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	XF5000	USAGE METER PROBLEMS	0001845946	000734864		
	XF5100	POWER SUPPLY ENTRY	0001845947	000734556B		
	XF5200	CB1 TRIPPED	0001845948	000734556A		
	XF5300	CB1 TRIPPED	0001845949	000734556A		
	XF5400	CB1 TRIPPED	0001845950	000734556A		
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	XF8000	RD/WRT HEAD ASSY-SYS/3	0001845976	000736672	
	XF8400	701 HALT 01 ANALYSIS	0001845980	C00736672	
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	XF9000	TAPE UNIT ANALYSIS	0001845986	000736672	
	XF9100	TAPE UNIT ANALYSIS	0001845987	C00736672	
	XF9200	TAPE UNIT ANALYSIS	0001845988	000734864	
	XF9300	TAPE ERROR STATISTICS ANALYSI	0001845989	000734556A	
	XF9400	TAPE ERROR STATISTICS ANALYSI	0001845990	000734556	

IBM Maintenance Library

Volume 1	Volume 2
PLAN	DIAG System/3 User's Guide
INTRO duction	INSTAL lation
MAP Plan	CARRL Checks, Adjustments, Removal/Replacements, Locations
MAP AAxxx	REF erence
MAP ABxxx	SER vice Techniques
MAP ACxxx	INDEX
MAP ADxxx	

3410/3411

Magnetic Tape Subsystem Maintenance Manual

XA0010	1845885	734556	734556A	736672		
Seq. 1 of 2	Part Number	1 Sept 72	20 Oct 72	26 Oct 73		

Maintenance Library Ordering Procedure (IBM Internal)

Individual pages of the 3410/3411 Maintenance Library can be ordered from the San Jose plant by using the *Wiring Diagram Logic Page Request* (Order Number Z120-1679-1). In the column headed "Logic Page," enter the page identifier information: sequence number, part number, and EC number. Groups of pages can be ordered by including a description (section, volume, etc.) and the machine serial number.

A form for readers' comments is provided at the back of this publication. If the form has been removed, send your comments to Product Publications, Department G24, Building 125, San Jose, California 95193.

This manual was prepared by the IBM General Products Division, Product Publications, Department 21M, Building 022, Boulder, Colorado 80302.

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SAFETY

CE SAFETY PRACTICES

All Customer Engineers are expected to take every safety precaution possible and observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you MUST work alone.
2. Remove all power ac and dc, when removing or assembling major components, working in immediate areas of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. After turning off wall box power switch, lock it in the Off position or tag it with a "Do Not Operate" tag, Form 229-1266. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, observe the following precautions:
   a. Another person familiar with power off controls must be in immediate vicinity.
   b. Do not wear rings, wrist watches, chains, bracelets, or metal cuff links.
   c. Use only insulated pliers and screwdrivers.
   d. Keep one hand in pocket.
   e. When using test instruments, be certain that controls are set correctly and that insulated probes of proper capacity are used.
   f. Avoid contacting ground potential (metal floor strips, machine frames, etc.). Use suitable rubber mats, purchased locally if necessary.
5. Wear safety glasses when:
   a. Using a hammer to drive pins, riveting, staking, etc.
   b. Power or hand drilling, reaming, grinding, etc.
   c. Using spring hooks, attaching springs.
   d. Soldering, wire cutting, removing steel bands.
   e. Cleaning parts with solvents, sprays, cleaners, chemicals, etc.
   f. Performing any other work that may be hazardous to your eyes. REMEMBER – THEY ARE YOUR EYES.
6. Follow special safety instructions when performing specialized tasks, such as handling cathode ray tubes and extremely high voltages. These instructions are outlined in CEMs and the safety portion of the maintenance manuals.
7. Do not use solvents, chemicals, greases, or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that have not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. Lift by standing or pushing up with stronger leg muscles – this takes strain off back muscles. Do not lift any equipment or parts weighing over 60 pounds.
11. After maintenance, restore all safety devices, such as guards, shields, signs, and grounding wires.
12. Each Customer Engineer is responsible to be certain that no action on his part renders products unsafe or exposes customer personnel to hazards.
13. Place removed machine covers in a safe out-of-the-way place where no one can trip over them.
14. Ensure that all machine covers are in place before returning machine to customer.
15. Always place CE tool kit away from walk areas where no one can trip over it; for example, under desk or table.
16. Avoid touching moving mechanical parts when lubricating, checking for play, etc.
17. When using stroboscope, do not touch ANYTHING – it may be moving.
18. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled above the elbow.
19. Ties must be tucked in shirt or have a tie clasp (preferably nonconductive) approximately 3 inches from end. Tie chains are not recommended.
20. Before starting equipment, make certain fellow CEs and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in area of machine while performing and after completing maintenance.

Knowing safety rules is not enough.
An unsafe act will inevitably lead to an accident.
Use good judgment - eliminate unsafe acts.

ARTIFICIAL RESPIRATION

General Considerations

1. Start Immediately – Seconds Count
   Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim, or apply stimulants.
2. Check Mouth for Obstructions
   Remove foreign objects. Pull tongue forward.
3. Loosen Clothing – Keep Victim Warm
   Take care of these items after victim is breathing by himself or when help is available.
4. Remain in Position
   After victim revives, be ready to resume respiration if necessary.
5. Call a Doctor
   Have someone summon medical aid.
6. Don't Give Up
   Continue without interruption until victim is breathing without help or is certainly dead.

Rescue Breathing for Adults

1. Place victim on his back immediately.
2. Clear throat of water, food, or foreign matter.
3. Tilt head back to open air passage.
4. Lift jaw up to keep tongue out of air passage.
5. Pinch nostrils to prevent air leakage when you blow.
6. Blow until you see chest rise.
7. Remove your lips and allow lungs to empty.
8. Listen for snoring and gurglings – signs of throat obstruction.
9. Repeat mouth to mouth breathing 10-20 times a minute. Continue rescue breathing until victim breathes for himself.

Thumb and finger positions

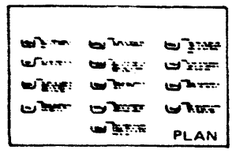
Final mouth-to-mouth position

IBM 3410/3411 MAINTENANCE LIBRARY

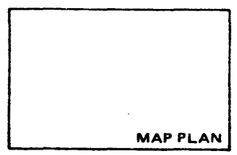
This manual is EC controlled. When a new EC is installed on a machine, be sure that any accompanying documentation is inserted in the appropriate section of this manual.

ORGANIZATION

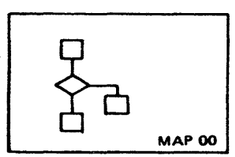
How information is arranged:



DOCUMENTATION PLAN defines major sections of the manual. Where practical, documentation is arranged in sections corresponding to the natural breakdown of machine elements. (TAPE UNIT, TAPE CONTROL, ATTACHMENT, etc.)



DOCUMENTATION PLAN OF EACH SECTION describes the contents of each section, as well as the location of related information in other sections of the manual.

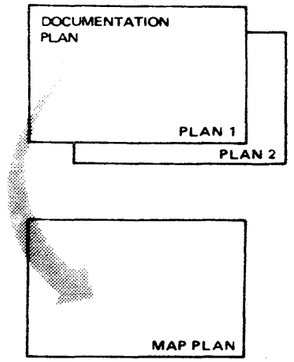


MAINTENANCE ANALYSIS PROCEDURES (MAP) charts are the basic approach to trouble shooting procedures for subsystem malfunctions. References from MAPs give page numbers of repair procedures within the MAPs and CARRL sections of this manual.

MAINTENANCE PROCEDURES describe Checks, Adjustments, Removals, Replacements and Locations (CARRL) for Field Replaceable Units (FRUs).

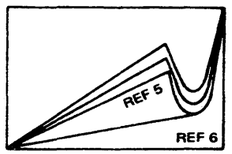
RETRIEVAL AIDS

How to find information:

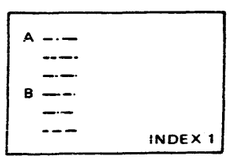


DOCUMENTATION PLAN describes the contents of major sections of the manual.

DOCUMENTATION PLAN OF EACH section describes the organization of each section.



PAGE NUMBERS in "Thumbing" position may be scanned rapidly by flipping pages.



A SUBJECT INDEX references specific subjects.

MAINTENANCE LIBRARY DOCUMENTATION PLAN

VOLUME 1

PLAN

PLAN

Defines the contents and organization of the Maintenance Library Manual and its major sections. Explains retrieval aids and how to use the divider tabs.

INTROduction

INTRODUCTION

Explains the 3410/3411 maintenance philosophy, and how the MLM maintenance manual should be used. The introduction also describes the 3410, 3411 subsystem data flow and subsystem major components.

MAPs

MAPs

Maintenance Analysis Procedures are the basic troubleshooting procedures for fixing subsystem malfunctions. MAPs include FRU replacement suggestions, some checkout procedures, and references additional maintenance information when needed.

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VOLUME 2

DIAG User's Guide

DIAGNOSTIC GUIDE

Explains how to run the System/3 diagnostics and how to interpret HALT Codes. Includes detailed descriptions of each diagnostic section. This guide is shipped with the diagnostics from Boca Raton, Florida, for domestic use and from Vimercate, Italy, for WTC. It should be inserted in the DIAG section of this manual.

Note: The System/360 and System/370 Online Test User's Guide for 3410 and 3411 Subsystems is shipped from PID (Poughkeepsie, N. Y.) for domestic and from World Trade Program Libraries for WTC. The guide is not EC controlled.

INSTALlation

INSTALLATION

Contains installation instructions for the 3410/3411 Tape Subsystem when attaching to System/3, System/360 or System/370.

CARRL

CARRL

Checks, Adjustments, Removals, Replacements, and Locations describes maintenance functions that can be performed on the 3410/3411 Tape Subsystem.

REFerence

REFERENCE

Contains status and sense information. Also contains procedures for running the System/360 and System/370 EREP programs.

SERvice Techniques

SERVICE TECHNIQUES

Describes the ROS Address Tracer, the CE Diagnostic Probe, the Microprocessor Tester, and the ROS Patch Card. It also explains tape developing procedures and master skew tape handling and use.

INDEX

Maintenance Concepts

The 3410/3411 Magnetic Tape Subsystem consists of one or more IBM 3410 Magnetic Tape Units and an IBM 3411 Magnetic Tape Unit and Control. The major parts (tape unit and tape control) are functionally packaged (all controls used in performing a hardware function are located together) for quick isolation and replacement of a failing component. The circuitry within the subsystem (called the *attachment*), which adapts the subsystem to the I/O interface of the host system, must be considered in maintenance. Expanded sense data is provided to include more details of hardware failure than was furnished by most earlier tape subsystems.

The subsystem requires few electrical or mechanical adjustments. Adjustment of read signal amplitude, feedthrough cancellation, write compensation, read threshold and clipping levels, or degauss amplitude is not required. On tape units with the dual density feature, electrical skew must be adjusted. However, a skew diagnostic program guides the customer engineer so he has no need to measure actual skew during the adjustment.

Total diagnostic guidance in skew adjustment and the elimination of most other read/write adjustments allows normal subsystem maintenance without the use of an oscilloscope.

Maintenance Analysis Procedures (MAPs)

MAPs provide step-by-step instructions for handling a trouble call, from the time you arrive at the customer installation, to the time you return the checked out subsystem to the customer or call for assistance. MAPs tell you the visual symptoms to look for, the tests to run to obtain nonvisual symptoms, and the corrective actions to take. Steps found in MAPs should be followed in the exact order in which they appear. When used correctly, MAPs provide a logical order for applying the proper diagnostic tools and techniques to each failure.

Diagnostic Programs

Subsystem diagnostic programs (diagnostics) are written to take advantage of both functional packaging and expanded sense data. Each diagnostic exercises a specific portion of the subsystem and is one of three types:

- **Functional Test:** Contains routines that determine whether the hardware is functioning properly and, if not, attempt to identify the failing area. These routines test all subsystem operations, using a variety of instruction sequences and data patterns.
- **Fault Locator:** Contains routines that attempt to identify a hardware failure in terms of a replaceable component or an adjustment.

  Special commands place the subsystem in diagnostic mode, enabling the host system to perform a more critical examination of hardware reliability. A fault locator thoroughly exercises a failing area of the subsystem and, based on results of the generated test cases, determines the faulty component or the necessary adjustment.
- **Adjustment Aid:** A skew routine analyzes total skew (electrical and mechanical) to determine if adjustment is required. If electrical skew is present, a printout notes the deskew potentiometers in need of adjustment, as well as the direction to turn each potentiometer. If mechanical skew requires adjustment, a printout indicates the adjustment needed.

  A tracking routine causes the selected tape unit to move tape back and forth through the tape transport for tracking adjustment.

Diagnostic User's Guides

Two diagnostic user's guides (one for System/360 and System/370; one for System/3) provide you with operating instructions for each program, tell you what each program tests, and describe how the tests are accomplished. The User's Guides are shipped with the diagnostic programs and not with this manual. The System/3 Diagnostic User's Guide should be inserted in this manual when received. The Online Test User's Guide (System/360 and System/370) is kept in a separate binder when received.

Log Analysis

In the past, the customer engineer has had trouble distinguishing between customer problems caused by hardware and those caused by defective tape. Log analysis programs help pinpoint these problems. Log analysis is also useful during analysis of intermittent failures, when it is often difficult to re-create the failure.

Log analysis programs analyze an error log that is stored in a customer data set. The error log contains temporary and permanent errors encountered in normal customer processing. The log also includes the type and nature of each error, the tape unit involved, and the tape reel on which the error occurred. A special utility program sorts and assembles the error data statistics for review by the customer engineer.

If a pattern of failure indicates bad tape, the tape reel at fault is identified. If the tape is not at fault, log analysis indicates a diagnostic which should be run, a MAP entry reference, or a field replaceable unit (FRU) which should be replaced. When the problem is corrected, the customer engineer shall clear the data log area of all previous information.

XC0100 Seq. 1 of 2	1845892 Part Number	See EC History	443751 20 Sept 74	443800 31 Oct 75		

Integrated Maintenance Package (IMP)

The IMP consists of the various tools, techniques, documents, and programs used in maintenance of an IBM 3410/3411 subsystem.

Special Tools

Located in Branch Office

• Go/No-Go Tool	2518029
• Half Column Door	2517722
• LWR Test Card	5861454
• Erase Head Tool	2517647
• Test Clip	2518318
• Skew Tape	432640 or 432641
• MST Probe	817971

Located in Area Office

• Microprocessor Tester	2518291
• Patch Card	8215414
• Reel Hub Alignment Tool	2517735

Located in Regional Office

• ROS Address Tracer	8216729

Documentation

- Maintenance Library Manual (MLM)

  Introduction
  MAP Charts
  Diagnostic User's Guide
  Installation Procedure
  Checks, Adjustments, Removals, Replacements, Locations
  Reference Material
  Service Techniques

Diagnostics

- System/360 and System/370 Diagnostics
- System/3 Diagnostics
- Log Analysis
- Utility Programs
- Automated Logic Diagrams
- Theory Diagrams Manual

  Introduction to Magnetic Tape Subsystem
  Tape Unit Theory of Operation
  Tape Control Theory of Operation
  Tape Unit/Tape Control Interface
  Microprocessor
  Attachments (System/360 and System/370 and System/3)
  Sample Microcode Listing
  Statistical Error Recording and Analysis
- ROS Listing

Functional Unit Packaging

Functional packaging results in less time spent isolating the cause of failures, since the failure must only be traced to a set of controls rather than to the failing circuit. Diagnostic program fault locating routines are more effective since fewer replaceable units may be at fault.

Native Attachment (System/3 or System/370 Models 115 and 125) And Tape Control

The native attachment and tape control logic consist of MST circuits. The native attachment is used when the subsystem is attached to a System/3 or a System/370 Model 115 or 125. The tape control attachment is used when the subsystem is attached to a System/360 or other System/370 models.

Tape Unit

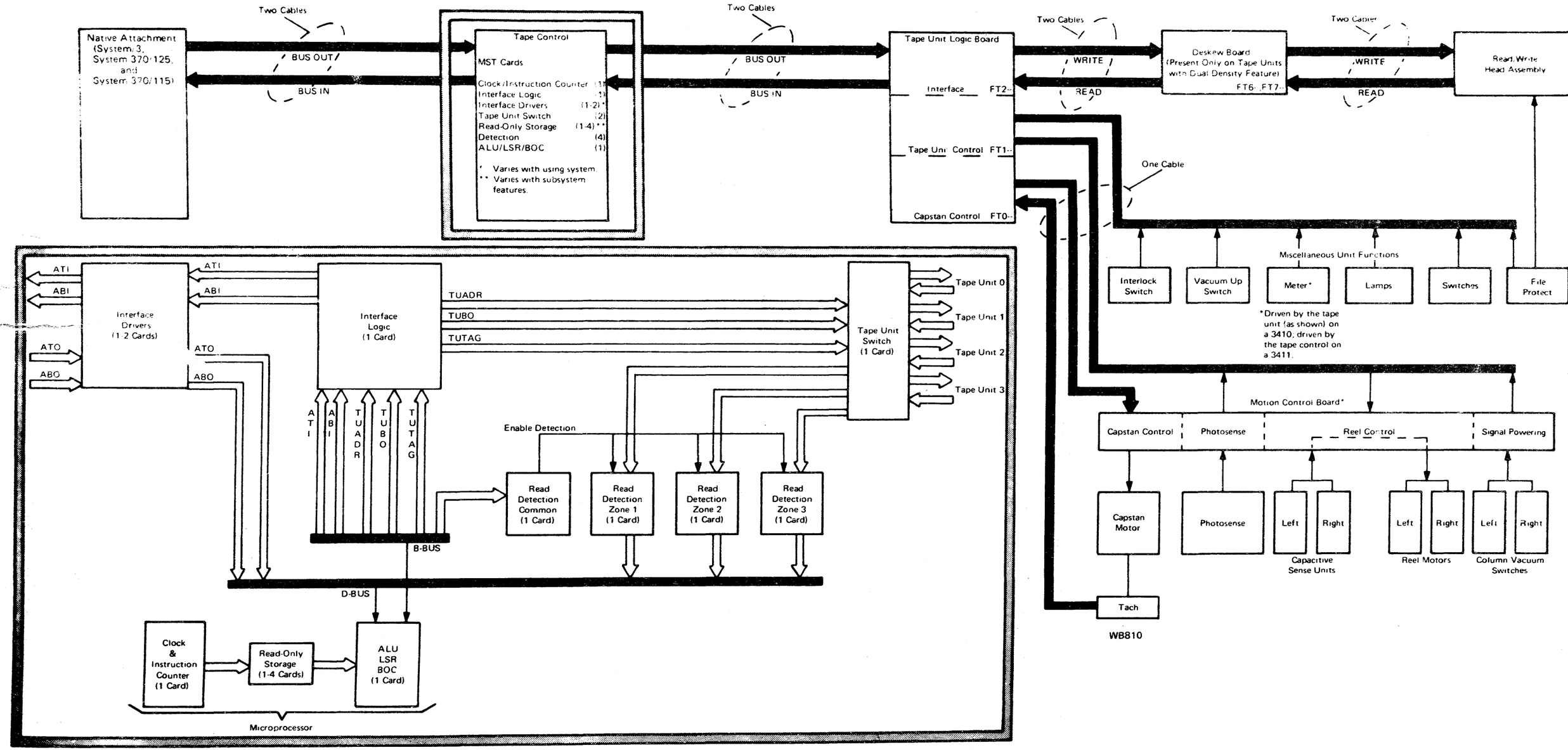
The tape unit is controlled by the tape unit logic board. Control of the tape unit is divided into three major functions:

1. **Interface:** maintains communication with the tape control, decodes commands to the tape unit, and transfers data between the tape control and read/write head assembly during read or write operations.
2. **Tape unit control:** supervises the mechanical and electrical functions of the tape unit.
3. **Capstan control:** measures pulses from the capstan tachometer and provides signals to maintain correct capstan speed.

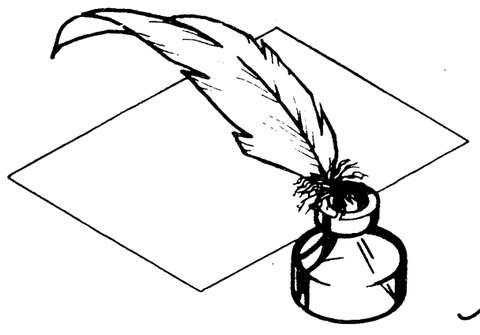
Two small jumper cards plug into test point sockets on the tape unit logic board. These sockets are for factory use only. In the field, the jumper cards must be plugged into the sockets for the logic board to operate. The tape unit logic board is one field replaceable unit (FRU). In the event of circuit failure, the entire board is replaced.

The deskew board and read/write head assembly are used in reading from, or writing on tape. The motion control board contains the circuits for powering the capstan and reel motors. Also on the motion control board are circuits for transmitting vacuum switch and photosense signals to the tape unit logic. The deskew board, the read/write head assembly, and the motion control board are field replaceable units. Failure of an individual circuit requires replacement of the entire FRU.

The page numbers of the automated logic diagrams (ALDs) correspond to each functional area. For example, ALDs for the interface circuits on the tape unit logic board are numbered between FT200 and FT299. Diagrams for the tape unit control circuits are numbered between FT100 and FT199. The ALD series for each major functional area of the tape unit is shown in this diagram.


Native Attachment (System/3, System 370/125, and System 370/115)
Two Cables
BUS OUT
BUS IN
Tape Control
MST Cards
Clock/Instruction Counter (1)
Interface Logic (1)
Interface Drivers (1-2)*
Tape Unit Switch (2)
Read-Only Storage (1-4)**
Detection (4)
ALU/LSR/BOC (1)
* Varies with using system.
** Varies with subsystem features.
Tape Unit Logic Board
Interface FT2-
Tape Unit Control FT1-
Capstan Control FT0-
WRITE
READ
Deskew Board (Present Only on Tape Units with Dual Density Feature) FT6-, FT7-
Read/Write Head Assembly
One Cable
Miscellaneous Unit Functions
Interlock Switch
Vacuum Up Switch
Meter*
Lamps
Switches
File Protect
*Driven by the tape unit (as shown) on a 3410; driven by the tape control on a 3411.
Motion Control Board*
Capstan Control
Photosense
Reel Control
Signal Powering
Capstan Motor
Photosense
Left
Right
Capacitive Sense Units
Reel Motors
Column Vacuum Switches
Tach
ATI
ABI
ATO
ABO
Interface Drivers (1-2 Cards)
Interface Logic (1 Card)
TUADR
TUBO
TUTAG
Tape Unit Switch (1 Card)
Tape Unit 0
Tape Unit 1
Tape Unit 2
Tape Unit 3
Enable Detection
Read Detection Common (1 Card)
Read Detection Zone 1 (1 Card)
Read Detection Zone 2 (1 Card)
Read Detection Zone 3 (1 Card)
B-BUS
D-BUS
Clock & Instruction Counter (1 Card)
Read-Only Storage (1-4 Cards)
ALU LSR BOC (1 Card)
Microprocessor

WB810



Notes

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Introduction to 3410/3411 MAPs

MAPs is a service technique that allows you to isolate machine failures by progressing through a flowchart that asks a series of questions about machine performance. MAPs help isolate failures quickly without using elaborate test equipment. Based upon your answer to a specific question, a MAP may direct you to run a diagnostic program, go to another MAP, replace a failing part (FRU), or take other action to correct the problem.

To troubleshoot a problem, start with the Tape Subsystem Main Entry MAP AA010. This MAP will direct you to additional MAPs or diagnostic programs that help to further define the problem. System/3 diagnostics have numbers in the "700" series, while those for System/360 and System/370 are identified as "T3410 Section". When two diagnostics are listed, use the one for your system.

You can also use the MAPs titles in the 3410/3411 MAPs Listing in Index I, Vol. II to find the appropriate MAP for already-defined tape unit problems (for example, a circuit protector that keeps tripping). Always investigate unusual noises and obvious failures that can lead you directly to the appropriate MAP.

If you make a mistake following a MAP, or decide you are following a path that is obviously not related to the problem, don't backtrack. Return to the Subsystem Entry MAP and start over.

In instances where MAPs fail to define your problem:

1. Check for shorts between back-panel wiring "nets."
2. Inspect for loose objects (paper clips, solder, loose wire, etc.).
3. Check for open land patterns.
4. Check power supply voltages (for intermittent failures, use a voltmeter having ± 0.25% accuracy) for level and ripple.
5. Check power crossovers.
6. Inspect signal cables.
7. Recheck card seating.

Note 1: Whenever a field replaceable unit (FRU) change, or corrective action is specified:

1. Power down subsystem.
2. Replace defective FRU or take corrective action as required.
3. Power up subsystem and retry failing operation.

Note 2: When more than one component is called out in a repair/replace block, don't replace all the listed components. Replace the components one at a time in the order listed, retrying the failing operation each time until the failing component is found. Always return unused parts to stock.

Note 3: If changing a component does not correct the failure (or change the symptoms); reinstall the original component.

Note 4: When replacement or adjustment of a component is called for, go to the "Checks,Adjustments, Removals, Replacements, and Locations" (CARRL) section of this manual for correct procedures.

Note 5: When a decision block asks about the status of a certain byte, that byte will be one of the sense bytes that was printed out with the error message. The sense bytes are numbered 0 through 8, left to right.

Note 6: Some MAPs ask you to "Check the Cables." In this case, inspect the connectors for bent or broken pins, repair them, if necessary, and then reseat the connectors. A continuity check or check for "shorts" is not required. When a true continuity check is needed, actual "pin-to-pin" test points are specified.

Note 7: When necessary, the tape transport assembly can be raised for servicing. To do this:

1. Turn off tape unit power. See "CARRL" Figure D-2 for reference.
2. Remove the front cover.
3. Open the sliding door.

CAUTION
Always use the handle when raising the transport assembly. Lifting the transport assembly any other way can damage the top cover. When raising the transport assembly, make sure both sides latch securely. One side may require manual latching.

4. Grasp the handle located under the transport assembly and lift.

CAUTION
The transport assembly weigns about 50 pounds (23 kg); be careful lifting it.

Note 8: Many MAPs tell you to "power down" before performing an action. They assume you will "power up" if a subsequent action requires you to do so.

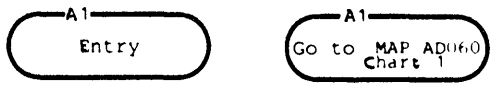
Symbols:

The following symbols are used in 3410/3411 MAPs:

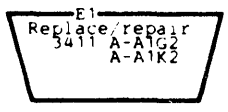
On-Page Connectors: show connections between points on the same MAP page.

Off-Page Connectors: show connections between points of the same flow on different pages.

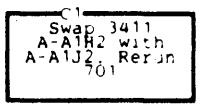
Entry/Exit Block: directs you to another chart.



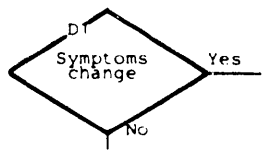
Repair/Replace Block: directs you to repair or replace a component.



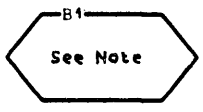
Action Block: describes an action you are to take.



Decision Block: asks a question that you must answer to proceed.



Information Block: directs you to other pertinent information on the page.



XF0200 Seq 1 of 2	1845898 Part Number	734556 1 Sept 72	734556B 20 Nov 72	734852 26 Feb 73	736672 26 Oct 73	443751 20 Sept 74

Abbreviations:

The following abbreviations are used in 3410/3411 MAPs:

ABI .....attachment bus in
ABO.....attachment bus out
ASSY.....assembly

BD .....board
BOB .....beginning of block
BOT .....beginning of tape

cap .....capstan
CB.....circuit breaker
CCW .....counterclockwise
CCW .....channel command word
COL .....column
CONN .....connect
cont.....continuity
CP.....circuit protector
CPU .....central processing unit
CR .. ..rectifier
CW.....clockwise

D. .. ..depress
D.H. .....depress and hold
D.R. .....depress and release
DCP .....diagnostic control program (Sys/3)
DD.....dual density
DIA/
DIAG .....diagnostic
dn.....down
DNA .....device not available
DNO .....device not operational
DNK .....don't know
DSE.....data security erase
DSR .....depress system reset
DTE .....diagnostic track error

EOF .....end of file
EOT .....end of tape
EPO .....emergency power off
ERG.....erase gap

FI.....fuse indicator
FP.....file protect
FRU .....field replaceable unit

GND .....ground (electrical)

IC ..... instruction counter
IBG ..... interblock gap
ind ..... indicate, indicator
intlk ..... interlock

LB ..... logic board
LBC .... logic board cable
LCL ..... limited channel logout (M115 and M125)
L/REW ..... load rewind
LOC/REM ..... local/remote
LT ..... left
LWR ..... loop write to read

M ..... meter
MAP ..... maintenance analysis procedure
MCB ..... motion control board
MCK ..... machine check (M115 and M125)
MECH .....mechanical
MFCU .....multifunction card unit
MPX ..... multiplex channel
MTA ..... magnetic tape attachment (adapter)

N/C ..... normally closed (relay point)
N/O .... normally open (relay point)

OLTEP .....online test executive program
OLTSEP.....online test stand alone executive program
OSC .....oscillator

P. .....probe
PEID .....phase encode identification
PLUNGR .....plunger
prob.....problem
PS .....power supply
PWR DN .....power down

REG.....regulator
REPL/
REPR .....replace or repair
RUN.....rewind unload
RT.....right

SEC FD.....secondary feed
SNS.....sense
SR.....system reset
SSW .....sense switch
SW.....switch

T.I.....tape indicate
TB.....terminal board
TC.....tape control
TEB..... .....tape error block
TIE.....track in error
TM.....tape mark
TU .....tape unit
TI .....transformer I

VLTG.....voltage

W/O.....without
WLR.....wrong length record
WTM.....write tape mark

Definitions:

System Loop:
The system repeats a set of instructions indefinitely or until a specified condition is met. The instructions within the loop manipulate data and keep track of the number of repetitions. The loop can contain any number of conditions necessary for exiting the loop.

