedure).

The user reported trouble may be intermittent in nature and PROC 641 can isolate the potential trouble to a particular touch tone dialing receiver with PROC 620 providing further diagnostic analysis as required to correct the problem.
This maintenance procedure must be performed on the user's premises. Terminal equipment must be connected to the test line and test set-up steps performed prior to executing any test.

## Field Definitions and Codes

Each field of PROC 641 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AP, PROC 641 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6 - Change test line equipment location.
3. Fields 8 through 12 - Select touch tone dialing receiver equipment location to be tested (Test 2 only).
4. Field 13 - Enter destination number (number of terminal to be dialed - to turn off hunting).

TABLE AP.

| PROC 641 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fielo | CODE | definition | Fielo | CODE | definition |
| 1 | 1-3 | Test number. | 9 | 0-7 | Cabinet number. |
| Test Line Equipment Location. |  |  | 10 | 0-3 | Carrier number. |
| 2 | 0-30 | Module number. | 11 | 0-21 | Slot number. |
| 3 | 0-7 | Cabinet number. | 12 | 0-3 | Circuit number. |
| 4 | 0-3 | Carrier number. | 13 | Any 2-, <br> 3-, or 4digit number | Dialed/destination number. |
| 5 | 0-21 | Slot number of circuit pack. |  |  |  |
| 6 | 0-7 | Number of circuit assigned to line. | 14 | 0 | Test line or specified register is not idle. <br> Test line on-hook. Dial tone through dialing. Alerting or talking. <br> Busy or intercept tone. <br> End of group test. <br> Call aborted. <br> No register or time slot available. |
| 7 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Touch-tone. <br> Rotary digit collection. |  | $\begin{aligned} & 1 \\ & 2 \end{aligned}$ |  |
| Touch-Tone Receiver Equipment Location (Test 2 only). |  |  |  | 4 4 5 |  |
| 8 | 0-30 | Module number. |  | $\begin{aligned} & 6 \\ & 7 \end{aligned}$ |  |

## Test Equipment Required

A touch tone telephone set with 2 W1AP test cords and a 249 A adapter is required to place test calls from the test line to a selected destination number (Test 1 and 2 only).

A rotary dial telephone set with 2 W 1 AP test cords and a 249A adapter is required to test rotary digit collection (Test 3 only).

## Operation of Procedure

## Overview

PROC 641 is used to make a terminal-to-terminal test call.
To call in PROC 641, perform the following:

1. Depress PROC NO; 641; ENTER.
2. Test 1 is automatically selected.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Tests all touch tone dialing receivers.
2. Test 2 - Tests a specific touch tone dialing receiver.
3. Test 3 - Tests rotary digit collection.

## Test 1

Test 1 enables maintenance personnel to test all touch tone dialing receivers by means of making terminal-to-terminal test calls.

1. Test 1 is the default test when entering PROC 641, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. When Test 1 is initially called in, a default test line equipment location, after first being administered through PROC 000 (Line translation - single line), is displayed in Fields 2 through 6, and the first touch tone dialing receiver equipment location is displayed in Fields 8 through 12.
3. The first touch tone dialing receiver can be tested or another touch tone dialing receiver can be selected for testing.

## Caution: The test line used for the test calls (Fields 2 through 6) must be in service and not busied out.

Note: The default test line equipment location can be changed or a new test line added by using translation procedure PROC 000 (Line translation - single line).
4. The module field of the test line equipment location (Field 2) is flashed when Test 1 is initially called in, indicating it is an optional entry field.
5. To select another test line, enter its equipment location in Fields 2 through 6:
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
6. If another touch tone dialing receiver is to be selected for testing, NEXT CIRCUIT and NEXT UNIT is used to sequence through all the touch tone dialing receivers in the switch.

NEXT CIRCUIT sequences to the next untested touch tone dialing receiver in the module.
NEXT UNIT sequences to the first untested touch tone dialing receiver in the next module.
7. After selecting the test line and touch tone dialing receiver, the number to be dialed during the test call may be entered in Field 13.

Note: Entering the number to be dialed in Field 13 ensures that the test call is directed to the terminal dialed by eliminating hunting.
8. The number to be dialed can be entered in Field 13 by the CHANGE FIELD sequence:

CHANGE FIELD; 13; ENTER; (Number to be dialed); ENTER.

## PROC 641 Test 1 and Test 2

9. If a number is not entered in Field 13, or a number other than that entered in Field 13 is dialed from the test line and hunting is allowed, the test line is connected to a hunted-to terminal if the dialed terminal is busy and the call is successful.
10. Prior to starting Test 1 , connect the touch tone telephone set to the test line.
11. To start Test 1, depress EXECUTE.

If the test line and touch tone dialing receiver are available for Test 1 , Field 14 equals 1.
A 0 in Field 14 indicates that either the test line or touch tone dialing receiver is not available for Test 1.
12. When the telephone connected to the test line is taken off-hook and a number dialed, Field 14 advances to 2 .
During dialing Field 13 contains the dialed digits.
13. When dialing is completed, Field 14 contains a 3 (if ringing or a conversation is in progress) or 4 (if a busy or intercept tone is received), indicating successful completion of the test for the selected touch tone dialing receiver.
14. After dialing is completed, Field 13 changes to display the hunt-to destination. If hunting does not occur, the dialed number is displayed.
15. If during Test 1 , Field 14 displays a 0,6 , or 7 , a problem in the test call is indicated.
16. Test $\mathbf{1}$ should be performed for each touch tone dialing receiver in the switch.

Touch tone dialing receivers that are in use when an attempt is made to test them are passed over.
17. When all touch tone dialing receivers are tested in Test 1, Field 14 equals 5.

If the switch has more than 63 touch tone dialing receivers, special error code 80 is displayed in the MAAP error code field to indicate that testing of all touch tone dialing receivers is not complete. Testing should be continued until all possible touch tone dialing receivers are tested.
Depressing NEXT CIRCUIT after the test of the last touch tone dialing receiver is attempted reloads the test buffer with more untested touch tone dialing receivers and causes special error code 80 to be displayed again in the MAAP error code field.
The next set of touch tone dialing receivers can now be tested. State 5 (displayed in Field 14) is displayed only when all touch tone dialing receivers are tested.

## Test 2

Test 2 enables maintenance personnel to test a specific touch tone dialing receiver by means of making a terminal-to-terminal test call.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is called in, the default test line and touch tone dialing receiver equipment locations from Test 1 may be displayed in Fields 2 through 6, and 8 through 12.
3. The module field of the touch tone dialing receiver equipment location (Field 8) is flashed, indicating it is an optional entry field.
4. Either the default touch tone dialing receiver can be tested or another touch tone dialing receiver can be selected for testing.
5. To select another touch tone dialing receiver for testing, enter its equipment location in Fields 8 through 12:
(Touch tone receiver module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
6. The number to be dialed during the test call may be entered in Field 13 by using the CHANGE FIELD sequence:

CHANGE FIELD; 13; ENTER; (Number to be dialed); ENTER.
7. Entering the number to be dialed in Field 13 ensures that the test call is directed to the terminal dialed by eliminating hunting.
8. If a number is not entered in Field 13, or a number other than that entered in Field 13 is dialed from the test line and hunting is allowed, the test line is connected to a hunted-to terminal if the dialed terminal is busy and the call is successful.
9. Prior to starting Test 2, connect a touch tone telephone set to the test line.
10. To start Test 2, depress EXECUTE.

If the test line and touch tone dialing receiver are available for Test 2, Field 14 equals 1.
A 0 in Field 14 indicates that either the test line or touch tone dialing receiver is not available for Test 2.
11. When the telephone connected to the test line is taken off-hook and a number dialed, Field 14 advances to 2 .

During dialing Field 13 contains the dialed digits.
12. When dialing is completed, Field 14 contains a 3 (if ringing or a conversation is in progress) or 4 (if a busy or intercept tone is received), indicating successful completion of the test for the selected touch tone dialing receiver.
13. After dialing is completed, Field 13 changes to display the hunt-to destination. If hunting does not occur, the dialed number is displayed.
14. If during Test 2, Field 14 displays a 0,6 , or 7 , a problem in the test call is indicated.

## Test 3

Test 3 enables maintenance personnel to test rotary digit collection, where a touch tone dialing recejver is not used, by means of making a terminal-to-terminal test call.

Rotary digit collection consists primarily of the collection and counting of groups of dial pulses by the call processing software.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. When Test 3 is initially called in, a default test line equipment location is displayed in Fields 2 through 6.
3. If the displayed originating register (Fields 8 through 12) is for rotary digit collection, a 0 is displayed in Field 7.
4. When a 1 is displayed in Field 7, use NEXT CIRCUIT to select an originating register for rotary digit collection, indicated by a 0 in Field 7.
5. The number to be dialed during the test call may initially be entered in Field 13 (flashing) by using:
(Number to be dialed); ENTER.
6. Entering the number to be dialed in Field 13 ensures that the test call is directed to the terminal dialed by eliminating hunting.
7. If a number is not entered in Field 13, or a number other than that entered in Field 13 is dialed from the test line and hunting is allowed, the test line is connected to a hunted-to terminal if the dialed terminal is busy and the call is successful.
8. Prior to starting Test 3, connect a rotary dial telephone set to the test line.
9. To start Test 3, depress EXECUTE.

If the test line and originating register are available for Test 3, Field 14 equals 1.
A 0 in Field 14 indicates that either the test line or originating register is not available for Test 3.
10. When the telephone connected to the test line is taken off-hook and a number dialed, Field 14 advances to 2 .

During dialing Field 13 contains the dialed digits.
11. When dialing is completed, Field 14 contains a 3 (if ringing or a conversation is in progress) or 4 (if a busy or intercept tone is received), indicating successful completion of the test for the selected originating register.
12. After dialing is completed, Field 13 changes to display the hunt-to destination. If hunting does not occur, the dialed number is displayed.
13. If during Test 3 , Field 14 displays a 0,6 , or 7 , a problem in the test call is indicated.

## Repair Guide

When a terminal-to-terminal call to a particular destination number is reported by the user as a trouble, and PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure) has not detected a touch tone dialing receiver trouble, the following steps should be performed by maintenance personnel, in the order listed, to isolate and replace the failing circuit pack.

1. Execute Test 1 for all touch tone dialing receivers, or until a failure is detected.

To test a touch tone dialing receiver, perform Steps 3 through 10 below.
2. Based on test results of Test 1 , use Test 2 for further testing of failing circuits.

To test a touch tone dialing receiver, perform Steps 3 through 10 below.
3. At the test line, install a 249A adapter and a touch tone telephone set.
4. Select one valid directory number which contains any of the following:

1,5 , and 9 used in any combination.
1,6 , and 8 used in any combination.
2,4 , and 9 used in any combination.
2,6 , and 7 used in any combination.
3,5 , and 7 used in any combination.
3,4 , and 8 used in any combination.
5. Enter the selected directory number in Field 13.
6. Depress EXECUTE.
7. Dial the selected number.

If Field 13 displays a number different than the one dialed, the touch tone dialing receiver is failing. Replace SN251 and repeat the test.
8. If the touch tone dialing receiver did not fail, select another valid directory number that contains a 0 and enter it in Field 13.
9. Make another test call using the new number.

If Field 13 displays a number different than the one dialed, the touch tone dialing receiver is failing. Replace SN251 and repeat the test.
10. If the touch tone dialing receiver continues to fail after replacing SN251, use PROC 620 Test 4 (unit type 25) to further isolate the cause of the problem.
If PROC 620 is unable to correct the problem, check the wiring associated with the replaced circuit pack.
11. When the touch tone dialing receiver that was failing passes, repeat Steps 3 through 10 for all other touch tone dialing receivers in the switch.

PROC 642 - TERMINAL-TO-TRUNK TEST CALL


## Purpose

PROC 642 is used to test trunks by means of terminal-to-trunk test calls using the test line and terminal equipment.
PROC 642 is normally used when a user reported trouble concerning terminal-to-trunk calls is not detected by PROC 600 (Alarm causes/error log) and PROC 620 (Network procedure).
The user reported trouble may be intermittent in nature and PROC 642 can isolate the potential trouble to a particular trunk circuit with PROC 620 providing further diagnostic analysis as required to correct the problem.

This maintenance procedure must be performed on the user's premises. Terminal equipment must be connected to the test line and test set-up steps performed prior to executing any test.

## Field Definitions and Codes

Each field of PROC 642 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AQ, PROC 642 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6 - Change test line equipment location.
3. Fields 7 through 11 - Select trunk equipment location to be tested (Test 2 only).
4. Fields 12 through 14 - Select trunk dial access code (Test 1 only).
5. Field 15 - Select trunk group to be tested (Test 3 only).

## TABLE AQ.

| PROC 642 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fielo | CODE | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | $\begin{gathered} 16 \\ \text { (Contd) } \end{gathered}$ | 13 | Wink start in/(wink start or delay dial) and dial tone out. <br> Delay dial in/dial tone out. Wink start in/dial tone out. |
| 2 | 0-30 | Test line module number. |  |  |  |
| 3 | 0-7 | Test line cabinet number. |  | $\begin{aligned} & 14 \\ & 15 \end{aligned}$ |  |
| 4 | 0-3 | Test line carrier number. |  |  |  |
| 5 | 0-21 | Test line slot number. |  | 17 | Regular CO trunks: <br> 1 -way outgoing DOD, dial tone and ground start. 1-way out DOD with party test, dial tone and ground start. <br> 2 -way automatic in/DOD, dial tone and ground start. 2 -way automatic in/dial tone and ground start out with party test. |
| 6 | 0-7 | Test line circuit number. |  |  |  |
| 7 | 0-30 | Trunk module number. |  | 18 |  |
| 8 | 0-7 | Trunk cabinet number. |  | 19 |  |
| 9 | 0-3 | Trunk carrier number. |  | 20 |  |
| 10 | 0-21 | Trunk slot number. |  |  |  |
| 11 | 0-3 | Trunk circuit number. |  | 22 | Foreign exchange CO trunks: |
| 12 |  | First digit of trunk dial access code: |  |  | 1-way outgoing DOD, dial tone and ground start. |
|  | $1-9$ 11 12 | 1-9 <br> Touch-tone * Touch-tone \# |  | 23 | 1-way out DOD with party test, dial tone and ground start. |
| 13 | 0-9 | Second digit of trunk dial access code. |  | 24 | 2-way automatic in/DOD, dial tone and ground start. 2 -way automatic in/dial |
| 14 | 0-9 | Third digit of trunk dial access code. |  | 25 | tone and ground start out with party test. |
| 15 | 11-256 | Trunk group number. |  | 27 | WATS CO trunks: <br> 1-way outgoing DOD or toll terminal access for TSPS, ground start and dial tone. 1 -way out DOD with party test, ground start and dial tone. |
| 16 |  | Trunk type: <br> All 2-way CCSA/APLT CO trunks: |  |  |  |
|  | 12 | Delay dial in/(wink start or delay dial) and dial tone out. |  | 28 |  |

TABLE AQ. (Contd)

| $\text { PROC } 642$ <br> FIELD DEFINITIONS AND CODES (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 16 <br> (Contd) | 33 <br> 34 <br> 36 <br> 37 <br> 38 <br> 39 <br> 44 <br> 45 | Tie trunks: <br> 1-way automatic out. 1-way dial tone out. 2-way dial in/dial tone out. 2-way dial tone in/automatic out. <br> 2-way automatic in/dial tone out. <br> 2-way automatic in/automatic out. <br> 2 -way dial tone or delay dial in/dial tone out. 2 -way dial tone or delay dial in/automatic out. | 17 | 0 <br> 1 <br> 2 <br> 3 <br> 4 <br> 5 <br> 6 <br> 7 <br> 8 <br> 9 | State of trunk test call: <br> Test line or specific trunk not idle. <br> Test line on-hook and trunk idle. <br> Dial tone through dial completion. <br> CO response (dial tone or busy). <br> Wrong access code or timeout <br> End of group test. <br> Call dropped. <br> No receiver or no time slot available. <br> No trunk available. Trunk seized incoming. |
| APLT - Advanced private line termination <br> CCSA - Common control switching arrangement <br> CO - Central office <br> DOD - Direct outward dialing <br> TSPS - Traffic service position system <br> WATS - Wide area telecommunication service. |  |  |  |  |  |

## Test Equipment Required

A telephone set with 2 W1AP test cords and a 249A adapter, or a 1013 hand test set and a 249 A adapter is required to place terminal-to-trunk test calls from the test line.

## Operation of Procedure

## Overview

PROC 642 is used to make a terminal-to-trunk test call.
To call in PROC 642, perform the following:

1. Depress PROC NO; 642; ENTER.
2. Test 1 is automatically selected.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Tests all trunks.
2. Test 2 - Tests a specific trunk.
3. Test 3-Tests all trunks in a specific trunk group.

## Test 1

Test 1 enables maintenance personnel to test all trunks in a trunk group for the trunk dial access code specified in Fields 12 through 14.

1. Test 1 is the default test when entering PROC 642, or is selected by using NEXT TEST.
2. When Test 1 is initially called in, a default test line equipment location, after first being administered through PROC 000 (Line translation - single line), is displayed in Fields 2 through 6.
3. This test line can be used or another test line can be selected.

Note: The default test line equipment location can be changed or a new test line added by using translation procedure PROC 000 (Line translation - single line).
4. The module field of the test line equipment location (Field 2) is flashed when Test 1 is initially called in, indicating it is an optional entry field.
5. To select another test line, enter its equipment location in Fields 2 through 6:
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.

Note: If Field 2 alone is changed, a new default test line equipment location is displayed in Fields 2 through 6.
6. A trunk dial access code must be entered in Fields 12 through 14 by one of the following two methods (Steps 7 or 8 ).
7. If a new test line is entered, Field 12 is blanked and the decimal point in that field flashed. This indicates a mandatory entry field. The trunk dial access code is entered in Fields 12 through 14 as follows:
(First digit); ENTER; (Second digit - if required); ENTER; (Third digit - if required); ENTER.
8. If the displayed test line is to be used (not changed to a new test line), a trunk dial access code is entered by using the CHANGE FIELD sequence:

CHANGE FIELD; 12; ENTER; (First digit); ENTER; (Second digit - if required); ENTER; (Third digit - if required); ENTER.
9. Prior to starting Test 1 , connect the telephone set or hand test set to the test line.
10. To start Test 1, depress EXECUTE.

Requirement: EXECUTE must be used before going off-hook and dialing from the test line. EXECUTE must be depressed before each test call is placed even when repetitive calls are attempted through the same trunk.

## PROC 642 Test 1

11. If the test line is on-hook and available, the following is displayed:

Field 1-1.
Fields 2 through 6 - Test line equipment location.
Fields 7 through 11 - Equipment location of the lowest numbered trunk in the trunk group.
Fields 12 through 14 - Trunk dial access code.
Field 15 - Trunk group number.
Field 16 - Trunk type.
Field 17 - State of the test.
12. If the test line is on-hook and available, and if the selected trunk is available, a 1 is displayed in Field 17.
If either the test line or the trunk is busy, a 0 is displayed in Field 17, and Test 1 should be repeated by depressing EXECUTE or another trunk selected for testing.
13. When the telephone or hand test set connected to the test line is taken off-hook, and the trunk dial access code displayed in Fields 12 through 14 is dialed, Field 17 changes to a 2.
14. If Field 17 does not change to a 2 at this time, the trunk under test has been seized by an incoming Central Office (CO), Foreign Exchange (FX), or Wide Area Telecommunications Service (WATS) call. (Field 17 should display 9.)
Wait until the trunk is idle and repeat Test 1, or select another trunk to be tested.
15. Field 17 displays a 2 during the dial access code dialing phase and changes to 3 at various times depending on several factors, e.g.: touch-tone or rotary test line, SMDR, trunk type, etc.
16. The minimum change time from a display of 2 to 3 in Field 17, after the trunk dial access code is dialed, is 1 second.
The maximum change time after the last digit is dialed to complete the call is about 10 seconds.
17. If the terminal-to-trunk test fails, a 4, 6, 7, or 8 is displayed in Field 17.
18. When 7 or 8 is displayed, repeat Test 1 .
19. If 4 is displayed, check the dial access code in Fields 12 through 14 to determine if the correct dial access code was entered. If the correct dial access code was entered and dialed, the trunk circuit is failing.
20. If 6 is displayed, the trunk circuit is failing.

Note: If an intercept tone is received when making the test call, check the class of service of the test line and either change it to the least restricted class of service, or enter an unrestricted test line in Fields 2 through 6.
21. A trunk is considered to be tested successfully after EXECUTE is depressed, the call progresses to state 2 and either terminates by going on-hook or completes the testing sequence.
The tested trunk is then removed from the untested trunk list.
22. Test 1 should be performed for all trunks assigned to the trunk dial access code and trunk group displayed in Fields 12 through 15.
23. If another trunk equipment location in the trunk group is to be selected for testing, NEXT CIRCUIT and NEXT UNIT can be used as follows:

NEXT CIRCUIT sequences to the next untested trunk equipment location in the module.
NEXT UNIT sequences to the first untested trunk equipment location in the next module.
24. Sequencing beyond the end of the list of trunks in the trunk group buffer, by using NEXT CIRCUIT and NEXT UNIT, causes trunk equipment location Fields 7 through 11 to be dashed.
25. If all the trunks in the buffer are tested beyond state 1 , depressing NEXT CIRCUIT or NEXT UNIT causes one more search for untested trunks.

If no untested trunks are found, a 5 is displayed in Field 17 to indicate that all trunks with the displayed dial access code and trunk group number are tested.
26. If any trunks in the trunk group buffer are not tested, and the trunk equipment location fields are dashed, depressing NEXT CIRCUIT or NEXT UNIT displays the lowest untested trunk, from the trunk group buffer, in Fields 7 through 11.

If the number of trunks in the trunk group exceeds the size of the trunk group buffer (63), an error code of 80 (only testing 63 trunks at a time) is displayed in the MAAP error code field to indicate that the sorted group of trunks is not complete. Testing should be continued until all additional trunks are tested.

If the size of a trunk group exceeds the capacity of the trunk group buffer, the buffer is loaded again with the untested trunks when all of the first group of trunks in the buffer are tested. These trunks are then sorted in ascending order.

When NEXT CIRCUIT or NEXT UNIT is depressed to search for the first untested trunk exceeding the capacity of the buffer, special error code 80 is displayed again in the MAAP error code field. This code indicates that the trunk group is exceptionally large and the next group of untested trunks is loaded in the buffer for testing.

The next set of trunks in the trunk group can now be tested, noting that state 5 (displayed in Field 17) is displayed only when all trunks in the trunk group are tested.

## Test 2

Test 2 enables maintenance personnel to test a specific trunk by means of making a terminal-totrunk test call.

1. Test 2 is selected by use of NEXT TEST.
2. When Test 2 is called in, Field 7 is blanked and the decimal point in that field is flashed, indicating a mandatory entry field.
3. The equipment location of the trunk to be tested is entered in Fields 7 through 11 as follows:
(Trunk module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.
4. Prior to starting Test 2, connect a telephone set or hand test set to the test line.
5. To start Test 2, depress EXECUTE.

Requirement: EXECUTE must be used before going off-hook and dialing from the test line. EXECUTE must be depressed before each test call is placed even when repetitive calls are attempted through the same trunk.

## PROC 642 Test 2

6. If the test line is on-hook and available, the following is displayed:

Field 1-2.
Fields 2 through 6 - Test line equipment location.
Fields 7 through 11 - Equipment location of the trunk selected for testing.
Fields 12 through 14 - Trunk dial access code.
Field 15 - Trunk group number.
Field 16 - Trunk type.
Field 17 - State of the test.
7. If the test line is on-hook and available, and if the selected trunk is available, a 1 is displayed in Field 17.
8. If either the test line or the trunk is busy, a 0 is displayed in Field 17, and Test 2 should be repeated by depressing $\mathbf{E X E C U} \mathbf{T E}$ or another trunk selected for testing.
9. When the telephone or hand test set connected to the test line is taken off-hook, and the trunk dial access code displayed in Fields 12 through 14 is dialed, Field 17 changes to a 2.
10. If Field 17 does not change to a 2 at this time, the trunk under test has been seized by an incoming CO, FX, or WATS call. (Field 17 should display 9.)
Wait until the trunk is idle and repeat Test 2 , or select another trunk to be tested.
11. Field 17 displays a 2 during the dial access code dialing phase and changes to 3 at various times depending on several factors, e.g.: touch-tone or rotary test line, SMDR, trunk type, etc.
12. The minimum change time from a display of 2 to 3 in Field 17, after the trunk dial access code is dialed, is 1 second.
The maximum change time after the last digit is dialed to complete the call is about 10 seconds.
13. If the terminal-to-trunk test fails, a $4,6,7$, or 8 is displayed in Field 17.
14. When 7 or 8 is displayed, repeat Test 2.
15. If 4 is displayed, check the dial access code in Fields 12 through 14 to determine if the correct dial access code was dialed. If the correct dial access code was dialed, the trunk circuit is failing.
16. If 6 is displayed, the trunk circuit is failing.

Note: If an intercept tone is received when making the test call, check the class of service of the test line and either change it to the least restricted class of service, or enter an unrestricted test line in Fields 2 through 6.
17. A trunk is considered to be tested successfully after EXECUTE is depressed, the call progresses to state 2 and either terminates by going on-hook or completes the testing sequence.

## Test 3

Test 3 enables maintenance personnel to test all trunks in a specific trunk group by means of making terminal-to-trunk test calls.

1. Test 3 is selected by use of NEXT TEST.
2. When Test 3 is called in, Field 15 is blanked and the decimal point in that field is flashed, indicating a mandatory entry field.
3. The number of the trunk group to be tested is entered in Field 15 as follows:
(Trunk group number); ENTER.
4. Prior to starting Test 3 , connect a telephone set or hand test set to the test line.
5. To start Test 3, depress EXECUTE.

Requirement: EXECUTE must be used before going off-hook and dialing from the test line. EXECUTE must be depressed before each test call is placed even when repetitive calls are attempted through the same trunk.
6. If the test line is on-hook and available, the following is displayed:

Field 1-3.
Fields 2 through 6 - Test line equipment location.
Fields 7 through 11 - Equipment location of the lowest numbered trunk in the trunk group.
Fields 12 through 14 - Trunk dial access code.
Field 15 - Trunk group number.
Field 16 - Trunk type.
Field 17 - State of the test.
7. If the test line is on-hook and available, and if the selected trunk is available, a 1 is displayed in Field 17.
8. If either the test line or the trunk is busy, a 0 is displayed in Field 17, and Test 3 should be repeated by depressing EXECUTE or another trunk selected for testing.
9. When the telephone or hand test set connected to the test line is taken off-hook, and the trunk dial access code displayed in Fields 12 through 14 is dialed, Field 17 changes to a 2.
10. If Field 17 does not change to a 2 at this time, the trunk under test has been seized by an incoming CO, FX, or WATS call. (Field 17 should display 9.)
Wait until the trunk is idle and repeat Test 3, or select another trunk to be tested.
11. Field 17 displays a 2 during the dial access code dialing phase and changes to 3 at various times depending on several factors, e.g.: touch-tone or rotary test line, SMDR, trunk type, etc.
12. The minimum change time from a display of 2 to 3 in Field 17, after the trunk dial access code is dialed, is 1 second.
The maximum change time after the last digit is dialed to complete the call is about 10 seconds.
13. If the terminal-to-trunk test fails, a 4, 6, 7, or 8 is displayed in Field 17.

## PROC 642 Test 3

14. When 7 or 8 is displayed, repeat Test 3 .
15. If 4 is displayed, check the dial access code in Fields 12 through 14 to determine if the correct dial access code was dialed. If the correct dial access code was dialed, the trunk circuit is failing.
16. If 6 is displayed, the trunk circuit is failing.

Note: If an intercept tone is received when making the test call, check the class of service of the test line and either change it to the least restricted class of service, or enter an unrestricted test line in Fields 2 through 6.
17. A trunk is considered to be tested successfully after EXECUTE is depressed, the call progresses to state 2 and either terminates by going on-hook or completes the testing sequence.
18. After the first trunk is tested, another trunk in the trunk group can be selected for testing by using NEXT CIRCUIT or NEXT UNIT as follows:
Depressing NEXT CIRCUIT sequences to the next untested trunk equipment location in the module.

Depressing NEXT UNIT sequences to the first untested trunk equipment location in the next module.
19. Repeat steps 5 through 15 until all trunks in the trunk group selected for testing are tested which is indicated by a 5 in Field 17.

## Repair Guide

When a terminal-to-trunk call is reported by the user as a trouble, and PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure) has not detected a trunk failure associated with the user's problem, the following steps should be performed by maintenance personnel, in the order listed, to isolate and replace the failing circuit pack.

1. Determine from the user reported trouble if a particular dial access code or trunk group is the potential cause of the trouble.
2. For dial access codes, perform the following:

Execute Test 1 for all trunks associated with the dial access code, or until a failure is detected. (See Step 4 below.)

Based on the lest results of Test 1, use Test 2 to further test failing circuits. (See Step 4 below.)
3. For trunk groups, perform the following:

Execute Test 3 for all trunks in the specified trunk group, or until a failure is detected. (See Step 4 below.)

Based on the results of Test 3, use Test 2 to further test failing circuits. (See Step 4 below.)
4. To test a trunk, proceed as follows:

At the test line, install a 249A adapter and telephone set or hand test set.
Depress EXECUTE.

Go off-hook and dial the displayed trunk dial access code.
Dial the appropriate number of digits to complete the call.
If a single trunk fails (Field 17 equals 6), replace the associated circuit pack.
5. Repeat Test 2.

If the test fails again, use PROC 620, to further isolate the problem.
If PROC 620 cannot correct the problem, check the wiring associated with the replaced circuit pack.
A test call stuck at state 2 indicates a possible failure for CO, FX, and WATS trunks.
A test call can also be stuck at state 2 for valid CCSA/APLT and TIE trunks.

1. Listen to the test call to determine whether it is completed successfully.
2. If the call cannot be completed, replace the associated circuit pack.
3. Repeat Test 2.

If the test fails again, use PROC 620, to further isolate the problem.
If PROC 620 cannot correct the problem, check the wiring associated with the replaced circuit pack.

PROC 643 - TERMINAL-TO-TONE TEST CALL


## Purpose

PROC 643 provides the capability to transmit the eight tones contained on circuit pack SN250 to a test line to allow maintenance personnel to listen to each tone to determine if problems with attenuation or improper interruption rates exist.

PROC 643 is normally used when a user reported trouble concerning tone failures is not detected by PROC 600 (Alarm causes/error $\log$ ) or PROC 620 (Network procedure).

The user reported trouble may be intermittent in nature and PROC 643 can isolate the potential trouble to a particular tone plant with PROC 620 providing further diagnostic analysis as required to correct the problem.

This maintenance procedure must be performed on the user's premises. Terminal equipment must be connected to the test line and test set-up steps performed prior to executing any test.

## Field Definitions and Codes

Each field of PROC 643 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AR, PROC 643 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6-Change test line equipment location.
3. Fields 7 through 10 - Select tone plant equipment location to be tested.
4. Fields 11 through 18 - Select tone to be transmitted (Test 2 only).

## Test Equipment Required

A telephone set with 2 W1AP test cords and a 249A adapter or a 1013 type hand test set with a 249A adapter is required to listen to the transmitted tones at the test line.

TABLE AR.

| PROC 643 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | DEFIIITION | field | CODE | definition |
| 1 | 1, 2 | Test number. | In fields 11 through 18 : <br> $0=$ Tone is not to be transmitted. <br> $1=$ Tone is to be transmitted <br> Flashing $1=$ Tone is active (being transmitted). |  |  |
| 2 | 0-30 | Test line module number. |  |  |  |
| 3 | 0-7 | Test line cabinet number. |  |  |  |
| 4 | 0-3 | Test line carrier number. |  |  |  |
|  | 0-21 | Test line slot number. | 11 | 0,1 | Busy tone. |
|  |  |  | 12 | 0,1 | Reorder tone. |
|  |  |  | 13 | 0,1 | Audible alert tone. |
| 7 | 0-30 | Tone plant module number. |  |  |  |
|  |  |  | 14 | 0,1 | Special audible alert, tone. |
| 8 | 0-7 | Tone plant cabinet number. | 15 | 0, 1 | Dial tone. |
| 9 | 0-3 | Tone plant carrier number. | 15 |  |  |
| 10 | 0-21 | Tone plant slot number. | 16 | 0, 1 | Recall tone. |
|  |  |  | 17 | 0, 1 | Miscellaneous tone. |
|  |  |  | 18 | 0,1 | Intercept tone. |

## Operation of Procedure

## Overview

PROC 643 is used to listen to the tones transmitted to the test line.
To call in PROC 643, perform the following:

1. Depress PROC NO; 643; ENTER.
2. Test 1 is automatically selected.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Sequentially transmits busy, reorder, audible alert, special audible alert, dial, recall, miscellaneous, and interrupt tones.
2. Test 2 - Allows any of the above tones to be selected and transmitted independently of the other tones.

## Test 1

Test 1 enables maintenance personnel to sequentially transmit busy, reorder, audible alert, special audible alert, dial, recall, miscellaneous, and intercept tones from a specific tone plant over a test line.

1. Test 1 is the default test when entering PROC 643, or is selected by using NEXT TEST, or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. When Test 1 is initially called in, a default test line equipment location is displayed in Fields 2 through 6, and the first tone plant equipment location is displayed in Fields 7 through 10.
3. The first tone plant can be used for testing or another tone plant can be selected for testing.

Note: The default test line equipment location can be changed or a new test line added by using translation procedure PROC 000 (Line translation - single line).
4. The module field of the test line equipment location (Field 2) is flashed when Test 1 is initially called in, indicating it is an optional entry field.
5. To select another test line, enter its equipment location in Fields 2 through 6:
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.

Note: The test line must be in service and not busied out. If only Field 2 is changed, a default test line for the new module is provided.
6. To select both another test line and tone plant, enter their equipment locations in Fields 2 through 10:
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER; (Tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
7. To select another tone plant without selecting a new test line, use the CHANGE FIELD sequence to enter the new tone plant equipment location:
CHANGE FIELD; 7; ENTER; (Tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
8. Depressing NEXT CIRCUIT repeatedly increments through all the tone plants in the switch.

Depressing NEXT UNIT increments to the first tone plant in the next module (and NEXT CIRCUIT steps through the tone plants within the selected module).
9. When Test 1 is called in, Fields 11 through 18 all contain l's.

The 1's indicate that the tone associated with each field is selected for transmission during Test 1.
10. Prior to starting Test 1 , connect the telephone set or hand test set to the test line.
11. To start Test 1, depress EXECUTE.

The transmission of the first tone (busy) is initiated when EXECUTE is depressed.
12. As the tone is transmitted, either a 0 or 1 is flashed in the associated field (Field 11).

A 0 indicates that the tone is not being transmitted; a 1 indicates that the tone is being transmitted.
13. When the telephone or hand test set connected to the test line is taken off-hook, maintenance personnel can listen to the tone being transmitted.

Maintenance personnel can determine if the tone is being transmitted or if other problems exist, such as attenuation, improper interruption rates, or if the proper tone is heard without interference from other tones.
14. Depressing NEXT DATA initiates transmission of the next tone in sequence.

Depressing NEXT DATA repeatedly sequences through the transmission of all the tones associated with Fields 11 through 18.

Depressing NEXT DATA during transmission of the last tone (intercept) sequences back to the first tone (busy), which is again transmitted.
15. Test 1 is stopped by depressing NEXT TEST or RESET.

## Test 2

Test 2 enables maintenance personnel to transmit selected tones from a specific tone plant over a test line.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is called in, the default test line and tone plant equipment locations from Test 1 are displayed in Fields 2 through 10.

Either the default tone plant can be tested or another tone plant can be selected for testing.
3. To select another tone plant for testing use the CHANGE FIELD sequence or NEXT CIRCUIT and/or NEXT UNIT:

CHANGE FIELD; 7; ENTER; (Tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.

Depressing NEXT CIRCUIT increments through all the tone plants in the switch.
Depressing NEXT UNIT increments to the first tone plant in the next module while NEXT CIRCUIT steps through the tone plants within the selected module.
4. When Test 2 is called in, Fields 11 through 18 all contain 0 's.

The 0's indicate that the tone associated with each field is not selected for transmission during Test 2.
5. The 0 in Field 11 is flashed, indicating an optional entry field.
6. To select the tone associated with Field 11 (busy) for transmission, a 1 must be entered in the field:

## 1; ENTER.

7. To leave the tone not selected for transmission, ENTER can be depressed to increment to the next field.

## PROC 643 Test 2

8. Each tone that is to be transmitted during Test 2 must be selected by entering a 1 in the associated field.

The order in which the tones are selected to be tested (corresponding field set to 1 ) is the order that the tones are transmitted.
9. Prior to starting Test 2, connect the telephone set or hand test set to the test line.
10. To start Test 2, depress EXECUTE.

Note: Depressing EXECUTE with no tones selected for transmission (Fields 11 through 18 all contain 0 's), causes special error code 80 (no tone selected for transmission) to be displayed in the MAAP error code field.
11. The first field selected containing a 1 is flashed when EXECUTE is depressed, indicating that the associated tone is being transmitted.
12. Maintenance personnel can monitor the transmission of the tone selected by going off-hook at the test line.
13. Depressing NEXT DATA sequences to the next field containing a 1 and begins transmitting the associated tone.

Repeated use of NEXT DATA sequences through all the selected tones, transmitting them, and back to the first tone selected which is again transmitted.
14. Test 2 is stopped by depressing NEXT TEST or RESET.

## Repair Guide

When tone failures are reported by the user as a trouble, and PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure) has not detected a tone plant failure, the following steps should be performed by maintenance personnel, in the order listed, to isolate and replace the failing circuit pack.

1. At the test line, install a 249 A adapter and a telephone set or hand test set.
2. Execute Test 1 for the first tone plant displayed upon entering PROC 643, and listen to each tone by going off-hook at the test line.
3. If the tone plant passes, execute Test 1 for all tone plants in the switch, using NEXT CIRCUIT and/or NEXT UNIT to select the next tone plant for testing.
4. If no tone plants indicate a failure, check the wiring between the terminal equipment experiencing the trouble and the associated connections to the switch.
5. If a tone plant fails, determine which tones are defective, and execute Tesi 2 to inhibit the transmission of the fault-free tones to verify the status of the tones suspected of being defective by listening to the selected tones at the test line.
6. Replace SN250 and repeat Test 1.
7. If the tone plant continues to fail after replacing SN250, use PROC 620, Test 4 (unit type 16) to further isolate the exact cause of the problem.
8. If the tone plant still fails after further diagnosis by PROC 620, check the wiring associated with the defective tones isolated in Step 5.

## PROC 644 - TERMINAL-TO-AUXILIARY TONE TEST CALL



## Purpose

PROC 644 provides the capability to transmit the six tones contained on circuit pack SN253 to a test line to allow maintenance personnel to listen to each tone to determine if attenuation or improper interruption rate problems exist.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) are tested only when circuit pack SN253C is installed.

PROC 644 is normally used when a user reported trouble concerning auxiliary tone failures is not detected by PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure).

The user reported trouble may be intermittent in nature and PROC 644 can isolate the potential problem to a particular auxiliary tone plant with PROC 620 providing further diagnostic analysis as required to correct the problem.

This maintenance procedure must be performed on the user's premises. Terminal equipment must be connected to the test line and test set-up steps performed prior to executing any test.

## Field Definitions and Codes

Each field of PROC 644 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AS, PROC 644 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6 - Change test line equipment location.
3. Fields 7 through 10 - Select auxiliary tone plant equipment location to be tested.
4. Fields 11 through 16 - Select tone to be transmitted (Test 2 only).

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can only be selected when circuit pack SN253C is installed.

TABLE AS.

| PROC 644 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1, 2 | Test number. | 10 | 0-21 | Auxiliary tone plant slot number. |
| 2 | 0-30 | Test line module number. |  |  |  |
| 3 | 0-7 | Test line cabinet number. | In fields 11 through 16: |  |  |
| 4 | 0-3 | Test line carrier number. | $0=$ Tone is not to be transmitted. <br> $1=$ Tone is to be transmitted. <br> Flashing $1=$ Tone is active (being transmitted). |  |  |
| 5 | 0-21 | Test line slot number. |  |  |  |  |  |
| 6 | 0-7 | Test line circuit number. | 11 | 0, 1 | Immediate audible alert tone. |
| 7 | 0-30 | Auxiliary tone plant module number. |  |  |  |
|  |  |  | 12 | 0,1 | Zip tone. |
| 8 | 0-7 | Auxiliary tone plant cabinet number. | 13 | 0,1 | Remote hold tone. |
| 9 | 0-3 | Auxiliary tone plant carrier number. | 14 | 0,1 | Data answer tone. |
|  |  |  | 15 | 0,1 | Preemption tone. |
|  |  |  | 16 | 0,1 | Precedence audible alert tone. |

## Test Equipment Required

A telephone set with 2 W1AP test cords and a 249A adapter or a 1013 type hand test set with a 249A adapter is required to listen to the transmitted tones at the test line.

## Operation of Procedure

## Overview

PROC 644 is used to listen to the auxiliary tones transmitted to the test line.
To call in PROC 644, perform the following:

1. Depress PROC NO; 644; ENTER.
2. Test 1 is automatically selected.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Two tests are available:

1. Test 1 - Sequentially transmits immediate audible alert, zip, remote hold, data answer, preemption, and precedence audible alert tones.

Note: Preemption tone and precedence audible alert tone is transmitted only when circuit pack SN253C is installed.
2. Test 2 - Allows any of the above tones to be selected and transmitted independently of the other tones.

## Test 1

Test 1 enables maintenance personnel to sequentially transmit immediate audible alert, zip, remote hold, data answer, preemption, and precedence audible alert tones from a specific auxiliary tone plant over a test line.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can only be tested when circuit pack SN253C is installed.

1. Test 1 is the default test when entering PROC 644, or is selected by using NEXT TEST, or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. When Test 1 is initially called in, a default test line equipment location is displayed in Fields 2 through 6, and the first auxiliary tone plant equipment location is displayed in Fields 7 through 10 .
3. The first auxiliary tone plant can be tested or another auxiliary tone plant can be selected for testing.

Note: The default test line equipment location can be changed or a new test line added by using translation procedure PROC 000 (Line translation - single line).
4. The module field of the test line equipment location (Field 2) is flashed when Test 1 is initially called in, indicating it is an optional entry field.
5. To select another test line, enter its equipment location in Fields 2 through 6:
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER.

Note: The test line must be in service and not busied out. If only Field 2 is changed, a default test line for the new module is provided.
6. To select both another test line and auxiliary tone plant, enter their equipment locations in Fields 2 through 10 :
(Test line module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER; (Circuit); ENTER; (Auxiliary tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
7. To select another auxiliary tone plant without selecting a new test line, use the CHANGE FIELD sequence to enter the new auxiliary tone plant equipment location:

CHANGE FIELD; 7; ENTER; (Auxiliary tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.
8. Depressing NEXT CIRCUIT repeatedly increments through all the auxiliary tone plants in the switch.
9. Depressing NEXT UNIT increments to the first auxiliary tone plant in the next module (and NEXT CIRCUIT steps through the auxiliary tone plants within the selected module).
10. When Test 1 is called in, Fields 11 through 16 all contain 1 's.

The 1's indicate that the tone associated with each field is selected for transmission during Test 1.
11. Prior to starting Test 1, connect the telephone set or hand test set to the test line.
12. To start Test 1, depress EXECUTE.

Transmission of the first tone (immediate audible alert) is initiated when EXECUTE is depressed.
13. As the tone is transmitted, either a 0 or 1 is flashed in the associated field (Field 11).

A 0 indicates that the tone is not being transmitted; a 1 indicates that the tone is being transmitted.
14. When the telephone or hand test set connected to the test line is taken off-hook, maintenance personnel can listen to the tone being transmitted.
15. Maintenance personnel can determine if the tone is being transmitted or if other problems exist, such as attenuation, improper interruption rates, or if the proper tone is heard without interference from other tones.
16. Depressing NEXT DATA initiates transmission of the next tone in sequence.

Depressing NEXT DATA repeatedly sequences through the transmission of all the tones associated with Fields 11 through 16.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can only be tested when circuit pack SN253C is installed.
17. Depressing NEXT DATA during transmission of the last tone (either data answer tone or precedence audible alert tone) sequences back to the first tone (immediate audible alert), which is again transmitted.
18. Test 1 is stopped by depressing NEXT TEST or RESET.

## Test 2

Test 2 enables maintenance personnel to transmit selected tones from a specific auxiliary tone plant over a test line.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. When Test 2 is called in, the default test line and auxiliary tone plant equipment locations from Test 1 are displayed in Fields 2 through 10.

Either the default auxiliary tone plant can be tested or another auxiliary tone plant can be selected for testing.
3. To select another tone plant for testing use the CHANGE FIELD sequence or NEXT CIRCUIT and/or NEXT UNIT:

CHANGE FIELD; 7; ENTER; (Auxiliary tone plant module); ENTER; (Cabinet); ENTER; (Carrier); ENTER; (Slot); ENTER.

Depressing NEXT CIRCUIT increments through all the auxiliary tone plants in the switch.
Depressing NEXT UNIT increments to the first auxiliary tone plant in the next module (and NEXT CIRCUIT steps through the auxiliary tone plants within the selected module).
4. When Test 2 is called in, Fields 11 through 16 all contain 0 's.

The 0's indicate that the tone associated with each field is not selected for transmission during Test 2.
5. The 0 in Field 11 is flashed, indicating an optional entry field.
6. To select the tone associated with Field 11 (immediate audible alert) for transmission, a 1 must be entered in the field:
1; ENTER.
7. To leave the tone not selected for transmission, ENTER can be depressed to increment to the next field.
8. Each tone that is to be transmitted during Test 2 must be selected by entering a 1 in the associated field.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can only be selected for transmission when circuit pack $\mathbf{S N} 253 \mathrm{C}$ is installed.
9. Prior to starting Test 2, connect the telephone set or hand test set to the test line.
10. To start Test 2, depress EXECUTE.

Note: Depressing EXECUTE with no tones selected for transmission (Fields 11 through 16 all contain 0 's), causes special error code 80 (no tone selected for transmission) to be displayed in the MAAP error code field.
11. The first field selected containing a 1 is flashed when EXECUTE is depressed, indicating that the associated tone is being transmitted.
12. Maintenance personnel can monitor the transmission of the tone selected by going off-hook at the test line.
13. Depressing NEXT DATA sequences to the next field containing a 1 and begins transmitting the associated tone.

Repeated use of NEXT DATA sequences through all the selected tones, transmitting them, and then back to the first tone selected which is again transmitted.
14. Test 2 is stopped by depressing NEXT TEST or RESET.

## PROC 644

## Repair Guide

When auxiliary tone failures are reported by the user as a trouble, and PROC 600 (Alarm causes/error log) or PROC 620 (Network procedure) has not detected an auxiliary tone plant failure, the following steps should be performed in the order listed, to isolate and replace the failing circuit pack.

1. At the test line, install a 249A adapter and a telephone set or hand test set.
2. Execute Test 1 for the first auxiliary tone plant displayed upon entering PROC 644, and listen to each tone by going off-hook at the test line.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can not be transmitted if circuit pack SN253C is not installed.
3. If the auxiliary tone plant passes, execute Test 1 for all auxiliary tone plants in the switch, using NEXT CIRCUIT and/or NEXT UNIT to select the next auxiliary tone plant for testing.
4. If no auxiliary tone plants indicate a failure, check the wiring between the terminal equipment experiencing the trouble and the associated connections to the switch.
5. If an auxiliary tone plant fails, determine which tones are defective, and execute Test 2 to inhibit the transmission of the fault-free tones to verify the status of the tones suspected of being defective by listening to the selected tones at the test line.

Note: Field 15 (preemption tone) and Field 16 (precedence audible alert tone) can not be transmitted if circuit pack SN253C is not installed.
6. Replace SN253 and repeat Test 1.
7. If the auxiliary tone plant continues to fail after replacing SN253, use PROC 620, Test 4 (unit type 31) to further isolate the exact cause of the problem.
8. If the auxiliary tone plant still fails after further diagnosis by PROC 620, check the wiring associated with the defective tones isolated in Step 5.

## PROC 646

PROC 646 －MODEM POOLING AND FACILITY TESTING

| FLIPCHART ISSUE 1 |  |  | MODEM POOLING AND FACILITY TESTING $+^{*}$ |  |  | ＋ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| EQUI IYPE 0 0 a | PMENT LOCATION S（FIELD 6）： FTC MBER A GPP MBER A GATA PORT MEER B GPP MEER B OATA PORT | DATA TYPES（FIELD 13 ） 1＝SPECIFIC FAULI CODE 2－8IT ERROR RATE／ 日ITS SENT $3=8 L O C K$ ERROR RATE／ 日LOCKS SENT $4=$ NUMBER OF CIRCUITS TESTED $5=$ MAINT BUSY $6=$ NOI MAINT BUSY | DATA RATE（FIELD 14）： DASH $=$ DEFAULT RATE $3=300$ BPS $12=1200$ BPS $24=2400$ BPS $48=4800$ BPS $96=9600$ BPS $182=19.2 \mathrm{~K} \mathrm{BPS}$ $660=56 \mathrm{~K}$ BPS $640=64 \mathrm{~K}$ BPS | SPECIAL ERROR CODES： <br> 80＝EQUIPMENT LOCATION NOT CDMPLETE 81＝MESSAGE TRANSMISSION TO MODULE PROCESSOR FAILED <br> 82＝TEST OF RANGE NOI COMPLETED 83＝NO ADFTC AVAILABLE FOR TEST 84－OMIOS OVERFLOW <br> 85－INVALID EQUIPMENT LOCATION <br> 86－INVALID TEST TYPE <br> 87－INVALID CIRCUIT FIELOS <br> 88－INVALIO MEMBER <br> 89－NO MEMEER available <br> go－invalio data rate <br> 91－WRONG EQUIPMENT LOCATION TYPE <br> g2－INVALID TEST TYPE FOR TRUNK GROUP MODE <br> g3－no circuit found in range <br> 94－MEMBER B INVALID FOR DIGITAL <br> facilities <br> 95 WAIT FOR TEST TO STOP <br> 96－FIELDS 7－11 MUST BE ENTERED BEFORE <br> USE OF BUSY OUT／RELEASE BUSY OUT |  |  |  |
| 产 |  |  |  |  |  |  | NETWORK 646 |



The flipcharts shown are for R2V2．The R2V1 flipcharts are similar except that the input definition for Field $12=1-99$ minutes．

## Purpose

PROC 646 is used when referenced from PROC 600 （Alarm causes／error log）to verify and turn off the OTHER FAILS fault indicator resulting from a Analog／Digital Facility Test Circuit （ADFTC）failure，a modem pool member（MPM）failure，and／or a digital facility failure．

## PROC 646

PROC 646 is used to:

1. Test ADFTC circuits.
2. Perform a detection test on MPMs and digital facilities.
3. Perform a diagnostic test on MPM and digital facilities.
4. Automatically turn off the fault indicator when all ADFTC circuits, MPMs, and/or digital facilities that caused an alarm to be raised are tested as good.

Note: Alarmed ADFTC circuits, MPM circuits, and/or digital facility circuits in PMIDS are marked as resolved.

Maintenance tests are performed on ADFTC circuits, MPMs, and data modules, EIA ports, and digital facilities that are translated as trunks.
The ADFTC (circuit pack SN261) is used in testing MPMs, data modules, EIA ports, and digital facilities.

A MPM consists of an enhanced Trunk Data Module (TDM/2) connected to a General Purpose Port (GPP) circuit pack (SN270), and an analog modem connected to a data port trunk circuit (SN243).

A MPM is a conversion resource which allows System 85 outside users to communicate through the analog network with off/on premises facilities.
The Processor Data Module (PDM) and Trunk Data Module (TDM and TDM/2) are data modules.
The EIA port (circuit pack SN238) with a Limited Distance Modem (LDM) functions similar to a GPP port and a data module.

Digital facilities include Public Switched Digital Connectivity (PSDC), Digital Data Service (DDS), private line data facilities, and host computer access that connect to a data module or EIA port which are translated as trunks.

A Modem Pool Group (MPG) is a trunk group of MPMs all with similar data transmission characteristics.

## Field Definitions and Codes

Each field of PROC 646 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AT, PROC 646 - Field Definitions and Codes.

Optional input fields are:

1. Field 2-Select type of test to be performed.
2. Fields 3 through 5 - Select trunk group and member number to be tested (Tests 2 and 3 only).
3. Field 6 - Select equipment location type to be tested (Tests 2 and 3 only).
4. Fields 7 through 11 - Select equipment location of the ADFTC, MPM, or digital facility to be tested.
5. Field 12 - Select length (time in minutes) of test to be performed (Tests 2 and 3 only).
6. Field 14-Select data rate required to perform the test (Tests 2 and 3 only).

Note: Fields 12 and 14 are multiple use fields; however, for optional inputs they are used for test length and data rate.

TABLE AT.

| PROC 646 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | dEFINITION |
| 1 | 1-3 | Test number. |  | 3 | Test 3 test types (Contd): |
| 2 | 0-8 | Test types. |  |  |  |
|  | $\begin{gathered} 0-3 \\ 0 \\ 1 \end{gathered}$ | Test 1 test types: <br> All ADFTC self tests. One port ADFTC self test. |  | 4 5 | tests. <br> EIA remote loopback originating tests. EIA remote loopback terminating tests. |
|  | 3 | self test. <br> Two port reverse ADFTC self test. | 3-5 | 1-255 | Circuit location. <br> Trunk group number. |
|  | 0.8 0 1 | Tes: 2 test types. <br> All tests or host access. All originating tests. | 4 5 | $\begin{aligned} & 1-99 \\ & 1-99 \end{aligned}$ | Member A. <br> Member B . |
|  | 2 3 4 4 5 | All terminating tests. Two port originating normal test. Two port originating reverse test. Two port terminating normal test. | 6 | $\begin{gathered} 0-4 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{gathered}$ | Equipment location type. <br> ADFTC. <br> Member A GPP port. <br> Member A data port. <br> Member B GPP port. <br> Member B data port. |
|  | 7 8 | reverse test. <br> One port originating test. <br> One port terminating test. | $7-11$ 7 8 | 0-30 | Equipment location. <br> Module number. <br> Cabinet number. |
|  | 0-8 | Test 3 test types: | 9 | 0-3 | Carrier number. |
|  | 0 1 2 | All tests. <br> All EIA remote loopback tests. <br> Data module remote loopback tests. | 10 | $\begin{gathered} 00-03, \\ 05-08, \\ 13-16, \\ 18-21 \end{gathered}$ | Slot number |
|  |  |  | 11 | 0-3 | Circuit number. |

TABLE AT. (Contd)


## Operation of Procedure

## Overview

PROC 646 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a ADFTC failure, MPM failure, and/or digital facility failure.
To call in PROC 646, perform the following:

1. Depress PROC NO; 646; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 , Field 2 is blanked and blinking, Field 6 displays a 0 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Tests ADFTC circuits.
2. Test 2 - Performs detection tests on MPMs and digital facilities.
3. Test 3 - Performs diagnostic tests on MPMs and digital facilities.

## Test 1

Test 1 runs a detection test on ADFTC circuit(s). Self tests are performed on ADFTC circuit(s) as determined by the test type specified in Field 2.
ADFTC self tests consist of the following test types:

1. Test type 0 - All ADFTC self tests which includes a one port, two port normal, and two port reverse detection test.
2. Test type 1 - ADFTC one port self test: A connection is made between the ADFTC and itself (port 1 to port 1) through the switch and a detection test is run.
3. Test type 2-ADFTC two port normal test: A connection is made between the ADFTC and itself (port 1 to port 2) through the switch and a detection test is run.
4. Test type 3-ADFTC two port reverse test: A connection is made between the ADFTC and itself (port 1 to port 2 ) through the switch and a detection test is run.

ADFTC circuits can be selected for testing on a single circuit basis or a range of ADFTC circuits.
If a circuit is tested with a test type of 0 (all ADFTC self tests) and no failure occurs, any alarm on that circuit is automatically resolved in PMIDS.

## Test 1 Data Entry

1. Test 1 is the default test when entering PROC 646, or is selected by using NEXT TEST.

Note:, Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, Fields 7 through 11 (equipment location) are dashed, or a default equipment location may be displayed in Fields 7 through 11. Field 13 may display a default maintenance busy status and Field 14 (data) may display a specific fault code.

## PROC 646 Test 1

3. The default equipment location can be the last ADFTC equipment location displayed in Test 2 or 3 of PROC 646 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.

The default equipment location can also be passed from PROC 620 as long as the equipment location is a ADFTC port equipment location (circuit 1) and is still displayed in PROC 620 when it is passed.
4. Field 2 (test type) is blanked and blinking indicating a mandatory entry.
5. Fields 3 through 5 (circuit fields) are dashed during Test 1 execution and Field 6 (type) defaults to 0 (ADFTC).
6. To select the type of test to be run on ADFTC circuit(s), enter the test type number in Field 2 and depress ENTER.
Tests that can be run on ADFTC circuits are: $0=$ All ADFTC self tests; $1=$ one port ADFTC self test; $2=$ two port normal ADFTC self test; $3=$ two port reverse ADFTC self test.
7. After the test type (Field 2) is entered, the module number field (Field 7) is blinking indicating that a module number may be entered.
8. All ADFTC circuits, a range of ADFTC circuits, a specific ADFTC circuit, or the default equipment location can be tested.
9. Selection of a range of ADFTC circuits to be tested depends on whether or not a default equipment location is displayed. If a default equipment location is displayed, the CHANGE FIELD sequence must be used. If no default equipment location is displayed, either ENTER or the CHANGE FIELD sequence can be performed to select the range of ADFTC circuits to be tested.
10. To select all ADFTC circuits in the switch for testing, Fields 7 through 11 must be dashed.

If no default equipment location is displayed, depress ENTER.
If a default equipment location is displayed, depress CHANGE FIELD; 7; ENTER; ENTER

Test 1 starts with the first module, first cabinet and carrier and runs until all ADFTC circuits in the switch are tested.
Proceed to Step 1 of Test 1 Execution.
11. To select all ADFTC circuits in a module for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Module number to be tested); ENTER.
CHANGE FIELD; 7; ENTER; (Module number to be tested); ENTER.
Test 1 starts with the first ADFTC circuit in the module selected and runs until all ADFTC circuits in the module are tested.

Proceed to Step 1 of Test 1 Execution.
12. To select all ADFTC circuits in a cabinet for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

CHANGE FIELD; 7; ENTER; (Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Test 1 starts with the first ADFTC circuit in the cabinet selected and runs until all ADFTC circuits in the cabinet are tested.

Proceed to Step 1 of Test 1 Execution.
13. To select all ADFTC circuits in a carrier for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

CHANGE FIELD; 7; ENTER; (Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER

Test 1 starts with the first ADFTC circuit in the carrier selected and runs until all ADFTC circuits in the carrier are tested.
Proceed to Step 1 of Test 1 Execution.
14. To select all ADFTC circuits in a slot for testing, perform one of the following depending on whether or not a default equipment location is displayed:
(Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number. to be tested); ENTER.
CHANGE FIELD; 7; ENTER; (Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

Test 1 tests circuit 1 of the ADFTC in the slot selected.
Proceed to Step 1 of Test 1 Execution.
15. To select a specific ADFTC circuit for testing, perform one of the following depending on whether or not a default equipment location is displayed:

Note: Port 0 (circuit number 0) cannot be tested in PROC 646 but can be tested in PROC 620.
(Module number of ADFTC circuit to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number 1); ENTER.

CHANGE FIELD; 7; ENTER; (Module number of ADFTC circuit to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number 1); ENTER.

Field 13 (data type) displays the maintenance busy status of the specific ADFTC circuit selected for testing.

Note: Special error code 85 (invalid equipment location) is displayed in the MAAP error code field when EXECUTE is depressed if the correct equipment location is not entered in Fields 7 through 11.

Proceed to Step 1 of Test 1 Execution.