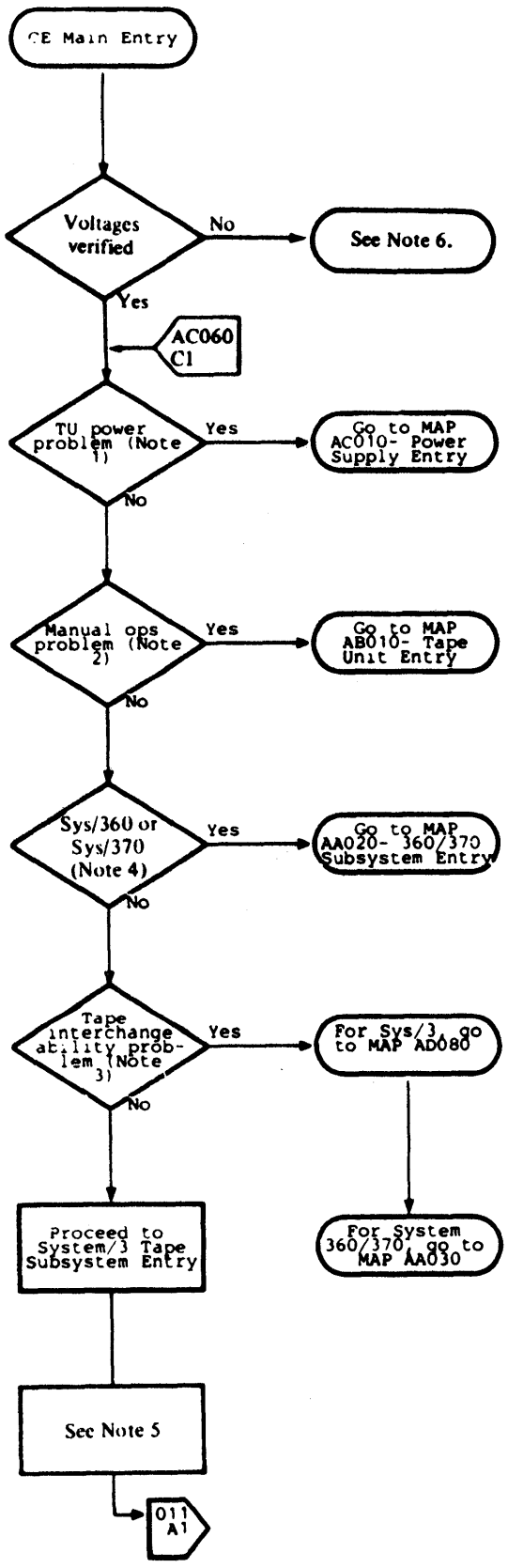
System Hang:
An undefined CPU HALT or the inability of the CPU to proceed from a loop.

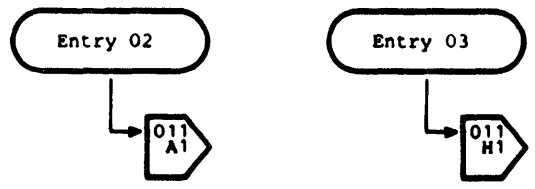
Device Not Operational (DNO):
A device is not operational when the tape control does not recognize the address. This occurs if the tape control is not defined in the system, tape control power is off, or the tape control cannot properly decode or is logically disconnected from the I/O interface.

Device Not Available (DNA):
The tape control is working but has an interrupt pending or is not operational.

Tape Subsystem Main Entry

Discussion: This MAP is your entry point for all 3410/3411 tape subsystem problems. This, and subsequent MAPs, will help you isolate the problem; they will not direct you to any other I/O device. Make all entries from block A1 on this map.





Note 1: Power on indications are fans running and FILE PROTECT light on when tape unit is in NOT READY status.

Note 2: Manual operations include all the functions performed by use of the operator's panel and mechanical problems (such as broken cover parts, etc.)

Note 3: An interchangeability problem is the inability to read a tape on a tape unit other than the unit on which the tape was written. This problem could be caused by differences in tracking or skew between the tape units.

Note 4: If attached to the multiplex channel on System/370 Model 115 or 125, answer this block yes. Address multiplex problems as System 360.

CAUTION

Re-IPL logs the next selected address. Associate time of day MPX logs with the probable error device.

Note 5: The 3410/3411 Tape Attachment board is located in one of the following positions:

CPU Model	Board Location
8	A-A2
10,12,15	B-B2

Any cards to be probed or replaced (B-B2) should be referenced to the CPU model for correct board location.

Note 6: If voltages have not been checked, go to AC060 entry, then return to AA010 entry C1.

XF0300 Seq. 1 of 2	1845899 Part Number	See EC History	443806 2 May 77	443806 B 1 Dec 77		

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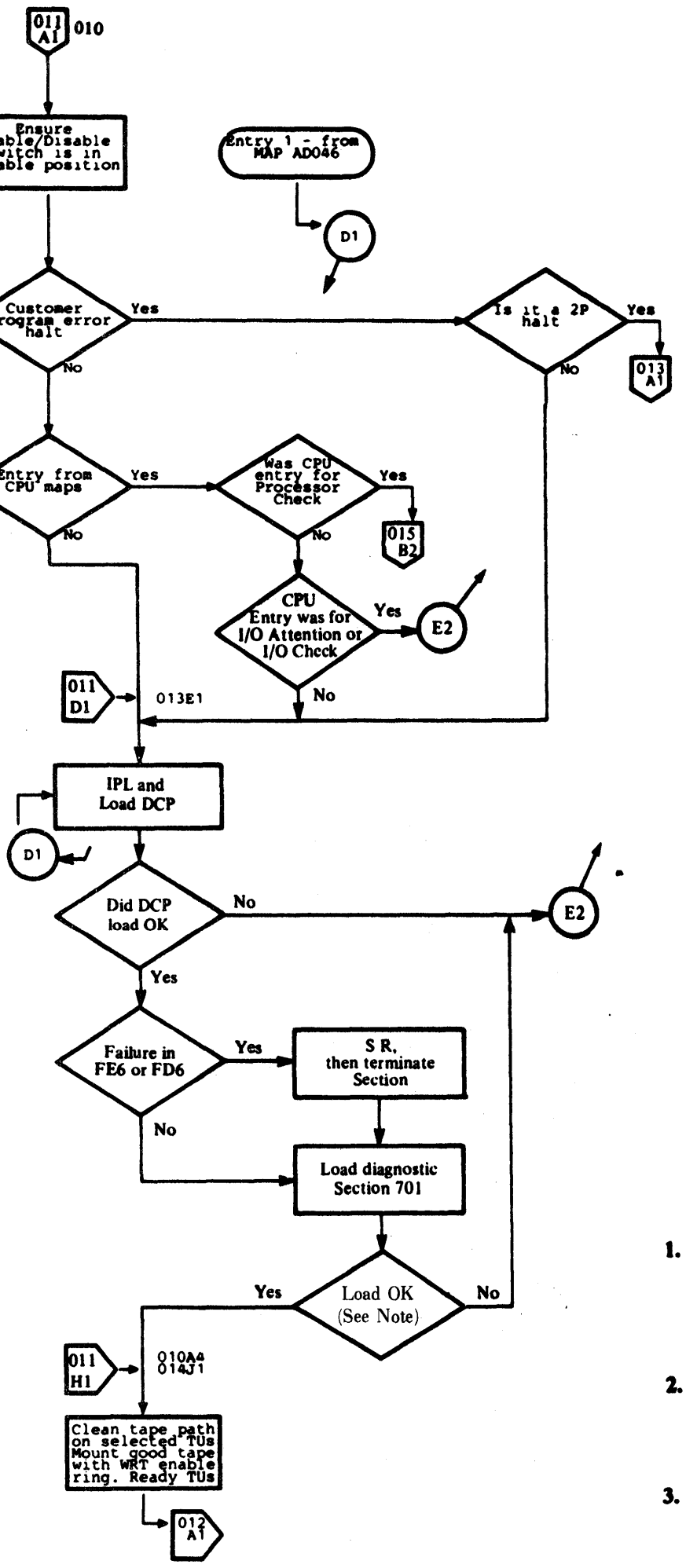
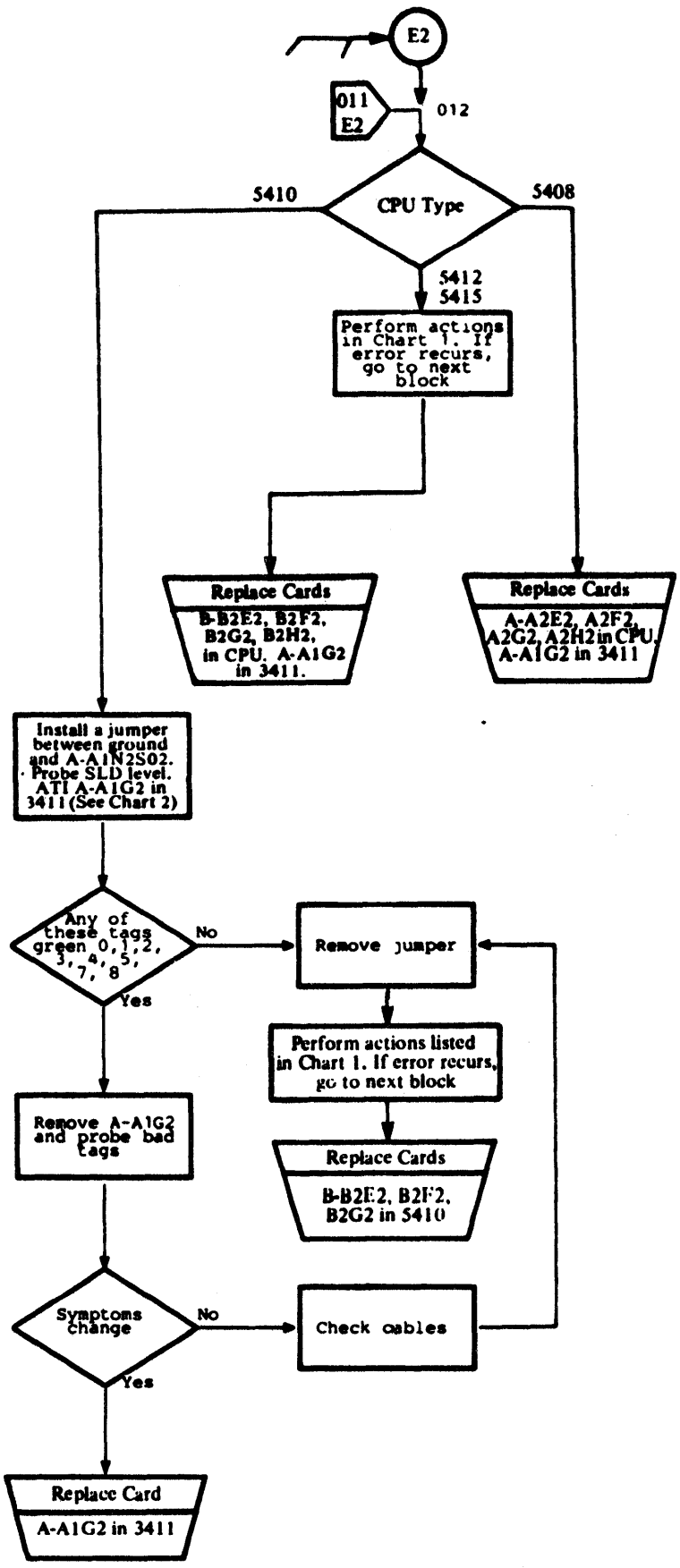
Tape Subsystem Entry (System/3)





Note – Sense Switch Settings: Select desired tape units for test as follows:

SSW10	=	TU 0
SSW11	=	TU 1
SSW12	=	TU 2
SSW13	=	TU 3
SSW14	=	IF ON, Sense data will be printed on printer.

If possible, run more than one tape unit. If you are running Section 701 at "Log Analysis" request, set SSW 14 ON.

Chart 1:
System Reset and power down. Interchange the cards listed in the following three steps. Then power up, reload, and rerun failing routine.

If error changes or goes away, interchange the cards again but only two at a time to see which card causes the error to change.

1. Pull A-B2C2.
   Put A-B2D2 in A-B2C2
   Put A-B2E2 in A-B2D2
   Put A-B2F2 in A-B2E2
   Put original A-B2C2 card in B2F2.
2. Pull A-B2E4.
   Put A-B2F4 in A-B2E4
   Put A-B2G4 in A-B2F4
   Put original A-B2E4 in A-B2G4.
3. Interchange terminators that will be located on one of the following boards:
   a. B-A2U2, B-A2U3
   b. B-B2B2, B-B2B3
   c. B-A1U2, B-A1U3
   d. B-B1J2, B-B1J3

Check Bus In cables by using System pages:
WB201, WB203, WB205, WB207

Check Bus Out cables by using System pages:
WB251, WB253, WB255, WB257

Chart 2: ATI 3411 Panel A-A1

Line	No.	SLD Level At
-Meter In	0	G2J03
-Address In	1	G2U03
-I/O Working	2	G2U04
-Command In	3	G2U05
-Service In	4	G2U06
-Status In	5	G2U07
-I/O Check	6	G2U09
-NOP	7	G2U10
+Disable	8	G2U11

XF0300 Seq. 2 of 2	1845899 Part Number	See EC History	443806 2 May 77	443806 B 1 Dec 77		

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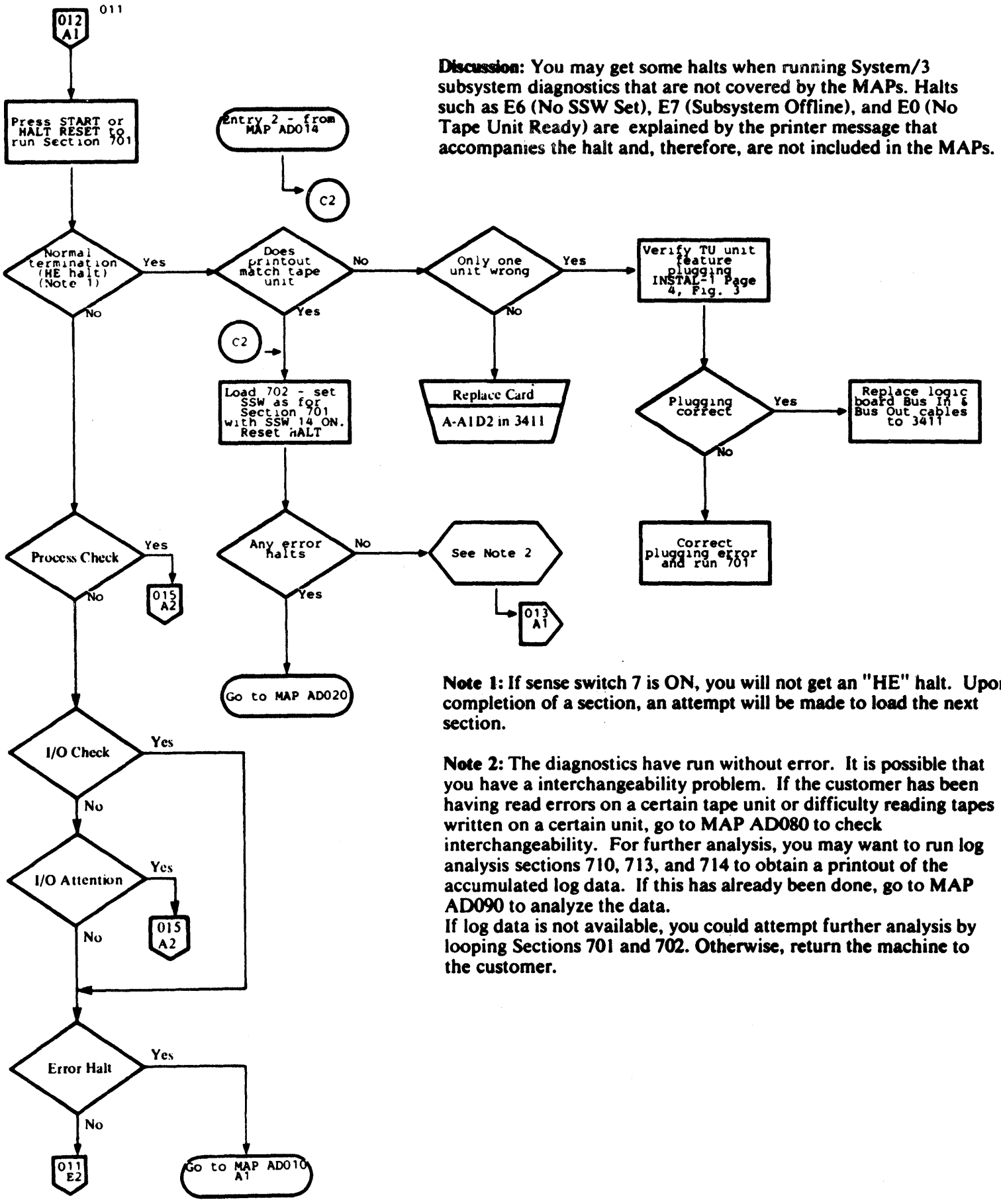
Tape Subsystem Entry (System/3)



Discussion: You may get some halts when running System/3 subsystem diagnostics that are not covered by the MAPs. Halts such as E6 (No SSW Set), E7 (Subsystem Offline), and E0 (No Tape Unit Ready) are explained by the printer message that accompanies the halt and, therefore, are not included in the MAPs.

Note 1: If sense switch 7 is ON, you will not get an "HE" halt. Upon completion of a section, an attempt will be made to load the next section.

Note 2: The diagnostics have run without error. It is possible that you have a interchangeability problem. If the customer has been having read errors on a certain tape unit or difficulty reading tapes written on a certain unit, go to MAP AD080 to check interchangeability. For further analysis, you may want to run log analysis sections 710, 713, and 714 to obtain a printout of the accumulated log data. If this has already been done, go to MAP AD090 to analyze the data.
If log data is not available, you could attempt further analysis by looping Sections 701 and 702. Otherwise, return the machine to the customer.

XF0400 Seq. 1 of 2	1845900 Part Number

See EC History	736672 26 Oct 73	443800 31 Oct 75	443806 2 May 77	

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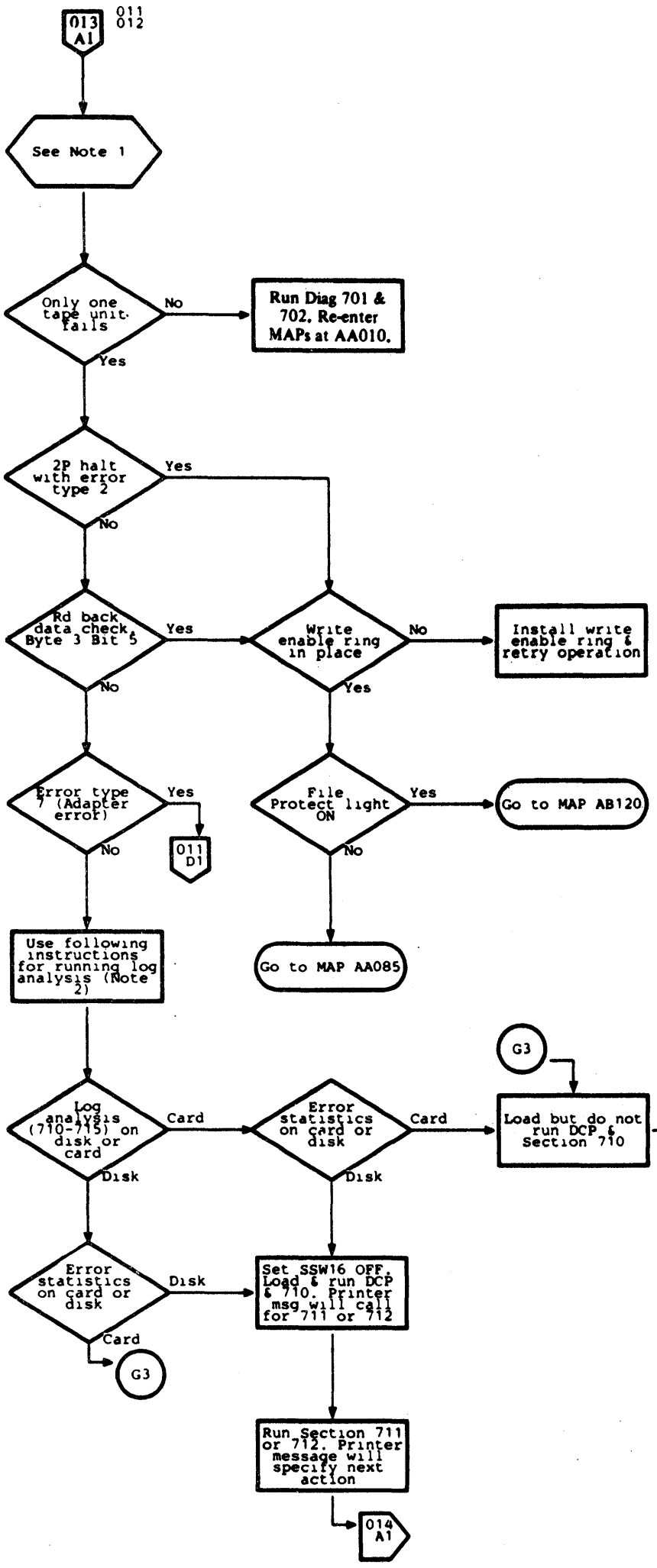
Tape Subsystem Entry (System/3)



Note 1: Determine if customer has a 2P halt; for any other halt, the customer should refer to the *System Control Program Halt Code Manual* for instructions. A 2P halt indicates a permanent tape error. The second byte of the halt code indicates the tape unit and type of error as follows:

Byte 1		Byte 2	
2	P	TU	Error Types

Error Types:

1. Read Data Check
2. Write Data Check
5. Permanent Noise Error
6. Equipment Check
7. Adapter Error
8. Data Check on Control Command
9. I/O Request to Tape Unit Not Accepted

See the *System Control Program Halt Code Manual* for more information.

Note 2 - Log Analysis: Log analysis is a diagnostic program used to analyze tape error statistics accumulated by the customer's IBM System Control Program. The disk system accumulates the statistics on the disk pack where they can be accessed by the log analysis program. The basic card system stores the statistics in core storage until the end of the job, when they can be punched into cards by the customer. If your customer is operating with the basic card system, and he has not punched out the error statistics or saved the cards, you must, when using log analysis, regenerate error log data.

XF400 Seq. 2 of 2	1845900 Part Number	See EC History	736672 26 Oct 73	443800 31 Oct 75	443806 2 May 77	

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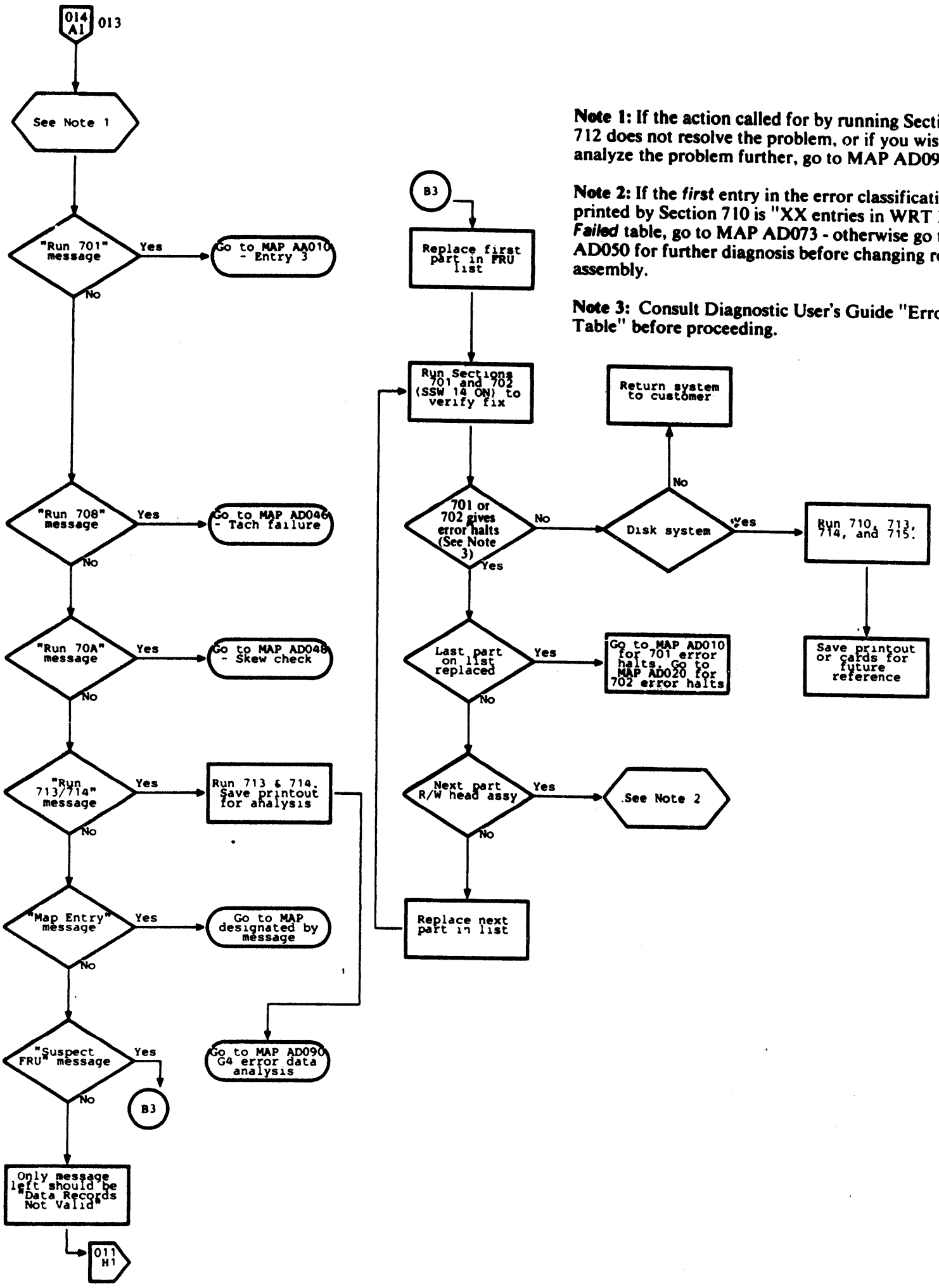
Tape Subsystem Entry (System/3)



Note 1: If the action called for by running Section 711 or 712 does not resolve the problem, or if you wish to analyze the problem further, go to MAP AD090 G4.

Note 2: If the *first* entry in the error classification table printed by Section 710 is "XX entries in WRT LWR" *Failed* table, go to MAP AD073 - otherwise go to MAP AD050 for further diagnosis before changing read/write assembly.

Note 3: Consult Diagnostic User's Guide "Error Halt Table" before proceeding.

XF0500	1845901
Sect 1 of 2	Part Number

See EC History	443800	443806		
	31 Oct 75	2 May 77		

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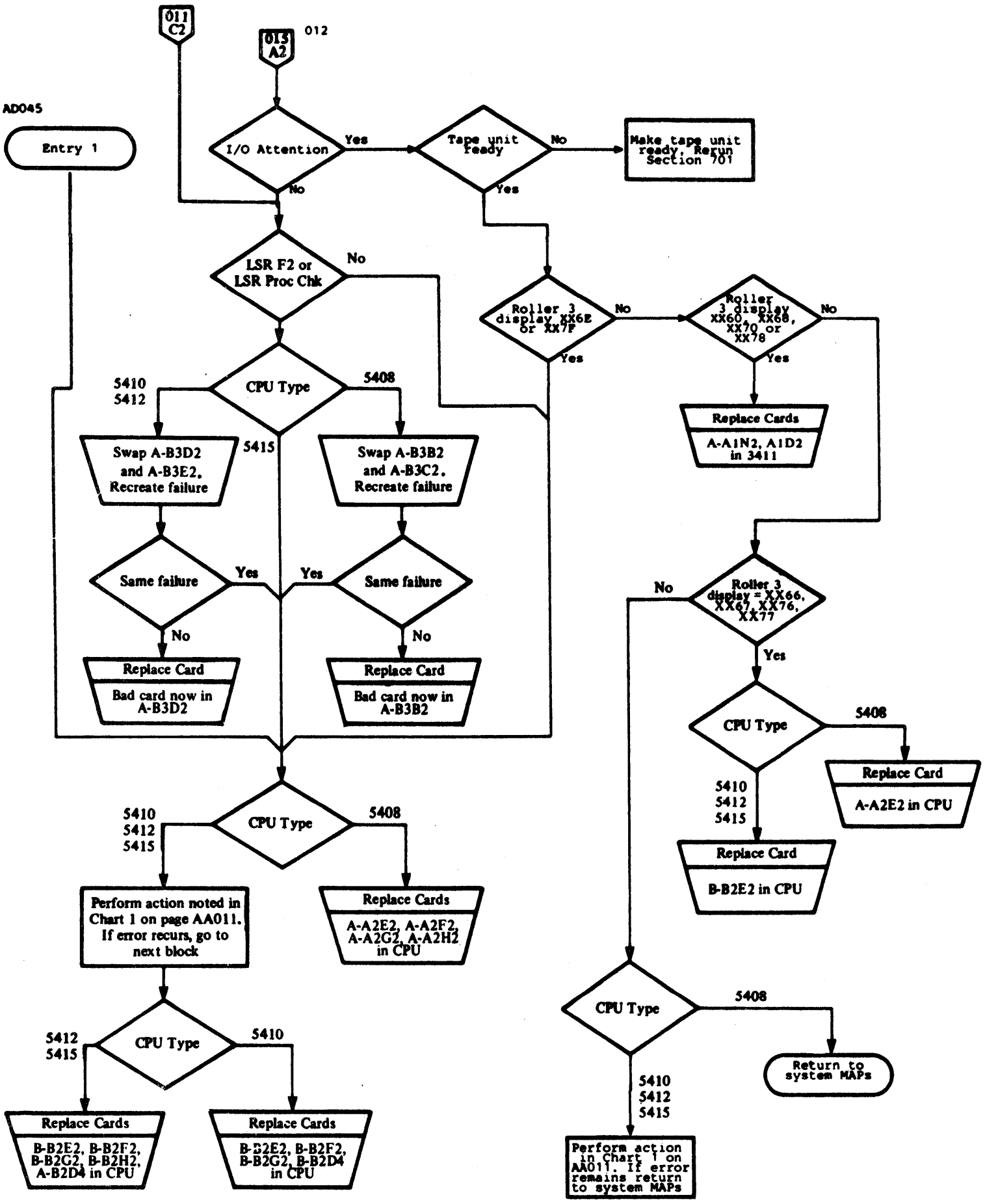
Tape Subsystem Entry (System/3)



Tape Subsystem Entry (System/3)

MAP AA015

XF0500	1845901	See EC	443800	443806		
Seq. 2 of 2	Part Number	History	31 Oct 75	2 May 77		

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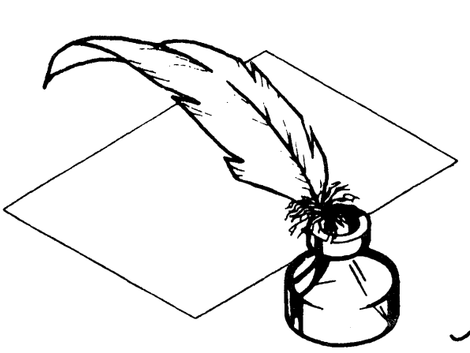
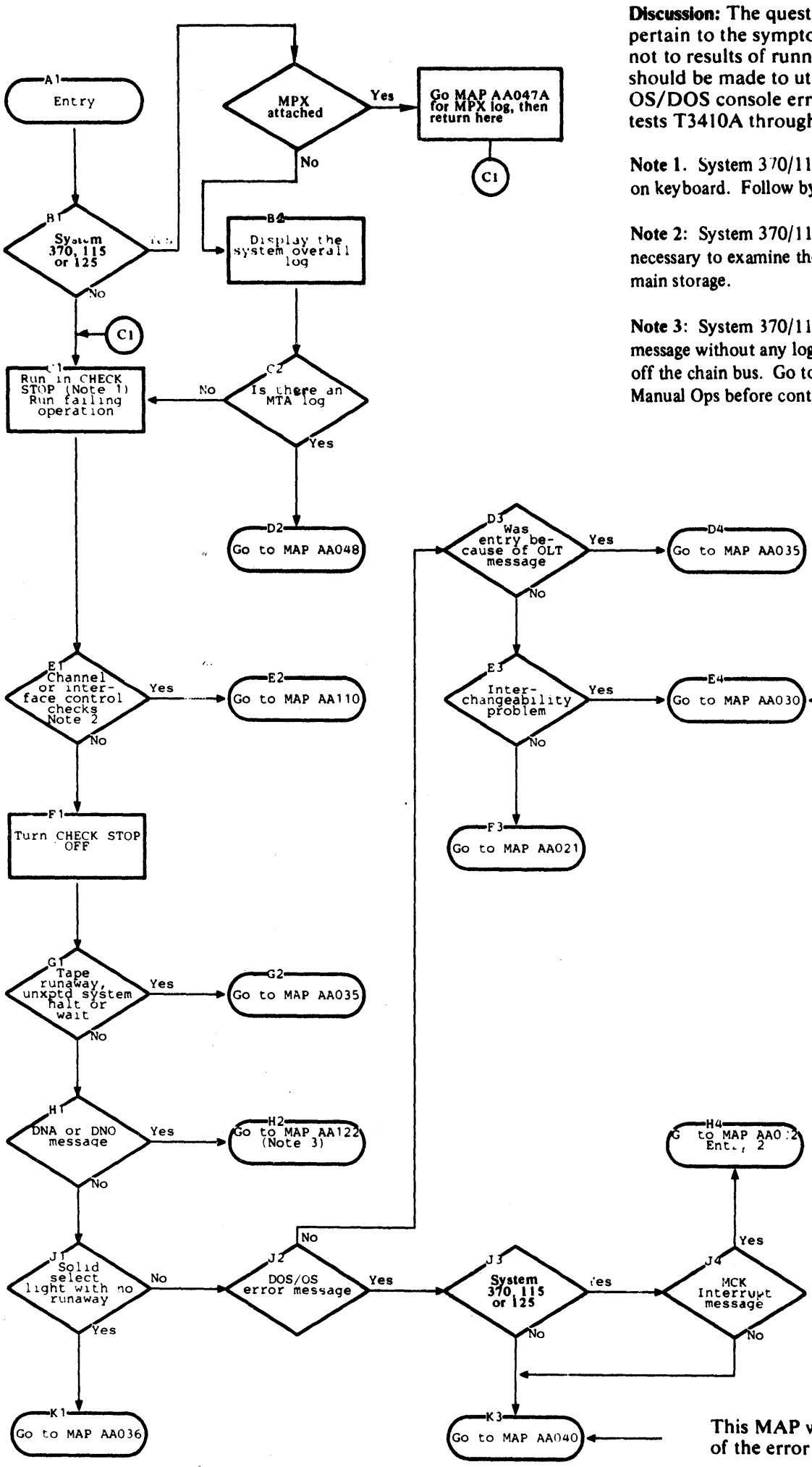


Notes

XF0600	1845902
Seq 1 of 2	Part Number

See EC	736672	443751		
History	26 Oct 73	20 Sept 74		

MAP AA016



Discussion: The questions at the beginning of this MAP pertain to the symptoms reported by the customer and not to results of running the online tests. An attempt should be made to utilize the sense information in the OS/DOS console error message before running the online tests T3410A through O.

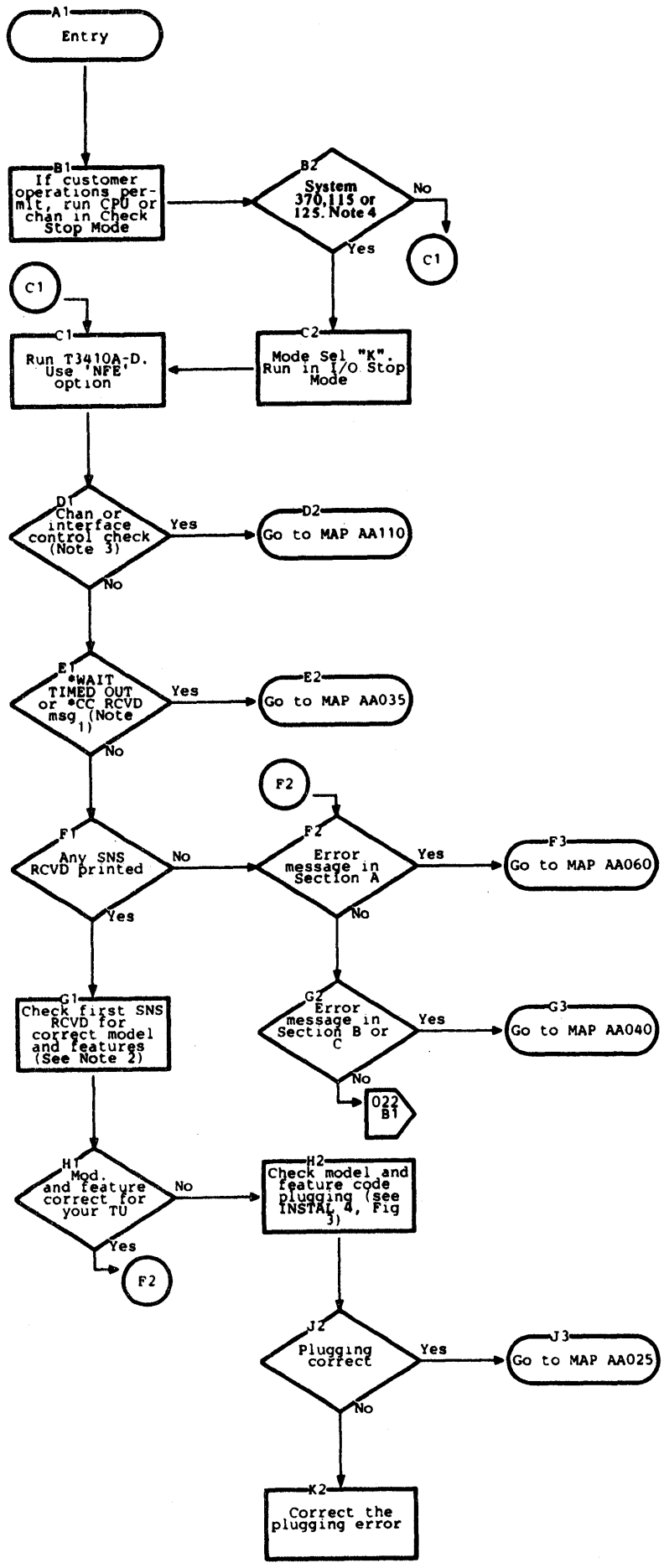
Note 1. System 370/115 and System 370/125, Mode Sel "K" on keyboard. Follow by running in "I/O STOP" mode.

Note 2: System 370/115 and on System 370/125, it may be necessary to examine the CSW stored in location X'40' of main storage.

Note 3: System 370/115 and on System 370/125, a "DNO" message without any log indicates that the 3411/3410 may be off the chain bus. Go to MAP AA127 and execute IOP Manual Ops before continuing to AA122.

An interchangeability problem is the inability to read a tape on any tape unit other than the one on which the tape was written.

This MAP will help you analyze the sense bytes of the error message printout.



Discussion: The OLT sections are called for in small groups by this MAP in an effort to reduce running time. Most solid failures will cause errors in Sections A through D. If you would rather run all sections at the same time, run A through O, take the printout, and answer the questions on this page. Always start with the first error message on the printout. If channel errors are suspected, run the OLTs with the channel in Check Stop Mode.

OLT Section D performs the LWR test and effectively checks the read chain from an addressed tape unit through the tape control detection. Errors only are indicated. The R/W head and shielded cable to the R/W logic board are not checked by this routine.

Note 1: If the "CC RCVD" message is not preceded by an asterisk, take the "NO" branch.

Note 2: Check sense byte 6 for model and feature codes:

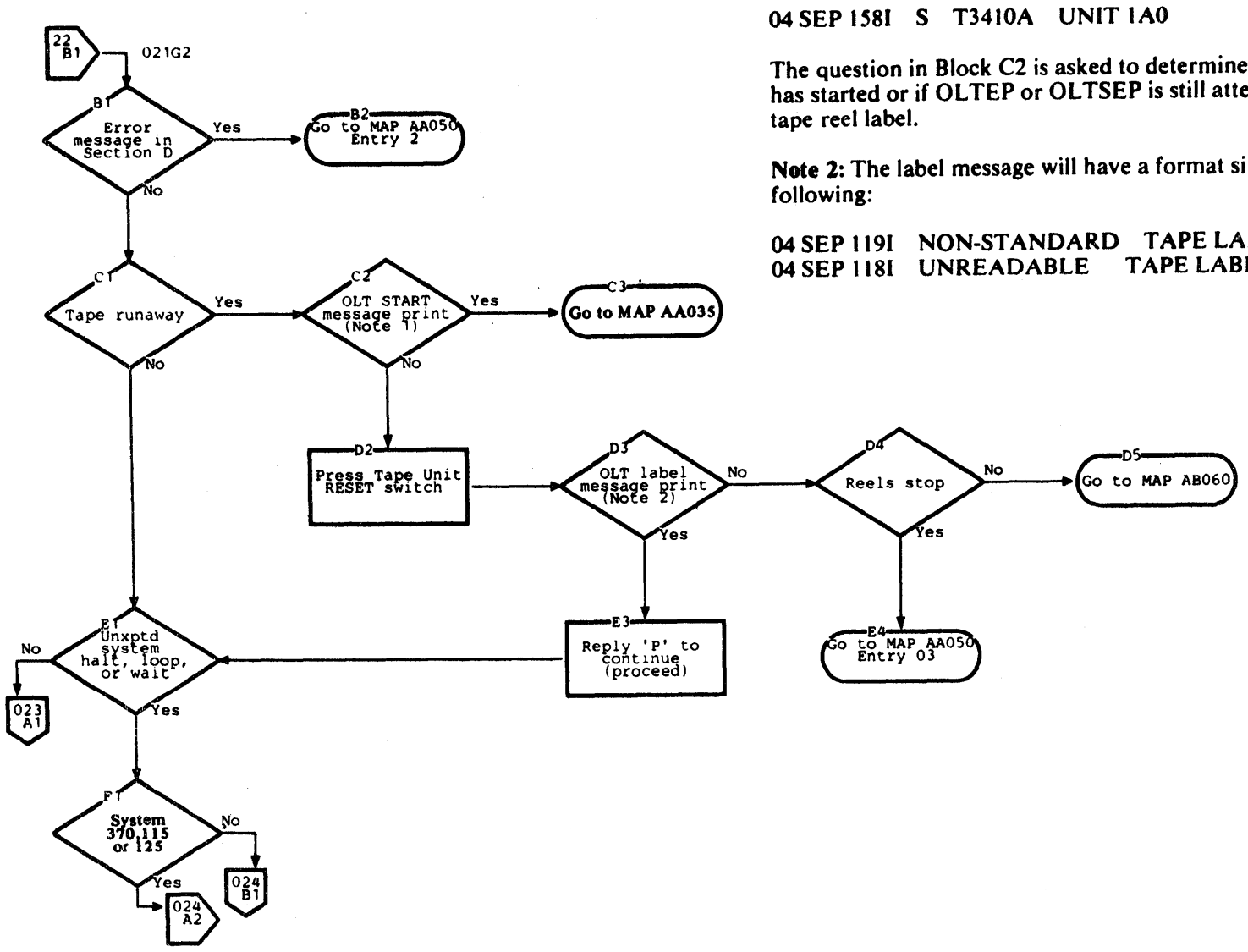
Bit 2 ON if TU has dual density feature.
Bit 2 OFF if TU is PE-only.
Bits 4-7
- 0 0 0 0 = Model 1 tape unit
- 0 0 0 1 = Model 2 tape unit
- 0 0 1 0 = Model 3 tape unit

Other combinations of bits 4-7 are invalid.
Example:
- Byte 6 = 22 = DD Mod 3
- Byte 6 = 00 = PE Mod 1

Note 3: On System 370/115, 370/125, it may be necessary to examine the CSW stored in location hex '40' of main storage.

Note 4: If attached to MPX on System 370 Model 115 or 125, answer this block no.

XF0700 Seq 1 of 2	1845903 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734852 26 Feb 73	734864 1 Aug 73	443751 20 Sept 74



Note 1: The start message will have a format similar to the following:

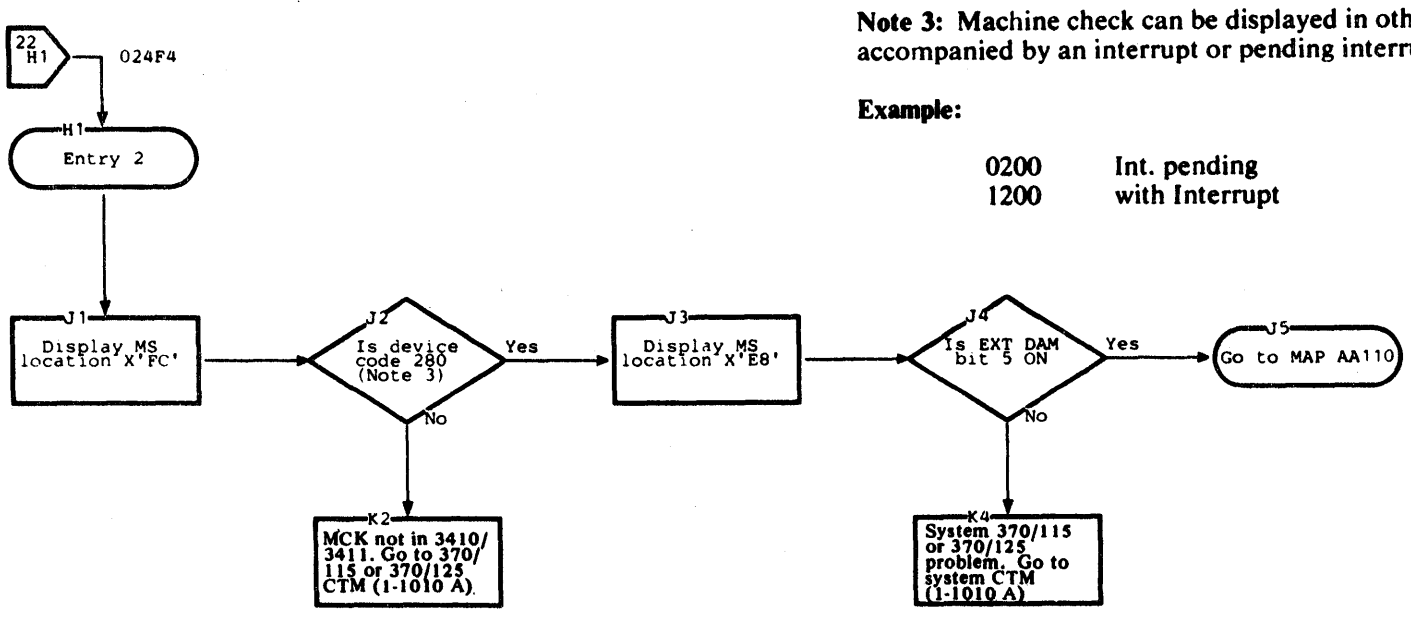
04 SEP 158I S T3410A UNIT 1A0

The question in Block C2 is asked to determine if the OLT section has started or if OLTEP or OLTSEP is still attempting to read the tape reel label.

Note 2: The label message will have a format similar to the following:

04 SEP 119I NON-STANDARD TAPE LABEL ON 01A0, or
04 SEP 118I UNREADABLE TAPE LABEL ON 01A0

Machine Check Entry - System 370/115 or 370/125

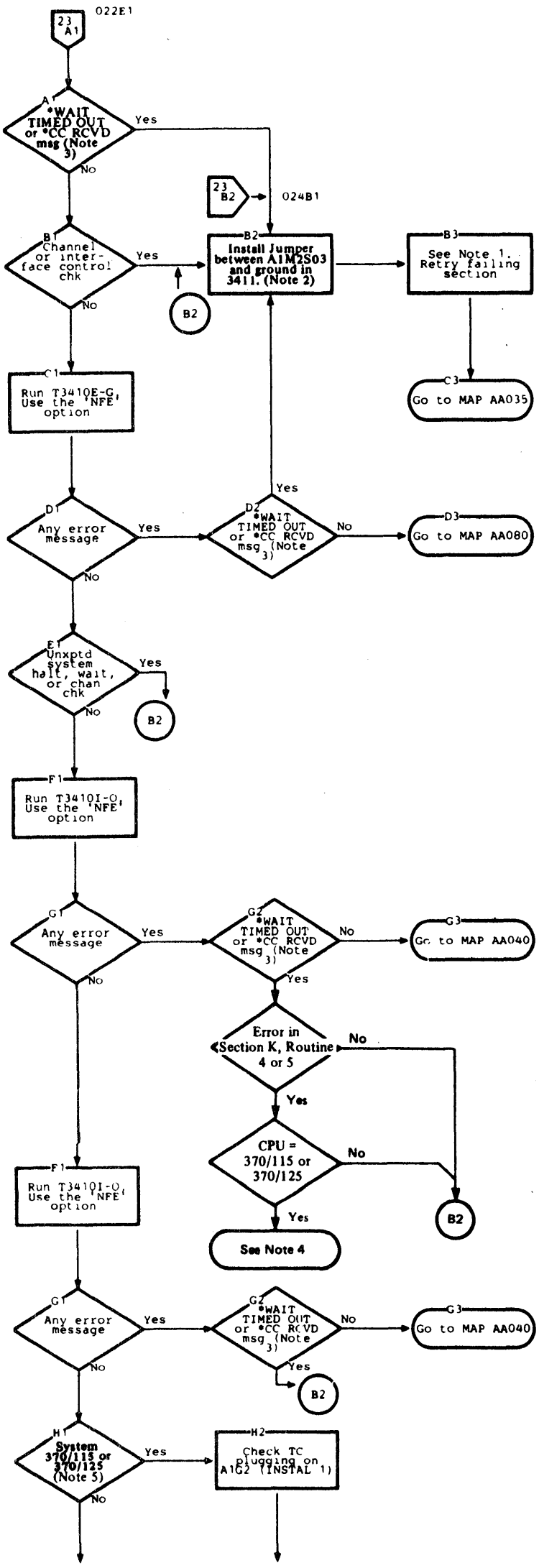


Note 3: Machine check can be displayed in other forms if accompanied by an interrupt or pending interrupt.

Example:

0200	Int. pending
1200	with Interrupt

On Line Tests (OLTs)



Note 1: The error which occurred may leave the microprogram hung in a loop which would prevent the 3411 from responding to the system. Before retrying the failing section, reset the 3411 via a system reset or, if you cannot do a system reset, power down and power up the 3411 to generate a power-on reset. Attempting to run diagnostics without resetting the 3411 may give invalid results.

Note 2: Ignore this block if 370/115 or 370/125 and examine hard stop condition before preceeding to MAP AA035. If 370/115 or 370/125 MPX attached, jumper 3411 A1M2S03 to ground.

Note 3: If the "CC RCVD" message is not preceded by an asterisk, take the "NO" branch.

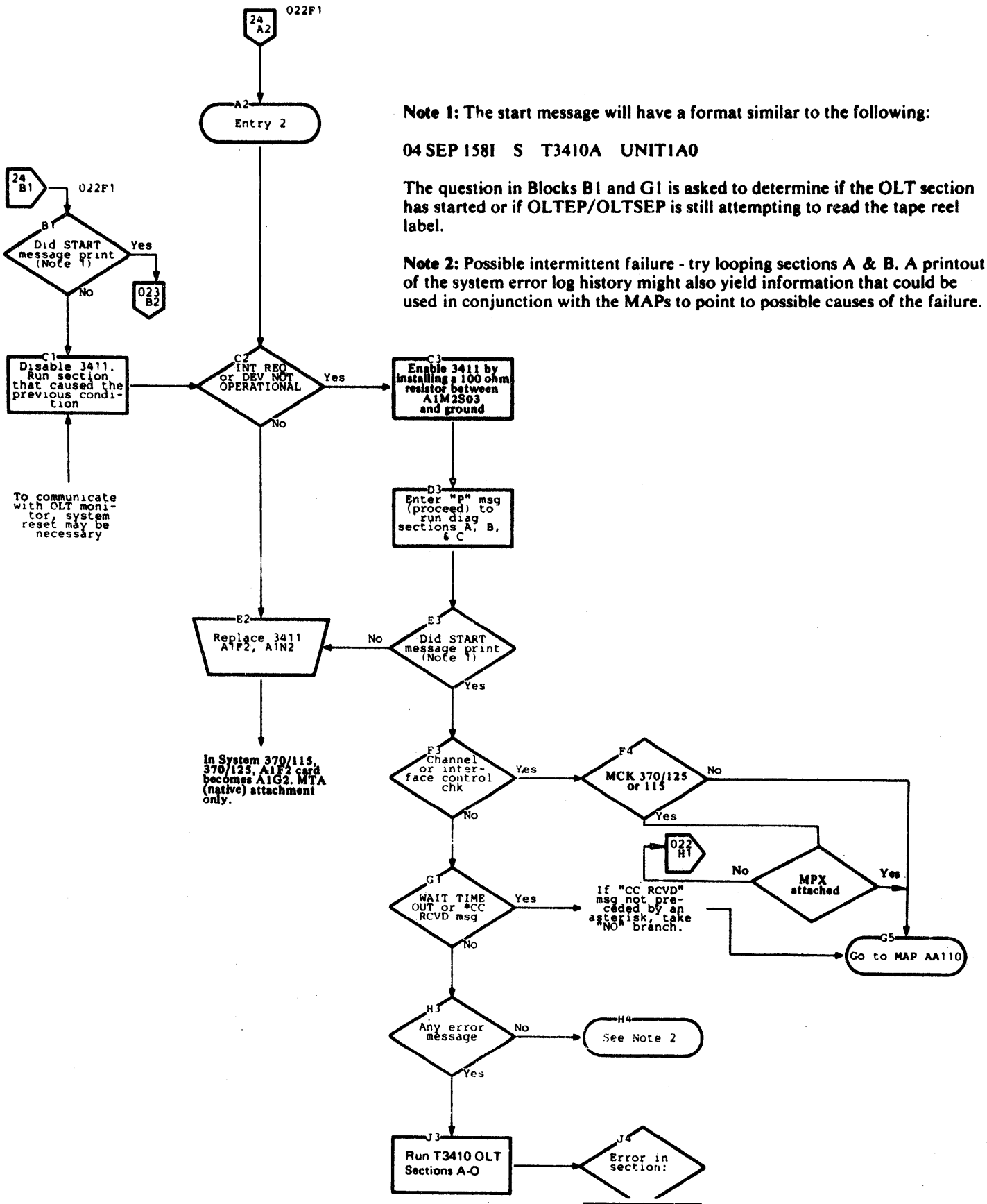
Note 4: Applies to S/370 CPU Models 115 and 125 only. Diagnostic section K, routine 4 or 5 can fail because the tape unit did not recognize a tape mark in the "short tape mark" recognition routine. If the customer is interchanging tapes with 24XX tape units, install EC 443792 (ECA 044). If the customer is not interchanging tapes with 24XX tape drives, ignore this error and proceed to entry (B2)

Note 5: If 370/115 or 370/125 MPX attached, answer this block no.

The problem seems to be intermittent. Try looping the diagnostics. A printout of the system history records for the suspect tape unit might also prove helpful. Use the error history data in conjunction with MAPs to analyze the problem.
Erroneous address conditions, which indicate other than the tape unit being addressed, generally involve the switch cards in locations 01A1D2 and 01A1E2.

XF0800 Seq 1 of 2	1845904 Part Number

See EC History	734864 1 Aug 73	443751 20 Sept 74	443800 31 Oct 75	



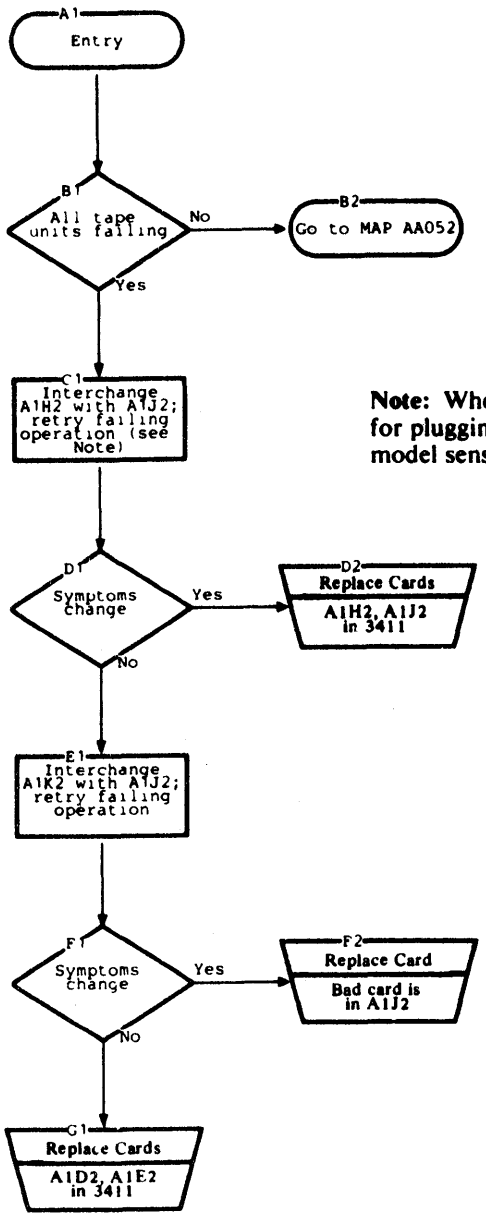
Note 1: The start message will have a format similar to the following:

04 SEP 1581 S T3410A UNIT1A0

The question in Blocks B1 and G1 is asked to determine if the OLT section has started or if OLTEP/OLTSEP is still attempting to read the tape reel label.

Note 2: Possible intermittent failure - try looping sections A & B. A printout of the system error log history might also yield information that could be used in conjunction with the MAPs to point to possible causes of the failure.

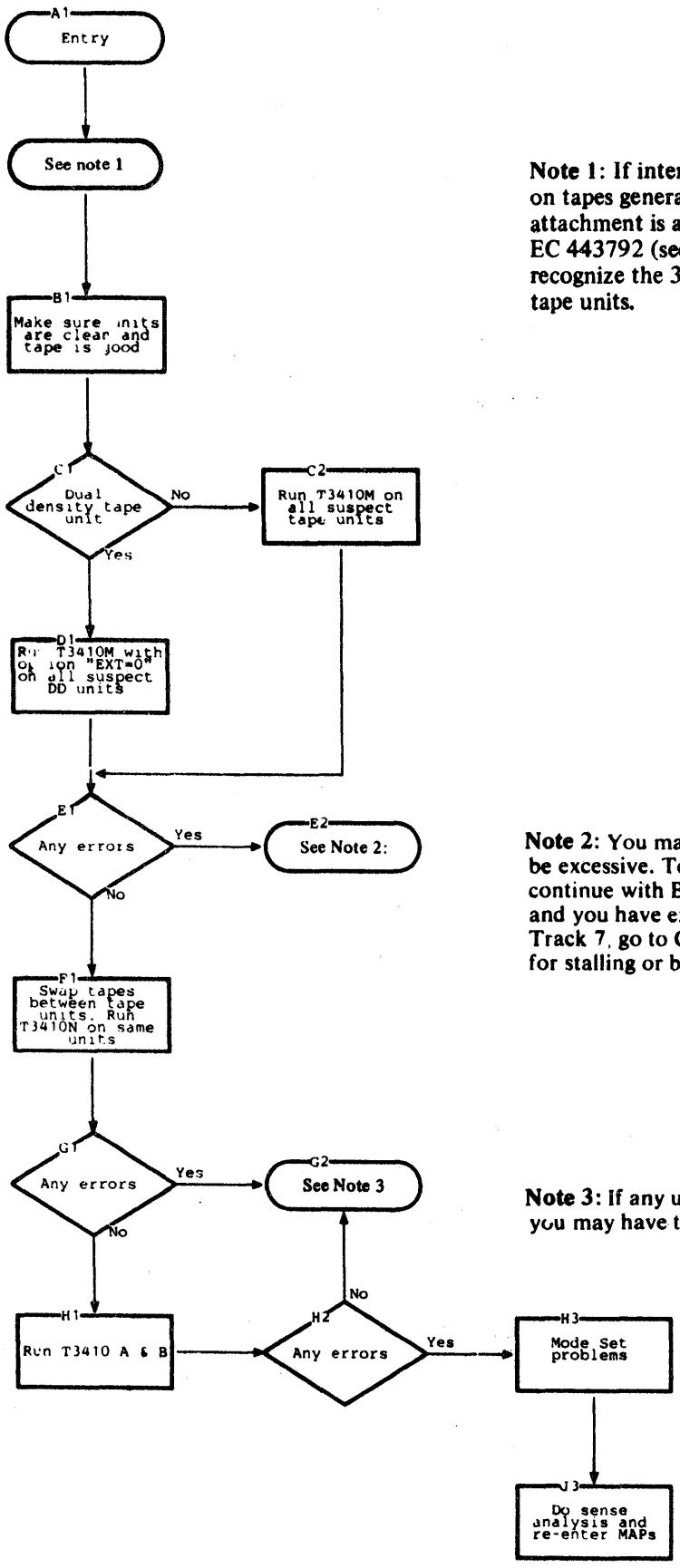
Tape Unit Sense Failure



Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

Interchangeability

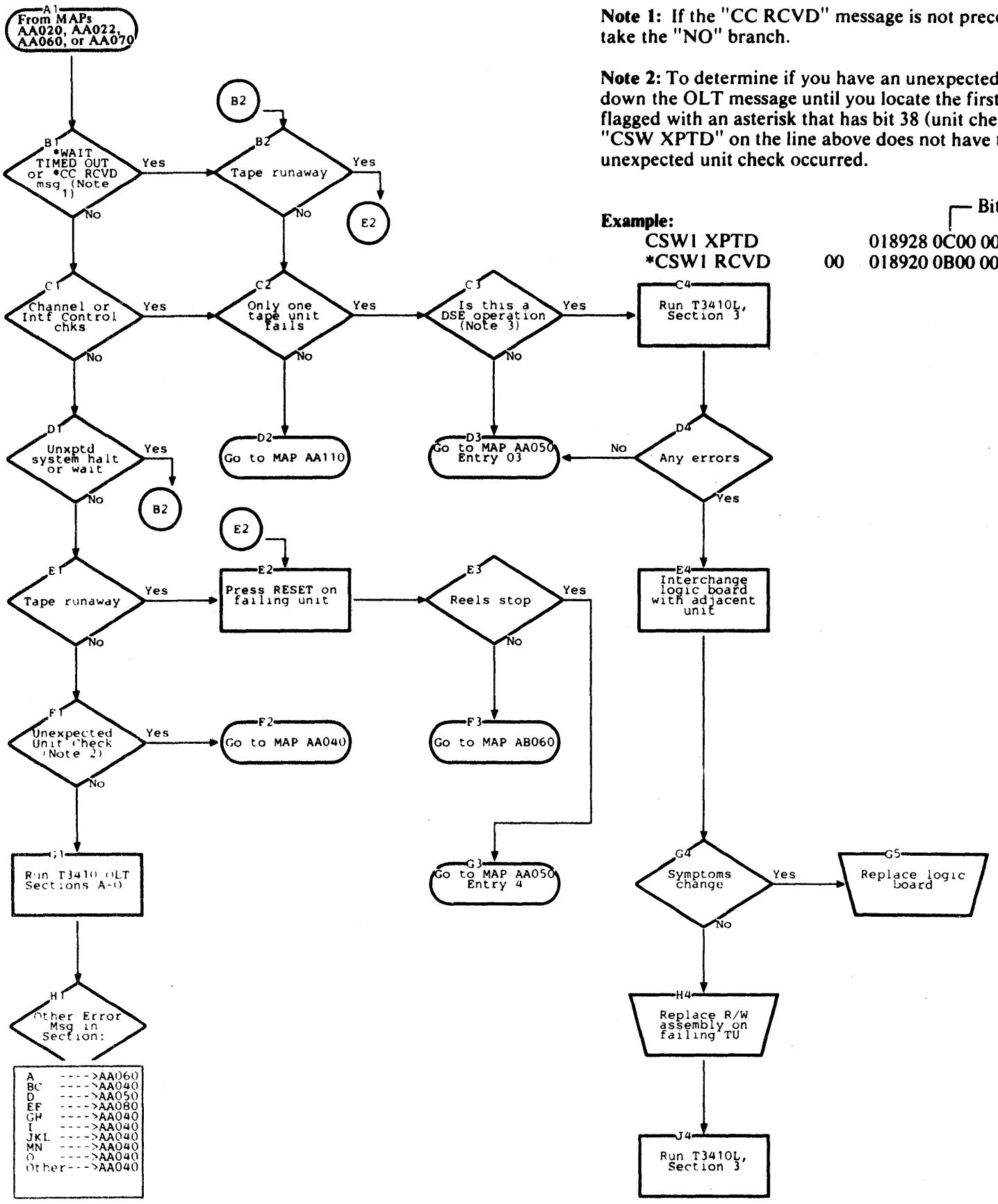
Discussion: An interchangeability problem would be a failure of a tape volume to read on a unit other than the one on which it was written. This problem could be caused by skew or tracking "off" in one or both of the tape units.
Failure to Mode Set correctly on dual density units may also lead to interchangeability problems. Sense analysis should indicate incorrect Mode Set.