## PROC 646 Test 1

16. A specific ADFTC circuit can also be selected for testing by use of NEXT CIRCUIT.

Depress NEXT CIRCUIT until the port equipment location of the ADFTC circuit to be tested is displayed in Fields 7 through 11.

Note: The WAIT indicator lights while a circuit is searched for. The delay is approximately 30 seconds per module.

Proceed to Step 1 of Test 1 Execution.
17. To test the default equipment location displayed in Fields 7 through 11, proceed to Step 1 of Test 1 Execution.

## Test 1 Execution

1. To start Test 1 after selecting the test type and ADFTC circuit(s) to be tested, depress EXECUTE.
The WAIT indicator on the MAAP is turned on.
2. If test type 0 was selected, Field 2 changes to a 1 to indicate that test type 1 is currently being executed.

If any other test type was selected, Field 2 does not change.
3. When testing encounters an ADFTC circuit in use by the periodic test, the periodic test is stopped and the ADFTC circuit is tested.
4. STOP can be depressed to halt Test 1 at any time.
5. If Test 1 is stopped before one complete testing pass through a single ADFTC circuit or a range of ADFTC circuits is made, special error code 95 (wait for test to stop) is displayed in the MAAP error code field.

Note: One complete testing pass equals all test types selected for a single circuit are tested, or in a range of circuits all test types selected for each circuit in a range of circuits are tested.
6. After the current test is completed, special error code 82 (test of range not completed) is displayed in the MAAP error code field indicating that one complete pass through the ADFTC circuit or range of ADFTC circuits was not completed.
7. The port equipment location of the last ADFTC circuit tested is displayed in Fields 7 through 11, the total number of circuits tested is displayed in Field 14 (if all test types of a circuit are tested), and the total number of failures (if any) is displayed in Field 12.
8. If any failures are displayed in Field 12, test result information can be stepped through as described in Step 10 below when Test 1 is halted using STOP even though the ADFTC circuit or the entire range of ADFTC circuits is not tested.
9. To restart the test when Test 1 is halted by use of STOP before a single ADFTC circuit or range of ADFTC circuits are tested at least once, EXECUTE is depressed and Test 1 starts at the port equipment location and specific test following the last port equipment location and specific test fully tested.

Note: When Test 1 is continued from where it was stopped any test results gathered to that point are retained.
10. Test 1 operation and display of test results is different when a specific ADFTC circuit or default equipment location is tested and when a range of ADFTC circuits are tested.

For test operation and display of test results for a default equipment location or a specific ADFTC circuit, proceed to Step 1 of Test 1 Result Display for a Single Circuit.
For test operation and display of test results for a range of ADFTC circuits, proceed to Step 1 of Test 1 Result Display for a Range of Circuits.

## Test 1 Result Display for a Single Circuit

1. When Test 1 is completed for a default equipment location or a specific ADFTC circuit, the WAIT indicator is turned off and the following is displayed:
Field 1-1.
Field 2 - Original test type selected for testing ADFTC circuit.
Fields 3 through 5 - Dashed.
Field 6-0.
Fields 7 through 11 - Port equipment location of ADFTC circuit tested.
Field 12-0 (indicating no failures were found for the ADFTC circuit tested) or 1 (indicating the ADFTC circuit failed the test).
Field 13 - Data type of 4 (indicating that Field 14 indicates the number of circuits tested).
Field 14-0 (if STOP was depressed indicating all tests are not completed) or 1 (indicating 1 ADFTC circuit tested).
2. Depressing NEXT CIRCUIT changes the display in the data type and data fields (Fields 13 and 14).
Field 13 displays a 1 indicating that the data in Field 14 is a specific fault code.
3. Depressing NEXT FAULT displays a 2 in Field 13 and the bit error rate/bits sent in Field 14.

Depressing NEXT FAULT once more displays a 3 in Field 13 and the block error rate/blocks sent in Field 14.

Note: Refer to Table AT, PROC 646 - Field Definitions and Codes, to determine how to interpret bit, block error rates and bits/blocks sent.
4. Depressing NEXT FAULT repeatedly advances through each test type selected for testing displaying specific fault code (if any), bit error rate/bits sent, and block error rate/blocks sent for each test type.

After the block error rate/blocks sent of the last test type selected for testing is displayed for the circuit tested, depressing NEXT FAULT once more dashes all fields except Field 1.
Depressing NEXT FAULT again starts the cycle over with a 1 displayed in Field 13, and a specific fault code displayed in Field 14 for the same circuit.
5. When another specific ADFTC circuit is to be tested, the CHANGE FIELD sequence must be used to select the test type desired and the specific ADFTC circuit to be tested.
CHANGE FIELD; 2; ENTER; (Test type desired); ENTER; (Module number of ADFTC circuit to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number 1); ENTER.

## PROC 646 Test 1

6. EXECUTE must be depressed to test the specific ADFTC circuit selected for testing.

## Test 1 Result Display for a Range of Circuits

1. When a range of ADFTC circuits is being tested, the WAIT indicator is turned on and the following fields are incremented as a circuit is tested:
Field 2 is updated with the test type currently being executed (i.e., 1, 2, and 3 ) if test type 0 (all ADFTC tests) was selected.
Fields 7 through 11 - Port equipment location of the current ADFTC circuit being tested.
Field 14 - Bit error rate/bits sent (updated every 10 seconds).
2. When testing is completed for an ADFTC circuit, the bit error rate/bits sent, block error rate/blocks sent, any specific fault code and the port equipment location are stored in DMIDS.
3. When a range of ADFTC circuits has completed testing, the WAIT indicator is turned off.

Field 2 displays the original test type and Fields 7 through 11 display the original equipment range selected.
Field 12 displays the number of failures (if any).
Field 13-4 (indicating that Field 14 displays the number of ADFTC circuits tested).
Field 14 - Number of ADFTC circuits tested.
4. All failures with a specific fault code are displayed first followed by passing circuits with a specific fault code of 0 .
Bit and block error rates are displayed for failing and passing circuits.
When multiple tests (more than one test type) are performed on ADFTC circuits, a specific fault code (if any) and bit/block error rates are displayed for all test types executed for each ADFTC circuit tested.
5. Depressing NEXT CIRCUIT displays the first ADFTC circuit tested as follows:

Field 1-1.
Field 2 - Test type for the displayed ADFTC circuit.
Fields 3 through 5 - Dashed.
Field 6-0 (default ADFTC equipment type).
Fields 7 through 11 - Equipment location of the displayed ADFTC circuit.
Field 12-0 or number of circuits failed.
Field 13-1 (indicating that Field 14 displays a specific fault code).
Field 14-0 or specific fault code.
6. Depressing NEXT FAULT displays a 2 in Field 13 and the bit error rate/bits sent in Field 14.

Depressing NEXT FAULT once more displays a 3 in Field 13 and the block error rate/blocks sent in Field 14.

Note: Refer to Table AT, PROC 646 - Field Definitions and Codes, to determine how to interpret bit and block error rates.
7. Depressing NEXT FAULT repeatedly advances through each test type selected for testing displaying specific fault code (if any), bit error rate/bits sent, and block error rate/blocks sent for each test type.
After the block error rate/blocks sent of the last test type selected for testing is displayed for the circuit tested, depressing NEXT FAULTT once more dashes all fields except Field 1.

Depressing NEXT FAULT again starts the cycle over with a 1 displayed in Field 13, and a specific fault code displayed in Field 14 for the same circuit.
8. Depressing NEXT CIRCUIT repeatedly displays the remaining tested ADFTC circuits with a 1 displayed in Field 13 and a specific fault code displayed in Field 14.
Depressing NEXT FAULT displays the bit error rate/bits sent and block error rate/blocks sent.

Depressing NEXT FAULT repeatedly advances through each test type selected for the displayed ADFTC circuit, displaying specific fault code, bit error rate/bits sent, and block error rate/blocks sent for each test type.
9. When all ADFTC circuits are displayed, depressing NEXT CIRCUIT dashes Fields 2 through 14.
Depressing NEXT CIRCUIT once more starts the sequence over with the first failure or tested ADFTC circuit.
10. If a circuit is tested with a test type of 0 (all tests) and no failure occurs, any alarms on that circuit is automatically resolved in PMIDS.
11. To select another range of ADFTC circuits to test, the CHANGE FIELD sequence must be used to select the test type desired and the specific range of ADFTC circuits to be tested as follows:

## CHANGE FIELD; 2; ENTER; (Test type desired); ENTER.

Refer to Steps 10 through 13 of Test 1 Data Entry above to select a range of ADFTC circuits to test in a module, cabinet, carrier, or slot.
12. EXECUTE must be depressed to test the range of ADFTC circuits selected for testing.
13. Test 1 automatically turns off the OTHER FAILS fault indicator when all ADFTC circuits that raised an alarm pass Test 1 assuming no MPM, digital facilities, or other alarm sources affecting the OTHER FAILS fault indicator are active.

Note: ADFTC alarmed circuit entries in PMIDS are marked as resolved.

## Test 2

Test 2 runs detection tests on modem pool members (MPMs) and digital facilities as determined by the test type specified in Field 2.
Detection tests consist of half duplex tests and full duplex tests. (Refer to Figure 9 - Modem Pooling and Facility Test Configurations.)

1. The half duplex test is run only on MPMs. It is run four times, from both the originating and terminating modes and in both the forward and reverse direction. The half duplex test requires the use of two MPMs. Connections are made from ports 1 and 2 of the ADFTC to the GPP of each MPM and between each MPM's data (analog) port.

## PROC 646 Test 2

2. The full duplex test is run on digital facilities assigned as trunks, and for diagnostic purposes on full duplex MPMs and the TDM/2 on half duplex MPMs. The full duplex test can put MPMs in either originating or terminating modes. Only one connection is necessary except when testing a full duplex MPM. It is made between port 1 of the ADFTC and the GPP of the data module to be tested. An additional connection must be made, when testing a full duplex MPM, between its data port and the data port of a known good MPM.


Figure 9. Modem Pooling and Facility Test Configurations

Types of detection tests for MPMs and digital facilities consist of all tests (test type 0 - includes test types 3 through 8); all originating tests (test type 1 - includes test types 3,4 , and 7 ); all terminating tests (test type 2 - includes test types 5, 6, and 8); two port originating normal test (test type 3); two port originating reverse test (test type 4); two port terminating normal test (test type 5); two port terminating reverse test (test type 6); one port originating test (test type 7); and one port terminating test (test type 8).
Each type of test is not applicable to all types of modem pool members or digital facilities. Types of modems available with modem pool members tested consist of 103J, 113C, 113D, 202S, 201C, 208B, and 212A.

Types of tests that can be run in Test 2 for modem pool members and digital facilities are:

1. Modem pool members that are both originating and terminating (all modems except 113C and 113D) - All tests except one port test (test types 0 through 6).
2. Originating only modem (i.e., 113C) - All tests (test type 0 ) all originating tests (test type 1 ), and one port originating test (test type 7).
3. Terminating only modem (i.e., 113D) - All tests (test type 0 ), all terminating tests (test type 2), and one port terminating test (test type 8).
4. Digital facilities and host access - All tests (test type 0 ).

Several different test types may be run on one modem pooling circuit (or circuit pair).

1. Some test types might fail while other test types pass.
2. Failing test types are displayed first while passing test types are displayed after all failing test types are displayed.
3. When a modem pooling circuit (or circuit pair) test fails, a specific fault code is displayed. A specific fault code of 0 is displayed for passing tests.
4. Bit and block error rates are displayed for both failing and passing circuits (or failing and passing test types) for further diagnosis (if required).
Characteristics (i.e., modem type, loop back control, etc.) of digital trunks used in modem pooling are provided in PROC 100 Words 1 and 2.
MPMs and digital facilities can be selected for testing on a single circuit basis or a range of MPMs or digital facilities (i.e., trunk group number; trunk group number and member A; trunk group number and member B (MPM only); or no entries).
If a circuit or circuit pair is tested with a test type of 0 (all tests) and no failure occurs, any alarm on that circuit or circuit pair is automatically resolved in PMIDS.

## Test 2 Data Entry

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2.
2. When Test 2 is initially called in, Fields 3 through 11 (trunk group member number and equipment location) are dashed, or a default equipment location may be displayed in Fields 7 through 11. Field 13 may display a default maintenance busy status and Field 14 (data) may display a default specific fault code.
3. The default equipment location can be the last equipment location or trunk group and member number displayed in Test 3 of PROC 646 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.
4. The default equipment location can also be passed from PROC 620 as long as the equipment location is a GPP, data port, or ADFTC port 1 equipment location which is part of an MPM or digital facility and is still displayed in PROC 620 when it is passed.
5. Field 2 (test type) is blanked and blinking indicating a mandatory entry.
6. Types of tests that can be run in Test 2 for modem pool members and digital facilities are:

Originating and terminating modem pool members (all modems except 113C and 113D) - All tests except one port test (test types 0 through 6).

## PROC 646 Test 2

113 C modem - All tests (test type 0 ), all originating tests (test type 1), and one port originating test (test type 7).

113 D modem - All tests (test type 0), all terminating tests (test type 2), and one port terminating test (test type 8).

Digital facilities and host access - All tests (test type 0).
7. To select the type of test to be run on MPMs or digital facilities to be tested, enter the test type number in Field 2 and depress ENTER.

Note: When a default equipment location is displayed, the maintenance busy status is displayed in Field 13 (data type) when the test type is entered.
8. After the test type (Field 2) is entered, the trunk group number field (Field 3) is blinking indicating that a trunk group number of the MPM or digital facility to be tested may be entered.
9. If an equipment location was carried over from Test 3 and it is an MPM or digital facility, its trunk group and member number are displayed in Fields 3 through 5 (as appropriate) and the equipment location is displayed in Fields 7 through 11.
10. A range of MPMs or digital facilities, a specific MPM or digital facility, or the default equipment location can be tested.

If a default equipment location is to be tested, proceed to Step 11.
If a range of MPMs or digital facilities, a specific MPM or a specific digital facility is to be tested, proceed to Step 12.
11. To test the default equipment location, determine if the ADFTC to be used for testing is to be specified before testing.

If the ADFTC is to be specified, record the default equipment location (Fields 3 through 5, and 7 through 11 as appropriate) and proceed to Step 13.
If the ADFTC is not to be specified, proceed to Step 45.
12. If a specific ADFTC is to be used for testing, it must be selected at this time.

To select a specific ADFTC to be used for testing, proceed to Step 13.
If a specific ADFTC is not to be used for testing, proceed to Step 15.
13. The ADFTC to be used for testing can be specified by entering the complete equipment location and the correct type in Fields 6 through 11 as follows:
CHANGE FIELD; 6; ENTER; 0; ENTER; (Module number of ADFTC); ENTER; (Cabinet number of ADFTC); ENTER; (Carrier number of ADFTC); ENTER; (Slot number of ADFTC); (Circuit number of ADFTC); ENTER.

Note: If the ADFTC is incompletely specified (all fields not entered), special error code 85 (invalid equipment location) is displayed in the MAAP error code field when EXECUTE is depressed. Field 7 (module) blinks.

Proceed to Step 14.
14. If a default equipment location is being tested, enter the default equipment location (recorded in Step 11 above) in Fields 3 through 5, and 7 through 11 (as appropriate) using the CHANGE FIELD sequence and proceed to Step 45.

## PROC 646 Test 2

If a range of MPMs or digital facilities, a specific MPM or a specific digital facility is being tested, proceed to Step 15.
15. MPMs or digital facilities can be selected for testing by one of two methods; i.e., by circuit (Fields 3 through 5) or by type and equipment location (Fields 6 through 11).

To select MPMs or digital facilities for testing using the circuit method, proceed to Step 16.
To select MPMs or digital facilities for testing using the type and equipment location, proceed to Step 35.
16. If no entries are specified in Fields 3 through 5 or 7 through 11, Test 2 is run on all trunk groups corresponding to the test type entered in Field 2.
17. If only the trunk group number is specified in Field 3, Test 2 is run on all members of the trunk group.
18. If the trunk group number and member A are specified in Fields 3 and 4, Test 2 is run only on member $A$ using any available member $B$.
19. If the trunk group number and member $B$ are specified in Fields 3 and 5, Test 2 is run on all member As of the trunk group using the member B specified.
20. If the trunk group number and members $A$ and $B$ are specified in Fields 3 through 5, Test 2 is run only on that circuit pair.
21. Selection of a range of MPMs or digital facilities to be tested depends on whether or not a default equipment location is displayed or if a specific ADFTC is selected for testing.
If a default equipment location is displayed or if a specific ADFTC is selected for testing, the CHANGE FIELD sequence must be used.

If no default equipment location is displayed or no specific ADFTC is selected for testing, either ENTER or the CHANGE FIELD sequence can be performed to select the range of MPMs or digital facilities to be tested.
22. To select all trunk groups corresponding to the test type entered in Field 2 for testing, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
ENTER.

## CHANGE FIELD; 3; ENTER; ENTER.

Note: Fields 3 through 11 are dashed.
Test 2 starts with the first MPM or digital facility (in equipment location order not trunk group sequence) corresponding to the test type entered in Field 2 and runs until all MPMs and/or digital facilities are tested.
Proceed to Step 47.
23. To select all MPMs or digital facilities in a trunk group for testing, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
(Trunk group number to be tested); ENTER.
CHANGE FIELD; 3; ENTER; (Trunk group number to be tested); ENTER.

## PROC 646 Test 2

Test 2 starts with the first MPM or digital facility in the trunk group selected (in equipment location order not trunk group sequence) and runs until all MPMs or digital facilities in the trunk group are tested.

Proceed to Step 47.
24. NEXT UNIT is also used to select a trunk group for testing. Depress NEXT UNIT until the trunk group number to be tested is displayed in Field 3. All other fields are dashed.

Test 2 starts with the first MPM or digital facility in the trunk group selected (in equipment location order not trunk group sequence) and runs until all MPMs or digital facilities in the trunk group are tested.

Proceed to Step 47.
25. To test a single member A with any member $B$, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing
(Trunk group number of member B to be tested); ENTER; (Member A); ENTER.
CHANGE FIELD; 3; ENTER; (Trunk group number of member $B$ to be tested); ENTER; (Member A); ENTER

Note: If the trunk group number is a digital facility or MPG with one way modems, the member B field must be dashed.

Test 2 tests the member A specified with any member B.
Proceed to Step 47.
26. To select all member As in a trunk group for testing, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
(Trunk group number of member A to be tested); ENTER; ENTER; (Member B or dashed); ENTER.

CHANGE FIELD; 3; ENTER; (Trunk group number of member $A$ to be tested); ENTER; ENTER; (Member B or dashed); ENTER.

Note: If the trunk group number is a digital facility or MPG with one way modems, the member B field must be dashed since it is not required for testing member As. If the trunk group is not a digital facility or a modem pool with one way members and member $B$ was dashed, member Bs are also selected for testing.

Test 2 starts with the first member A in the trunk group selected (in equipment location order) and runs until all member As in the trunk group are tested.

Proceed to Step 47.
27. To select a specific MPM or digital facility for testing, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
(Trunk group number of MPM to be tested); ENTER; (Member A of MPM to be tested); ENTER; (Member B of MPM to be tested); ENTER.

CHANGE FIELD; 3; ENTER; (Trunk group number of MPM to be tested); ENTER; (Member A of MPM to be tested); ENTER; (Member B of MPM to be tested); ENTER.

Note: If a specific digital facility is being tested, Field 5 (member B) must be dashed.
Test 2 tests the MPM specified in Fields 3 through 5 or the digital facility specified in Fields 3 and 4.

Proceed to Step 32.
28. NEXT CIRCUIT can be used to select a circuit or circuit pair before test execution.
29. If nothing is specified in the circuit or equipment location fields (Fields 3 through 5 and 7 through 11), two available facilities are displayed in the circuit and equipment location fields from the first testable trunk group when NEXT CIRCUIT is depressed. If the trunk group contains digital facilities or MPMs with one way modems, member B (Field 5) is dashed.

Proceed to Step 32.
30. If the circuit field is specified up to member A (Fields 3 and 4), member A is incremented to the next member A when NEXT CIRCUIT is depressed.
Proceed to Step 32.
31. If both members $A$ and $B$ are specified, the member number is advanced corresponding to the type field (Field 6) of the equipment location fields when NEXT CIRCUIT is depressed.

Proceed to Step 32.
32. After the circuit fields are specified, the equipment location fields (Fields 7 through 11) defaults to the equipment location of member $A$.
The type field (Field 6) defaults to 1 indicating the GPP port of member $A$ is displayed in Fields 7 through 11.
Proceed to Step 33.
33. Before test execution, NEXT DATA can be depressed to examine port equipment locations associated with the circuit selected for testing.
34. Successive depression of NEXT DATA displays in Fields 6 through 11 the type and port equipment locations of the member A GPP; member A data port; member B GPP; and member B data port.

Note: Depressing NEXT DATA does not always display 4 equipment locations before testing. The type and port equipment locations (displayed in Fields 6 through 11) used for testing depends on whether MPMs or digital facilities are being tested.

The maintenance busy status of each port equipment location is displayed in Field 13.
Proceed to Step 45.
35. MPMs or digital facilities can be selected for testing using the type and equipment location fields (Fields 6 through 11).
Only one member A GPP or one member A data port can be designated as the type facility to test if an individual circuit is to be tested.
36. A range of member A GPP (equipment location type 1) facilities can be selected for testing.

Note: Ranging is not allowed for other equipment location types.
37. To select the type of facility to test, the CHANGE FIELD sequence must be used: CHANGE FIELD; 6; ENTER; (equipment location type); ENTER.
38. Equipment location types are: $1=$ Member A GPP port, $2=$ Member A data port for a fully specified circuit; or $1=$ Member A GPP for a range test.

Note: Only equipment location type 1 (member A GPP) can be entered in Field 6 for testing of digital facilities.
39. When the equipment location type is entered in Field 6, the module field (Field 7) blinks for entry.
40. To select all member A GPPs in a module for testing, enter the following:
(Module number to be tested); ENTER.
Test 2 starts with the first member A GPP in the module selected and runs until all member A GPPs in the module are tested. In addition, any data port associated with a modem pool is also tested.

Proceed to Step 47.
41. To select all member A GPPs in a cabinet for testing, enter the following:
(Module number of cabinet to be tested); ENTER; (Cabinet number to be tested); ENTER.

Test 2 starts with the first member A GPP in the cabinet selected and runs until all member A GPPs in the cabinet are tested.

Proceed to Step 47.
42. To select all member A GPPs in a carrier for testing, enter the following:
(Module number of carrier to be tested); ENTER; (Cabinet number of carrier to be tested); ENTER; (Carrier number to be tested); ENTER.

Test 2 starts with the first member A GPP in the carrier selected and runs until all member A GPPs in the carrier are tested.

Proceed to Step 47.
43. To select all member A GPPs in a slot for testing, enter the following:
(Module number of slot to be tested); ENTER; (Cabinet number of slot to be tested); ENTER; (Carrier number of slot to be tested); ENTER; (Slot number to be tested); ENTER.

Test 2 starts with the first member A GPP in the slot selected and runs until all member A GPPs in the slot are tested.

Proceed to Step 47.
44. To select a specific member A GPP or member A data port for testing, enter the following:
(Module number of member A GPP or member A data, port to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.

Note: Equipment type (Field 6) must correspond to the equipment location selected or error code 85 (invalid equipment location) is displayed in the MAAP error code field.

Proceed to Step 45.
45. The maintenance busy status of the equipment location displayed in Fields 7 through 11 is displayed in Field 13.

The circuit displayed in Fields 7 through 11 can be busied out (if required).
If the circuit is to be busied out for testing, proceed to Step 46. If busy out of the circuit is not required, proceed to Step 47.
46. Individual port equipment locations can be placed in maintenance busy out status for testing by performing the following:

Check the maintenance busy status displayed in Field 13.
If the maintenance busy status $=5$, proceed to Step 47 .
If the maintenance busy status $=6$, depress BUSY OUT and proceed to Step 47 .
Note: If Fields 7 through 11 are not entered, special error code 96 (fields 7 through 11 must be entered before use of BUSY OUT) is displayed in the MAAP error code field.
47. The length of the test (maximum of 4 minutes for each test type executed - both R2V1 and R2V2) can be entered in Field 12, or a default test length can be chosen.

Note: The default test length causes a very short (less than 2 seconds) test. However, processing overhead increases the delay seen at the MAAP to less than 15 seconds for each test type. This default test length applies to all bit rates and test types.
48. Either Field 12 (test length) is blinking or the CHANGE FIELD sequence must be used to enter the desired test length.

If Field 12 is blinking, proceed to Step 49.
If Field 12 is not blinking, perform CHANGE FIELD; 12; ENTER; and proceed to Step 49.
49. If a default test length is desired, depress ENTER. If a different test length is desired, enter the time (minutes) in Field 12 :
(1 through 4-maximum of 4 minutes for both R2V1 and R2V2); ENTER.
Note: The actual test length executed for each test type selected is determined by whether the test for the test type passes or fails. If the test passes, either the default test length or the time entered in Field 12 is used for the test performed. If the test fails, the time of the test is the default test length no matter what time is entered in Field 12.

## PROC 646 Test 2

50. Field 14 (data rate) blinks for entry. The data rate can be entered in Field 14, or a default data rate can be chosen.

Note: Refer to Table AU, PROC 646 Modem Bit Rates, to determine the data rate for the modem type to be tested.

TABLE AU.

| PROC 646 - MODEM BIT RATES |  |
| :---: | :---: |
| MODEM <br> TYPE | BIT RATE |
| 103 J | 300 bits per second. |
| 113 C | 300 bits per second. |
| 113 D | 300 bits per second. |
| 201 C | 2400 bits per second. |
| 202 S | 1200 bits per second. |
| 208 B | 4800 bits per second. |
| 212 A | $300 / 1200$ bits per second. |

51. If a default data rate is desired, depress ENTER. If a different data rate is desired, enter the data rate in Field 14:
(Data rate); ENTER.
Data rate encodes are: $3=300 \mathrm{bps} ; 12=1200 \mathrm{bps} ; 24=2400 \mathrm{bps} ; 48=4800 \mathrm{bps} ; 96=9600 \mathrm{bps}$; $192=19.2 \mathrm{kbps} ; 560=56 \mathrm{kbps} ; 640=64 \mathrm{kbps}$.

## Test 2 Execution

1. To start Test 2 after selecting the test type, the ADFTC to be used for testing, the MPM(s) and/or digital facilities to be tested, the test length and data rate, depress EXECUTE.
The WAIT indicator on the MAAP is turned on.
2. If a facility is maintenance busied out, it is released from busy while under test.
3. When the test encounters a facility in use, a specific fault code is logged in DMIDS records and the test is stopped.

## The data call in progress is not aborted.

When testing multiple circuits (range testing) and Test 2 encounters a facility in use the test continues with the next circuit to be tested.
4. STOP can be depressed to halt Test 2 at any time.
5. If Test 2 is stopped before one complete testing pass through the facility or range of facilities specified is made, special error code 95 (wait for test to stop) is displayed in the MAAP error code field.

Note: One complete testing pass equals all test types selected for a single circuit are tested, or in a range of circuits all test types selected for each circuit in a range of circuits are tested.
6. After the current test is completed, special error code 82 (test of range not completed) is displayed in the MAAP error code field indicating that one complete pass through the facility or range of facilities is not completed.
7. The original test type selected is displayed in Field 2, the port equipment location of the last facility tested is displayed in Fields 3 through 11, the total number of circuits tested is displayed in Field 14 (if all test types of a circuit are complete), and the total number of failures (if any) is displayed in Field 12.
8. If any failures are displayed in Field 12, test result information can be stepped through as described in Step 10 below when Test 2 is halted using STOP even though the facility or range is not tested.
9. To restart the test when Test 2 is halted by use of STOP before a single facility or range of facilities are tested at least once, EXECUTE is depressed and Test 2 starts at the port equipment location and specific test following the last port equipment location and specific test fully tested.

Note: When Test 2 is continued from where it was stopped any test results gathered to that point are retained.
10. Test 2 operation and display of test results is different when a specific MPM, digital facility, or default equipment location is tested and when a range of MPMs or digital facilities are tested.

For test operation and display of test results for a default equipment location or a specific MPM or digital facility, proceed to Step 1 of Test 2 Result Display for a Single Circuit.
For test operation and display of test results for a range of MPMs or digital facilities, proceed to Step 1 of Test 2 Execution and Test Result Display for a Range of Circuits.

## Test 2 Result Display for a Single Circuit

1. When Test 2 is completed or STOP is depressed for a default equipment location, a specific MPM, or digital facility the WAIT indicator is turned off and the following is displayed:

Field 1-2.
Field 2 - Test type originally selected for testing MPM or digital facility.
Fields 3 through 5 - Circuit location.
Field 6 - Type of equipment location ( 1 through 4).
Fields 7 through 11 - Port equipment location of MPM or digital facility tested.
Field 12 - 0 (indicating no failures were found for the MPM or digital facility tested) or 1 (indicating the MPM or digital facility failed the test).
Field 13 - Data type of 4 (indicating that Field 14 indicates the number of circuits tested).

## PROC 646 Test 2

Field 14-0 (if STOP was depressed indicating all tests are not completed) or 1 (indicating 1 . MPM, MPM pair, or digital facility tested).
2. Depressing NEXT CIRCUIT changes the display in the data type and data fields (Fields 13 and 14) and may change the type and equipment location in Fields 6 through 11 depending on the type of failure (if any).

Field 13 displays a 1 indicating that the data in Field 14 is a specific fault code.
3. Depressing NEXT FAULT displays a 2 in Field 13 and the bit error rate/bits sent in Field 14.

Depressing NEXT FAULT once more displays a 3 in Field 13 and the block error rate/blocks sent in Field 14.

Note: Refer to Table AT, PROC 646 - Field Definitions and Codes, to determine how to interpret bit error rate/bits sent and block error rate/blocks sent.
4. Depressing NEXT FAUL'T repeatedly advances through each test type selected displaying type and equipment location of the failure (if any), specific fault code, bit error rate/bits sent, and block error rate/blocks sent for each test type.

After the block error rate/blocks sent of the last test type selected for testing is displayed for the circuit tested, depressing NEXT FAULT once more dashes all fields except Field 1.

Depressing NEXT FAULT again starts the cycle over with a 1 displayed in Field 13, and a specific fault code displayed in Field 14 for the same circuit.
5. To examine the port equipment locations of the GPPs, data ports, and the ADFTC used in testing a MPM or digital facility, depress NEXT DATA.

Note: NEXT DATA can only be depressed after NEXT CIRCUIT and/or NEXT CIRCUIT and NEXT FAULT is depressed.
6. Field 6 cycles from 0 through 4 each time NEXT DATA is depressed, starting at different positions depending on the type of circuit(s) tested and the failures detected, and displays in Fields 7 through 11 the port equipment locations of the ADFTC (Field $6=0$ ), member A GPP (Field $6=1$ ); member A data port (Field $6=2$ ), member B GPP (Field $6=3$ ), and member B data port (Field $6=4$ ).

Note: Depressing NEXT DATA does not always display 5 equipment locations. The type and port equipment locations (displayed in Fields 6 through 11) used for testing depends on whether MPMs or digital facilities were tested.
7. The possible starting positions are the ADFTC (Field $6=0$ ), member A GPP (Field $6=1$ ), or member B GPP (Field $6=3$ ).

Note: One way MPMs only display the ADFTC (Field $6=0$ ), member A GPP (Field $6=$ 1), or member A data port (Field $6=2$ ). Digital facilities only display the ADFTC (Field $6=0$ ), or member A GPP (Field $6=1$ ).
8. When another specific MPM, digital facility, member A GPP, or member A data port is to be tested, the CHANGE FIELD sequence must be used to select the test type desired and the specific MPM, digital facility, member A GPP, or member A data port to be tested.

## CHANGE FIELD; 2; ENTER; (Test type desired); ENTER.

Refer to Step 28 of Test 2 Data Entry above to select a specific MPM or digital facility to be tested using Fields 3 through 5 (circuit).

Refer to Steps 37 and 43 of Test 2 Data Entry above to select a specific member A GPP or member A data port to be tested using Fields 7 through 11 (equipment type and equipment location).
9. EXECUTE must be depressed to test the specific ADFTC circuit selected for testing.

## Test 2 Execution and Test Result Display for a Range of Circuits

1. When a range of MPMs and/or digital facilities or member A GPPs are being tested, the WAIT indicator is turned on and the following fields are incremented as each facility is tested:

Field 2 - If test type 0 through 2 was entered, Field 2 increments according to the specific tests that are executed.

Note: If host access is being tested, Field 2 does not increment.

Field 3 - Trunk group number of MPM or digital facility being tested.
Field 4 - Member A number of the current MPM or digital facility being tested.
Field 5 - Dashed or member B number if a two way MPM is being tested.
Field 6-1 (Equipment type of member A GPP being tested).
Fields 7 through 11 - Port equipment location of the current MPM or digital facility being tested.

Field 13 - Data type 2 (indicating that bit error rate/bits sent is displayed in Field 14).
Field 14 - Bit error rate/bits sent.
Note: Fields 13 and 14 are updated every 10 seconds.
2. When testing is completed for two MPMs, one digital facility, or a one way MPM the bit and block error rates, any specific fault code, and the port equipment locations are stored in DMIDS.
3. If DMIDS becomes full at any time during the test, Test 2 is stopped and the WAIT indicator is turned off.

The originally selected test type is displayed in Field 2, the circuit location and port equipment location of the last MPM or digital facility tested is displayed in Fields 3 through 11, the current number of circuits tested is displayed in Field 14, and the number of circuits failed is displayed in Field 12.

Special error code 84 (DMIDS overflow) is displayed in the MAAP error code field.
4. Results of the test can be examined at this time (See Steps 9 through 17 below) and Test 2 can be continued from where it was stopped, i.e., from the next MPM and/or digital facility in the range being tested.

Caution: If Test 2 is continued from where it was stopped by a DMIDS overflow, any test results gathered to that point are lost and only new failure data is retained.

## PROC 646 Test 2

5. If Test 2 is halted because of a DMIDS overflow, a new test type and range of MPMs, digital facilities, or member A GPPs can be selected instead of continuing the test from where it was stopped.
6. The CHANGE FIELD sequence must be used to enter the test type desired and the new range of facilities to be tested as follows:
CHANGE FIELD; 2; ENTER; (Test type desired); ENTER.
Refer to Steps 22 through 26 of Test 2 Data Entry above to select a range of MPMs or digital facilities to be tested.

Refer to Steps 36 through 43 of Test 2 Data Entry above to select a range of member A GPPs to be tested.
7. EXECUTE must be depressed to begin Test 2 from the new range of facilities entered or from where the test was stopped.

Note: Before depressing EXECUTE to continue Test 2 from where it was stopped because of a DMIDS overflow, the failure data should be examined. and recorded for future maintenance activities.
8. When a range of MPMs and/or digital facilities or member A GPPs has completed testing or STOP is depressed, the WAIT indicator is turned off.
The original test type selected is displayed in Field 2, the original range selected is displayed in Fields 3 through 11, and the number of circuits tested is displayed in Field 14.

Field 12 displays the number of failures (if any).
9. All failures with a specific fault code are displayed first followed by passing circuits with a specific fault code of 0 .
Bit and block error rates are displayed for failing and passing circuits.
When multiple tests (more than one test type) are performed on MPMs, digital facilities, or member A GPPs, a specific fault code (if any) and bit/block error rates are displayed for all test types executed for each MPM, digital facility, or member A GPP tested.
10. Depressing NEXT CIRCUIT displays the first failing or tested circuit as follows:

Field 1-2.
Field 2 - Test type for the displayed facility.
Fields 3 through 5 - Trunk group number, member A, and member B (if applicable) of failing or tested facility.

Field 6 - Type of equipment corresponding to the equipment location displayed in Fields 7 through 11 (i.e., $0=\mathrm{ADFTC}, 1=$ member A GPP, $2=$ member A data port, $3=$ member B GPP, $4=$ member B data port).
Fields 7 through 11 - Equipment location of the failing or tested facility (ADFTC, member A GPP, member A data port, member B GPP, or member B data port).

Field 12-0 or number of failures.
Field 13-1 (indicating that Field 14 displays a specific fault code).
Field 14 - Specific fault code.
11. Depressing NEXT DATA examines the port equipment numbers of the GPPs, data ports, and the ADFTC used in testing a facility or facility pair.

Note: NEXT DATA can only be depressed after NEXT CIRCUIT and/or NEXT CIRCUIT and NEXT FAULT is depressed.
12. Successive depression of NEXT DATA displays in Fields 6 through 11 the type and port equipment locations of the ADFTC; member A GPP; member A data port; member $B$ data GPP; and member B port, starting at different positions depending on the type of circuit(s) tested and the failures detected.

The possible starting positions are the ADFTC (Field $6=0$ ), member A GPP (Field $6=11$ ), or member B GPP (Field $6=3$ ).
13. Depressing NEXT FAULT displays the bit and block error rates for the tested circuit.

The first time NEXT FAULT is depressed, a 2 is displayed in Field 13, and the bit error rate/bits sent is displayed in Field 14.
Depressing NEXT FAULT once more displays a 3 in Field 13 and the block error rate/blocks sent in Field 14.

Note: Refer to Table AT, PROC 646 - Field Definitions and Codes, to determine how to interpret bit error rate/bits sent and block error rate/blocks sent.
14. Depressing NEXT FAULT repeatedly advances through each test type selected displaying type and equipment location of the failure (if any), specific fault code, bit error rate/bits sent, and block error rate/blocks sent for each test type.

After the block error rate/blocks sent of the last test type selected for testing is displayed for the circuit tested, depressing NEXT FAULT once more dashes all fields except Field 1.

Depressing NEXT FAULT again starts the cycle over with a 1 displayed in Field 13, and a specific fault code displayed in Field 14 for the same circuit.
15. Depressing NEXT CIRCUIT displays the remaining tested circuits with a 1 displayed in Field 13 and a specific fault code displayed in Field 14.
NEXT FAULT is used to obtain the bit error rate/bits sent and block error rate/blocks sent for the tested circuits.
16. When more than one trunk group number is tested, depressing NEXT UNIT causes the first tested circuit of the next tested trunk group to be displayed.

NEXT CIRCUIT is used to step through the tested trunk group to display the tested circuits.
NEXT FAULT is used to obtain the bit error rate/bits sent and block error rate/blocks sent for the tested circuits.
17. When all tested circuits are displayed, depressing NEXT CIRCUIT and/or NEXT UNIT dashes all fields except Field 1.
18. If a facility is tested with a test type of 0 , all tests, and no failure occurs, then any alarm on that facility is automatically resolved in PMIDS.

## PROC 646 Test 2 and Test 3

19. To select another range of MPMs or digital facilities to test, the CHANGE FIELD sequence must be used to select the test type desired and the specific range of MPMs or digital facilities to be tested as follows:
CHANGE FIELD; 2; ENTER; (Test type desired); ENTER.
Refer to Steps 22 through 26 of Test 2 Data Entry above to select a range of MPMs or digital facilities in a trunk group, all member Bs, or all member As to be tested.

Refer to Steps 36 through 43 of Test 2 Data Entry to select a range of member A GPPs in a module, cabinet, carrier, or slot to be tested.
20. EXECUTE must be depressed to begin Test 2 from the new range of MPMs or digital facilities selected for testing.
21. Test 2 automatically turns of the OTHER FAILS fault indicator when all MPMs and/or digital facilities that raised an alarm pass Test 2 with a test type of 0 assuming no other alarm sources affecting the OTHER FAILS fault indicator are active.

Note: MPMs and/or digital facilities alarmed entries in PMIDS are marked as resolved if passed with a test type of 0 .

## Test 3

Test 3 runs diagnostic tests on modem pool members (MPMs) and digital facilities as determined by the test type specified in Field 2.
Diagnostic tests consist of data module or EIA port remote loopback, modem analog loopback, and modem remote digital loopback (212A type modems only) originating and terminating tests. (Each test type is executed in sequence to isolate the fault.)
For digital facilities, translation defined by PROC $\mathbf{1 0 0}$ Word 2, Field 18 determines the different places that loopbacks may be done.
Types of diagnostic tests for MPMs and digital facilities consist of all tests (test type 0 - includes test types 2, 3, 4, and 5); all EIA (remote digital for 212A) remote loopback tests (test type 1 includes test types 4 and 5); data module remote loopback test (test type 2); EIA local loopback (analog loopback) tests (test type 3); EIA remote loopback (digital) originating tests (test type 4); and EIA remote loopback (digitai) terminating tests (test type 5).

Each type of test is not applicable to all types of modem pool members or digital facilities. Types of modems available with modem pool members tested consist of 103.J, 113C, 113D, 202S, 203C, 208B, and 212A.
Test types that can be run in Test 3 for nodem pool members and digital facilities are:

1. Test type $0=$ Any MPM or digital facility being tested.
2. Test type $1=$ Any MPM or digital facility if Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control).
3. Test type $2=$ Any MPM or digital facility.
4. Test type $3=$ Any MPM or digital facility if Field 18 (test type) of PROC $\mathbf{1 0 0}$ Word 2 equals 1 (local loopback control), or 2 (local and remote loopback control).
5. Test type $4=$ Any MPM or digital facility if Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control).
6. Test type $5=$ Any MPM if Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control).

Several different tests may be run on one modem pooling circuit (or circuit pair).

1. Some tests might fail while other tests pass.
2. When a modem pooling circuit (or circuit pair) test fails, a specific fault code is displayed.
3. Bit error rate/bits sent and block error rate/blocks sent are displayed for passing and failing tests.
4. The bit error rate/bits sent and block error rate/blocks sent are provided for further diagnosis (if required).
Characteristics (i.e., facility type, modem type, loopback control, etc.) of digital trunks used in modem pooling are provided in PROC 100 Words 1 and 2.
When performing diagnostic tests on a trunk group basis, PROC $\mathbf{1 0 0}$ Word 2 can be used to determine the loopback control of digital trunks.
5. If Field 18 (test type) of PROC 100 Word 2 equals 0 (no loopback control), the following test types can be run: all tests (test type 0), and the data module remote loopback test (test type 2) on the digital trunk in Test 3.
6. If Field 18 (test type) of PROC $\mathbf{1 0 0}$ Word 2 equals 1 (local loopback control), the following test types can be run: all tests (test type 0), the data module remote loopback test (test type 2), and EIA local loopback (analog loopback) tests (test type 3) on the digital trunk in Test 3.
7. If Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control), the following test types can be run: all tests (test type 0), all EIA remote (remote digital) loopback tests (test type 1), the data module remote loopback test (test type 2), EIA local loopback (analog loopback) tests (test type 3), EIA remote loopback originating tests (test type 4), and EIA remote loopback terminating tests (test type 5) if the trunk group contains modem pool members.
MPMs and digital facilities can be selected for testing by trunk group number and member A; trunk group number, member A, and Member B (MPM only); or by equipment location.

## Test 3 Data Entry

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3.
2. When Test 3 is initially called in, Fields 3 through 11 (trunk group member number and equipment location) are dashed, or a default equipment location may be displayed in Fields 3 through 11. Field 14 (data) may display a default specific fault code.
3. The default equipment location can be the last equipment location or trunk group member number displayed in Test 2 of PROC 646 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.
4. The default equipment location can also be passed from PROC 620 as long as the equipment location is a GPP, data port, or ADFTC port 1 equipment location which is part of an MPM or digital facility and is still displayed in PROC 620 when it is passed.
5. Field 2 (test type) is blanked and blinking indicating a mandatory entry.
6. Test types that can be run in Test 3 for modem pool members and digital facilities are:

Test type $0=$ Any MPM or digital facility being tested.
Test type $1=$ Any MPM or digital facility if Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control).

## PROC 646 Test 3

Test type $2=$ Any MPM or digital facility.
Test type $3=$ Any MPM or digital facility if Field 18 (test type) of PROC 100 Word 2 equals 1 (local loopback control), or 2 (local and remote loopback control).

Test type $4=$ Any MPM or digital facility if Field 18 (test type) of PROC $\mathbf{1 0 0}$ Word 2 equals 2 (local and remote loopback control).
Test type $5=$ Any MPM if Field 18 (test type) of PROC 100 Word 2 equals 2 (local and remote loopback control).
7. To select the type of test to be run on MPMs or digital facilities to be tested, enter the test type number in Field 2 and depress ENTER.

Note: When a default equipment location is displayed, the maintenance busy status is displayed in Field 13 (data type) when the test type is entered.
8. After the test type (Field 2) is entered, the trunk group number field (Field 3) is blinking indicating that a trunk group number of the MPM or digital facility to be tested may be entered.
9. If an equipment location was carried over from Test 2 and it is an MPM or digital facility, its trunk group and member number are displayed in Fields 3 through 5 (as appropriate) and the equipment location is displayed in Fields 7 through 11.
10. A specific MPM or digital facility or the default equipment location can be tested.

Note: Ranging is not allowed in Test 3 (diagnostic testing).
11. To test the default equipment location, proceed to Step 12.

To test a specific MPM or digital facility, proceed to Step 13.
12. To test the default equipment location, determine if the ADFTC to be used for testing is to be specified before testing.

If the ADFTC is to be specified, record the default equipment location (Fields 3 through 5 , and 7 through 11 as appropriate) and proceed to Step 14.
If the ADFTC is not to be specified, proceed to Step 33 .
13. If a specific ADFTC is to be used for testing, it must be selected at this time.

To select a specific ADFTC to be used for testing, proceed to Step 14.
If a specific ADFTC is not to be used for testing, proceed to Step 16.
14. The ADFTC to be used for testing can be specified by entering the complete equipment location and the correct type in Fields 6 through 11 as follows:
CHANGE FIELD; 6; ENTER; 0; ENTER; (Module number of ADFTC); ENTER; (Cabinet number of ADFTC); ENTER; (Carrier number of ADFTC); ENTER; (Slot number of ADFTC); (Circuit number of ADFTC); ENTER.

Note: If the ADFTC is incompletely specified (all fields not entered), special error code 85 (invalid equipment location) is displayed in the MAAP error code field when EXECUTE is depressed. Field 7 (module) blinks.

[^1]15. If a default equipment location is being tested, enter the default equipment location (recorded in Step 12 above) in Fields 3 through 5, and 7 through 11 (as appropriate) using the CHANGE FIELD sequence and proceed to Step 33.
16. MPMs or digital facilities can be selected for testing in one of two methods; i.e., by circuit (Fields 3 through 5) or by equipment location and type (Fields 6 through 11).

To select MPMs or digital facilities for testing using the circuit method, proceed to Step 17.
To select MPMs or digital facilities for testing using the equipment location and type, proceed to Step 28.
17. Diagnostic tests of MPMs can be specified with only a member A entry or both member A and member B if the MPM is two way.

Note: Special error code 87 (invalid circuit fields) is displayed in the MAAP error code field if the trunk group number and member A; or trunk group number, member A, and member B are not specified when EXECUTE is depressed.
18. Selection of an MPM or digital facility to be tested depends on whether or not a default equipment location is displayed or if a specific ADFTC is selected for testing.

If a default equipment location is displayed or if a specific ADFTC is selected for testing, the CHANGE FIELD sequence must be used.

If no default equipment location is displayed or no specific ADFTC is selected for testing, either ENTER or the CHANGE FIELD sequence can be performed to select the MPM or digital facility to be tested.
19. To select an MPM or digital facility to be tested by using the trunk group number and member A, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
(Trunk group number of MPM or digital facility to be tested); ENTER; (Member A of MPM or digital facility to be tested); ENTER; ENTER.

CHANGE FIELD; 3; ENTER; (Trunk group number of MPM or digital facility to be tested); ENTER; (Member A of MPM or digital facility to be tested); ENTER; ENTER.

Note: If a specific digital facility or a one way MPM is being tested, Field 5 (member B) must be dashed.

Test 3 tests the MPM or digital facility specified in Fields 3 and 4.
Proceed to Step 25.
20. To select an MPM to be tested by using the trunk group number, member $A$, and member $B$, perform one of the following depending on whether or not a default equipment location is displayed or a specific ADFTC was selected for testing:
(Trunk group number of MPM to be tested); ENTER; (Member A of MPM to be tested); ENTER; (Member B of MPM to be tested); ENTER.

CHANGE FIELD; 3; ENTER; (Trunk group number of MPM to be tested); ENTER; (Member A of MPM to be tested); ENTER; (Member B of MPM to be tested); ENTER.

Note: Digital facilities cannot be tested by specifying a member B. Special error code 94 (member B invalid for digital facilities) is displayed in the MAAP error code field if member $B$ is specified and the trunk group number is a digital facility trunk before EXECUTE is depressed.

Test 3 tests the MPM specified in Fields 3 through 5.
Proceed to Step 25.
21. NEXT CIRCUIT can be used to select a circuit or circuit pair before test execution.
22. If nothing is specified in the circuit or equipment location fields (Fields 3 through 5 and 7 through 11), two available facilities are displayed in the circuit and equipment location fields from the first testable trunk group when NEXT CIRCUIT is depressed. If the trunk group contains digital facilities or MPMs with one way modems, member B (Field 5) is dashed.
Proceed to Step 25.
23. If the circuit field is specified up to member A (Fields 3 and 4), member $A$ is incremented to the next member A when NEXT CIRCUIT is depressed.

Proceed to Step 25.
24. If both members $A$ and $B$ are specified, the member number is advanced corresponding to the type field (Field 6) of the equipment location fields when NEXT CIRCUIT is depressed.

Proceed to Step 25.
25. After the circuit fields are specified, the equipment location fields (Fields 7 through 11) defaults to the equipment location of the member A GPP.

The type field (Field 6) defaults to 1 indicating the GPP port of member A is displayed in Fields 7 through 11.

Proceed to Step 26.
26. Before test execution, NEXT DATA can be depressed to examine port equipment locations associated with the circuit selected for testing.
27. Successive depression of NEXT DATA displays in Fields 6 through 11 the type and port equipment locations of the member A GPP; member A data port; member B GPP; and member B data port.

Note: Depressing NEXT DATA does not always display 4 equipment locations before testing. The type and port equipment locations (displayed in Fields 6 through 11) used for testing depends on whether MPMs or digital facilities are being tested.

The maintenance busy status of each port equipment location is displayed in Field 13.
Proceed to Step 33.
28. MPMs or digital facilities can be selected for testing using the test type and equipment location fields (Fields 6 through 11).
Member A GPP, nember A data port, member B GPP, or member $B$ data port can be designated as the type of facilities to test.

Note: Ranging is not allowed in Test 3 (diagnostic testing). Special error code 87 (invalid circuit fields) is displayed in the MAAP error code field after EXECUTE is depressed if ranging is attempted.
29. To select the type of facility to test, the CHANGE FIELD sequence must be used:

CHANGE FIELD; 6; ENTER; (equipment location type); ENTER.
Equipment location types are: $1=$ Member A GPP port; $2=$ Member A data port; $3=$ Member B GPP port; $4=$ Member B data port.

Note: Only equipment location type 1 (member A GPP) can be entered in Field 6 for testing of digital facilities.
30. When the equipment location type is entered in Field 6, the module field (Field 7) blinks for entry.
31. To select an MPM or digital facility to be tested by using the equipment location method, enter the following:
(Module number of member A GPP, member A data port, member B GPP, or member B data port to be tested); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.

Note: Equipment location type (Field 6) must correspond to the equipment location selected or error code 85 (invalid equipment location) is displayed in the MAAP error code field when EXECUTE is depressed.
32. After the equipment location fields are specified, the circuit fields (Fields 3 through 5) display the trunk group number and member A number.

The equipment location's (displayed in Fields 7 through 11) maintenance busy status is displayed in Field 14 (data field).

Note: The equipment location fields (Fields 7 through 11) must be completely specified or special error sode 80 (equipment location not complete) is displayed in the MAAP error code field when EXECUTE is depressed.
33. The maintenance busy status of the equipment location displayed in Fields 7 through 11 is displayed in Field 13.

The circuit displayed in Fields 7 through 11 can be busied out (if required).
If the circuit is to be busied out for testing, proceed to Step 34. If busy out of the circuit is not required, proceed to Step 35.
34. Individual port equipment locations can be placed in maintenance busy out status for testing by performing the following:

Check the maintenance busy status displayed in Field 13.
If the maintenance busy status $=5$, proceed to Step 35 .
If the maintenance busy status $=6$, depress BUSY OUT and proceed to Step 35 .
Note: If Fields 7 through 11 are not entered, special error code 96 (fields 7 through 11 must be entered before use of BUSY OUT) is displayed in the MAAP error code field.
35. The length of the test (maximum of 4 minutes for each test type executed - both R2V1 aind R2V2) can be entered in Field 12; or a default test length can be chosen.

Note: The default test length causes a very short (less than 2 seconds) test. However, processing overhead increases the delay seen at the MAAP to less than 15 seconds for each test type. This default test length applies to all bit rates and test types.
36. Either Field 12 (test length) is blinking or the CHANGE FIELD sequence must be used to entered the desired test length.

If Field 12 is blinking, proceed to Step 37.
If Field 12 is not blinking, perform CHANGE FIELD; 12; ENTER and proceed to Step 37.
37. If a default test length is desired, depress ENTER. If a different test length is desired, enter the time (minutes) in Field 12:
( 1 through 4 - maximum of 4 minutes for both R2V1 and R2V2); ENTER.
Note: The actual test length executed for each test type selected is determined by whether the test for the test type passes or fails. If the test passes, either the default test length or the time entered in Field 12 is used for the test performed. If the test fails, the time of the test is the default test length no matter what time is entered in Field 12.
38. Field 14 (data rate) blinks for entry. The data rate can be entered in Field 14, or a default data rate can be chosen.

Note: Refer to Uable AT, PROC 646 Modem Bit Rates, to determine the data rate for the modem type to be tested.
39. If a default data rate is desired, depress ENTER. If a different data rate is desired, enter the data rate in Field 14:

## (Data rate); ENTER.

Data rate encodes are: $3=300 \mathrm{bps} ; 12=1200 \mathrm{bps} ; 24=2400 \mathrm{bps} ; 48=4800 \mathrm{bps} ; 96=9600 \mathrm{bps} ;$ $192=19.2 \mathrm{kbps} ; 560=56 \mathrm{kbps} ; 640=64 \mathrm{kbps}$.

## Test 3 Execution

1. To start Test 3 after selecting the test type, the ADFTC to be used for testing, the MPM or digital facility to be tested, the test length and baud rate, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. Field 2 displays the test type being executed

Field 13 displays a 2 indicating the bit error rate/bits sent is being displayed in Field 14.
The bit error rate/bits sent is displayed in the data field (Field 14).
Note: Fields 13 and 14 are updated every 10 seconds.
3. If a facility is maintenance busied out; it is released from busy while under test.
4. When the test encounters a facility in use, a specific fault code is logged in DMIDS records and the test is stopped.
The data call in progress is not aborted.
5. During Test 3, STOP can be depressed to halt the test.
6. If Test 3 is stopped before one complete testing pass through a specific MPM or digital facility or the default equipment location is made, special error code 95 (wait for test to stop) is displayed in the MAAP error code field.

Note: One complete testing pass equals all test types selected for a specific MPM or digital facility or the default equipment location are tested.
7. After the current test is completed, special error code 82 (test of range not completed) is displayed in the MAAP error code field indicating that one complete pass through the specific MPM or digital facility or the default equipment location is not completed.
8. The port equipment location of the MPM or digital facility being tested is displayed in Fields 3 through 11, and the total number of failures (if any) is displayed in Field 12.
9. If any failures are displayed in Field 12, test result information can be stepped through as described in Test 3 Result Disply below when Test 3 is halted using STOP even though the facility is not tested.
10. To restart the test when Test 3 is halted by use of STOP, EXECUTE is depressed and Test 3 retests the MPM or digital facility selected for testing.

Note: When Test 3 is restarted after being halted by use of STOP, any test results gathered to that point are retained.

## Test 3 Result Display

1. When Test 3 is completed or STOP is depressed for a default equipment location, a specific MPM or digital facility the WAIT indicator is turned off and the following is displayed:

Field 1-3.
Field 2 - Original test type selected for testing MPM or digital facility.
Fields 3 through 5 - Circuit location.
Field 6 - Type of equipment location (1 through 4).
Fields 7 through 11. - Port equipment location of MPM or digital facility tested.
Field 12-0 (indicating no failures were found for the MPM or digital facility tested) or 1 (indicating the MPM or digital facility failed the test).

Field 13 - Data type of 4 (indicating that Field 14 indicates the number of circuits tested).
Field 14-0 (if STOP was depressed indicating all tests are not completed) or 1 (indicating 1 MPM, MPM pair, or digital facility tested).
2. When multiple tests are performed on the MPM or digital facility tested, failing tests are displayed first, followed by tests that passed.
3. Depressing NEXT CIRCUIT changes the display in the data type and data fields (Fields 13 and 14) and may change the type and equipment location in Fields 6 through 11 depending on the type of failure (if any).

Field 13 displays a 1 indicating that the data in Field 14 is a specific fault code.
4. Depressing NEXT FAULT displays a 2 in Field 13 and the bit error rate/bits sent in Field 14.

## PROC 646 Test 3

5. Depressing NEXT FAULT once more displays a 3 in Field 13 and the block error rate/blocks sent in Field 14.

Note: Refer to Table AT, PROC 646 - Field Definitions and Codes, to determine how to interpret bit error rate/bits sent and block error rate/blocks sent.
6. Depressing NEXT FAULT repeatedly advances through each test type selected displaying type and equipment location of the failure (if any), specific fault code, bit error rate/bits sent, and block error rate/blocks sent for each test type.

After the block error rate/blocks sent of the last test type selected for testing is displayed for the circuit tested, depressing NEXT FAULT once more dashes all fields except Field 1.

Depressing NEXT FAULT again starts the cycle over with a 1 displayed in Field 13, and a specific fault code displayed in Field 14 for the same circuit.
7. To examine the port equipment locations of the GPPs, data ports, and the ADFTC used in testing a MPM or digital facility, depress NEXT DATA.

Note: NEXT DATA can only be depressed after NEXT CIRCUIT and/or NEXT CIRCUIT and NEXT FAULT is depressed.
8. Field 6 cycles from 0 through 4 each time NEXT DATA is depressed, starting at different positions depending on the type of circuit tested and the failures detected, and displays in Fields 7 through 11 the port equipment locations of the ADFTC (Field $6=0$ ); member A GPP (Field $6=1$ ); member A data port (Field $6=2$ ), member B GPP (Field $6=3$ ), and member B data port (Field $6=4$ ).

Note: Depressing NEXT DATA does not always display 5 equipment locations. The type and port equipment locations (displayed in Fields 6 through 11) used for testing depends on whether MPMs or digital facilities were tested.
9. The possible starting positions are the ADFTC (Field $6=0$ ); member A GPP (Field $6=1$ ), or member B GPP (Field $6=3$ ).

Note: One way MPMs only display the ADFTC (Field $6=0$ ), member A GPP (Field $6=$ 1), or member A data port (Field $6=2$ ). Digital facilities only display the ADFTC (Field $6=0$ ), or member A GPP (Field $6=1$ ).
10. When another specific MPM, digital facility, member A GPP, member A data port, member B GPP, or member B data port is to be tested, the CHANGE FIELD sequence must be used to select the test type desired and the specific MPM, digital facility, member A GPP, member A data port, member B GPP, or member B data port to be tested.

CHANGE FIELD; 2; ENTER; (Test type desired); ENTER.
Refer to Steps 19 through 24 of Test 3 Data Entry above to select a specific MPM or digital facility to be tested using the circuit method (Fields 3 through 5).

Refer to Steps 28 through 31 of Test 3 Data Entry above to select a specific MPM or digital facility to be tested using the equipment location and type method (Fields 6 through 11 ).
11. EXECUTE must be depressed to tesi the specific ADFTC circuit selected for testing.

## Repair Guide

When an ADFTC, MPM, or digital facility failure is indicated, PROC 646 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted perform the following steps, in the order listed, to isolate and repair the faulty unit.
The starting point for isolation and repair of alarmed ADFTC, MPM, or digital facilities is PROC 600.

1. Execute PROC 600 Test 1 to determine which type of modem pooling circuits (ADFTC, MPM, or digital facility) are alarmed, indicated by PROC 646 being referenced in Field 15 of PROC 600, the severity of the alarms, and the order in which the modem pooling circuits are displayed.
Record the failing modem pooling circuits displayed in PROC 600 Test 1.
2. Determine from the modem pooling circuits recorded if a pattern exists that would assist in determining the type of corrective action required.

If only ADFTC failures are recorded, perform isolation and repair steps detailed in: ADFTC Alarmed Failures.
If only MPM or digital facility failures are recorded, perform isolation and repair steps detailed in: MPM or Digital Facility Alarmed Failures.
3. When both ADFTC and MPM or digital facility failures are recorded, perform isolation and repair steps for ADFTC failures before performing isolation and repair steps for MPM or digital facility failures.
When user reported troubles associated with modem pooling members are reported, perform isolation and repair steps detailed in: User Reported Troubles.
To assist in fault isolation, PROC 620 may be used before or after PROC 646 to test specific GPPs, data ports, or ADFTCs. Equipment locations are automatically passed from PROC 620 to PROC 646 or from PROC 646 to PROC 620.

## ADFTC Alarmed Failures

1. Display the failing ADFTC circuit in Test 1 of PROC 600.
2. Enter PROC 646 Test 1.

Note: The alarmed ADFTC circuit that was displayed in Test 1 of PROC 600 is the default equipment location displayed in Test 1 of PROC 646.

Record the specific fault code displayed in Field 14 (data) which was detected by on-line periodic software tests and logged in PMIDS.
3. Enter test type number 0 in Field 2 and depress ENTER.

Note: If the ADFTC circuit is tested with a test type of 0 (all ADFTC self tests) and no failure occurs, any alarm on the ADFTC circuit is automatically resolved in PMIDS,
4. Depress EXECUTE.

If the ADFTC circuit passes (indicated by a 0 in Field 12), proceed to Step 9.
If the ADFTC circuit fails (indicated by a 1 in Field 12), proceed to Step 5.
5. Depress NEXT CIRCUIT and record the specific fault code displayed in Field 14 (data).

## PROC 646

6. Replace the CKT1 component or perform corrective action listed in Table AV, PROC 646 Component Replacements, for the specific fault code displayed in Field 14.
7. Repeat Test 1.

If the ADFTC passes Test 1, proceed to Step 11.
8. If the ADFTC fails Test 1 , replace CKT2 or perform any additional corrective action listed in Table AV, PROC 646 - Component Replacements for the specific fault code recorded.
If no additional corrective action is listed in Table AV, PROC 646 - Component Replacements, refer to isolation and repair step Specific Fault Codes for further isolation techniques.
9. When alarmed ADFTC circuits pass Test 1 without corrective action being performed (i.e., replacing a circuit pack), further analysis of the problem should be performed by using PROC 620 Test 4 and testing unit type 62 (ADFTC).
If Test 4 of PROC 620 passes, check the backplane wiring associated with the ADFTC circuit pack.
If Test 4 of PROC 620 fails, take the appropriate corrective action.
10. When Test 4 of PROC 620 passes after taking corrective action, repeat Test 1 of PROC 646 to retire the cause of the OTHER FAILS fault indicator.
11. Test 1 must be run for each alarmed ADFTC circuit recorded in Test 1 of PROC 600.

Use the CHANGE FIELD sequence to enter the next recorded ADFTC failure in Fields 7 through 11 (equipment location).
Repeat Steps 3 through 11 (as appropriate).
12. If all alarmed ADFTC circuits pass Test 1, the OTHER FAILS fault indicator is automatically turned off if no other sources (including MPM or digital facility failures) are affecting the fault indicator.

## MPM or Digital Facility Alarmed Failures

1. Display the failing MPM or digital facility in Test 1 of PROC 600.
2. Enter PROC 646 Test 3.

Note: The alarmed MPM or digital facility that was displayed in Test 1 of PROC 600 is the default equipment location displayed in Test 3 of PROC 646.

Record the specific fault code displayed in Field 14 (data) which was detected by on-line periodic software tests and logged in PMIDS.
3. Enter test type number 0 in Field 2 and depress ENTER.
4. Enter the test length in Field 12 or depress ENTER for a default test length. The MPM or digital facility can be tested from 1 to 4 minutes for each test type selected - both R2V1 and R2V2 by entering the time (in minutes) in Field 12.
( 1 through 4 -maximum of 4 minutes for both R2V1 and R2V2); ENTER.
Note: The actual test length executed for each test type selected is determined by whether the test for the test type passes or fails. If the test passes, either the default test length or the time entered in Field 12 is used for the test performed. If the test fails, the time of the test is the default test length no matter what time is entered in Field 12.

PROC 646

TABLEAV.

| PROC 646 - COMPONENT REPLACEMENTS |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FAULTCODE | Component replacement or corrective action |  |  |  |  |
|  | CKT ${ }^{\text {\% }}$ | CKT 2 | скт 3 | CKT 4 | ckt 5 |
| 12 | Repeat test when switch is less busy. If failure continues with a fault code of 12 , use PROC 620 to test time slots (i.e., range on PDIs). |  |  |  |  |
| 218 | Run PROC 620 on module processor (unit type 7). |  |  |  |  |
| 454 | Run PROC 646 Test 1. |  |  |  |  |
| 455 through 458 | Run PROC 646 Test 1 and PROC 620 GPP test by specifying ADFTC unit type 62. |  |  |  |  |
| 1000 | Run PROC 620 on module processor (unit type 7). |  |  |  |  |
| 1001 | Run PROC 646 on unit. |  |  |  |  |
| 1002 | Run PROC 646 on trunk group. |  |  |  |  |
| 1003 | TDM/2 | SN270 |  |  |  |
| 1004 | MODEM | SN243 |  |  |  |
| 1005 through 1025 | SN261 |  |  |  |  |
| 1026 through 1029 | SN261 | Run PROC 620 on IOBI (unit type 12) and PCI (unit type 14). |  |  |  |
| 1030, 1038, 1045, 1052, 1059, 1066, 1073, 1080, 1087, 1094, 1101, 1108, $1115,1122,1129,1136,1143,1150$, 1157, 1164, 1171, 1178, 1185, 1192, 1199, 1207, 1214, 1221, 1228, 1235, 1242, 1249, 1256, 1263, 1270, 1277 | MODEM | TDM/2 | SN261 |  |  |
| 1031, 1039, 1046, 1053, 1060, 1067, 1074, 1081, 1088, 1095, 1102, 1109, 1116, 1123, 1130, 1137, 1144, 1151, $1158,1165,1172,1179,1186,1193$, $1200,1208,1215,1222,1229,1236$, 1243, 1250, 1257, 1264, 1271, 1278 | MODEM | TDM/2 | SN261 |  |  |
| 1032, 1040, 1047, 1054, 1061, 1068, 1075, 1082, 1089, 1096, 1103, 1110, $1117,1124,1131,1138,1145,1152$, $1159,1166,1173,1180,1187,1194$, 1201, 1209, 1216, 1223, 1230, 1237, 1244, 1251, 1258, 1265, 1272, 1279 | MODEM | TDM/2 | SN270 | SN243 | SN261 |

TABLE AY. (Contd)

| PROC 646 - COMPONENT REPLACEMENTS (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fault CODE | COMPOMENT REPLACEMENT OR CORRECTIVE ACTION |  |  |  |  |
|  | CKT 1 | CKT 2 | CKT 3 | CKT 4 | CKT 5 |
| 1034, 1041, 1048, 1055, 1062, 1069, $1076,1083,1090,1097,1104,1111$, $1118,1125,1132,1139,1146,1153$, $1160,1167,1174,1181,1188,1195$, $1202,1210,1217,1224,1231,1238$, $1245,1252,1259,1266,1273,1280$ | MODEM | TDM/2 | SN270 | SN243 | SN261 |
| 1035, 1042, 1049, 1056, 1063, 1070, 1077, 1084, 1091, 1098, 1105, 1112, 1119, 1126, 1133, 1140, 1147, 1154, 1161, 1168, 1175, 1182, 1189, 1196, 1203, 1211, 1218, 1225, 1232, 1239 , 1246, 1253, 1260, 1267, 1274, 1281 | TDM/2 | SN270 | SN261 |  |  |
| 1036, 1043, 1050, 1057, 1064, 1071, 1078, 1085, 1092, 1099, 1106, 1113, 1120, 1127, 1134, 1141, 1148, 1155, $1162,1169,1176,1183,1190,1197$, $1204,1212,1219,1226,1233,1240$, 1247, 1254, 1261, 1268, 1275, 1282 | MODEM | TDM/2 | SN270 | SN243 | SN261 |
| 1037, 1044, 1051, 1058, 1065, 1072, $1079,1086,1093,1100,1107,1114$, 1121, 1128, 1135, 1142, 1149, 1156, $1163,1170,1177,1184,1191,1198$, $1206,1213,1220,1227,1234,1241$, $1248,1255,1262,1269,1276,1283$ | SN261 |  |  |  |  |
| 1284 | TDM/2 | SN270 | SN261 |  |  |
| 1285 | TDM/2 | SN270 | SN261 |  |  |
| $\begin{aligned} & 1286,1293,1300,1307,1314,1321 \text {, } \\ & 1328,1335,1342,1349,1356,1363 \text {, } \\ & 1370,1377,1384,1391,1398,1405 \text {, } \\ & 1412 \end{aligned}$ | MODEM | TDM/2 | SN261 |  |  |

TABLEAV. (Contd)

| PROC 646 - COMPONENT REPLACEMENTS (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FAULT CODE | COMPONENT REPLACEMENT OR CORRECTIVE ACTION |  |  |  |  |
|  | CKT 1 | CKT 2 | CKI 3 | CKT 4 | CKT 5 |
| $\begin{aligned} & 1287,1294,1301,1308,1315,1322 \text {, } \\ & 1329,1336,1343,1350,1357,1364 \text {, } \\ & 1371,1378,1385,1392,1399,1406 \text {, } \\ & 1413 \end{aligned}$ | MODEM | TDM/2 | SN261 |  |  |
| $\begin{aligned} & 1288,1295,1302,1309,1316,1323, \\ & 1330,1337,1344,1351,1358,1365 \\ & 1372,1379,1386,1393,1400,1407 \text {, } \\ & 1414 \end{aligned}$ | MODEM | TDM/2 | SN270 | SN243 | SN261 |
| $\begin{aligned} & 1289,1296,1303,1310,1317,1324, \\ & 1331,1338,1345,1352,1359,1366, \\ & 1373,1380,1387,1394,1401,1408, \\ & 1415 \end{aligned}$ | MODEM | TDM/2 | SN270 | SN243 | SN261 |
| $\begin{aligned} & 1290,1297,1304,1311,1318,1325 \\ & 1332,1339,1346,1353,1360,1367 \text {, } \\ & 1374,1381,1388,1395,1402,1409 \\ & 1416 \end{aligned}$ | TDM/2 | SN270 | SN261 |  |  |
| $\begin{aligned} & 1291,1298,1305,1312,1319,1326 \text {, } \\ & 1333,1340,1347,1354,1361,1368, \\ & 1375,1382,1389,1396,1403,1410 \\ & 1417 \end{aligned}$ | MODEM | TDM/2 | SN270 | SN243 | SN261 |
| $\begin{aligned} & 1292,1299,1306,1313,1320,1327, \\ & 1334,1341,1348,1355,1362,1369, \\ & 1376,1383,1390,1397,1404,1411, \\ & 1418 \end{aligned}$ | SN261 |  |  |  |  |
| 1419 through 1421 | If call BUSY, an | e droppe test. | BU | UT, th | LLEASE |
| 1422 and 1423 | Use BUS | UT, then | LEASE | Y, and |  |
| 1424 | Wait for then REL ber. | mber to SE BUS | me ava rop cu | or use call on | Y OUT, sy mem- |

TABLEAV. (Contd)

| PROC 646 - COMPONENT REPLACEMENTS (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fault CODE | Component replacement or corrective action |  |  |  |  |
|  | CKT 1 | CKT 2 | CKT 3 | CKT 4 | CKT 5 |
| 1425 and 1426 | SN261 |  |  |  |  |
| 1427 | Ensure ADFTC is administered. |  |  |  |  |
| 1428 | Use BUSY OUT, then RELEASE BUSY if call using ADFTC can be dropped. |  |  |  |  |
| 1429 | RELEASE BUSY and retest. |  |  |  |  |
| 1430 | MODEM | SN243 |  |  |  |
| 1431 | TDM/2 | SN270 |  |  |  |

5. Enter the data rate in Field 14 or depress ENTER for a default data rate.

## (Data rate); ENTER.

6. Depress EXECUTE.

If the MPM or digital facility passes (indicated by a 0 in Field 12), proceed to Step 18.
If the MPM or digital facility fails (indicated by a 1 in Field 12), proceed to Step 7.
7. Depress NEXT CIRCUIT and record the test type (first test type failed) displayed in Field 2, the equipment location displayed in Fields 7 through 11, and the specific fault code displayed in Field 14 (data).
8. Component replacements for the specific fault code displayed in Field 14 are listed in Table AV, PROC 646 - Component Replacements.
9. For modem pooling, the priority order of component replacement is listed in Table AW, PROC 646 Test 3 Failure Groups for Modem Pooling.
10. For digital facilities, the priority order of component replacement is listed in Table AX, PROC 646 Test 3 Failure Groups for Digital Facilities.
11. The order of component replacement depends on the first test type failed (displayed in Field 2) and the type of facility tested.
12. Determine from the specific fault code, the first test type failed, and the facility tested, the first component to replace based on Table AV, and Table AW or Table AX.

Replace the component.
13. Repeat Test 3.

If the facility passes Test 3, proceed to Step 22.
14. If the facility fails Test 3 , replace the next component listed in Table AV, and Table AW, or Table AX based on the specific fault code and the type of facility tested.
15. Depressing NEXT DATA displays in Field 6 (type) the member A GPP, member A data port, nember B GPP, and member B data port equipment locations in Fields 7 through 11.

Note: The equipment location displayed in Fields 7 through 11 for data ports determines the location of the modem to be replaced for modem pooling failures. The equipment location displayed in Fields 7 through 11 for member A GPP determines the location of the digital facility to be replaced for digital facility failures.

TABLE AW.

| PROC 646 TEST 3 <br> FAILURE GROUPS FOR MODEM POOLING |  |  |  |
| :---: | :---: | :---: | :---: |
| FIRST <br> TEST <br> TYPE <br> FAILED | FAILURE GROUP FOR FAILING MEMBER IDENTIFIED (IN PRIORITY ORDER) |  |  |
|  | MEmber A | MEMBER B [2] | ADFTC |
| $\begin{gathered} 4 \text { or } 5 \\ {[1]} \end{gathered}$ | Modem B [2]; modem A; SN243 member A; SN243 member B [2]; TDM/2 member A; TDM/2 member B [2]; SN270 member A; SN261. | Modem B [2]; TDM/2 member B [2]; SN270 member B [2]; SN261. | SN261 |
| 3 | Modem A; TDM/2 member A; SN270 member A; SN261. |  | SN261 |
| 2 | TDM member A; SN270 member A; SN261. |  | SN261 |
| [1] This failure group is also applicable with members which cannot use test types 4 or 5 , but pass test types 2 and 3 in Test 3 and fail test type 0 in Test 2. <br> [2] For originating and terminating modem pool members only. <br> [3] Run PROC 620 on individual SN270/TDM/2, SN243, or ADFTC if further isolation of trouble is required. |  |  |  |

16. Repeat Steps 13 through 15 until all components listed in Table AV, and Table AW, or Table AX based on the specific fault code and the type of facility are replaced or the problem is corrected.
17. If the facility still fails after all components are replaced, refer to isolation and repair step Specific Fault Codes for further isolation techniques.
18. When alarmed MPM or digital facilities pass Test 3 without corrective action being performed (i.e., replacing a circuit pack), further analysis of the problem should be performed by changing the length of the test and repeating Test 3 to ensure that the alarmed failure is not intermittent.

## PROC 646

19. Four minutes (for both R2V1 and R2V2) is recommended for the length of the test to ensure no intermittent failures exist.

Proceed to Step 20.
20. Change the length of the test by performing:

CHANGE FIELD; 12; ENTER; (4); ENTER.
21. Depress EXECUTE.

If the MPM or digital facility passes (indicated by a 0 in Field 12), proceed to Step 21.
TABLE AX.

| PROC 646 TEST 3 <br> FAILURE GROUPS FOR DIGITAL FACILITIES |  |  |
| :---: | :---: | :---: |
| FIRST test | FAILURE GROUP FOR FAILING MEMBER IDENTIFIED (IN PRIORITY ORDER) |  |
| falled | MEMBER A [1] [2] | ADFIC [2] |
| 4 | Digital facility; TIE/DSU/private line modem; TDM/2; SN270; SN261. | SN261 |
| 3 | TIE/DSU/private line modem; TDM/2; SN270; SN261. | SN261 |
| 2 | [3] TDM/2 or PDM4 SN270; SN261. | SN261 |

[1] Components included in a particular failure group depend on the specific application.
[2] Run PROC 620 on individual SN270/TDM/2 or SN261 if further isolation of trouble is required.
[3] When the digital facility uses an EIA port, replace SN238 instead of TDM/2 or PDM and SN270.

If the MPM or digital facility fails (indicated by a 1 in Field 12), perform Steps 7 through 17 (as appropriate).
22. Test 3 must be run for each alarmed MPM or digital facility recorded in Test 1 of PROC 600.

Use the CHANGE FIELD sequence to enter the next recorded MPM or digital facility failure in Fields 6 through 11 (equipment type and equipment location).
Repeat Steps 3 through 21 (as appropriate).
23. If all alarmed failures pass Test 3, perform Test 2 to turn off the OTHER FAILS fault indicator.

## User Reported Troubles

When user troubles associated with modem pooling members are reported, perform the following steps (as appropriate).
Typical user information may include data rate, asynchronous or synchronous, or dial code used which may help to isolate the failing trunk group.

1. For example, if the user dialed 9 and then a remote computer port, the PDM used was set at 1200 bps , asynchronous, full duplex. A modem pool trunk group with matching characteristics would be suspect.
2. On the other hand, if a user dialed a local host computer, then a host access type of trunk group with that dial code is suspect.
3. Incoming calls may also chose a specific trunk group.

To determine the data rate on a data module associated with a modem, PROC 070 or PROC 100 can be used.

1. Examine Test 1 of PROC 600 to determine if any alarmed entries exist for unit type 62 (ADFTC), unit type 65 (modem pooling), and unit type 35 (digital facilities).
2. If alarmed ADFTC circuits exist, perform isolation and repair step ADFTC Alarmed Failures above for all alarmed ADFTC circuits in PROC 600 Test 1 to isolate the trouble.
3. If alarmed modem pooling or digital facility circuits exist, perform isolation and repair step MPM or Digital Facility Alarmed Failures above for all alarmed modem pooling or digital facility circuits in PROC 600 Test 1 to isolate the trouble.
4. Examine Test 2 of PROC $\mathbf{6 0 0}$ to determine if any entries with recorded entries exist for unit type 62 (ADFTC), unit type 65 (modem pooling), or unit type 35 (digital facilities).
5. If entries with recorded errors exist for ADFTC circuits, perform isolation and repair step ADFTC Alarmed Failures above for all ADFTC entries with recorded errors in PROC 600 Test 2 to isolate the trouble.
6. If entries with recorded errors exist for modem pooling or digital facilities, perform isolation and repair step MPM or Digital Facility Alarmed Failures above for all modem pooling or digital facility entries with recorded errors in PROC 600 Test 2 to isolate the trouble.
7. Determine from the user the type of modem, data rate, and dial access code used to initiate the call.
Modem types consist of $103 \mathrm{~J}, 113 \mathrm{C}, 113 \mathrm{D}, 202 \mathrm{~S}, 201 \mathrm{C}, 208 \mathrm{~B}$, and 212A.
8. Characteristics (i.e., modem type, loopback control, etc.) of digital trunks used in modem pooling are provided in PROC 100 Words 1 and 2.
9. Perform Test 2 of PROC 646 on the trunk group suspected of failing by entering the trunk group number in Field 3.

Note: If the trunk group has a data rate of 300 or 1200 bps , set the test length to only 1 minute to identify severe problems quickly.
10. If any members of the trunk group fail, perform isolation and repair step MPM or Digital Facility Alarmed Failures above for each failing member of the trunk group to isolate the trouble.

## PROC 646

11. If no members of the trunk group fail, use NEXT FAULT to determine the bit and block error rate for each member of the trunk group.
12. The bit and block error rate is determined by multiplying the first digit (left most side) in Field 14 by 10 raised to the negative of the second digit in Field 14.
The number of bits or blocks sent is determined by multiplying the third digit in Field 14 by 10 raised to the fourth digit in Field 14.
13. The threshold for bit and block error rates is $1 \times 10$ to the minus 5 (or 15 displayed in the first 2 digits of Field 14).
14. Determine which member of the trunk group has the poorest bit and block error rate.
15. Depress NEXT DATA and record the equipment location of the GPPs and data ports used in the testing of the MPM with the poorest bit and block error rate.

Note: Field $6=1$, Fields 7 through 11 displays the equipment location of member A GPP; Field $6=2$, Fields 7 through 11 displays the equipment location of member A data port; Field $6=3$, Fields 7 through 11 displays the equipment location of member B GPP; Field $6=4$, Fields 7 through 11 displays the equipment location of member $B$ data port.
16. Display the member A GPP equipment location in Fields 7 through 11 of PROC 646 Test 2.
17. Use PROC 620 Test 4 to test the member A GPP.

Note: The circuit that was displayed in Test 2 of PROC 646 is the default equipment location displayed in Test 4 of PROC 620.
18. If Test 4 of PROC 620 fails, take the appropriate corrective action and proceed to Step 20 .

Note: Some failures detected by the GPP test in PROC 620 are repaired by replacing the associated TDM/2 or PDM.

If Test 4 of PROC 620 passes, proceed to Step 19.
19. Repeat Test 4 of PROC 620 for the member A data port, member B GPP, and member B data port using the CHANGE FIELD method to enter the equipment locations recorded in Step 15 above.

If Test 4 of PROC 620 fails, take the appropriate corrective action and proceed to Step 20.
If Test 4 of PROC 620 passes for all circuits tested (member A GPP; member A data port; member B GPP; member B data port), proceed to Step 22.
20. When PROC 620 passes after taking corrective action, repeat Test 2 of PROC 646 to ensure that the failure is corrected.
21. Check the bit and block error rate.

If the bit and block error rate is acceptable, no further corrective action is required.
22. Enter Test 2 of PROC 646 and display the member of the trunk group with the poorest bit and block error rate.
23. Replace the modem associated with the member with the poorest bit and block error rate.

Repeat Test 2.
24. Check the bit and block error rate.

If the bit and block error rate is acceptable, no further corrective action is required.
25. If the bit and block error rate is the same or worse, replace the data module associated with the member with the poorest bit and block error rate.
Repeat Test 2.
26. Check the bit and block error rate.

If the bit and block error rate is acceptable, no further corrective action is required.
27. If the bit and block error rate is the same or worse, check the wiring associated with the ADFTC, MPM or digital facility, modem, and data module.

## Specific Fault Codes

A specific fault code is a number used to provide a description of a failure.

1. This description provides more detail about the failure associated with a circuit.
2. Specific fault codes are recorded during periodic or time available testing in PMIDS. Demand testing specific fault codes are recorded in DMIDS.
3. Both the PMIDS and DMIDS specific fault codes (normally the same) are available for display during testing.
Table AY, PROC 646 - Specific Fault Code Definitions, lists the specific fault codes in numerical sequence with a definition for each specific fault code.
Further isolation of a failure may be accomplished as follows:
4. Analyze the specific fault codes recorded from PMIDS (first specific fault code recorded before executing Test 1 or 3 ) and DMIDS (second specific fault code recorded after Test 1 or 3 failed).
5. Determine from the specific fault codes recorded (using Table AY, PROC 646 - Specific Fault Code Definitions), if any additional corrective action can be performed (i.e., cabling, connectors, etc.).
6. Check the wiring associated with the circuit pack(s) and/or components replaced (point to point depending upon specific fault code(s) recorded).

TABLE AY.

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS |  |
| :---: | :---: |
| fault CODE | definition |
| 12 | TIME SLOT UNAVAILABLE |
| 218 | NETWORK ORDER FAILED |
| 454 | DTLF FAULT ON ADFTC (DIGITAL SELF-TEST) |
| 455 | 48-VOL FAULT ON ADFTC (ANALOG SELF-TEST) |
| 456 | 48-VOL AND DLTF FAULTS TOGETHER ON ADFTC |
| 457 | PROTOCOL ERROR ON ADFTC |
| 458 | DTL IDLE ON ADFTC |
| 1000 | COULD NOT SEND AN S MESSAGE |
| 1001 | FACILITY NOT TESTED FOR MORE THAN X CYCLES |
| 1002 | TRUNK GROUP NOT TESTED FOR MORE THAN X CYCLES |
| 1003 | DID NOT RECEIVE AN OFF-HOOK FROM THE MPM (DTIM/2) |
| 1004 | did not receive a data set ready from the mpm (MODEM) |
| 1005 | NO BITS RECEIVED ON A 1-PORT ADFTC SELF-TEST |
| 1006 | DATA TRANSMISSION INTERRUPTED: 1-PORT ADFTC, SELF-TEST |
| 1007 | BIT ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
| 1008 | BLOCK ERROR RATE EXCEEDED FOR 1-PORT ADFTC SELF-TEST |
| 1009 | EIA UPDATE FAILURE DURING A 1-PORT ADFTC SELF-TEST |
| 1010 | ERROR OVERFLOW DURING A 1-PORT ADFTC SELF-TEST |
| 1011 | UNDEFINED ERROR DURING A 1-PORT ADFTC SELF-TEST |
| 1012 | NO BITS RECEIVED ON A 2-PORT NORMAL ADFTC SELF-TEST |
| 1013 | DATA TRANSMISSION INTERRUPTED: 2-PORT NORMAL ADFTC SELF-TEST |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1014 | BIT ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
| 1015 | BLOCK ERROR RATE EXCEEDED FOR 2-PORT NORMAL ADFTC SELF-TEST |
| 1016 | EIA UPDATE FAILURE DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1017 | ERROR OVERFLOW DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1018 | UNDEFINED ERROR DURING A 2-PORT NORMAL ADFTC SELF-TEST |
| 1019 | NO BITS RECEIVED ON A 2-PORT REVERSE ADFTC SELF-TEST |
| 1020 | DATA TRANSMISSION INTERRUPTED: 2-PORT REVERSE ADFTC SELF-TEST |
| 1021 | BIT ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
| 1022 | BLOCK ERROR RATE EXCEEDED FOR 2-PORT REVERSE ADFTC SELF-TEST |
| 1023 | EIA UPDATE FAILURE DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1024 | ERROR OVERFLOW DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1025 | UNDEFINED ERROR DURING A 2-PORT REVERSE ADFTC SELF-TEST |
| 1026 | UNSENT STOP MESSAGE RECEIVED BY ADFTC |
| 1027 | DID NOT RECEIVE EXPECTED: TEST ABORTED S MESSAGE |
| 1028 | DID NOT RECEIVE EXPECTED: TEST COMPLETED S MESSAGE |
| 1029 | THE BIT AND/OR BLOCK ERROR RATES WERE NOT RECEIVED |
| 1030 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE |
| 1031 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | DEFINITION |
| 1032 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE |
| 1034 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE |
| 1035 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST |
| 1036 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST |
| 1037 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE |
| 1038 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 300 BAUD |
| 1039 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORGINATING, NORMAL MODE AT 300 BAUD |
| 1040 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 300 BAUD |
| 1041 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 300 BAUD |
| 1042 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 300 BAUD |
| 1043 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 300 BAUD |
| 1044 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 300 BAUD |
| 1045 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 1200 BAUD |
| 1046 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 1200 BAUD |
| 1047 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 1200 BAUD |
| 1048 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 1200 BAUD |
| 1049 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 1200 BAUD |
| 1050 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 1200 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | definition |
| 1051 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 1200 BAUD |
| 1052 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 2400 BAUD |
| 1053 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 2400 BAUD |
| 1054 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 2400 BAUD |
| 1055 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 2400 BAUD |
| 1056 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 2400 BAUD |
| 1057 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINAT'ING NORMAL MODE TEST AT 2400 BAUD |
| 1058 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 2400 BAUD |
| 1059 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 4800 BAUD |
| 1060 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 4800 BAUD |
| 1061 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 4800 BAUD |
| 1062 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 4800 BAUD |
| 1063 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 4800 BAUD |
| 1064 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 4800 BAUD |
| 1065 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 4800 BAUD |
| 1066 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 9600 BAUD |
| 1067 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 9600 BAUD |

TABLEAY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1068 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 9600 BAUD |
| 1069 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 9600 BAUD |
| 1070 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 9600 BAUD |
| 1071 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 9600 BAUD |
| 1072 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 9600 BAUD |
| 1073 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1074 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1075 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1076 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1077 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 19.2 KILOBAUD |
| 1078 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 19.2 KILOBAUD |
| 1079 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1080 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 56 KILOBAUD |
| 1081 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 56 KILOBAUD |
| 1082 | BIT ERROR RATE EXCEEDED FOR HALF' DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 56 KILOBAUD |
| 1083 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 56 KILOBAUD |
| 1084 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 56 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1085 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 56 KILOBAUD |
| 1086 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 56 KILOBAUD |
| 1087 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 64 KILOBAUD |
| 1088 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 64 KILOBAUD |
| 1089 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 64 KILOBAUD |
| 1090 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 64 KILOBAUD |
| 1091 | EIA. UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 64 KILOBAUD |
| 1092 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING NORMAL MODE TEST AT 64 KILOBAUD |
| 1093 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 64 KILOBAUD |
| 1094 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE |
| 1095 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE |
| 1096 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE |
| 1097 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE |
| 1098 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST |
| 1099 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST |
| 1100 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE |
| 1101 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 300 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| FAULT CODE | definition |
| 1102 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 300 BAUD |
| 1103 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 300 BAUD |
| 1104 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 300 BAUD |
| 1105 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 300 BAUD |
| 1106 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 300 BAUD |
| 1107 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 300 BAUD |
| 1108 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 1200 BAUD |
| 1109 | DATA TRȦNSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 1200 BAUD |
| 1110 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 1200 BAUD |
| 1111 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 1200 BAUD |
| 1112 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 1200 BAUD |
| 1113 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 1200 BAUD |
| 1114 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 1200 BAUD |
| 1115 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 2400 BAUD |
| 1116 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 2400 BAUD |
| 1117 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 2400 BAUD |
| 1118 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 2400 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fautit CODE | definition |
| 1119 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 2400 BAUD |
| 1120 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 2400 BAUD |
| 1121 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 2400 BAUD |
| 1122 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 4800 BAUD |
| 1123 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 4800 BAUD |
| 1124 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 4800 BAUD |
| 1125 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST in Reverse normal mode at 4800 BAUD |
| 1126 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 4800 BAUD |
| 1127 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 4800 BAUD |
| 1128 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 4800 BAUD |
| 1129 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 9600 BAUD |
| 1130 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 9600 BAUD |
| 1131 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 9600 BAUD |
| 11.32 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 9600 BAUD |
| 1133 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 9600 BAUD |
| 1134 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 9600 BAUD |

TABLE AY. (Contd)

| PROC 646-SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault code | definition |
| 1135 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 9600 BAUD |
| 1136 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1137 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1138 | bit error rate exceeded for half duplex test in ORIGINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1139 | BLOCK ERFOR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1140 | EiA update failure during a half duplex origiNATING REVERSE MODE TEST AT 19.2 KILOBAUD |
| 1141 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 19.2 KILOBAUD |
| 1142 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1143 | NO BI'TS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 56 KILOBAUD |
| 1144 | Data Transmission interrupted: Half duplex test IN ORIGINATING, REVERSE MODE AT 56 KILOBAUD |
| 1145 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 56 KILOBAUD |
| 1146 | BLOOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 56 KILOBAUD |
| 1147 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 56 KILOBAUD |
| 1148 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 56 KILOBAUD |
| 11.49 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 56 KILOBAUD |
| 1150 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 64 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | DEFINITION |
| 1151 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 64 KILOBAUD |
| 1152 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 64 KILOBAUD |
| 1153 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 64 KILOBAUD |
| 1154 | EIA UPDATE FAILURE DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 64 KILOBAUD |
| 1155 | ERROR OVERFLOW DURING A HALF DUPLEX ORIGINATING REVERSE MODE TEST AT 64 KILOBAUD |
| 1156 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN ORIGINATING, REVERSE MODE AT 64 KILOBAUD |
| 1157 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING NORMAL MODE |
| 1158 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE |
| 1159 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE |
| 1160 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE |
| 1161 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST |
| 1162 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST |
| 1163 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE |
| 1164 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 300 BAUD |
| 1165 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 300 BAUD |
| 1166 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 300 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | DEFINITITAN |
| 1167 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 300 BAUD |
| 1168 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 300 BAUD |
| 1169 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 300 BAUD |
| 1170 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 300 BAUD |
| 1171 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 1200 BAUD |
| 1172 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 1200 BAUD |
| 1173 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 1200 BAUD |
| 1174 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 1200 BAUD |
| 1175 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 1200 BAUD |
| 1176 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 1200 BAUD |
| 1177 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 1200 BAUD |
| 1178 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 2400 BAUD |
| 1179 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 2400 BAUD |
| 1180 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 2400 BAUD |
| 1181 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 2400 BAUD |
| 1182 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 2400 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1183 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 2400 BAUD |
| 1184 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 2400 BAUD |
| 1185 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 4800 BAUD |
| 1186 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 4800 BAUD |
| 1187 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 4800 BAUD |
| 1188 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 4800 BAUD |
| 1189 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 4800 BAUD |
| 1190 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 4800 BAUD |
| 1191 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 4800 BAUD |
| 1192 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 9600 BAUD |
| 1193 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 9600 BAUD |
| 1194 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 9600 BAUD |
| 1195 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 9600 BAUD |
| 1196 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 9600 BAUD |
| 1197 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 9600 BAUD |
| 1198 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 9600 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1199 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1200 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1201 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN terminating, NORMAL MODE AT 19.2 Kilobaud |
| 1202 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1203 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 19.2 KILOBAUD |
| 1204 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 19.2 KILOBAUD |
| 1206 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 19.2 KILOBAUD |
| 1207 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 56 KILOBAUD |
| 1208 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 56 KILOBAUD |
| 1209 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 56 KILOBAUD |
| 1210 | BLOCK E'RROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 56 KILOBAUD |
| 1211 | EIA UPDATE FALLURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 56 KILOBAUD |
| 1212 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 56 KILOBAUD |
| 1213 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 56 KILOBAUD |
| 1214 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 64 KILOBAUD |
| 1215 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 64 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1216 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 64 KILOBAUD |
| 1217 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST in TERMINATING, NORMAL MODE AT 64 KILOBAUD |
| 1218 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 64 KILOBAUD |
| 1219 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING NORMAL MODE TEST AT 64 KILOBAUD |
| 1220 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, NORMAL MODE AT 64 KILOBAUD |
| 1221 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE |
| 1222 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE |
| 1223 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE |
| 1224 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE |
| 1225 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST |
| 1226 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST |
| 1227 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE |
| 1228 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 300 BAUD |
| 1229 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 300 BAUD |
| 1230 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 300 BAUD |
| 1231 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 300 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1232 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 300 BAUD |
| 1233 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 300 BAUD |
| 1234 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 300 BAUD |
| 1235 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 1200 BAUD |
| 1236 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 1200 BAUD |
| 1237 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 1200 BAUD |
| 1238 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 1200 BAUD |
| 1239 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 1200 BAUD |
| 1240 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 1200 BAUD |
| 1241 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 1200 BAUD |
| 1242 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 2400 BAUD |
| 1243 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 2400 BAUD |
| 1244 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 2400 BAUD |
| 1245 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 2400 BAUD |
| 1246 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 2400 BAUD |
| 1247 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 2400 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1248 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 2400 BAUD |
| 1249 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 4800 BAUD |
| 1250 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 4800 BAUD |
| 1251 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 4800 BAUD |
| 1252 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 4800 BAUD |
| 1253 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 4800 BAUD |
| 1254 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 4800 BAUD |
| 1255 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 4800 BAUD |
| 1256 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 9600 BAUD |
| 1257 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 9600 BAUD |
| 1258 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 9600 BAUD |
| 1259 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 9600 BAUD |
| 1260 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 9600 BAUD |
| 1261 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 9600 BAUD |
| 1262 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 9600 BAUD |
| 1263 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 19.2 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault code | definition |
| 1264 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1265 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1266 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1267 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 19.2 KILOBAUD |
| 1268 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 19.2 KILOBAUD |
| 1269 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 19.2 KILOBAUD |
| 1270 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 56 KILOBAUD |
| 1271 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 56 KILOBAUD |
| 1272 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 56 KILOBAUD |
| 1273 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 56 KILOBAUD |
| 1274 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 56 KILOBAUD |
| 1275 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 56 KILOBAUD |
| 1276 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 56 KILOBAUD |
| 1277 | NO BITS RECEIVED ON A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 64 KILOBAUD |
| 1278 | DATA TRANSMISSION INTERRUPTED: HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 64 KILOBAUD |
| 1279 | BIT ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 64 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | definition |
| 1280 | BLOCK ERROR RATE EXCEEDED FOR HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 64 KILOBAUD |
| 1281 | EIA UPDATE FAILURE DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 64 KILOBAUD |
| 1282 | ERROR OVERFLOW DURING A HALF DUPLEX TERMINATING REVERSE MODE TEST AT 64 KILOBAUD |
| 1283 | UNDEFINED ERROR DURING A HALF DUPLEX TEST IN TERMINATING, REVERSE MODE AT 64 KILOBAUD |
| 1284 | DID NOT RECEIVE A HANDSHAKE MESSAGE |
| 1285 | HANDSHAKE.FAILURE MESSAGE RECEIVED |
| 1286 | NO BITS RECEIVED ON A FULL DUPLEX TEST |
| 1287 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST |
| 1288 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST |
| 1289 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST |
| 1290 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST |
| 1291 | ERROR OVEFLOW DURING A FULL DUPLEX TEST |
| 1292 | UNDEFINED ERROR DURING A FULL DUPLEX TEST |
| 1293 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE |
| 1294 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE. |
| 1295 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE |
| 1296 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE |
| 1297 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE |
| 1298 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE |

TABLEAY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault code | definition |
| 1299 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE |
| 1300 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1301 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1302 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1303 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1304 | EIA UPDATE FAILURE DURING A F FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1305 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1306 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 300 BAUD |
| 1307 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1308 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1309 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1310 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1311 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1312 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1313 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 1200 BAUD |
| 1314 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1315 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1316 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1317 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1318 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1319 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1320 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 2400 BAUD |
| 1321 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1322 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1323 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1324 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1325 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1326 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1327 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 4800 BAUD |
| 1328 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1329 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1330 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1331 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1332 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1333 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1334 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 9600 BAUD |
| 1335 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1336 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1337 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1338 | BLOCK ERROR RATE EXCEEDED FOR FULI DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1339 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1340 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1341 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 19.2 KILOBAUD |
| 1342 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1343 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1344 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1345 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1346 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1347 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |
| 1348 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 56 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| $\begin{aligned} & \text { FAULT } \\ & \text { CODE } \end{aligned}$ | definition |
| 1349 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1350 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1351 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1352 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1353 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| $1354{ }^{\text { }}$ | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1355 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN ORIGINATING MODE AT 64 KILOBAUD |
| 1356 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE |
| 1357 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE |
| 1358 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE |
| 1359 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE |
| 1360 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE |
| 1361 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERMINATING MODE |
| 1362 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE |
| 1363 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1364 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1365 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1366 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1367 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1368 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1369 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 300 BAUD |
| 1370 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1371 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1372 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1373 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1374 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1375 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1376 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 1200 BAUD |
| 1377 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE AT 2400 BAUD |
| 1378 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE AT 2400 BAUD |
| 1379 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 2400 BAUD |
| 1380 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 2400 BAUD |

TABLE AY. (Contd)

|  | PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |
| :---: | :--- |
| FAUIT <br> code | dEFINIION |

TABLEAY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | definition |
| 1397 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 9600 BAUD |
| 1398 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMI NATING MODE AT 19.2 KILOBAUD |
| 1399 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST <br> IN TERMINATING MODE AT 19.2 KILOBAUD |
| 1400 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TES'T IN TERMINATING MODE AT 19.2 KILOBAUN |
| 1401 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST In TERMINATING MODE AT 19.2 KILOBAUD |
| 1402 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 19.2 KILOBAUD |
| 1403 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 19.2 KILOBAUD |
| 1404 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 19.2 KILOBAUD |
| 1405 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1406 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1407 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 56 KilobaUd |
| 1408 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1409 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1410 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1411 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 56 KILOBAUD |
| 1412 | NO BITS RECEIVED ON A FULL DUPLEX TEST IN TERMINATING MODE AT 64 KILOBAUD |

TABLE AY. (Contd)

| PROC 646 - SPECIFIC FAULT CODE DEFINITIONS (Contd) |  |
| :---: | :---: |
| fault CODE | defintion |
| 1413 | DATA TRANSMISSION INTERRUPTED: FULL DUPLEX TEST IN TERMINATING MODE AT 64 KILOBAUD |
| 1414 | BIT ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN terminating mode at 64 Kilobaud |
| 1415 | BLOCK ERROR RATE EXCEEDED FOR FULL DUPLEX TEST IN TERMINATING MODE AT 64 KILOBAUD |
| 1416 | EIA UPDATE FAILURE DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 64 KILOBAUD |
| 1417 | ERROR OVERFLOW DURING A FULL DUPLEX TEST IN TERminating mode at 64 Kilobaud |
| 1418 | UNDEFINED ERROR DURING A FULL DUPLEX TEST IN TERMINATING MODE AT 64 KILOBAUD |
| 1419 | MEMBER A IN USE |
| 1420 | MEMBER B IN USE |
| 1421 | MEMBER A AND B IN USE |
| 1422 | MEMBER A COULD NOT BE SEIZED |
| 1423 | MEMBER B COULD NOT BE SEIZED |
| 1424 | NO MEMBER AVAILABLE FOR TESTING |
| 1425 | ADFTC DID NOT RETURN A SETUP (HANDSHAKE) RESULT MESSAGE |
| 1426 | ADFTC DID NOT RECEIVE A SET TEST (START HANDSHAKE) MESSAGE |
| 1427 | NO ADFTC AVAILABLE FOR TESTING |
| 1428 | ADFTC IN USE |
| 1429 | ADFTC MAINTENANCE BUSY |
| 1430 | NO ON-HOOK RECEIVED FROM MODEM |
| 1431 | TDM/2 DID NOT GO ON-HOOK AFTER TEST WAS COMPLETED |

PROC 647 (R2V2 Only)

PROC 647 - AUTOMATIC TRANSMISSION MEASUREMENT SYSTEM (ATMS) TESTS (R2V2 Only)

|  | CHART <br> JE 2 | $\begin{gathered} +\quad \text { AUTOMATIC TRANSMISSION MEASUREMENT } \\ \text { SYSTEM (ATMS) TESTS } \end{gathered}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | MEASUREMENT INDEX: <br> 10=FIRST SET OF MEASUREMENTS $20=$ SECOND SET OF MEASUREMENTS 30-THIRD SEI OF MEASUREMENTS 40:FOURTH SET OF MEASUREMENTS SO=FIFIH SET OF MEASUREMENTS 60=SIXIH SEI OF MEASUREMENTS <br> FAULT CODES (FIELD 12): ASSOCIATED WITH TEST STATE 2: 1=ADFJC IN USE <br> 2=ADFTC NOT AVAILABLE <br> 3=ADFTC MAINTENANCE BUSIED associated with test state 3: 4=NO TTL ADMINISTERED | ASSOCIATED WITH TEST STATE 4: <br> 1=ADFTC IN USE (SUBSEQUENT TO STATE 2) <br> 67-NO TEST TONE FROM FAR END <br> GB=OTL NOT ASSIGNED AS ROTARY <br> 69=ADFTC RECEIVED UNSENT STOP TEST MESSAG <br> 70=ADFTC SELF-TEST FAILS <br> $71=$ BAD Y/O TO/FROM OTL <br> 72-CANNOT SEIZE OR <br> 73=DIALING DF TVS FEATURE FAILED <br> $74=$ CODE dialed oid not match tvs feature <br> $75=$ TRUNK GROUP D.A.C. INAPPPROPRIATE <br> $76=$ SOFTWARE RECORD INCORRECT <br> 77 =adftc and truank cannot be connected <br> $78=$ Intercept tone <br> 79=REEORDER TONE | $86=$ NO DATA REJURNED fROM FAR END $87=$ STEADY UNIOENTIFIABLE TONE FROM FAR END $88=$ BROADBAND ENERGY FROM FAR END (NOISE, VOICE, OR RECORDED ANNOUNCEMENI) $89=$ FAR ENO TEST LINE unavailagle SO=NEAR-END SELF-TESt FAILED <br> 91=FAR END LOSS SELF-TEST AT 0 DBM 1004HZ FAILED <br> S2=FAR END NOISE SELf-TESt FAILED <br> 93:far end high freq. singing return loss self-test faileo <br> 94=FAR END ECHO RETURN LOSS SELF-TEST FAILED <br> 95xfar end simging return loss self-test FAILED | 99=FAR END NOISE WITH TONE SELF-TEST FAILED <br> (Fault codes cont on WORD 08! <br> TRUNK TYPE: SAME AS USED IN PROCEDURE 100. |
|  | $\begin{aligned} & 5=\text { TRUNX IN USE } \\ & 6=\text { CAN' } \\ & \text { TRUNK } \end{aligned}$ | 79=REEORDER TONE <br> 80=OTHER UNEXPECTED TONE <br> 81=RING NO ANSWER FROM FAR END <br> $82=$ UNIDENTIFIABLE INTERRUPTED TONE <br> 83:BUSY FROM fAR END <br> 84=far end release <br> 85=NO RESPONSE FROM FAR END | ```FAILED 96:FAR END LOSS SELF-TEST AT-160BM 1004HZ FAILED 97=FAR END LOSS SELF-TEST AT-160BM 404hZ FAILED 98=FAR END LOSS SELF-TEST AT-160SM 2804hZ FAILED``` | NE TWORK ATMS TESTS 647 |


| FLIPCHART ISSUE 2 | $+\quad+\quad$ AUTOMATIC TRANSM | MISSION MEASUREMENT <br> (ATMS) TESTS |  |
| :---: | :---: | :---: | :---: |
| FAULT CODES (FIELO 12) CONIINUED FROM WORD OA. | ASSOCIAIED WIIH TEST STATE $5 \& 6$ : <br> $0=$ Passed ALL IESTS <br> $11=$ FAILEO 404HZ FAR END to near End deviation threshold. <br> $12=$ FAILEO 0 DEM LOSS FAR END TO NEAR END LOSS threshold. <br> 13 FFAILEO 2804 Hz far end to near emo deviation threshold. <br> $21=$ FAILED 404 HZ NEAR END TO FAR END DEVIATION THRESHOLD. <br> 22=FAILED 0 DBM LOSS NEAR END TO FAR END LOSS threshold. <br> $23=$ FAILED 2804 HZ NEAR END to far end oeviation thresholo. <br> $31=$ Failed 1004 hz far end-near end level loss threshold. <br> $32=$ FAILED 1004 HZ NEAR END-FAR END Level loss threshold. <br> 33-failed near end c-message without tone noise thresholo. | 62=FAILED FAR END ECHO RETURN loss thresholo. <br> b3=failed far end singing return loss high threshold. | ```TEST LINE TYPES (FIELD 11): 1=102 OR OLD 100-TYPE 2=NEW 100-TYPE 3=LC-145 OR SN-260A 4=SN-2608 5=56A OR 105 W/O RETURN LOSS 6=SN-261. ZLC-12, OR 105 WITH RETURN LOSS``` |
|  | 41=FAILED FAR END C-MESSAGE WIthOUT tONE NOISE fhreshold. 42:FAILED NEAR END C-MESSAGE WITH TONE THRESHOLD. 43=FAILEO FAR END C-MESSAGE WIIH TONE THRESHOLD. 51=FAiled near end singing resurn loss low threshold. 52-FAILED NEAR ENO ECHO RETURN LOSS thRESHOLD. 53-failed near end singing return loss high threshold. 61=FAILED FAR END SINGING RETURN LOSS LOW THRESHOLD. $\qquad$ | (MEASUREMENT INDEX CONT ON HORD OC) | 1NETWORK <br> ATMS <br> TESTS <br> $\mathbf{6 4 7}$ |




## Purpose

PROC 647 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from an Automatic Transmission Measurement System (ATMS) failure.
PROC 647 is also used to perform transmission tests between near-end and far-end facilities by measuring loss, noise, and echo impairments when the user suspects an intermittent trouble with analog trunks.
PROC 647 provides a trunk supervision test to determine if a test progress tone, or the ${ }^{\sim} 1004 \mathrm{~Hz}$ tone from the terminating test line can be obtained.
PROC 647 is used to:

1. Display the failure history for trunk circuits failing ATMS scheduled tests.
2. Manually turn off any alarms activated because of a trunk circuit failing ATMS tests.
3. Perform a transmission measurement on selected circuits or a group of circuits.

Note: Measurement results are only displayed in Test 2.
4. Perform a supervision test on selected circuits or a group of circuits.

## Field Definitions and Codes

Each field of PROC 647 flipchart and the possible displays for the fields during execution of the different tests are defined in Table AZ, PROC 647 - Field Definitions and Codes.

PROC 647 (R2V2 Only)

TABLE AZ.


TABLE AZ. (Contd)

| PROC 647 <br> field definitions and codes (Contd) |  |  |
| :---: | :---: | :---: |
| FIELD | CODE | definition |
| $14 *$ |  | Total number of failures |
|  | 0-60 | Total number of PMIDS failures (Test 1 only) |
|  | 0-99 | Total number of failed cir cuits (Tests 2 and 3 only) |
| 14* | 0-99 | Total number of faults for the displayed failing cir cuit (Test 2 only) |
| 14* | $\begin{aligned} & 0-74, \\ & 91-99 \end{aligned}$ | Measurement results (Test 2 only) |
| $15^{*}$ | 0-99 | Trunk type (Prior to exe cution of Tests 2 and 3 only) |
| 15* | $\begin{aligned} & 0-74, \\ & 91-99 \end{aligned}$ | Measurement results (Test 2 only) |
| $=$ Fields 10, and 12 through 15 are multiple use fields depending on the test being performed and when the data is displayed. |  |  |

Optional input fields are:

1. Field 2 - Select a specific trunk group to be tested (Tests 2 and 3 only).
2. Fields 2 and 3 - Select trunk group and trunk number of a specific trunk to be tested (Tests 2 and 3 only).
3. Fields 4 through 8 - Select equipment location of a specific circuit to be tested (Tests 2 and 3 only).

## Operation of Procedure

## Overview

PROC 647 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a trunk failure detected during ATMS scheduled tests.

## PROC 647 Test 1 (R2V2 Only)

To call in PROC 647, perform the following:

1. Depress PROC NO; 647; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Displays failure history logged in PMIDS by on-line periodic testing. Up to 60 failures can be displayed.
Test 1 is also used to manually resolve all alarmed circuit failures associated with ATMS.
2. Test 2 - Performs demand tests on selected circuits or a group of circuits and compares transmission measurements to administered thresholds.
3. Test 3 -Performs a supervision test on selected circuits or a group of circuits.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

## Test 1

Test 1 provides a failure history of the circuit failures detected by the on-line ATMS periodic software.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

Test 1 is also used to manually resolve the alarmed circuit failures associated with ATMS in PMIDS and to turn off the OTHER FAILS fault indicator if no other alarm sources affecting the OTHER FAILS fault indicator are active.

Note: Measurement results are not displayed in Test 1.

1. Test 1 is the default test when entering PROC 647 or is selected by using NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 1.
2. When Test 1 is initially called in, Field 1 displays a 1 and all other fields are dashed.
3. To start Test 1, depress EXECUTE.
4. The failure history is sorted and a summary is displayed.
5. If no failures exist, the following summary is displayed:

Field 1-1.
Field 14-0 (Indicating no failures).
6. If any failures exist, the summary displays a 1 in Field 1 and the total number of circuits that failed in Field 14 (maximum of 60 ).
7. Depressing NEXT CIRCUIT displays the first failure as follows:

Field 1-1.
Field 2 - Trunk group.
Field 3 - Trunk number.
Fields 4 through 8 - Equipment location of failing circuit.
Field 9 - Circuit status of the displayed failure.
Field 10 - Alarm status of failing circuit.
Field 11 - Terminating test line type.
Field 12 - Fault code.

Note: Only one (first, or most severe) fault code is recorded for each failing circuit.

Field 13 - Failure index (equals number of failures displayed in Field 14).
Field 14 - Total number of failing circuits recorded in PMIDS.
Field 15 - Trunk type.
8. Depressing NEXT CIRCUIT repeatedly displays the remaining failing circuits (if any).

Field 13 decrements by 1 each time NEXT CIRCUIT is depressed.
9. When all failing circuits are displayed (1 displayed in Field 13), depressing NEXT CIRCUIT dashes Fields 2 through 15.

Depressing NEXT CIRCUIT once more causes the summary to be displayed, and the failing circuits can be stepped through again by use of NEXT CIRCUIT.
10. The CLEAR DATA; EXECUTE sequence is used to manually resolve individual alarmed circuit failures after EXECUTE is used to initiate Test 1.

The failures which are resolved are those failures with an alarm status of 2 (minor) or 3 (warning) displayed in Field 10.
11. To resolve individual circuit failures with an alarm status of 2 or 3 , perform Steps 12 and 13 .
12. Use NEXT CIRCUIT to display the failing circuit with an alarm status of 2 or 3 on the MAAP.

Note: Individual circuit failures cannot be resolved unless the alarmed circuit is displayed on the MAAP.
13. Depress CLEAR DATA; EXECUTE.

Field 10 (alarm status) displays a 5 indicating that the alarmed circuit in PMIDS is marked as resolved.
14. Repeat Steps 12 and 13 for each alarmed circuit failure to turn off the OTHER FAILS fault indicator, assuming no other alarm sources affecting the OTHER FAILS fault indicator are active.

## PROC 647 Test 2 (R2V2 Only)

## Test 2

Test 2 is used to test one or more circuits once and compares transmission measurements to administered thresholds for the circuits tested.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

Circuits can be selected for testing by all circuits; trunk group; trunk group and trunk number; or by equipment location.

When a range of circuits are tested, failing circuits are displayed first and passing circuits are displayed after all failing circuits are displayed.

Measurement results can be obtained for failing and passing circuits.
Note: When test states 2 through 4 (indicates test not fully completed) are displayed in Field 10 for failing circuits, measurement results are not available. Fields 13 through 15 display dashes.

Measurement results are provided for further diagnosis (if required) to determine if the passing circuits are within marginal thresholds or if the thresholds need to be adjusted.

## Test 2 Data Entry

1. Test 2 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 2 .
2. When Test 2 is initially called in, a default trunk group, trunk number, and equipment location may be displayed in Fields 2 through 8 . Field 9 displays the circuit status, Field 11 displays the terminating test line type, and Field 15 displays the trunk type.
3. The default circuit can be the last circuit displayed in Test 1 of PROC 647 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.
4. The default equipment location can also be passed from PROC 620 as long as the equipment location is a CO trunk or tie trunk equipment location and is still displayed in PROC 620 when it is passed.
5. All circuits, a range of circuits, a specific circuit, or the default circuit can be tested.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

To test the default circuit, proceed to Step 14.
6. Selection of a range of circuits to be tested depends on whether or not a default equipment location is displayed.

If a default equipment location is displayed, the CHANGE FIELD sequence must be used.
If no default equipment location is displayed, either ENTER or the CHANGE FIELD sequence can be performed to select the range of circuits to be tested.
7. To test all circuits in the switch, Fields 2 through 8 must be dashed. Perform one of the following depending on whether or not a default equipment location is displayed:

## ENTER.

## CHANGE FIELD; 2; ENTER.

Test 2 starts with trunk member 1 of the first trunk group (numerically) and runs until all circuits in the switch are tested.
Proceed to Step 1 of Test 2 Execution.
8. To select all trunks in a trunk group to be tested, perform one of the following depending on whether or not a default equipment location is displayed:
(Trunk group number); ENTER.
CHANGE FIELD; 2; ENTER; (Trunk group number); ENTER.
Note: Fieid 11 displays the test line type and Field 15 displays the trunk type when the trunk group is entered in Field 2.

Test 2 starts with the first circuit in the trunk group selected and runs until all trunks in the trunk group are tested.
Proceed to Step 1 of Test 2 Execution.
9. A specific circuit can be selected for testing in one of three ways; j.e., by trunk group and trunk number; by equipment location; and by use of NEXT CIRCUIT and/or NEXT UNIT. (Refer to steps 10 through 13.)
10. To select a specific circuit using trunk group and trunk number, perform one of the following depending on whether a default equipment location is displayed:
(Trunk group); ENTER; (Trunk number); ENTER.
CHANGE FIELD; ENTER; 2; ENTER; (Trunk group); ENTER; (Trunk number); ENTER.

Note: Fields 4 through 8 display the equipment location of the trunk circuit, Field 9 displays the circuit status of the trunk, Field 11 displays the terminating test line type, and Field 15 displays the trunk type when the trunk group and number are entered in Fields 2 and 3.

Proceed to Step 14.
11. To select a specific circuit using the equipment location, perform one of the following depending on whether or not a default equipment location is displayed:
CHANGE FIELD; ENTER; 4; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
CHANGE FIELD; ENTER; 4; ENTER; (Module number); ENTER; CHANGE FIELD; ENTER; 5; ENTER; (Cabinet number); ENTER; CHANGE FIELD; ENTER; 6; ENTER; (Carrier number); ENTER; CHANGE FIELD; ENTER; 7; ENTER; (Slot number); ENTER; CHANGE FIELD; ENTER; 8; ENTER; (Circuit number); ENTER;

Note: Fields 2 and 3 display the trunk group and trunk number, Field 9 displays the circuit status of the trunk, Field 11 displays the terminating test line type, and Field 15 displays the trunk type when the equipment location is entered in Fields 4 through 8.

Proceed to Step 14.

## PROC 647 Test 2 (R2V2 Only)

12. Depressing NEXT CIRCUIT advances to the next trunk in the displayed trunk group or the first trunk in the next testable trunk group.

Depressing NEXT UNIT advances to the first trunk in the next testable trunk group.
13. To select a specific circuit using NEXT CIRCUIT and/or NEXT UNIT, perform the following:

Depress NEXT CIRCUIT until the circuit to be tested is displayed in Fields 2 through 8.
Depress NEXT UNIT until the trunk group is displayed in Field 2, then depress NEXT CIRCUIT (if necessary) until the circuit to be tested is displayed in Fields 3 through 8.

Note: Field 9 displays the circuit status, Field 11 displays the terminating test line type, and Field 15 displays the trunk type for the circuit to be tested.

Proceed to Step 14.
14. A specific circuit or the default circuit can be placed in maintenance busy out status for testing by performing the following:

Check the circuit status displayed in Field 9.
If the circuit status $=1$ or 2 , proceed to Step 1 of Test 2 Execution.
If the circuit status $=0$, depress BUSY OUT and proceed to Step 1 of Test 2 Execution.

## Test 2 Execution

1. To start Test 2 after selecting the circuit(s) to be tested, depress EXECUTE.

The WAIT indicator on the MAAP is turned on
2. During testing of a specific circuit or the default circuit, Field 10 (test state) is incremented to indicate progress of Test 2.
3. When the entire switch or an entire trunk group is tested, the following fields are incremented as a circuit is tested:

Fields 2 and 3 - Trunk group and number.
Fields 4 through 8 - Equipment location of circuit being tested.
Field 9 - Circuit status of circuit being tested.
Field 10 - Test state (encodes 1 through 5).
Field 11 - Terminating test line type.
Field 13 - Total number of circuits tested.
Field 14 - Total number of failures (if any).
Field 15 - Trunk type.
4. The failure information returned in Test 2 is stored in DMIDS.