Note 1: If interchange problems occur while reading tape marks on tapes generated by 24XX series tape units, and the 3411 attachment is a S/370 CPU Model 115 or 125 Model 3, install EC 443792 (see 3411 ECA 044). This EC allows the 3411 to recognize the 32 bit tape marks written on the 24XX series tape units.

Note 2: You may want to ignore write errors unless they appear to be excessive. To pursue write errors, go to MAP AA040; otherwise, continue with Block E1 on this page. If subsystem is a 3411 Mod 1 and you have excessive write errors, predominantly TIE Data Track 7, go to CARRL D 24 and check the lower left guide roller for stalling or binding.

Note 3: If any units show what you judge to be excessive errors, you may have tracking or skew problems. Go to MAP AA070.



Note 1: If the "CC RCVD" message is not preceded by an asterisk, take the "NO" branch.

Note 2: To determine if you have an unexpected unit check, scan down the OLT message until you locate the first "CSW RCVD" flagged with an asterisk that has bit 38 (unit check) on. If the "CSW XPTD" on the line above does not have this bit on, an unexpected unit check occurred.

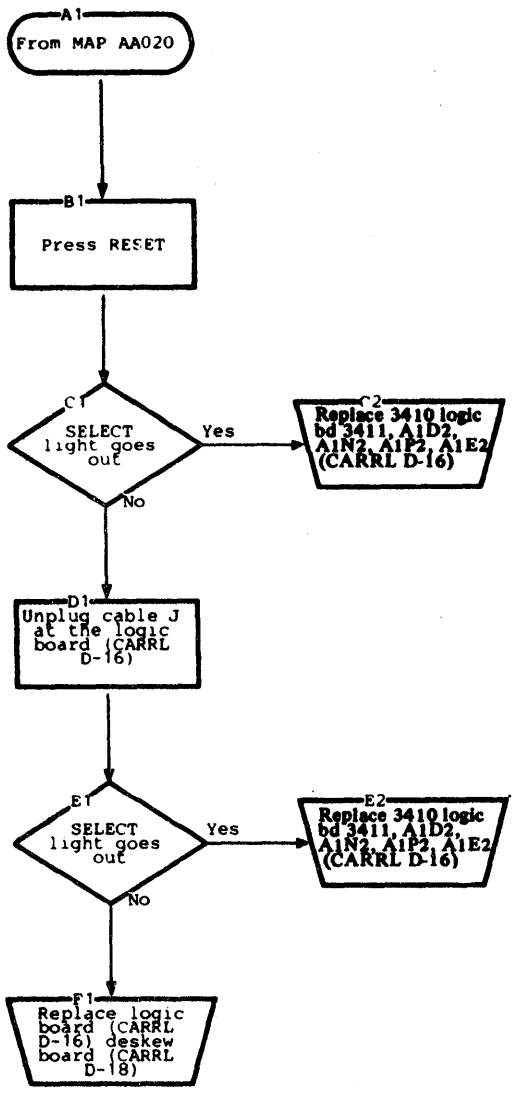
Example:

Bits 36–39

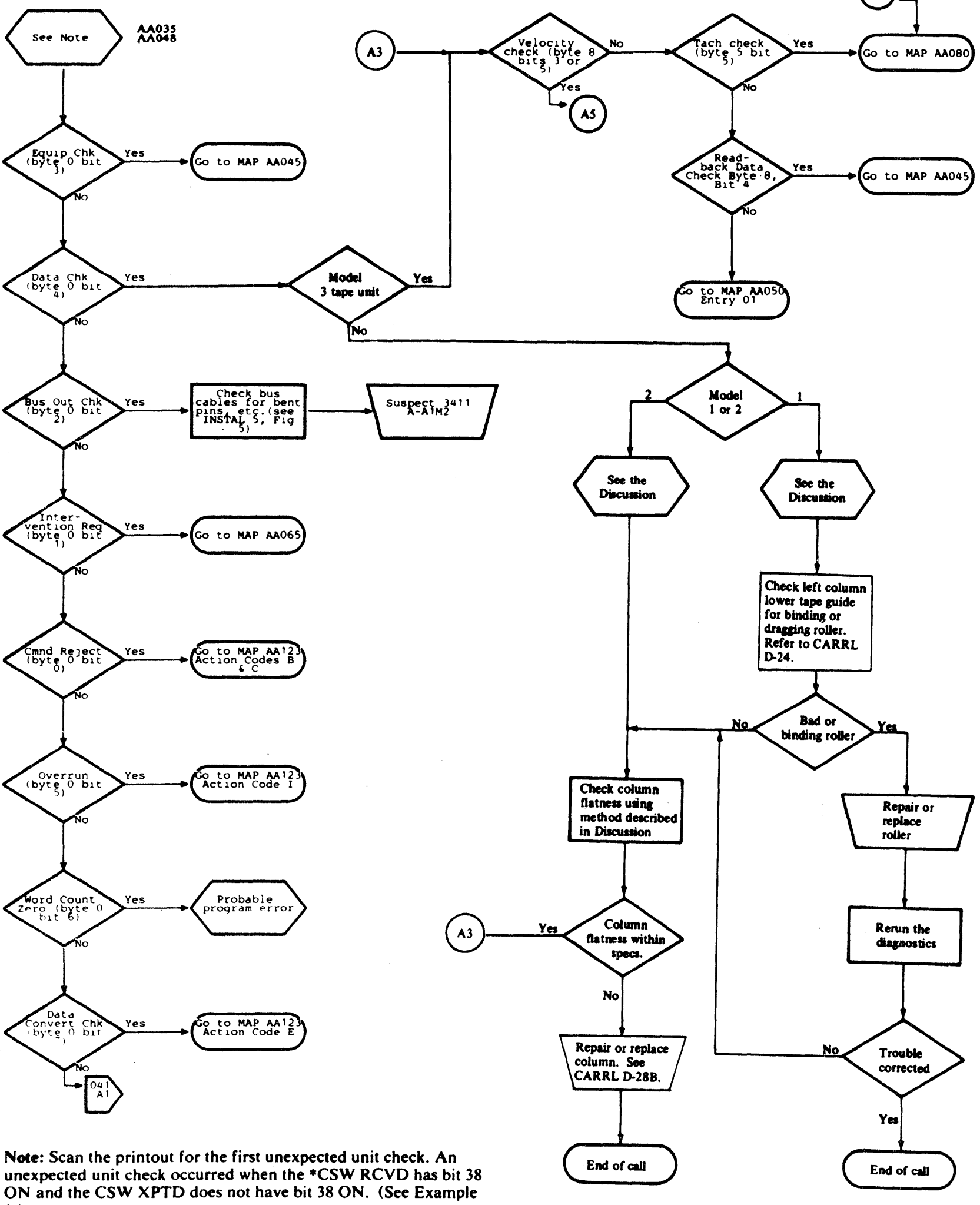
```
CSW1 XPTD          018928 0C00 0000
*CSW1 RCVD    00   018920 0B00 0027
```

Note 3: During a DSE operation, if all tape units fail T3410L Section 3, the problem is in 01A1N2, 01A1D2, or 01A1E2.

SELECT Light Always On



Unit Check Analysis



Note: Scan the printout for the first unexpected unit check. An unexpected unit check occurred when the *CSW RCVD has bit 38 ON and the CSW XPTD does not have bit 38 ON. (See Example 1.)

The byte and bit notation used in this MAP refers to the sense data printed out with the error message. In the case of OLT messages, the reference is to the sense received (SNS 00–08 RCVD) line of the message. *Bits* are counted 0–7, left to right. 3410/3411 *sense bytes* are numbered 0–8, left to right. (See Example 2.)

Example 1:

		Bits 36–39 ↓
CSW1 XPTD		018928 0C00 0000
*CSW1 RCVD	00	018920 0E00 0027

Example 2:

*SNS 00-08 RCVD	1044 0304 0040 2200 08
SNS ERROR MASK	1000 0000 0000 0000 08

Exercise caution when sense decoding as certain levels of OS and DOS do not support extended sense and will present only six sense bytes (0-5).

Discussion: To prevent the creation of tapes that may not be interchangeable with 24xx series tape units, the 3411 models 1 and 2 are equipped with a velocity rate of change per bit detection circuit. This circuit is active only in the PE mode during a write operation.

When the error threshold is exceeded, a Data Check with a track-in-error (TIE) byte 01 will occur. If a tape unit is experiencing a large number of Data Checks on track 7 (TIE 01) during a write operation, suspect a velocity rate of change problem.

Common causes of a velocity rate change error are:

1– Lower tape guide in the left column (model 1 only) has a binding roller. Check the roller for free rotation. It is important that all washers and springs are properly installed. Refer to CARRL D-24 for correct installation.

2– Check for column flatness on models 1 and 2. Excessive warpage of the vacuum column can cause excessive vibration at the tape loop. Flatness of the vacuum column in the tape loop area should be checked using a straight edge. (The edge of the half column cover, PN 2517722, can be used for this measurement.) Column should be flat within 0.015 inches (0.381 mm) over the area below the BOT/EOT block the full width of the column.

XF1100	1845907
Seq 1 of 2	Part Number

See EC History	734864	443751	443806	
	1 Aug 73	20 Sept 74	2 May 77	

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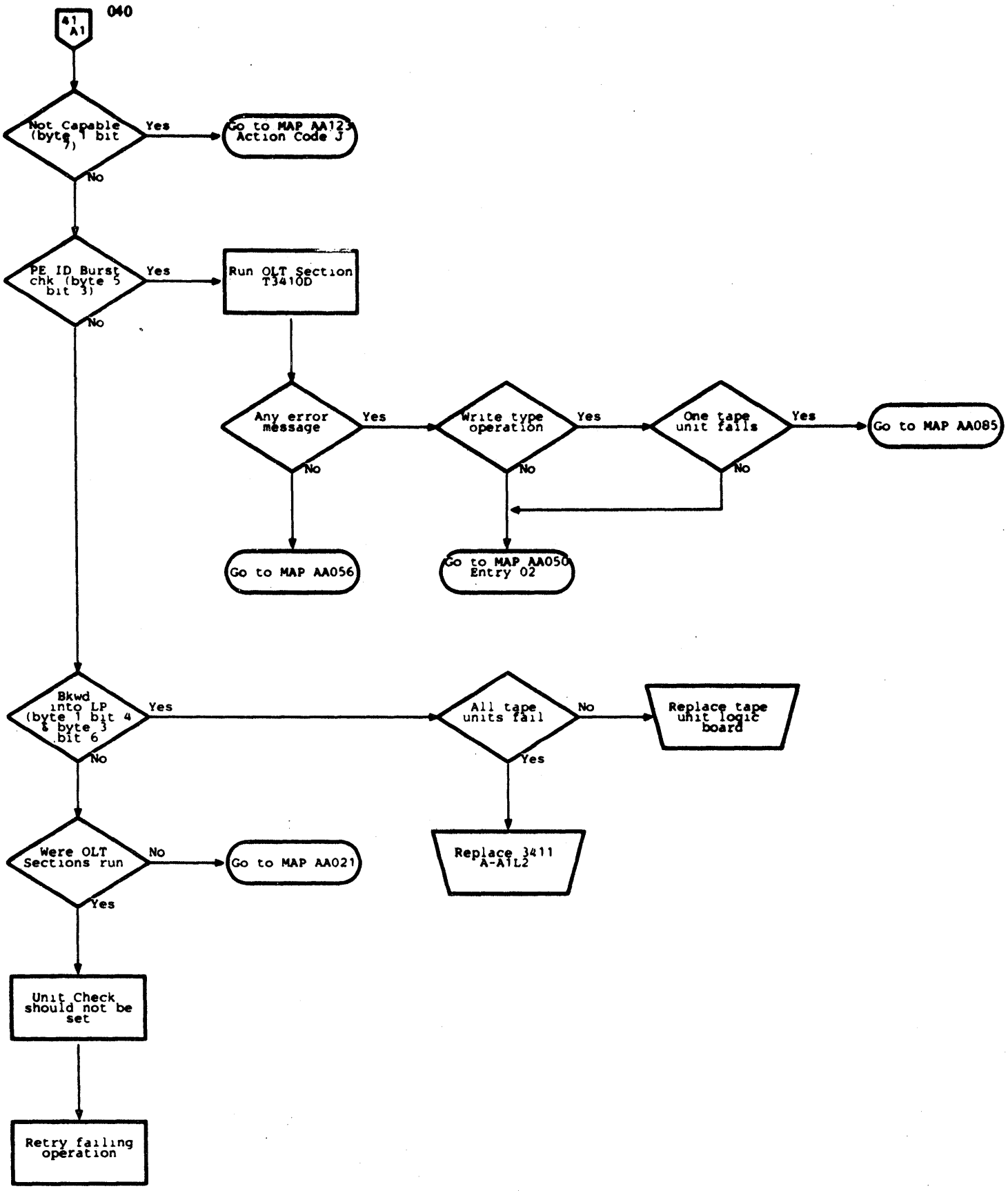
Unit Check Analysis



XF1100	1845907	See EC	734864	443761	443806	
Seq 2 of 2	Part Number	History	1 Aug 73	20 Sept 74	2 May 77	

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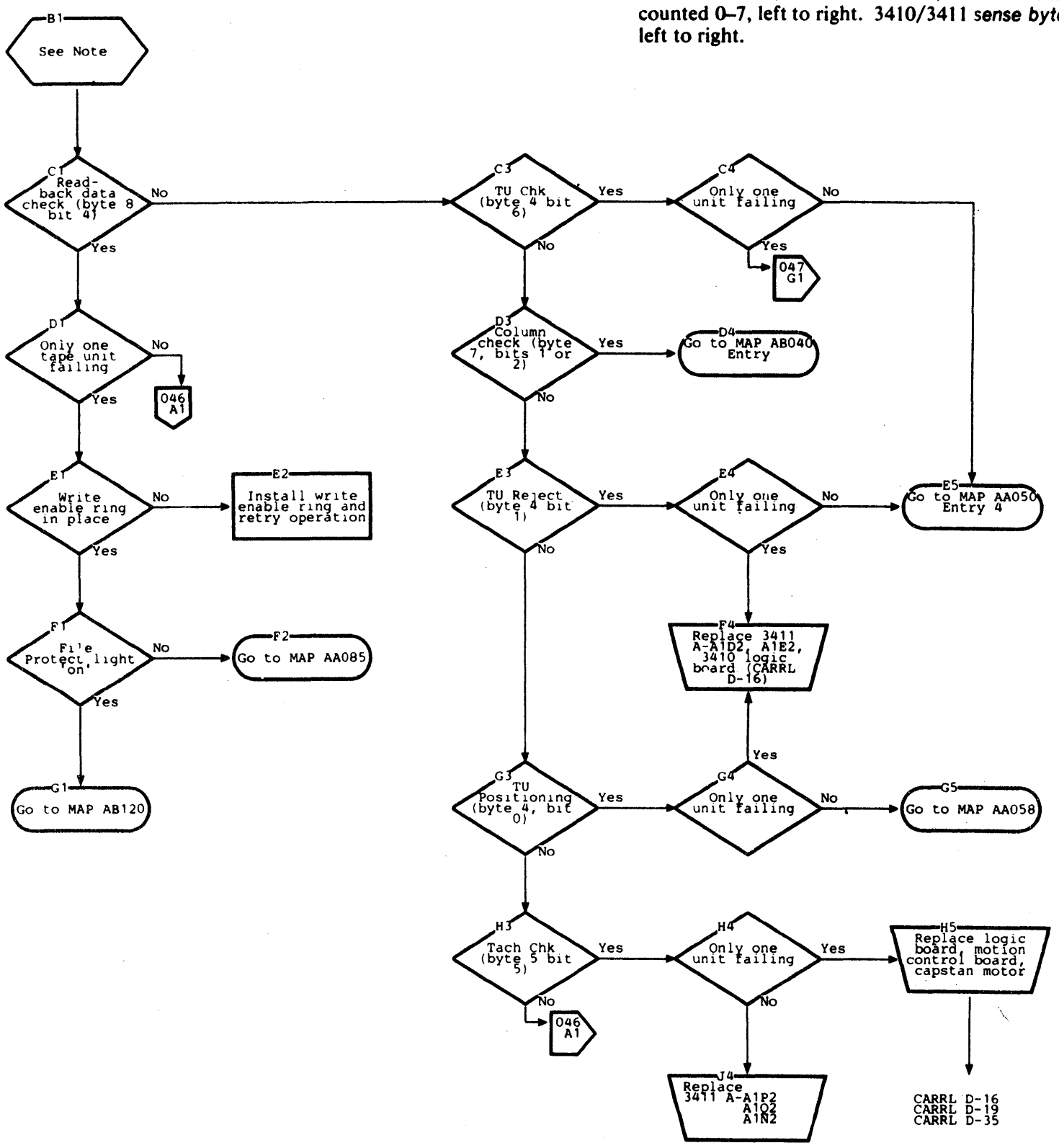
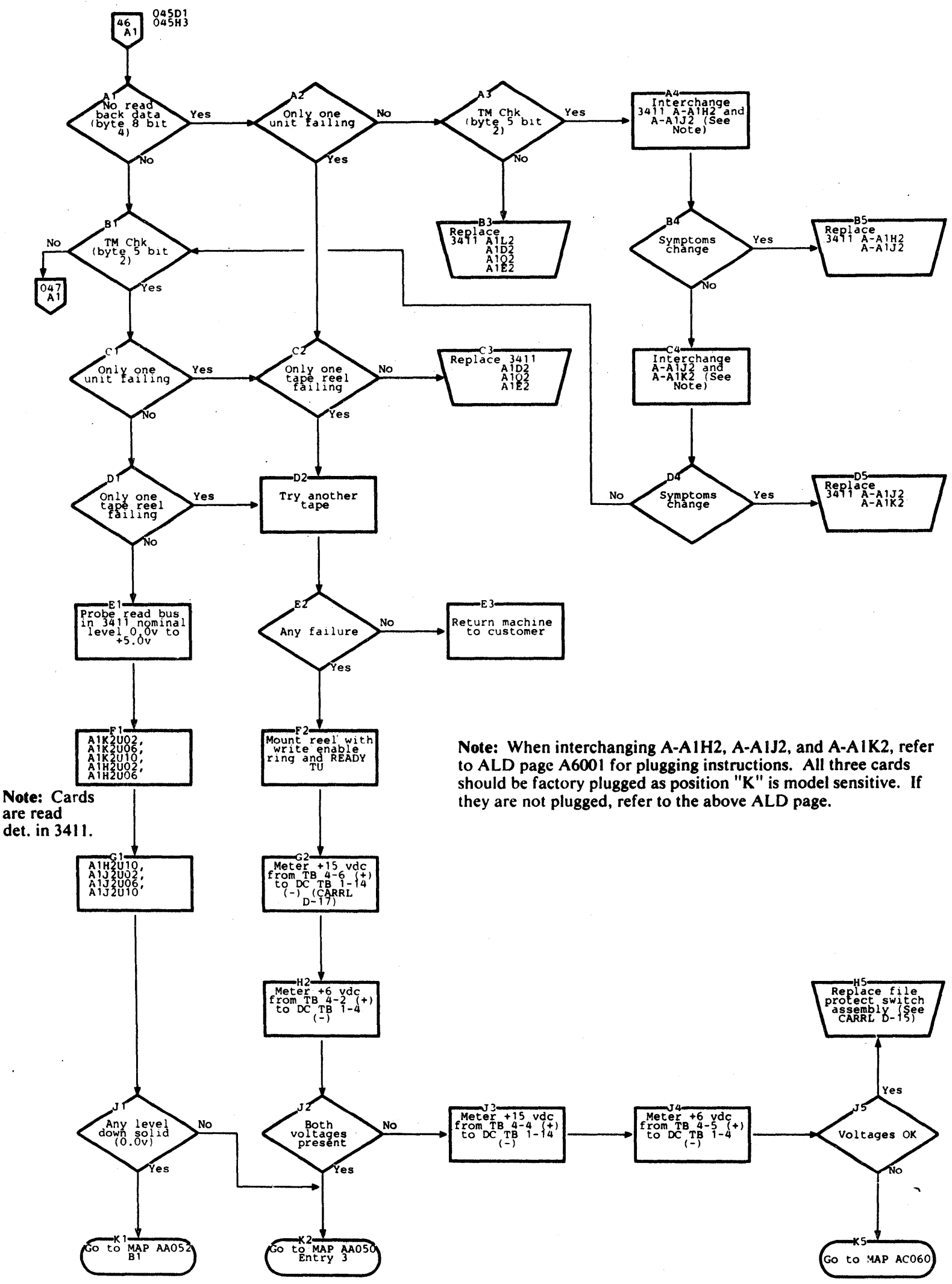
Equipment Check

Note: Enter this MAP if you have equipment checks. If the action called for by this MAP does not resolve the problem, go to MAP AA050 Entry 3 for further analysis. The byte and bit notation used in this MAP refers to the sense data printed out with the error message. In the case of OLT messages, the reference is to the sense received (SNS00–08 RCVD) line of the message. *Bits* are counted 0–7, left to right. 3410/3411 *sense bytes* are numbered 0–8, left to right.



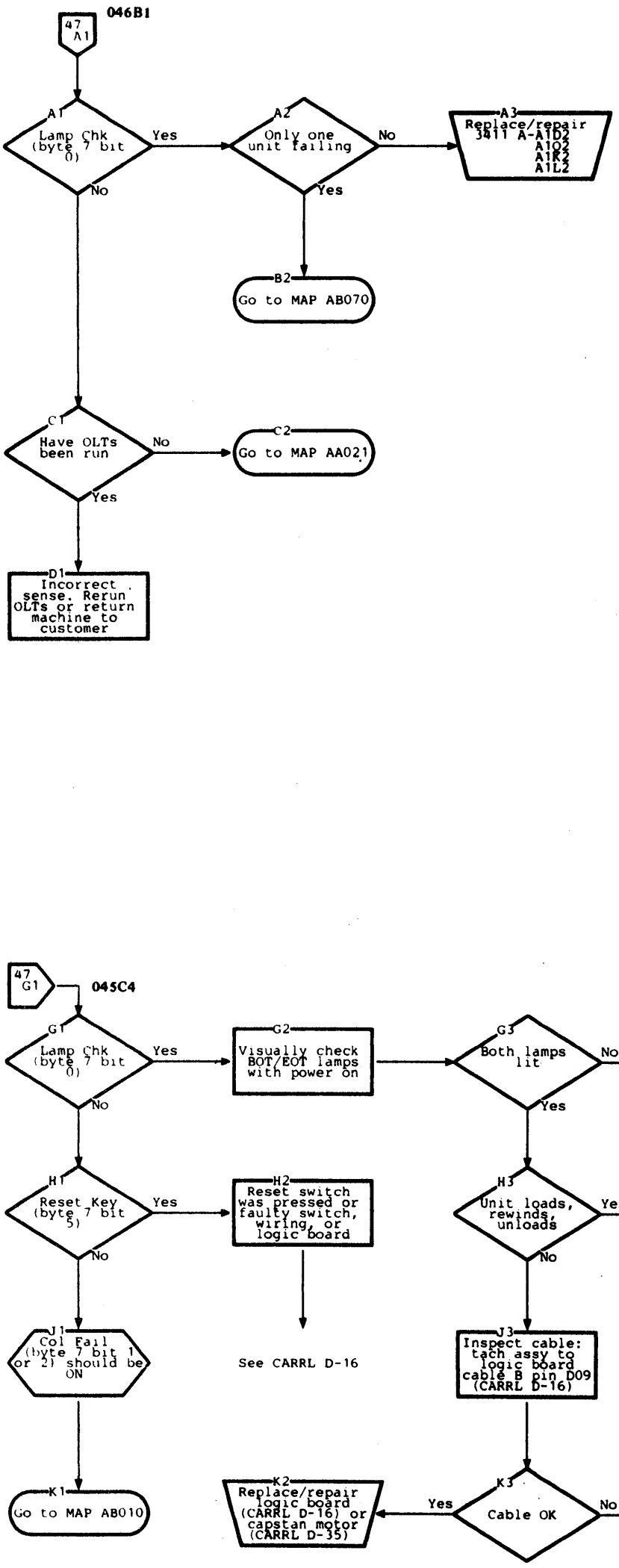
Equipment Check



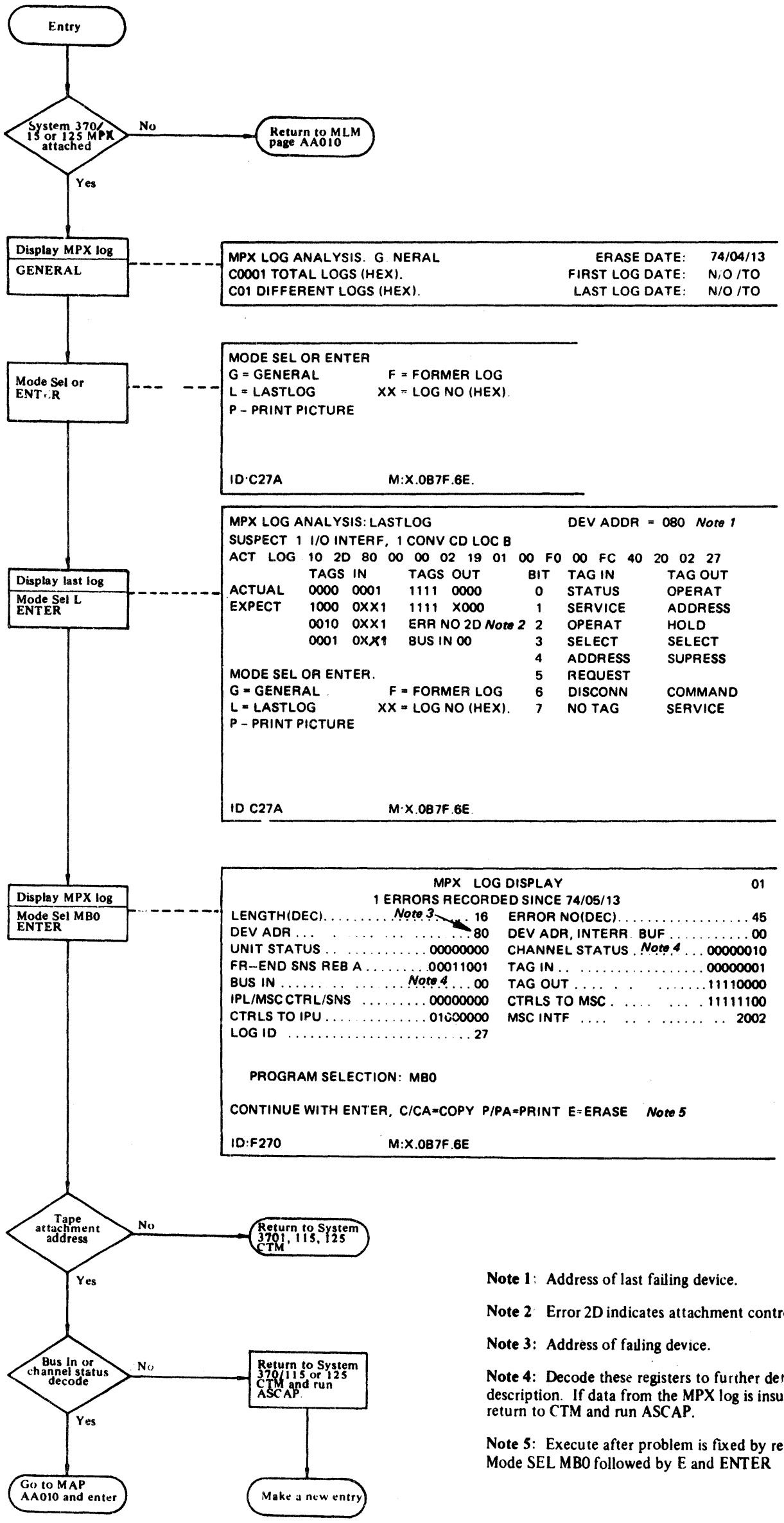
Note: Cards are read det. in 3411.

Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

Equipment Check



SYSTEM 370 MODELS 115 and 125 MPX LOG ANALYSIS



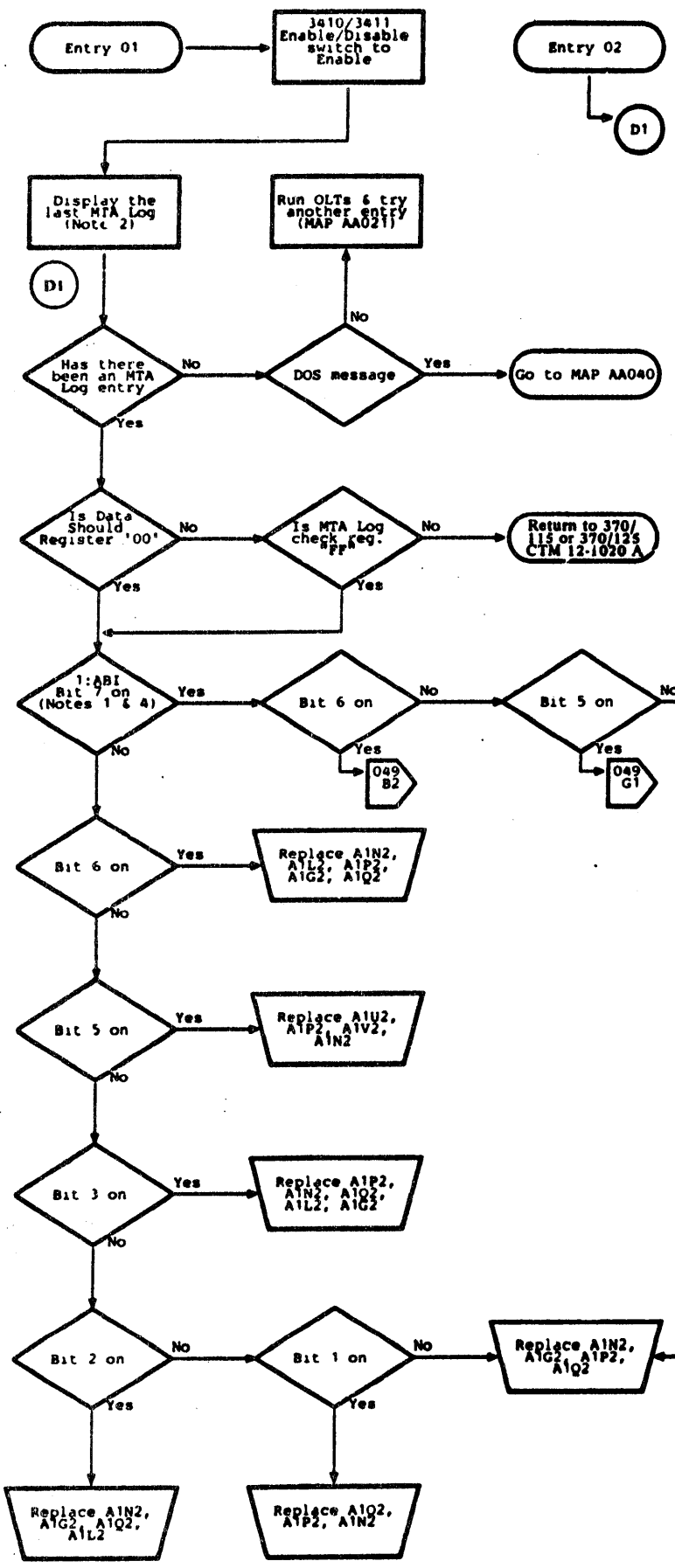
Note 1: Address of last failing device.

Note 2: Error 2D indicates attachment controller as fault.

Note 3: Address of failing device.

Note 4: Decode these registers to further define error description. If data from the MPX log is insufficient, return to CTM and run ASCAP.

Note 5: Execute after problem is fixed by returning to: Mode SEL MB0 followed by E and ENTER



Note 1: Analyze MTA Log entry for ABI message as follows: (ABI is in hex). Use the first ABI.

ABI	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit Position	0	1	2	3	4	5	6	7

Note 2: The MTA Log Display is invoked by entering MBK on the keyboard. Decode the ABI using the following table:

*1:ABI	0	1	2	3	4	5	6	7
HDWR ERROR	SPARE	IC	XFR	ALU	SPARE	ROS	TCU	OFF
µPGM ERROR	ALU	IC	WR CLK	INTER-FACE or MTA	DETECT BOC	MSC	TU BUS	ON

* Decode this table in descending order.

Note 3: Refer to MAP AA127 for details of MTA Log Routine.

Note 4: When replacing any failing FRU called out on this MAP:

1. Power down the System.
2. Replace the failing FRU.
3. Power up the System.
4. Return to the System 370/115 or 370/125 CTM 12-1010 C to run ASCAP.

XF1350 Seq. 1 of 2	1846047 Part Number	734864 1 Aug 73	443751 20 Sept 74	443806 2 May 77		

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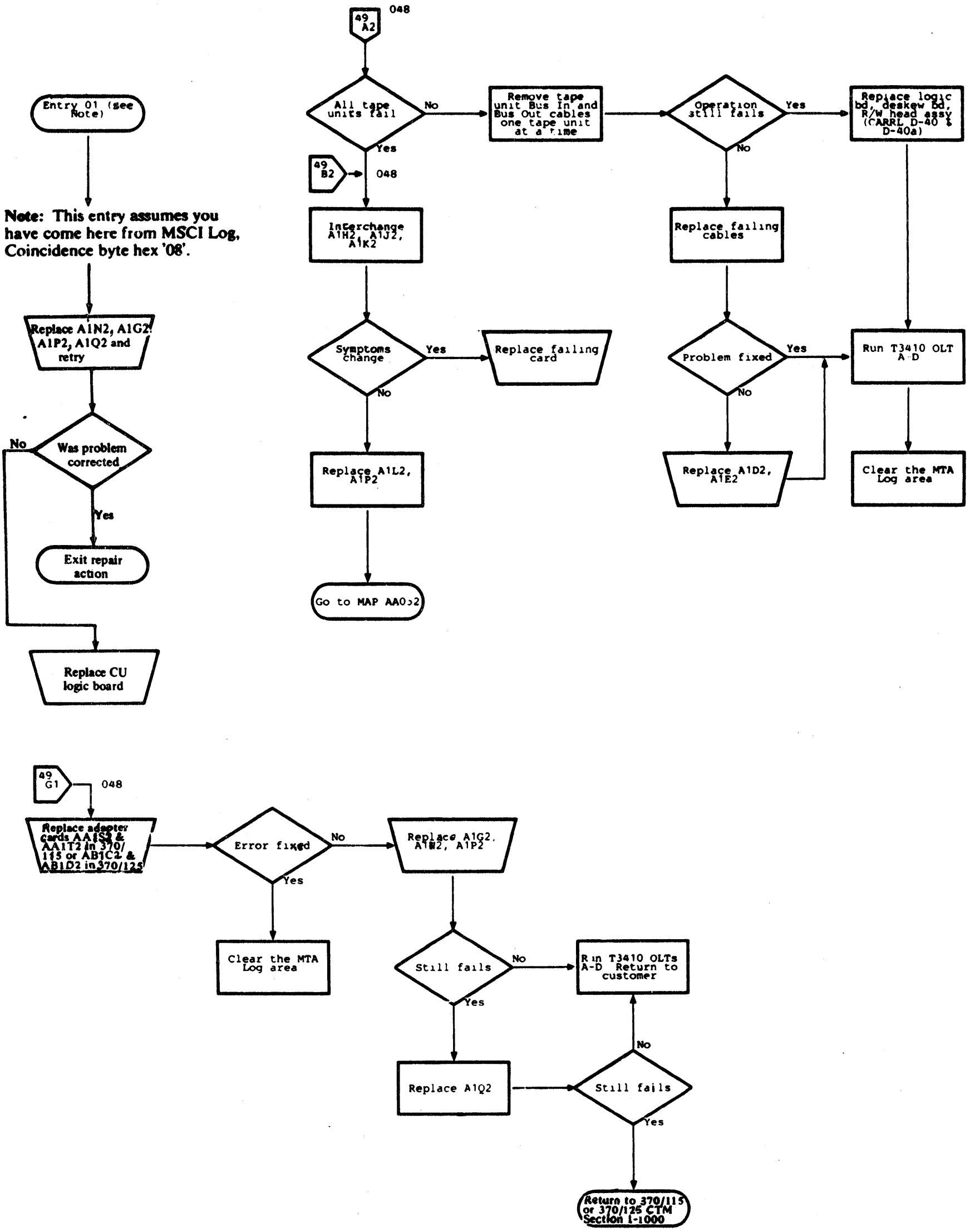

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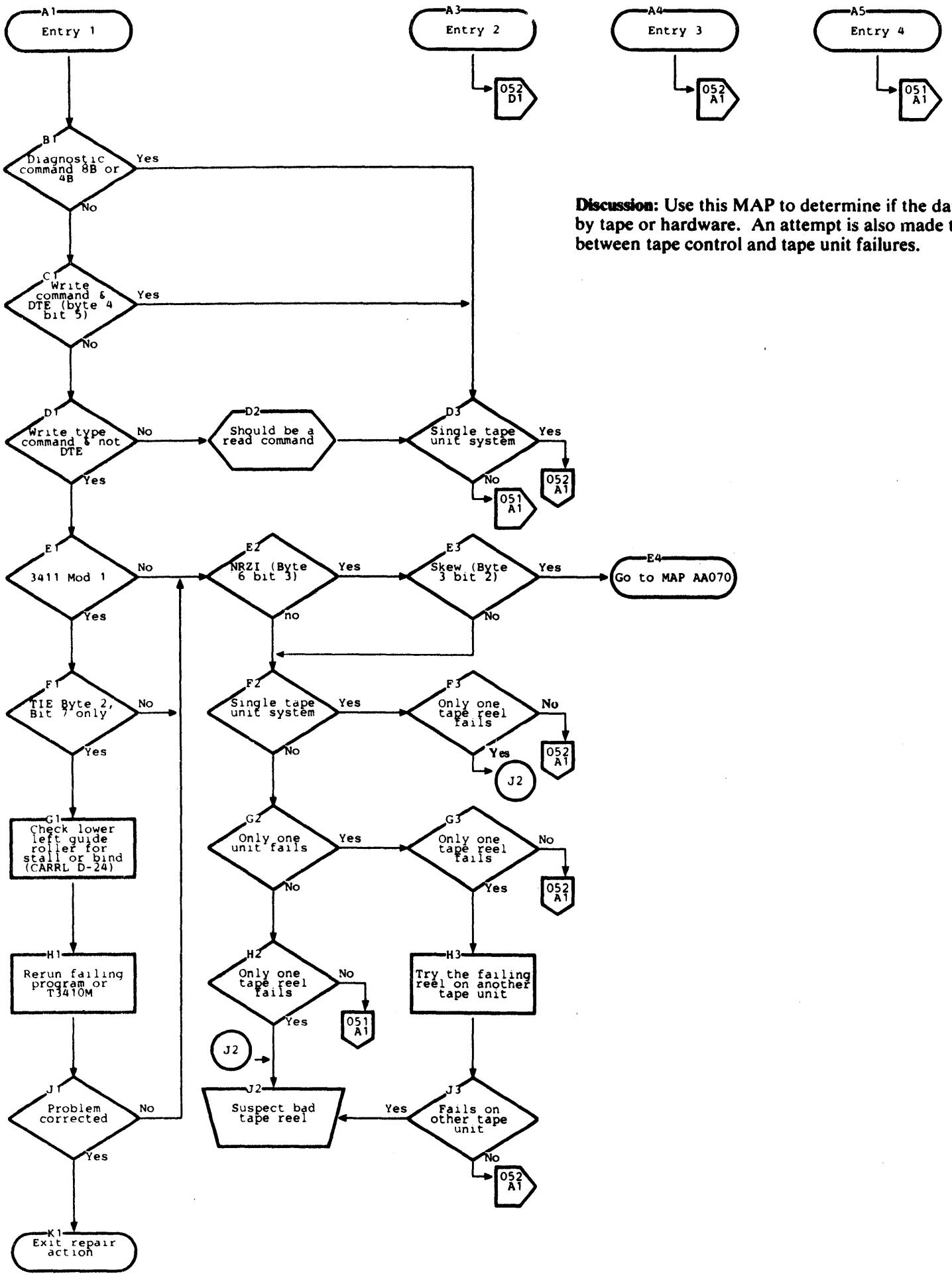
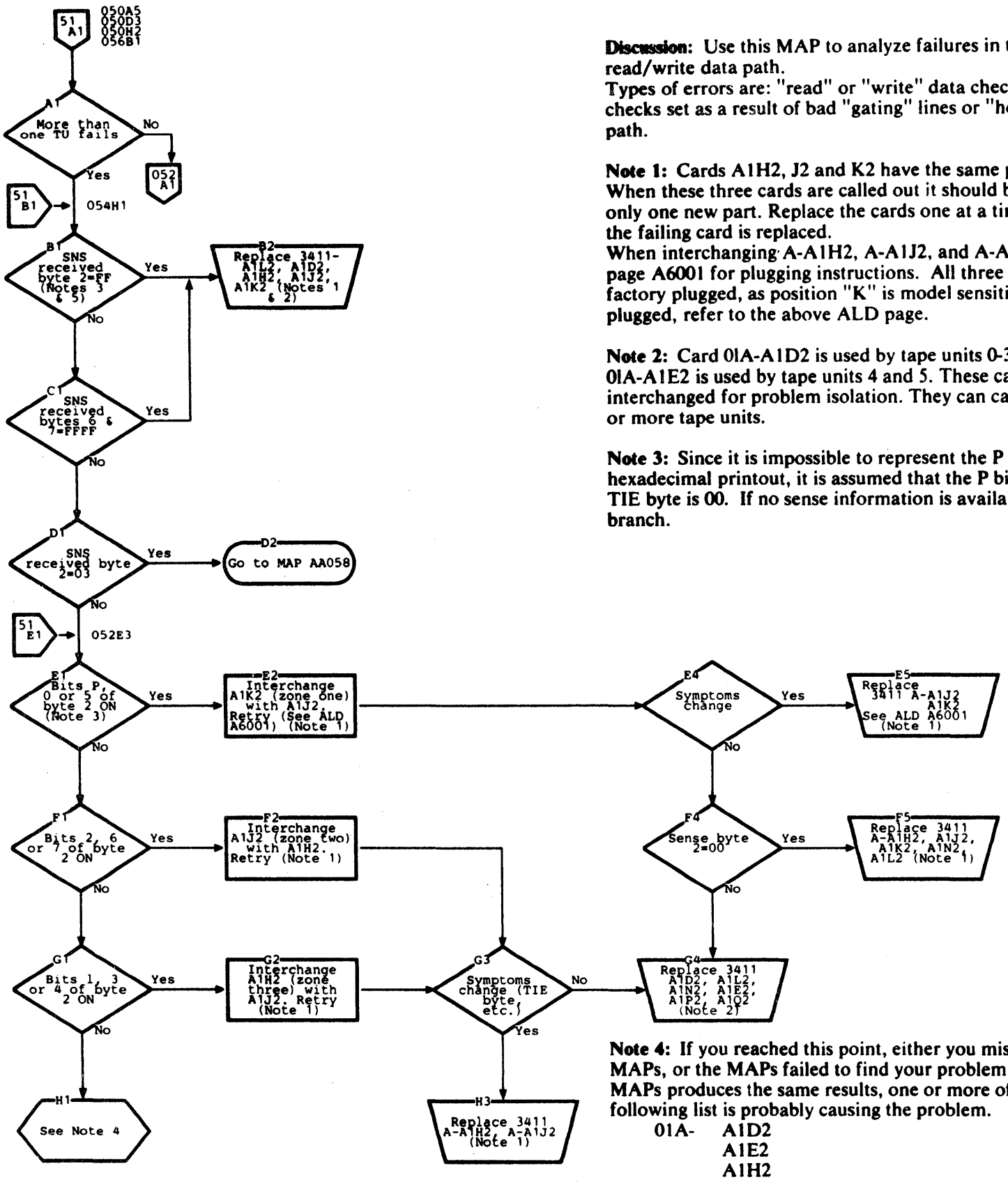
Data Check



Discussion: Use this MAP to determine if the data check is caused by tape or hardware. An attempt is also made to differentiate between tape control and tape unit failures.

Data Check



Discussion: Use this MAP to analyze failures in the tape control read/write data path.
Types of errors are: "read" or "write" data checks, and equipment checks set as a result of bad "gating" lines or "hot" bits in the data path.

Note 1: Cards A1H2, J2 and K2 have the same part number. When these three cards are called out it should be necessary to get only one new part. Replace the cards one at a time and retry until the failing card is replaced.
When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

Note 2: Card 01A-A1D2 is used by tape units 0-3 and card 01A-A1E2 is used by tape units 4 and 5. These cards may be interchanged for problem isolation. They can cause failures on one or more tape units.

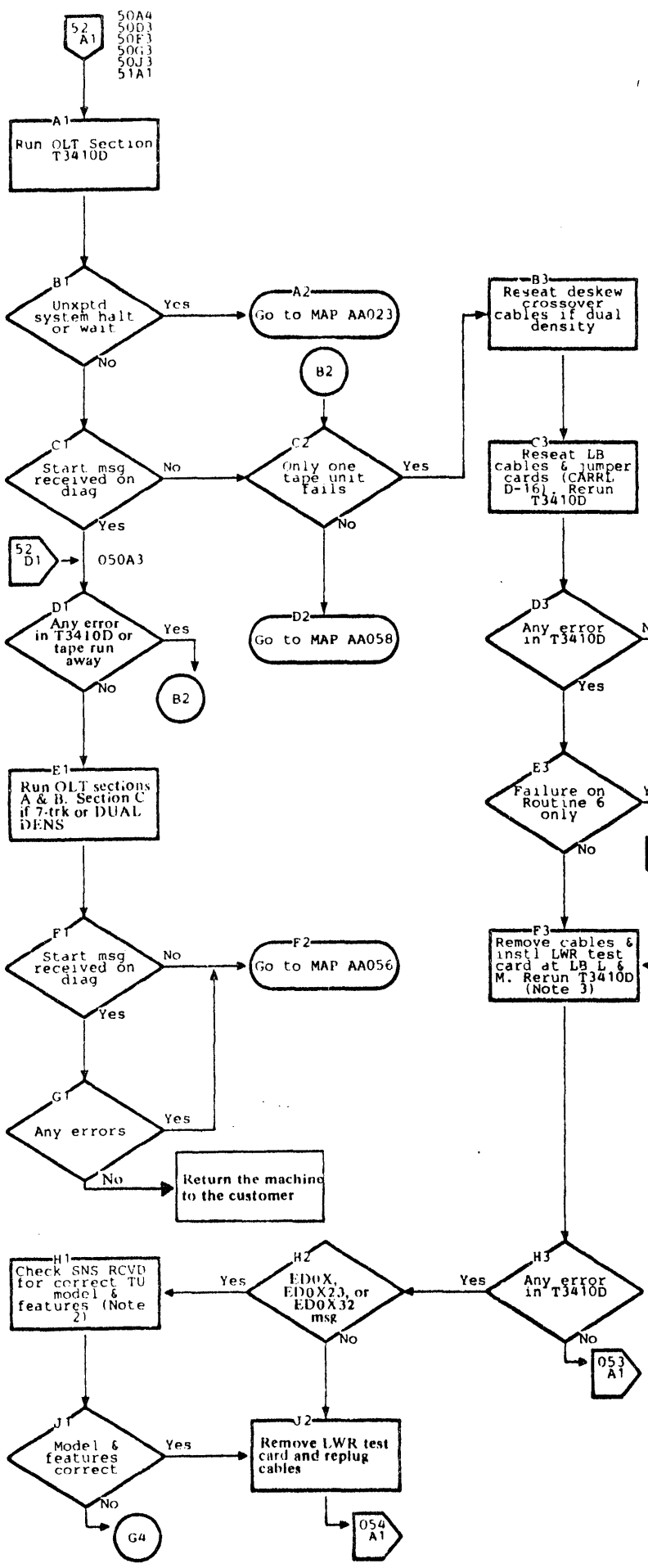
Note 3: Since it is impossible to represent the P bit in a hexadecimal printout, it is assumed that the P bit is ON when the TIE byte is 00. If no sense information is available, take the "No" branch.

Note 4: If you reached this point, either you misinterpreted the MAPs, or the MAPs failed to find your problem. If re-entering MAPs produces the same results, one or more of the cards in following list is probably causing the problem.

01A- A1D2
A1E2
A1H2
A1J2
A1K2
A1L2
A1N2

Note 5: On Mod 370/125, when powering up/down on 3410/3411 subsystem with program loaded, do "MODE SELECT" first. Recover by pressing "CANCEL" key on keyboard.

Data Check



Discussion: Use this MAP to isolate tape unit data path problems by using the special LWR (loop-write-to-read) test card and OLT section T3410D. See MAP AA054 for procedure. Because the paths for data and sense are the same, it is possible for failures in this area to cause both data checks and equipment checks.

Note 1: Card 01A-A1D2 is used by tape units 0-3, and card 01A-A1E2 is used by tape units 4 and 5. If you have less than 5 tape units on this tape control, you will not have the A1E2 card.

Note 2: Check sense byte 6 for model and feature codes:

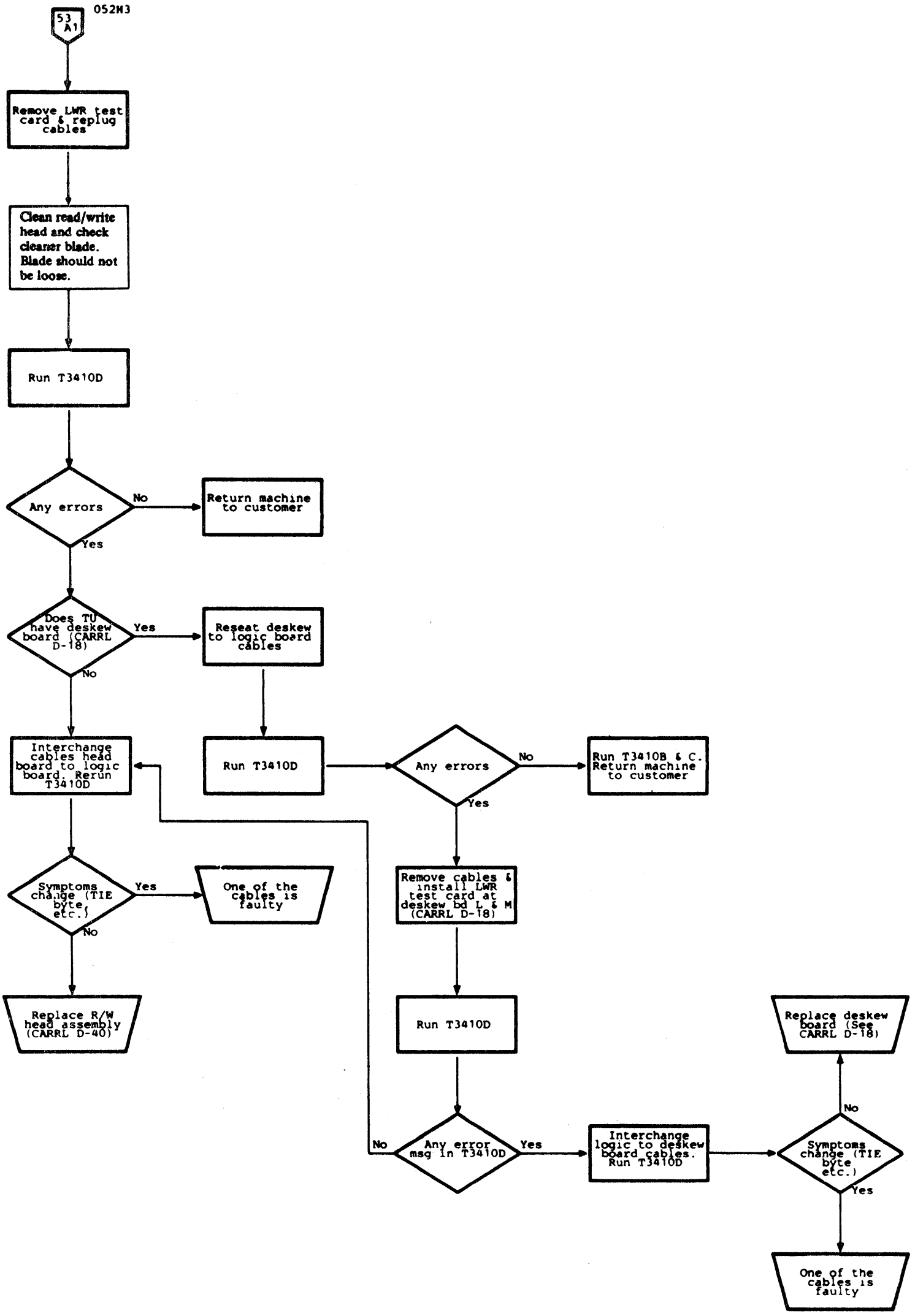
Bit 2 ON if TU has dual density feature.
Bit 2 OFF if TU is PE-only.
Bits 4-7
- 0 0 0 0 = Model 1 tape unit
- 0 0 0 1 = Model 2 tape unit
- 0 0 1 0 = Model 3 tape unit

All other combinations of bits 4-7 are invalid.

Note 3: The LWR test card, P/N 5861454, is an offline tool and must be ordered by the Branch Office. Refer to MAP AA054, Note 1, for assistance
The LWR test does not check the R/W head or shielded cable to the R/W logic board.

EXT = LWR1 for Mod 1
EXT = LWR 2 for Mod 2
EXT = LWR 3 for Mod 3

Data Check



XF1500 Seq. 2 of 2	1845911 Part Number	See C History	736672 26 Oct 73	443751 20 Sept 74	443806 2 May 77	

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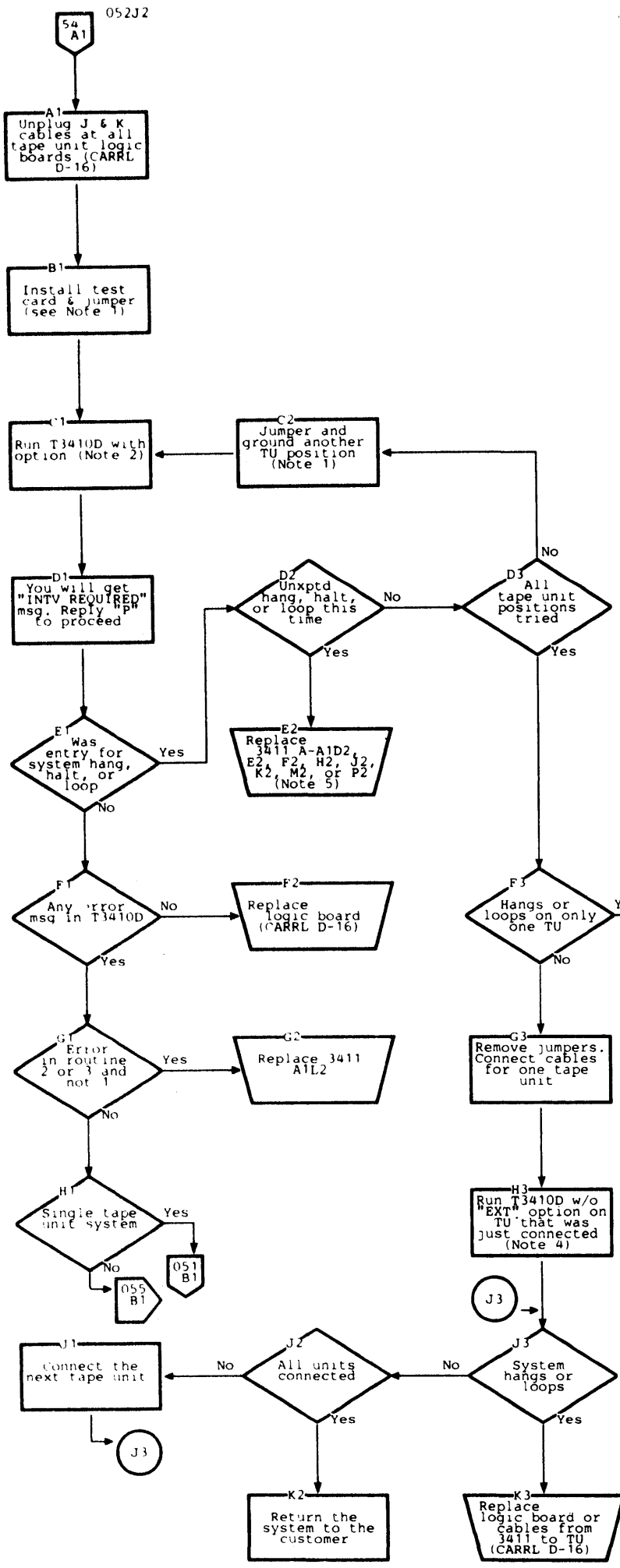
Data Check



Discussion: Use this MAP to diagnose tape-unit-caused unexpected system "hangs," halts, or "loops," and some data path problems.

Note 1:

Tape Unit	Jumper This Point to Ground (A1C2D08)
0	A1C2D11
1	A1C2J11
2	A1C2P11
3	A1C2U11
4	A1E2D11
5	A1E2J11

Plug the LWR test card part 5861454 into logic board sockets J & K of one of the tape units and install the ground jumper as specified in the MAP above. Plug the two cables together that were plugged into J & K by plugging into the pins on the LWR test card. The pins and land pattern on the card provide the necessary crossover to loop Bus Out signals back to the Bus In cable. You must ensure that the cables are correctly oriented so that pin B02 of both cables is at the top. If you came here from MAP AA052, sockets J and K become Land M, and the signal is looped from socket L to socket M of the ¾ planer. It is not necessary to plug the Read/Write cables into the card.

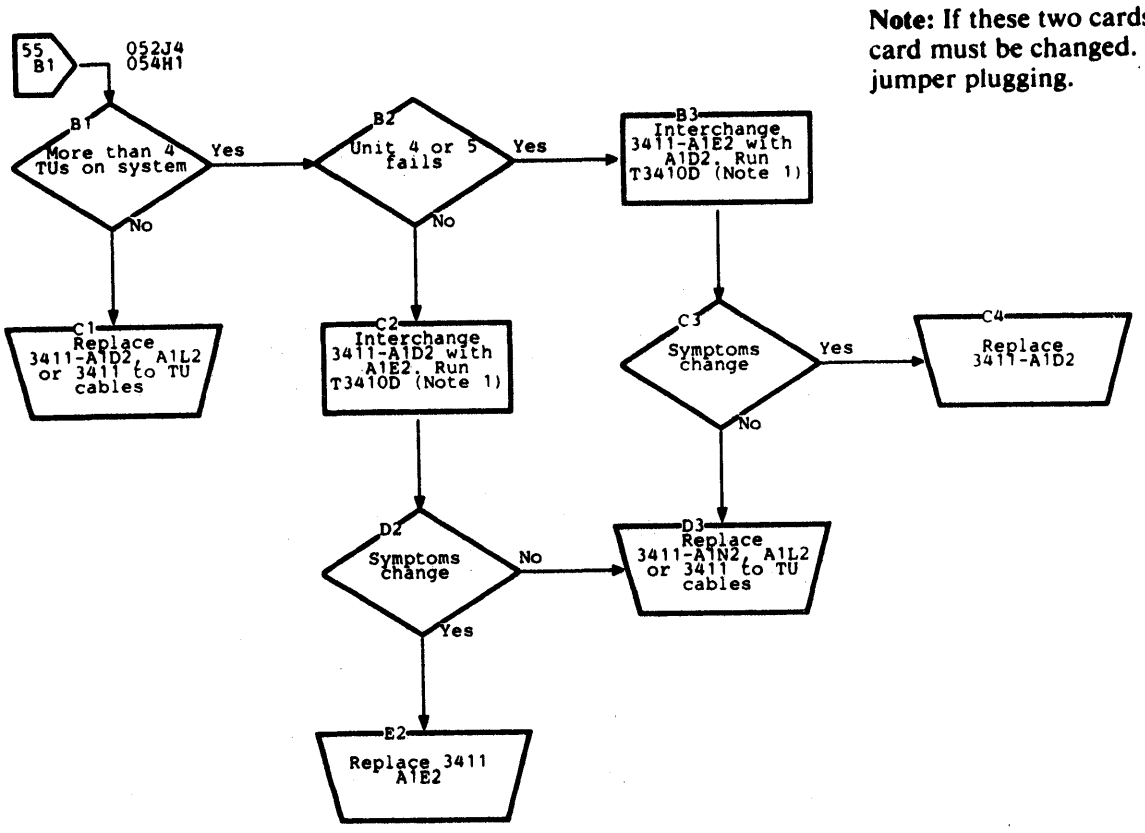
Note 2: Enter **OLT Device/Test/Option**

TU Mod 1: TU Addr/3410D/NFE,EXT=LWR 1/
TU Mod 2: TU Addr/3410D/NFE,EXT=LWR 2/
TU Mod 3: TU Addr/3410D/NFE,EXT=LWR 3/

Note 3: Card 01A-A1D2 is used by tape units 0–3, and card A1E2 is used by tape units 4 and 5. If both cards are in the machine, they can be swapped for further fault isolation.
If these cards were swapped, you must change the jumper on each card. ALD pages JA101 and JA201 show the location of the jumpers.