If DMIDS becomes full at any time during the test, Test 2 is stopped and the WAIT indicator is turned off.

Note: Although Fields 13 and 14 only display 99 entries, DMIDS allows testing of at least 255 trunks prior to DMIDS overflowing occurring.
5. The original range of circuits selected is displayed in Fields 2 through 8, and special error code 83 (DMIDS overflow - range not completed) is displayed in the MAAP error code field.
6. Results of the test can be examined at this time (Refer to Test 2 Result Display below). Test 2 can be restarted from the original range of circuits entered by depressing EXECUTE.

Caution: If Test 2 is restarted from the original range entered any test results gathered to that point are lost and only new failure data is retained.

Note: Before depressing EXECUTE to restart Test 2 from the original range entered, the failure data should be examined and recorded.
7. If Test 2 is halted because of a DMIDS overflow, a new range of circuits to be tested can be entered instead of testing the original range of circuits.
8. The CHANGE FIELD sequence must be used to enter the new range of circuits to be tested.

Refer to Step 7 of Test 2 Data Entry above to select all circuits in the switch to be tested or Step 8 of Test 2 Data Entry above to select all circuits in a trunk group to be tested.
9. EXECUTE must be depressed to begin Test 2 from the new range of circuits entered or to start over from the original range of circuits.
10. STOP can be depressed when a specific circuit or a range of circuits is being tested.

The WAIT indicator is turned off, the original range of circuits selected is displayed in Fields 2 through 8 and test state 9 (test terminated) is displayed in Field 10.

Note: Special error code 82 (STOP used - range not completed) is displayed in the MAAP error code field.
11. Test result information can be stepped through as described in Test 2 Result Display below when Test 2 is halted using STOP even though the specific circuit or the entire range is not tested.
12. To restart the test when Test 2 is halted by use of STOP before the specific circuit or range of circuits are tested at least once, EXECUTE is depressed and Test 2 starts from the equipment location(s) originally selected.

## Test 2 Result Display

1. When Test 2 is completed or STOP is depressed for a specific circuit, a default circuit, a trunk group, or the entire switch, the WAIT indicator is turned off and the following is displayed:

Fields 2 through 8 - Specific circuit, default circuit, or the range of circuits originally selected for testing.
Field 10 - Test state of 9 indicating test terminated.
Field 13 - Total number of circuits tested.
Field 14-0 or total number of failures (if any).
2. Depressing NEXT CIRCUIT displays the first, and then successive circuits tested.

Failing circuits are displayed first, followed by passing circuits. If STOP is depressed, circuits are displayed in the order tested.

## PROC 647 Test 2 (R2V2 Only)

3. The display of the first circuit tested consists of:

Field 1-2
Fields 2 and 3 - Trunk group and trunk number.
Fields 4 through 8 - Equipment location of the displayed circuit.
Field 9 - Current circuit status of the displayed circuit.
Field 10 - Test status (indicated by test states 2 through 6).
Field 11 - Terminating test line type.
Field 12 - Fault code.
Field 13-0 or failure index (equaling Field 14).
Field 14-0 or total number of fault codes recorded for the circuit displayed.
Field 15 - Trunk type.
4. If Field 10 (test state) indicates a test abort encode ( 2 through 4) an abort cause fault code ( 1 through 6, or 67 through 99) is displayed in Field 12 and no further information (including measurement data) is available.
5. If Field 10 displays a test completed encode ( 5 or 6) Field 12 displays either 0 (passed all tests) or the first of one or more fault code(s) (11 through 63) indicating some threshold was exceeded.

If Field 12 displays a fault code other than 0, Field 13 displays an index (equal to Field 14) and Field 14 displays the total number of fault codes recorded for the displayed circuit.
6. If Field 12 displays a 0 or Field 13 displays a 1 (indicating only one fault code) proceed to Step 10 to display measurement results.
If Field 13 displays a number greater than 1, proceed to Step 7.
7. Depressing NEXT FAULT displays a different fault code in Field 12 for the same circuit.

Field 13 is decremented each time NEXT FAULT is depressed.
Field 10 (test state) either displays a 5 (marginal threshold) or 6 (unacceptable threshold was not passed) for the fault code displayed in Field 12.
8. If a circuit is in-use when testing is attempted (range or single circuit selected), test state 3 is displayed in Field 10, and fault code 5 is displayed in Field 12.

Field 9 (circuit status) indicates whether the circuit is still in use at time of display.
Note: Record each in-use circuit for later testing (See Step 18 below).
9. When all fault codes are displayed, (Field $13=1$ ), depressing NEXT FAULT once more dashes Fields 12 through 14.
Depressing NEXT FAULT again starts the sequence over.
10. Measurement results for the circuit tested, whether the circuit passed or failed, are displayed by depressing NEXT DATA.

Note: When tests states 2 through 4 are displayed in Field 10 for failing circuits, measurement results are not available. Fields 13 through 15 display dashes. Test states 5 and 6 indicate the test is completed and provide measurement data for passing and failing circuits.
11. Six sets of measurements (total of 18 measurements) are always displayed for each tested circuit by repeatedly depressing NEXT DATA.

Measurement results are displayed in sets of three (displayed in Fields 13 through 15) and Field 12 (measurement index) is used to indicate which set is being displayed.

Field 12 (measurement index) increments from 10 to 60 ; i.e., $10,20,30,40,50$, and 60 indicating the six sets of measurements for the circuit tested.
12. The values displayed in Fields 13 through 15 refer to thresholds exceeded for measurements of each set. The definition for each measurement is indicated in Table BA, PROC 647 Measurement Results.

Values range from 0 through 74 , and 91 through 99.91 through 99 indicate negative numbers 1 through 9.

Note: Dashes displayed in any of the three fields (13 through 15) indicate that the measurement is not applicable to the terminating test line (TTL) displayed in Field 11.
13. The order of measurements is the same as that implied by fault codes 11 through 63 .

Fault codes 11 through 13 refer to thresholds exceeded for measurements of the first set, (Field $12=10$ ), and are displayed in Fields 13 through 15.

Fault codes 21 through 23 refer to thresholds exceeded for measurements of the second set, (Field $12=20$ ), and are displayed in Fields 13 through 15.
Fault codes 31 through 33 refer to thresholds exceeded for measurements of the third set, (Field $12=30$ ), and are displayed in Fields 13 through 15.

Fault codes 41 through 43 refer to thresholds exceeded for measurements of the fourth set, (Field $12=40$ ), and are displayed in Fields 13 through 15.

Fault codes 51 through 53 refer to thresholds exceeded for measurements of the fifth set, (Field $12=50$ ), and are displayed in Fields 13 through 15.
Fault codes 61 through 63 refer to thresholds exceeded for measurements of the sixth set, (Field $12=60$ ), and are displayed in Fields 13 through 15.
14. Depressing NEXT DATA after the sixth set of measurements is displayed (Field $12=60$ ), dashes Fields 12 through 15.

Depressing NEXT DATA once more starts the sequence over with the first set of measurements displayed.
15. When a range of circuits are tested (all circuits in the switch or a trunk group) depressing NEXT CIRCUIT advances to the next circuit tested.

Caution: Depressing NEXT UNIT advances to the first trunk in the next trunk group and erases all data stored in DMIDS, i.e., circuits tested, fault codes, and measurement data is erased. Do not depress NEXT UNIT while displaying the tested circuits.

TABLE BA.

| PROC 647 - MEASUREMENT RESULTS |  |  |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { FIELD } 12 \\ & \text { MEASUREMENT } \\ & \text { INDEX }= \end{aligned}$ | FIELD number $\qquad$ | definition of measurement values displayed in fillos 13 Through 15 |
| 10 | 13 | Far to near end 404 Hz loss measurement |
|  | 14 | Far to near end 0 dbm loss measurement |
|  | 15 | Far to near end 2804 Hz loss measurement |
| 20 | 13 | Near to far end 404 Hz loss measurement |
|  | 14 | Near to far end 0 dbm loss measurement |
|  | 15 | Near to far end 2804 Hz loss measurement |
| 30 | 13 | Far to near end 1004 Hz loss measurement |
|  | 14 | Near to far end 1004 Hz loss measurement |
|  | 15 | Near end C-message noise without tone measurement |
| 40 | 13 | Far end C-message noise without tone measurement |
|  | 14 | Near end C-message noise with tone measurement |
|  | 15 | Far end C-message noise with tone measurement |
| 50 | 13 | Low frequency near end singing return loss measurement |
|  | 14 | Near end echo return loss measurement |
|  | 15 | High frequency near end singing return loss measurement |
| 60 | 13 | Low frequency far end singing return loss measurement |
|  | 14 | Far end echo return loss measurement |
|  | 15 | High frequency far end singing return loss measurement |

16. When a range of circuits are tested, NEXT FAULT is used to display all fault codes (if any) for the displayed circuit.

Note: Record all in-use circuits with a 3 displayed in Field 10 (test state) and a 5 displayed in Field 12 (fault code) for later testing. Refer to Step 18 for testing of in-use circuits.

NEXT DATA is used to display measurement results for the displayed circuit.
17. When all tested circuits are displayed, depressing NEXT CIRCUIT dashes all fields except Field 1.

Depressing NEXT CIRCUIT once more displays the summary information.
Depressing NEXT CIRCUIT again starts the sequence over.
18. When in-use fault encodes are recorded, EXECUTE may be depressed for an additional test attempt on the in-use circuit.

Caution: Retesting of in-use circuits should occur only after all Test 2 failure history is examined, since the retesting of an in-use circuit erases all prior test results.
19. To test a circuit recorded as in-use (Step 8 or Step 15 above), use NEXT CIRCUIT to display the circuit in Fields 2 through 8.

Note: Note that the circuit status field indicates the current status as idle, in-use, or maintenance busied ( 0,1 , or 2 ) displayed in Field 9.

If Field 9 (circuit status) displays a 1 , the circuit is in use.
20. Depress EXECUTE.

If the circuit is still in use and Field 12 (fault code) displays a 5 indicating prior in-use failure, a camp-on procedure is used. Field 10 (test state) remains in state 3 until the circuit becomes available.
21. When an in-use circuit is tested, use NEXT FAULT and NEXT DATA as appropriate to determine the status of the circuit and the measurement results recorded.
22. To test other in-use circuits, perform the CHANGE FIELD sequence to select the in-use circuit recorded in Step 15 above.

Refer to Steps 10 and 11 of Test 2 Data Entry above to select an in-use circuit using the trunk group and trunk number or the equipment location of the in-use circuit.
23. When a circuit was busied out and the test passed, or the trouble was corrected, the circuit should be released from busy using RLS BUSY OUT.
24. When another specific circuit is to be tested, refer to Steps 10 through 13 of Test 2 Data Entry above to select the specific circuit.

EXECUTE must be depressed to test the specific circuit selected for testing.
25. To select another range of circuits to test, the CHANGE FIELD sequence must be used.

Refer to Step 7 of Test 2 Data Entry above to select all circuits in the switch to test, or Step 8 of Test 2 Data Entry above to select all circuits in a trunk group to test.
26. EXECUTE must be depressed to test the range of circuits selected for testing.
27. When all circuits that raised an alarm pass Test 2 perform the CLEAR DATA; EXECUTE sequence in Test 1 of PROC 647 for each alarmed circuit to resolve the alarmed circuits and to turn off the OTHER FAILS fault indicator assuming no other alarm sources affecting the OTHER FAILS fault indicator are active.

Note: Alarmed circuits in PMIDS are marked as resolved when the CLEAR DATA; EXECUTE sequence is used in Test 1 for each alarmed circuit.

## PROC 647 Test 3 (R2V2 Only)

## Test 3

Test 3 provides a trunk supervision test on one or more circuits. Test execution causes an attempt to obtain either the test progress tone or the ${ }^{*} 1004 \mathrm{~Hz}$ tone from the terminating test line.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

Circuits can be selected for testing by all circuits; trunk group; trunk group and trunk number; or by equipment location.

Note: Measurement results are not displayed in Test 3.

## Test 3 Data Entry

1. Test 3 is selected by use of NEXT TEST.

Note: Use of the CHANGE FIELD sequence is not valid to select Test 3.
2. When Test 3 is initially called in, a default trunk group, trunk number, and equipment location may be displayed in Fields 2 through 8. Field 9 displays the circuit status, Field 11 displays the terminating test line type, and Field 15 displays the trunk type.
3. The default circuit can be the last circuit displayed in Test 1 or 2 of PROC 647 or can be passed from PROC 600 while it is still displayed in Test 1 or 2 of PROC 600 when it is passed.
4. The default equipment location can also be passed from PROC 620 as long as the equipment location is a CO trunk or tie trunk equipment location and is still displayed in PROC 620 when it is passed.
5. All circuits, a range of circuits, a specific circuit, or the default circuit can be tested.

Note: Circuit(s) indicates all trunks with translations allowing access to a terminating test line which are associated with ATMS.

To test the default circuit, proceed to Step 14.
6. Selection of a range of circuits to be tested depends on whether or not a default equipment location is displayed.
If a default equipment location is displayed, the CHANGE FIELD sequence must be used.
If no default equipment location is displayed, either ENTER or the CHANGE FIELD sequence can be performed to select the range of circuits to be tested.
7. To test all circuits in the switch, Fields 2 through 8 must be dashed. Perform one of the following depending on whether or not a default equipment location is displayed:

## ENTER

## CHANGE FIELD; 2; ENTER.

Test 3 starts with trunk member 1 of the first trunk group (numerically) and runs until all circuits in the switch are tested.

Proceed to Step 1 of Test 3 Execution.
8. To select all trunks in a trunk group to be tested, perform one of the following depending on whether or not a default equipment location is displayed:
(Trunk group number); ENTER.
CHANGE FIELD; 2; ENTER; (Trunk group number); ENTER.
Note: Field 11 displays the test line type and Field 15 displays the trunk type when the trunk group is entered in Field 2.

Test 3 starts with the first circuit in the trunk group selected and runs until all trunks in the trunk group are tested.

Proceed to Step 1 of Test 3 Execution.
9. A specific circuit can be selected for testing in one of three ways; i.e., by trunk group and trunk number; by equipment location; and by use of NEXT CIRCUIT and/or NEXT UNIT. (Refer to steps 10 through 13.)
10. To select a specific circuit using trunk group and trunk number, perform one of the following depending on whether a default equipment location is displayed:
(Trunk group); ENTER; (Trunk number); ENTER.
CHANGE FIELD; ENTER; 2; ENTER; (Trunk group); ENTER; (Trunk number); ENTER.

Note: Fields 4 through 8 display the equipment location of the trunk circuit, Field 9 displays the circuit status of the trunk, Field 11 displays the terminating test line type, and Field 15 displays the trunk type when the trunk group and number are entered in Fields 2 and 3.

Proceed to Step 14.
11. To select a specific circuit using the equipment location, perform one of the following depending on whether or not a default equipment location is displayed:

CHANGE FIELD; ENTER; 4; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.

CHANGE FIELD; ENTER; 4; ENTER; (Module number); ENTER; CHANGE FIELD; ENTER; 5; ENTER; (Cabinet number); ENTER; CHANGE FIELD; ENTER; 6; ENTER; (Carrier number); ENTER; CHANGE FIELD; ENTER; 7; ENTER; (Slot number); ENTER; CHANGE FIELD; ENTER; 8; ENTER; (Circuit number); ENTER;

Note: Fields 2 and 3 display the trunk group and trunk number, Field 9 displays the circuit status of the trunk, Field 11 displays the terminating test line type, and Field 15 displays the trunk type when the equipment location is entered in Fields 4 through 8.

Proceed to Step 14.
12. Depressing NEXT CIRCUIT advances to the next trunk in the displayed trunk group or the first trunk in the next testable trunk group.
Depressing NEXT UNIT advances to the first trunk in the next testable trunk group.

## PROC 647 Test 3 (R2V2 Only)

13. To select a specific circuit using NEXT CIRCUIT and/or NEXT UNIT, perform the following:

Depress NEXT CIRCUIT until the circuit to be tested is displayed in Fields 2 through 8.
Depress NEXT UNIT until the trunk group is displayed in Field 2, then depress NEXT CIRCUIT (if necessary) until the circuit to be tested is displayed in Fields 3 through 8.

Note: Field 9 displays the circuit status, Field 11 displays the terminating test line type, and Field 15 displays the trunk type for the circuit to be tested.

Proceed to Step 14.
14. A specific circuit or the default circuit can be placed in maintenance busy out status for testing by performing the following:

Check the circuit status displayed in Field 9.
If the circuit status $=1$ or 2 , proceed to Step 1 of Test 3 Execution.
If the circuit status $=0$, depress BUSY OUT and proceed to Step 1 of Test 3 Execution.

## Test 3 Execution

1. To start Test 3 after selecting the circuit(s) to be tested, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
2. During testing of a specific circuit or the default circuit, Field 10 (test state) is incremented to indicate progress of Test 3.
3. When the entire switch or an entire trunk group is tested, the following fields are incremented as a circuit is tested:

Fields 2 and 3 - Trunk group and number.
Fields 4 through 8 - Equipment location of circuit being tested.
Field 9 - Circuit status of circuit being tested.
Field 10 - Test state (encodes 1 through 5 ).
Field 11 - Terminating test line type.
Field 14 - Total number of failures (if any).
Field 15 - Trunk type.
4. The failure information returned in Test 3 is stored in DMIDS.

If DMIDS becomes full at any time during the test, Test 3 is stopped and the WAIT indicator is turned off.

Note: Although Fields 13 and 14 only display 99 entries, DMIDS allows testing of at least 255 trunks prior to DMIDS overflowing occurring.
5. The original range of circuits selected is displayed in Fields 2 through 8, and special error code 83 (DMIDS overflow - range not completed) is displayed in the is displayed in the MAAP error code field.
6. Results of the test can be examined at this time (Refer to Test 3 Result Display below). Test 3 can be restarted from the original range of circuits entered by depressing EXECUTE.

## Caution: If Test 3 is restarted from the original rañge entered any test results gathered to that point are lost and only new failure data is retained.

Note: Before depressing EXECUTE to restart Test 3 from the original range entered, the failure data should be examined and recorded.
7. If Test 3 is halted because of a DMIDS overflow, a new range of circuits to be tested can be entered instead of testing the original range of circuits.
8. The CHANGE FIELD sequence must be used to enter the new range of circuits to be tested.

Refer to Step 7 of Test 3 Data Entry above to select all circuits in the switch to be tested or Step 8 of Test 3 Data Entry above to select all circuits in a trunk group to be tested.
9. EXECUTE must be depressed to begin Test 2 from the new range of circuits entered or to start over from the original range of circuits.
10. STOP can be depressed when a specific circuit or a range of circuits is being tested.

The WAIT indicator is turned off, the original range of circuits selected is displayed in Fields 2 through 8 and test state 9 (test terminated) is displayed in Field 10.

Note: Special error code 82 (STOP used - range not completed) is displayed in the MAAP error code field.
11. Test result information can be stepped through as described in Test 3 Result Display below when Test 3 is halted using STOP even though the specific circuit or the entire range is not tested.
12. To restart the test when Test 3 is halted by use of STOP before the specific circuit or range of circuits are tested at least once, EXECUTE is depressed and Test 3 starts from the equipment location(s) originally selected.

## Test 3 Result Display

1. When Test 3 is completed or STOP is depressed for a specific circuit, a default circuit, a trunk group, or the entire switch, the WAIT indicator is turned off and the following is displayed:
Fields 2 through 8 - Specific circuit, default circuit, or the range of circuits originally selected for testing.
Field 10 - Test state of 9 indicating test terminated.
Field 13 - Total number of circuits tested.
Field 14-0 or total number of failures (if any).
2. Depressing NEXT CIRCUIT displays the first, and then successive circuits tested.

Failing circuits are displayed first, followed by passing circuits. If STOP is depressed, circuits are displayed in the order tested.

## PROC 647 Test 3 (R2V2 Only)

3. The display of the first circuit tested consists of:

Field 1-3
Fields 2 and 3 - Trunk group and trunk number.
Fields 4 through 8 - Equipment location of the displayed circuit.
Field 9 - Current circuit status of the displayed circuit.
Field 10 - Test status (indicated by test states 2 through 6).
Field 11 - Terminating test line type.
Field 12 - Fault code.
Field 13-0 or failure index (equaling Field 14).
Field 14-0 or total number of fault codes recorded for the circuit displayed.
Field 15 - Trunk type.
4. Field 10 (test state) displays either a test completed encode of 5 or a test abort encode of 2 through 4.

If Field 10 displays a test completed encode of 5, Field 12 (fault code) displays a 0 indicating successful completion of Test 3.
5. If Field 10 indicates a test abort encode (2 through 4) an abort cause fault code ( 1 through 6, or 67 through 99) is displayed in Field 12 and no further information is available.

Note: Only one (first, or most severe) fault code is recorded for each failing circuit.
6. If a circuit is in-use when testing is attempted (range or single circuit selected), test state 3 is displayed in Field 10, and fault code 5 is displayed in Field 12.
Field 9 (circuit status) indicates whether the circuit is still in use at time of display.
Note: Record each in-use circuit for later testing (See Step 10 below).
7. When a range of circuits are tested (all circuits in the switch or a trunk group) depressing NEXT CIRCUIT advances to the next circuit tested.
8. Record all in-use circuits with a 3 displayed in Field 10 (test state) and a 5 displayed in Field 12 (fault code) for later testing. Refer to Step 10 for testing of in-use circuits.

Caution: Depressing NEXT UNIT advances to the first trunk in the next trunk group and erases all data stored in DMIDS, i.e., circuits tested, fault codes, and measurement data is erased. Do not depress NEXT UNIT while displaying the tested circuits.
9. When all tested circuits are displayed, depressing NEXT CIRCUIT dashes all fields except Field 1.

Depressing NEXT CIRCUIT once more displays the summary information.
Depressing NEXT CIRCUIT once more starts the sequence over with the first tested circuit.
10. When in-use fault encodes are recorded, EXECUTE may be depressed for an additional test attempt on the in-use circuit.

## Caution: Retesting of in-use circuits should occur only after all Test 3 failure history is examined, since the retesting of an in-use circuit erases all prior test results.

11. To test a circuit recorded as in-use (Steps 6 or 8 above), use NEXT CIRCUIT to display the circuit in Fields 2 through 8.

Note: Note that the circuit status field indicates the current status as idle, in-use, or maintenance busied ( 0,1 , or 2) displayed in Field 9.

If Field 9 (circuit status) displays a 1, the circuit is in use.
12. Depress EXECUTE.

When an in-use circuit is tested, use NEXT CIRCUIT to determine the status of the circuit.
13. If the circuit is still in use and Field 12 (fault code) displays a 5 indicating prior in-use failure, a camp-on procedure is used. Field 10 (test state) remains in state 3 until the circuit becomes available.
14. To test other in-use circuits, perform the CHANGE FIELD sequence to select the in-use circuit recorded in Step 7 above.
Refer to Steps 10 and 11 of Test 3 Data Entry above to select an in-use circuit using the trunk group and trunk number or the equipment location of the in-use circuit.
15. When a circuit was busied out and the test passed, or the trouble was corrected, the circuit should be released from busy using RLS BUSY OUT.
16. When another specific circuit is to be tested, refer to Steps 10 through 13 of Test 3 Data Entry above to select the specific circuit.
EXECUTE must be depressed to test the specific circuit selected for testing.
17. To select another range of circuits to test, the CHANGE FIELD sequence must be used.

Refer to Step 7 of Test 3 Data Entry above to select all circuits in the switch to test, or Step 8 of Test 2 Data Entry above to select all circuits in a trunk group to test.
18. EXECUTE must be depressed to test the range of circuits selected for testing.

## Repair Guide

When a trunk circuit failing ATMS scheduled tests is indicated, PROC 647 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following steps in the order listed to isolate and repair the faulty unit.

The starting point for isolation and repair of alarmed trunk circuits failing ATMS scheduled tests is Test 1 of PROC 600 or Test 1 of PROC 647.

To isolate an alarmed trunk circuit failing ATMS scheduled tests displayed in Test 1 of PROC 600 or Test 1 of PROC 647, Test 2 of PROC 647 is executed to determine the extent of the trouble.

## PROC 647 (R2V2 Only)

1. Execute Test 1 of PROC 600 or Test 1 of PROC 647 to determine which circuits are alarmed, indicated by a 2 (minor) or 3 (warning) displayed in the alarm status field.
Record the alarmed circuits displayed in Test 1 of PROC 600 or Test 1 of PROC 647.
2. Display the alarmed circuit in Test 1 of PROC 600 or Test 1 of PROC 647.
3. Enter PROC 647 Test 2.

Note: The alarmed circuit that was displayed in Test 1 of PROC 600 or Test 1 of PROC 647 is the default equipment location displayed in Test 2 of PROC 647.
4. Depress EXECUTE.

If Test 2 passes, proceed to Step 12.
5. If Test 2 fails, depress NEXT CIRCUIT.

Field 10 indicates the test state and Field 12 displays a fault code. Field 14 displays the number of fault codes for the failing circuit and Field 13 displays the index into the fault codes (equaling Field 14).
6. Record the test state displayed in Field 10 and the fault code displayed in Field 12 and proceed to Step 7.
7. If Field 13 (failure index) displays a 1, proceed to Step 10.

If Field 13 displays more than 1, proceed to Step 8.
8. Depressing NEXT FAULT repeatedly displays the remaining fault codes for the failing circuit.
Record each test state displayed in Field 10 and the associated fault code displayed in Field 12.
9. When all fault codes are displayed (Field $13=1$ ) depressing NEXT FAULT once more dashes Fields 12 through 14.
Proceed to Step 10.
10. Refer to Table BB, PROC 647 - Fault Code Definitions, for a list of the test state, fault codes, and definitions associated with each test state and fault code.
Proceed to Step 11 to perform corrective action.
11. Perform the corrective action listed below associated with the test state and fault code displayed in Fields 10 and 12 for the failing circuit.
12. Test 2 must be run for each alarmed circuit failure recorded in Test 1 of PROC 600 or Test 1 of PROC 647.
Repeat Steps 2 through 12 for each recorded alarmed circuit failure.
13. If all alarmed circuit failures pass Test 2, perform the CLEAR DATA; EXECUTE sequence in Test 1 of PROC 647 for each alarmed circuit to resolve the alarmed circuits and to turn off the OTHER FAILS fault indicator assuming no other alarm sources affecting the OTHER FAILS fault indicator are active.

TABLE BB.

| PROC 647 - FAULT CODE DEFINITIONS |  |  |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { fIELD } 10 \\ & \text { TEST STATE } \end{aligned}$ | FIELD 12 fault code | definition |
| 2 | 1 | ADFTC in use |
|  | 2 | ADFTC not available |
|  | 3 | ADFTC maintenance busied |
| 3 | 4 | No terminating test line (TTL) administered |
|  | 5 | Trunk in use |
|  | 6 | Cannot release busy the trunk |
| 4 | 1 | ADFTC in use (after Test State 2) |
|  | 67 | No test tone returned from far end (105 type only) |
|  | 68 | Originating test line (OTL) not assigned as rotary |
|  | 69 | ADFTC received unsent stop test message |
|  | 70 | ADFTC self-test fails |
|  | 71 | Bad I/O to or from OTL |
|  | 72 | Cannot seize originating register |
|  | 73 | Dialing of Trunk Verification by Station (TVS) feature failed |
|  | 74 | Code dialed did not match TVS feature access |
|  | 75 | Trunk group dial access code inappropriate |
|  | 76 | Software record incorrect |
|  | 77 | ADFTC and trunk cannot be connected |
|  | 78 | Intercept tone from near end |
|  | 79 | Reorder tone from near end - |
|  | 80 | Other unexpected tone |
|  | 81 | Ring no answer from near end |
|  | 82 | Unidentifiable interrupted tone |

TABLE BB. (Contd)

| Proc 647 - fault code definitions (Contd) |  |  |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { FIELD } 10 \\ & \text { TEST STATE } \end{aligned}$ | $\begin{aligned} & \text { FIED } 12 \\ & \text { FAUIT CODE } \end{aligned}$ | definition |
| $\begin{gathered} 4 \\ \text { (Contd) } \end{gathered}$ | 83 | Busy from far end |
|  | 84 | Far end release |
|  | 85 | No response from far end |
|  | 86 | No data returned from far end |
|  | 87 | Steady unidentifiable tone from far end |
|  | 88 | Broadband energy from far end (noise, voice, or recorded announcement) |
|  | 89 | Far end test line unavailable, timeout after waiting for test progress tone removal |
|  | 90 | Near end self-test failed |
|  | 91 | Far end loss self-test at 0 dbm 1004 Hz failed |
|  | 92 | Far end noise self-test failed |
|  | 93 | Far end high frequency singing return loss self-test failed |
|  | 94 | Far end echo return loss self-test failed |
|  | 95 | Far end singing return loss self-test failed |
|  | 96 | Far end loss self-test at -16 dbm 1004 Hz failed |
|  | 97 | Far end loss self-test at -16 dbm 404 Hz failed |
|  | 98 | Far end loss self-test at -16 dbm 2804 Hz failed |
|  | 99 | Far end noise with tone self-test failed |
| 5 and 6 | 0 | Passed all tests |
|  | 11 | Failed 404 Hz far end to near end deviation threshold |
|  | 12 | Failed 0 dbm loss far end to near end loss threshold |
|  | 13 | Failed 2804 Hz far end to near end deviation threshold |

TABLE BB. (Contd)

| PROC 647 - FAULT CODE DEFINITIONS (Contd) |  |  |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { FIELD } 10 \\ & \text { TEST STATE } \end{aligned}$ | $\begin{aligned} & \text { field } 12 \\ & \text { fauti code } \end{aligned}$ | definition |
| 5 and 6 (Contd) | 21 | Failed 404 Hz near end to far end deviation threshold |
|  | 22 | Failed 0 dbm loss near end to far end loss threshold |
|  | 23 | Failed 2804 Hz near end to far end deviation threshold |
|  | 31 | Failed 1004 Hz far end to near end level loss threshold |
|  | 32 | Failed 1004 Hz near end to far end level loss threshold |
|  | 33 | Failed near end C-message noise threshold |
|  | 41 | Failed far end C-message without tone noise threshold |
|  | 42 | Failed near end C-message with tone threshold |
|  | 43 | Failed far end C-message with tone threshold |
|  | 51 | Failed near end singing return loss low threshold |
|  | 52 | Failed near end echo return loss threshold |
|  | 53 | Failed near end singing return loss high threshold |
|  | 61 | Failed far end singing return loss low threshold |
|  | 62 | Failed far end echo return loss threshold |
|  | 63 | Failed far end singing return loss high threshold |

## Test state 2 -Fault codes 1 and 2

Repeat Test 2 on the same circuit.

## Test state 2 - Fault code 3

1. Perform Test 1 of PROC 646 and Test 4 of PROC 620 (unit type 62) to test the ADFTC. If the ADFTC passes both tests, proceed to Step 2.

If the ADFTC fails either test, perform corrective action as required and release the ADFTC from maintenance busy. Proceed to Step 3.
2. If the ADFTC passes PROC 646 and PROC 620, release the ADFTC from maintenance busy status and proceed to Step 3.
3. Repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.

## Test state 3 -Fault code 4

Administer the TTL.

## PROC 647 (R2V2 Only)

## Test state 3 - Fault code 5

Repeat Test 2 to camp-on the circuit until the circuit is available for testing.

## Test state 3 - Fault code 6

1. Perform Test 4 of PROC 620 to test the busy circuit.

Note: The circuit that was displayed in Test 2 of PROC 647 is the default equipment location displayed in Test 4 of PROC 620.
2. If Test 4 passes, release the circuit from busy and proceed to Step 3.

If Test 4 fails, take corrective action as appropriate and release the circuit from busy. Proceed to Step 3.
3. Repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.

## Test state 4 -Fault code 1

Repeat Test 2 on the same circuit.

## Test state 4 - Fault codes 67, 78 through 82, and 85 through 88

1. Perform Test 4 of PROC 620 to test the failing circuit.

Note: The circuit that was displayed in Test 2 of PROC 647 is the default equipment location displayed in Test 4 of PROC 620.
2. If Test 4 passes, proceed to Step 3.

If Test 4 fails, take corrective action as appropriate and repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.
Proceed to Step 8.
3. Use Test 2 of PROC 642 (terminal-to-trunk test call) to test the failing circuit.
4. Analyze how far the call went to the far end.

If the test call completely passes, repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status and proceed to Step 8.
5. If the test call is stuck at state 2 , proceed to Step 14.
6. If the test call fails (test call aborted - state 6), take corrective action as appropriate and repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.
Proceed to Step 8.
7. If the test call is answered by someone other than the intended party, i.e., recorded announcement, proceed to Step 13.
8. If Test 2 fails again with the same test state and fault code (test state 4, fault code 67,78 through 82 , or 85 through 88 ), proceed to Step 9 .
If Test 2 fails again with a different test state and/or fault code, perform corrective action as listed for the test state and fault code.
9. Perform Test 1 of PROC 646 and Test 4 of PROC 620 (unit type 62) to test the ADFTC.

If the ADFTC passes both tests, proceed to Step 10.
If the ADFTC fails either test, perform corrective action as required and proceed to Step 10.
10. Repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status. Proceed to Step 11.
11. If Test 2 fails again with the same test state and fault code (test state 4 , fault code 67,78 through 82 , or 85 through 88 ), proceed to Step 12.

If Test 2 fails again with a different test state and/or fault code, perform corrective action as listed for the test state and fault code.
12. Perform the following step in accordance with the fault code displayed.

Perform Step 13 for fault codes 67 , and 78 through 80.
Perform Step 14 for fault codes 81,82 , and 85 through 88.
13. Some type of translation trouble is indicated. Use translation procedure PROC $\mathbf{1 0 7}$ to correct the trouble.
14. A trouble with the far end terminating test line is indicated. Refer the trouble to the far end maintenance organization for further diagnosis.

## Test state 4 - Fault codes 68 and 72 through 75

When fault codes 68 , and 72 through 75 are recorded with a test state of 4 , some type of translation trouble is indicated.

## Fault code 68:

1. For fault code 68 (OTL not assigned as rotary), use translation procedures PROC 000 and PROC 010 to determine the assignment of the OTL.
2. If translation is correct, refer the trouble to switch engineers for further diagnosis.
3. If translation is not correct, administer the OTL and repeat Test 2 for the same circuit to determine the status.

## Fault code 72:

1. For fault code 72 (cannot seize originating register), use translation procedure PROC 254 to determine if originating registers are assigned.
2. If originating registers are assigned, refer the trouble to switch engineers for further diagnosis.

Note: Additional originating registers may be required.
3. If translation is not correct, administer the originating registers (as necessary) and repeat Test 2 for the same circuit to determine the status.

## Fault code 73:

1. For fault code 73 (dialing of TVS feature failed), repeat Test 2.
2. If Test 2 fails again with the same test state and fault code (test state 4 , fault code 73 ) use translation procedure PROC 107 Word 1 to determine the dial code assignment and trunk type of the TVS feature and proceed to Step 3.

Note: Refer to AT\&T System 85 Feature Translations Service Manual 555-101107, Issue 2 for definition and operation of PROC 107 Word 1.

## PROC 647 (R2V2 Only)

3. If Test 2 fails again with a different test state and/or fault code, perform corrective action as listed for the test state and fault code.
4. If translation is correct, refer the trouble to switch engineers for further diagnosis.
5. If translation is not correct, administer the dial code assignment of the TVS feature and repeat Test 2 for the same circuit to determine the status.

Fault code 74:

1. For fault code 74 (code dialed did not match TVS feature), repeat Test 2.
2. If Test 2 fails again with the same test state and fault code (test state 4, fault code 74) use translation procedure PROC 350 to determine the dial access code assignment of the TVS and proceed to Step 3.

Note: Refer to AT\&T System 85 Feature Translations Service Manual 555-101107, Issue 2 for definition and operation of PROC 350.
3. If Test 2 fails again with a different test state and/or fault code, perform corrective action as listed for the test state and fault code.
4. If translation is correct, refer the trouble to switch engineers for further diagnosis.
5. If translation is not correct, administer the dial access code assignment of the TVS feature and repeat Test 2 for the same circuit to determine the status.

## Fault code 75:

1. For fault code 75 (trunk group dial access code inappropriate) use translation procedures PROC 100 Word 1, PROC 175, PROC 010 Word 3, PROC 000 Word 1, and PROC 107, Word 1 to determine trunk type, trunk group translations, and restrictions.

Note: Refer to AT\&T System 85 Feature Translations Service Manual 555-101107, Issue 2 for definition and operation of PROC 100 Word 1, PROC 175, PROC 010 Word 3, PROC 001 Word 1, and PROC 107 Word 1.
2. If translation is correct, refer the trouble to switch engineers for further diagnosis.
3. If translation is not correct, administer the trunk group dial access code and repeat Test 2 for the same circuit to determine the status.

## Test state 4-Fault code 69

1. Repeat Test 2 of PROC 647 on the same circuit.

Determine the status of the circuit tested.
2. If Test 2 passes, corrective action is complete.

If Test 2 fails again with the same test state and fault code (test state 4, fault code 69) refer the trouble to the far end maintenance organization for further diagnosis.
3. If Test 2 fails again with a different test state and/or fault code, perform corrective action as listed for the test state and fault code.

## Test state 4-Fault codes 70, 71, and 90

1. Perform Test 1 of PROC 646 and Test 4 of PROC 620 (unit type 62) to test the ADFTC. If the ADFTC passes both tests, proceed to Step 2.
If the ADFTC fails either test, perform corrective action as required and proceed to Step 2.
2. Repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.

## Test state 4-Fault codes 76 and 77

1. Record the information displayed in Fields 2 through 15 for each circuit with a fault code of 76 or 77 .
2. When excessive entries (based on experience) are noted, refer the trouble to the switch engineers for further diagnosis.

## Test state 4-Fault codes 83 and 89

1. Record the information displayed in Fields 2 through 15 for each circuit with a fault code of 83 or 89 .
2. When excessive entries (based on experience) are noted, refer the trouble to the far end maintenance organization for further diagnosis.

Note: If fault codes 83 (busy from far end) and 89 (far end test line unavailable) occur often enough, more equipment may be needed to perform transmission measurements between the near end and far end.

## Test state 4-Fault codes 84, and 91 through 99

Refer the trouble to the far end maintenance organization for further diagnosis.

## Test state 5 or 6 - Fault codes 11 through 63

1. Perform Test 4 of PROC 620 to test the appropriate circuit.

Note: The circuit that was displayed in Test 2 of PROC 647 is the default equipment location displayed in Test 4 of PROC 620.
2. If Test 4 passes, refer the trouble to the facility responsible for connections between the near and far end.

If Test 4 fails, take corrective action as appropriate and proceed to Step 3.
3. Repeat Test 2 of PROC 647 on the same circuit that was failing to determine the status.

## Transmission Measurements

Measurement results include contributions from 3 sources:

1. The System 85 (near-end) switch.
2. The trunk circuit.
3. The switch at the location of the terminating test line (far-end).

## PROC 647 (R2V2 Only)

Table BC, PROC 647 Measurement Conversion Factors, provides the contributions of DIMENSION PBX's and System 85 switches used as OTL or TTL to the measurement results.

For example, for a CO trunk measurement, facility loss is determined by adding the measured loss on the MAAP display to the OTL conversion factor listed in Table BC plus the CO gain.
An example of computing facility loss is to add the following:

1. The measured loss on the MAAP display.
2. Table BC OTL listing.
3. CO gain (determined from far end switch) which is the location of the far end.

TABLE BC.

| PROC 647 - MEASUREMENT CONVERSION FACTORS |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{gathered} \text { SYSTEM } \\ \text { TYPE } \end{gathered}$ | test circuit CONNECTED | trunk TYPE | MEASUREMENT TYPE |  |  |
|  |  |  | toss | NOISE | return loss |
| SYSTEM 85 R2L2 (NEAR END) | ADFTC OTL <br> (SN-261) | CO F-N <br> CO N-F <br> TT F-N <br> TT N-F <br> D F-N <br> D N-F | $\begin{aligned} & -0.125 \\ & -0.125 \\ & -1.875 \\ & -1.875 \\ & -6.0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \quad 0 \\ & +\quad 0.125 \\ & 0 \\ & +\quad 1.875 \\ & 0 \\ & +\quad 6.0 \end{aligned}$ | $\begin{aligned} & 0 \\ & - \\ & - \\ & 0.25 \\ & 0 \\ & - \\ & -3.75 \\ & 0 \\ & - \\ & -6.0 \end{aligned}$ |
| "DIMENSION" <br> (FAR <br> END) | ANY TTL <br> (ZLC-12) <br> (56A) <br> (LC-145) | CO F-N <br> CO N-F <br> TT F-N <br> TT N-F <br> D F-N <br> D N-F | $\begin{aligned} & -0.3 \\ & -0.3 \\ & -2.3 \\ & -2.3 \\ & -2.3 \\ & -2.3 \end{aligned}$ | $\begin{aligned} & +0.3 \\ & 0 \\ & +2.3 \\ & 0 \\ & +2.3 \\ & 0 \end{aligned}$ | $\begin{gathered} -0.6 \\ 0 \\ -4.6 \\ 0 \\ -4.6 \\ -4 \end{gathered}$ |
| $\begin{gathered} \text { SYSTEM } \\ 85 \\ \text { R2L2 } \\ \\ \text { (FAR } \\ \text { END) } \end{gathered}$ | ADFTC TTL <br> (SN-261) | $\begin{array}{ll}\text { CO } & \text { F-N } \\ \text { CO } & \text { N-F } \\ \text { TT } & \text { F-N } \\ \text { TT } & \text { N-F } \\ \text { D } & \text { F-N } \\ \text { D } & \text { N-F }\end{array}$ | $\begin{aligned} & -0.125 \\ & -0.125 \\ & -1.875 \\ & -1.875 \\ & 0 \\ & -6.0 \end{aligned}$ | $\begin{aligned} & +0.125 \\ & 0 \\ & +\quad 1.875 \\ & 0 \\ & +6.0 \\ & 0 \end{aligned}$ | $\begin{aligned} & -0.25 \\ & 0 \\ & -3.75 \\ & 0 \\ & -6.0 \\ & 0 \end{aligned}$ |
| $\begin{gathered} \text { SYSTEM } \\ 85 \\ \text { (FAR } \\ \text { END) } \end{gathered}$ | $\begin{gathered} \text { FTC TTL } \\ \text { (SN-260) } \end{gathered}$ | $\begin{array}{ll}\text { CO } & \text { F-N } \\ \text { CO } & \text { N-F } \\ \text { TT } & \text { F-N } \\ \text { TT } & \text { N-F } \\ \text { D } & \text { F-N } \\ \text { D } & \text { N-F }\end{array}$ | $\begin{aligned} & -0.125 \\ & -0.125 \\ & -1.875 \\ & -1.875 \\ & 0 \\ & -6.0 \end{aligned}$ | $\begin{aligned} & \text { NA } \\ & 0 \\ & \text { NA } \\ & 0 \\ & \text { NA } \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { NA } \\ & 0 \\ & \text { NA } \\ & 0 \\ & \text { NA } \\ & 0 \end{aligned}$ |
| Abbreviations: |  |  |  |  |  |
|  | alog central -1 interface $r$-to-near end play) is the $n$ $r$ end measur AAP display) ar-to-far end play) is the ar end measu AAP display) t applicable iginating test alog tie trunk minating tes | ice trunk cuit pack easuremen r-end ent for no the neareasurement r-end ment for the near- <br> ircuit pack ine | uit pack <br> or loss w OR and retu <br> or loss wh OR <br> e and ret | OTL end oss wher OTL end loss whe | MAAP <br> TL end <br> AAP <br> OTL end |

PROC 650 - DCIU TESTS



## Purpose

PROC 650 is used when referenced from PROC 600 (Alarm causes/error log) or when the APPL PROCR AP INTER and MAJOR, MINOR, or WARNING fault indicators on the alarm panel are lighted.

PROC 650 is used to:

1. Display the failure history for the DCIU.
2. Allow manual resolving of the alarms activated because of a DCIU failure (which turns off the APPL PROCR AP INTER fault indicator).

Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.
3. Perform a DCIU circuit pack verification test, testing all circuits once and displaying the test results.
4. Detect failures in the DCIU link to the Applications Processor (AP) and isolate the failure to the DCIU or to the interface between the DCIU and the AP by performing internal and external loopback tests.
5. Automatically turn off the APPL PROCR AP INTER fault indicator when all circuits that caused an alarm are tested as good.

Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.
When performing an external manual looparound test, maintenance personnel must be at the customer's premises to further isolate failures associated with the data link between the DCIU and the AP.

Requirement: During external manual looparound testing, the data set must be set in Analog Loopback (AL), local loopback, or an RS449 looparound plug (female connector) must be connected to the back of the common control cabinet in order to determine if the DCIU or the interface to the AP is failing.

## Field Definitions and Codes

Each field of PROC 650 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BD, PROC 650 = Field Definitions and Codes.

Optional input fields are:

1. Field 1-Change test number.
2. Field 6 - Select specific data link ( 1 through 8 ) to be tested (Test 3 only).
3. Field 7 - Select type of loopback test to be performed (Test 3 only).

## Test Equipment Required

An RS449 looparound plug (female connector) is required to perform the manual external looparound test in Test 3.
The looparound test determines if an interface problem exists between the AP or data set which interfaces with the DCIU.

## Operation of Procedure

## Overview

PROC 650 is used to determine the cause of the APPL PROCR AP INTER fault indicator being lighted resulting from a DCIU failure.

To call in PROC 650, perform the following:

1. Depress PROC NO; 650; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Field 9 indicates the status of the DCIU and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

## PROC 650 Test 1

Three tests are available:

1. Test 1 - Displays DCIU failure history.
2. Test 2 - Performs a verification test on all DCIU circuit packs.
3. Test 3 - Performs a DCIU data link looparound test.

TABLE BD.

| PROC 650 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Fleti | Code | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | 9 | 0-3 | DCIU status. |
| 2-6 | $\begin{gathered} 0-99 \\ 0-7 \\ 0-3 \\ 16-18 \\ 1-8 \end{gathered}$ | Equipment location.. <br> Module number. <br> Cabinet number. <br> Carrier number. <br> Slot number. <br> Data link number. |  | 0 | On-line and operational. |
| 2 |  |  |  | 1 | Off-line and operational. |
| 3 |  |  |  | 2 | On-line and out of service. |
| 4 |  |  |  | 3 | Off-line and out of service. |
| 5 |  |  | 10 | 0-2 | Data link status. |
|  |  |  |  | 0 | Translated and operational. |
| 7 | 0-2 | Loopback test type. |  | 1 | Translated and busied out. |
|  | 0 | Internal loopback. |  | 2 | Not translated. |
|  | 1 | External manual loopback. | 11 | 0-15 | Failure index. |
|  | 2 | External automatic loopback. |  | 0-6 | Index into PMIDS failures |
| 8 | 1-5 | Alarm status. |  |  | (Test 1 only). |
|  | 1 | Major. |  | 0-15 | Index into DMIDS failures (Test 2 only). |
|  | 2 | Minor. | 12 | 0-99 | Fault code. |
|  | 3 | Warning. | 13 | 0-99 | Number of frames with failures ( 1000 bits per frame). |
|  | 4 | Errors recorded. | 14 | $\begin{gathered} 0- \\ 9999 \end{gathered}$ | Thousands of loopback test bits sent. |
|  | 5 | Alarm resolved. |  |  |  |

## Test 1

Test 1 displays failure history, in order of alarm severity, of the DCIU failures recorded by periodic on-line software. The failure history includes equipment location, alarm status, DCIU status and fault code information for each recorded failure.

Test. 1 is also used to manually turn off the APPL PROCR AP INTER fault indicator when all alarmed failures are resolved.

1. Test 1 is the default test when entering PROC 650, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. Upon initial entry to Test 1 , Field 1 displays a 1 , Field 9 displays the DCIU status and all other fields are dashed.
3. To start Test 1, depress EXECUTE.
4. If no DCIU failures exist, Field 11 (failure index) displays a 0.
5. If any DCIU failures exist, the first failure is displayed as follows:

Field 1-1.
Field 2 - Module number of displayed failure.
Field 3 - Cabinet number of displayed failure.
Field 4 - Carrier number of displayed failure.
Field 5 - Dashed or slot number of displayed failure.
Field 6 - Dashed or data link number of displayed failure.
Note: Fields 5 and 6 are dashed if a specific DCIU circuit pack or data link cannot be identified for the fault code displayed in Field 12.

Field 7 - Dashed.
Field 8 - Alarm status ( $1=$ major, $2=$ minor, $3=$ warning, or $4=$ errors recorded) of displayed failure.
Field 9 - DCIU status.
Field 10 - Dashed.
Field 11 - Failure index (total number of DCIU failing circuits; maximum of 6 ).
Field 12 - Fault code associated with the displayed failure.
Fields 13 and 14 - Dashed.
6. Depressing NEXT CIRCUIT repeatedly displays the remaining failures. Field 11 (failure index) is decremented each time NEXT CIRCUIT is depressed.
When all failures are displayed, depressing NEXT CIRCUIT once more dashes all fields except Fields 1 and 9.

Depressing NEXT CIRCUIT again causes the first failure to be displayed.
7. The CLEAR DATA, EXECUTE sequence can be used to manually resolve individual DCIU failures or all DCIU failures after EXECUTE is used to initiate Test 1 .

The failures that are resolved are those failures with an alarm status of 1,2 , or 3 displayed in Field 8.
8. To resolve individual DCIU failures with an alarm status of 1,2 , or 3 , perform the following:

Use NEXT CIRCUIT to display the failing circuit with an alarm status of 1,2 , or 3 on the MAAP.

Requirement: Individual DCIU failures cannot be resolved unless the failing circuit is displayed on the MAAP.

## PROC 650 Test 1 and Test 2

## Depress CLEAR DATA; EXECUTE.

9. Field 8 (alarm status) displays a 5 indicating that the failing circuit is resolved.

The APPL PROCR AP INTER fault indicator is turned off if no other DCIU failures exist.
10. If the CLEAR DATA; EXECUTE sequence is performed when Field 1 displays a 1 and Field 9 displays the DCIU status with all other fields dashed (initial display), all DCIU failures with an alarm status of 1,2 , or 3 are resolved and the APPL PROCR AP INTER fault indicator is turned off.
11. All DCIU failures with an alarm status of 1,2 , or 3 can be resolved upon entry to PROC 650 Test 1, and after displaying and recording all DCIU failures and then using NEXT CIRCUIT to display a 1 in Field 1, the DCIU status in Field 9 and all other fields dashed (initial display).

> Caution: The DCIU failures should be displayed and recorded in order that a record of the equipment location and fault code of each failure is available for maintenance personnel prior to manually resolving alarmed entries.
12. After initial entry to Test 1 and depressing EXECUTE, depress CLEAR DATA; EXECUTE.

All DCIU failures with an alarm status of 1,2 , or 3 are marked as resolved in PMIDS and the APPL PROCR AP INTER fault indicator is turned off.
13. After displaying and recording all DCIU failures, depress NEXT CIRCUIT until the initial display (Field $1=1$, Field $9=$ DCIU status, with all other fields dashed) is displayed, then depress CLEAR DATA; EXECUTE.

All DCIU failures with an alarm status of 1,2 , or 3 are marked as resolved in PMIDS and the APPL PROCR AP INTER is turned off.
14. The MAJOR, MINOR, or WARNING alarm indicator is also turned off if no other sources are affecting the alarm indicator.

## Test 2

Test 2 is used to test the entire DCIU. Test 2 performs the following:

1. Displays the current status of the DCIU.
2. Reads the Get-Off-The-Bus (GOTB) register to determine if the DCIU is operational or shutdown, and whether the RAM status is valid,
If RAM status is valid, reads RAM status words and stores any failures (as indicated by DCIU hardware) in DMIDS.

If RAM status is not valid, reads maintenance status register and stores circuit pack indictments in DMIDS.
3. Checks counters and mailbox entries for threshold failures recorded by hardware.
4. Performs an ID chip function test on each circuit pack.
5. Tests the parity checker/generator function.
6. Controls circuit pack LEDs for pass/fail indication.

Test 2 provides visual feedback to maintenance personnel on whether a problem is corrected by the use of RED and GREEN LEDs on the faceplate of the circuit pack that is reseated or replaced.
Test 2 provides alternate circuit pack replacements (if any) when the first circuit pack replaced does not correct the problem.
Test 2 allows for demand re-initialization of the DCIU (when required) by use of BUSY OUT and RELEASE BUSY OUT

Test 2 automatically turns off the APPL PROCR AP INTER fault indicator when all circuits that raised an alarm pass Test 2.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. Upon initial entry to Test 2, Field 1 displays a 2, Field 9 displays the DCIU status and all other fields are dashed.
3. To start Test 2, depress EXECU'TE.

The WAIT lamp on the MAAP is turned on while Test 2 is running.
4. When Test 2 is completed, the WAIT lamp is turned off.
5. If no failures are detected, Field 1 displays a 2, Field 8 (alarm status) displays a 5 if alarmed entries existed in PMIDS indicating the alarm entries are resolved, or a dash if there were no alarmed entries and Field 11 (failure index) displays a 0.

Note: The GREEN LEDs on TN406, TN405, and UN156 are turned on when no failures exist.
6. If any failures are detected, the first failure is displayed as follows:

Field 1-2.
Fields 2 through 6 - Equipment location of failed circuit.
Note: Fields 5 and/or 6 are dashed if a specific DCIU circuit pack or data link cannot be identified for the fault code displayed in Field 12.

Fields 7 and 8 - Dashed.
Field 9 - DCIU status.
Field 10 - Dashed or 0 through 2 (data link status).
Note: Field 10 (data link status) is dashed if Field 6 (data link) is dashed.
Field 11 - Failure index (total number of failures recorded in DMIDS).
Field 12 - Fault code associated with the failed circuit.
Fields 13 and 14 - Dashed.
Note: The RED LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack failed Test 2.
7. Depressing NEXT CIRCU1T displays an alternate circuit pack (if any) to be replaced.

The RED LED on the original circuit pack is turned off and the RED LED on the displayed circuit pack in Fields 2 through 6 is turned on.

## PROC 650 Test 2

8. Depressing NEXT CIRCUIT again displays the last alternate circuit pack (if any) to be replaced.

The RED LED on the first alternate circuit pack is turned off and the RED LED on the displayed circuit pack in Fields 2 through 6 is turned on.
9. When all alternate circuit packs are displayed, depressing NEXT CIRCUIT once more dashes Fields 2 through 6.

Depressing NEXT CIRCUIT again displays the first circuit pack in the replacement sequence.
10. Depressing NEXT FAULT repeatedly displays the remaining failures. Field 11 (failure index) is decremented each time NEXT FAULT is depressed.

When all failures are displayed, depressing NEXT FAULT again dashes all fields except Fields 1 and 9.

Depressing NEXT FAULT once more displays the first failure again.
11. The APPL PROCR AP INTER fault indicator is automatically turned off when Test 2 completes with no failures detected for all DCIU circuits that raised an alarm.

Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.
12. The MAJOR, MINOR, or WARNING alarm indicator is also turned off if no other sources are affecting the major, minor, or warning alarm indicator.

When required, a demand re-initialization of the DCIU can be performed by use of BUSY OUT and RELEASE BUSY OUT.

Re-initialization of the DCIU is performed as follows:

1. Enter PROC 650 Test 2, and depress EXECUTE.
2. Depress BUSY OUT.
3. When special error code 80 (busy out key pressed once) is displayed in the MAAP error code field, depress BUSY OUT again.

Requirement: BUSY OUT must be depressed twice to re-initialize the DCIU. Special error code 80 must be displayed in the MAAP error code field before BUSY OUT is depressed the second time.

Field 9 (DCIU status) changes to 2 (on-line and out-of-service) when BUSY OUT is depressed the second time.
4. Depress RLS BUSY OUT

Field 9 (DCIU status) changes to 0 (on-line and operational) when RLS BUSY OUT is depressed.
5. If special error code 85 (DCIU reinit failed) is displayed in the MAAP error code field, demand re-initialization of the DCIU failed.
6. If special error code 87 (restore maintenance busy; data links failed) is displayed in the MAAP error code field, depress BUSY OUT to place the DCIU in maintenance busy status.

Perform Test 3 to determine the reason for the data link failures.

## Test 3

Test 3 is used to test a data link continuously.
Test 3 executes three types of looparound testing and allows for busying out individual data links.

1. Internal looparound testing is performed to test the data link interface hardware (UN156 circuit pack).
2. External looparound testing is performed to test the data link cabling between the backplane and the connector; and between the connector and the data set.
The three types of looparound testing are:
3. Internal: for either an on-line or off-line DCIU data link loops the test vector defined by the DCIU firmware at the High Level Data Link (HDLC) interface.
4. External manual: for an on-line DCIU data link loops the test vector defined by the DCIU firmware at an external looparound such as a local area data set AL key operation, external looparound plug, etc.
5. External automatic: for an on-line DCIU data link loops the test vector defined by the DCIU firmware at an external looparound activated by the RS449 EIA loopback signal.

Note: External automatic looparound testing cannot currently be performed. An RS449 compatible data set must be used in order for external automatic looparound testing to work correctly. At present compatible RS449 data sets are not available.

Maintenance personnel must be on the customer's premises to perform the external manual looparound test. Equipment must be disconnected and a looparound adapter installed, or the AL key on the data set depressed.

The external manual looparound test is described in the Repair Guide part of PROC 650.
Test 3 monitors the looparound testing at a rate of about 10,000 bits sent per 90 seconds. At least 100,000 bits, requiring 15 minutes should be monitored without error prioring to halting Test 3.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. Upon initial entry to Test 3, Field 1 displays a 3, Fields 2 through 6 display the default data link, Field 7 displays a 0 (default loopback test type), Field 9 displays the DCIU status, Field 10 displays the data link status and all other fields are dashed.
3. To test the default data link, proceed to Step 5.
4. To select another data link to be tested, depress NEXT CIRCUIT until the data link to be tested is displayed in Field 6.
Proceed to Step 5.
Note: Depressing NEXT CIRCUIT cycles Field 6 from 1 through 8 and back to 1.
5. Prior to starting Test 3 , it must be determined which type of loopback test is to be performed. The loopback field defaults to 0 which indicates that an internal loopback test is performed without further input by maintenance personnel.

Note: An internal loopback test is used to test the UN156 circuit pack. An external loopback test is used to test the data link cabling.

## PROC 650 Test 3

6. The internal loopback test should be performed first, and if required, the external loopback test(s) should be performed when it is necessary to further isolate a problem with the HDLC.

Note: Only an internal loopback test can be performed on the off line DCIU data link.
7. When compatible RS449 data sets are available, the external automatic loopback test is performed without connecting any equipment by setting Field 7 to 2 as follows:
CHANGE FIELD; 7; ENTER; 2; ENTER.
Note: At present compatible RS449 data sets are not available and the external automatic loopback test cannot be performed.

Proceed to Step 9.
8. The external manual loopback test assists in isolating a problem between the DCIU and the AP.

The external manual loopback test requires that the loop be closed manually.
The external manual loopback test must be performed when maintenance personnel are on the customer's premises as equipment must be disconnected and a looparound adapter installed or the AL key depressed.

The external manual loopback test is described in the Repair Guide part of PROC 650.
9. Prior to starting Test 3 , the data link must be busied out or untranslated.

Check the data link status displayed in Field 10.
10. If the data link is busied out ( 1 displayed in Field 10), proceed to Step 13.

If the data link is untranslated ( 2 displayed in Field 12), proceed to Step 13.
11. If the data link is translated and operational ( 0 displayed in Field 10), depress BUSY OUT.

Note: Special error code 82 (See Note 2) indicating that BUSY OUT is not valid for untranslated data links may be displayed in the MAAP error code field.
12. When special error code 80 (busy out key pressed once) is displayed in the MAAP error code field, depress BUSY OUT again.

Requirement: BUSY OUT must be depressed twice to perform looparound testing. Special error code 80 must be displayed in the MAAP error code field before BUSY OUT is depressed the second time.

Proceed to Step 13.
13. To start Test 3 after selecting the data link to be tested and the type of loopback, depress EXECUTE.

The WAIT indicator is not turned on during Test 3 execution.
14. The following special error codes may be displayed in the MAAP error code field when EXECUTE is depressed.
Special error code 81 (See Note 1) indicates that the data link must be busied out prior to performing Test 3.
Special error code 83 (See Note 3) indicates that only internal loopback testing of the data link is allowed on the off-line side of the common control.
15. During execution of Test 3 , the following fields are displayed:

Field 1-3.
Fields 2 through 6 - Equipment location of data link being tested.
Field 7-0,1, or 2 (Type of loopback test).
Field 8 - Dashed.
Field 9 - DCIU status.
Field 10 - Data link status ( $1=$ Translated and busied out, $2=$ Untranslated ).
Fields 11 and 12 - Dashed.
Field 13-0 through 99 (Number of frames with failures, 1000 bits per frame).
Field 14-1 through 9999 (Thousands of bits sent).
16. During execution of Test 3, the following fields are updated after every 2000 ( 2 frames) bits are sent:
Field 13 - Number of frames with failures, 1000 bits per frame (if any).
Field 14 - Thousands of bits sent.
Note: Test 3 monitors loopback testing at a rate of about 10,000 bits sent per 90 seconds. (Multiples of 10 displayed in Field 14.)
17. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.

The testing time required to determine if the data link is functioning properly is approximately 15 minutes. (At least 100,000 bits sent.)
It is recommended that 1 million bits (approximately 2 and $1 / 2$ hours) be monitored when performing Test 3 in the off-line common control.

Note: Failure rate (Field 13) should be less than 1. per 100,000 bits sent (i.e., 100 displayed in Field 14). If Field 14 is less than 1000, results are not conclusive if Field 13 is less than 10 .
18. If no failures occur after 10,000 bits are sent ( 10 displayed in Field 14), the GREEN LED on UN156 is turned on. As soon as a failure is detected (before or after 10,000 bits are sent) the RED LED on UN156 is turned on and the GREEN LED (if lighted) is turned off.
19. When Test 3 is stopped, the results of the loopback test is displayed in Fields 13 and 14 and the RED or GREEN LED is lighted on UN156.
If the failure rate displayed in Field 13 is more than 1 per 100,000 bits sent (i.e., 100 displayed in Field 14), the data link failed the loopback test.
If the RED LED on UN156 is lighted, at least $\mathbf{i}$ failure occurred. If the threshold is not exceeded (indicated by Fields 13 and 14), Test 3 passed. If the threshold is exceeded, Test 3 failed.
20. When Test 3 is completed for the data link being tested, the data link should be released from busy. To release busy the data link, perform the following:
Depress RLS BUSY OUT

Note: Special error code 82 (See Note 2) indicating that RLS BUSY OUT is not valid for untranslated data links may be displayed in the MAAP error code field. Untranslated data links cannot be released from busy.
21. If special error code 87 (restore maintenance busy; data links failed) is displayed in the MAAP error code field, depress BUSY OUT to place the DCIU in maintenance busy status.
Perform corrective action as required to restore the failed data links.
22. When another data link is to be continuously tested, the CHANGE FIELD sequence must be used to select the data link:
CHANGE FIELD; 6; ENTER; (Data link 1 through 8); ENTER.
23. Repeat Steps 5 through 21 to test the new data link.

## Repair Guide

When the APPL PROCR AP INTER and MAJOR, MINOR, or WARNING fault indicators on the alarm panel are lighted (indicating a DCIU failure) or when PROC 650 is referenced from PROC 600 (Alarm causes/error $\log$ ) as a potential problem, the following steps should be performed, in the order listed, to isolate and repair the faulty unit.

## General

1. Execute Test 1.

Step through the failure history and record the equipment location and fault codes associated with each failure.

Note: Fields 5 and 6 are dashed if a specific DCIU circuit pack or data link cannot be identified for the fault code displayed in Field 12.
2. Execute Test 2.

If all circuits pass Test 2, the APPL PROCR AP INTER fault indicator is turned off.
Note: The GREEN LED on each DCIU circuit pack (TN406, TN405, and UN156) are turned on when no failures exist.
3. If all circuits pass Test 2, perform Looparound Testing (below) for those failures recorded in Test 1 with a fault code of 6 , or 31 through 34 and an alarm status of major, minor, or warning ( 1,2 , or 3 ) to ensure that no intermittent problems exist with data links.
4. If any failures are detected in Test 2, display the failure on the MAAP.
5. Record the equipment location displayed in Fields 2 through 6 and the fault code displayed in Field 12 which is detected by the demand diagnostic test and logged in DMIDS.

Note: The RED LED is lighted on the circuit pack to indicate to maintenance personnel that the circuit pack failed Test 2.
6. Determine if fault code 20 through 35 is displayed in Field 12.

If fault code 20 through 35 is not displayed in Field 12, proceed to Step 7.

If fault code 20 through 35 is displayed in Field 12, repeat Test 2.
Note: Fault codes 20 through 35 may not be solid failures because the accumulated count needs to be cleared.

If fault code 20 through 25 is still displayed in Field 12 after repeating Test 2, proceed to Step 7.
7. At the equipment location displayed in Fields 2 through 5 , replace the circuit pack with the RED LED lighted.

Caution: Reseating or replacing TN406 without use of the GO/HALT switch causes a partial reload. Replace $T N 406$ in the common control carrier as detailed in SWITCH COMPONENT REPLACEMENT - CIRCUIT PACK REPLACEMENTS.
8. Repeat Test 2.

If Test 2 passes, the APPL PROCR AP INTER fault indicator is turned off.
Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.
Perform Demand Re-initialization (below), if required.
9. If Test 2 fails, step through the failures to determine if the same failure exists.

If different failures exist, proceed to Step 21.
10. If the same failure exists, display the failure on the MAAP.

Depress NEXT CIRCUIT to determine if an alternate circuit pack replacement is available.
If all fields except Fields 1 and 9 are dashed, no alternate circuit pack is available for replacement.

Proceed to Step 20.
11. If an alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 2 through 5.
Record the equipment location displayed in Fields 2 through 6 and the fault code displayed in Field 12 which is detected by the demand diagnostic test and logged in DMIDS.

The RED LED on the original circuit pack is turned off, and the RED LED on the alternate circuit pack is turned on.
12. At the equipment location displayed in Fields 2 through 5, replace the alternate circuit pack.

Caution: Reseating or replacing TN406 without use of the GO/HALT switch causes a partial reload. Replace $T N 406$ in the common control carrier as detailed in SWITCH COMPONENT REPLACEMENT - CIRCUIT PACK REPLACEMENTS.
13. Repeat Test 2.

If Test 2 passes, the APPL PROCR AP INTER fault indicator is turned off.
Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.

Perform Demand Re-initialization (below), if required.
14. If Test 2 fails, step through the failures to determine if the same failure exists.

If different failures exist, proceed to Step 21.
1.5. If the same failure exists, display the failure on the MAAP.

Depress NEXT CIRCUIT to determine if another alternate circuit pack replacement is available.

If all fields except Fields 1 and 9 are dashed, no alternate circuit pack is available for replacement.

Proceed to Step 20.
16. If another alternate circuit pack exists, the equipment location of the circuit pack is displayed in Fields 2 through 5.
Record the equipment location displayed in Fields 2 through 6 and the fault code displayed in Field 12 which is detected by the demand diagnostic test and logged in DMIDS.

The RED LED on the first alternate circuit pack is turned off, and the RED LED on the second alternate circuit pack is turned on.
17. At the equipment location displayed in Fields 2 through 5, replace the second alternate circuit pack.

> Caution: Reseating or replacing TN406 without use of the GO/HALT switch causes a partial reload. Replace TN406 in the common control carrier as detailed in SWITCH COMPONENT REPLACEMENT - CIRCUIT PACK REPLACEMENTS.
18. Repeat Test 2.

If Test 2 passes, the APPL PROCR AP INTER fault indicator is turned off.
Note: DCIU alarmed circuit entries in PMIDS are marked as resolved.
Perform Demand Re-initialization (below), if required.
19. If Test 2 fails, step through the failures to determine if the same failure exists.

If different failures exist, proceed to Step 21.
20. If the same failure exists, determine if fault codes 6,15 , or 31 through 35 were recorded.

If fault code 15 was recorded, perform PROC 614 (Memory read/memory match tests) to isolate the cause of the problem.

- If fault code 6, or 31 through 35 was recorded, perform Looparound Testing External Manual (below) to isolate the cause of the problem.
If fault codes 6,15 , or 31 through 35 were not recorded, refer to Fault Codes (below) for further isolation techniques.

21. If the same failure is not displayed, but Test 2 fails with other failures, repeat Steps 4 through 21 as appropriate.

## Demand Re-initialization

When required, a demand re-initialization of the DCIU can be performed by use of BUSY OUT and RELEASE BUSY OUT.
Re-initialization of the DCIU is performed as follows:

1. Enter PROC 650 Test 2, and depress EXECUTE.
2. Depress BUSY OUT.
3. When special error code 80 (busy out key pressed once) is displayed in the MAAP error code field, depress BUSY OUT again.

Requirement: BUSY OUT must be depressed twice to re-initialize the DCIU. Special error code 80 must be displayed in the MAAP error code field before BUSY OUT is depressed the second time.

Field 9 (DCIU status) changes to 2 (on-line and out-of-service) when BUSY OUT is depressed the second time.
4. Depress RLS BUSY OUT

Field 9 (DCIU status) changes to 0 (on-line and operational) when RLS BUSY OUT is depressed.
5. If special error code 85 (DCIU reinit failed) is displayed in the MAAP error code field, demand re-initialization of the DCIU failed.
6. If special error code 87 (restore maintenance busy; data links failed) is displayed in the MAAP error code field, depress BUSY OUT to place the DCIU in maintenance busy status.
Perform Looparound Testing (below) to determine the reason for the data link failures.

## Looparound Testing

## Overview

The three types of looparound testing are internal, external manual, and external automatic.

1. Internal looparound testing is performed to test the data link interface hardware (UN156 circuit pack).
2. External looparound testing is performed to test the data link cabling between the backplane and the connector; and between the connector and the data set.

Note: External automatic looparound testing cannot currently be performed. An RS449 compatible data set must be used in order for external automatic looparound testing to work correctly. At present compatible RS449 data sets are not available.
3. When failures are recorded in Test 1 but pass Test 2 without corrective action being taken (i.e., replacing a circuit pack) looparound testing should be performed on those failures with a fault code of 6 , or 31 through 34 and an alarm status of major, minor, or warning.

The internal loopback test should be performed first, and if required, the external loopback test(s) should be performed when it is necessary to further isolate a problem with the HDLC.
4. Only an internal loopback test can be performed on the off-line DCIU data link.

## PROC 650

## Internal

Internal loopback testing of an on-line or off-line DCIU data link is performed as follows:

1. Enter Test 3 of PROC 650 and select the data link to be tested.
2. Busy out the data link to be tested.

Requirement: BUSY OUT must be depressed twice to perform looparound testing.
3. Internal loopback testing encode 0 is displayed by default in Field 7.
4. Depress EXECUTE.

The WAIT indicator is not turned on during Test 3 execution.
5. During execution of Test 3 , the following fields are incremented:

Field 13 - Failures per thousands of bits sent.
Field 14 - Thousands of bits sent.

Note: Test 3 monitors loopback testing at a rate of about 10,000 bits sent per 90 seconds. (Multiples of 10 displayed in Field 14.)
6. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
The testing time required to determine if the data link is functioning properly is approximately 15 minutes. (At least 100,000 bits sent.)

It is recommended that 1 million bits (approximately 2 and $1 / 2$ hours) be monitored when performing Test 3 in the off-line common control.
7. If no failures occur after 10,000 bits are sent ( 10 displayed in Field 14), the GREEN LED on UN156 is turned on. As soon as a failure is detected (before or after 10,000 bits are sent) the RED LED on UN156 is turned on and the GREEN LED (if lighted) is turned off.
8. When Test 3 is stopped, the results of the loopback test is displayed in Fields 13 and 14.

The LED on UN156 is off if 10,000 bits were not sent or the RED or GREEN LED is lighted on UN156.
9. If the failure rate displayed in Field 13 is more than 1 per 100,000 bits sent (i.e., 100 displayed in Field 14), the data link failed the loopback test.
10. If the RED LED on UN156 is lighted at least 1 failure occurred. If the threshold is not exceeded (indicated by Fields 13 and 14), Test 3 passed. If the threshold is exceeded, Test 3 failed.

Note: Failure rate (Field 13) should be less than 1 per 100,000 bits sent (i.e., 100 displayed in Field 14). If Field 14 is less than 1000 , results are not conclusive if Field 13 is less than 10 .
11. If Test 3 passes and a data link problem is still suspected, perform External Manual Looparound Testing (below) to isolate the trouble.
If Test 3 passes, and no data link problem is suspected, repeat Test 2 to resolve the alarm cause and turn off the APPL PROCR AP INTER fault indicator.

## PROC 650

12. If Test 3 fails, replace UN156.

Repeat Test 3.
13. If Test 3 passes, repeat Test 2 to resolve the alarm cause and turn off the APPL PROCR AP INTER fault indicator.
14. If Test 3 fails again, and a data link problem is still suspected perform external manual Looparound Testing (below) to isolate the trouble.
If Test 3 fails again, and a data link problem is not suspected refer to Fault Codes (below) for further isolation techniques.
15. When Test 3 is completed for the data link being tested, release the data link from busy out.

## External Manual

Performing the external manual loopback test to isolate an interface problem between the DCIU and the AP results in message handling being suspended for the data link being tested.
External manual loopback test is initiated with the AL key (or local loopback button) on a data set, or connecting an RS449 looparound plug to the back of the common control. Both methods are presented below.

External manual loopback testing of an on-line only DCIU data link is performed as follows:

1. Enter Test 3 of PROC. 650 and select the data link to be tested.
2. Busy out the data link to be tested.

Requirement: BUSY OUT must be depressed twice to perform looparound testing.
3. Determine if a data set is the interface between the AP and the DCIU data link.

If a data set is the interface, proceed to Step 4.
If a data set is not the interface, proceed to Step 5.
4. Depress the $\mathbf{A L}$ key (or local loopback button) on the data set.

When AL is depressed, the MB, TR, MR, and TM LEDs on the data set are turned on.
The TR LED indicates that the data set detects the terminal ready signal from the switch.
Proceed to Step 7.
5. At the rear of the common control cabinet, disconnect the cable from the common control connector ( $\mathrm{F}^{*}$ ) corresponding to the UN 1.56 slot and data link that is failing.

Cable designations are: F0 through F7 = Data link 1 through 8; i.e., F3 = Data link 4.
6. Connect the RS449 looparound plug to the $F^{*}$ connector corresponding to the UN156 slot and data link that is failing and proceed to Step 7.
7. The external manual loopback test is performed by setting Field 7 to 1 as follows:

CHANGE FIELD; 7; ENTER; 1; ENTER.
8. Depress EXECUTE.

The WAIT indicator is not turned on during Test 3 execution.
9. During execution of Test 3 , the following fields are incremented:

Field 13 - Failures per thousands of bits sent.
Field 14 - Thousands of bits sent.
Note: Test 3 monitors loopback testing at a rate of about 10,000 bits sent per 90 seconds. (Multiples of 10 displayed in Field 14.)
10. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
The testing time required to determine if the data link is functioning properly is approximately 15 minutes. (At least 100,000 bits sent.)
11. If no failures occur after 10,000 bits are sent ( 10 displayed in Field 14) , the GREEN LED on UN156 is turned on. As soon as a failure is detected (before or after 10,000 bits are sent) the RED LED on UN156 is turned on and the GREEN LED (if lighted) is turned off.
12. When Test 3 is stopped, the results of the loopback test is displayed in Fields 13 and 14, and the RED or GREEN LED is lighted on UN156.
If the failure rate displayed in Field 13 is more than 1 per 100,000 bits sent (i.e., 100 displayed in Field 14), the data link failed the loopback test.

If the RED LED on UN156 is lighted at least 1 failure occurred. If the threshold is not exceeded (indicated by Fields 13 and 14), Test 3 passed. If the threshold is exceeded, Test 3 failed.

Note: Failure rate (Field 13) should be less than 1 per 100,000 bits sent (i.e., 100 displayed in Field 14). If Field 14 is less than 1000, results are not conclusive if Field 13 is less than 10 .
13. If Test 3 passes, determine which method of external manual looparound testing was performed.

If the AL key (or local loopback button) was depressed, repeat Test 2 to resolve the alarm cause and turn off the APPL PROCR AP INTER fault indicator.

If an RS449 looparound plug was used, refer the data set problem to the appropriate personnel.
14. If Test 3 fails, determine which method of external manual looparound testing was performed.

If the AL key (or local loopback button) was depressed, repeat Steps 5 through 12 using an RS449 looparound plug and proceed to Step 15.
If an RS449 looparound plug was used, refer to Fault Codes (below) for further isolation techniques.
15. If Test 3 now passes using the RS449 looparound plug, refer the data set problem to the appropriate personnel.

If Test 3 fails again, refer to Fault Codes (below) for further isolation techniques.
16. Release the AL key (or local loopback button) or connect the cable to the connector on the back of the common control carrier as appropriate.
17. When Test 3 is completed for the data link being tested, release the data link from busy out.

## PROC 650

## Fault Codes

Further isolation of a DCIU failure may be accomplished by analyzing the fault codes recorded from Test 1 (PMIDS) and Test 2 (DMIDS).

1. Determine from Table BE, PROC 650 - Fault Code Definitions, if any additional corrective action can be performed (i.e., cabling, connectors, etc.).
2. Check the wiring associated with the circuit pack(s) replaced (point to point depending upon specific fault code recorded).

TABLE BE.

| PROC 650 <br> fault code definitions |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fault CODE | CKT 1 | CKT 2 | CKT 3 | DEFINITION | $\begin{gathered} \text { ALARM } \\ \text { TYPE } \end{gathered}$ |
| 1 | TN406 | TN405 |  | Shutdown bit detected maintenance register | MAJOR |
| 2 | TN406 |  |  | RED LED on TN406 maintenance register | MAJOR |
| 3 | TN405 | TN406 | UN156 | TN405 unhealthy maintenance register | MAJOR |
| 4 | UN156 | TN406 | TN405 | UN156 unhealthy maintenance register | MAJOR |
| 5 | TN406 |  |  | No failures in maintenance register but status control RAM not good | MAJOR |
| 6 | $\begin{aligned} & \text { DL } \\ & {[1]} \end{aligned}$ | UN156. |  | Status control RAM indicts assigned DL | MAJOR |
| 7 | UN156 | $\begin{aligned} & \text { LB } \\ & {[2]} \end{aligned}$ |  | Status control RAM indicts unassigned DL | WARN |
| 8 | TN406 |  |  | Status control RAM indicts 8086, DPROM, memory mapper, or firmware | MAJOR |
| 9 | TN405 | TN406 | $\begin{aligned} & \text { LB } \\ & {[2]} \end{aligned}$ | Status control RAM indicts local RAM | MAJOR |
| 10 | TN406 |  |  | Status control RAM indicts 501CC interface | MAJOR |
| 11 | TN405 | TN406 | UN156 | Status control RAM indicts DCIU I/O | MAJOR |
| 12 | TN406 |  |  | GOTB indicates shutdown by nothing else | MAJOR |
| 13 | $\begin{gathered} \mathrm{S} / \mathrm{H} \\ {[3]} \end{gathered}$ | TN406 |  | System bus time-out | MINOR |
| 14 | $\begin{gathered} \mathrm{S} / \mathrm{H} \\ {[3]} \end{gathered}$ | TN406 |  | Single byte parity errors | MINOR |
| 15 | $\begin{gathered} \text { MEM } \\ {[4]} \end{gathered}$ | TN406 |  | Double byte parity errors | MINOR |
| 16 | $\underset{[3]}{\mathrm{S} / \mathrm{H}}$ | TN406 |  | Write protect violations | MINOR |
| 17 | TN405 | $\begin{aligned} & \text { LB } \\ & {[2]} \end{aligned}$ |  | RAM parity errors | MAJOR |

TABLE BE. (Contd)

| PROC 650 <br> fault code definitions (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fault CODE | CKI 1 | CKT 2 | CKT 3 | definition | $\begin{gathered} \text { ALARM } \\ \text { TYPE } \end{gathered}$ |
| 18 | TN406 |  |  | Sanity time-outs | MAJOR |
| 19 | TN405 | TN406 | UN156 | Local bus time-out | MAJOR |
| 20 | TN406 | $\begin{gathered} \mathrm{S} / \mathrm{H} \\ {[3]} \end{gathered}$ |  | Occupancy less than 9000 | WARN |
| 21 | TN406 | $\begin{gathered} \mathrm{S} / \mathrm{H} \\ {[3]} \end{gathered}$ |  | Occupancy less than 4500 | MINOR |
| 22 | TN406 |  |  | Primary queue errors | MINOR |
| 23 | TN406 |  |  | Secondary queue errors | MINOR |
| 24 | TN406 |  |  | Translation errors | MINOR |
| 25 | TN406 |  |  | Memory mapper errors | MINOR |
| 26 | TN405 | TN406 |  | Protocol timer audits | MINOR |
| 27 | TN405 |  |  | RAM parity checker/generator | MAJOR |
| 28 | TN405 | TN406 |  | Memory access | MAJOR |
| 29 | $\mathrm{S} / \mathrm{H}$ <br> [3] | TN406 |  | Write protect register audit | MAJOR |
| 30 | $\mathrm{S} / \mathrm{H}$ [3] | TN406 |  | Write protect register test | MAJOR |
| 31 | $\begin{aligned} & \mathrm{DL} \\ & {[1]} \end{aligned}$ | UN156 |  | HDLC (Receive) | MAJOR |
| 32 | $\begin{gathered} \mathrm{DL} \\ {[1]} \end{gathered}$ | UN156 |  | HDLC (Transmit) | MAJOR |
| 33 | $\begin{aligned} & \text { DL } \\ & {[1]} \end{aligned}$ | UN156 |  | Set Asynchronous Balanced Mode (SABM'S) | MAJOR |
| 34 | $\begin{aligned} & \text { DL } \\ & {[1]} \end{aligned}$ | UN156 |  | Frames retransmitted | MINOR |

TABLE BE. (Contd)

| PROC 650FAULT CODE DEFINITIONS (Contd) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fault CODE | ckt 1 | CKT 2 | CKT 3 | defintion | $\begin{aligned} & \text { ALARM } \\ & \text { TYPE } \end{aligned}$ |
| 35 | UN156 | $\begin{aligned} & \mathrm{DL} \\ & {[1]} \end{aligned}$ |  | Loopback test error rate (off-line only) | MINOR |
| 36 | TN406 | TN405 | UN156 | Re-initialization failed | MAJOR |
| 37 | - TN406 |  |  | Mailbox request failed | MINOR |
| 38 | TN406 |  |  | INIT B shutdown DCIU | MAJOR |
| 39 |  |  |  | PROC 650 exited with DCIU busy | MAJOR |
| 40 | TN406 |  |  | System I/O error | MINOR |
| 41 | TN406 |  |  | Counter request failed | WARN |
| 42 | TN406 | TN405 | UN156 | Re-initialization failed and stopping DT tests failed also | MAJOR |
| 43 | TN406 | TN405 | UN156 | State vector send failed | MAJOR |
| 44 | TN406 |  |  | State of health bad, no failures in status control RAM | WARN |
| 45 |  |  |  | PROC 650 ID chip failure | NONE |
| 46 | TN406 |  |  | PROC 650 parity CMD failure | NONE |
| [1] DL = Data link <br> [2] LB $=$ Local bus <br> [3] $\mathrm{S} / \mathrm{H}=$ Software/Hardware <br> [4] $\mathrm{MEM}=$ Main memory |  |  |  |  |  |

PROC 652 - TIME-OF-DAY CLOCK SYNCHRONIZER


## Purpose

PROC 652 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from a time-of-day clock synchronizer failure.
PROC 652 is used to:

1. Display the equipment location of the time-of-day clock synchronizer and related failures causing a failure indication.
2. Display the maintenance busy status and alarm status of the time-of-day clock synchronizer.
3. Set the time-of-day clock synchronizer to the correct time of day.

When the switch does not include a hardware clock, Test 3 of PROC 652 may be used to set the software clock.

## Field Definitions and Codes

Each field of PROC 652 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BF, PROC 652 - Field Definitions and Codes.
Optional input fields are:

1. Field 1-Change test number.
2. Fields 7 through 12 - Set time and date of software or hardware time-of-day clocks (Test 3 only).

TABLE BF.

| PROC 652 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | code | definition | FIELD | CODE | definition |
| 1 | 1-3 | Test number. | 6 | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Clock type <br> (Tests 2 and 3): <br> Software clock. Hardware clock. |
| 2 | 0 | Common control carrier. |  |  |  |
| 3 | 32 | LC144 slot number. | 7 | 1-12 |  |
| 4 | 0123 | Maintenance busy status: <br> Not busied out, not alarmed Busied out, not alarmed Not busied out, alarmed Busied out, alarmed |  |  | Month. |
|  |  |  | 8 | 1-31 | Day. |
|  |  |  | 9 | Dash | Not used with hardware clock display. |
|  |  |  |  | 1-99 | Year for software clock time and date display. |
|  |  |  | 10 |  | Hours of the day: |
| 5 | 1 2 3 <br> 4 <br> 5 <br> 6 <br> 7 <br> 8 <br> 9 <br> 10 | Failure codes: <br> No response. <br> Battery failure. <br> Battery status stuck good. <br> No change in time since last read. <br> Software time updated after initialization. Small difference between software and hardware clock times. Large difference between software and hardware clock times. Software assumed correct. <br> Invalid time values from hardware. Invalid time values from software. Clock set failure. |  | $\begin{gathered} 0 \\ 1-11 \\ 12 \\ 13-23 \end{gathered}$ | Midnight. <br> 1 through 11 am . <br> Noon <br> 1 through 11 pm . |
|  |  |  | 11 | 0-59 | Minutes. |
|  |  |  | 12 | 0-59 | Seconds. |
|  |  |  | 13 | $\begin{gathered} 0 \\ 1-6 \end{gathered}$ | Failure Index: <br> Failure summary. Index into failure history. |
|  |  |  | 14 | 1-99 | Failure summary: Sum of approximate number of failures per hour for all failures. <br> Failure History: Approximate number of failures per hour for failure code being displayed. |

TABLE BF. (Contd)

\left.| PROC 652 |  |  |  |
| :---: | :---: | :--- | :---: |
| FIELD DEFINITIONS AND CODES (Contd) |  |  |  |$\right]$| FIELD | CODE |
| :---: | :--- |

## Operation of Procedure

## Overview

PROC 652 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a time-of-day clock synchronizer failure.
To call in PROC 652, perform the following:

1. Depress PROC NO; 652; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Fields 2 and 3 display the equipment location of the time-of-day clock synchronizer (if provided), and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Displays failure history.
2. Test 2 - Continuously tests the time-of-day clock circuit and software buffer.
3. Test 3 - Displays and allows either or both the hardware and software time-of-day clocks to be reset.

## Test 1

Test 1 provides a failure history of hardware time-of-day clock synchronizer failures. The failure history is recorded by the on-line time-of-day clock program.

Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 652, or is selected by using NEXT TEST or the CHANGE FIELD sequence:
CHANGE FIELD; 1; ENTER; 1; ENTER.

## PROC 652 Test 1

2. To start Test 1, depress EXECUTE.

Note: If the translation records indicate the switch is not equipped with a hardware time-of-day clock synchronizer, special error code 74 is displayed in the MAAP error code field when EXECUTE is depressed. Further key inputs related to the hardware time-of-day clock synchronizer are ignored by Test 1. However, Test 3 may be used to set the software clock.
3. If no failures occurred, the following is displayed:

Field 1-1.
Fields 2 and 3 - Equipment location of the hardware time-of-day clock synchronizer.
Fields 4, 13, and 14-0.
Field 15 - Dashed.
4. If one or more failures occurred, the following summary is displayed:

Field 1-1.
Fields 2 and 3 -Equipment location of the hardware time-of-day clock synchronizer.
Field 4-0.
Field 13-0 (Indicating failure summary).
Fields 14 and 15 - Failure summary.
5. Depressing NEXT DATA displays the failure code with the highest peg count. The display is updated as follows:
Field 4 - Busy status of the hardware time-of-day clock synchronizer (indicating whether failures recorded were severe enough to cause an alarm).
Field 5 - First failure code.
Field 13 - Incremented to 1 , indicating first failure code.
Fields 14 and 15 - Failure history of displayed failure code.
6. Depressing NEXT DATA repeatedly displays the remaining failure codes (if any) in descending order of peg count and updates Fields 4, 5, and 13 through 15.
When all failure codes are displayed, depressing NEXT DATA once more dashes Fields 4, 5, and 13 through 15.
Depressing NEXT DATA again executes Test 1 and an updated failure summary is displayed.
7. Performing Test 1 does not busy out the hardware time-of-day clock synchronizer.
8. To manually turn off the OTHER FAILS fault indicator, (assuming no other sources affecting the OTHER FAILS fault indicator are active), after Test 1 is executed at least once, perform the following:
Depress CLEAR DATA; EXECUTE.
9. Field 14 displays a zero ( 0 ) and Field 15 is dashed.

Note: The hardware time-of-day clock synchronizer alarmed circuit entry in PMIDS is marked as resolved.

## Test 2

During execution of Test 2 , the following checks are performed:

1. Whether a hardware time-of-day clock synchronizer is provided and appears to be functional.
2. Battery status and validity of battery status.
3. Whether the hardware time-of-day clock changed since last read (read once per second).
4. Whether time and date values are within obvious bounds, i.e.: non- Binary-Coded Decimal ( BCD ) values.

Test 2 continuously tests a combination of the hardware time-of-day clock synchronizer and the software buffer.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 2; ENTER.

2. To start Test 2, depress EXECUTE.

Note: If the translation records indicate the switch is not equipped with a hardware time-of-day clock synchronizer, special error code 74 is displayed in the MAAP error code field when EXECUTE is depressed. Further key inputs related to the hardware time-of-day clock synchronizer are ignored by Test 2. However, Test 3 may be used to set the software clock.
3. A flashing digit in Field 5 indicates Test 2 is running.

Fields 7, 8, and 10 through 13 provide a transitional display of the actual time and date generated by the hardware time-of-day clock.
4. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
5. When STOP is depressed, the following is displayed:

Field 1-2.
Fields 2 and 3 - Equipment location of the hardware time-of-day clock synchronizer.
Field 4 - Busy/alarm status.
Field 5 - Failure code.
Field 6-1 (Indicating hardware time-of-day clock).
Fields 7, 8, and 10 through 12 - The display of the actual time and data generated by the hardware time-of-day clock up to the time STOP was depressed is frozen.

Fields 13 through 15 - Dashed.
6. If no failures occurred during Test 2, a 0 is displayed in Field 5.
7. If a failure occurs, the failure code for the first failure is locked into Field 5.
8. NEXT DATA can be used to sequence through all the failure codes associated with the failing hardware time-of-day clock.

## PROC 652 Test 2 and Test 3

9. The OTHER FAILS fault indicator is automatically turned off by Test 2 (indicating the hardware time-of-day clock synchronizer alarm cause is resolved) when the following conditions are met:

The hardware time-of-day clock synchronizer failure(s) is cleared.
Note: The hardware time-of-day clock synchronizer alarmed circuit entry in PMIDS is marked as resolved.

All other sources of the OTHER FAILS fault indicator are cleared.
10. The hardware time-of-day clock synchronizer is automatically released from the busy-out condition if it was passing Test 2 when Test 2 was stopped.

## Test 3

Test 3 enables maintenance personnel to set the software and/or hardware time-of-day clock.
If the switch does not include a hardware time-of-day clock the software clock can be set using Test 3.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1 ; ENTER; 3; ENTER.

2. To start Test 3, depress EXECUTE.
3. When EXECUTE is depressed, the following is displayed:

Field 1-3.
Fields 2 and 3 - Equipment location of the hardware time-of-day clock.
Field 4 - Busy/alarm status.
Field 5 - Dashed.
Field 6-0 (Indicating software clock).
Fields 7 through 12 - Transitional display providing a real-time readout of the actual time and date generated by the software clock.
Fields 13 through 15 - Dashed.
Note: If the switch does not include a hardware time-of-day clock, Fields 2 through 5 are dashed.
4. Depressing NEXT UNIT causes the hardware time-of-day clock (if provided) to be displayed as follows:

Fields 1 through 5 - Same as software clock display.
Field 6-1 (Indicating hardware time-of-day clock).
Fields 7,8 , and 10 through 12 - Transitional display providing a real-time readout of the actual time and date generated by the hardware time-of-day clock.

Fields 9 and 13 through 15 - Dashed.
5. When both clocks are provided, repeated use of NEXT UNIT toggles the display between the two clocks.

When the hardware time-of-day clock is replaced or the switch does not include a hardware time-of-day clock, the clock(s) should be set as follows:

1. Display the software clock in Fields 6 through 12.
2. Determine if the software clock time and date is correct.
3. If the software clock is correct:

If the switch does not include a hardware time-of-day clock, no further action is required.
If a hardware time-of-day clock is provided, depress CLEAR DATA; EXECUTE. Both clocks are set to equal each other.
4. If the software clock is not correct:

Determine which fields need to be corrected (i.e., month, day, year, hours, minutes, or seconds) and use the CHANGE FIELD sequence to change the required fields:

CHANGE FIELD; (Field number to be changed); ENTER; (Enter correct data, i.e., month, day, year, hours, minutes, or seconds); ENTER.
5. Repeat the CHANGE FIELD sequence as necessary for all fields requiring change, or depress ENTER until the field to be changed is indicated with a flashing decimal point.

Enter the correct data in the appropriate field.
6. When all required fields are corrected, depress CLEAR DATA; EXECUTE.

The software clock or both clocks (when a hardware time-of-day clock is provided) are set to the entered values.

When the clocks are being checked to determine any differences and the hardware time-of-day clock is not replaced, or failure code 6 is indicated, the clocks should be set as follows:

1. Use NEXT UNIT to toggle between the two clocks to determine which of the two are correct.
2. Leave the correct clock displayed.
3. Depress CLEAR DATA; EXECUTE.

Both clocks are set to equal each other.
4. If neither clock appears to be correct, toggle to the software clock and input new time and date values using the CHANGE FIELD sequence:

CHANGE FIELD; (Field number to be changed); ENTER; (Enter correct data); ENTER.
5. When other fields need to be changed, the CHANGE FIELD sequence or ENTER can be used to step to the new field and correct data can be entered.
6. When all required fields are corrected, depress CLEAR DATA; EXECUTE.

Both clocks are set to the entered values.
When the clocks are set, and the switch includes a hardware time-of-day clock, Test 2 should be run to determine if the hardware time-of-day clock is functioning correctly.

## Repair Guide

When a time-of-day clock synchronizer failure is indicated, PROC 652 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following steps, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1.

Step through the failure history and record the results.
Determine which failure codes are accompanied by an alarm-sent indication (encode 2 or 3 in Field 4).
2. Execute Test 2.

Record any failure codes.
If the circuit passes the test, the hardware time-of-day clock synchronizer alarmed entry in PMIDS is resolved.

If the circuit was busied out, it is released from the busy out state.
The OTHER FAILS fault indicator is turned off if no other sources affecting the OTHER FAILS fault indicator are active.
3. When failure codes are recorded, based on the results of Test 2, refer to Table BG, PROC 652 -Time-of-Day Clock Synchronizer Repair Procedure, and perform the corrective action indicated for the failure code recorded.
4. When multiple failure codes are indicated, perform the corrective action for the first failure code with an alarm-sent indication (encode 2 or 3 in Field 4).
5. If the hardware time-of-day clock synchronizer is replaced, execute Test 3 to set the time-ofday clock to the correct time and then repeat Test 2.
6. If a failure is still indicated, analyze the failure codes, and perform any additional corrective action as required.
Repeat Test 3 as appropriate, and then Test 2.
7. If all corrective action is taken, and the hardware time-of-day clock still fails check the wiring associated with the replaced circuit pack and the battery.
Failure code 9 is a software problem that cannot be corrected by hardware.

TABLE BG.

| PROC 652 <br> TIME-OF-DAY CLOCK SYNCHRONIZER REPAIR PROCEDURE |  |  |  |
| :---: | :---: | :---: | :---: |
| fAILURE CODE | CORRECTIVE ACTION | fallure CODE | CORRECTIVE ACTION |
| 1 | No Response. <br> Replace TN492 | 6 | There are small differences in the software and hardware clocks resulting in the software clock being updated by the hardware. <br> Some counts are expected and do not indicate a fault condition. If field 4 indicates that an alarm has been sent: <br> Replace TN492. |
| 2 | The battery used to run the clock during power failure has failed. <br> Replace the battery. <br> Replace TN492. |  |  |
|  | Check the battery wiring. | 7 | Large differences in the software and hardware clocks have resulted in the hardware clock being updated by the software clock. <br> Replace TN492. |
| 3 | Cannot detect a change in battery status. <br> Replace TN492. |  |  |
| 4 | The hardware clock is not running. | 8 | Invalid time values have been received from hardware. <br> Replace TN492. |
| 5 | The software clock has been updated after initialization from a power up. <br> This is not an alarmable condition and, therefore, does not require repair activity. | 9 | Invalid time values have been received from the software. <br> This is a software problem that cannot be corrected with hardware. |
|  |  | 10 | Clock set failure. Replace TN492 |

## PROC 653

PROC 653 - ATTENDANT CONSOLE TESTS


## Purpose

PROC 653 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from a console failure.

PROC 653 is used to:

1. Test all attendant consoles once or a particular console continuously.
2. Display attendant console failures.
3. Resolve the console alarm cause when all consoles pass Test 2.

Note: Dual-speed data channels associated with attendant consoles are tested in PROC 611.

## Field Definitions and Codes

Each field of PROC 653 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BH, PROC 653 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 4 - Select a specific console for testing (Test 3 only).

TABLE BH.

| PROC 653 <br> field derinitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FiELD | CODE | definition | Fieio | CODE | DEFINITON |
| 1 | 1-3 | Test number. | 10 | * | Failure Summary: <br> Sum of approximate number of failures per hour for all failing circuits. <br> Failure History: <br> Approximate number of failures per hour for circuit being displayed. |
| 2 | 0 | Common control carrier. |  |  |  |
| 3 | 23-26 | Slot number. |  |  |  |
| 4. | 0-15 | Channel number. |  |  |  |
| 5 | 0-40 | Failed console. |  |  |  |
| 6 |  | Failure codes: |  |  |  |
|  | $\begin{aligned} & 0 \\ & 1 \end{aligned}$ | Pass. <br> On-line periodic. Addressing. Message echo. | 11 | 0-17 | Failure Summary: <br> Number of hours since the oldest individual failure started (to the nearest hour). <br> Individual Failure History: <br> Number of hours since failures started in the displayed circuit (to the nearest hour.) |
| 7 | * | Number of consoles in system. |  |  |  |
| 8 | * | Number of failed channels: <br> Test 1 |  |  |  |
|  |  | channels in the failure history. <br> Test 2 <br> Number of dual- | Number of hours plus minutes since: <br> Failure Summary: Most-recent failure of any circuit. <br> Failure History: Most-recent failure of the displayed circuit. |  |  |
|  |  | channels that | 12 | 0-136 | Hours |
|  |  |  | 13 | 0-59 | Minutes. |
| 9 | $\begin{gathered} 0 \\ 1-6 \end{gathered}$ | Failed console index: <br> Failure Summary. <br> Individual failures. | * Number varies according to switch configuration. |  |  |

## PROC 653 Test 1

## Operation of Procedure

## Overview

PROC 653 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a console failure.

To call in PROC 653, perform the following:

1. Depress PROC NO; 653; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Field 7 displays the number of consoles in the switch, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1-Displays failure history.
2. Test 2-Tests all consoles.
3. Test 3 - Tests a specific console continuously.

## Test 1

Test 1 displays the failure history of console failures. These failures are detected during call processing, not by periodic tests.

Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 653, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 1; ENTER.
2. To start Test 1, depress EXECUTE.
3. The failure history is displayed in the form of a summary.

The failure summary displays the total number of console failures that occurred.
4. If no failures occurred, Fields 8 through 10 display a 0 .
5. If one or more failures occurred, the following summary is displayed:

Field 1-1.
Field 7-Total number of consoles in the switch.
Field 8 - Number of failed channels.
Field 9-0 (Indicating the first failure is not displayed).
Fields 10 through 13 - Failure summary.
6. Depressing NEXT CIRCUIT displays the first failing console in the failure history. The display includes the following:

Field 1-1.
Fields 2 through 4 - Equipment location of the dual-speed data channel associated with the failing console.
Field 5 - Console number.
Field 6 - Failure code associated with the failing console.
Field 7 - Total number of consoles in the switch.
Field 8 - Number of failed channels.
Field 9-1 (Indicating first failing console).
Fields 10 through 13 - Failure history for the displayed console.
7. Depressing NEXT CLRCUIT repeatedly displays the failure histories of the remaining failing consoles.

Fields 2 through 6, and 9 through 13 are updated.
8. Depressing NEXT CIRCUIT after all failure histories are displayed, dashes all fields except Fields 1 and 7.
9. Depressing NEXT CIRCUIT again causes Test 1 to be executed, starting the sequence over with an updated failure summary.
10. To manually turn off the OTHER FAILS fault indicator, (assuming no other sources affecting the OTHER FAILS fault indicator are active), after Test 1 is executed at least once, perform the following:
Depress CLEAR DATA; EXECUTE.
Note: Alarmed console entries in PMIDS are marked as resolved.

## Test 2

Test 2 tests all consoles to determine if any are failing.
Prior to executing Test 2 , the handset or headset must be plugged into all consoles or the consoles fail the test.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. To start Test 2, depress EXECUTE.

The WAIT indicator on the MAAP is turned on.
3. Upon completion of the test the WAIT indicator is turned off.

If no failures are detected in Test 2, Field 8 displays a 0.

## PROC 653 Test 2 and Test 3

4. If a failure is detected, the first failed console is displayed as follows:

Field 1-2.
Fields 2 through 4 - Equipment location of the dual-speed data channel associated with the failing console.
Field 5 - Console number.
Field 6 - Failure code associated with the first failure.
Field 7 - Total number of consoles in the switch.
Field 8 - Number of failed channels.
Field 9 - Failed console index (1, indicating first failing console).
Fields 10 through 13 - Dashed.
5. NEXT CIRCUIT can be depressed repeatediy to display the remainder of the failing consoles.

Fields 2 through 6, and 9 are updated as appropriate.
6. Depressing NEXT CIRCUIT after all failing consoles are displayed, dashes all fields except Fields 1 and 7.

Depressing NEXT CIRCUIT again causes Test 2 to start over.
7. The console alarm cause is resolved when all attendant consoles pass Test 2.

Note: Alarmed console entries in PMIDS are marked as resolved.
The OTHER FAILS fault indicator is automatically turned off when the console alarm cause, and all other alarm sources affecting the OTHER FAILS fault indicator are cleared.

## Test 3

Test 3 is used to continuously test a specific attendant console that is suspected of having intermittent failures or to trace wiring problems.

The handset or headset must be plugged into the console that is being tested in Test 3 or the console fails.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. A console to be tested must be selected prior to execution of Test 3 .
3. A default console may be displayed in Fields 2 through 4.

Field 2 is flashing, indicating an optional entry field.
The default console is the last console failure displayed in Test 1 or 2.
4. Either the default console can be tested or another console can be selected for testing by entering the data in the flashing fields and depressing ENTER or by using the CHANGE FIELD sequence:
(Carrier number); ENTER; (Slot number); ENTER; (Channel number); ENTER.
CHANGE FIELD; 2; ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Channel number); ENTER.
5. If no failures occurred (none displayed in Test 1 or 2), Field 2 is blanked and the decimal point in that field flashed to indicate a mandatory entry field.
An equipment location must be entered in Fields 2 through 4 before Test 3 can be executed, as follows:
(Carrier number); ENTER; (Slot number); ENTER; (Channel number); ENTER.
6. Console selection can also be made by using NEXT CIRCUIT and/or NEXT UNIT when a default console is displayed.

NEXT CIRCUIT is used to sequence through all consoles in a carrier.
NEXT UNIT is used to sequence through all appropriately equipped carriers which contain consoles.
7. When NEXT UNIT is depressed to sequence to the next equipped carrier, the first applicable console in that carrier is automatically displayed.
NEXT CIRCUIT steps through the consoles within the selected carrier.
8. To start Test 3, depress EXECUTE.

A flashing digit displayed in Field 6 (failure code) indicates Test 3 is running.
9. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
10. When STOP is depressed, a 0 displayed in Field 6 indicates Test 3 passed.

Any other digit displayed in Field 6 indicates Test 3 failed.
11. When another console is to be tested, perform the following:

Halt Test 3 by depressing STOP.
Select the console to be tested by using the CHANGE FIELD sequence, or NEXT CIRCUIT, NEXT UNIT, etc.
Depress EXECUTE to start Test 3.
12. After corrective action is taken, Test 3 must be repeated to clear any previously displayed failure code. After Test 3 indicates a 0 , Test 2 must be performed to resolve the console alarm cause of the OTHER FAILS fault indicator.

## Repair Guide

When an attendant console failure is indicated, PROC 653 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, the following steps should be performed, in the order listed, to isolate and repair the faulty unit.

1. Verify that the handsets or headsets are plugged into the attendant consoles.
2. Execute Test 1 and record the failure history.
3. Execute Test 2 and record the results.

If Test 2 passes and a console failure is suspected, perform Test 3 to check for intermittent failures. (See Step 13 below.)
4. If Test 2 fails, use Test 4 of PROC 620 (unit type 44) to test the attendant interface circuit pack (SN233) associated with the failing console.
5. After passing Test 4 of PROC 620, (taking appropriate corrective action as required), enter PROC 653 and repeat Test 2.
If Test 2 passes, the console alarm cause is resolved, and the OTHER FAILS fault indicator is turned off if no other alarmed causes exist.
6. If the same console fails Test 2 again, check the voltages on the console power supply circuit pack MW-4 in the attendant console indicated in Field 5.

If the voltages are correct, replace console circuit pack AEE1 and repeat Test 2.
Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of console circuit pack AEE1.

Proceed to Step 8.
7. If the voltages are incorrect, replace console circuit pack MW-4 and repeat Test 2.

Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of console circuit pack MW-4.

Proceed to Step 8.
8. If the same console fails Test 2 again, replace the console indicated in Field 5, and repeat Test 2.
9. If the same console fails Test 2 again, perform PROC 611 Test 3 , entering the equipment location displayed in Fields 2 through 4 to determine if an I/O failure exists.
10. After passing Test 3 of PROC 611, (taking appropriate corrective action as required), enter PROC 653 and repeat Test 2.
If Test 2 passes, the console alarm cause is resolved, and the OTHER FAILS fault indicator is turned off if no other alarmed causes exist.
11. If the same console fails Test 2 again, check the wiring associated with the failing console and the attendant interface circuit.
12. Repeat Steps 4 through 11 for each failing console.
13. If intermittent console failures or wiring problems are suspected, execute Test 3 to continuously test the suspect consoles.
When a failure is indicated, perform corrective action listed in Steps 4 through 10, repeating Test 3 after performing each corrective action.
14. If Test 3 passes after taking corrective action, repeat Test 2 to resolve the console alarm cause.

If Test 3 fails after taking all corrective action, check the wiring associated with the failing console and the attendant interface circuit.

## PROC 654 - DISPLAY TERMINALS TEST



The flipchart shown is for R2V2. The R2V1 flipchart is similar except that Field 2 includes terminal type 15 (UCD/FADS) and Field 3 includes UCD group number (Type. 15)

## Purpose

PROC 654 is used when referenced from PROC 600 (Alarm causes/error log) to verify and turn off the OTHER FAILS fault indicator resulting from a display terminal failure.

PROC 654 is used to:

1. Display 102D calling number display and 102F or 102G FADS terminal failures.
2. Display the time stamp of each failure.
3. Test each terminal with a short data test to obtain the total failed circuit count.
4. Resolve the alarm cause when all display terminal circuits pass Test 2.

Note: Display terminal alarmed circuits in PMIDS are marked as resolved.
When Test 3 is performed to determine if the digits displayed on the display terminal are correct, or if an intermittent failure exists, the observing function of this test must be performed at the customer's premises.

Note: Dual-speed data channels associated with display terminals are tested in PROC 611.

## Field Definitions and Codes

Each field of PROC 654 flipehart and the possible displays for the fields during execution of the different tests are defined in Table BI, PROC 654 - Field Definitions and Codes.
Field 1 is an optional input field for changing the test number to be executed.

TABLE BI.

| PROC 654 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| fieto | CODE | definition | FiELD | CODE | definition |
| 1 | 1-3 | Test number. | $\begin{gathered} 8 \\ \text { (Contd) } \end{gathered}$ | 2 | No data reply (echo) from terminal. <br> Failures 1 and 2. <br> Bad reply from terminal echo data nonzero, but no data transmitted. <br> Failures 1 and 4. <br> Failures 2 and 4. <br> Failures 1, 2 and 4. |
| 2 | 1 13 | Calling number display. 102D terminal. CAS/FADS display. 102G or 102F terminal. |  | $\begin{aligned} & 3 \\ & 4 \end{aligned}$ |  |
| 3 | Any 2-, <br> 3 -, or <br> 4-digit <br> number | Directory number of the called station associated with the selected terminal type. |  | 6 |  |
|  |  |  | 9 | 0-7 | Failure code from the last transmission to a terminal before the test was terminated. Updated in real time for Test 3 showing current latest failure while test is running. Refer to field 8 for encode descriptions. |
| 4 | 0 | Common control carrier. |  |  |  |
| 5 | 23-26 | Slot number. |  |  |  |
| 6 | 0-15 | Channel number. |  |  |  |
| 7 | $\begin{aligned} & 0-9 \\ & 8,- \end{aligned}$ | Digits sequenced 0 through 9 , test character, and dash are alternated with blanks. They will correspond to all digits displayed on the terminal. | 10 | 0-99 | Total number of failed channels. |
|  |  |  | 11-13 |  | Time stamp: A time stamp showing the day of the month, hour, and minute when the alarm cause occurred. |
| 8 |  | Failure code representing the ORed collection of all failures since test started: <br> Pass. <br> Data channel address not acknowledged. |  |  |  |
|  |  |  | 11 | 1-31 | Day of the month. |
|  | 01 |  | 1213 | 0-23 | Hour of the day. |
|  |  |  |  | 0-59 | Minutes. |

## Operation of Procedure

## Overview

PROC 654 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from a display terminal failure.
To call in PROC 654, perform the following:

1. Depress PROC NO; 654; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Three tests are available:

1. Test 1 - Displays failure history and time of each failure.
2. Test 2 - Tests each display terminal with a short data test:
3. Test 3 - Tests a specific display terminal continuously.

## Test 1

Test 1 displays a failure history of display terminal failures. The failure history is generated by on-line maintenance software.

Test 1 can also be used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 654, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. To start Test 1, depress EXECUTE.
3. The total number of display terminal failures is displayed as a summary.
4. If no failures occurred, a 0 is displayed in Field 10.
5. If one or more failures occurred, the following is displayed:

Field 1-1.
Field 10-Total number of failed channels.
Fields 11 through 13 - Day, hour, and minute when the first failure occurred.
6. Depressing NEXT CIRCUIT displays the first failing display terminal in the failure history.

Note: Calling number display failures are displayed before FADS terminal failures.
7. The display includes the following:

## Field 1-1.

Field 2 - Terminal type.
Note: Terminal type 15 (UCD/FADS) may be displayed for R2V1.
Field 3 - Extension number for terminal type 1 or unit number for terminal type 13.
Note: A UCD group number for terminal type 15 may be displayed for R2V1.
Fields 4 through 6 - Dual-speed data channel equipment location associated with the failing display terminal.

Field 10 - Total number of failed channels.
Fields 11 through 13 - Time stamp (day, hour, and minute) when the failure occurred.

## PROC 654 Test 1 and Test 2

8. After the first failing display terminal is displayed, depressing NEXT CIRCUIT repeatedly displays the failure history of the remaining failing display terminals.
9. Fields 2 through 6 , and 11 through 13 are updated.

Note: All calling number display failures are displayed before FADS terminal failures. Display terminals with more errors recorded are displayed before display terminals with less errors recorded.
10. Depressing NEXT CIRCUIT after all failures are displayed, dashes Fields 2 through 13.

Depressing NEXT CIRCUIT again, causes Test 1 to be executed, starting the sequence over with an updated failure summary.
11. To manually turn off the OTHER FAILS fault indicator, assuming no other alarmed sources affecting the OTHER FAILS fault indicator are active, after Test 1 is executed at least once, perform the following:

Depress CLEAR DATA; EXECUTE.
Note: Display terminal alarmed circuit entries in PMIDS are marked as resolved.

## Test 2

Test 2 tests all display terminals to determine if any are failing.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. To start Test 2, depress EXECUTE.

The WAIT indicator on the MAAP turns on and Test 2 starts from the lowest display terminal.

Note: When Test 2 encounters a FADS (type 102F or 102G) display terminal during testing, the IN USE lamp on the MAAP can remain on for up to 2 minutes while waiting for the FADS display terminal to be released from its normal function for testing.
3. If no failures are detected, Test 2 stops, the WAIT indicator is turned off, and a 0 is displayed in Field 10.
4. If a failure is detected, Test 2 stops and the WAIT indicator turns off. The display terminal that failed is displayed as follows:

Field 1-2.
Field 2 - Terminal type.
Note: Terminal type 15 (UCD/FADS) may be displayed for R2V1.
Field 3 - Extension number or unit number.

Note: A UCD group number for terminal type 15 may be displayed for R2V1.

Fields 4 through 6 - Equipment location of dual-speed data channel circuit associated with the failing display terminal.

Fields 8 and 9 - Once and last failure code associated with first failing display terminal.
Field 10 - Circuit count of 1.
Fields 11 through 13 - Dashed.
5. To resume testing, NEXT CIRCUIT is depressed.

Depressing NEXT CIRCUIT, after all failing display terminals are displayed, dashes all fields except Fields 1 and 10 (test number and total failed channels).
6. Depressing NEXT CIRCUIT again causes Test 2 to be executed from the beginning of the test.
7. The display terminal alarm cause is automatically resolved if all display terminals pass Test 2.

Note: Display terminal alarmed circuit entries in PMIDS are marked as resolved.
8. The OTHER FAILS fault indicator is turned off when the display terminal alarm cause, and all other alarm sources affecting the OTHER FAILS fault indicator are cleared.

## Test 3

Test 3 is used to continuously test a specific display terminal which is suspected of having intermittent failures or to trace wiring problems.
In addition, Test 3 is used to verify that all digits are displayed correctly at each display terminal position.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. A display terminal to be tested must be selected prior to execution of Test 3.

Display terminal selection can be made as indicated in Steps 3 through 7 .
3. If no failures occurred (none displayed in Test 1 or 2 ) which indicates that a default display terminal does not exist, the lowest featured display terminal type is displayed first in Field 2.
4. If a failure occurred, a default display terminal is displayed.

The default display terminal is the last failed display terminal displayed by Test 1 or 2.
Either the default display terminal can be tested or another display terminal can be selected for testing using NEXT UNIT and/or NEXT CIRCUIT.
5. NEXT CIRCUIT is used to display the first display terminal of the lowest display terminal type. Either this display terminal can be tested or another display terminal can be selected for testing.
6. To select another display terminal, use NEXT UNIT and/or NEXT CIRCUIT to locate the display terminal to be tested.

## PROC 654 Test 3

7. Depress NEXT UNIT repeatedly until the desired terminal type is displayed in Field 2.

Depress NEXT CIRCUIT repeatedly to advance the display to the display terminal location to be tested.
Dashes are displayed after the last display terminal location in the last terminal type is displayed.
8. Depressing NEXT CIRCUIT again displays the first display terminal equipment location in the lowest terminal type.
9. To start Test 3, depress EXECUTE.

The digit displayed in Field 7 of the MAAP corresponds with the digit displayed at the terminal being tested.
The changing display in Field 7 indicates the test is running.
10. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
This allows maintenance personnel time to observe the digits displayed at the display terminal being tested in order to determine if all digits are correct and to verify existence of intermittent failures.
11. The failure codes detected are recorded by Test 3 and displayed in Fields 8 and 9.
12. To select another display terminal to be tested, perform the following:

Halt Test 3 by depressing STOP.
Select the new display terminal to be tested using NEXT UNIT and/or NEXT CIRCUIT.
Depress EXECUTE to start Test 3.

## Repair Guide

When a display terminal failure is indicated, PROC 654 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, the following steps should be performed, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1 and record the failure history.
2. Execute Test 2 and record the results.

If Test 2 passes and a display terminal failure is suspected, perform Test 3 and check for intermittent failures. (Refer to Step 9.)
3. When failures are recorded, based on the results of Test 2, refer to Table BJ, PROC 654 Display Terminals Repair Procedure, and perform the corrective action indicated.
4. Repeat Test 2 after each corrective action is performed.

If Test 2 passes, the display terminal alarm cause is resolved, and the OTHER FAILS fault indicator is turned off when all other alarmed sources (if any) affecting the OTHER FAILS fault indicator are cleared.
5. If the same display terminal fails Test 2 again, perform PROC 611 Test 3, entering the equipment location displayed in Fields 4 through 6 to determine if an I/O failure exists.

TABLE BJ.

| PROC 654 <br> DISPLAY TERMINALS REPAIR PROCEDURE |  |
| :---: | :--- |
| FAILURE <br> CODE | CORRECTIVE ACTIon |

6. After passing Test 3 of PROC 611, (taking appropriate corrective action as required), enter PROC 654 and repeat Test 2.
If Test 2 passes, the display terminal alarm cause is resolved, and the OTHER FAILS fault indicator is turned off if no other alarm causes exist.
7. If the same display terminal fails Test 2 again, check the wiring associated with the cabling between the 211 A power unit, 102D, 102F, or 102G terminal, and the switch.
8. Repeat Steps 3 through 7 for each failing display terminal.
9. If an intermittent failure or wiring problems are suspected, execute Test 3 to continuously test the suspect terminal.
When a failure is indicated, perform Steps 3 through 7 above.
10. If a 0 is displayed in Field 8, allow Test 3 to run and check the display on the terminal being tested.

If bad data is displayed on the terminal, perform the corrective action listed in Table BJ, PROC 654 - Display Terminals Repair Procedure.
11. If Test 3 passes after taking corrective action, repeat Test 2 to resolve the display terminal alarm cause.

PROC 655 - SMDR TEST


## Purpose

PROC 655 is used when referenced from PROC 600 (Alarm causes/error $\log$ ) to verify and turn off the OTHER FAILS fault indicator resulting from a SMDR failure.

Tests 3 through 5 of this maintenance procedure must be performed on the customer's premises. Successful test completion for Tests 3 through 5 is determined by observing printouts from the SMDR equipment.

PROC 655 is used to:

1. Display SMDR equipment failures.
2. Run an echo test with the SMDR equipment.
3. Resolve the SMDR alarm cause when all circuits pass Test 4.

Note: Dual-speed data channels associated with SMDR equipment are tested in PROC 611.

## Field Definitions and Codes

Each field of PROC 655 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BK, PROC 655 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 and 3 - Select operation code and data of test word to be transmitted to the SMDR equipment (Test 5 only).