Note 4: You must cancel the external option at this point. To do this, enter **TU ADDR/3410D/NFE,EXT=/**

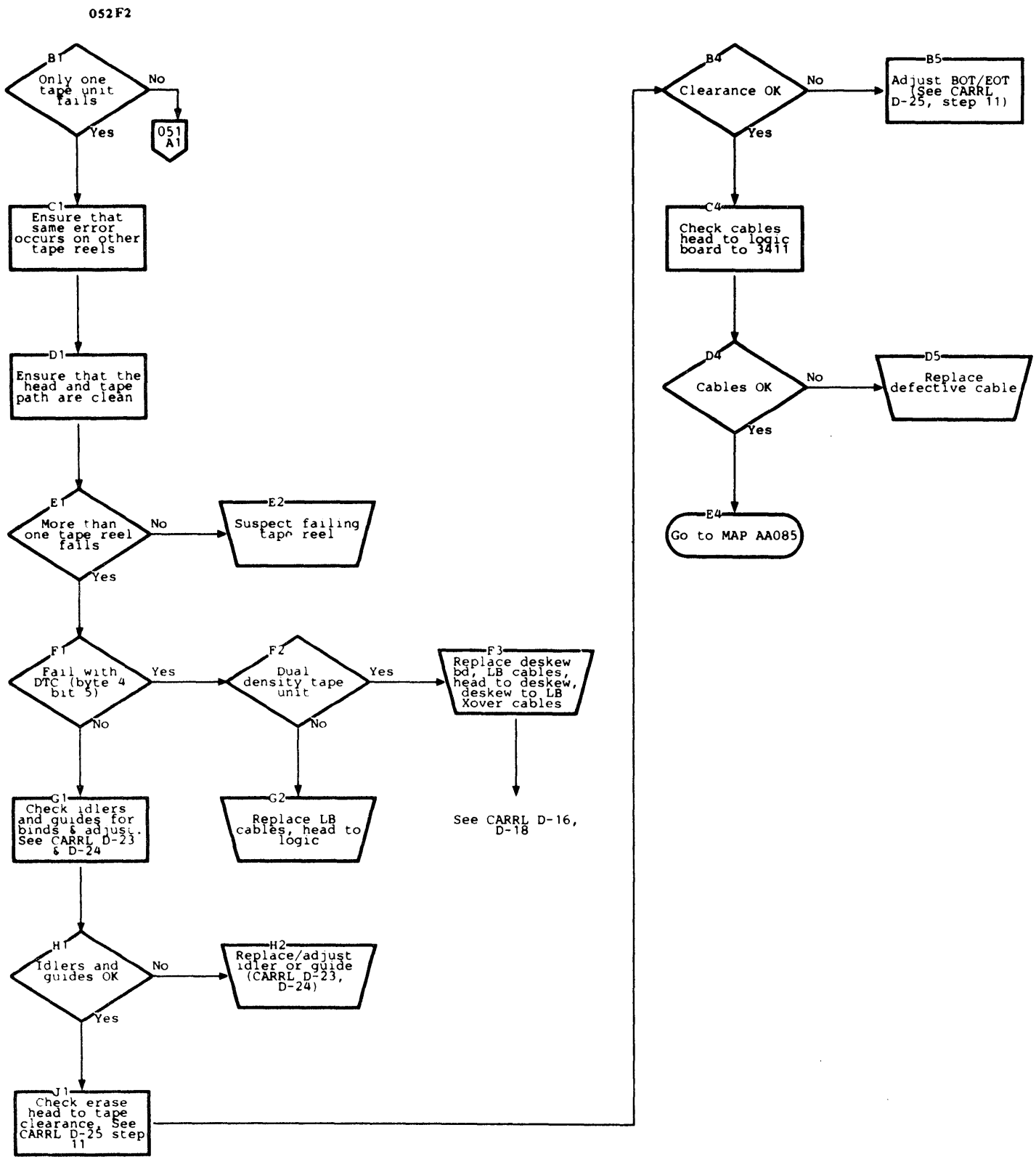
Note 5: Cards 01A-A1D2 and -E2 are the same part number. The E2 card is present only when more than four tape units are attached to a tape control.
Cards 01A-A1H2, -J2, and -K2 also carry the same part number.



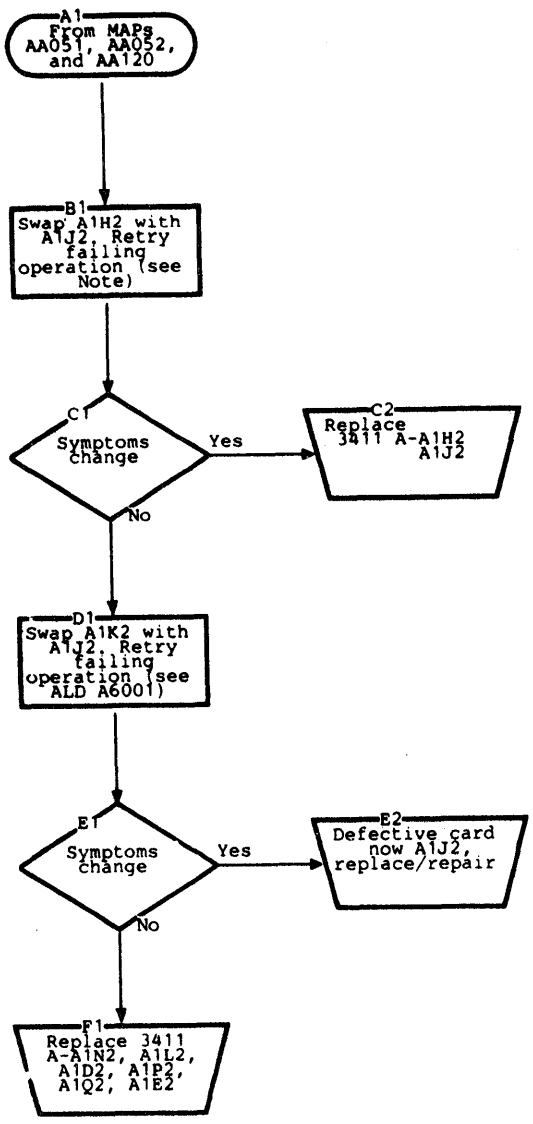
Discussion: You have reached this MAP because only one tape unit failed while being looped back at the tape control.

Note: If these two cards are swapped, the jumper on each card must be changed. ALD pages JA101 & JA201 show jumper plugging.

Data Check



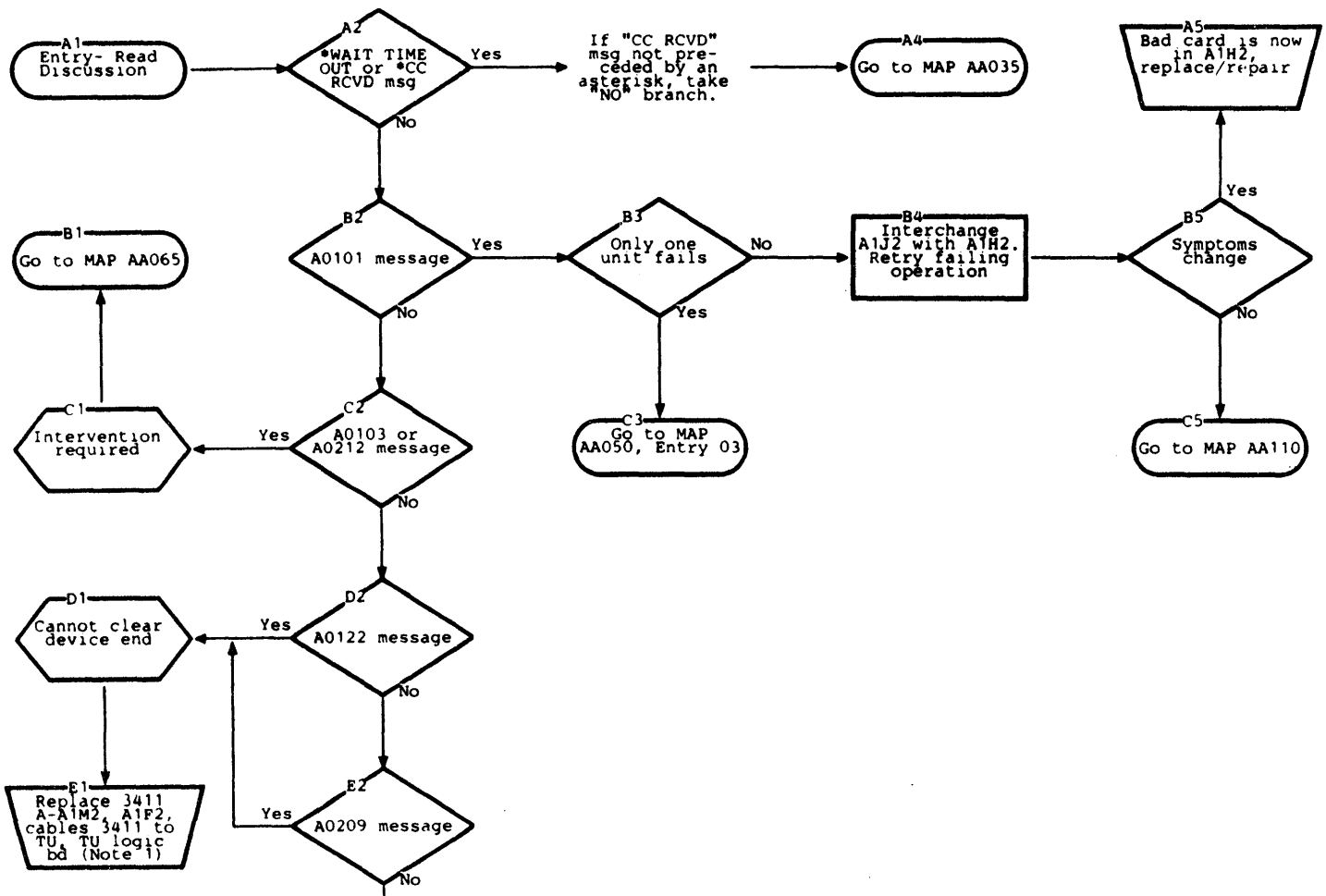
XF1700 Sect 1 of 2	1845913 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734556B 20 Nov 72	734852 26 Feb 73	443751 20 Sept 74

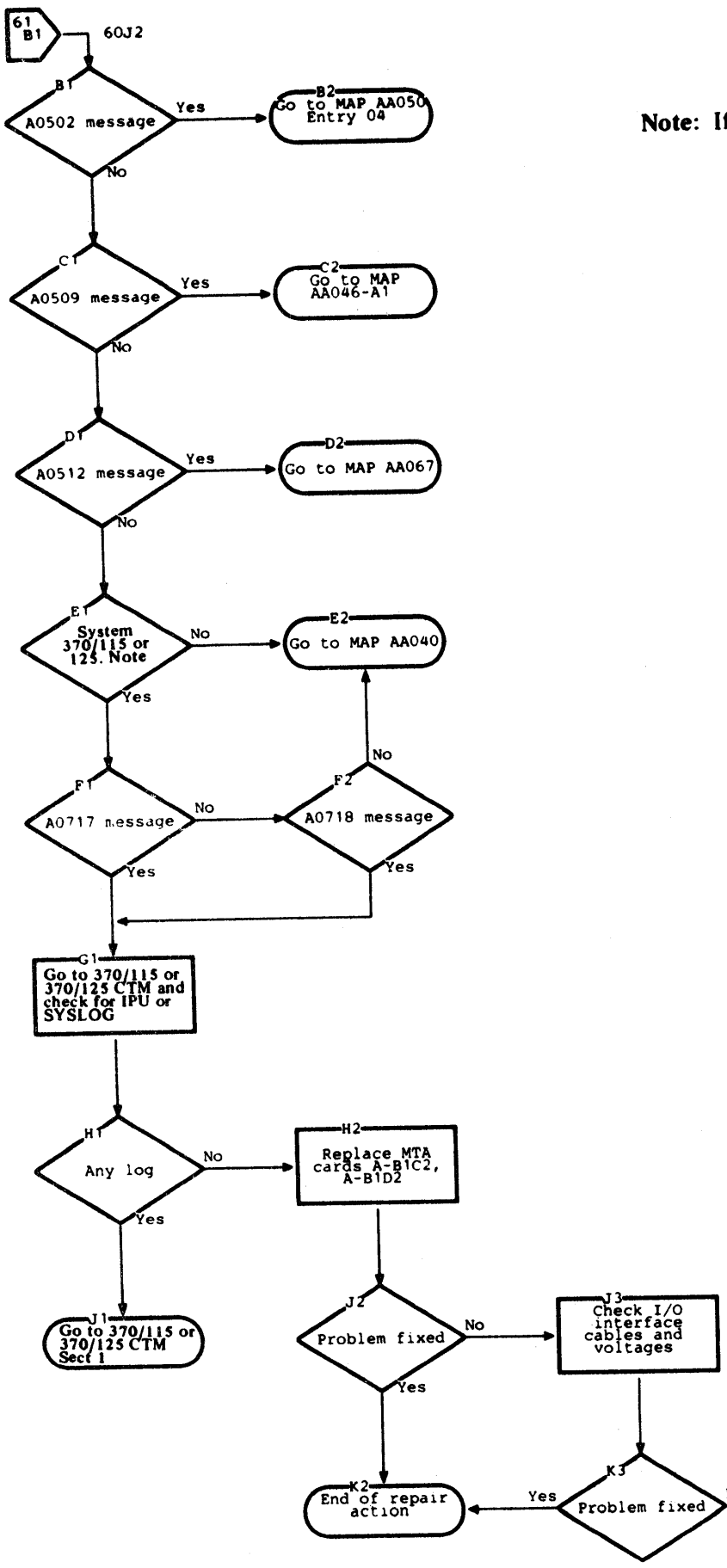


Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

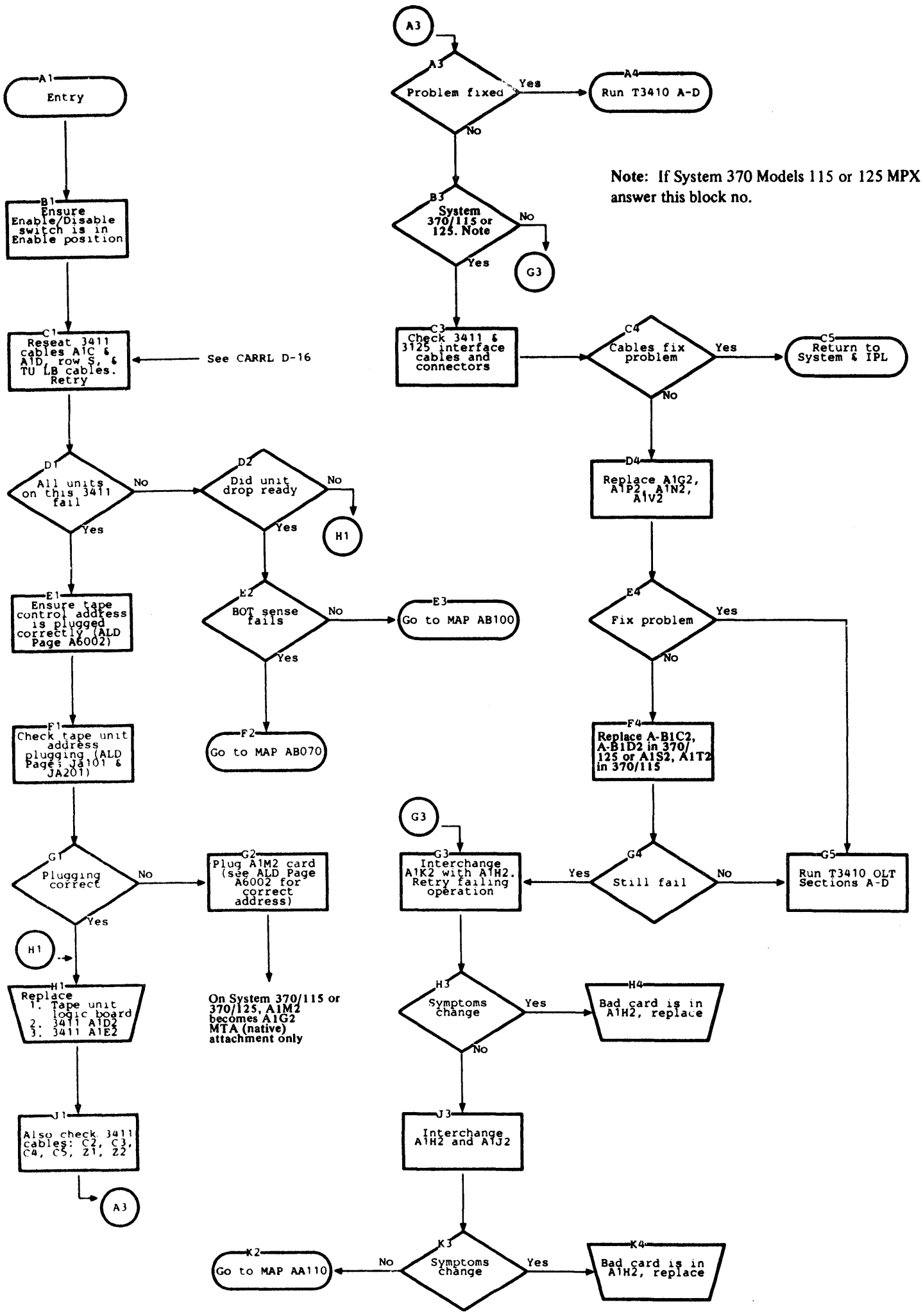
Discussion: The questions about message numbers on this MAP pertain to the first error message. You could have several of the messages listed here. Start with the first error message on your printout and answer the questions with regard to that message.

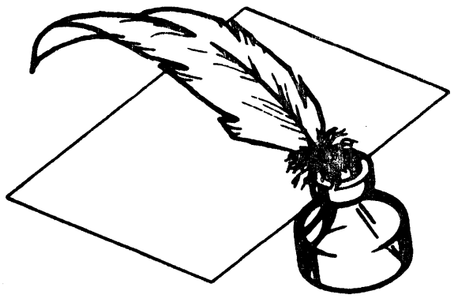
Note 1: System 370/115 or 370/125, A1M2 becomes A1G2 in the 3411 tape control and A-B1C2, A-B1D2 in the 3125 and AA1S2, AA1T2 in the 3115. Interface problems can also be caused by attachment cables. If MPX attached, the channel interface locations are: 370/115 and 370/125 – 01BA1B02.





Note: If Systems 370 Model 115 or 125 MPX attached, answer this block no.


A1
Entry
B1
Ensure Enable/Disable switch is in Enable position
C1
Reseat 3411 cables A1C & A1D, row S, & TU LB cables. Retry
See CARRL D-16
D1
All units on this 3411 fail
No
Yes
D2
Did unit drop ready
No
Yes
H1
E1
Ensure tape control address is plugged correctly (ALD Page A6002)
E2
BOT sense fails
No
Yes
E3
Go to MAP AB100
F1
Check tape unit address plugging (ALD Pages JA101 & JA201)
F2
Go to MAP AB070
G1
Plugging correct
No
Yes
G2
Plug A1M2 card (see ALD Page A6002 for correct address)
On System 370/115 or 370/125, A1M2 becomes A1G2 MTA (native) attachment only
H1
Replace
1. Tape unit logic board
2. 3411 A1D2
3. 3411 A1E2
J1
Also check 3411 cables: C2, C3, C4, C5, Z1, Z2
A3
A3
A3
Problem fixed
Yes
No
A4
Run T3410 A-D
B3
System 370/115 or 125. Note
No
Yes
G3
Note: If System 370 Models 115 or 125 MPX attached, answer this block no.
C3
Check 3411 & 3125 interface cables and connectors
C4
Cables fix problem
Yes
No
C5
Return to System & IPL
D4
Replace A1G2, A1P2, A1N2, A1V2
E4
Fix problem
Yes
No
F4
Replace A-B1C2, A-B1D2 in 370/125 or A1S2, A1T2 in 370/115
G3
G3
Interchange A1K2 with A1H2. Retry failing operation
G4
Still fail
Yes
No
G5
Run T3410 OLT Sections A-D
H3
Symptoms change
Yes
No
H4
Bad card is in A1H2, replace
J3
Interchange A1H2 and A1J2
K3
Symptoms change
No
Yes
K2
Go to MAP AA110
K4
Bad card is in A1H2, replace



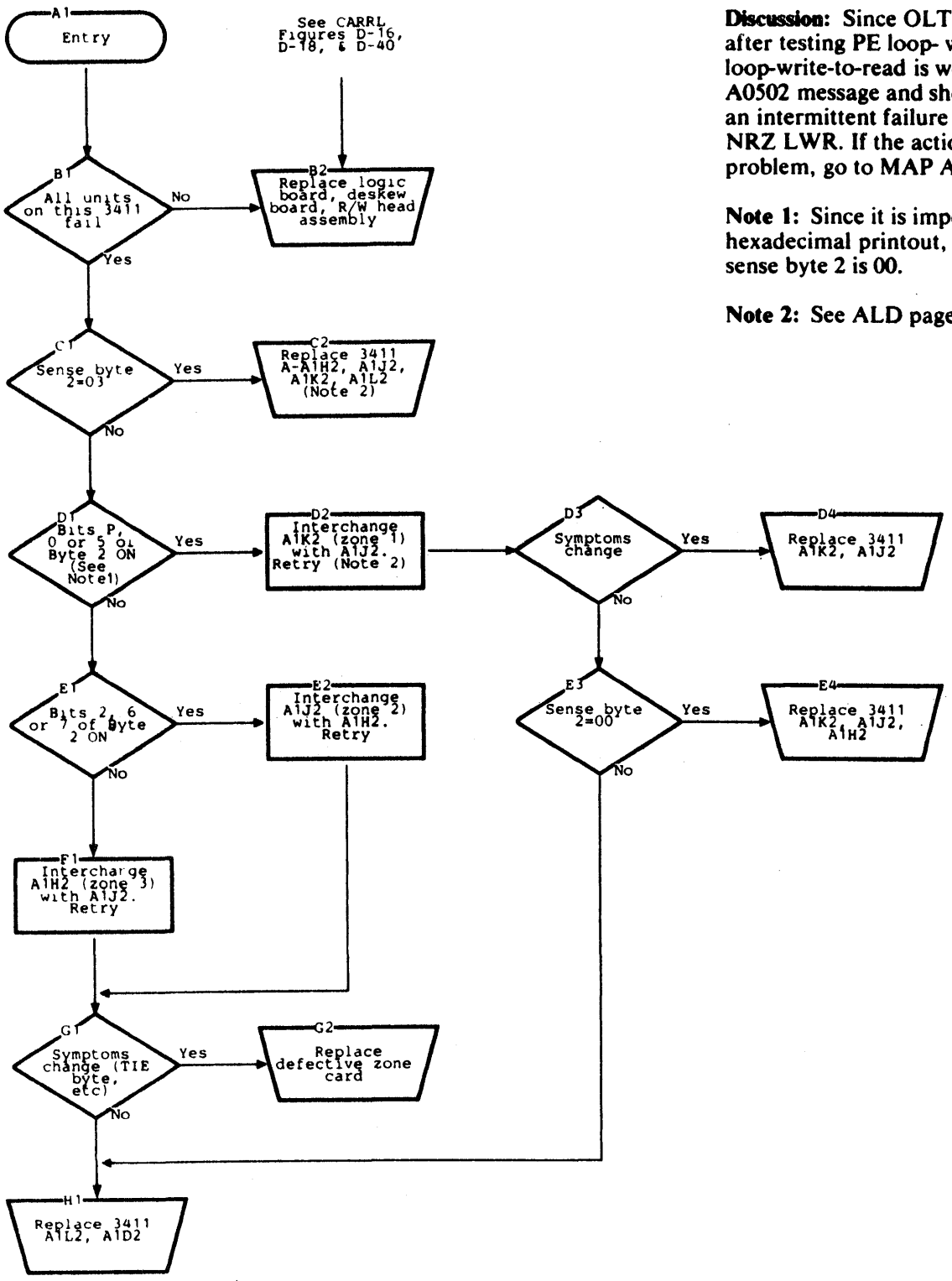
Notes

Intervention Required

MAP AA066

XF1850 Seq 2 of 2	1846052 Part Number	734864 B 1 Aug 73	443751 20 Sept 74		

NRZI LWR Failure

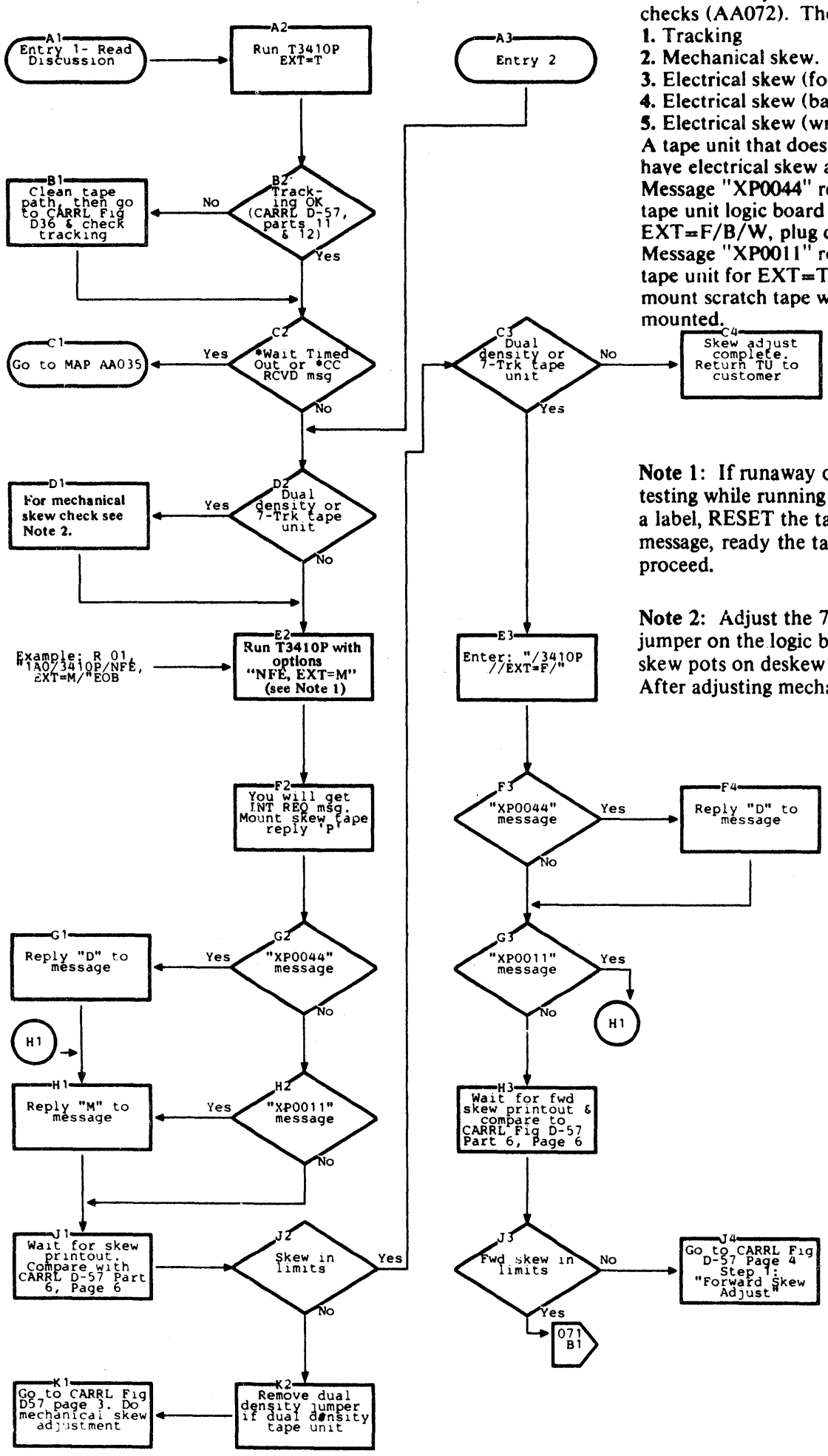


Discussion: Since OLT Section "A" tests NRZI loop-write-to-read after testing PE loop- write-to-read, this MAP assumes that PE loop-write-to-read is working. If PE LWR failed, you would get an A0502 message and should go to MAP AA051. It is possible that an intermittent failure could have passed PE LWR and failed on NRZ LWR. If the action on this MAP does not resolve the problem, go to MAP AA051.

Note 1: Since it is impossible to represent the P bit in a hexadecimal printout, it is assumed that the P bit is ON when sense byte 2 is 00.

Note 2: See ALD page A6001 for plugging instructions.

Skew Check and Adjust



Discussion: Since skew and tracking are interrelated, you are asked to verify that tracking is correct before proceeding with skew checks (AA072). The sequence is as follows:

1. Tracking	EXT=T	
2. Mechanical skew.	EXT=M	T3410P
3. Electrical skew (forward).	EXT=F	EXTERNAL
4. Electrical skew (backward).	EXT=B	OPTIONS
5. Electrical skew (write).	EXT=W	

A tape unit that does not have the dual density feature does not have electrical skew adjustments.

Message "XP0044" requests removal of the dual density jumper on tape unit logic board for EXT=T/M. Reply "D" when removed. For EXT=F/B/W, plug dual density jumper. Reply "D" when plugged.