## TABLE BK.

| PROC 655 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | Field | CODE | definition |
| 1 | 1-5 | Test number. | 8 | 0-8 | Failure code-last: Failure code indicating one or more failures occurring during the last transmission to the SMDR equipment before the test ended or was stopped. |
| 2 | $\begin{aligned} & 0 \\ & 3 \\ & 4 \\ & \\ & 10 \\ & 14 \end{aligned}$ | Operation code (octal): <br> Normal data word. <br> No operation. <br> Retransmit normal data word. <br> Last word in message. Retransmit last word in message. |  |  |  |
|  |  |  | 9 | 0 1 | Alarm cause status: <br> None. <br> SMDR failure. |
| 3 | $\begin{aligned} & 0000 \\ & 7777 \end{aligned}$ | Data word (octal). | 10-12 |  | Time stamp: A time stamp showing the day of the month, hour, and minute when the alarm cause occurred. |
| 4 | 0 | Common control carrier. |  |  |  |
| 5 | 23-26 | Slot number. | 10 | 0-31 | Day of the month. : |
| 6. | 0-15 | Channel number. |  | 0-23 | Hour of the day. |
| 7 |  | Failure code-once: <br> Accumulative "OR"ing of all failure codes that occurred at least once during a test. <br> Pass. <br> Data channel address not acknowledged. <br> No data reply (echo) from SMDR equipment. <br> Failures 1 and 2. <br> Echo mismatch. <br> Failures 1 and 4. <br> Failures 2 and 4. <br> Failures 1, 2, and 4. <br> SMDR equipment failure (reported by SMDR after 16-message buffer filled). | 12 | 0-59 | Minute. |
|  | 0 1 2 |  | 13 | 0 1 8 | Failure codes: Logged in failure history table displayed in Test 1 only. <br> Failure summary display. No reply or echo mismatch. SMDR equipment failure. |
|  | $\begin{aligned} & 3 \\ & 4 \\ & 5 \\ & 5 \\ & 6 \\ & 7 \\ & 8 \end{aligned}$ |  | 14 | 0 1 2 | Message length encode: <br> Number of data words used in a call record. <br> 12-word message. <br> 15-word message. <br> 18 -word message. |

## Operation of Procedure

## Overview

PROC 655 is used to determine the cause of the OTHER FAILS fault indicator being lighted resulting from an SMDR failure.

To call in PROC 655, perform the following:

1. Depress PROC NO; 655; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Fields 4 through 6 display the data channel equipment location associated with the SMDR equipment, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Five tests are available:

1. Test 1-Displays failure history.
2. Test 2 - Runs an echo test on the SMDR equipment.
3. Test 3 - Sends an alternating one-zero pattern continuously to the SMDR equipment.
4. Test 4 - Sends a 16 -message pattern to the SMDR equipment, testing most digits in each digit's position.
5. Test 5 - Sends a single data word to the SMDR equipment allowing manual entry of operation codes and data words.

## Test 1

Test 1 provides a failure history of the SMDR equipment.
Test 1 is also used to manually turn off the OTHER FAILS fault indicator.

1. Test 1 is the default test when entering PROC 655, or is selected by using NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 1; ENTER.

2. To start Test 1 , depress EXECUTE.
3. A summary of the failure history is displayed.
4. If no failures occurred, a 0 is displayed in Fields 9 and 13.
5. If one or more failures occurred, the summary displays a 1 in Field 1, the SMDR alarm cause in Field 9, a 1 or 8 in Field 13 (failure code), and dashes in all other fields.
6. Depressing NEXT DATA displays the first failing equipment location and associated failure code. The following information is displayed:

Field 1-1.
Fields 4 through 6 - Data channel equipment location associated with the SMDR equipment.
Field 9 - SMDR alarm cause.
Fields 10 through 12 - Time stamp (day, hour, and minute) when the failure code displayed in Field 13 occurred.

Field 13 - Failure code ( 1 or 8 ).
7. Depressing NEXT DATA repeatedly displays all failure codes (Field 13) associated with individual failures recorded in the failure history.
Depressing NEXT DATA after all failures are displayed, dashes Fields 9 through 13.
Depressing NEXT DATA again executes Test 1 and an updated failure summary is displayed.
8. To manually turn off the OTHER FAILS fault indicator, (assuming no other alarm sources affecting the OTHER FAILS fault indicator are active), after Test 1 is executed at least once, perform the following:
Depress CLEAR DATA; EXECUTE.
9. Field 9 (alarm status) displays a 0 .

Note: SMDR alarmed entries in PMIDS are marked as resolved.

## Test 2

Test 2 runs an echo test with the SMDR equipment.
Test 2 does not interfere with call processing recording of calls.
An alternating one-zero pattern is used for the first echo test. A complementing one-zero pattern is used for the second echo test.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 2; ENTER.
2. To start Test 2 , depress EXECUTE.
3. If no failures are detected, Fields 7 and 8 display a 0 .
4. If any failures are detected, the following is displayed:

Field 1-2.
Fields 4 through 6 - Data channel equipment location associated with the SMDR equipment.
Fields 7 and 8 - Failure codes ( 1 through 8).

## Test 3

Test 3 sends a continuous alternating one-zero pattern in the format of a call record message to the SMDR equipment.
When Test 3 is performed, maintenance personnel must be on the customer's premises to operate SMDR equipment and to determine if the test is successful by observing the SMDR printout.

Caution: Test 3 prevents normal call processing from recording call data using the SMDR equipment. SMDR equipment must be disabled using PROC 275, Word 1 before Test 3 is executed. After Test 3 is completed, SMDR service should be restored using PROC 275, Word 1.

1. Change Field 12 of PROC 275, Word 1 from 1 to 0 to disable SMDR service.

Note: Prior to using Test 3 , the customer's tape should be unloaded (with customer's permission) and a spare tape loaded.

## PROC 655 Test 3

2. Enter PROC 655 and select Test 3 by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
3. Upon entry to Test 3 , the call record message length to be transmitted to the SMDR equipment is 12 words (indicated by a 0 in Field 14).
4. NEXT DATA is used to change the call record message length to be transmitted depending upon the type of SMDR equipment being tested.
A 1 in Field 14 indicates a 15 word message length, a 2 in Field 14 indicates a 18 word message length.

Depressing NEXT DATA repeatedly cycles Field 14 to 1 , 2, and back to 0, etc.
5. To start Test 3, depress EXECUTE.

Note: Special error code 80 is displayed in the MAAP error code field if EXECUTE is depressed with the SMDR service enabled.
6. During execution of Test 3 , the following fields are displayed:

Field 1-3.
Fields 2 and 3 - Operation code and data word currently being transmitted to the SMDR equipment.
Fields 4 through 6 - Data channel equipment location associated with the SMDR equipment.
Fields 7 and 8 - Once and last failure codes.
Field 14 - Message length encode.
7. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
The one-zero pattern data word is complemented each time it is transmitted with 0.5 seconds between words.

Between the last word transmitted (normally word 12) and the start of the next message is a 2 -second delay to allow stopping Test 3.
8. Successful test completion results in a 0 displayed in Fields 7 and 8, and a printout similar to that shown in Figure 10.

| $00: 23$ | $:$ | .5 | E | 5 | 55 | 5 | 5.55 | $5-55$ | 555 | 55 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $00: 23$ | $:$ | .5 | E | 55 | 5 | $5-55$ | $5-55$ | 555 | 55 |  |

Figure 10. Sample Printout Generated From Test 3 (12-Word Format)
9. The printout shown was generated by the printer direct output option.
10. After Test 3 is successfully completed, the customer's tape should be loaded, and SMDR service enabled.
To enable SMDR service, change Field 12 of PROC 275, Word 1 from 0 to 1.

## Test 4

Test 4 sends 16 messages in either 12,15 , or 18 word message formats to the SMDR equipment.
Test 4 is used to load memory in the SMDR equipment with a 16 -message block. A 31 -message block can be written on magnetic tape by executing Test 4 twice.

Four of the SMDR operation codes are exercised by Test 4, i.e., normal word transmission, last word of message transmission, retransmit normal word, and retransmit last word.

When Test 4 is performed, maintenance personnel must be on the customer's premises to operate SMDR equipment and to determine if the test is successful by observing the SMDR printouts.

1. Enter PROC 655 if SMDR service was enabled in Test 3 or 5 of PROC 655.
2. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
3. Upon entry to Test 4 , the call record message length to be transmitted to the SMDR equipment is 12 words (indicated by a 0 in Field 14).
4. NEXT DATA is used to change the call record message length to be transmitted depending upon the type of SMDR equipment being tested.

A 1 in Field 14 indicates a 15 word message length, a 2 in Field 14 indicates a 18 word message length.
Depressing NEXT DATA repeatedly cycles Field 14 to 1,2 , and back to 0 , etc.
5. To start Test 4, depress EXECUTE.
6. If no failures are detected, Fields 7 and 8 display a 0 . The printouts should be checked to ensure that the SMDR equipment is operating properly.
7. If any failures are detected, the following is displayed:

Field 1-4.
Fields 4 through 6 - Data channel equipment location associated with the SMDR equipment.
Fields 7 and 8 - Once and last failure codes.
Field 14 - Message length encode.
8. When using direct output SMDR equipment, successful completion of Test 4 results in a printout similar to that shown in Figure 11.
9. When using the 9 -track magnetic tape SMDR equipment ( 12 or 15 word messages) only the numerical characters of the messages can be displayed as shown in Figure 12.
10. Hexadecimal dumps for Test 4 are shown in Figure 13 and Figure 14.
11. When Test 4 is successfully completed, the $\operatorname{SMDR}$ alarm cause is resolved and the OTHER FAILS fault indicator is turned off when all other alarm sources (if any) affecting the OTHER FAILS fault indicator are cleared.

Note: SMDR alarmed entries in PMIDS are marked as resolved.
12. The MAJOR and/or MINOR alarms are also turned off by Test 4 when all other major and/or minor alarm sources are cleared.

## PROC 655 Test 4

The 16 messages of Figure 11 completely fill and test the direct output SMDR memory buffer, testing each digit in each digit's position.


NOTE
When call records are displayed on either the Type I or Type II displays, non-numeric characters, colons, and dashes are omitted and numeric digits are displayed in the "condition code" field.

Figure 11. Sixteen-Message Test - Sample Printout From Test 4

When using the 9 -track magnetic tape SMDR equipment, Test 4 should be executed four times to fill the two 9 -track SMDR 31-message memory buffers.

1. Executing Test 4 four times allows displaying an individual call record from each magnetic tape SMDR memory buffer as each 31-message block is written on magnetic tape.
2. By specifying the EXTENSION NUMBER, with the thumbwheel switch on the 9-track magnetic tape control panel, a specific call record message from Figure 12 is displayed on the 9 -track control panel.
When running Test 4 using the 9 -track magnetic tape SMDR equipment, both the tape drive units' ON-LINE button and the 9 -track control panels' ON-LINE button should be depressed.



Figure 12. Displayable Characters on 9 -Track SMDR Equipment (Note: Correct Time is Displayed) From Test 4

1. The mode EXTENSION NUMBER/AUTO switch should be set in the EXTENSION NUMBER mode, and the thumbwheel switch selected to the desired station or extension number to display a specific extension number call record.
2. Depressing CLEAR DISPLAY clears the control panel display prior to displaying a new call record.
3. Depressing DUMP MEMORY causes the data contained in the ON-LINE memory buffer to be written on tape.

Depressing DUMP MEMORY repeatedly causes the data from alternate ON-LINE memory to be written on tape.


Figure 13. Hexadecimal Dump For Test 4 Test Call (12-Word Format)

## Test 5

Test 5 sends a single data word to the SMDR equipment and is normally used in repair of SMDR equipment. Test 5 allows sending most words or messages to the SMDR by manually entering it into Fields 2 and 3.

When Test 5 is performed, maintenance personnel must be on the customer's premises to operate SMDR equipment and to determine if Test 5 is successful by observing the SMDR printout.

Caution: Test 5 prevents normal call processing from recording call data using the SMDR equipment. SMDR equipment must be disabled using PROC 275, Word 1 before Test 5 is executed. After Test 5 is completed, $S M D R$ service should be restored using PROC 275, Word 1.

1. Change Field 12 of PROC 275, Word 1 from 1 to 0 to disable SMDR service.

Note: Prior to using Test 5, the customer's tape should be unloaded (with customer's permission) and a spare tape loaded.
2. Enter PROC 655 and select Test 5 by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 5; ENTER.


Figure 14. Hexadecimal Dump For Test 4 Test Call (15-Word Format)
3. When Test 5 is called in, a default test word (operation code and data word) is displayed in Fields 2 and 3.

To test the default test word, proceed to Step 7.
4. Field 2 is blinking indicating an optional entry field. To select an operation code and data word different than the default test word, enter the following:
(Operation code); ENTER; (Data word); ENTER.
Proceed to Step 7.
5. Operation codes and data words can also be selected for testing by using the CHANGE FIELD sequence:

CHANGE FIELD; 2; ENTER; (Operation code); ENTER; (Data word); ENTER.
Proceed to Step 7.
6. In addition, operation codes and data words can also be selected for testing by use of NEXT DATA.

Depressing NEXT DATA selects the next of ten operation codes and data words that are available to be transmitted. (Refer to Figure 15.)
When the operation code and data word to be used is displayed in Fields 2 and 3 by depressing NEXT DATA, proceed to Step 7.

## PROC 655 Test 5

| Field 2 OP Code | Field 3 Data |
| :---: | :---: |
|  | H |
| 3.2525 | No operation op code with 01 pattern |
| 3.5252 | No operation op code with 10 pattern |
| 14.2525 | - Retransmission, end of message with 01 pattern |
| 14.5252 | - Retransmission, end of message with 10 pattern |
| 4.2525 | Retransmission with 01 pattern |
| 4.5252 | Retransmission with 10 pattern |
| 10.2525 | End of message op code with 01 pattern |
| 10.5252 | End of message op code with 10 pattern |
| 0.2525 | Normal data word op code with 01 pattern |
| 0.5252 | Normal data word op code with 10 pattern |

Figure 15. List of Operation Codes and Data Words Available Using the NEXT DATA Key in Test 5
7. To start Test 5, depress EXECUTE.

Note: Special error code 80 is displayed in the MAAP error code field if EXECUTE is depressed with the SMDR service enabled.
8. During execution of Test 5, the following is displayed:

Field 1-5.
Fields 2 and 3 - Operation code and data word currently being transmitted to the SMDR equipment.

Fields 4 through 6 - Data channel equipment location associated with the SMDR equipment.
Fields 7 and 8 - Once and last failure codes.
9. Each time EXECUTE is depressed, the operation code and data word displayed in Fields 2 and 3 is transmitted to the SMDR equipment.

NEXT DATA is used to select a different operation code and data word to be transmitted prior to depressing EXECUTE
10. Successful test completion results in a 0 displayed in Fields 7 and 8 and a printout similar to that shown in Figure 16.

| $00: 23$ | $:$ | .5 | E | 5 | 55 | 5 | $5-55$ | $5-55$ | 555 | 55 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $00: 23$ | $:$ | .5 | E | 5 | 55 | 5 | 5.55 | 5.55 | 555 | 55 |

Figure 16. Sample Printout From Test 5, Using 11 Normal Data Word Operation Codes Followed by an End-of-Message Operation Code. The Data Word is an Alternating Ones-Zeros Pattern.
11. After Test 5 is successfully completed, the customer's tape should be loaded, and SMDR service enabled.

To enable SMDR service, change Field 12 of PROC 275, Word 1 from 0 to 1.

## Repair Guide

## Overview

When a SMDR failure is indicated, PROC 655 referenced from PROC 600 as the cause for the OTHER FAILS fault indicator being lighted, perform the following steps, in the order listed, to isolate and repair the faulty unit.

1. Execute Test 1, step through the failure history and record the results.
2. Execute Test 2 and record the results.
3. Execute Test 4 for the direct output SMDR version or the 9 -track magnetic tape SMDR version.

When the 9 -track magnetic tape SMDR version is being tested, dump the memory so that when Test 4 is executed twice the 16 -message test completely fills one memory buffer and the corresponding tape record.
4. Execute Test 4 (twice for a 31 -message tape buffer), record the failures and compare several of the messages with Figures 11 and 12.
Repeat Test 4 for the alternate memory buffer for 9 -track SMDR testing.
5. Based on the results of Tests 2 and 4, perform the corrective action indicated (in the order listed) in isolation and repair steps:

## Repair procedure for direct output SMDR.

Repair procedure for 9-track SMDR.
6. Test 3 can be used to determine if failures are intermittent or to use the logic probe at test points on the SMDR equipment to trace wiring problems.
7. Test 5 can be used to transmit a single data word repeatedly (by depressing EXECUTE repeatedly) and to change the single data word transmitted to help isolate failures in the SMDR equipment.
8. When $I / O$ failures are suspected between the dual-speed data channel and the SMDR equipment, perform PROC 611 Test 3, entering the equipment location displayed in Fields 4 through 6.

## Repair Procedure for Direct Output SMDR

Use the following steps to repair a printer or paper tape punch SMDR.

1. Perform the corrective action listed for the failure code recorded as a result of Test 2 and the type of message error or incorrect operation as a result of Test 4 (if appropriate).
2. Execute Test 3 for each corrective action taken until the final repair is made.
3. Verify correct operation of the SMDR equipment using Test 4.

## PROC 655

4. Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of common control circuit packs.
5. Refer to SMDR COMPONENT REPLACEMENT for steps on:

Replacement of SMDR carrier circuit packs.
Replacement of SMDR clock/calendar display.
Failure code 0 - Time or date is incorrectly displayed:
At the SMDR carrier:

1. Replace LC66 (time).
2. Replace LC67 (date).
3. Check the wiring associated with the replaced circuit packs.
4. Replace the SMDR clock assembly.

## Failure code 0 - No printout message:

1. Determine if HP-H05-10525T logic probe is provided or available:

If the logic probe is available, connect it to the SMDR carrier and proceed to Step 2.
If the logic probe is not available, proceed to Step 6.
2. At the SMDR carrier, insert the logic probe into test point TP8 of LC63 or LC374 circuit pack for at least 5 seconds.
3. Execute Test 4.

If the logic probe is not flashing, proceed to Step 4.
If the logic probe is flashing, proceed to Step 5.
4. At the SMDR carrier, insert the logic probe into test point TP1 of circuit pack LC62.

If the logic probe is not flashing, replace LC62 at the SMDR carrier.
If the logic probe is flashing, replace LC63 or LC374 at the SMDR carrier.
5. If the logic probe is flashing and no characters are being sent to the printer:

If the date is not printed, replace LC65 at the SMDR carrier.
If the date is printed, replace LC64 at the SMDR carrier.
6. When no logic probe is available, perform Steps 7 through 9 as appropriate.
7. At the SMDR carrier, replace LC62.

At the SMDR carrier, replace LC63 or LC374.
8. Execute Test 4.
9. If no characters are being sent to the printer:

If the date is not printed, replace LC65 at the SMDR carrier.
If the date is printed, replace LC64 at the SMDR carrier.

## Failure Code 0 - Invalid printout message:

At the SMDR carrier:

1. Replace LC63 or LC374.
2. Replace LC39.
3. Replace LC64.

## Failure code 1, 3, 5, 7, or 8:

1. Replace TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6.
2. At the SMDR carrier, replace LC62.
3. Check the wiring associated with the replaced circuit packs.

## Failure code 2:

1. Verify TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6 is set for high speed data.
2. At the SMDR carrier, replace LC62.
3. Replace TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6.
4. Check the wiring associated with the replaced circuit packs.

## Failure code 4:

1. At the SMDR carrier, replace LC62.
2. Replace TN403 (dual-speed data channel associated with the SMDR ) at the equipment location displayed in Fields 4 through 6.
3. Check the wiring associated with the replaced circuit packs.

## Failure code 6:

1. At the SMDR carrier, check for a blown fuse.
2. At the SMDR carrier, replace LC62.
3. Replace TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6.
4. Check the wiring associated with the replaced circuit packs.

## Repair Procedure for 9-Track SMDR

Use the following steps to repair magnetic tape SMDR equipment.

1. Perform the corrective action listed for the failure code recorded as a result of Test 2 and the type of message error or incorrect operation as a result of Test 4 (if appropriate).
2. Execute Test 2 and/or Test 4 for each corrective action taken until the final repair is made.
3. Verify correct operation of the SMDR equipment using Test 4.
4. Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of common control circuit packs.

## PROC 655

5. Refer to SMDR COMPONENT REPLACEMENT for steps on:

Replacement of SMDR carrier circuit packs.
Replacement of SMDR formatter circuit packs.
Replacement of SMDR tape drive circuit packs.
Photosensors adjustment.
Tape speed and ramp time adjustments.
Capstan servo zero and tension arm travel adjustments.
Replacement of SMDR clock/calendar display.
Replacement of SMDR formatter.
Replacement of SMDR tape drive.
Failure code 0 - Time and/or date failure:
At the SMDR carrier:

1. Replace LC66 (time).
2. Replace LC67 (date).
3. Check the wiring associated with the replaced circuit packs.
4. Replace the SMDR clock assembly.

## Failure code 0 - Data not recorded on tape:

1. Determine if HP-H05-10525T logic probe is provided or available:

If the logic probe is available, connect it to the SMDR carrier and proceed to Step 2.
If the logic probe is not available, proceed to Step 13.
2. Load a spare 9 -track tape. Ensure the write-enable ring is installed on the tape and verify the tape is threaded correctly.
3. Connect the logic probe to test point TP1 on the LC178 and execute Test 4 twice.
4. Determine the status of the logic probe.

If the logic probe is not flashing, proceed to Step 5.
If the logic probe is flashing, proceed to Step 6.
5. If the logic probe did not flash, perform the following at the SMDR carrier:

Check for a blown fuse.
Replace LC177.
Replace LC68.
Replace LC175.
Replace LC178.
Replace LC63 or LC374.
Replace LC40.
Check the wiring associated with the replaced circuit packs.
6. If the logic probe flashed, perform Steps 7 through 12 as appropriate.
'7. At the SMDR carrier:
Replace LC175.
Replace LC176.
Replace LC177.
8. At the SMDR formatter:

Replace board 4062.
Replace board 4257.
9. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
Replace board 4207.
Replace board 4188.
Replace board 4209.
Replace board 3844 and adjust the photosensors.
10. Check the cabling between the formatter, tape drive, and SMDR carrier and the wiring associated with the replaced SMDR circuit packs.
11. Replace the SMDR formatter.
12. Replace the SMDR tape drive.
13. When no logic probe is available, perform Steps 14 through 19 as appropriate.
14. At the SMDR carrier:

Check for a blown fuse.
Replace LC177.
Replace LC68.
Replace LC175.
Replace LC178.
Replace LC63 or LC374.
Replace LC40.
Replace LC176.
15. At the SMDR formatter:

Replace board 4062.
Replace board 4257.
16. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
Replace board 4207.

## PROC 655

Replace board 4188.
Replace board 4209.
Replace board 3844 and adjust the photosensors.
17. Check the cabling between the formatter, tape drive, and SMDR carrier and the wiring associated with the replaced SMDR circuit packs.
18. Replace the SMDR formatter.
19. Replace the SMDR tape drive.

## Failure code 0-Data not displayed at system control panel:

1. Determine if HP-H05-10525T logic probe is provided or available:

If the logic probe is available, connect it to the SMDR carrier and proceed to Step 2.
If the logic probe is not available, proceed to Step 17.
2. Ensure the write-enable ring is on the tape.
3. Connect the logic probe to test point TP1 on the LC178 circuit pack.
4. Execute Test 4 twice.
5. Determine the status of the logic probe.

If the logic probe is not flashing, proceed to Step 6.
If the logic probe is flashing, proceed to Step 10.
6. If the logic probe did not flash, perform Steps 7 through 9 as appropriate.
7. At the SMDR carrier:

Check for a blown fuse.
Check output voltages on the 207B power supply.
8. At the SMDR carrier, replace the first circuit pack listed below. If the logic probe still does not flash, replace the next circuit pack and retest; etc.
LC177.
LC68.
LC175.
LC178.
LC63 or LC374.
LC40
9. Check the wiring associated with the replaced circuit packs.
10. If the logic probe flashed, perform Steps 11 through 16 as appropriate.
11. At the SMDR carrier:

Replace LC175.
Replace LC176.
Replace LC177.
12. At the SMDR formatter:

Replace board 4062.
Replace board 4257.
13. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
Replace board 4207.
Replace board 4188.
Replace board 4209.
Replace board 3844 and adjust the photosensors.
14. Check the cabling between the formatter, tape drive, and SMDR carrier and the wiring associated with the replaced SMDR circuit packs.
15. Replace the SMDR formatter.
16. Replace the SMDR tape drive.
17. When no logic probe is available, perform Steps 18 through 23 as appropriate.
18. At the SMDR carrier:

Check for a blown fuse.
Replace LC177.
Replace LC68.
Replace LC175.
Replace LC178.
Replace LC63 or LC374.
Replace LC40.
Replace LC176.
19. At the SMDR formatter:

Replace board 4062.
Replace board 4257.
20. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
Replace board 4207.
Replace board 4188.
Replace board 4209.
Replace board 3844 and adjust the photosensors.
21. Check the cabling between the formatter, tape drive, and SMDR carrier and the wiring associated with the replaced SMDR circuit packs.

## PROC 655

22. Replace the SMDR formatter.
23. Replace the SMDR tape drive.

## Failure code 0 - Incorrect data display at system control panel:

1. At the SMDR carrier:

Replace LC68.
Replace LC63 or LC374.
Replace LC175.
Replace LC176.
Replace LC177.
Replace LC178.
2. Check for trouble in the System 85 software.

## Failure code 0 -Tape fails to load:

1. Ensure the write-enable ring is installed.

The write-enable lamp lights if installed.
2. If the tape does not advance to the load point, perform Steps 3 through 7 (as appropriate) at the tape drive.
3. Adjust the photosensors on board 3844 .
4. Replace board 3844.

Replace board 4843.
5. Replace board 3645 and adjust the tape speed and ramp time.
6. Replace board 4306 and adjust the capstan servo zero and tension arm travel.
7. Replace the SMDR tape drive.
8. If the tape does not stop at the load point, perform Steps 9 through 14 as appropriate.
9. Adjust the photosensors on board 3844 at the tape drive.
10. Replace board 3844 and adjust the photosensors at the tape drive.
11. Replace board 4062 at the formatter.
12. Check the cabling between the tape drive and formatter.
13. Replace the SMDR formatter.
14. Replace the SMDR tape drive.
15. If the ON LINE lamp on the tape drive does not light, refer to Failure code 0-ON LINE lamp does not light at the tape drive.

## Failure code 0 - Tape fails to rewind:

1. Verify that the tape is threaded correctly.
2. Adjust the photosensors on board 3844 at the tape drive.
3. If the tape fails to rewind completely onto the supply reel, perform Steps 4 and 5 as appropriate.
4. Replace board 4843 at the tape drive.

Replace board 3645 at the tape drive and adjust the tape speed and ramp time.
5. Replace the SMDR tape drive.
6. If the tape fails to rewind to the load point, perform Steps 7 through 13 as appropriate.
7. At the SMDR carrier, replace LC177.

If the UNLOAD lamp on LC177 does not light when the TAPE UNLOAD button is depressed, check the wiring between LC177 and the TAPE UNLOAD button.
8. At the SMDR carrier, replace LC175.
9. At the SMDR formatter, replace board 4062 .
10. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
Replace board 3645 and adjust the tape speed and ramp time.
Replace board 4306 and adjust the capstan servo zero and tension arm travel.
11. Check the wiring associated with the replaced circuit packs and the cabling between the SMDR carrier, formatter, and tape drive.
12. Replace the SMDR formatter.
13. Replace the SMDR tape drive.

## Failure code 0 - Tape fails to move when DUMP MEMORY button is depressed:

1. Determine if HP-H05-10525T logic probe is provided or available:

If the logic probe is available, connect it to the SMDR carrier and proceed to Step 2.
If the logic probe is not available, proceed to Step 17.
2. Connect the logic probe to test point TP10 on the LC177 circuit pack and observe the logic probe when DUMP MEMORY is depressed.
3. Depress DUMP MEMORY.
4. Determine the status of the logic probe.

If the logic probe is not flashing, proceed to Step 5.
If the logic probe is flashing, proceed to Step 9.
5. If the logic probe did not flash, perform Steps 6 through 8 as appropriate.
6. At the SMDR carrier, replace LC68.

Depress DUMP MEMORY.
7. If the logic probe still does not flash, replace LC177 at the SMDR carrier.
8. Check the wiring associated with the replaced circuit packs.
9. If the logic probe flashed, perform Steps 10 through 16 as appropriate.
10. Verify that the tape is threaded correctly.
11. At the SMDR carrier, replace LC177.

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12. At the SMDR formatter, replace board 4062.
13. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
14. Check the wiring between LC177 and the formatter and the cabling between the formatter and tape drive.
15. Replace the SMDR formatter.
16. Replace the SMDR tape drive.
17. When no logic probe is available, perform Steps 18 through 24 as appropriate.
18. Verify that the tape is threaded correctly.
19. At the SMDR carrier:

Replace LC68.
Replace LC177.
20. At the SMDR formatter, replace board 4062.
21. At the SMDR tape drive:

Replace board 3842.
Replace board 4843.
22. Check the wiring between LC177 and the formatter and the cabling between the formatter and tape drive.
23. Replace the SMDR formatter.
24. Replace the SMDR tape drive.

## Failure code 0-ON LINE lamp does not light at the tape drive:

1. At the SMDR tape drive, replace board 4843.
2. Check the cabling between the tape drive and the formatter.
3. Replace the SMDR tape drive.

## Failure code 1, 3, 5, 7, or 8:

1. Replace TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6.
2. At the SMDR carrier, replace LC62.
3. Check the wiring associated with the replaced circuit packs.

## Failure code 2, 4, or 6:

1. At the SMDR carrier, replace LC62.
2. Replace TN403 (dual-speed data channel associated with the SMDR) at the equipment location displayed in Fields 4 through 6.
3. Check the wiring associated with the replaced circuit packs.

## Failure code 9:

1. Determine if HP-H05-10525T logic probe is provided or available:

If the logic probe is available, connect it to the SMDR carrier and proceed to Step 2.
If the logic probe is not available, proceed to Step 8.
2. Connect the logic probe to test point TP8 on the LC68 circuit pack.
3. Determine the status of the logic probe.

If the logic probe is not flashing, perform Steps 4 and 5 as appropriate.
If the logic probe is flashing, perform Steps 6 and 7 as appropriate.
4. At the SMDR carrier, replace LC62.
5. Check the wiring associated with the replaced circuit pack.
6. At the SMDR carrier:

Replace LC62.
Replace LC68.
Replace LC63 or LC374.
Replace LC40.
Replace LC177.
Replace LC178.
7. Check the wiring associated with the replaced circuit packs.
8. When no logic probe is available, perform Steps 9 and 10 as appropriate
9. At the SMDR carrier:

Replace LC62.
Replace LC68.
Replace LC63 or LC374.
Replace LC40.
Replace LC177.
Replace LC178.
10. Check the wiring associated with the replaced circuit packs.

PROC 656

PROC 656 - NCOSS TEST


## Purpose

PROC 656 provides the capability to test NCOSS equipment when a trouble is reported or suspected.

Tests 3 through 5 of this maintenance procedure must be performed on the customer's premises. Successful test completion for Tests 3 through 5 is determined by observing printouts from the NCOSS equipment.
PROC 656 is used to:

1. Display failures associated with the NCOSS equipment (when Test 1 is enabled).
2. Run an echo test with the NCOSS equipment.

Note: Dual-speed data channels associated with NCOSS equipment are tested in PROC 611.

## Field Definitions and Codes

Each field of PROC 656 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BL, PROC 656 - Field Definitions and Codes.

Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 and 3 - Select operation code and data of test word to be transmitted to the NCOSS equipment (Test 5 only).

TABLE BL.

| PROC 656 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1-5 | Test number. | 7 |  | Failure code-once: Accumulative "OR"ing of all failure codes that occurred at least once during a test. <br> Pass. <br> Data channel address not acknowledged. <br> No data reply (echo) from NCOSS equipment in all cases. <br> Failures 1 and 2. <br> Echo mismatch. <br> Failures 1 and 4. <br> Failures 2 and 4. <br> Failures 1, 2, and 4. <br> Equipment failure (reported by NCOSS). <br> Failure code-last: Failure code indicating one or more failures occurring during the last transmission to the NCOSS equipment before the test ended or was stopped. |
| 2 | 0 | Operation code (octal): <br> Normal data word: |  |  |  |
|  | 3 | No operation. |  | 0 |  |
|  | 4 | Retransmit normal data word. |  | 1 |  |
|  | $\begin{aligned} & 10 \\ & 14 \end{aligned}$ | Last word in message. Retransmit last word in message. |  | 2 |  |
| 3 | $\begin{aligned} & 0000- \\ & 7777 \end{aligned}$ | Data word (octal). |  | $\begin{aligned} & 3 \\ & 4 \\ & 5 \end{aligned}$ |  |
| 4 | 0 | Common control carrier. |  | 6 7 |  |
| 5 | 23-26 | Slot Number. |  | 8 |  |
| 6 | 0-15 | Channel number. | 8 | 0-8 |  |

## Operation of Procedure

## Overview

PROC 656 is used to test NCOSS equipment.
To call in PROC 656, perform the following:

1. Depress PROC NO; 656; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1 , Fields 4 through 6 display the data channel equipment location associated with the NCOSS equipment, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Caution: NCOSS call recording is blocked under the following conditions While Test 3, 4, and 5 are executing. In Test 4, the 16 message pattern is sent in less than 1 second. In Test 5, the blockage is extended for 2 minutes after EXECUTE is depressed.

## PROC 656 Test 1, Test 2, and Test 3

Five tests are available:

1. Test 1 - Displays failure history (when Test 1 is enabled).
2. Test 2 - Runs an echo test on the NCOSS equipment.
3. Test 3 - Sends an alternating one-zero pattern continuously to the NCOSS equipment.
4. Test 4 - Sends 16 messages to the NCOSS equipment testing most digits in each digit's position.
5. Test 5 - Sends a single data word to the NCOSS equipment allowing manual entry of operation codes and data words.

## Test 1

Test 1 is disabled at the present time and no failure history is available for display.
Note: Depressing EXECUTE displays error code 06 (wrong key, press right key and continue).

## Test 2

Test 2 runs an echo test with the NCOSS equipment.
Test 2 does not interfere with normal call processing recording of calls.
An alternating one-zero pattern is used for the first echo test transmission. A complementing onezero pattern is used for the second echo test transmission.

1. Test 2 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

## CHANGE FIELD; 1; ENTER; 2; ENTER.

2. To start Test 2, depress EXECUTE.
3. If no failures are detected, Fields 7 and 8 display a 0 .
4. If any failures are detected, the following is displayed:

Field 1-2.
Fields 4 through 6 - Data channel equipment location associated with the NCOSS equipment.
Fields 7 and 8 - Failure codes ( 1 through 8 ).

## Test 3

Test 3 sends a continuous alternating one-zero pattern in the format of a call record message to the NCOSS equipment.

1. Test 3 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 3; ENTER.
2. To start Test 3, depress EXECUTE.

Caution: While Test 3 is executing, NCOSS call recording is blocked.
3. During execution of Test 3 , the following fields are displayed:

Field 1-3.
Fields 2 and 3 - Operation code and data word currently being transmitted to the NCOSS equipment.

Fields 4 through 6 - Data channel equipment location associated with the NCOSS equipment.
Fields 7 and 8 - Once and last failure codes (if any).
4. The testing interval is determined by maintenance personnel performing the test, and is ended by depressing STOP.
5. The one-zero pattern data word is complemented each time it is transmitted with 0.5 seconds between words.

Between the last word transmitted (normally word 18) and the start of the next message is a 2 -second delay to allow stopping Test 3 .
6. Successful test completion results in a 0 displayed in Fields 7 and 8.

## Test 4

Test 4 sends 16 messages in either 12,15 , or 18 word message formats to the NCOSS equipment.
Four of the NCOSS operation codes are exercised by Test 4, i.e., normal word transmission, last word of message transmission, retransmit normal word, and retransmit last word.
When Test 4 is performed, maintenance personnel must be on the customer's premises to determine if the test is successful by observing the NCOSS printout.

1. Test 4 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; 1; ENTER; 4; ENTER.
2. To start Test 4, depress EXECUTE.

Caution: While Test 4 is executing ( 16 message pattern sent in less than 1 second) NCOSS call recording is blocked.
3. If no failures are detected, Fields 7 and 8 display a 0.

The printout (Refer to Figure 17) should be check to ensure that the NCOSS equipment is operating properly.
4. If any failures are detected, the following is displayed:

Field 1-4.
Fields 4 through 6 - Data channel equipment location associated with the NCOSS equipment.
Fields 7 and 8 - Once and last failure codes.

PROC 656 Test 5


## NOTE

Bit 2 of the 0 p Code (parity bit) may be incorrect in this table.

Figure 17. Hexadecimal Dump for Test 4 Test Call (18-Word Format)

## Test 5

Test 5 sends a single data word to the NCOSS equipment and is normally used in repair of NCOSS equipment. Test 5 allows sending most words or messages to the NCOSS equipment by manually entering it into Fields 2 and 3.

When Test 5 is performed, maintenance personnel must be on the customer's premises to determine if the test is successful by observing the NCOSS equipment.

1. Test 5 is selected by use of NEXT TEST or the CHANGE FIELD sequence:

CHANGE FIELD; l; ENTER; 5; ENTER.
2. When Test 5 is called in a test word (operation code and data word) is displayed in Fields 2 and 3.
3. Depressing NEXT DATA selects the next of ten operation codes and data words that are available to be transmitted. (Refer to Figure 18.)

| Field 2 | Field 3 |
| :---: | :---: |
| OP Code | Data |
|  |  |
| 3.2525 | - No operation op code with 01 pattern |
| 3.5252 | - No operation op code with 10 pattern |
| 14.2525 | - Retransmission, end of message with 01 pattern |
| 14.5252 | - Retransmission, end of message with 10 <br> - pattern |
| 4.2525 | - Retransmission with 01 pattern |
| 4.5252 | - Retransmission with 10 pattern |
| 10.2525 | - End of message op code with 01 pattern |
| 10.5252 | - End of message op code with 10 pattern |
| 0.2525 | - Normal data word op code with 01 pattern |
| 0.5252 | - Normal data word op code with 10 pattern |

Figure 18. List of Operation Codes and Data Words Available using the NEXT DATA Key in Test 5
4. Operation codes and data words can be manually entered into Fields 2 and 3 using the CHANGE FIELD sequence:
CHANGE FIELD; 2; ENTER; (Operation code); ENTER; (Data word); ENTER.
5. To start Test 5 , depress EXECUTE.

Caution: When Test 5 is executed, NCOSS call recording is blocked for 2 minutes after EXECUTE is depressed.
6. During execution of Test 5 , the following fields are displayed:

Field 1-5.
Fields 2 and 3 - Operation code and data word currently being transmitted to the NCOSS equipment.
Fields 4 through 6 - Data channel equipment location associated with the NCOSS equipment.
Fields 7 and 8 - Once and last failure codes (if any).
7. Each time EXECUTE is depressed, the operation code and data word displayed in Fields 2 and 3 is transmitted to the NCOSS equipment.
NEXT DATA can be used to select a different operation code and data word to be transmitted prior to depressing EXECUTE.

## PROC 656

## Repair Guide

When an NCOSS failure is reported or suspected, perform the following steps in the order listed to isolate and repair the faulty unit.

1. Execute Test 2 and record the results.
2. Execute Test 4, record the results and look at the printout.
3. If Test 4 fails or the printout is not correct, the NCOSS equipment is faulty.

Refer the problem to the appropriate personnel.
4. Test 3 can be used to determine if failures are intermittent or to trace wiring problems.
5. Test 5 can be used to transmit a single data word repeatedly (by depressing EXECUTE repeatedly) and to change the single data word transmitted to help isolate failures in the NCOSS equipment.
6. When $1 / O$ failures are suspected between the dual-speed data channel and the NCOSS equipment, perform PROC 611 Test 3, entering the equipment location displayed in Fields 4 through 6.

## PROC 960 - QUEUE ACTIVITY



## Purpose

PROC 960 is used to display queue information for a particular equipment location, or to display the equipment locations associated with a particular queue.

## Field Definitions and Codes

Each field of PROC 960 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BM, PROC 960 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Fields 2 through 6 - Select a specific equipment location to determine the queue activity (Test 1 only).
3. Field 8 - Select a specific queue number to determine the equipment locations on the queue (Test 2 only).

## Operation of Procedure

## Overview

PROC 960 is used to determine the queue activity.
To call in PROC 960, perform the following:

1. Depress PROC NO; 960; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Field 2 is blanked and blinking, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

## TABLE BM.

| PROC 960 <br> FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | FIELD | CODE | definition |
| 1 | 1,2 | Test number | 8 | 0-255 | Queue number |
| 2-6 |  | Equipment location: | 9 | 0-255 | Trunk group number |
| 2 | 0-30 | Module number | 10 | 0-999 | Queue index |
| 3 4 | $0-3$ | Carrier number | 11 | 0-999 | Queue length |
| 5 | 0-21 | Slot number | 12 | 0-127 | Trunk type |
| 6 | 0-7 | Circuit number | 13 | 0-3 | QBIT (Queue status): |
| 7 | $\begin{gathered} 0-2 \\ 0 \end{gathered}$ | Busied or unequipped: <br> Equipped with hardware and not maintenance busy. |  | 0 1 | Not on any queue. <br> On idle queue. |
|  | 1 | Unequipped with hardware or maintenance busy. |  | 2 | On a busy queue without QBIT set (error condition). |
|  | 2 | Pseudo trunk. |  | 3 | On a busy queue. |

Two tests are available:

1. Test 1 - Displays queue information for an entered equipment location.

The equipment location contains the internal trunk number for a pseudo trunk.
2. Test 2 - Displays queue information and the first trunk in queue for an entered queue number.

## Test 1

Test 1 is used to display the queue information for an entered equipment location.
The equipment location fields (4 through 6) display the internal trunk record number when Field 7 displays a 2.

1. Test 1 is the default test when entering PROC $\mathbf{9 6 0}$ or is selected by use of NEXT TEST.
2. When Test 1 is initially called in, Field 2 (module) is blanked and blinking to indicate that data must be entered.
3. The equipment location to be displayed is entered as follows:
(Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
4. To start Test 1, depress EXECUTE.
5. The busied or unequipped status is displayed in Field 7 and the queue status is displayed in Field 13 when EXECUTE is depressed.
6. For a trunk equipment location that is not on a queue ( 0 displayed in Field 13) no further information is provided.
7. The following information is provided for trunk equipment locations that are in queue:

Field 1-1.
Fields 2 through 6 - Equipment location selected.
Field 7-0 or 2.
Field 8 - Queue number.
Field 9 - Trunk group number.
Field 10 - Dashed.
Field 11 - Queue length.
Field 12 - Trunk type.
Field 13 - QBIT ( $1=$ on idle queue or $3=$ on busy queue).
8. When another specific equipment location is to be displayed, the CHANGE FIELD sequence must be used to select the specific equipment location.

Either all or any part of the equipment location fields can be changed.
9. EXECUTE must be depressed to display the queue information for the specific equipment location entered.

## Test 2

Test 2 is used to display the queue information and first trunk in queue for an entered queue number.

1. Test 2 is selected by use of NEXT TEST.
2. When Test 2 is initially called in, a default equipment location from Test 1 may be displayed in Fields 2 through 6 and Field 8 (queue number) is blinking to to indicate that data may be entered.

Either the default equipment location may be displayed or a specific queue number can be selected for display.
3. To select a specific queue number to be displayed, enter the following:

## (Queue number); ENTER

4. To start Test 2, depress EXECUTE.
5. The following information for the first trunk equipment location of the queue number entered is displayed as follows:

Field 1-2.
Fields 2 through 6 - Trunk equipment location.
Field 7 - Busied or unequipped.
Note: If Field 7 equals 2 (pseudo trunk), Fields 4 through 6 display an internal trunk number and Fields 2 and 3 are dashed.

Field 8-Queue number selected.

## PROC 960 Test 2

Field 9 - Trunk group number.
Field 10 - Queue index.
Field 11 - Queue length.
Field 12 - Trunk type.
Field 13 - Dashed.
6. Depressing NEXT CIRCUIT repeatedly displays the remaining trunks in the queue.

When all trunks in the queue are displayed, depressing NEXT CIRCUIT once more dashes Fields 2 through 7, 12 and 13.

Depressing NEXT CIRCUIT again displays the first trunk equipment location in the queue.
7. Depressing NEXT UNIT steps to the next queue number.

NEXT CIRCUIT can be used to step through the new queue number if Field 11 is greater than 0 .
8. When all queues are displayed, depressing NEXT UNIT again dashes Fields 2 through 8,12 and 13 . Fields 9 through 11 display a 0 .

Depressing NEXT UNIT once more displays the first queue number.
9. When another specific queue number is to be displayed without stepping through all queue numbers using NEXT UNIT, the CHANGE FIELD sequence must be used to select the specific queue number:
CHANGE FIELD; 8; ENTER; (Queue number); ENTER.
10. EXECUTE must be depressed to display the trunk equipment locations of the specific queue number entered.

## PROC 961 - CONNECTION ACTIVITY



## Purpose

PROC 961 is used to display the connection status activity, i.e., connection number, module and accumulator number, and equipment location.

## Field Definitions and Codes

Each field of PROC 961 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BN, PROC 961 - Field Definitions and Codes.
Optional input fields are:

1. Field 1 - Change test number.
2. Field 2 - Select a specific connection number to determine the equipment location, constat table number, acport table number, and time slot identity (Test 1 only).
3. Fields 6 and 7 - Select a specific time slot identity to determine the connection number and constat table number (Test 2 only).
4. Fields 9 through 13 - Select a specific equipment location to determine the constat table number, acport table number, connection number and time slot identity accumulator number (Test 3 only).
5. Field 6 - Select a specific module to determine the connection number and the first active accumulator on a module (Test 4 only).

## PROC 961

TABLE BN.

| PROC 961 <br> field definitions and codes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD | CODE | definition | fieto | Code | definition |
| 1 | 1-4 | Test number | 9-13 |  | Equipment location or TMS |
| 2 | 0-77777 | Connection number (octal) | 9 | 0-30 | Module number |
| 3 | 0,1 | Busy/idle bit | 10 | 0-6 | Cabinet number |
| 4 | 1-6 | Constant table number. | 12 | 0-21 | Slot number |
| 5 | 0,1 | In-use status | 13 | 0-7 | Circuit number |
| $6-7$ 6 | 0-30 | Time slot identity: <br> Module number | Fields 9,10 , and 13 are dashed when a multimodule call is made and Fields 11 and 12 display the TMS time slot. |  |  |
| 7 | 1-255 | Accumulator number | 14 | 0-6 | Number of ports in connection. |
| 8 | 1-6 | ACPORT table number. | 15 | 1-6 | Port index |

## Operation of Procedure

## Overview

PROC 961 is used to determine the connection activity.
To call in PROC 961, perform the following:

1. Depress PROC NO; 961; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Field 2 is blanked and blinking, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

Four tests are available:

1. Test 1 - Displays equipment location, constat table number, acport table number, and time slot information for an entered connection number.
2. Test 2 - Displays connection number and constat table number for an entered time slot identity accumulator number.
3. Test 3 - Displays constat table number, acport table number, connection number, and time slot identity accumulator number for an entered equipment location.
4. Test 4 - Displays the connection number and the first active accumulator on a module.

## Test 1

Test 1 displays the equipment location, constat table number, acport table number, and time slot identity for an entered connection number.

1. Test 1 is the default test when entering PROC 961 , or is selected by use of NEXT TEST.
2. When Test 1 is initially called in, a default connection number may be displayed in Field 2.

Field 2 (connection number) is blanked and blinking, indicating an optional entry field.
3. The default connection number can be the last connection number displayed in Tests 2 through 4 of PROC 961.
Either the default connection number may be displayed or a specific connection number can be selected for display.
4. A specific connection number can be selected for display by entering the connection number (in octal) in Field 2:
(Connection number); ENTER.
5. To start Test 1, depress EXECUTE.
6. The busy/idle status of the connection number is provided in Field $3(0=i d l e, 1=$ busy $)$ when EXECUTE is depressed.
7. For a connection number that is not busied (0 displayed in Field 3), no further information is provided.
8. For a busied connection (1 displayed in Field 3), the following information is provided:

Field 1-1.
Field 2 - Connection number selected.
Field 3-1.
Field 4 - Constat table number.
Fields 6 and 7 - Module and accumulator number.
Field 8 - Acport table number.
Fields 9 through 13 - Equipment location on the connection.
Field 14 - Number of ports in connection.
Field 15 - Port index.
9. Depressing NEXT CIRCUIT displays the next port in the acport tables.

Field 8 displays the number of the acport table and Field 14 displays the total number of acport tables being used for the current constat table number (Field 4).
10. Depressing NEXT CIRCUIT after all ports in the acport tables are displayed dashes Fields 2 through 15.
Depressing NEXT CIRCUIT once more causes the first entry to be displayed.

## PROC 961 Test 1 and Test 2

11. Depressing NEXT UNIT decrements the constat table number displayed in Field 4.

When all constat table numbers are displayed, depressing NEXT UNIT again dashes Fields 2 through 15.
Depressing NEXT UNIT once more causes the first entry to be displayed.
12. Depressing NEXT DATA advances the display to the next busied connection number and displays the data for that connection number.

When all busied connection numbers are displayed, depressing NEXT DATA again dashes Fields 2 through 15.

Depressing NEXT DATA once more causes the first entry to be displayed.
13. When another specific connection number is to be displayed, the CHANGE FIELD sequence must be used to select the connection number:

## CHANGE FIELD; 2; ENTER; (Connection number); ENTER.

14. EXECUTE must be depressed to display the equipment location, constat table number, acport table number, and time slot identity for the entered connection number.

## Test 2

Test 2 displays the connection number and constat table number for an entered time slot identity accumulator number.

1. Test 2 is selected by use of NEXT TEST.
2. When Test 2 is initially called in, a default module and accumulator number may be displayed in Fields 6 and 7.

The default module and accumulator number can be the last module and accumulator number displayed in Test 1, 3, or 4 of PROC 961.
3. Field 6 (module) is blinking, indicating an optional entry field.

Either the default module and accumulator number may be displayed or a specific module and accumulator number can be selected for display.
4. A specific module and accumulator number can be selected for display by performing one of the following depending on whether or not a default module and accumulator number are displayed:
(Module number); ENTER; (Accumulator number); ENTER.
CHANGE FIELD; 6; ENTER; (Module number); ENTER; (Accumulator number); ENTER.
5. To start Test 2, depress EXECUTE.
6. A search of all of the constat tables for the entered module and accumulator number is performed when EXECUTE is depressed.
7. If the module and accumulator number are not found, the constat table number is displayed in Field 4, a 0 is displayed in Field 5 and no other information is provided.
8. If the module and accumulator are found in the constat tables, the following information is provided:

Field 1-2.
Field 2 - Connection number.
Field 3-1.
Field 4 - Constat table number.
Field 5-1.
Field 6 - Module number selected.
Field 7 - Accumulator number selected.
9. When another module and accumulator number is to be displayed, the CHANGE FIELD sequence must be used to select the specific module and accumulator number:
CHANGE FIELD; 6; ENTER; (Module number); ENTER; (Accumulator number); ENTER.
10. EXECUTE must be depressed to display the connection number and constat table number for the module and accumulator number entered.

## Test 3

Test 3 displays the constat table number, acport table number, connection number, and time slot identity for an entered equipment location.

1. Test 3 is selected by use of NEXT TEST.
2. When Test 3 is initially called in, a default equipment location may be displayed in Fields 9 through 13 .
Field 9 (module) is blinking, indicating an optional entry field.
3. The default equipment location can be the last equipment location displayed in Test 1,2 , or 4 of PROC 961.
Either the default equipment location may be displayed or a specific equipment location can be selected for display.
4. A specific equipment location can be selected for display by performing one of the following depending on whether or not a default equipment location is displayed:
(Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
CHANGE FIELD; 9; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
5. To start Test 3, depress EXECUTE.
6. A search of all of the acport tables for the entered equipment location is performed when EXECUTE is depressed.

## PROC 961 Test 3 and Test 4

7. If the equipment location is not found, a 0 is displayed in Field 5 and no other information is provided.
8. If the equipment location is found in the acport tables, the following information is provided: Field 1-3.

Field 2 - Connection number.
Field 3-1.
Field 4 - Constat table number.
Field 5-1.
Fields 6 and 7 - Time slot identity.
Field 8 - Acport table number.
Fields 9 through 13 - Equipment location selected.
9. When another equipment location is to be displayed, the CHANGE FIELD sequence must be used to select the specific equipment location:

CHANGE FIELD; 9; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
10. EXECUTE must be depressed to display the constat table number, acport table number, connection number, and time slot identity for the entered equipment location.

## Test 4

Test 4 displays the connection number and the first active accumulator for an entered module number.

1. Test 4 is selected by use of NEXT TEST.
2. When Test 4 is initially called in, a default module number may be displayed in Field 6.

Field 6 (module) is blinking, indicating an optional entry field.
3. The default module number can be the last module number displayed in Tests 1 through 3 of PROC 961.
Either the default module number can be displayed or a specific module number can be selected for display.
4. A specific module number can be selected for display by performing one of the following depending on whether or not a default module number is displayed:
(Module number); ENTER.
CHANGE FIELD; 6; ENTER; (Module number); ENTER.
5. To start Test 4, depress EXECUTE.
6. The following information is provided for the module entered:

Field 1-4.
Field 2 - Connection number.
Field 4 - Constat table number.
Field 5-1.
Field 6 - Module number selected.
Field 7 - First active accumulator in module.
7. Depressing NEXT CIRCUIT displays the next active accumulator in Field 7 for the module entered in Field 6.
Field 2 displays the connection number that the accumulator is on.
8. Depressing NEXT CIRCUIT after all active accumulators are displayed for the module entered in Field 6 dashes Fields 2 through 15.

Depressing NEXT CIRCUIT once more causes the first active accumulator for the module entered in Field 6 to be displayed.
9. Depressing NEXT UNIT increments the module number displayed in Field 6.

When all modules are displayed, depressing NEXT UNIT again dashes Fields 2 through 15.
Depressing NEXT UNIT once more causes the first entry to be displayed.

PROC 962 - FACILITY CONNECTIONS


The flipchart shown is for R2V2. The R2V1 flipchart is similar except that Note 1 on the flipchart is not included.

## Purpose

PROC 962 is used to display the trunk number linkages for line records and the facility and conference facility linkages for trunk records.
PROC 962 also displays the progress mark and linkage information for an entered equipment location.

## Field Definitions and Codes

Each field of PROC 962 flipchart and the possible displays for the fields during execution of the different tests are defined in Table BO, PROC 962 - Field Definitions and Codes.

Optional input fields are:

1. Field 1-Change test number.
2. Fields 2 through 6 - Select a specific equipment location to determine the facility connection information.

## Operation of Procedure

## Overview

PROC 962 is used to determine the facility connections.
To call in PROC 962, perform the following:

1. Depress PROC NO; 962; ENTER.
2. Test 1 is automatically selected.

Field 1 displays a 1, Field 2 is blanked and blinking, and all other fields are dashed.
3. Depressing NEXT TEST repeatedly advances the procedure to the desired test.

TABLE BO.

| PROC 962FIELD DEFINITIONS AND CODES |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Field | CODE | definition | FiELD | CODE | DEFINITION |
| 1 | 1,2 | Test number | $\begin{gathered} 10 \\ (\text { Contd }) \end{gathered}$ | $\begin{aligned} & 3 \\ & 4 \\ & 5 \\ & 6 \end{aligned}$ | Intercom (ICOM) record <br> Attendant switch loop <br> Attendant originating register <br> Dial pulse originating register |
| 2-6 2 | 0-30 | Initiating circuit equipment location: <br> Module number <br> Cabinet number <br> Carrier number <br> Slot number <br> Circuit number |  |  |  |
| 3 | 0-6 |  | 11-15 |  | Facility or conference port equipment location: |
| 5 | 0-21 |  | 11 |  | Module number |
| 6 | 0-7 |  | 12 | $0-30$ $0-7$ |  |
| 7 | $\begin{gathered} 0-5 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{gathered}$ | Circuit type: <br> Unequipped <br> Line <br> Trunk <br> 72 Series terminal <br> TMS <br> Pseudo trunk | $\begin{aligned} & 13 \\ & 14 \\ & 15 \end{aligned}$ | $\begin{gathered} 1-3 \\ 0-21 \\ 0-7 \end{gathered}$ | Carrier number <br> Slot number <br> Circuit number |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  | 16 | $1-6$ 1 2 | How linked: <br> Trunk - facility 1. <br> Trunk - facility 2. <br> Trunk - facility 3. <br> Station <br> Not used. <br> Station - Conference (Conference facility 1 through 8 ). |
| 8 | $\begin{gathered} 0-7 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \end{gathered}$ | Status: <br> Noncontrol, nonconference. <br> In control, nonconference. <br> Noncontrol, in conference. <br> In control, in conference. <br> Not on time slot. <br> Invalid location. <br> Maintenance busy. <br> Unequipped circuit. |  | $5$ |  |
|  |  |  | 17 | $0-5$ 0 1 2 | Circuit type: <br> Unequipped <br> Line <br> Trunk <br> 72 Series terminal <br> TMS <br> Pseudo trunk |
| 9 | 0-2047 | Progress mark (octal) |  | 3 |  |
| 10 | $\begin{gathered} 1-6 \\ 1 \\ 2 \end{gathered}$ | Internal number type: <br> Internal number <br> Queueing trunk |  | 5 |  |
|  |  |  | 18 | 1-8 | Conference port number |

## PROC 962 Test 1

Two tests are available:

1. Test 1 - A static test that displays a copy of the connection information for an initiating equipment location.
2. Test 2 - A dynamic test that continually updates the progress mark of the initiating equipment location.

## Test 1

Test 1 is a static test that displays a copy of the connection information for an initiating circuit.
The connection information is not updated until EXECUTE is depressed again.

1. Test 1 is the default test when entering PROC 962, or is selected by use of NEXT TEST.
2. When Test 1 is initially called in, a default equipment location may be displayed in Fields 2 through 6 .
Field 2 (module) is blinking, indicating an optional entry field.
3. The default equipment location can be the last equipment location displayed in Test 2 of PROC 962.

To display the default equipment location, proceed to Step 5.
4. A specific equipment location can be selected for display by entering the following:
(Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
5. To start Test 1, depress EXECUTE.
6. The initiating circuit and its status and the facility or conference port data linked to the initiating circuit is provided when EXECUTE is depressed.
7. The following information is displayed:

Field 1-1.
Fields 2 through 6 - Initiating circuit equipment location.
Field 7 - Initiating circuit type.
Field 8 - Initiating circuit status.
Field 9 - Progress mark (octal).
Field 10 - Internal number type ( 1 - indicating internal number when Field $17=5$ ) or dashed.
Fields 11 through 15 - Facility or conference port equipment location or dashed.
Field 16 - How the facility or conference port is linked.
Field 17 - Facility or conference port circuit type or dashed.
Field 18 - Conference port number or dashed.
8. If the initiating circuit is a trunk record, depressing NEXT CIRCUIT repeatedly steps through all the facilities that are linked.
9. If the initiating circuit is a conference record, depressing NEXT CIRCUIT repeatedly steps through all equipment locations on the conference.

The conference port number is displayed in Field 18.
10. When all facilities or conference records are displayed, depressing NEXT CIRCUIT again dashes Fields 10 through 18.
Depressing NEXT CIRCUIT once more restores the display to its initial state.
11. When a facility or conference port equipment location is displayed, depressing CLEAR DATA; EXECUTE transfers the facility or conference port equipment location to the initiating circuit equipment location.
12. After transfer, depressing EXECUTE displays the new facility or conference port equipment location associated with the new initiating circuit equipment location:
13. When another initiating circuit equipment location is to be displayed, the CHANGE FIELD sequence must be used to select the specific initiating circuit equipment location:
CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
14. EXECUTE must be depressed to display a copy of the connection information for the entered initiating circuit.

## Test 2

Test 2 is a dynamic test that continually updates the progress mark of the initiating circuit.
Test 2 is similar to Test 1 except that the connection information is displayed every time the progress mark changes, instead of only when depressing EXECUTE.

1. Test 2 is selected by use of NEXT TEST.
2. When Test 2 is initially called in, a default equipment location may be displayed in Fields 2 through 6.
Field 2 (module) is blinking, indicating an optional entry field.
3. The default equipment location can be the last equipment location displayed in Test 1 of PROC 962.
To display the default equipment location, proceed to Step 5.
4. A specific equipment location can be selected for display by entering the following:
(Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
5. To start Test 2, depress EXECUTE.
6. The initiating circuit and its status and the facility or conference port data linked to the initiating circuit is provided when EXECUTE is depressed.

## PROC 962 Test 2

7. The following information is displayed:

Field 1-2.
Fields 2 through 6 - Initiating circuit equipment location.
Field 7 - Initiating circuit type.
Field 8 - Initiating circuit status.
Field 9 - Progress mark (octal).
Field 10 - Internal number type ( 1 - indicating internal number when Field $17=5$ ) or dashed.
Fields 11 through 15 - Facility or conference port equipment location or dashed.
Field 16 - How the facility or conference port is linked.
Field 17 - Facility or conference port circuit type or dashed.
Field 18 - Conference port number or dashed.
8. If the initiating circuit is a trunk record, depressing NEXT CIRCUIT repeatedly steps through all the facilities that are linked.
9. If the initiating circuit is a conference record, depressing NEXT CIRCUIT repeatedly steps through all equipment locations on the conference.

The conference port number is displayed in Field 18.
10. When all facilities or conference records are displayed, depressing NEXT CIRCUIT again dashes Fields 10 through 18.
Depressing NEXT CIRCUIT once more restores the display to its initial state.
11. When a facility or conference port equipment location is displayed, depressing CLEAR DATA; EXECUTE transfers the facility or conference port equipment location to the initiating circuit equipment location.
12. After transfer, depressing EXECUTE displays the new facility or conference port equipment location associated with the new initiating circuit equipment location.
13. When a change occurs in the progress mark (Field 9) of the initiating circuit after EXECUTE is depressed, the display is updated as the change occurs.
14. When another initiating circuit equipment location is to be displayed, the CHANGE FIELD sequence must be used to select the specific initiating circuit equipment location:
CHANGE FIELD; 2; ENTER; (Module number); ENTER; (Cabinet number); ENTER; (Carrier number); ENTER; (Slot number); ENTER; (Circuit number); ENTER.
15. EXECUTE must be depressed to display the connection information for the entered initiating circuit.


## Purpose

PROC 999 is used to access and display the word contents of memory via the software tables.
PROC 999 is a display only maintenance procedure and is provided as an aid in displaying the data contents of a memory address.

## Field Definitions and Codes

1. Field 1 is used to enter a memory address (in octal) in order to display the data contents of the memory address.

Maximum addressable memory location (based on current switch memory configuration) for Field 1 (address) is 77777777 octal which equals FFFFFF hexadecimal (or 8 megawords).
2. Field 2 (data) can display 0 through 177777 in octal (which equals 0 through FFFF hexadecimal).

## Operation of Procedure

PROC 999 is used to determine the data contents of a memory address.
To determine the data contents of a memory address, perform the following:

1. Depress PROC NO; 999; ENTER.
2. Depress DISPLAY.

The address fields on the MAAP are blanked.
3. Enter the address (in octal) of the word contents to be displayed.
4. Depress ENTER.

The address and word contents are displayed in the address and data fields (Fields 1 and 2).
5. Once a software table is accessed, the next word in sequence can be displayed by depressing NEXT DATA.
The address is automatically incremented by one, and the data contents of the new address are displayed.

To display the data contents of all memory addresses beginning with memory address $\mathbf{0 0 0 0 0 0 0 1}$, perform the following:

1. Depress PROC NO; 999; ENTER.
2. Depress NEXT DATA.

The address and word contents are displayed in the address and data fields (Fields 1 and 2).
3. Depressing NEXT DATA repeatedly steps through all memory addresses and displays the data contents of each memory address.

## SWITCH COMPONENT REPLACEMENT

## GENERAL

This section provides a brief description of the switch cabinets and carriers and contains instructions for replacement of switch components.

Replacement of switch components and other maintenance tasks as determined by performing maintenance procedures consist of the following:

1. Circuit pack replacements for:

Unduplicated common control carrier circuit packs.
Duplicated common control carrier circuit packs.
TMS or module control carrier circuit packs.
Port carrier circuit packs.
Unduplicated common control DC/DC converter unit and duplicated common control power carrier circuit packs.
2. Circuit pack switch option settings.
3. High Capacity Mini-recorder (HCMR) circuit pack replacement.
4. Cleaning HCMR tape head and capstan.
5. HCMR replacement.
6. Power supply replacement.
7. Frequency generator replacement.
8. DC fan and fan assembly replacement.
9. TMS/RMI cabinet AC distribution unit replacement.
10. Module control or port cabinet AC distribution unit replacement.
11. DC filter replacement.
12. Console component replacement.
13. Alarm panel replacement.
14. AEH4 alarm board replacement.

## EQUIPMENT CONFIGURATION

## Overview

The switch consists of various arrangements of the four basic cabinets. One or more auxiliary cabinets may be provided for mounting peripheral equipment. The Station Message Detail Recorder (SMDR) cabinet, when provided and connected to the switch, is also part of the switch.

A typical System 85 equipment configuration (Refer to Figure 19) consists of a common control cabinet, one or more module control cabinets, a TMS/RMI cabinet, and one or more port cabinets.


Figure 19. Typical System 85 Equipment Configuration

## Common Control Cabinet

The common control cabinet can be either an unduplicated common control cabinet or a duplicated common control cabinet.

## Unduplicated Common Control Cabinet

An unduplicated common control cabinet contains the common control carrier and up to three port carriers or DS-1/MFAT carriers. The common control carrier and a High Capacity Mini-recorder (HCMR) make up the control complex.
An unduplicated common control cabinet (Refer to Figure 20) contains the following equipment:

1. An unduplicated alarm panel and thermal assembly (sensor).
2. Up to three port carriers.
3. Up to three DS-1/MFAT carriers.
4. One common control carrier.
5. A fan assembly and alarm board.
6. A frequency generator.
7. One battery reserve unit.

Note: When equipped with extended power reserve, the battery reserve unit is not included.
8. One HCMR.
9. One $\mathrm{DC} / \mathrm{DC}$ converter unit.
10. A dc filter.

## Duplicated Common Control Cabinet

A duplicated common control cabinet (Refer to Figure 21) contains the following equipment:

1. A duplicated alarm panel and thermal assembly (sensor).
2. Two common control carriers.
3. One power carrier.
4. A fan assembly and alarm board.
5. Two HCMRs.
6. Two 334 A power units.
7. One battery reserve unit.
8. An ac distribution unit.

Note: When equipped with an extended power reserve, the power units and battery reserve unit are not included, and a de filter replaces the ac distribution unit.


Figure 20. Unduplicated Common Control Cabinet


Figure 21. Duplicated Common Control Cabinet

## TMS/RMI Cabinet

The TMS/RMI cabinet is used only in multimodule switches and may contain up to four TMS carriers or 4 RMI carriers.
In the unduplicated TMS configuration, there is one basic carrier and up to three growth carriers.
In a duplicated TMS configuration, there may be two basic carriers with a no-carrier adapter between them. This arrangement can be expanded to add one growth carrier per basic carrier.
In the maximum duplicated TMS configuration, two TMS cabinets are provided, each containing one basic carrier and two or three growth carriers. Both TMS cabinets must contain the same number of growth carriers.
The TMS/RMI cabinet (Refer to Figure 22) may contain the following equipment:

1. A thermal assembly (sensor).
2. Up to four TMS carriers, or 4 RMI carriers, or a combination of both.
3. A fan assembly and alarm board.
4. One or two 334A rectifiers.
5. One battery reserve unit.
6. An ac distribution unit.

Note: When equipped with extended power reserve, the power units and battery reserve unit are not included, and a de filter replaces the ac distribution unit.

## Module Control Cabinet

The module control cabinet may be configured for duplicated or unduplicated module control.
A module control carrier and up to three port carriers (or one port carrier and two DS-1/MFAT carriers, or a combination of both) may be contained in an unduplicated module control cabinet configuration.
Two module control carriers and up to two port carriers (or two DS-1/MFAT carriers or a combination of both) may be contained in a duplicated module control cabinet configuration.
The module control cabinet. (Refer to Figure 23) contains the following equipment:

1. A thermal assembly (sensor).
2. Up to three port carriers.
3. Up to two DS-1/MFAT carriers.
4. One module control carrier for an unduplicated module control or two module control carriers for a duplicated module control.
5. A fan assembly and alarm board.
6. A frequency generator.
7. One battery reserve unit.
8. A 48 V rectifier.
9. An ac distribution unit.

Note: When equipped with extended power reserve, the battery reserve unit and rectifier are not included, and a dc filter replaces the ac distribution unit.


Figure 22. Time Multiplexed Switch (TMS)/Remote Module Interface (RMI) Cabinet


Figure 23. Module Control Cabinet

## Port Cabinet

The port cabinet (Refer to Figure 24) is equipped with up to four port carriers.
The port cabinet contains:

1. A thermal assembly (sensor).
2. From one to four port carriers.
3. Up to four DS-1/MFAT carriers.
4. A fan assembly and alarm board.
5. A frequency generator.
6. One battery reserve unit.
7. A -48V rectifier and ac distribution unit, or a dc filter.

Note: When equipped with extended power reserve, the battery reserve unit and rectifier are not included, and a dc filter replaces the ac distribution unit.
The first port cabinet in a duplicated common control switch receives power from the module control cabinet.

## Common Control Carrier

The common control carrier provides primary control, memory, and input/output channels for processing, supervising, and coordinating system operations.
Backplane wiring provides connections between circuit packs in the common control carrier. Circuit breakers are provided on the right side of the common control carrier. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers or components associated with each circuit breaker.

Figure 25 identifies the circuit pack type and code for each slot location in the common control carrier.


Figure 24. Port Cabinet

NOTE:
NOTE:
SLOT 15 CONTAINS TN513 (DCIU TESI SUPPORT) IF
SLOT 15 CONTAINS TN513 (DCIU TESI SUPPORT) IF
SHIPPED WITH THE SWITCH.
SHIPPED WITH THE SWITCH.

Figure 25. Common Control Carrier

## Unduplicated Common Control DC/DC Converter Unit

The $\mathrm{DC} / \mathrm{DC}$ converter unit provides operating +5 volts to the unduplicated common control carrier circuit packs.

Circuit breakers are provided on the left side of the unduplicated common control DC/DC converter unit. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 26 identifies the circuit pack type and code for each slot location in the unduplicated common control DC/DC converter unit.


Figure 26. Unduplicated Common Control DC/DC Converter Unit

## Duplicated Common Control Power Carrier

The common control power carrier provides operating +5 volts to the duplicated common control carrier circuit packs.
Circuit breakers are provided on the right side of a duplicated common control power carrier. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 27 identifies the circuit pack type and code for each slot location in the duplicated common control power carrier.


Figure 27. Duplicated Common Control Power Carrier

## TMS Carrier

The TMS carrier provides the time multiplexed space division switch that interconnects the modules in a multimodule switch.

Backplane wiring provides connections between circuit packs in the TMS carrier. Circuit breakers are provided on the right side of the TMS carrier. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers associated with each circuit breaker.
Figure 28 identifies the circuit pack type and code for each slot location in the TMS carrier.


Figure 28. TMS Carrier

## Module Control Carrier

The module control carrier provides the digital switch and the associated circuits that detect and process requests for service.

Backplane wiring provides connections between circuit packs in the module control carrier. Circuit breakers are provided on the right side of the module control carrier. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers associated with each circuit breaker.
Figure 29 identifies the circuit pack type and code for each slot location in the module control carrier.


```
* TN481 OR TN463
\dagger TN441 DR TN460
NOTES:
    1. FOR A SINGLE MODULE UNSYNCHRONIZED SWITCh, SLOTS OCB, 01, aND 02 ARE EMPTY AND
        TN460 (MODULE CLOCK) IS USED IN SLOT O3. FOR A SINGLE MODULE SYNCHRONIZED SWITCH.
        SLOTS OOB AND 01 ARE EMPTY, TN463 (SYSTEM CLOCK SYNCHRONIZER) IS USED IN SLOT 02.
        AND TN460 IS USED IN SLOT 03. FOR AN UNDUPLICATED MULTIMDDULE SWIICH, SLOTS OOB
        AND 01 ARE EMPTY. TN481 (LIGHT GUIDE INTERFACE) IS USED IN SLOT 02, AND TN441
        (TMS INTERMODULE DATA STORE) IS USED IN SLOT O3. FOR A DUPLICAYED MULTIMODULE
        SWITCH, 494GA POWER UNIT IS USED IN SLOT OOB, TN481 IS USED IN SLOT 01, SLOT 02
        IS EMPTY, AND TN441 IS USED IN SLOT O3.
    2. TN512 (TEST SUPPORT) IS INSTALLED IN SLOT 18 IF SHIPPED WITH THE SWITCH.
```

Figure 29. Module Control Carrier

## Port Carrier

The port carrier connects the switch to peripheral equipment (analog/digital, voice/data, and lines/trunks). The port carrier provides dedicated port circuits determined by the equipment connected.
Backplane wiring provides connections between circuit packs in the port carrier. A fuse panel is provided on the right side of the port carrier. Numbers are stamped adjacent to the fuses to identify the slot numbers associated with each fuse.

Figure 30 identifies the circuit pack type and code for each slot location in the port carrier.
Note: The port carrier for R2V1 may contain SN221 and SN222 circuit packs instead of SN228 and SN229 circuit packs.


NOTES:

1. CARRIER POSITIONS 00-03, 05-08, 13-16, 18-21 ARE UNIVERSAL PORT POSITIONS WHICH CAN ACCEPT THE FOLLOWING CIRCUIT PACKS:

| $\begin{aligned} & \text { CKT PACK } \\ & \text { CODE } \end{aligned}$ | CIRCUIT PACK NaME | $\begin{gathered} \text { CKT PACK } \\ \text { CODE } \end{gathered}$ | CIRCUIT PACK NAME |
| :---: | :---: | :---: | :---: |
| SN224 | MFET LINE PDRT | SN250 | CALL PROGRESS TONE |
| SN228 | OfF PREMISES LINE | SN251 | TOUCH-TONE RECEIVER |
| SN229 | ON PREMISES LINE | SN252 | TOUCH-TONE SENDER |
| SN230 | CO TRUNK | SN253 | AUXILIARY TONES |
| SN23 $\dagger$ | AUXILIARY TRUNK | SN254 | ATTENDANT CONFERENCE |
| SN232 | DID TRUNK | SN255 | TONE DETECTOR 2 |
| SN233 | tie trunk/attendant interface | SN260 | FACILITY TEST |
| SN238 | EIA INTERFACE | SN264 | analog/digital facility test |
| SN241 | contact interface | SN270 | general purpose Port |
| SN243 | data Port |  |  |

2. CARRIER POSItIONS OO THROUGH 02 CAN ACCEPT SN244 AUTOMATIC NUMBER IOENTIFICATION (ANI) CIRCUIT PACK
3. TN452 = UNIVERSAL PORT CONTROL INTERFACE; TN454 = PORT DATA INTERFACE

Figure 30. Port Carrier

## DS-1/MFAT Carrier

The DS-1/MFAT carrier is a modified port carrier. The DS-1/MFAT carrier provides high-density dedicated interface circuits for DS-1 trunks and/or low-cost hybrid voice terminals. The DS1/MFAT carrier also provides the same dedicated port circuits as the port carrier.
Backplane wiring provides connections between circuit packs in the DS-1/MFAT carrier. A fuse panel is provided on the right side of the DS-1/MFAT carrier. Numbers are stamped adjacent to the fuses to identify the slot numbers associated with each fuse.

Figure 31 identifies the circuit pack type and code for each slot location in the DS-1/MFAT carrier.
Note: The DS-1/MFAT carrier for R2V1 may contain SN221 and SN222 circuit packs instead of SN228 and SN229 circuit packs.


NOTES:

1. CARRIER POSITIONS 00-03, 05-08, 13-16, 18-21 ARE UNIVERSAL PORT POSITIONS WHICH CAN ACCEPT THE FOLLOWING
CIRCUIT PACKS:

| CKT PACK CODE | CIRCUIT PACK NAME | CKT PACK CODE | CIRCUIT PACK NAME |
| :---: | :---: | :---: | :---: |
| ANN 17 | MULTIFUNCTIONAL ANALOG | SN243 | DATA PORT |
|  | TERMINAL (MFAT) | SN250 | CALL PROGRESS TONE |
| SN224 | MFET LINE PORT | SN251 | TOUCH-TONE RECEIVER |
| SN228 | OfF PREMISES LINE | SN252 | TOUCH-TONE SENDER |
| SN229 | ON PREMISES LINE | SN253 | AUXILIARY TONES |
| SN230 | CO TRUNK | SN254 | ATTENDANT CONFERENCE |
| SN231 | AUXILIARY TRUNK | SN255 | TONE DETECTOR 2 |
| SN232 | did trunk | SN260 | FACILITY TEST |
| SN233 | tie trunk/attendant interface | SN261 | ANALOG/DIGITAL FACILITY TEST |
| SN238 | EIA INTERFACE | SN270 | GENERAL PURPOSE PORT |
| SN241 | CONTACT INTERFACE |  |  |

2. CARrIER POSITIONS 05 AND 18 CAN ACCEPT CIRCuIt PACK ANN11- dS-1 trunk interface. IF ANN11 IS USED IN SLOT 05, SLOTS 00, 01, 02, 06, AND 07 CANNOT BE USED. HOWEVER, SLOTS 03 AND 08 CAN BE USED FOR ANN 17 OR ANY PORT CIRCUIT WHEN SLOT 05 IS USED FOR ANN11: IF ANN11 IS USED IN SLOT 18, SLOTS 13, 14, 15, 19, AND 20 CANNOT BE USED. HOWEVER, SLDTS 16 AND 21 CAN BE USED FOR ANN17 OR ANY PORT CIRCUIT WHEN SLOT 18 IS USED FOR ANN11.
3. THE OS-1/mfat carrier is not intended to replace the port carrier. use of sn port CIRCUIT PACKS IN THE DS-1/MFAT CARRIER CAUSES WALL FIELD REQUIREMENTS TO DDUBLE.

Figure 31. DS-1/MFAT Carrier

## RMI Carrier

The RMI carrier houses the TN456 RMI circuit packs to support remote modules. The RMI carrier is mounted in the TMS/RMI cabinet. A maximum of two RMI carriers are possible for a switch with unduplicated module controls, and four RMI carriers for a switch with duplicated module controls.
Backplane wiring provides connections between circuit packs in the RMI carrier. A circuit breaker panel is provided on the right side of the RMI carrier. Circuit breaker CB1 is associated with slots 00 through 10 and circuit breaker CB2 is associated with slots 11 through 22. The MAAP connector on the circuit breaker panel allows the user to plug in a MAAP to the RMI carrier. Only one RMI carrier per TMS/RMI cabinet is equipped with the MAAP connector.
Figure 32 identifies the circuit pack type and code for each slot location in the RMI carrier.


Figure 32. Remote Module Interface (RMI) Carrier

## PRECAUTIONS

When performing maintenance or translation procedures on System 85 switch equipment, certain precautions must be observed by user personnel.
Cautions, warnings, and danger statements contained within the service manual must be observed to prevent loss of service, possible equipment damage, and possibility of personnel injury.

In addition, the following precautions regarding electromagnetic interference and static electricity must be observed.
a. Electromagnetic Interference: This equipment generates, uses, and can radiate radio frequency energy. Electromagnetic fields radiating from the switch may cause noise to be introduced into the customer's equipment. If the equipment is not installed and used in accordance with the instruction manual, interference to radio communications may be caused.

WARNING: To maintain the Electromagnetic Interference (EMI) integrity of the System 85 switch, maintenance personnel (after performing any translation or maintenance activities) must ensure that all cabinet panels, covers, etc. are firmly secured in place prior to leaving the customer's premises.
b. Static Electricity: To prevent or reduce electrostatic discharge, maintenance personnel must always attach wrist grounding straps before working on switch components or handing circuit packs.

## Caution: Electrostatic discharge can damage or destroy circuit packs containing integrated circuits (ICs).

## CIRCUIT PACK REPLACEMENTS

## Overview

When replacing circuit packs in the switch it is necessary to maintain switch integrity and identify the correct circuit pack, vintage, and series to be replaced. Switch integrity is maintained by taking the appropriate steps when replacing circuit packs in the switch carriers. Circuit packs to be replaced in the digital network can be identified by using PROC 290, Word 2.

PROC 290, Word 2 is used to search for all circuit packs installed in module control and port carriers. The prefix, number, suffix, vintage series, and vintage update of each circuit pack is displayed.
Circuit packs should be replaced with circuit packs of the same suffix or later (i.e., SN270 replaced by SN270 or SN270B).

Any circuit pack to be replaced should be unseated and reseated to ensure its connector is making good contact with the mating connector. Retest the circuit pack after reseating. If circuits are still defective, replace the circuit pack.

## Precautions

To prevent or reduce electrostatic discharge, maintenance personnel should always attach wrist grounding straps before working on system components or handling circuit packs.

## Caution: Electrostatic discharge can damage or destroy circuit packs containing integrated circuits (ICs).

1. The EMC wrist strap and cable assembly (cc900698226) is placed in the bottom of the module control cabinet in a poly bag (cc900492372) next to the AC distribution unit.
2. The EMC wrist strap assembly is used in the following manner:
a. Attach the wrist strap to either wrist.
b. Connect the alligator clip to the cabinet frame.
3. A good ground connection for the alligator clip is:
a. In equipment coded cabinets which have removable sides, attach the alligator clip to any convenient screw head that fasten the hinges to the cabinet or to the screws that fasten the door latch to the frame.
b. In equipment coded cabinets which have intergrated sides, the front and rear cabinet formed faces (front door area or back area when viewed in an open position) which are coated with a conductive paint; the alligator clip may be attached to any of these surfaces.
c. In either case an area close to the vertical center of the cabinct should be selected for the alligator clip allowing a more central position to operate from.

To ensure that the System 85 switch recovers from circuit pack replacement in the switch carriers certain precautions should be exercised during circuit pack replacement. These precautions consist of busying out circuits, using the GO/HALT switch, etc., and are covered in the parts on circuit pack replacements for each type of switch carrier.

Requirement: These precautions should also be taken when unseating and reseating circuit packs.

## Option Settings

Prior to reseating and/or replacing circuit packs in any of the switch carriers, the option settings on appropriate circuit packs should be checked to determine if the correct option setting is being used for the application required. Refer to Circuit Pack Switch Option Settings in this section for circuit packs with option settings.

## Unduplicated Common Control Carrier Circuit Pack Replacement

When replacing circuit packs in an unduplicated common control carrier, use of the GO/HALT switch is required. Placing the GO/HALT switch in the HALT position before removing any circuit pack in the common control carrier stops any interactions with memory when removing or replacing circuit packs.

Caution: Reseating or replacing circuit pack TN406 (DCIU processor memory) in Slot 16 of the unduplicated common control carrier without use of the GO/HALT switch causes a partial reload.

Perform the following steps when replacing circuit packs in a unduplicated common control carrier.
Note: The following steps are performed at the alarm panel and at the common control carrier.

1. Determine if the switch is in emergency transfer.

If switch is in emergency transfer, set EMERGENCY TRANSFER switch to ACT and proceed to Step 3.
2. If switch is not in emergency transfer, set EMERGENCY TRANSFER switch to INHIB and notify the user that no new calls can be processed.
Proceed to Step 3.
3. Set GO/HALT switch to HALT.
4. Remove circuit pack being replaced.
5. Verify option settings on replacement circuit pack are correct (if applicable).
6. Replace circuit pack.
7. Determine status of EMERGENCY TRANSFER switch.

If EMERGENCY TRANSFER switch is in the INHIB position, proceed to Step 8.
If EMERGENCY TRANSFER switch is in the ACT position, proceed to Step 10.
Caution: In the following step, the GO/HALT switch must be set to GO within 5 seconds after depressing RESET to avoid major alarm indication.
8. Depress RESET, and set GO/HALT switch to GO within 5 seconds.
9. Set EMERGENCY TRANSFER switch to OFF.

Note: Replacement of circuit pack is complete.
10. Set GO/HALT switch to GO.
11. If system appears to be functioning normally, set EMERGENCY TRANSFER switch to OFF and proceed to Step 12.

If switch does not appear to be functioning normally, investigate other possible problem areas, using PROC 600, PROC 612, and microdiagnostic testing.
12. Notify customer that emergency transfer service will be interrupted.
13. Depress RESET.

Note: Replacement of circuit pack is complete.

## Duplicated Common Control Carrier Circuit Pack Replacement

When replacing circuit packs in both the on-line and off-line side of a duplicated common control carrier, use of the GO/HALT switch is required. Placing the GO/HALT switch in the HALT position before removing any circuit pack in the common control carrier stops any interactions with memory when removing or replacing circuit packs.

Caution: Reseating or replacing circuit pack TN406 (DCIU processor memory) in Slot 16 of the duplicated common control carrier without use of the GO/HALT switch causes a partial reload.

Perform the following steps when replacing circuit packs in a duplicated common control carrier.
Note: The following steps are performed at the alarm panel and at the common control carrier.

1. Determine if circuit pack being replaced is in the on-line or off-line side of the duplicated common control.

If circuit pack being replaced is in the on-line side of the duplicated common control, proceed to Step 2.
If circuit pack being replaced is in the off-line side of the duplicated common control, proceed to Step 3.
2. Use PROC 613 Test 3 to soft switch the on-line common control to the off-line side, and proceed to Step 3.

Note: If the soft switch cannot be performed, replace circuit pack(s) in the on-line side using the steps for Unduplicated Common Control Carrier Circuit Pack Replacement above.
3. Set LOCK ON LINE switch to the active (on-line) CC position; i.e., CCO or CC1.
4. At off-line common control, set GO/HALT switch to HALT.
5. At off-line common control, remove circuit pack being replaced.
6. Verify option settings on replacement circuit pack are correct (if applicable).
7. At off-line common control, replace the circuit pack.
8. At off-line common control, set GO/HALT switch to GO.

## 9. Set LOCK ON LINE switch to OFF.

Note: Replacement of circuit pack is complete.
10. Use PROC 613 Test 3 to soft switch the off-line common control to the on-line side (if required) for further testing to determine if replacement of the circuit pack corrected the problem.

Requirement: If further testing can be accomplished in the off-line common control, do not soft switch until the appropriate test(s) complete with a pass indication.

## IMS, Module Control, or RMI Carrier Circuit Pack Replacement

Perform the following steps when replacing circuit packs in the TMS, module control, or RMI carrier.

1. Determine if the TMS or module control carrier is duplicated.

If the TMS or module control carrier is duplicated, proceed to Step 2.
If the TMS or module control carrier is unduplicated, proceed to Step 4.
2. Determine if circuit pack being replaced is in the on-line or off-line side of the TMS, module control, or RMI carrier.
If circuit pack being replaced is in the on-line side of the TMS, module control, or RMI carrier, proceed to Step 3.
If circuit pack being replaced is in the off-line side of the TMS, module control, or RMI carrier, proceed to Step 4.
3. Use PROC 621 Test 2 to soft switch the on-line TMS or module control to the off-line side, and proceed to Step 4.

Note: If the soft switch cannot be performed, proceed to Step 4.
4. Remove circuit pack being replaced.
5. Verify option settings on replacement circuit pack are correct (if applicable).
6. Replace circuit pack.

Caution: The DC/DC converter handle should not be toggled when replacing
circuit packs in the TMS, module control, and/or RMI carriers.
7. Replacement of circuit pack is complete.
8. If the TMS or module control carrier is duplicated, and a soft switch was performed, use PROC 621 Test 2 to soft switch the off-line TMS or module control to the on-line side (if required) for further testing to determine if replacement of the circuit pack corrected the problem.

Requirement: If further testing can be accomplished in the off-line TMS or module control, do not soft switch until the appropriate test(s) complete with a pass indication.

## Port or DS-1 / MFAT Carrier Circuit Pack Replacement

When replacing circuit packs in a port or DS-1/MFAT carrier, multiple circuits associated with the circuit, pack being replaced should be busied out.

Caution: Busying out port circuits that are in-use (indicated by a YELLOW LED on the circuit pack's edge) results in the connection(s) being dropped.
a. Port Circuit Packs: When a port circuit pack (i.e., line or trunk) is being replaced, all circuits on the circuit pack should be idle, if at all possible, before removal.
b. PDI or PCI Circuit Packs: When a Port Data Interface (PDI) or a Port Control Interface (PCI) circuit pack is replaced, all port circuits served by the PDI (left or right side of the port or DS-1/MFAT carrier) or PCI should be busied out. Busying out the circuits associated with a PDI prevents any interaction to the circuits if the PDI comes up in looparound. Busying out the circuits associated with a PCI prevents the circuits changing to unpredicatable states when removing or replacing the PCI.
Perform the following steps when replacing circuit packs in a port or DS-1/MFAT carrier.
All circuits associated with the port circuit pack, PDI, or PCI circuit pack being replaced should be busied out before the circuit pack is removed from the port, DS-1/MFAT, or RMI carrier.

Caution: Busying out a circuit when the circuit is in-use (lighted YELLOW LED on circuit pack) results in the connection being dropped.

1. Using PROC 632 Test 3 (carrier busy), busy out the circuit(s) affected by the circuit pack being replaced.
To busy out port circuits, display the circuit in PROC 632 Test 3, and depress BUSY OUT.
Repeat the sequence until all circuits affected by the circuit pack being replaced are busied out.
2. Remove circuit pack being replaced.

Caution: Removal of the circuit pack, when any circuit on the circuit pack is in-use (indicated by a lighted YELLOW LED on the circuit pack's edge) results in the connection(s) being dropped.
3. Verify option settings on replacement circuit pack are correct (if applicable).
4. Replace circuit pack.

After replacement, the port circuits associated with the port circuit pack or PDI/PCI circuit pack replaced should be released from busy.
5. Use PROC 632 Test 3 to release from busy the circuits busied out in Step 1.

To release busy out port circuits, display the circuit in PROC 632 Test 3 and depress RLS BUSY OUT.

Repeat the sequence until all circuits busied out in Step 1 are released from busy.

## Unduplicated Common Control DC/DC Converter Unit or Duplicated Common Control Power Carrier Circuit Pack Replacement

Perform the following steps when replacing circuit packs in the unduplicated common control DC/DC converter unit or duplicated common control power carrier.

1. Set the circuit breaker associated with the circuit pack to be replaced to OFF.
2. Remove the circuit pack by releasing the lever and pulling outward.

Note: Do not pull out the circuit pack by using the lever.
3. Install the replacement circuit pack by sliding inward and then pushing the lever forward.
4. Set the circuit breaker associated with the circuit pack replaced to ON.

## CIRCUIT PACK SWITCH OPTION SETTINGS

## Overview

Prior to reseating and/or replacing circuit packs in any of the switeh carriers, the option settings on appropriate circuit packs should be checked to determine if the correct option setting is being used for the application required.

Option settings by means of rocker-type switches use the following convention:
D - Down (switch contacts are closed).
U - Up (switch contacts are open).
X - Don't care (switch contacts are not used and may be set in either position).
Note: Switches are set down (closed) when the rocker end adjacent to the number is depressed and up (open) when the rocker end away from the number is depressed.

The following paragraphs list the circuit packs that have option settings in the switch carriers.

## Common Control Carrier Circuit Pack Option Settings

The following circuit packs in the common control carrier have circuit pack option settings. Use the referenced figure to determine if the option setting is correct for the application being used.

TN513 (Slot 15 in common control carrier), Figure 33.
TN403 (Slots 23 through 26 in common control carrier), Figure 34.

## TN513 DCIU TEST SUPPORT OPTION SETTINGS

> TWO SWITCH PACKAGES WITH SEVEN SWITCH SECTIONS ALLOW CONFIGURATION OF THE SERIAL PORT HARDWARE. SWITCH S1 IS USED TO CONFIGURE CHANNEL O USART AND SWITCH SZ IS USED TO CONFIGURE CHANNEL I USART.


THE FOLLOWING fABLE INDICATES THE S1 AND S2 SWITCH SECTION POSITIONS REQUIRED FOR EACH OPTION PROVIDED. (U) INDICATES THE ROCKER SWITCH IS DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH IS DEPRESSED AT THE LOWER END.

| FUNCTION | SWITCH | $\begin{aligned} & \text { SWITCH } \\ & \text { SECTION } \end{aligned}$ | POSIIION |
| :---: | :---: | :---: | :---: |
| RX/TX DIRECT MODE | 1 OR 2 | 1.4 | 0 |
|  |  | 2,3 | $\cup$ |
| RX/TX NULL MODE | 1 OR 2 | 2,3 | 0 |
|  |  | 1,4 | U |
| SHORT CTS/RIS | 1 OR 2 | 5 | 0 |
| SHORT OTR/DSR | 1 OR 2 | 6 | D |
| LOGICALLY (AND) CHD AND CH1 USART INTERRUPTS | 1 | 7 | 0 |
|  | 2 | 7 | $\checkmark$ |
| INDEPENDENT CHD AND CH1 USART INTERRUPTS | 1 | 7 | $\checkmark$ |
|  | 2 | 7 | 0 |
| DISABLE CH1 USART INTERRUPTS | 1 | 7 | $\pm$ |
|  | 2 | 7 | U |

Figure 33. TN513 DCIU Test Support Option Settings

TN403 DUAL SPEED DATA CHANNEL OPTION SETTINGS

SWIICH S1 CONTROLS THE DATA TRANSMISSION RATE
FOR CIRCUIT PACK CHANNELS 14 AND 15.


THE FOLLOWING TABLE INDICATES THE SWITCH POSITIONS REQUIRED FOR LOW AND HIGH SPEED OPTIONS. (U) INDICATES THE ROCKER SWITCH IS DEPRESSED AT THE UPPER END AND (D) INDICATES THE ROCKER SWITCH IS DEPRESSED AT THE LOWER END.

| CARRIER <br> SLOT | CHANNEL <br> NUMEERS | TN4O3 <br> CHANNEL <br> NUMBER | SWIICH <br> SECTION | SWITCH <br> POSITION |
| :---: | :---: | :---: | :---: | :---: |
| 23 | $00-15$ | 15 | 2 | 0 |
|  |  | 14 | 1 | 0 |
| 24 | $16-31$ | 15 | 2 | $U$ |
|  |  | 14 | 1 | $U$ |
| 25 | $32-47$ | 15 | 2 | $U$ |
| 26 | $48-63$ | 15 | 1 | $U$ |
|  |  | 14 | 1 | $U$ |

CHANNELS 0-13 ARE NOT SPEED OPTIONABLE. THEY WIL ${ }^{2}$ NLY OPERATE AT LOW SPEED (185K BPS).

Figure 34. TN403 Dual Speed Data Channel Option Settings

## Module Control or RMI Carrier Circuit Pack Option Settings

The following circuit pack in the module control or RMI carrier has option settings. Use che referenced figure to determine if the option setting is correct for the application being used. Cafier position 25 in the module control carrier and carrier positions 00 through 08 and 13 through 21 in the RMI carrier house the TN456 circuit pack.

TN456 (Slot 15 in common control carrier), Figure 35.

## TN456 REMOTE MODULE INTERFACE OPTION SETTINGS



THE SWITCH POSITION ON TN456 DEPENDS ON THE OPTIDN REQUIRED. FOR CENTRAL LOCATION OPERATION (COMMON CONTROL COMPLEX END OF THE LINK), SET BOTH SWITCHES IN THE UP POSITION. FOR REMOTE LOCATION OPERATION (MODULE AT THE FAR END OF THE LINK FROM THE COMMON CONTROL COMPLEX), SET BOTH SWITCHES IN THE DOWN POSITION.

Figure 35. TN456 Remote Module Interface Option Settings

## Port or DS-1/MFAT Carrier Circuit Pack Option Settings

The following circuit packs in the port carrier have circuit pack option settings. Use the referenced figure to determine if the option setting is correct for the application being used. Carrier positions 00 through 03,05 through 08,13 through 16 , and 18 through 21 are universal port positions which can accept any port circuit pack.

ANN11B or ANN11C (DS-1/MFAT Carrier Only), Figure 36.
SN221B, Figure 37.
SN224B, Figure 38.
SN228, Figure 39.
SN230, Figure 40.
SN231, Figure 41.
SN232B, Figure 42.
SN233C, Figure 43.
SN238, Figure 44.
SN243B, Figure 45.
SN253B, Figure 46.

## ANNIIB AND ANNIIC DS-1 INTERFACE OPTION SETTINGS

ONE SWITCH PACKAGE (S1) CONTAINING THREE ROCKER SWITCH SECTIONS IS POSITIONED ON THE CIRCUIT PACK AS SHDWN IN THE FOLLOWING OIAGRAM.


TO SELECT ONE OF FIVE TRANSMIT EQUALIZER SEITINGS, SET THE SWITCH SECTIONS AS SHOWN IN THE FOLLOWING TABLE. IN THE TABLE, (U) INDICATES THE SWITCH IS FULLY DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH IS FULLY DEPRESSED AT THE LOWER END.

| DISTANCE TO <br> SPECIFIED POINT | SWITCH SECTION |  |  |
| :---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 |
| 0 TO 133 FEET | D | D | U |
| 133 TO 266 FEET | D | U | D |
| 266 TO 399 FEET | D | U | U |
| 399 TO 533 FEET | U | D | 0 |
| 533 TO 655 FEET | U | D | U |

THE EQUALIZER SETTING REQUIRED IS BASED ON THE DISTANCE ALDNG THE 606 TYPE CABLE CONNECTION FROM THE SYSTEM 85 DS-1 CONNECTOR TO A SPECIFIED POINT. THE EQUALIZERS PROVIDE PRECONDITIONING OF THE TRANSMIT SIGNAL SO THAT THE DS-1 PULSE SHAPE FALLS WITHIN DEFINED BOUNDARIES AT A COMMON SPECIFIED POINT.

Figure 36. ANN11B/ANN11C DS-1 Interface Option Settings

## SN221B OFF PREMISES STATION (OPS) OPTION SETTINGS

SELECTION OF OPTION (Z OR Y
FDUR SWITCH PACKAGES, S1-S4, EACH CONTAINING two rocker switch sections, are positioned on THE CIRCUIT PACK AS SHOWN IN THE FOLLOWING diagram. each switch package serves two of the eight port circuits provided on the pack.


A SINGLE SWITCH PACKAGE IS SHOWN BELOW TO IDENTIFY THE TWO SWITCH SECTIONS (1,2) IN the package.


| PORT | SWITCH PACKAGE | SWITCH SECTION | SWITCH SECTION POSIIION |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{aligned} & \text { OPTION } \\ & (600 \text { OHMS } \end{aligned}$ | $\begin{aligned} & \text { OPTION } \\ & \text { (RC NTHK) } \end{aligned}$ |
| 0 | 1 | 1 | 0 | U |
| 1 | 1 | 2 | 0 | U |
| 2 | 2 | 1 | D | U |
| 3 | 2 | 2 | 0 | U |
| 4 | 3 | 1 | D | J |
| 5 | 3 | 2 | D | U |
| 6 | 4 | 1 | D | U |
| 7 | 4 | 2 | 0 | U |

USE 600 OHM OPTION WHEN LOOP LENGTH IS LeSS than 3500 feet (about 600 OHMS WITHOUT SET). USE RC NETWORK OPTION FOR LOOP LENGTH GREATER THAN 3500 fEET.

Figure 37. SN221B Off Premises Station (OPS) Option Settings

## SN224B MFET LINE PORT OPTION SETTINGS AND FUSES

SN224B OPTION SETTINGS
A SINGLE SHORTING PLUG IS PROVIDED TO ADAPT THE PORT CIRCUITS TO INTERFACE WITH EITHER MULTIFUNCTION ELECTRONIC TELEPHONE (MFET) OR MULTIBUTTON ELECTRONIC TELEPHONE (MET) TERMINALS. ALL FOUR PORTS ARE ALTERED by the single plug. for met terminals, the shorting plug is placed over terminals ei and ez. For mfet terminals, the shorting plug is placed over terminal E1 ONLY.

## SN224B FUSES

THE -48 VOLT POWER SUPPLIED TO STATION APPARATUS FROM EACH OF THE FOUR PORTS ON THIS PACK IS FUSED at Each port. the fuses, CODED $70 \mathrm{H}(0.75 \mathrm{AMP}$.). are located on the pack as shown in the following diagram.


WHEN MAINTENANCE PROCEDURES INDICATE A FUSE MAY
need replacement, all ports on the pack should be made maintenance busy before removing the pack from the carrier. proc 630 CAN Be USED to MAKE THE PORTS MAINTENANCE BUSY

Figure 38. SN224B MFET Line Port Option Settings and Fuses

## SN228 OFF PREMISES STATION (OPS) OPTION SETTINGS

SELECIION af option (2) OR (Y)
EIGHT SWITCH PACKAGES, Si-S8, EACH CONTAINING TWO ROCKER SWIICK SECIIONS, ARE POSITIONED ON the circuit pack as shown in the following diagram. each switch package serves one of the EIGHT PORT CIRCUITS PROVIDED ON THE PACK.


A SINGLE SWITCH PACKAGE IS SHOWN BELOW TO ioentify the two switch sections (1,2) in the package.


TO SELECT THE REQUIRED OPTION FOR A PORT CIRCUIT, REFER TO THE FOLLOWING tABLE. first, Identify the switch package (S1-S8) ASSOCIATED WITH THE PORT CIRCUIT. then set the shitch section for that PORT AS SHOWN IN THE TABLE; (U) INDICATES THE SWITCH SECTION IS FULLY DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH SECTION IS FULLY depressed at the lower end.

| PORT | SWITCH PACKAGE | $\begin{aligned} & \text { SWITCH. } \\ & \text { SECTION } \end{aligned}$ | SWITCH SECTION POSITION |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{aligned} & \text { OPTION } \\ & (600 \text { OHMS } \end{aligned}$ | $\begin{aligned} & \text { OPIION Y. } \\ & \text { (RC NTWK) } \end{aligned}$ |
| 0 | 1 | 1 AND 2 | D | U |
| 1 | 2 | 1 AND 2 | 0 | U |
| 2 | 3 | 1 AND 2 | D | U |
| 3 | 4 | 1 AND 2 | D | U |
| 4 | 5 | 1 AND 2 | D | U |
| 5 | 6 | 1 AND 2 | 0 | U |
| 6 | 7 | 1 AND 2 | 0 | U |
| 7 | 8 | 1 AND ? | 0 | U |

USE 600 OHM OPTION WHEN LOOP LENGTH IS LESS THAN 3500 FEET (ABDUT 600 OHMS WITHOUT SET). USE RC NETWORK OPTION FOR LOOP LENGTH GREATER THAN 3500 FEET.

Figure 39. SN228 Off Premises Station (OPS) Option Settings

## SN230 CENTRAL OFFICE (CO) TRUNK OPTION SETTINGS

SELECTION OF OPTION (W) OR X
FOUR SWITCH PACKAGES, EACH CONTAINING TWO ROCKER SWITCH SECTIONS, ARE POSITIONED ON THE CIRCUIT PaCK as shown in the following diagram. EACH SWITCH PACKAGE IS ASSIGNED TO A SINGLE PORT CIRCUIT AS IDENTIFIED IN THE DIAGRAM.


A SINGLE SWITCH PACKAGE IS SHOWN BELOW TO Identify the two switch sections (1,2) in the Package.


TO SELECT THE REQUIRED OPTION FOR A PORT CIRCUIT, IDENTIFY THE ASSOCIATED SWITCH package from the pack diagram. then set the switch sections for that port as shown in the following table.

| OPTION | TERMINATION |  | SWITCH SECTION |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | 1 | 2 |  |
| W | RC BALANCE NTWK | U | X |  |
| X | 600 OHMS | D | X |  |

In the table, (U) Indicates the switch is FULLY DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH IS FULLY DEPRESSED at the lower end. note that shitch section 2 IS NOT USED, AS INDICATED BY $(X)$ AND THE POSITION OF THIS SWITCH HAS NO EFFECT on CIRCUIT OPERATION.

USE GOO OHM OPTION WHEN LOOP LENGTH IS LESS THAN 3500 FEET. USE RC NETWORK OPTION FOR LOOP LENGTH GREATER THAN 3500 fEET.

Figure 40. SN230 Central Office (CO) Trunk Option Settings

## SN231 AUXILIARY TRUNK OPTION SETTINGS

SELECTION OF OPTION (Q), (R), or (S)
FOUR SWITCH PACKAGES, EACH CONTAINING FOUR ROCKER SWITCH SECTIONS ARE PDSITIONED ON THE CIRCUIT PACK AND ASSIGNED TO A SINGLE PORT cIrcuit as identified in the following DIAGRAM.
to select the required option for a port CIRCUIT, IOENTIFY THE ASSOCIATED SWITCH package from the pack diagram. set the SWITCH SECTIONS FOR THAT PORT AS SHOWN IN THE FOLLOWING table.


A SINGLE SWITCH PACKAGE IS SHOWN BELOW TO IDENTIFY THE FOUR SWITCH SECTIONS IN the package.


| OPIION | TRANSMISSION | SWITCH SECTION |  |  |  |
| :--- | :--- | :---: | :---: | :---: | :---: |
|  |  | 1 | 2 | 3 | 4 |
| S | ONE-WAY INCOMING | X | U | D | X |
| R | ONE-WAY OUTGOING | X | D | U | X |
| Q | TWO-WAY | X | U | J | X |
| ZA | TWO WIRE SIGNALING | D | X | X | X |
| ZB | FOUR WIRE SIGNALING | U | X | X | X |

IN The table, (U) indicates the switch is FULLY DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH IS FULLY DEPRESSED at the lower end. $x$ indicates that the POSITION OF THESE SECTIONS HAS NO EFFECT on circuit operation.

Figure 41. SN231 Auxiliary Trunk Option Settings

## SN232B - DIRECT INWARD DIALING (DID) TRUNK OPTION SETTINGS

SELECTION OF OPTION (T) OR (V)
TWO SWITCH PACKAGES, S 1 AND S2, EACH CONTAINING FOUR ROCKER SWITCH SECTIDNS, ARE POSITIONED ON THE CIRCUIT PACK AS SHOWN IN THE FOLLOWING DIAGRAM. EACH SWITCH PACKAGE SERVES TWO OF THE FOUR PORT CIRCUITS PROVIDED ON THE PACK.


A SINGLE SWITCH PACKAGE IS SHOWN BELOW TO IDENTIFY THE FOUR SWITCH SECTIONS (1-4) IN THE PACKAGE.


TO SELECT THE REQUIRED OPTION FOR A PORT CIRCUIT, REFER TO THE FDLLOWING TABLE. THE SYMBOL (U) INDICATES THE SWITCH SECTION IS FULLY DEPRESSED AT THE UPPER END AND (D) INDICATES THE SWITCH SECTION IS FÜLLY DEPRESSED AT THE LOWER END.

| PORT <br> CIRCUIT | SWITCH <br> PACKAGE | SWITCH <br> SECTION | SWITCH SECTION SETTING |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{aligned} & \text { OPTION } \\ & \text { (RC NTUK) } \end{aligned}$ | OPTION (600 OHMS) |
| 0 | S 1 | 1 | U | 0 |
|  |  | 2 | 0 | U |
| 1 | S2 | 1 | U | 0 |
|  |  | 2 | D | U |
| 2 | S1 | 3 | U | D |
|  |  | 4 | D | U |
| 3 | S2 | 3 | U | D |
|  |  | 4 | D | U |

USE GOO OHM OPTION WHEN LOOP LENGTH IS LESS THAN 3500 FEET. USE RC NETWORK OPTION FOR LOOP LENGTH GREATER THAN 3500 FEET.

Figure 42. SN232B Direct Inward Dialing (DID) Trunk Option Settings

## SN233C TIE TRUNK/ATTENDANT INTERFACE OPTION SETTINGS

SN233C JACK FUNCTIONS
access to both transmit and receive transmission CHANNELS ANO TO THE E AND M SIGNALING LEADS FOR EACH PORT IS PROVIDED BY JACKS ON THE FRONT OF THE PACK. THE JACK ASSIGNMENT IS SHOWN BELOW. PLUG INSERTION half way into the transmit or receive channel jack ALLOWS MONITORING OF THE SIGNALS. FULL INSERTION OF the jack accesses the local end and dpens the CHANNEL TOWARD THE DISTANT END. PLUG INSERTION INTO the signaling lead jack allows monitoring of the e and m leads. the e and m leads cannat be dpened by USE OF THIS JACK.


SWITCH ASSIGNMENT
the type of signaling used on the port is set BY OPTION SWITCHES AS DESCRIBED BELOW.
FOUR SWITCH PaCkages, S 1 through S4, are located AS SHOWN ON THE PACK DIAGRAM. S1 CONTAINS FDUR ROCKER SWITCH SECTIONS WHICH ARE SHARED BETWEEN PORT O AND PORT 1. S3 ALSO CONTAINS FOUR ROCKER SWITCH SECTIONS WHICH ARE SHARED BETWEEN PORT 2 AND PORT 3. S2 CONTAINS TEN ROCKER SWITCH SECTIONS WHICH are shared between port o and port 1. S4 also contains ten rocker switch sections which are SHARED BETHEEN PORT 2 AND PORT 3. THE SWITCH SETIINGS DETERMINE THE TYPE AND METHOD OF SIGNALINS used for the port and the codec conversion mode. the table below shows the switch settings for the VARIOUS SIGNALING TYPES FOR ANY PORT.

| SWITCH SECTION |  | A | B | C | D | E | F |
| :---: | ---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | a | b | c | d | e | f |
| STANDARD E\&M TYPE | IA | D | 0 | D | D | U | U |
|  | IB | U | U | D | U | U | U |
|  | V | U | U | D | D | U | U |
| PROTECTED TYPE | IA | D | D | U | D | U | U |
|  | IB | U | U | U | U | U | U |
|  | V | U | U | U | D | U | U |
| SIMPLEX TYPE | IA | D | D | U | D | D | D |
|  | IB | U | U | U | U | D | D |
|  | V | U | U | U | D | D | D |

CAPItal letters a through $F=$ port 0 and port 2 SMALL LETTERS A THROUGH F = PORT 1 AND PORT 3 SET SWITCH M FOR APPROPRIATE CONVERSION MODE:
ulaw (DOMESTIC) $=U$ alaw (INTERNATIONAL) $=D$
NOTE: SOME INTERNATIONAL COUNTRIES USE ulaw.

Figure 43. SN233C Tie Trunk/Attendant Interface Option Settings

## SN238 EIA INTERFACE OPTION SETTINGS

TWO SWITCH PACKAGES, EACH CONTAINING EIGHT ROCKER SWITCH SECTIONS, ARE POSITIONED ON THE CIRCUIT PACK AS SHOWN IN THE FOLLOWING DIAGRAM.


THE EIGHT ROCKER SWITCH SECTIONS ON SI ARE DESIGNATED AS SHOWN IN THE FOLLOWING DIAGRAM.

S 1


THE EIGHT ROCKER SWITCH SECTIONS ON S2 ARE DESIGNATED AS SHOWN IN THE FOLLOWING DIAGRAM.

S2


S1 IS USED TO SELECT OOD OR EVEN PARITY, ENABLE OR DISABLE PARITY, AND TO MANUALLY SELECT A BAUD RATE (DATA RATE). S2 IS USED TO ENABLE OR DISABLE AUTO-BAUD AND AUTO-PARITY FOR PORTS $0,1,2$, AND 3. S2 IS ALSO USED TO ENABLE OR DISABLE KEYBOARD DIALING FOR PORTS $0,1,2$, AND 3 .

FULLY DEPRESSING ROCKER SWITCH SECTION O/EPR DN S 1 AT THE UPPER END (U) SELECTS EVEN PARITY WHILE FULLY DEPRESSING ROCKER SWITCH SECTION O/EPR AT THE LOWER END (D) SELECTS ODD PARITY.

FULLY DEPRESSING THE OTHER ROCKER SWITCH SECTIONS AN S1 AND S2 AT THE UPPER END (U) DISABLES PARITY, BAUD RATES $19.2 K \mathrm{~B} / \mathrm{S}$. $9600 \mathrm{~B} / \mathrm{S}, 4800 \mathrm{~B} / \mathrm{S}, 2400 \mathrm{~B} / \mathrm{S}, 1200 \mathrm{~B} / \mathrm{S}, \mathrm{OR}$ 300 BS DN S 1 AND DISABLES AUTO-BAUD AND AUTO-PARITY FOR PORTS 0, 1, 2 AND 3 AND KEYBOARD DIALING FOR PORTS 0, 1, 2 AND 3. FULLY DEPRESSING THE ROCKER SWITCH SECTIONS ON S1 AND S2 AT THE LOWER END (D) SELECTS OR ENABLES PARITY, BAUD RATES, AUTO-BAUD AND AUTO-PARITY, AND KEYBOARD DIALING RESPECTIVELY.

NOTES:

1. IF MORE THAN ONE BAUD RATE ON S 1 IS SELECTED, THE PORT BOARD WILL DETERMINE PER PORT THE HIGHEST COMMON BAUD RATE WITH THE DISTANT END.
2. WHEN A CALL IS DISCONNECTED OR NOT INITIATED, THE PORT FOLLOWS THE HIGHEST BAUD RATE SELECIED ON S 1.
3. IF AUTO-BAUD AND AUTD-PARITY IS ENABLED USING S2 FOR A PORT OR ALL PORTS, SETTINGS ON S 1 ARE IGNORED.
4. IF AUTO-BAUD AND AUTO-PARITY IS ENABLEO FOR A PORT OR PORTS, KEYBOARD DIALING FOR THE SAME PORT OR PORTS MUST BE ENABLED.

Figure 44. SN238 EIA Interface Option Settings

## SN243B DATA PORT OPTION SETTINGS

TWO SWITCH PACKAGES, S1 and S2, EACH CONTAINING TWO ROCKER SWitch sections, are located on the circuit pack as shown below. each switch package serves two port circuits.

the following table indicates the switch package and section ASSOCIATED WITH EACH PORT CIRCUIT. A SWITCH SECTION IS FULLY DEPRESSED AT THE UPPER (U) END TO PROVIOE THE 600 OHMS OPTION and fully depressed at the lower end (d) for the rc network OPTION.

| PORT | SWITCH | SECTION |
| :---: | :---: | :---: |
| 0 | $\$ 1$ | 1 |
|  |  | 2 |
| 2 |  | S2 |

USE 600 OHM OPTION WHEN LOOP LENGTH IS LESS THAN 3500 FEET (ABOUT 600 OHMS WITHOUT SET). USE RC NETWORK OPTION FOR LOOP LENGTH GREATER THAN 3500 FEET.

Figure 45. SN243B Data Port Option Settings

## SN253B AUXILIARY TONES OPTION SETTINGS

SELECTION OF OPTIONS (F) , (G) , (J) OR (K)
a Shitch package containing two rocker suitch sections is located on the circuit pack in the UPPER LEFT CORNER (COMPONENT SIDE, CONNECTOR TO THE LEFT) and Sholn in the diagram below.


THE FOLLOWING TABLE INDICATES THE SWITCH SECTION POSIIIONS REQUIRED FOR EACH OPTION PROVIDED. IN THE TABLE, (U) INDICATES THE ROCKER SWITCH IS DEPRESSED AT THE UPPER END AND (D) INDICATES THE ROCKER SWITCH IS DEPRESSED AT THE LOWER END.

| FUNCTION |  | OPTION | SWITCH |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | S1 | S2 |
| INTERNAL SYSTEM CHIME ONLY (0.5 SEC PERIOD) |  |  | K | U | $\pm$ |
| EXTERNAL CHIME PERIOD (SEC.) * | 0.50 | J | D | U |
|  | 1.00 | G | U | D |
|  | 2.00 | F | D | D |

* internal chime will also operate at the same rate CHOSEN FOR THE EXTERNAL CHIME.

Figure 46. SN253B Auxiliary Tones Option Settings

## All Cabinets Alarm Board Option Settings

Alarm board AEH4 located behind the fan assembly in each cabinet can affect the alarm strategy. Use Figure 47 to determine if the option setting is correct for the application being used.

## ALARM BOARD AEH4 OPTION SETTINGS



FOUR SWITCH PaCKAges WIth six switch sections allow CONFIGURATION OF THE ALARM BOARD.
the following table indicates the four swifch packages POSITIONS REQUIRED FOR EACH OPTION PROVIDED. (U) indicates the rocker switch is depressed at the upper END and (D) indicates the switch is depressed at the LOWER END.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SWITCH S1 |  |  |  |  |  |  | SWITCH S2 |  |  |  |  |  | SWITCH S3 |  |  |  |  |  | SWITCH S4 |  |  |  |  |  |
| AEH4 LOCATED IN THIS TYPE OF CABINET | SECTION |  |  |  |  |  |  | SECTION |  |  |  |  |  | SECTION |  |  |  |  |  | SECTION |  |  |  |  |  |
|  | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| UNDUPLICATED COMMON CONTROL (501CC) (CONTAINS PORT CIRCUITS) | U | D |  | D | U | U | D | D | U | U | U | U | U | U | U | U | U | U | U | D | D | U | U | U | D |
| DUPLICATED COMMON CONTROL (501CC) (DOES NOT CONTAIN PORT CIRCUITS) | U | D |  | D | U | U | D | D | U | U | U | U | D | U | U | U | 0 | 0 | U | U | U | U | D | U | 0 |
| MOCULE CONTROL WITH 309A/310A UNDUPLICATED 501CC SYSTEM | 0 | U |  | U | D | D | U | U | D | D | 0 | D | U | U | U | U | U | U | U | U | U | U | U | 0 | U |
| MODJLE CONTROL WITH 309A/310A DUPLICATED 501CC SYSTEM | D | U |  | U | 0 | D | U | U | D | D | D | 0 | U | U | U | 0 | U | U | D | D | 0 | U | U | 0 | U |
| PORT CABINET WIIH 309A/310A | D | U |  | U | 0 | D | U | U | D | 0 | D | 0 | U | U | U | D | U | $\cup$ | D | 0 | D | U | U | D | U |
| PORT CABINET WITHOUT 309A/310A | D | U |  | 1 | 0 | D | U | U | D | U | 4 | $U$ | U | U | $U$ | U | U | U | U | U | U | U | U | D | U |
| UNDUPLICATED TMS FOR UP TO 31 MODULES | D | U |  | U | D | 0 | 0 | U | D | 0 | 0 | D | D | D | 0 | D | U | $\cup$ | D | 0 | D | D | U | D | U |
| DUPLICATED TMS - ONE CABINET for UP TO 15 MODULES | 0 | U |  | U | D | D | U | U | 0 | D | D | D | 0 | D | D | D | U | U | D | D | D | D | U | D | U |
| DUPLICATED TMS - TWO CABINETS FGR 16 - 31 MODULES | D | U |  | U | D | 0 | U | U | D | D | D | 0 | D | D | D | D | U | U | 0 | D | D | D | U | D | U |
| AUXILIARY CABINET WITH DC fan assembly | U | D |  | D | U | U | D | D | U | U | $U$ | U | U | U | U | U | U | U | U | U | U | D | U | D | 0 |

Figure 47. Alarm Board AEH4 Option Settings

## Other

Fuses on circuit pack SN270 which protect each port are shown in Figure 48.
Note: There are no fuses on circuit pack SN270B.

## SN270 GENERAL PURPOSE PORT FUSES

SN270 FUSES
the -48 VOLTS POWER SUPPLIED to STAIION apparatus
from each of the four poris on this pack is fused at
EACH PORT. THE FUSES, CODED 70G ( $0.5 A$ ), ARE LOCATED on the pack as shown in the following diagram.


When maintenance procedures indicate a fuse may need replacement, all ports on the pack should be made maintenance busy before removing the pack from the CARRIER. PROC 632 test 3 CAN be used to make the PORTS MAINTENANCE BUSY.