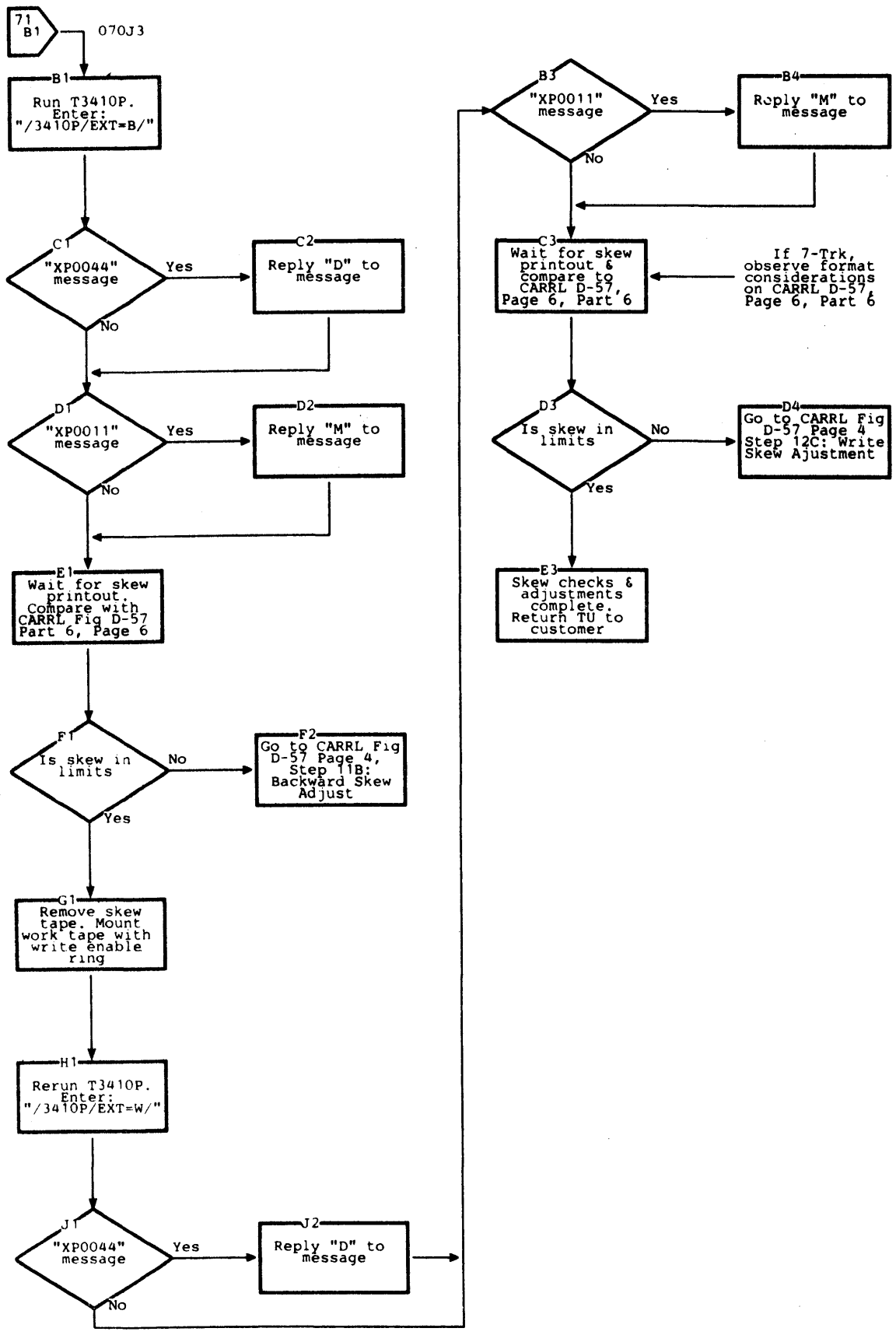
Message "XP0011" requests the master skew tape mounted on tested tape unit for EXT=T/M/F/B. Reply "M" when mounted. For EXT=W, mount scratch tape with write enable ring. Reply "M" when mounted.

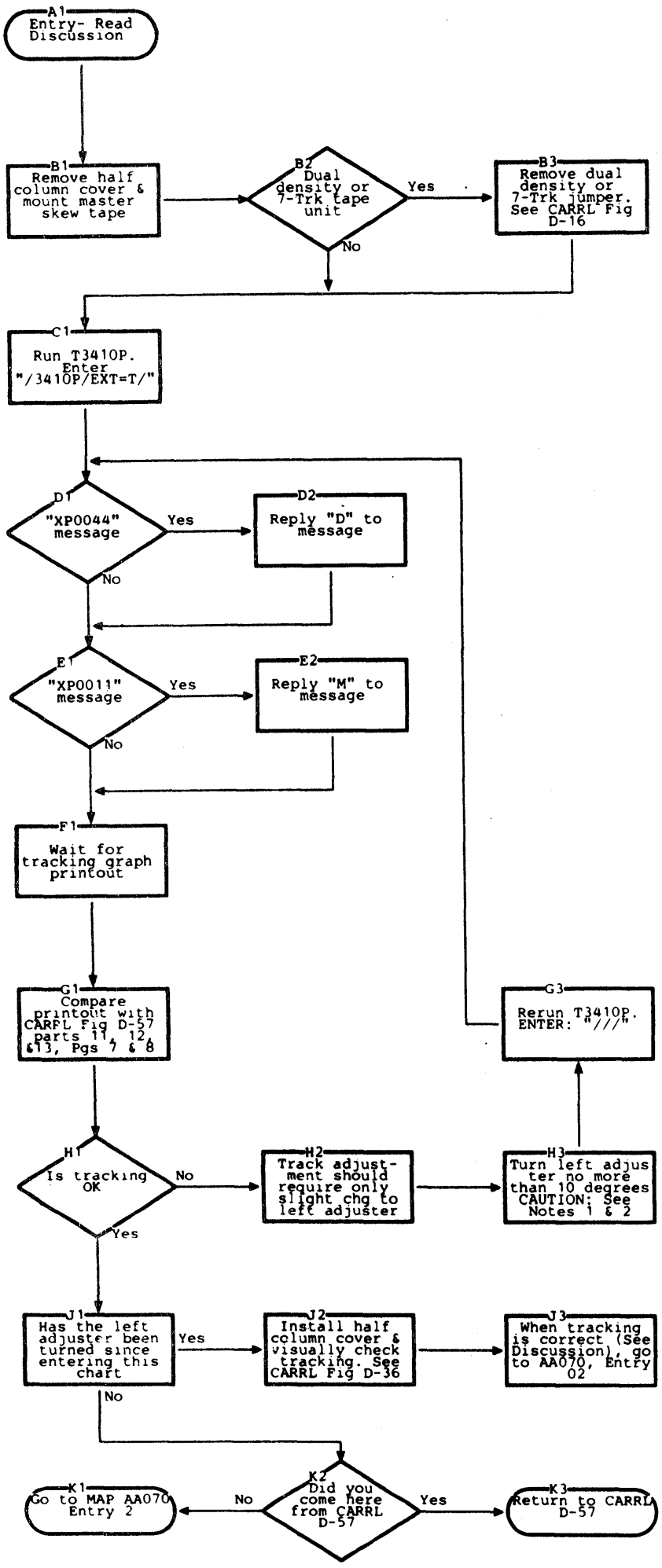
Note 1: If runaway occurs on the particular tape unit you are testing while running OLTs with OS or DOS and trying to read a label, RESET the tape unit. After "unreadable tape label" message, ready the tape unit, and continue by replying "P" to proceed.

Note 2: Adjust the 7-track mechanical skew. Leave the 7-track jumper on the logic board and turn FWD and BKWD electrical skew pots on deskew board clockwise for minimum setting. After adjusting mechanical skew, readjust electrical skew.

XF1900 Seq. 2 of 2	1845915 Part Number	See EC History	736672 26 Oct 73	443751 20 Sept 74		

Skew Check and Adjust



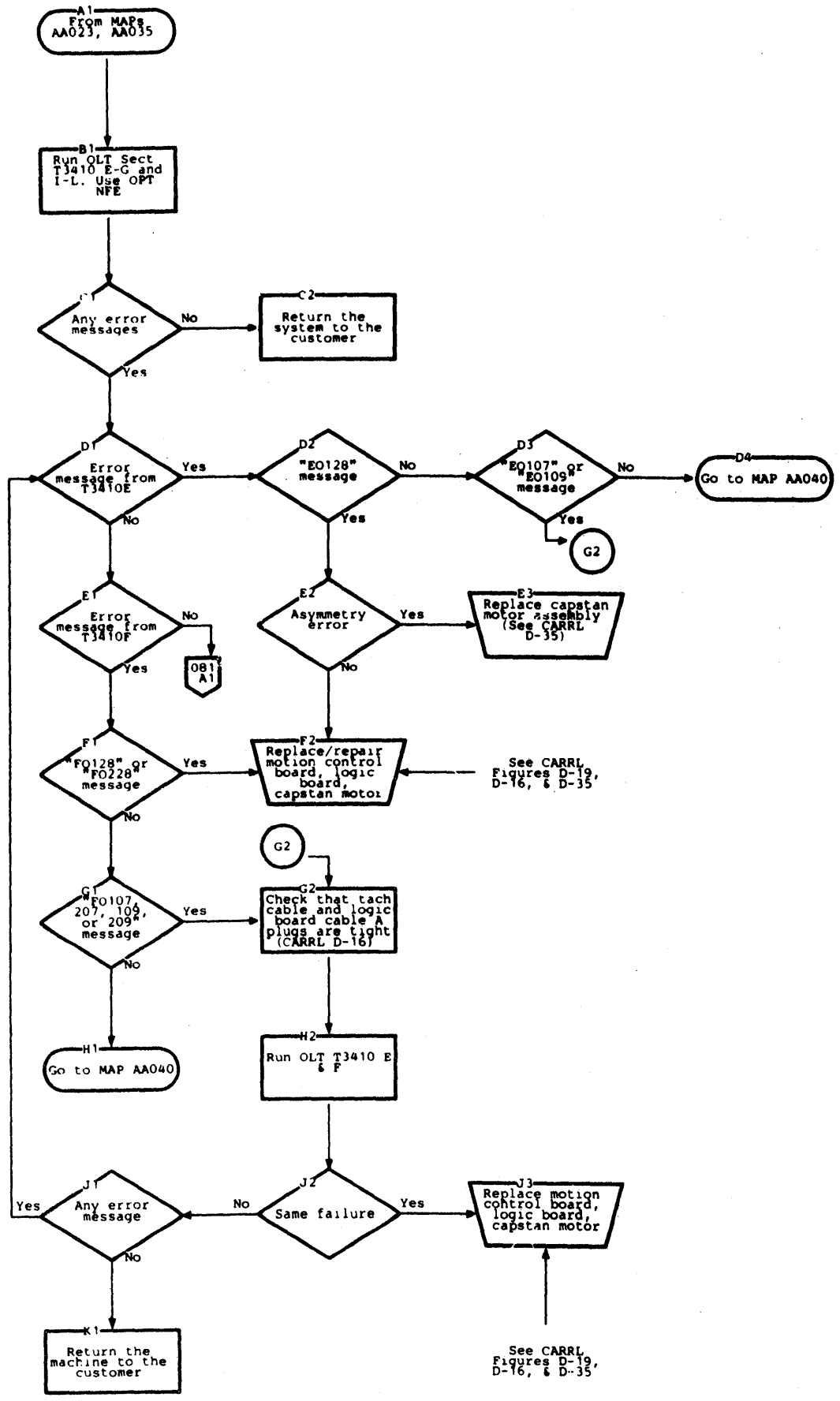


Discussion: Entry to this MAP assumes that a visual check of tracking has been made, using CARRL Figure D-36. The objective is to have tracking as specified by CARRL Figure D-36 Step 9 and to have the tracking printout of section T3410P indicate minimum tracking shift between forward and backward tape motion.

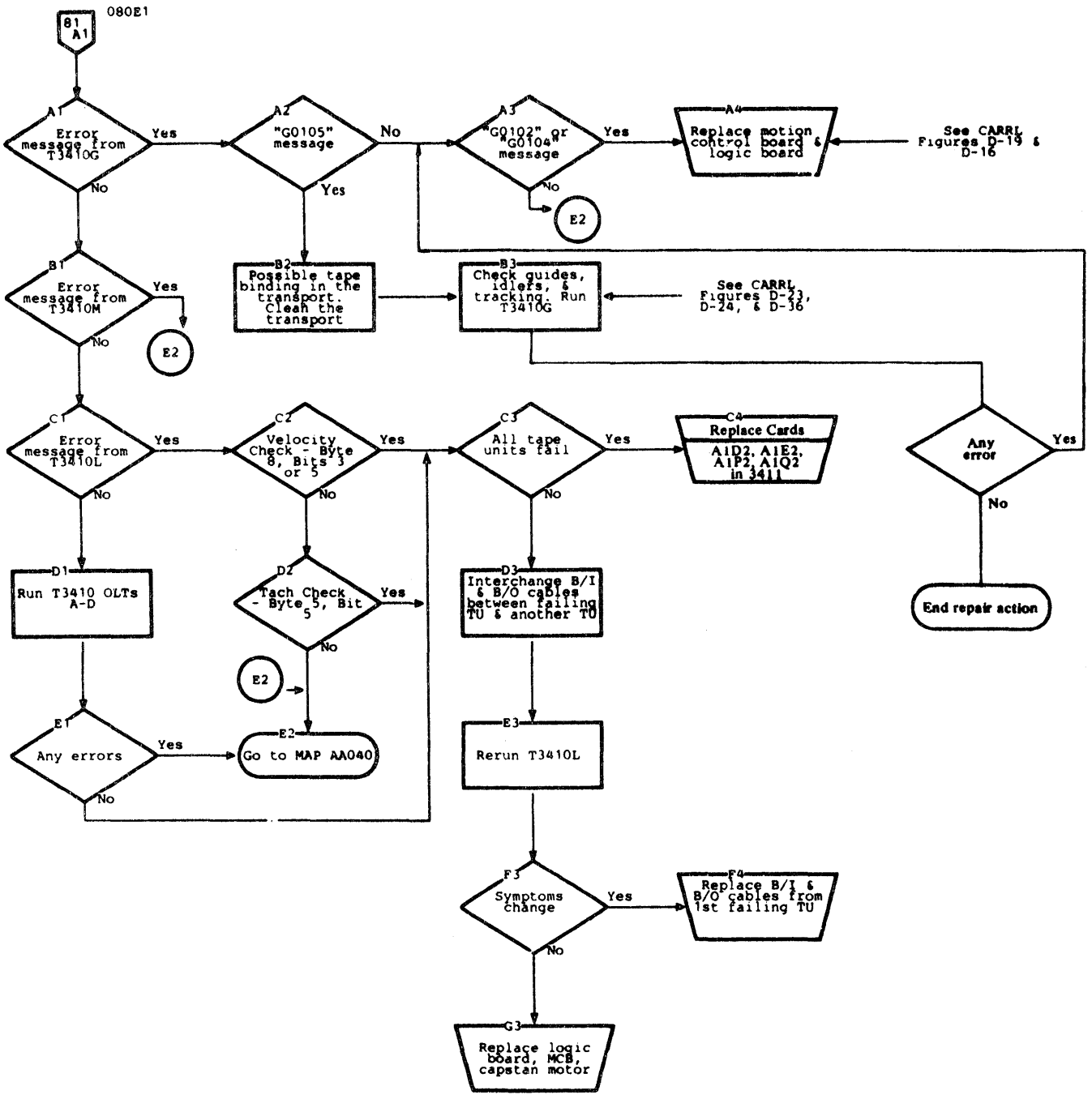
Note 1: If you are unable to obtain correct tracking after several tries, or if the printout shows no change between tries, go back to CARRL Figure D-36 and verify the visual check of tracking.

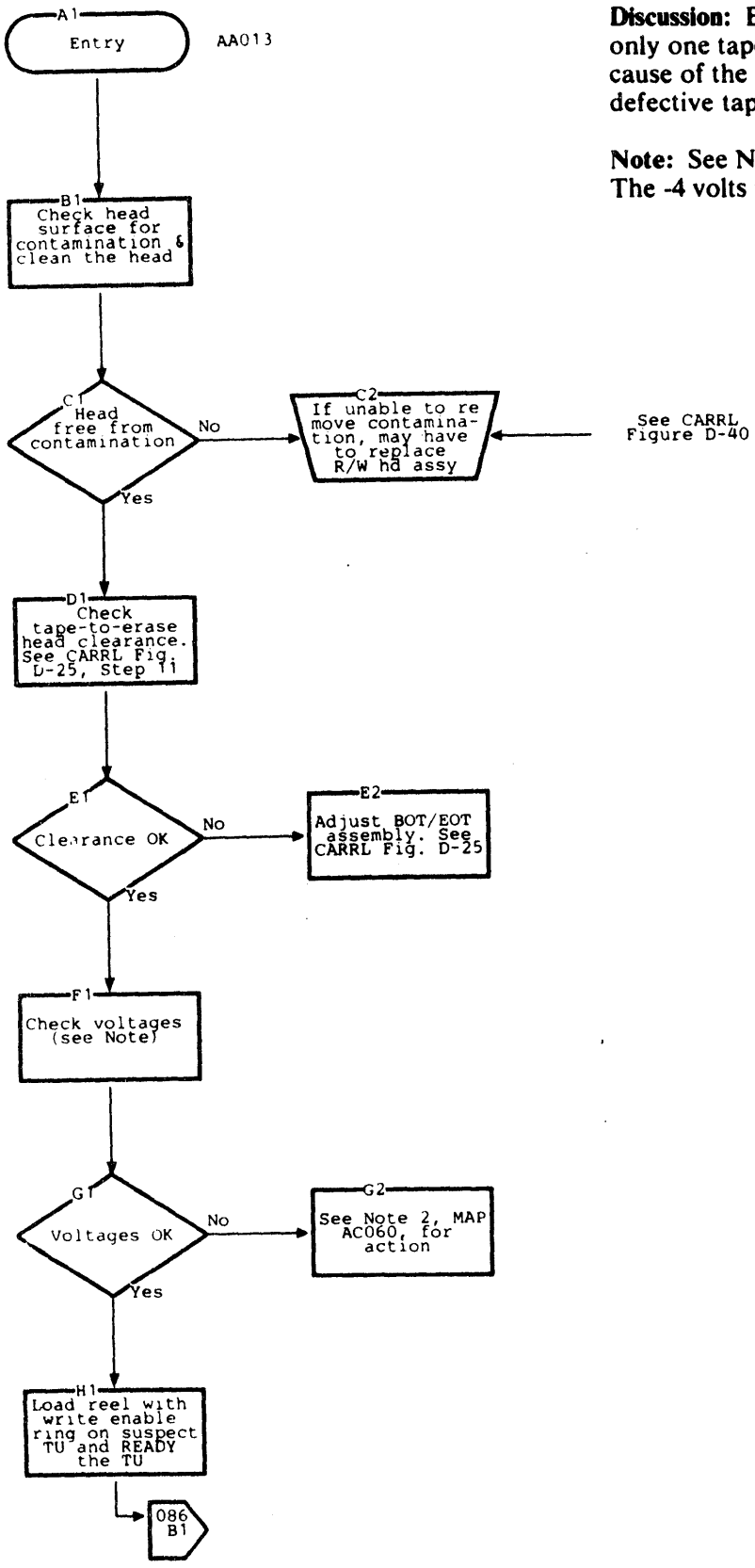
Note 2: If runaway occurs on the particular tape unit you are testing while running OLTs with OS or DOS and trying to read a label, RESET the tape unit. After "unreadable tape label" message, ready the tape unit, and continue by replying "P" for proceed.

Velocity and Tachometer Checks



Velocity and Tachometer Checks

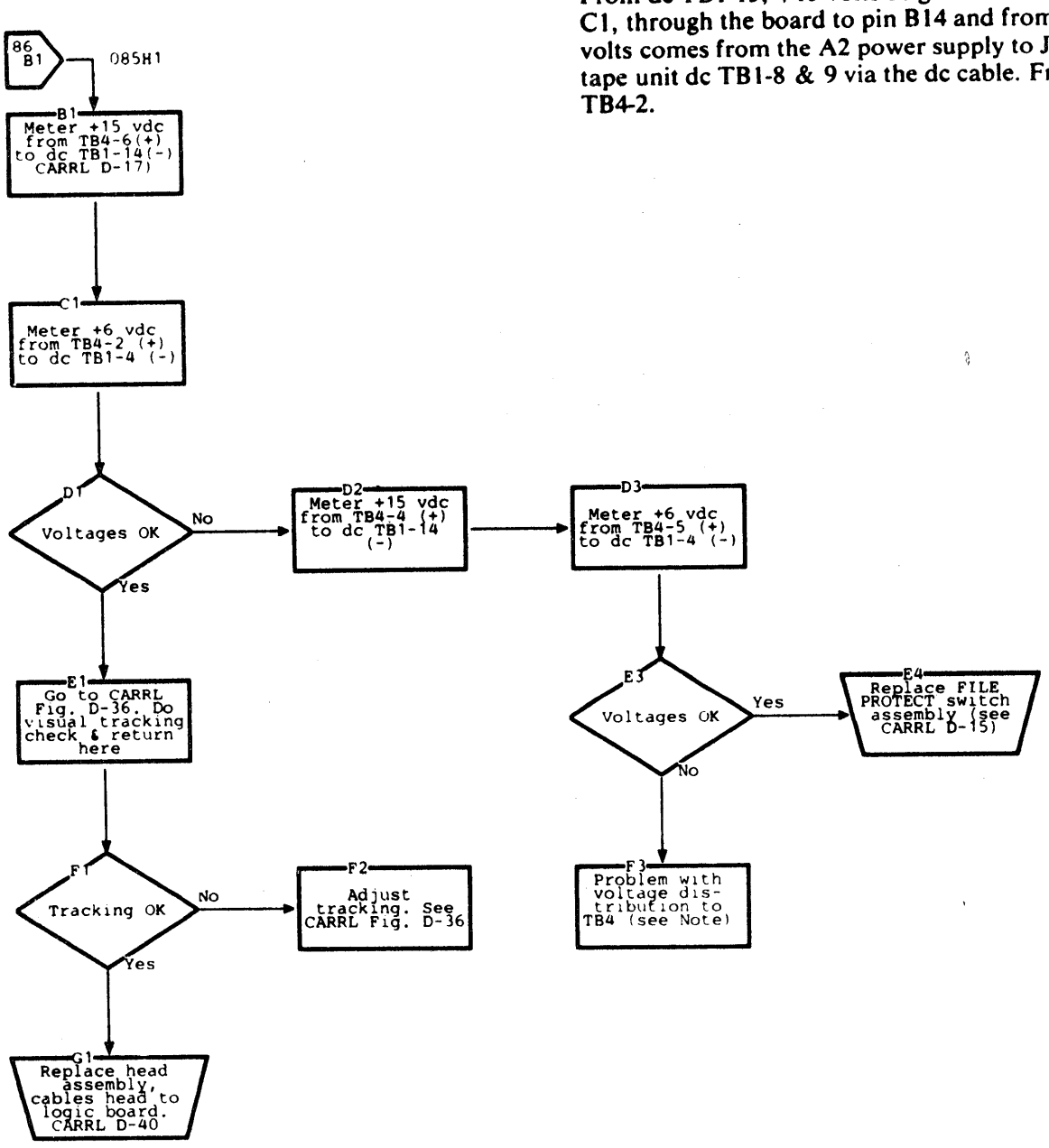




Discussion: Entry to this chart is for data checks that occur on only one tape unit and the R/W head assembly is suspected to be cause of the failure. Be sure the data check is not caused by defective tape. Try more than one tape reel.

Note: See Note 1 on MAP AC060 for voltage check procedure. The -4 volts need not be checked at this time.

Note: The +15 volts comes from A2 TB1-16 (YG110) to J21-J26 (YG112) to the tape unit dc TB1-10 through 13 via the dc cable. From dc TB1-13, +15 volts dc goes to the motion control board pin C1, through the board to pin B14 and from there to TB4-6. The +6 volts comes from the A2 power supply to J21-J26 (YG112) to the tape unit dc TB1-8 & 9 via the dc cable. From dc TB1-8, it goes to TB4-2.

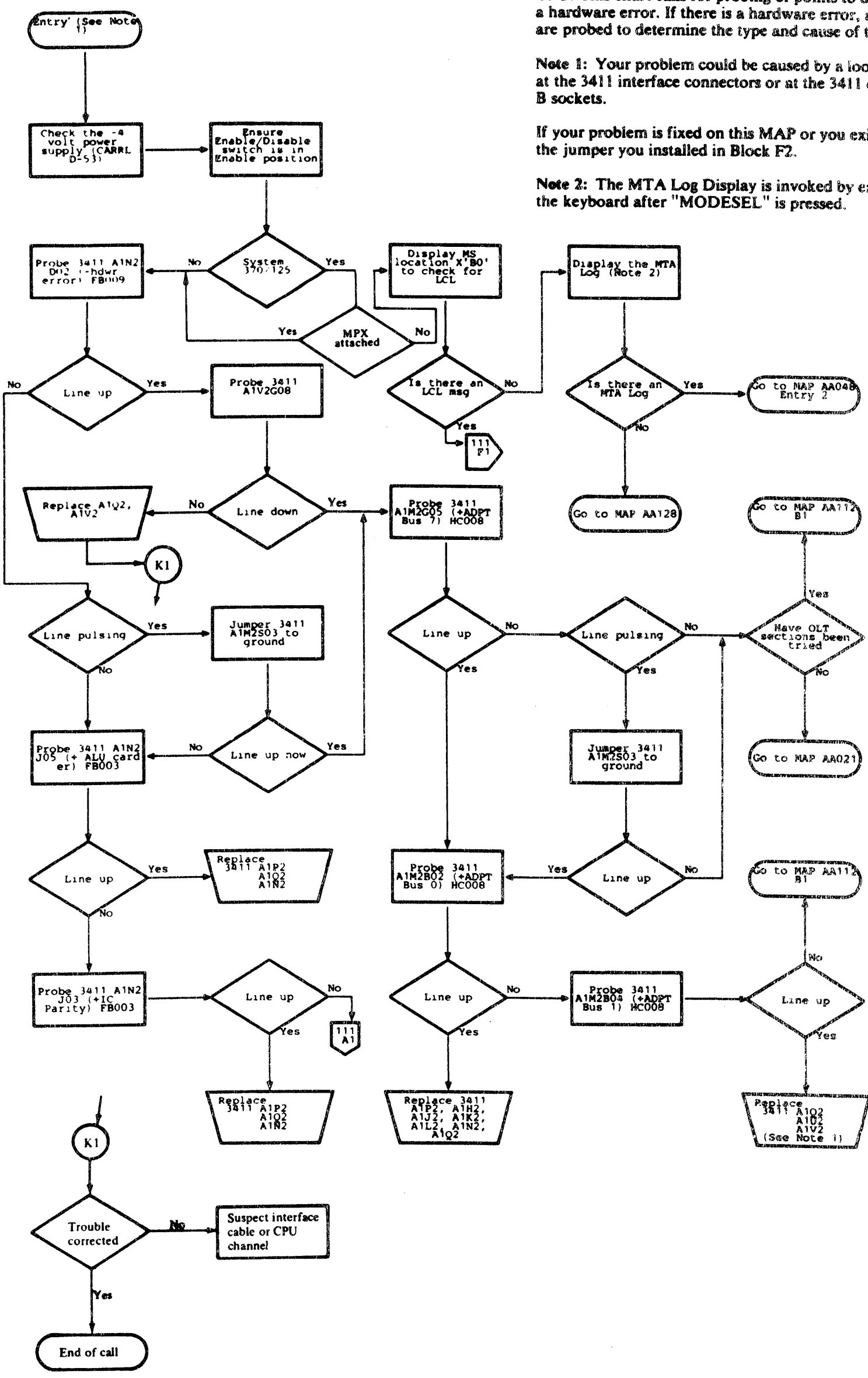


Read/Write Head Assembly

MAP AA086

XF2200 Seq. 2 of 2	1845918 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734864 1 Aug 73		

Hardware Error (System/360; System/370)



Discussion: Hardware errors in the 3411 will freeze the microprogram so it is not possible to get sense information to the CPU. This chart calls for probing of points to determine if there is a hardware error. If there is a hardware error, additional points are probed to determine the type and cause of the error.

Note 1: Your problem could be caused by a loose or failing cable at the 3411 interface connectors or at the 3411 circuit board A and B sockets.

If your problem is fixed on this MAP or you exit this page, remove the jumper you installed in Block F2.

Note 2: The MTA Log Display is invoked by entering "MBK" on the keyboard after "MODESEL" is pressed.

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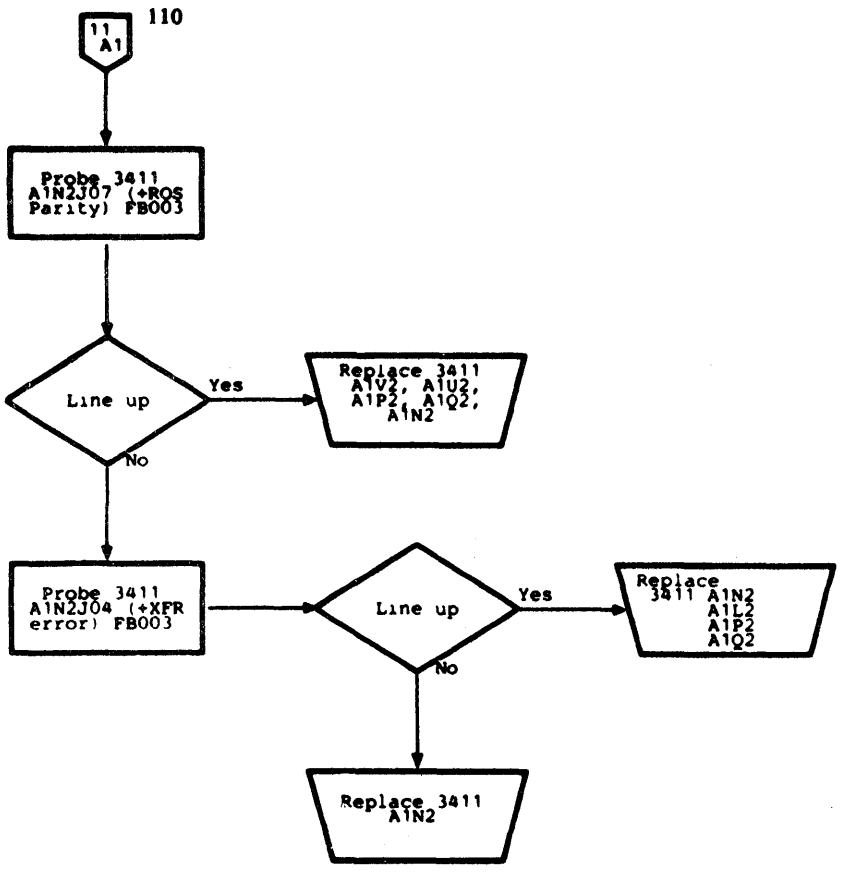
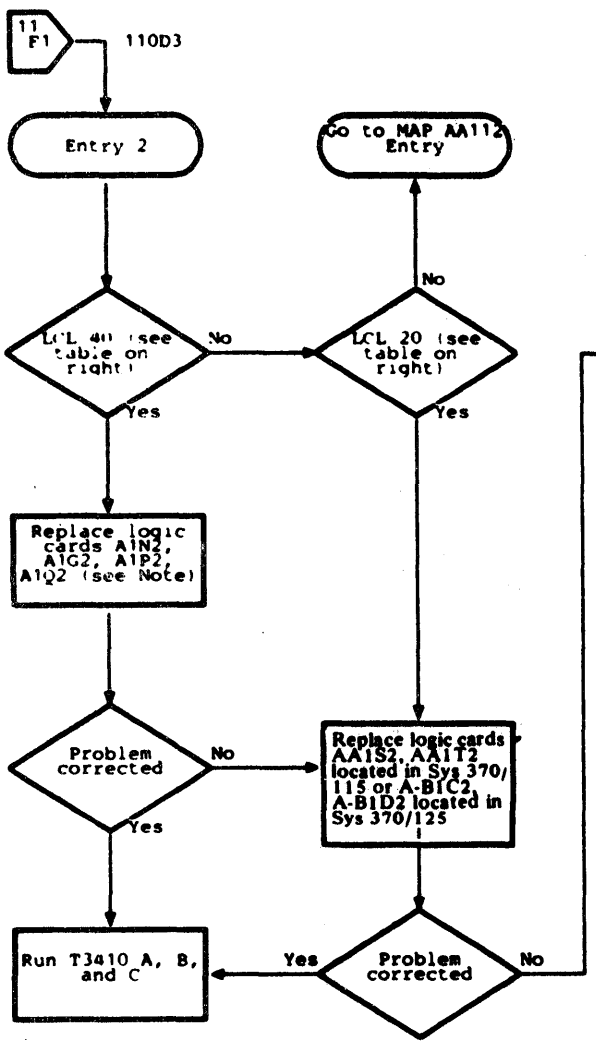


Note: If machine still fails check -4 volts at A1Q2M06(-) to A1Q2P08(+). Voltage should be -4 volts ± 1%. Check +6 volts at A1K2S11(+) to A1K2U08(-). Voltage should be +6 ±4%. If volts not correct, go to MAP AC060 Note 2.