Figure 48. SN270 General Purpose Port (GPP) Fuses

## HIGH CAPACITY MINI-RECORDER (HCMR)

The high capacity mini-recorder drives a tape cartridge which contains a copy of the programs, parameters, translations, and maintenance used by the switch common control. The mini-recorder reloads the switch memory when power to the switch is interrupted or when memory is lost for other reasons.

## HCMR Circuit Pack Replacement

Perform the following steps when replacing circuit packs in the HCMR. (Refer to Figure 49.)


Figure 49. Replacing High Capacity Mini-recorder (HCMR) Circuit Packs

1. Remove the tape cartridge.

Note: The tape cartridge can be removed if the YELLOW LED on the HCMR is lighted or not lighted.
2. Lift up the front cover to release the catch on both sides and lower the cover.
3. Power down the mini-recorder.

Caution: Damage to components on the circuit pack to be removed or other circuit packs (tape pin connectors -12 V ) and running tape off the reel on the tape cartridge may occur if the mini-recorder is not powered down.

If SN446 (power supply) is to be replaced, set the rocker switch (plunger) on SN446 to OFF and set circuit breaker CB3 on common control carrier to OFF.

Note: The GREEN LED on SN446 goes off.
If other circuit packs in the HCMR are to be replaced, set the rocker switch (plunger) on SN446 to OFF.

Note: The GREEN LED on SN446 goes off.
4. Remove the circuit pack to be replaced by releasing the lever and pulling outward.

Note: Do not pull out the circuit pack by using the lever.
5. Install the replacement circuit pack by sliding inward and then pushing the lever forward.
6. Power up the mini-recorder.

If SN446 (power supply) was replaced, depress the rocker switch (plunger) on SN446 and set circuit breaker CB3 on common control carrier to ON.

Note: The GREEN LED on SN446 is lighted.
If other circuit packs in the HCMR were replaced, depress the rocker switch (plunger) on SN446.

Note: The GREEN LED on SN446 is lighted.
7. Raise the cover and secure to the HCMR.
8. Insert the tape cartridge.

Caution: If the test fails after replacing the HCMR circuit pack, and the circuit pack replaced was $S N 441$ or $S N 445$, reseat the proms on $S N 441$ or $S N 445$ before assuming the replacement circuit pack or any other circuit pack is faulty.

## Cleaning HCMR Tape Head and Capstan

Perform the following steps when cleaning the HCMR tape head and capstan.

1. Remove the tape cartridge,
2. Lift up the front cover to release the catch on both sides and lower the cover.
3. Power down the mini-recorder.

Caution: Damage to components on the circuit pack to be removed or other circuit packs (tape pin connectors -12 V ) and running tape off the reel on the tape cartridge may occur if the mini-recorder is not powered down.

Set the rocker switch (plunger) on SN446 to OFF.
Note: The GREEN LED on SN446 goes off.
4. Remove SN443 circuit pack by releasing the lever and pulling outward.

Note: Do not pull out the circuit pack by using the lever.
5. Turn SN443 on its side to expose tape head, capstan, etc. (Refer to Figure 50.)


Figure 50. Cleaning Tape Head and Capstan on HCMR Circuit Pack SN443
6. Cover end-of-tape sensor with cloth or suitable material.
7. Wipe face of tape head with lint-free cloth moistened with $71 \%$ pure isopropyl alcohol. Dry with clean cloth.
8. Wipe capstan with lint-free cloth moistened with $71 \%$ pure isopropyl alcohol.

Dry with clean cloth.
9. Remove cloth from end-of-tape sensor.
10. Install SN443 into the HCMR by sliding inward and then pushing the lever forward.
11. Power up the mini-recorder.

Depress the rocker switch (plunger) on SN446.
Note: The GREEN LED on SN446 is lighted.
12. Raise the cover and secure to the HCMR.
13. Insert the tape cartridge.

## HCMR Replacement

To replace the HCMR perform the following steps:

1. At the rear of the HCMR, pull out terminal leads (48 and 48 RET).
2. Remove 2 mounting screws securing the HCMR to the cabinet.
3. Remove the HCMR from the front of the cabinet.
4. Install the replacement HCMR into the cabinet.
5. Secure the HCMR to the cabinet using the 2 mounting screws.
6. Connect the terminal leads to the rear of the HCMR.

## 309A OR 310A POWER SUPPLY REPLACEMENT

To replace the 309A or 310A power supply perform the following steps:

1. Set circuit breaker ON/OFF switch on 309A power supply to OFF.
2. Wait one minute and set the BATT switch on the 310A power supply to OFF .
3. Remove the ac input power to the power supply.
4. Tag and disconnect the cables from the power supply.
5. Remove the mounting screws securing the power supply to the cabinet.

Caution: An adequate lifting device must be used to support and lift the power supply in order to prevent personnel injury.
6. Remove the power supply from the cabinet.
7. Set the switches on the replacement power supply to OFF.
8. Install the replacement power supply into the cabinet.
9. Secure the power supply to the cabinet using the mounting screws.
10. Connect the cables to the replacement power supply.
11. Apply ac input power to the replacement power supply.
12. Set BATT switch on the 310A power supply to ON.
13. Set circuit breaker ON/OFF switch on 309A power supply to ON.

After replacing the 309 A or 310 A power supply, perform voltage tests on 310A power supply as appropriate.

## FREQUENCY GENERATOR REPLACEMENT

To replace the 124B frequency generator (Refer to Figure 51), perform the removal and installation steps below.
Removal Steps:

1. Disconnect the connector from PFG IN and PFG OUT.
2. Remove four mounting screws ( 2 from each side).
3. Remove the frequency generator from the rear shelf.

Installation steps:

1. Mount the replacement frequency generator on the rear shelf and secure with the four mounting screws.
2. Assure that the AC power cord (if applicable) is secured by the cable clamp.
3. Connect the connector to PFG IN and PFG OUT.

## DC FAN AND FAN ASSEMBLY REPLACEMENT

The fan assembly provides three fans to maintain interior cabinet temperature within the acceptable operating limit. The fans are mounted vertically side by side. They are designed to run continuously at variable speed and operate on dc power.

## DC Fan Replacement

To replace a DC fan (Refer to Figure 52), perform the removal and installation steps below.
Removal Steps:

1. Remove the fuse associated with the fan to be replaced.
2. Disconnect the plug from the fan to be replaced.
3. Remove two mounting screws.
4. Remove the fan from the fan assembly.

Installation steps:

1. Mount the replacement fan on the fan assembly and secure with the two mounting screws.
2. Install the fan plug to the replacement fan.
3. Install the fuse associated with the fan replaced.


Figure 51. Replacing 124B Frequency Generator


Figure 52. Replacing DC Fans

## DC Fan Wire Replacement

To replace a fan wire suspected of failing, perform the removal and installation steps below.
Removal Steps:

1. Remove the fuse associated with the fan wire to be replaced.
2. Disconnect the fan wire (plug) to be replaced.
3. Thread the fan wire through the fan assembly toward the rear.
4. Disconnect the fan wire from TB1 at the rear of the fan assembly.
5. Remove the fan wire from the fan assembly.

## Installation steps:

1. Connect the replacement fan wire to TB1 at the rear of the fan assembly.
2. Thread the fan wire through the fan assembly toward the front.
3. Install the replacement fan wire (plug) to the appropriate fan.
4. Replace the fuse associated with the fan wire replaced.

## DC Fan Assembly Replacement

To replace the DC fan assembly, perform the removal and installation steps below.
Removal Steps:

1. Remove two mounting screws securing the fuse panel to the fan assembly.
2. Remove two mounting screws (left side) securing the fan assembly to the cabinet.
3. Remove the fan assembly from the cabinet.

Installation steps:
Note: When the DC fan assembly is shipped loose, attach 900658329 vinyl plastic tape (approximately 60 inches) to the top and bottom edges of the unit before installing the DC fan assembly into the cabinet.

1. Mount the replacement fan assembly and secure with the two mounting screws.
2. Secure the fuse panel to the fan assembly with the two mounting screws.

## TMS/RMI CABINET AC DISTRIBUTION UNIT REPLACEMENT

To replace the TMS/RMI cabinet $A C$ distribution unit (Refer to Figure 53), perform the removal and installation steps below.

Removal Steps:

1. Set the circuit breaker on the TMS/RMI cabinet AC distribution unit to OFF.
2. At the front of the TMS/RMI cabinet $A C$ distribution unit, disconnect the cables from $\mathbf{J} 1$ through $\mathbf{J} \mathbf{3}$ as appropriate.
3. At the rear of the TMS/RMI cabinet AC distribution unit, disconnect the cables from $\mathbf{P 4}$ and P5 as appropriate.
4. Remove 2 mounting screws and remove the TMS/RMI cabinet $A C$ distribution unit from the cabinet.

Installation steps:

1. Set the circuit breaker on the replacement AC distribution unit to OFF.
2. Install the replacement AC distribution unit into the TMS/RMI cabinet and secure the unit to the cabinet using 2 mounting screws.
3. At the rear of the TMS/RMI cabinet $A C$ distribution unit, connect the cables to $\mathbf{P 4}$ and $\mathbf{P 5}$ as appropriate.
4. At the front of the TMS/RMI cabinet AC distribution unit, connect the cables to $\boldsymbol{J} 1$ through J3 as appropriate:
5. Set the circuit breaker on the replacement $A C$ distribution unit to $\mathbf{O N}$.


Figure 53. Replacing TMS/RMI Cabinet AC Distribution Unit

## MODULE CONTROL OR PORT CABINET AC DISTRIBUTION UNIT REPLACEMENT

To replace the module control or port cabinet AC distribution unit (Refer to Figure 54), perform the removal and installation steps below.


Figure 54. Replacing Module Control or Port Cabinet AC Distribution Unit

Removal Steps:

1. Set circuit breaker ON/OFF switch at 309A power supply to OFF
2. Wait one minute and set BAT'T switch on 310 A power supply to OFF.
3. Set the 3 circuit breakers on the $A C$ distribution unit to be replaced to OFF .
4. Disconnect Jl from the 309A/310A power supply.
5. Disconnect the power cord from the AC INPUT connector.
6. Tag and disconnect the remaining cables from the AC distribution unit to be replaced.
7. Remove 3 mounting screws and remove the AC distribution unit from the cabinet.

Installation steps:

1. Set the 3 circuit breakers on the replacement AC distribution unit to OFF.
2. Install the replacement $A C$ distribution unit into the cabinet and secure the unit to the cabinet using 3 mounting screws.
3. Connect the cables (disconnected in Step 6 of removal steps) to the replacement AC distribution unit.
4. Connect the power cord of the replacement $A C$ distribution unit to the AC INPUT connector.
5. Connect $J 1$ to the $309 \mathrm{~A} / 310 \mathrm{~A}$ power supply.
6. Set the 3 circuit breakers on the replacement AC distribution unit to $\mathbf{O N}$.
7. Set the BATT switch on the 310A power supply to ON.
8. Set the circuit breaker ON/OFF switch at the 309A power supply to ON.

## DC FILTER REPLACEMENT

To replace the DC filter (Refer to Figure 55), perform the following steps:

1. At the front of the DC filter, set the -48 V circuit breaker to OFF.
2. At the top of the DC filter, disconnect the alarm leads by pressing the clasps on both sides and lifting up.
3. At the rear of the DC filter, tag and disconnect the leads on both terminal strips.
4. Remove the mounting screws securing the DC filter to the cabinet.
5. Remove the DC filter from the cabinet.
6. Install the replacement DC filter into the cabinet ensuring the $\mathbf{- 4 8 V}$ circuit breaker is set. to OFF.
7. Secure the DC filter to the cabinet using the mounting screws.
8. At the rear of the DC filter, connect the leads to both terminal strips on the replacement DC filter.
9. At the top of the replacement $D C$ filter, connect the alarm leads.
10. At the front of the replacement DC filter, set the 48 V circuit breaker to OFF.


Figure 55. Replacing.DC Filter

## CONSOLE COMPONENT REPLACEMENT

## Overview

Prior to replacing console components, disconnect the console power cord and move the console to a convenient work area for disassembly. Disconnect the handset from the console.

Console components identified as replaceable are:

1. Power supply (Figure 56 ).
2. DSS and BLF carrier or button units (Figure 57).
3. Timing control and speech or alphanumeric control (Figure 59).
4. Alphanumeric display, lamp control and carrier, or dial key pad (Figure 60).

## Console Power Supply Replacement

To replace the console power supply (Refer to Figure 56), perform the following steps:


Figure 56. Replacing Console Power Supply

1. Tilt the console to access the bottom of the console.
2. Remove 4 screws to remove the power supply cover.
3. Remove the screw in the center of the power supply.
4. Lift the power supply up and out to remove the power supply from inside the console.
5. Disconnect 2 connectors from the power supply.
6. Connect 2 connectors to the replacement power supply.
7. Install the power supply inside the console.
8. Secure the power supply to the console by mounting the screw in the center of the power supply.
9. Secure the power supply cover with 4 screws.

## Console DSS and BLF Carrier or Button Units Replacement

To replace the console DSS and BLF carrier or button units (Refer to Figure 57), perform the following steps:


Figure 57. Replacing Console DSS and BLF Carrier or Button Units

1. Lift up and pull out to remove the rear access cover.
2. Disconnect the carrier connector.
3. Remove 7 flat head screws to remove the DSS and BLF carrier.
4. Push the DSS and BLF carrier from the front and remove the carrier from the console.
5. Unplug the key/lamp unit from the DSS and BLF carrier.
6. Plug the key/lamp unit into the replacement DSS and BLF carrier or plug the replacement key/lamp unit into the original DSS and BLF carrier.
7. Install the DSS and BLF carrier inside the console.
8. Secure the DSS and BLF carrier to the console using 7 flat head screws.
9. Connect the carrier connector.
10. Replace the rear access cover.

## Console Timing Control and Speech or Alphanumeric Control Replacement

To replace the timing control and speech or alphanumeric control (Refer to Figures 58 and 59), perform the following steps:


Figure 58. Removing Console Front Access Panel


Figure 59. Replacing Console Timing Control and Speech or Alphanumeric Control

1. Lean console toward rear and rest console on rear of DSS faceplate.
2. Remove the front cover and access panel (Refer to Figure 58), by opening the front cover and removing 8 screws from the access panel.
3. To replace the alphanumeric control, proceed to Step 4.

To replace the timing control and speech, proceed to Step 5.
4. Rotate both latches and remove the alphanumeric control.

Install the alphanumeric control and rotate both latches counterclockwise.
Proceed to Step 8.
5. Pull key pad connector forward and disconnect from timing control and speech board.
6. Release both latches and remove the timing control and speech board.
7. Install the replacement timing control and speech board.

Secure both latches by rotating counterclockwise.
Plug key pad connector into connector on front of timing control and speech board.
Proceed to Step 8.
8. Install access panel and front cover using 8 screws.
9. Pull console toward front and place in normal position.

## Console Alphanumeric Display, Lamp Control, or Dial Key Pad Replacement

To replace the console alphanumeric display, lamp control, or dial key pad (Refer to Figure 60), perform the following steps:

1. Lean console toward rear and rest console on rear of DSS faceplate.
2. Remove the front cover and access panel (Refer to Figure 58), by opening the front cover and removing 8 screws from the access panel.
3. Pull out then pull up to remove the console faceplate.

To replace the alphanumeric display, proceed to Step 4.
To replace the dial key pad or lamp control and carrier, proceed to Step 5.
4. Pull up to remove the alphanumeric display.

Install the replacement alphanumeric display and proceed to Step 12.
5. Disconnect the dial key pad connector.
6. Remove 4 screws to remove the dial key pad.

To replace the dial key pad, proceed to Step 7.
To replace the lamp control and carrier, proceed to Step 8.
7. Install the replacement dial key pad and proceed to Step 12.
8. Rotate both locks outward to remove the lamp control and carrier.

Install the replacement lamp control and carrier and proceed to Step 9.
9. Secure the lamp control and carrier by rotating both locks counterclockwise.

Install the dial key pad and proceed to Step 10.
10. Secure the dial key pad to the console using 4 screws.
11. Connect the dial key pad connector.
12. Install the console faceplate.
13. Install access panel and front cover using 8 screws.
14. Pull console toward front and place in normal position.


Figure 60. Replacing Console Alphanumeric Display, Lamp Control Carrier, or Dial Key Pad

## ALARM PANEL REPLACEMENT

To replace the alarm panel (Refer to Figure 61), perform the removal and installation steps below.


Figure 61. Replacing Alarm Panel

Removal Steps:

1. Set the GO/HALT switch(s) on the alarm panel to HALT.
2. Remove the tape cartridge(s) from the $\operatorname{HCMR}(\mathrm{s})$.
3. At the rear of the alarm panel, disconnect and tag the AP* cables.
4. At the rear of the alarm panel (left side), disconnect and tag PKBR and PAPPWR (2) wires.
5. Slide the alarm panel out the front of the common control cabinet.

## Installation Steps:

1. On the replacement alarm panel, set switches GO/HALT to HALT, TEST SELECT to 15, EMERGENCY TRANSFER to OFF, and LOCK ON LINE (when provided) to OFF.
2. Slide the replacement alarm panel into the common control cabinet.
3. At the rear of the alarm panel (left side), connect the PBKR and PAPPWR(s) wires.
4. At the rear of the alarm panel, connect the AP* cables.
5. Insert the tape cartridge(s) into the $\operatorname{HCMR}(\mathrm{s})$.
6. At the front of the replacement alarm panel, set the GO/HALT switch on CCO to GO and depress RESET, ENABLE.

Note: When the alarm panel is duplicated, set the GO/HALT switch on CC1 to GO, and depress RESET, ENABLE on CC1 after the tape is loaded in CCO.

## AEH4 ALARM BOARD REPLACEMENT

To replace the AEH4 alarm board, perform the following steps:

1. At the rear of the fan assembly, remove 4 ribbon cables from the AEH4 alarm board.

Note: All 4 ribbon cables may not be connected. Record the ribbon cables that are connected and the location they are connected to.
2. Remove eight clip-on fasteners from the AEH4 alarm board plugs labeled JTMP, JMISC, JFAN, JALM, JBKRO, JBKR1, JRSVO, and JRSV1.

Note: All eight fasteners may not be connected. Record the clip-on fasteners that are connected and the location they are connected to.
3. Remove 2 screws mounting the AEH4 alarm board to the fan assembly shelf.
4. Remove the AEH4 alarm board.
5. Record the option settings of the four switch packages on the AEH4 alarm board.
6. Set the four switch packages on the replacement AEH4 alarm board to the option settings as recorded in Step 5.
7. Install the replacement AEH4 alarm board on the fan assembly shelf and secure with the 2 mounting screws.
8. Connect the eight clip-on fasteners (if appropriate) as recorded in Step 2.
9. Connect the four ribbon cables (if appropriate) as recorded in Step 1.

## SMDR COMPONENT REPLACEMENT

## GENERAL

This section provides a brief description of the Station Message Detail Recorder (SMDR) and contains instructions for replacement of SMDR components.

Replacement of SMDR components, as determined by performing maintenance procedures, consist of the following:

1. SMDR carrier circuit pack replacements.
2. SMDR formatter circuit pack replacements.
3. SMDR tape drive circuit pack replacements and adjustments.
4. SMDR power supply replacement.
5. SMDR formatter replacement.
6. SMDR tape drive replacement.
7. SMDR clock/calendar display unit replacement.

## SMDR CABINET

The SMDR cabinet (Refer to Figure 62) contains the following:

1. A Kennedy 9800 tape drive.

Drives a 9 -track magnetic tape.
2. A 9-track magnetic tape.

Stores information for approximately 330,000 calls (a readable form of the tape can be provided through machine processing).
3. A clock/calendar display.

Provides a means for setting the time and date to be recorded onto the tape.
4. A call information display.

Displays detailed call information for one call at a time.
5. A control panel.

Provides a user interface to the 9 -track tape operation for functions such as changing the tape, dumping memory, and clearing the display.
6. An SMDR carrier.

Contains the circuit packs that control SMDR operations.
7. A fan assembly.

Maintains interior cabinet temperaturé.
8. A Kennedy 9217 tape formatter.

Records data on a standard 9-track magnetic tape.


Figure 62. Station Message Detail Recorder (SMDR) Cabinet
9. An ac distribution unit.

Distributes ac power throughout the cabinet.

## SMDR CARRIER CIRCUIT PACK REPLACEMENT

To replace circuit packs in the SMDR carrier (Refer to Figure 63), proceed as follows:


Figure 63. SMDR Carrier

1. At the SMDR power supply, set power switch to OFF.
2. At the SMDR carrier, replace circuit pack.
3. At the SMDR power supply, set power switch to ON.
4. At the SMDR control panel, depress the system ON LINE button.
5. If the ON LINE lamp on the tape drive is not lighted, depress the ON LINE button.

## SMDR FORMATTER CIRCUIT PACK REPLACEMENT

To replace circuit packs in the SMDR formatter (Refer to Figure 64), proceed as follows:

1. Remove 2 screws from front of the SMDR formatter to remove the front cover.
2. At the SMDR formatter, replace circuit pack.
3. Replace front cover on SMDR formatter using 2 screws.
4. At the SMDR control panel, depress the system ON LINE button.
5. If the ON LINE lamp on the tape drive is not lighted, depress the ON LINE button.


FDRMATTER WITH FRONT COVER REMOVED
Figure 64. Replacing SMDR Formatter Circuit Packs

## SMDR TAPE DRIVE CIRCUIT PACK REPLACEMENT

## Circuit Pack Replacement

To replace circuit packs in the SMDR tape drive (Refer to Figure 65), proceed as follows:

1. At the SMDR tape drive (behind dust cover), set power ON/OFF switch to OFF.
2. At top rear of the SMDR tape drive, replace circuit pack.
3. Refer to Table BP and perform adjustments required for circuit pack replaced.
4. At the SMDR tape drive, set power ON/OFF switch to ON (if off).
5. At the SMDR control panel, depress the SYSTEM ON LINE button.
6. If the ON LINE lamp on the tape drive is not lighted, depress the ON LINE button.


Figure 65. Replacing SMDR Tape Drive Circuit Packs

## Adiustments for Tape Drive Circuit Packs

## Tape Speed Adjustment:

This adjustment is performed on the SMDR tape drive ramp generator circuit board 3645 as follows:

1. At the SMDR tape drive (behind dust cover), set power ON/OFF switch to OFF.
2. Remove circuit board 4139 from position 4, (Refer to Figure 66) and insert a Kennedy card extender in its place.
3. Insert circuit board 4139 into the card extender.
4. At the SMDR tape drive, set power ON/OFF switch to ON.
5. Load the master skew tape.

TABLE BP.

| TAPE DRIVE ADJUSTMENTS |  |  |
| :---: | :---: | :--- |
| CIRCUIT <br> PACK <br> CODE | CIRCUIT <br> PACK <br> POSITION(S) | REQUIRED <br> ADJUSTMENT(S) |
| 3645 | 11 | TAPE SPEED |
|  |  | RAMP TIME |
| 3844 | 12 | PHOTOSENSOR |
| 4139 | 4 and 5 | READ SKEW |
| . |  | CAPSTAN ZERO OFFSET |
|  | 13 |  |



Figure 66. SMDR Tape Drive Test Points and Adjustments
6. Connect the test panel to the test connector on circuit board 4843 (Refer to Figure 67).


Figure 67. Test Panel Connection to Circuit Pack 4843
7. At the test panel, depress the STOP button.
8. At the test panel, depress the TEST MODE bution.
9. At the test panel, depress the FORWARD RUN button to advance the tape beyond load point and then depress the STOP button.
10. Connect an oscilloscope to pin H on the extender card.
11. At the test panel, depress the FORWARD RUN button while observing the signal on the oscilloscope.
12. If necessary, adjust potentiometer R14 on circuit board 3645 (Refer to Figure 66) for a signal with a period (T) of 100 usec as displayed on the oscilloscope (Refer to Figure 68).


Figure 68. Waveform for Tape Speed Adjustment

## Ramp Time Adjustment:

This adjustment is performed on the ramp generator circuit board. With the test conditions as in Step 12 of Tape Speed Adjustment above, proceed as follows:

1. Connect a test lead from pin $Y$ on card extender to the external trigger input on the oscilloscope.
2. Condition the oscilloscope to trigger on a high going external signal.
3. Connect the oscilloscope probe to point A on circuit board 3645 (Refer to Figure 66).
4. At the test panel, depress the FORWARD RUN button and observe trace of ramp-up signal (Refer to Figure 69).
This signal appears each time the tape starts to run forward.


Figure 69. Ramp-Up Signal
5. Alternately depress the FORWARD RUN and STOP buttons to cause the signal to repeat.
6. Adjust the start ramp potentiometer R3 on circuit board 3645 (Refer to Figure 66) if necessary, for a ramp-up time (tr) of 15 ms (Refer to Figure 69).
7. Condition the oscilloscope to trigger on a low going external signal.
8. At the test panel, alternately depress the FORWARD RUN and STOP buttons while observing the ramp-down signal (Refer to Figure 70) on the oscilloscope.
9. If necessary, adjust stop ramp potentiometer R 4 on circuit board 3645 for a ramp-down time ( tr ) of 15 ms (Refer to Figure 70).


Figure 70. Ramp-Down Signal
10. At the SMDR tape drive, set power ON/OFF switch to OFF.
11. Remove the test panel from circuit board 4843.
12. Remove circuit board 3645 from the card extender.
13. Remove the card extender and insert circuit board 3645 in its place.
14. Disconnect the oscilloscope probe and test cable.
15. At the SMDR tape drive, set power ON/OFF switch to ON.
16. Unload master skew tape, and load original 9 -track tape.

## Photosensor Adjustment:

This adjustment is performed on sensor amplifier driver circuit board 3844 as follows:

1. Load the master skew tape (or standard 9-track tape) and advance the tape to the load point.
2. Connect the test panel to test connector on circuit board 4843 (Refer to Figure 67).
3. At the test panel, depress the STOP button.
4. At the test panel, depress the TEST MODE button.

Note: Do not operate the FAST FORWARD or FAST REVERSE buttons on the test panel when using a master skew tape.
5. Connect a voltmeter between test points E and F on circuit board 3844 (Refer to Figure 66) and adjust potentiometer R16 to 0 volts on the voltmeter.
6. Disconnect the voltmeter and test panel.
7. Unload master skew tape and load original 9 -track tape.

## Read Skew Adjustment:

This adjustment is performed on the quad phase encoded read detector circuit board 4139 as follows:

1. Load master skew tape on tape drive and advance tape to the load point.

Note: Tape drive must be off-line.
2. Connect the test panel to test connector on circuit board 4843 (Refer to Figure 67).
3. At the test panel, depress the STOP button.
4. At the test panel, depress the TEST MODE button.
5. At the test panel, depress the FORWARD RUN button.
6. When the tape reaches end-of-tape marker, depress the REVERSE RUN button and observe the SKEW indicator lamp on the test panel. The SKEW lamp when illuminated, indicates excessive skew.
7. If the SKEW lamp lights while tape is running forward, adjust skew adjusting screw (Refer to Figure 71) until SKEW lamp is extinguished.
8. Disconnect the test panel from circuit board 4843.
9. Unload master skew tape and load original 9-track tape.

## Capstan Servo Zero Offset Adjustment:

This adjustment is performed on the servo preamplifier circuit board 4306 as follows:

1. At the SMDR tape drive (behind dust cover), set power ON/OFF switch to OFF.

Note: Tape must be loaded.
2. Remove circuit board 4306 and insert the card extender in its place.
3. Insert circuit board 4306 into the card extender.
4. At the SMDR tape drive, set power ON/OFF switch to ON.
5. Connect a voltmeter to test point A on circuit board 4306 to observe the voltage output of the capstan servo amplifier stage.
6. With tape at load point, adjust potentiometer R56 to 0 volts on voltmeter.
7. Observe that capstan does not rotate.

## Buffer Arm Travel Adjustment:

This adjustment is performed on the servo preamplifier circuit board 4306 to prevent excessive travel of the supply and take-up buffer arms during ramp-ups and ramp-downs. With the test conditions as in Step 7 of Capstan Zero Offset Adjustment above, proceed as follows:

1. Connect the test panel to test connector on circuit board 4306 (Refer to Figure 67).
2. With the tape drive off-line, depress the STOP button on the test panel.
3. At the test panel, depress the TEST MODE button.
4. At the test panel, alternately depress the FORWARD RUN and REVERSE RUN buttons while observing supply buffer arm travel.
5. Adjust R57 on circuit board 4306 for minimum travel of the supply buffer arm during rampups and ramp-downs.
6. Adjust R58 on circuit board 4306 for minimum travel of the take-up buffer arm during rampups and ramp-downs.
7. At the SMDR tape drive, set power ON/OFF switch to OFF.
8. Remove circuit board 4306 from card extender.
9. Remove card extender from tape drive and install circuit board 4306 in its place.
10. At the SMDR tape drive, set power ON/OFF switch to $O N$.
11. Remove test panel from circuit board 4843.


Figure 71. Read Skew Adjustment

## SMDR 207B POWER SUPPLY REPLACEMENT

To replace the SMDR 207B power supply (Refer to Figure 72), perform the removal and installation steps below.


Figure 72. Replacing SMDR 207B Power Supply

## Removal Steps:

1. Set switch on SMDR power supply to OFF.
2. Disconnect SMDR power cord from ac receptacle.
3. Tag and disconnect leads from rear of power supply.
4. Remove 4 mounting screws securing power supply to cabinet.
5. Remove power supply from cabinet.

Installation steps:

1. Install the replacement power supply into the cabinet and secure with 4 mounting screws.
2. Connect leads (disconnected in Step 3 of removal steps) to rear of replacement power supply.
3. Connect SMDR power cord to ac receptacle.
4. Set switch on power supply to ON.

## SMDR FORMATTER REPLACEMENT

To replace the SMDR formatter (Refer to Figure 73), perform the removal and installation steps below.

Removal Steps:

1. At rear of the SMDR cabinet, disconnect formatter power cord.
2. Tag and disconnect cables at rear of formatter.
3. Remove 2 mounting screws from formatter front cover and remove front cover.
4. Remove 4 mounting screws securing formatter to brackets.
5. Remove formatter from cabinet.

Installation steps:

1. Remove 2 mounting screws from front cover on replacement formatter and remove front cover.
2. Install the replacement formatter into the cabinet and secure to the brackets with 4 mounting screws.
3. Secure front cover on the replacement formatter using 2 mounting screws.
4. Connect cables (disconnected in Step 2 of removal steps) to rear of replacement formatter.
5. Connect formatter power cord.
6. At the rear of replacement formatter, set voltage switch to 115 volts.
7. At the SMDR control panel, depress the SYSTEM ON LINE button.
8. If the ON LINE lamp on the tape drive is not lighted, depress the ON LINE button.

## SMDR TAPE DRIVE REPLACEMENT

To replace the SMDR tape drive (Refer to Figure 74, Sheets 1 and 2), perform the removal and installation steps below.

Removal Steps:

1. At the SMDR control, depress the TAPE UNLOAD button.
2. Rewind tape onto supply reel either manually or by depressing the ON LINE and REWIND buttons on the tape drive.


Figure 73. Replacing SMDR Formatter
3. Remove supply reel from the tape drive.
4. Set tape drive power switch to OFF.
5. Disconnect power cord from ac voltage source.
6. Tag and disconnect cables at rear of the tape drive.
7. Remove 8 mounting screws at front of tape drive.
8. At rear of the tape drive, remove 2 mounting screws securing bracket to tape drive.
9. Remove tape drive from the control panel.


Figure 74. Replacing SMDR Tape Drive (Sheet 1 of 2)


PARTIAL REAR VIEW


Figure 74. Replacing SMDR Tape Drive (Sheet 2 of 2)

## Installation steps:

1. Install the replacement tape drive into the control panel and secure the tape drive to the control panel using 8 mounting screws.
2. Secure bracket to tape drive using 2 mounting screws.
3. Verify (or set) voltage switch at rear of tape drive is set to 115 volts.
4. Connect cables (disconnected in Step 7 of removal steps) to rear of the tape drive.
5. Connect power cord to ac voltage source.
6. At the tape drive, raise the quick release latch.
7. Install the supply reel on supply hub with the write enable ring side next to the tape transport deck.
8. Hold supply reel flush against the butt flange and secure the supply reel by depressing the quick release latch.
9. Thread tape and wind a few turns clockwise around the take up reel until the slack in the tape is removed.
10. Set the tape drive power switch to ON.
11. Close the dust cover and depress the LOAD BUTTON.
12. At the SMDR control panel, depress the SYSTEM ON LINE button.
13. At the SMDR tape drive, depress the ON LINE button.
14. At the SMDR control panel, depress the DUMP MEMORY button.

## SMDR CLOCK/CALENDAR DISPLAY REPLACEMENT

To replace the SMDR clock/calendar display (Refer to Figure 75), perform the removal and installation steps below.


Figure 75. Replacing SMDR Clock/Calendar Display

## Removal Steps:

1. At rear of the SMDR cabinet, disconnect connector CLK1 from CD01 jack on the SMDR carrier.
2. At inside front door of the SMDR cabinet, remove 4 screws securing clock/calendar display assembly.
3. Remove clock/calendar display assembly from the door.

Installation steps:

1. Install the replacement clock/calendar display assembly into the inside front door of the SMDR cabinet, and secure the clock/calendar display assembly to the door using 4 screws.
2. At rear of the SMDR cabinet, connect connector CLK1 to CDO1 jack on SMDR carrier.
3. At the clock/calendar display, set display switch to TIME.
4. Depress the TIME SET HRS button until correct hours digit is displayed.
5. Depress the TIME SET MIN button until correct minutes digit is displayed.
6. Set display switch to DATE.
7. Depress the DATE SET button until correct date is displayed.
8. Depress the DATE PRINT button.

## AUXILIARY CABINET COMPONENT REPLACEMENT

## GENERAL

This section provides a brief description of the auxiliary cabinet and contains instructions for replacement of auxiliary cabinet components.
Replacement of auxiliary cabinet components, as determined by performing maintenance procedures, consist of the following:

1. Frequency generator replacement.
2. DC fan and fan assembly replacement.
3. AC distribution unit replacement.
4. Rectifier replacement.

Other auxiliary cabinet components may require replacement based on the results of Isolation and Repair Techniques.

## AUXILIARY CABINET

The auxiliary cabinet (Refer to Figure 76) contains System 85 auxiliary equipment required by the customer.

This cabinet can contain:

1. A fuse panel.

Provides mounting for circuit fuses which protect auxiliary equipment.
2. A sensor.

Monitors the cabinet temperature.
3. Auxiliary equipment.

Provides features such as radio paging access, recorded telephone dictation access, recorded announcement, etc.
4. A fan assembly.

Maintains interior cabinet temperature.
5. A -48V rectifier.

Provides de power to the auxiliary cabinet.
6. An ac filter for the -48 V rectifier.

Note: When equipped with extended power reserve a dc filter replaces the ac filter (ac distribution unit).
7. An auxiliary alarm unit and alarm distribution panel.

Detects and reports equipment malfunctions.
8. A dc filter.

Provides extended power reserve.


Figure 76. Auxiliary Cabinet

## ISOLATION AND REPAIR TECHNIQUES

## Overview

Isolation and repair of troubles in the auxiliary cabinet begins with PROC 600 (Alarm causes/error log) unit type 63.

Test 1 of PROC 600 displays the type of alarm for unit type 63 (external equipment) and provides an encode that defines the area in the auxiliary cabinet where the trouble exists.

The encodes displayed in Field 4 of PROC 600 Test 1 for unit type 63 (external equipment) are:

1. Encode $1=$ The auxiliary cabinet battery holdover circuit alarm is active.
2. Encode $2=$ The auxiliary cabinet temperature limit sensor alarm is active.
3. Encode $3=$ The auxiliary cabinet fan power alarm is active.
4. Encode $4=$ The auxiliary cabinet circuit breaker/fuse alarm is active.
5. Encode $5=$ The auxiliary cabinet frequency generator alarm is active.
6. Encode $6=$ The auxiliary cabinet rectifier alarm is active.
7. Encode $7=$ The external equipment major or minor alarm is active.
8. Encode $8=$ Type of trouble is unknown (multiple errors).

Isolation techniques for the encodes displayed in PROC 600 are detailed in the following paragraphs.

## Encode 1 - Battery Holdover

Extended holdover or extended power reserve is provided by the DC filter.
If encode 1 is displayed in Field 4 of PROC 600 Test 1, replace the DC filter.
Note: Refer to SWITCH COMPONENT REPLACEMENT for steps on replacement of the DC filter.

## Encode 2 - Temperature Limit Sensor

An overtemperature alarm cause signifies that a predetermined cabinet temperature is exceeded.

1. Determine if fans are provided in the auxiliary cabinet.

If no fans are provided, proceed to Step 7.
If fans are provided, proceed to Step 2.
2. Determine if the fans are running.

If no fans are running, proceed to Step 4.
If fans are running, proceed to Step 3 .
3. Determine if all fans are operating properly.

Replace any defective fan, allow sufficient time for cabinet interior to cool and proceed to Step 8.
If all fans are operating properly, refer to isolation and repair step Other Repair Steps.
4. Check the circuit breakers associated with the fans.

If any circuit breaker is tripped, proceed to Step 5.
If no circuit breaker is tripped, it may be possible for excessive heat in the room to cause the temperature alarm. Proceed to Step 7.
5. Reset the circuit breaker.

If the circuit breaker does not trip again, allow sufficient time for cabinet interior to cool and proceed to Step 8.
If the circuit breaker trips again, replace the fan associated with the circuit breaker.
6. Reset the circuit breaker, allow sufficient time for cabinet interior to cool and proceed to Step 8.
7. When no fans are provided, or excessive heat in the room is suspected, determine if environmental temperature is above maximum for the auxiliary cabinet.
If the environmental temperature is above the maximum, leave the cabinet open to allow cooling, and refer the problem to local engineering.

If the environmental temperature is not above the maximum, refer to isolation and repair step Other Repair Steps.
8. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
9. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
10. If the same entry is not displayed, corrective action is complete.
11. If the same entry is displayed, check the wiring associated with the circuit breaker and fan.

## Encode 3 - Fan Power

Encode 3 (fan power) indicates that a fan may be malfunctioning.

1. Determine if the fans are running.

If no fans are running, proceed to Step 3.
If fans are running, proceed to Step 2.
2. Determine if all fans are operating properly.

Replace any defective fan, allow sufficient time for cabinet interior to cool and proceed to Step 6.
If all fans are operating properly, refer to isolation and repair step Other Repair Steps.
3. Check the circuit breakers associated with the fans.

If any circuit breaker is tripped, proceed to Step 4.
If the circuit breakers are not tripped, refer to isolation and repair step Other Repair Steps.
4. Reset the circuit breaker.

If the circuit breaker does not trip again, allow sufficient time for cabinet interior to cool and proceed to Step 6.

If the circuit breaker trips again, replace the fan associated with the circuit breaker.
5. Reset the circuit breaker, allow sufficient time for the cabinet interior to cool and proceed to Step 6.
6. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
7. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
8. If the same entry is not displayed, corrective action is complete.
9. If the same entry is displayed, check the wiring associated with the fan and circuit breaker.

## Encode 4 - Circuit Breaker/Fuse

Fuses and circuit breakers provide visual indications when they operate.

1. Determine if any fuses are blown or circuit breakers tripped.

If no fuses are blown or circuit breakers tripped, refer to isolation and repair step Other Repair Steps.
If any fuse is blown or circuit breaker tripped, proceed to Step 2.
2. Replace the blown fuse, or reset the circuit breaker.

If the fuse does not blow again or circuit breaker does not trip, proceed to Step 4.
If the fuse blows again or circuit breaker trips, proceed to Step 3.
3. The corrective action to be taken depends on the blown fuse or tripped circuit breaker.

Replacement of components associated with the blown fuse or circuit breaker may be required.

Wiring or cabling associated with the fuse or circuit breaker should be checked.
4. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
5. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
6. If the same entry is not displayed, corrective action is complete.
7. If the same entry is displayed, check the wiring associated with the fuse or circuit breaker.

## Encode 5 - Frequency Generator

1. Check the fuse associated with the frequency generator.

If the fuse is blown, proceed to Step 2.
If the fuse is not blown, proceed to Step 3.
2. Replace the blown fuse.

If the fuse does not blow, proceed to Step 4.
If the fuse blows again, check the wiring between the fuse and the frequency generator.
3. Replace the frequency generator.
4. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
5. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
6. If the same entry is not displayed, corrective action is complete.
7. If the same entry is displayed, check the wiring associated with the frequency generator.

## Encode 6 - Rectifier

A green pilot LED located on the front panel of the rectifier is on when the rectifier is producing - 48 volts on its output.

The green pilot LED does not indicate that the output voltage is within regulation limits.
Appropriate test points are available on the front panel of the rectifier for measuring the output voltage and determining the rectifier performance.

1. At the rectifier, determine if the green pilot LED is on.

If the green pilot LED is not on, proceed to Step 2.
If the green pilot LED is on, proceed to Step 6.
2. Determine if the circuit breaker associated with the rectifier is tripped.

If the circuit breaker is tripped, proceed to Step 3.
If the circuit breaker is not tripped, proceed to Step 4.
3. Reset the circuit breaker.

If the circuit breaker trips again, replace the rectifier. If the circuit breaker trips again after replacing the rectifier, check the wiring associated with the rectifier.

If the circuit breaker does not trip, proceed to Step 8.
4. Measure the rectifier output voltages at the test points using a digital multimeter.

If all voltages are within tolerance, refer to isolation and repair step Other Repair Steps.
If the voltages are not within tolerance, proceed to Step 5.
5. Replace the rectifier and measure the output voltages.

If all voltages are within tolerance, proceed to Step 8.
If voltages are not within tolerance, check the wiring associated with the rectifier.
6. Determine if marginal or fluctuating voltages exist at the rectifier test points by measuring the output voltages using a digital multimeter.

If all voltages are within tolerance without fluctuation, refer to isolation and repair step Other Repair Steps.

If the voltages are marginal or fluctuating, proceed to Step 7.
7. Replace the rectifier and measure the output voltages.

If all voltages are within tolerance and do not fluctuate, proceed to Step 8.
If voltages are not within tolerance or fluctuate, check the wiring associated with the rectifier.
8. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
9. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
10. If the same entry is not displayed, corrective action is complete.
11. If the same entry is displayed, check the wiring associated with the rectifier.

## Other Repair Steps

1. In the event an alarm encode is present but the equipment associated with the alarm encode is functioning properly, (or unable to function because of a suspected sensor or detector malfunction), the sensor, detector or alarm board corresponding to the auxiliary cabinet encode is probably faulty.
2. Replace the auxiliary cabinet alarm unit.
3. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
4. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
5. If the same entry is not displayed, corrective action is complete.
6. If the same entry is displayed, proceed to Step 7.
7. Check the sensor or detector and replace as appropriate.
8. Enter PROC 600 Test 1 and clear the alarmed entry.

Wait at least 5 to 10 minutes.
9. Enter PROC 600 Test 1 and depress EXECUTE.

Determine if the same entry for unit type 63 is displayed.
10. If the same entry is not displayed, corrective action is complete.
11. If the same entry is displayed, proceed to Step 12.
12. If the sensor or detector is functioning correctly or after replacement of the sensor or detector the failure still exists, the wiring between the sensor or detector and the module control channel may be at fault.
13. Encodes 7 (major or minor alarm) and 8 (type of trouble is unknown) requires investigation of the entire auxiliary cabinet to determine the location of the trouble.

## 124B FREQUENCY GENERATOR REPLACEMENT

To replace the 124B frequency generator (Refer to Figure 77) in the auxiliary cabinet, perform the removal and installation steps below.


Figure 77. Replacing Auxiliary Cabinet 124B Frequency Generator

Removal Steps:

1. Remove the -48 V fuse associated with the frequency generator.
2. Disconnect the connectors from PFG IN and PFG OUT.
3. Remove four mounting screws ( 2 from each side) securing the frequency generator to the front panel of the auxiliary cabinet.
4. Remove the frequency generator.

## Installation steps:

1. Install the replacement frequency generator into the auxiliary cabinet and secure the frequency generator to the front panel using 4 mounting screws.
2. Connect the connectors to PFG IN and PFG OUT.
3. Replace the -48 V fuse associated with the frequency generator.

## DC FAN AND FAN ASSEMBLY REPLACEMENT

## DC Fan Replacement

To replace a DC fan (Refer to Figure 78), in the auxiliary cabinet, perform the removal and installation steps below.


Figure 78. Replacing Auxiliary Cabinet DC Fans

## Removal Steps:

1. Remove the fuse associated with the fan to be replaced.
2. Disconnect the plug from the fan to be replaced.
3. Remove two mounting screws.
4. Remove the fan from the fan assembly.

## Installation Steps:

1. Mount the replacement fan on the fan assembly and secure with the two mounting screws.
2. Install the fan plug to the replacement fan.
3. Install the fuse associated with the fan replaced.

## DC Fan Wire Replacement

To replace a fan wire suspected of failing in the auxiliary cabinet, perform the removal and installation steps below.

Removal Steps:

1. Remove the fuse associated with the fan wire to be replaced.
2. Disconnect the fan wire (plug) to be replaced.
3. Thread the fan wire through the fan assembly toward the rear.
4. Disconnect the fan wire from TB1 at the rear of the fan assembly.
5. Remove the fan wire from the fan assembly.

## Installation Steps:

1. Connect the replacement fan wire to TB1 at the rear of the fan assembly.
2. Thread the fan wire through the fan assembly toward the front.
3. Install the replacement fan wire (plug) to the appropriate fan.
4. Replace the fuse associated with the fan wire replaced.

## DC Fan Assembly Replacement

To replace the DC fan assembly in the auxiliary cabinet, perform the removal and installation steps below.

## Removal Steps:

1. Remove two mounting screws securing the fuse panel to the fan assembly.
2. Remove two mounting screws (left side) securing the fan assembly to the auxiliary cabinet.
3. Remove the fan assembly from the cabinet.

Installation Steps:
Note: When the DC fan assembly is shipped loose, attach 900658329 vinyl plastic tape (approximately 60 inches) to the top and bottom edges of the unit before installing the DC fan assembly into the cabinet.

1. Mount the replacement fan assembly and secure with the two mounting screws.
2. Secure the fuse panel to the fan assembly with the two mounting screws.

## AC DISTRIBUTION UNIT REPLACEMENT

To replace the AC distribution unit (Refer to Figure 79) in the auxiliary cabinet, perform the removal and installation steps below.


Figure 79. Replacing Auxiliary Cabinet AC Distribution Unit

## Removal Steps:

1. Set circuit breakers CB1 through CB5 on the AC distribution unit to be replaced to OFF.
2. Disconnect the power cord from the ac source.
3. Tag and disconnect the two wires from the grounding block on the left rear side.

Note: One wire is connected to the rectifier, and the other wire is connected to terminal TS1.
4. Tag and disconnect the remaining cables from the AC distribution unit to be replaced.
5. At the rear of the auxiliary cabinet, remove 2 screws from mounting foot at left of AC distribution unit.
6. At the front of the auxiliary cabinet, remove 2 screws from the mounting bracket.
7. Remove the AC distribution unit from the auxiliary cabinet.

Installation steps:

1. Set circuit breakers CB1 through CB5 on the replacement AC distribution unit to OFF.
2. Install the replacement $A C$ distribution unit into the auxiliary cabinet and secure the unit to the cabinet using 4 mounting screws ( 2 in mounting bracket and 2 in the mounting foot).
3. Connect the cables (disconnected in Step 4 of removal steps) to the replacement AC distribution unit.
4. Connect the two wires (disconnected in Step 3 of removal steps) to the replacement AC distribution unit grounding block.
5. Connect the power cord of the replacement AC distribution unit to the ac source.
6. Set circuit breakers CBI through $\mathbf{C B 5}$ on the replacement AC distribution unit to $\mathbf{O N}$.

## RECTIFIER REPLACEMENT

To replace the rectifier (Refer to Figure 80) in the auxiliary cabinet perform the removal and installation steps below.

Removal Steps:

1. At the front of the rectifier:

Set the ON/OFF switch to OFF.
Remove the connector from the AC input jack.
2. At the rear of the rectifier, remove the connectors from the ALARMS and OUTPUT jacks.
3. At the front of the auxiliary cabinet, remove two hex nuts securing mounting clip to shelf. Remove the mounting clip from the shelf.
4. Slide the rectifier forward and remove from the auxiliary cabinet.

Installation steps:

1. At the front of the replacement rectifier, set the ON/OFF switch to OFF .
2. Install the replacement rectifier into the auxiliary cabinet.
3. At the front of the auxiliary cabinet, replace the mounting clip to the shelf and secure with the two hex nuts.
4. At the rear of the replacement rectifier, connect the two connectors to the ALARMS and OUTPUT jacks.
5. At the front of the replacement rectifier:

Connect the connector to the AC input jack.
Set the ON/OFF switch to ON.


Figure 80. Replacing Auxiliary Cabinet Rectifier

## MAINTENANCE AND ADMINISTRATION PANEL (MAAP)

## DESCRIPTION OF MAAP

## Overview

The various components of the MAAP (Refer to Figure 81), are described in the following paragraphs.


Figure 81. MAAP

## LED Indicators

The Light Emitting Diode (LED) indicators (Refer to Figure 82), function as follows.


Figure 82. LED Indicators
a. The MAJOR and MINOR alarm lamps (in parallel with the alarm panel) display the existence of alarm conditions.
b. The $\mathbf{O}$ or 1 lamp denotes which common control (processor) in a duplicated system is on-line.
c. The IN USE lamp denotes that a circuit selected for testing is in-use and cannot be tested.
d. The BUSY OUT lamp is lighted at all times when any circuit in the switch is maintenance or software busied out.
e. The SEE NOTE lamp serves as a reminder that translation changes have been made in memory and must be transferred to the tape.
f. The WAIT lamp is lighted when the tape is in motion selecting the requested procedure, or when a maintenance procedure is being run.
g. The IN USE, SEE NOTE, and WAIT lamps are lighted when a remote facility has control of the switch.

## Dual Tone Key Pad

The dual tone key pad (Refer to Figure 83), is used to enter data into the procedure fields.


Figure 83. Dual Tone Key Pad
a. The CLEAR ENTRY button clears existing data if depressed before the ENTER button. Depressing the ENTER button after depressing CLEAR ENTRY places a dash (-) in the blinking field.
b. The ENTER button is depressed when a number entered in a field is complete; when a number already displayed is to be used as it appears; or to advance to the next higher numbered field.

## Flipcharts

Each maintenance procedure is represented by one or more flipcharts. Each flipchart is used to:
a. Identify the fields required for display or entry purposes.
b. Identify information unique to that particular maintenance procedure.

Flipcharts are identified by the function of the procedure (procedure name) and a 3-digit procedure number. The 25 -digit data portion of each flipchart is segmented into fields identified by a number and a name.

Many maintenance procedures require that data be entered in specific field(s). These fields are called entry fields and are identified by black triangles on the flipchart.

All data entered into a maintenance procedure is displayed at the moment it is entered. The display may be used to denote all data contained in memory for a particular flipchart.

Flipehart field boundaries are delineated in the data display by a dot (decimal point) located in the bottom right-hand corner of each field. The decimal point for a particular field flashes as an indication that the field is ready for data entry.

## LED Data Display

The LED data display field is an operational display which functions with a flipchart. The display consists of 28 -digits which correspond to the 25 digit locations of a flipchart and the three-digit number of the procedure.

## Error Display

A 2-digit display (Refer to Figure 84), allowing the display of error codes informing the user that an invalid operation was attempted or that invalid data is entered in a field.

## Field Identification

A 2-digit display (Refer to Figure 84), which denotes the number of the MAAP field which is ready for data entry.


Figure 84. Error Display and Field Identification

## Error Code Listing

The error code listing (Refer to Figure 85), is an abbreviated listing of the most common error codes that may be displayed when performing procedures.

## Control Keys

The control keys in the center of the MAAP are used to select the various modes and functions. They are identified as translation, common, and maintenance keys and are color-coded. Figure 86 illustrates the key designations and color coding of the control keys.
a. The translation (blue) keys are used with the common (white) keys to execute translation procedures.
b. The common keys are used with both translation and maintenance procedures.
c. The maintenance (yellow) keys are used in conjunction with the common keys to execute maintenance procedures.

```
RESTART-SEQUENCE (EG 'CHANGE FIELD' ETC.) CHECK DATA-CORRECT AND TRY AGAIN FOLLOW LOCAL PRACTICES
OO- WRONG CONTROL KEY.
01- FLD DISP ONLY OR NOT ON FLIPCHART.
REENTER DATA
02- DATA OUT OF LIMITS (EG SLOT NO. TOO
    LARGE).
03- DATA WRONG (EG WRDNG SLOT NO. FOR
    CP TYPE).
04- DIGITS 8 AND 9 NOT ALLOWED.
05- TOD MANY DIGITS DIALED, IF OK,
    PRESS 'ENTER' IF NOT, REENTER DATA.
OG- WRONG KEY. PRESS RIGHT KEY AND
    CONTINUE.
07- DO NOT PRESS KEYS WHEN WAIT LAMP
``` IS ON.
08- IN USE LAMP ON OR FEATURE/SVC ACTIVE.
09- PROC MUST RUN ON DN-LINE PROCESSOR.

Figure 85. Error Code Listing


Figure 86. Control Keys

\section*{Use of Control Keys when performing Maintenance Procedures}

The control keys allow maintenance personnel to use and control the PROCs. Many of the control keys work basically the same in every situation (e.g., NEXT TEST, STOP, etc.) but some produce different responses depending upon the procedure being used and the function being performed.

The maintenance control keys, those common control keys required for maintenance functions, and some of their uses are described in the following paragraphs.
1. BUSY OUT is used to place a circuit location in maintenance busy out status. It can be used either during a maintenance procedure which allows a circuit to be busied out (not all procedures allow this capability) or in one of the following three busy out PROCs.
a. PROC 630-Busy out/release busy out.
b. PROC 631 - Trunk group busy out.
c. PROC 632 - Carrier busy.
2. CHANGE FIELD: If a data entry field must be changed but is not currently selected by the maintenance procedure for entry, CHANGE FIELD is used to change it. Data entry field means any display field in which the procedure allows or requires digit entry.
3. CLEAR DATA: The control key sequence CLEAR DATA; EXECUTE can be used to clear the alarm sent bits in the error log without clearing the record itself.
a. Clearing the alarm sent bit of an error record in PMIDS causes the alarm indication on the alarm panel to turn off.
b. In PROC 600 and PROC 612, the CLEAR DATA; EXECUTE sequence is used to clear (zero) error records in PMIDS. This is the only method available to clear PMIDS records.
4. ENTER is used to indicate that a number which is entered in a field is complete or that a number already displayed in a field is used as is. A typical entry sequence would be the specification of an equipment location for display or testing.
a. If the location is required, the first field (usually the module field) is blinked to indicate that an entry is necessary or can be done.
b. If the field is blank, the entry is mandatory. If the field is occupied, it can be accepted as is or changed.
c. To accept the data as is, depress ENTER with no data number entry.
5. EXECUTE: There are two main uses of EXECUTE.
a. One use is with CLEAR DATA (see above) in clearing failure history, resolving alarmed entries, and turning off fault indicators.
b. The second use causes the procedure being used to start the selected test. The test could be a hardware test, a test call, or a failure history snapshot and sort for display, etc.
c. When testing multiple circuits, the STOP; EXECUTE key sequence works in two ways depending upon which maintenance procedure is being performed.
1. The first method is for the test to begin again from the first appropriate circuit (circuit of the correct type for the maintenance procedure and test being run) in the switch.
2. The second method is for the test to start from a displayed location (the last circuit which was tested) and cycle to the end of the range of circuits being tested.
6. NEXT CIRCUIT causes a new circuit location to be selected and displayed by the maintenance procedure. There are two uses of NEXT CIRCUIT: to display stored circuit information or to select a circuit location for testing.
a. To display test results or failure history one circuit location at a time, NEXT CIRCUIT is depressed once for each new circuit location.
b. If maintenance personnel wish to test a single circuit location NEXT CIRCUIT allows the appropriate circuit locations to be stepped through and displayed one at a time until the circuit to be tested is displayed.
7. NEXT DATA is used to display demand test results, periodic failure history data, and call processing failure history data which are arranged by circuit location in records, one location per record. Successive uses of NEXT DATA allow data records to be displayed one part at a time.
8. NEXT FAULT is used to step through error records, which have different fault codes, one at a time.
9. NEXT TEST causes the procedure to automatically advance to the next test that can be run. If the current test displayed is the last test the procedure can run, the test selected is test number 1. The new test selected will not start until EXECUTE is depressed.
10. NEXT UNIT: When a hardware test is selected, NEXT UNIT causes the next unit type to be selected and displayed for testing. The first circuit of that unit type can be selected and displayed for testing by depressing NEXT CIRCUIT. When displaying failure history or test results, NEXT UNIT is used to look at the first circuit location recorded for the next unit type (numerically) in the failure history list.
11. PROC NO is used to call in a maintenance procedure. The default test (Test number 1) is automatically selected.
12. RESET: When RESET is depressed, the maintenance procedure executing or ready to be executed is returned to its initial nominal start configuration (e.g., Test number 1, initial display).
13. RLS BUSY OUT: Prior to maintenance personnel leaving the customer's premises all busied out circuits should be released from busy after corrective action is performed to restore the circuit to operation.
a. Whenever the BUSY OUT LED is lighted on the MAAP, RLS BUSY OUT is used to release a circuit location from maintenance busy status.
b. When the BUSY OUT LED remains lighted after all circuits are released from busy using individual maintenance procedures and the three busy out/release busy PROCs, PROC 621 should be used to release the off-line module control carrier from softlocked status in order to turn off the BUSY OUT LED.
14. STOP: The use of STOP halts test execution when a test is running.

\section*{HOW TO USE THE MAAP}

\section*{Overview}

This section describes how the MAAP is used to perform maintenance procedures and how to respond to error displays in the MAAP error code field.

\section*{Connect MAAP and Call Up Procedures:}
1. Remove the MAAP from the common control cabinet, module control cabinets housing module control carriers in a multi-module switch, or a remote module control cabinct.
2. Connect the MAAP to the appropriate connector.

Connectors are designated MAAP for an unduplicated common control switch and ON LINE, CCO, or CC1 for a duplicated common control switch. Connectors are also designated MAAP for module control cabinets housing module control carriers in a multi-module switch or a remote module control cabinet.
3. At this time a random display may appear on the MAAP indicators and display fields.

The most likely display would be zeroes in the Error, Data, and Procedure fields.
The WAIT, IN USE, BUSY OUT, and SEE NOTE indicators may be on.
4. Turn the flipcharts to the procedure to be used.
5. Depress the PROC NO button.

The procedure number fields go blank and dashes appear in the data fields.
6. Enter the procedure number using the data entry pad. All three digits must be entered.

The entered procedure number is displayed in the procedure display field.
7. Depress the ENTER button.

When the WAIT lamp goes off, the procedure is ready to be used.
8. Field indicator decimal points displayed in the data display should correspond to the field identifiers on the flipchart. Deviations may indicate that the flipchart issue is not compatible with the tape issue.

\section*{Responding to Error Displays:}

An error code is displayed in the 2-digit error code display field if an invalid operation is attempted or if invalid data is entered into a field on the MAAP.

Standard error codes common to all procedures are displayed on the decal on the faceplate of the MAAP. The error codes encompass two basic areas:
a. Operator error: Invalid button operation for the procedure involved. The error code decal identifies the invalid operation and the necessary corrective action.
b. Input data incompatible with existing translations or program tape. Corrective action requires a review of the input data and the service requirements of the customer.

Special error codes 80 through 98 are unique to the particular procedure being used. The codes are explained by notes on the flipchart associated with the procedure. The error codes identify problems with maintenance procedure operation. Resolution of these errors requires a review of the maintenance procedure being performed.

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[^0]:    *See Octal Sequence column for "same as" number.

[^1]:    Proceed to Step 15.