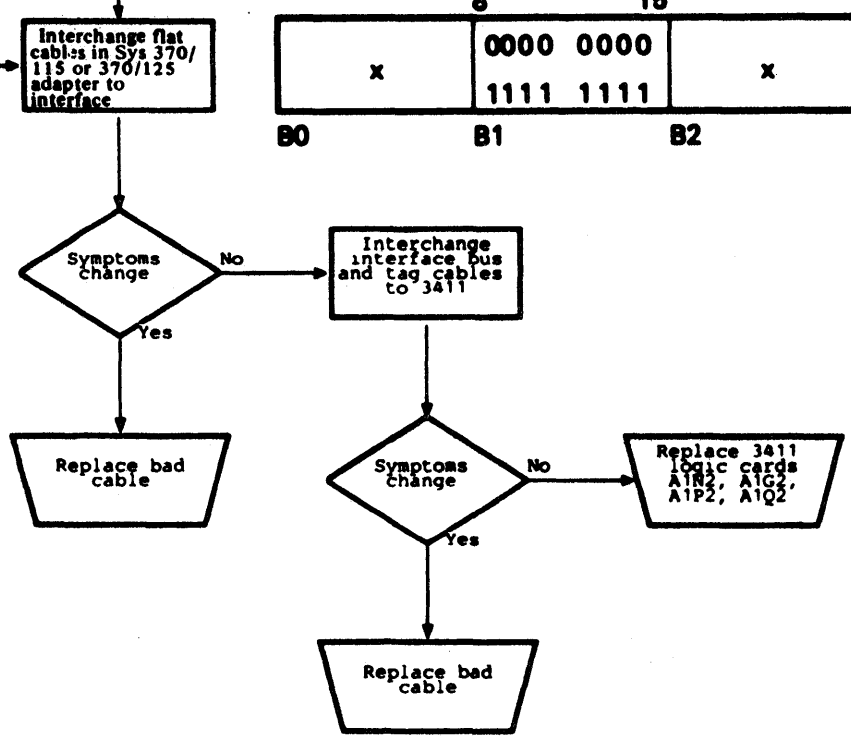
LCL Entry 370/115, 370/125



Description Table:

MS location X'B0' for LCL Display. Decode as follows:

	Bits 8 15		
x	0000 0000 1111 1111	x	x
B0	B1	B2	B3



XF2300 Sect 2 of 2	1845919 Part Number	See EC History	443751 20 Sept 74	443806 2 May 77		

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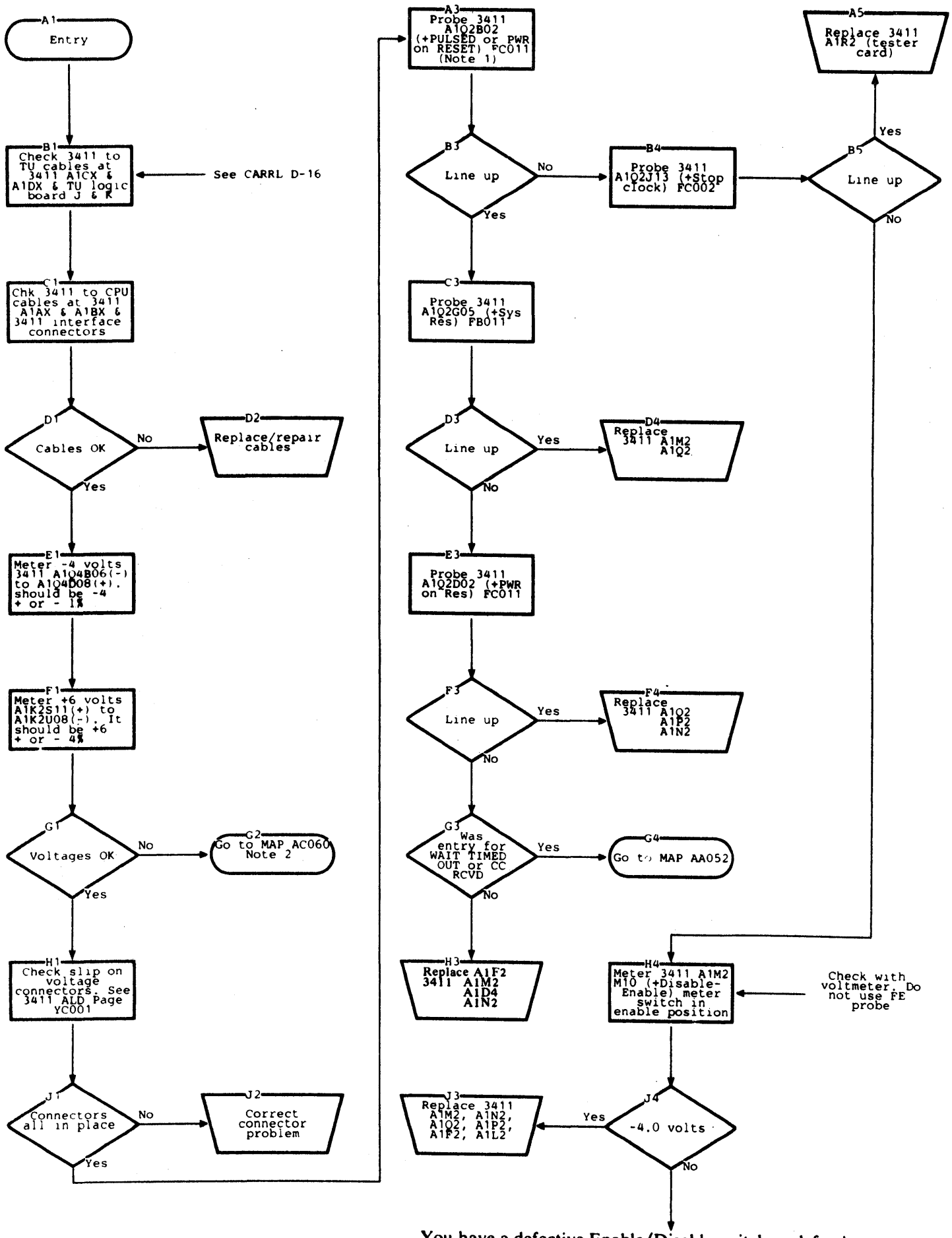
Note 1: Refer to SER 3 for functional description of FE Diagnostic Probe. You must understand probe response to "Line Up," "Line Down," and "Line Pulsing."



You have a defective Enable/Disable switch or defective wiring to the switch. The switch is wired from TB2-6 (ground) through the switch to TB2-12 and then to A1G2P13. A1G2P13 connects to A1M2M10.

Error Messages and Action Codes

Find the OS or DOS error message in the left column of MAPs AA120, AA121, and AA122. Using the Action Code listed with the message, go to the Action Code charts on MAPs AA123, AA124, and AA125. Take the indicated action.

ERROR MESSAGE	CODE	REASON FOR MESSAGE
BK INTO LP (DOS)	X	BACKWARD INTO LOAD POINT—A backward command, other than read backward, into load point (BOT) was issued to the tape unit.
BUSOUT CHK (DOS) BUS OUT CK (OS)	D	BUS OUT CHECK—Bad parity was detected on bus out during command or data byte transfer.
CANCELLED DUE TO CHANNEL FAILURE (DOS)	A	A machine check has occured as the result of a channel failure, or an I/O interrupt that caused a logout has occurred.
CANCELLED DUE TO I/O ERROR	O	An unrecoverable I/O error occurred during job processing.
CHAIN CHECK (OS)	K	CHAINING CHECK—A channel overrun occurred during data chaining on input operations.
CHAN CTL CK (OS)	A	CHANNEL CONTROL CHECK is caused by any machine malfunction affecting channel controls. See: IBM System/360 Principles of Operation, Form A22-6821, for full explanation of this error. See Note below.
CHAN DATA CK (OS) CHAN DTCHK (DOS)	A	CHANNEL DATA CHECK indicates the channel has detected a parity error in the information transferred to or from main storage during an I/O operation. See: IBM System/360 Principles of Operation, Form A22-6821, for a full explanation of this error.
CHAN ERROR ON CUU (DOS)	A	A channel control check or interface control check occurred during an I/O operation on the device at CUU (channel and unit).
CMD REJECT (OS) COMM REJECT (DOS)	B	COMMAND REJECT—Invalid CCW command or command sequence was detected by the device, or a write type command was issued to a file protected tape unit, or a Data Security Erase (DSE) was not chained to an Erase Gap command.
CONVRT CHK (DOS) DATA CONV CK (OS)	E	DATA CONVERTER CHECK—The data block just read in data convert mode did not contain a multiple of four characters. If the system is available to run diagnostics, run T3410Q (Log Analysis) to get an analysis of the failure. If the system will not be available for some time to run diagnostics, you should proceed with an analysis of the sense bytes printed out with the error message. Use this chart to find the action code associated with the sense bit(s) that caused EQUIPMENT CHECK to be set on.

Note: On System 360/25, the "Disconnect In" line should be made inoperative to clearly define the failing I/O attachment.

Error Messages and Action Codes

Find the OS or DOS error message in the left column of MAPs AA120, AA121, and AA122. Using the Action Code listed with the message, go to the Action Code charts on MAPs AA123, AA124, and AA125. Take the indicated action.

ERROR MESSAGE	SENSE byte, bit	CODE	REASON FOR MESSAGE
DATA CHECK (OS AND DOS)			The tape unit or tape control has detected a data error other than BUSOUT CHECK. DATA CHECK can be caused by any of the following:
	8,5	JJ	1. START VELOCITY CHECK: The tachometer velocity was not within ±5% of nominal timing for four consecutive tach pulses, within a total of 16 tach pulses, after the tape unit signalled it had completed generation of the IBG.
	8,5	JJ	2. END VELOCITY CHECK: The tachometer velocity was not within ±5% of nominal timing for four consecutive tach pulses after the end of the read back check of a write operation.
	4,5	FF	3. DIAGNOSTIC TRACK CHECK: A dead track or a phase error was detected during a loop-write-to-read (LWR) operation.
	3,0	Z	4. VERTICAL REDUNDANCY CHECK: A parity error occurred on a read which was not corrected during a read or read backward, or a parity error occurred during a read-back check of a write operation.
	3,3	EE	5. ENVELOPE CHECK (PE): During a read, read backward, or write, the signal amplitude dropped below an acceptable level, or a phase error occurred.
	5,3	DD	6. PE ID BURST CHECK: The PE identification burst was not written correctly from BOT, or a start velocity check occurred during either a PE or NRZI write from BOT.
	4,5	HH	7. PARITY COMPARE CHECK: The parity of a data byte sent to the channel disagrees with the parity of that byte as it was received from the micro code portion of the tape control.
	5,6	DD	8. FALSE END MARK (PE): The postamble all ones byte was detected prematurely, or too few postamble zeros were detected after sensing the postamble all ones byte.
	3,2	BB	9. SKEW CHECK: Present if bits within a data byte are excessively misaligned during a PE read or read backward, or during a NRZI write if bits within a data byte do not arrive within approximately 40% of the normal byte period during a NRZI write.
	3,1	AA	10. MULTIPLE TRACK ERROR (MTE): Present in PE operations if two or more tracks have envelope dropout and/or phase error in the same block.
	1,0	Y	11. NOISE: PE: A data check has occurred during a read or read backward operation. NRZI: A data check has occurred on a record having twelve or less bytes.
	3,3	DD	13. END DATA CHECK (PE): During PE read or write, after a preamble and data have been sensed, and a postamble is not sensed before reaching an IBG.

Error Messages and Action Codes

Find the OS or DOS error message in the left column of MAPs AA120, AA121, and
Using the Action Code listed with the message, go to the Action Code charts on MAPs AA123, AA124, and AA125. Take the indicated action.

ERROR MESSAGE	SENSE byte, bit	CODE	REASON FOR MESSAGE
DVC NOT OP (DOS)		G	DEVICE NOT OPERATIONAL—The I/O device was not operational.
DVC NOT AVAILABLE (DOS)		G	DEVICE NOT AVAILABLE—The I/O device was not available.
EQUIP CHECK (OS) EQUIP CHK (DOS)			EQUIPMENT CHECK can be caused by any of the following:
	4,6	R	1.TAPE UNIT CHECK: READY dropped during a tape motion operation. This bit is set by TACH LAMP CHECK (7,0) LEFT or RIGHT COLUMN CHECK (7,1 or 7,2), or START to NOT START (7,3).
	5,2	S	2. WRITE TAPE MARK CHECK: The subsystem has tried 15 times to write a tape mark, and has been unable to do so without error.
	4,0	F	3. TAPE UNIT POSITIONING CHECK: During tape unit selection, the tape unit is found to be positioning within the gap when it should have stopped.
	5,5	T	4. TACHOMETER CHECK: Tach pulses were not detected after a tape motion command was issued.
	4,1	H	5. TAPE UNIT REJECT: Tape unit failed to set a command correctly, or READY dropped during the time that MOVE was active.
	7,0	U	6. LAMP CHECK: The BOT, EOT, or TACH lamp has failed. TACH lamp failure also sets TAPE UNIT CHECK.
	7,1 7,2	V	7. LEFT COLUMN CHECK: 8. RIGHT COLUMN CHECK: Loss of vacuum occurred in the indicated column after tape was loaded.
	8,4	W	9. READ BACK DATA NOT DETECTED: A byte written on tape was not detected at the read head. after tape moved a distance equal to twice the spacing between the read head and the write head.
ERROR ON REC (DOS)		L	An error occurred during error recovery procedures, or the retry count was exhausted during error recovery.
FILE PROT (DOS)		C	The tape unit is unable to detect the presence of a write enable ring in the customer's tape reel.
INTF CTL CK (OS)		A	INTERFACE CONTROL CHECK—Caused by an invalid signal on the I/O interface. See: IBM System/360 Principles of Operation, Form A22-6821, for a full explanation of this error.
INTERV REQ (DOS)		G	INTERVENTION REQUIRED—The addressed device was not ready.
I/O ERROR (OS)		M	A UNIT CHECK occurred It will be necessary to examine the sense bytes to determine the cause of the unit check
MAGNETIC TAPE ERRORS (DOS)		Q	This is a printout of the DOS tape error block which shows the number of tape errors during the job that just completed.
NON COMPAT (DOS)		J	The tape unit was unable to read the tape at the density specified by the program.
OVERRUN (OS and DOS)		I	The channel was unable to handle data at the rate that it was being presented by the tape subsystem.
SNS I/O MALF (OS)		P	A unit check occurred during a sense operation.
UNDETR ERR (DOS)		N	A unit check occurred, but the sense data is not valid.
UNRECOVERABLE CHANNEL ERROR ON CUU (DOS)		A	A channel control check or interface check occurred during an I/O operation on the device at address CUU (channel and unit).

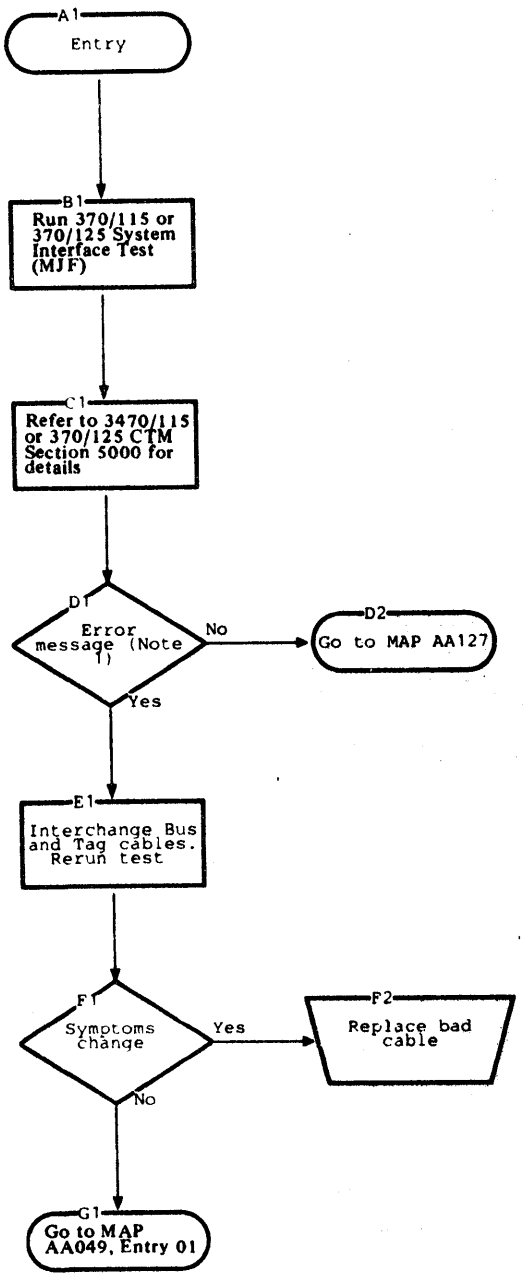
Error Messages and Action Codes

CODE	ACTION
A	Go to MAP AA110.
B	Examine the command byte printed out in the console error message to see if it is a valid command. If this message was caused by a write type command issued to a file protected tape or by a data security erase not chained to an erase gap command, the error was caused by an operator or program error. To verify that the 3411 is functioning, run T3410 A, B, and C.
C	If there is no write enable ring in the customer's tape reel, the problem is an operator error. If there is a write enable ring in the reel, check that the reel latch holds the reel down against the file protect plunger (MAP AB020). If neither of the above, go to MAP AB120 to verify the operation of the file protect mechanism.
D	1. Check bus cables at both ends for good connections. 2. This problem could be caused by a failure of the channel to put good data on bus out. 3. Run T3410A. 4. If T3410A fails, try to run it again with the 3411 on a different channel. 5. If the problem isolates to the 3411, change card A-A1M2 in the tape control. Possible failing areas: 1. Card A-A1M2 that receives the byte from channel bus out. 2. Defective channel bus out cable. 3. Data on channel bus out has incorrect parity.
E	This indication could result from reading a customer's tape containing a block with a byte count that is not a multiple of four tape characters. Try reading the tape on another tape unit with the same mode and density settings to see if the tape itself is written correctly. To check out the hardware, run T3410C.
F	Tape unit positioning check. The capstan motor control logic has failed. Go to MAP AA080.
G	1. Make sure that the system recognizes the tape unit addressed by the customer's program as an existing tape unit, and that the tape unit is also READY and has been enabled (via the ENABLE/DISABLE switch). Go to MAP AA112-B4 for reference information. 2. If the tape unit loads but fails to reach READY when the START key is pressed, go to MAP AB090. 3. If the tape unit drops READY, go to MAP AB100. 4. For all other conditions, go to MAP AA065.
H	Tape Unit Reject: 1. This indication could result from someone pressing the RESET key while the tape unit was performing a command. 2. Examine the tape unit for tape dumping, damaged tape, and blown fuses. 3. For tape dumping, or failure to load, go to MAP AB010. 4. If tape loads and the tape unit attains READY status but you suspect tape dumping during processing, go to MAP AB100.
I	Overrun is probably caused by too many devices on the channel, a channel failure, or by the tape unit presenting data too fast. To check out the tape unit, run T3410 A through G.
J	Possible causes: 1. The program is calling for the wrong density. 2. The tape was written incorrectly. 3. The tape unit trying to read the tape is malfunctioning. Check operation of file protect switch. Action: 1. Verify the density at which the tape was written. 2. Try to read the tape on another tape unit to determine whether the tape is good or bad. 3. To check out the tape unit that had the error, run T3410 A, B, and C.
K	Some channels are unable to perform data chaining on input operations with some models of the 3410. The data rate of the 3410/3411 subsystem does not allow enough time for some slower speed channels to perform data chaining. Verify that the data chaining operation is valid for your combination of channel and 3410/3411.
L	1. Try reading the tape on another tape unit. 2. If the tape does not fail on another tape unit, run T3410 A, B, and C on the failing tape unit. 3. If the tape fails on another tape unit, it is possibly a badly written or damaged tape. Examine the tape for signs of physical damage in the area where the failure occurred.

CODE	ACTION
M	Run T3410 A, B, and C to check out the functions of the tape unit.
N	Check the tape unit. Did READY drop? Is tape positioned correctly in the columns? Look for visible indications of malfunction. Go to MAP AB010.
O	Examine the sense bytes printed in the error message to determine the area in which the failure may have occurred.
P	Run T3410A to check the operation of the sense command. If T3410A indicates a failure, check the interface cables at both ends for good connections. If failure still occurs, change card A-A1M2 in the tape control logic gate.
Q	The tape error block (TEB) statistics are printed for information, and do not necessarily indicate hardware failures. The TEB is only printed for those DOS systems that have TEB=YES specified at system generation time. The message identifies the following tape errors: CH UNIT PRE RDE WTE ERG NRC CH—channel UNIT—device address PRE—permanent read errors RDE—read error entry WTE—write error entry ERG—erase gap NRC—noise record count While these error counts may not indicate the need for repair, they could prove useful by giving you a history of tape unit performance.
R	Tape Unit Check (Lamp Check). Go to MAP AA045.
S	Write Tape Mark Check. Go to MAP AA045.
T	1. Ensure that the tach assembly cable plug is making good connection. 2. Ensure that logic board cables B, C, and K are securely plugged. 3. Run T3410 E and F. If T3410 E and F indicate no tach pulses, go to MAP AB010. 4. If T3410 E and F indicate tach pulses out of specification, change the capstan tach or the capstan motor. 5. If no errors are indicated by T3410 E and F, run T3410 A, B, and C for a checkout.
U	Go to MAP AA045.
V	Go to MAP AA045.
W	1. Ensure that the columns are clean. 2. Check cables from head circuit card to logic board.
X	1.Verify that the BOT marker is in the BOT sensing area. If not, the tape unit may be indicating false BOT.Go to MAP AB080. 2.If the BOT marker is in the BOT sensing area, the problem was probably caused by the program erroneously issuing a backward command.
Y	Noise: 1. Make sure the tape transport is clean. 2. Run T3410I.
Z	VRC: 1. Make sure the tape transport is clean. 2. Go to MAP AA050.
AA	MTE: 1. Make sure the tape transport is clean. 2. Run T3410 J and K. 3. Go to MAP AA040.

Error Messages and Action Codes

CODE	ACTION
BB	1. Make sure the tape transport is clean. 2. Run T3410P (skew adjustment) to check skew. 3. Check that the column idlers are not binding. 4. Use gauge to check adjustment of idlers and guides. 5. If you change adjustments, check tracking.
CC	1. Make sure the tape transport is clean. 2. CRC check is a NRZI mode failure only. 3. Run T3410C to check out the NRZI functions of the tape unit.
DD	End Data Check: 1. Make sure the tape transport is clean. 2. Check the head card to logic board cables. 3. Go to MAP AA050.
EE	Envelope Check: 1. Make sure the tape transport is clean, especially the head and cleaner blade. 2. Go to MAP AA050.
FF	Diagnostic Track Check: 1. Make sure the tape transport is clean. 2. Go to MAP AA050.
HH	P-Compare Check: 1. Make sure the tape transport is clean. 2. Replace A1-A1M2. 3. Replace A1-A1F2.
JJ	Velocity Check: 1. Make sure the tape transport is clean. 2. Check that the column idlers are not binding. 3. Use gauge to check adjustment of idlers and guides. 4. If you change adjustments, check tracking. 5. Run T3410 E and F to check the capstan motor and tachometer.



The purpose of this test is to detect faulty interface lines which lead to an unexpected system halt, wait or loop condition. The lines tested are:

1. MSC Request
2. Interrupt Request
3. Response
4. Busy

Note 1:

```
* SYSTEM INTERFACE TEST *

DETECTED: HOT INTERRUPT REQUESTLINE
BETWEEN IPU AND TCU
LINE COULD BE RESET.
PRESS ENTER TO CONTINUE
```

This error display shows a hot interrupt request line detected by the test between IPU and TCU. The test was able to reset the line by using control signal via the SVP-Bus.

Note 2: Interface lines which **can** be reset point to the following areas:

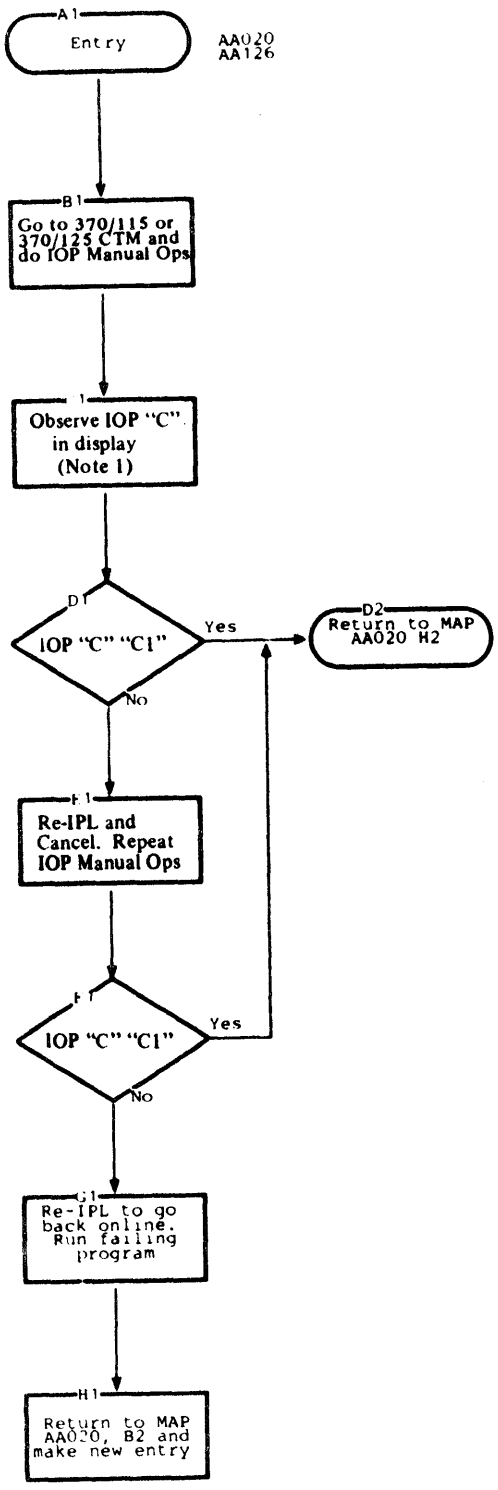
Between IPU and SVP - probably microprogram error or left over of previous microtest.

Between IPU and IOP - common ext. card in IOP (U2).

Between IPU and TCU - TCU interface, refer to 3410/3411 MLM AA049, Entry 02.

MAP AA126

XF2700	1845923	734556	734864	443751		
Seq. 2 of 2	Part Number	1 Sept 72	1 Aug 73	20 Sept 74		



Discussion:

1. Adapter Checkout: After error saving is performed automatically, the adapter checkout takes place. During the checkout, data is sent from SVP (via SVP Data Bus 0) to the MTA. The data is set in Low Data Reg or Hi Data Reg and sensed back to the SVP. The SVP compares the data sent against that received. In case of unequal compare, the 'is' and 'should be' pattern is saved. If the result is equal, a zero pattern is forced in both bytes and in the 'data reg' byte.

2. TCU Checkout: After the adapter checkout takes place, the TCU's initial checkout routine is invoked by an SVP CTRL 'C0'. After waiting until the routine is performed, ATI-6 (error) is checked again by the SVP SNS 'C0'. If ATI-6 is active, this indicates a TCU malfunction and, therefore, the ABI is saved again and 'FF' is set into the check byte. If ATI-6 is inactive, the ATI is investigated for MSC failure (ABI-5).

MTA LOG DISPLAY

Errors Recorded Since 00/00/00

Log 01

1.ABI	01000000	SENSE 2	00000000
CTL.A-20,SNSB	11011000	DATA HIGH	01000000
DATA LOW	01000000		

Result of Adapter Checkout

DATA SHOULD	00000000	DATA IS	00000000
DATA REG	00000000	2.ABI	00000000
CHECK	00000000		

Program Selection: MBK

LOCK

CONTINUE WITH ENTER / 'D' for Dump / 'E' for Erase

BC

ID=F250 M=X.0B7F.6E.

Note 1: *Consult table below for IOP Manual Ops Decode.*

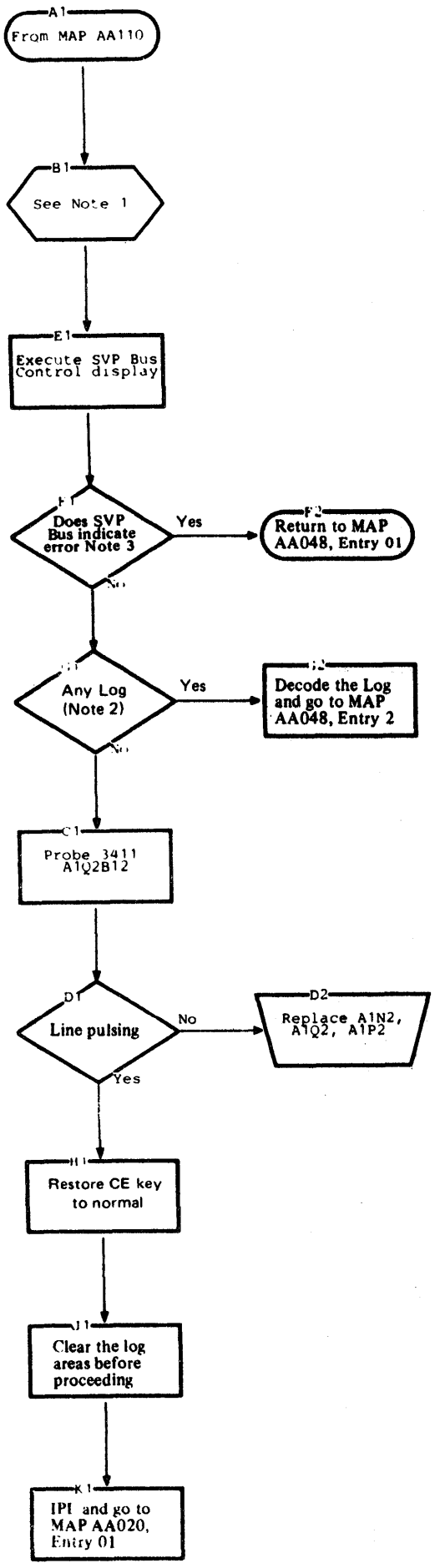
IOP MANOPS

A = IOP ALTER
F = IOP FILL
D = IOP DUMP

SET CODE: AND ENTER

SAT STATUS =IPU	MSC	63:60	IOP	8	9	A	B	C	D	F	F		
SENSE→	40:40	61:01	IDLE:	80	91	A1	B1	C1	00	00	00		
SENSE→	43:32	62:00	CHK:	FF	FF	FF	FF	00	00	00	00		

XF2750	1846044	734852	734864	443751		
Seq. 1 of 2	Part Number	26 Feb 73	1 Aug 73	20 Sept 74		



Note 1: Entry to this MAP assumes that you have no LCL or MTA Log entered and you have a system hang or channel/interface control check condition.

Note 2: Any Log means any MTA Log, LCL, or SVP Bus Control Sense Byte 8.

Note 3: Hex '48' on SVP Bus is valid and indicates a non-error condition. Go to MAP AA065 if this status is presented.

CAUTION: If you execute Initial Microprogram Load (IMPL) on the system, you will probably post an LCL or MTA Log. If this occurs, return to MAP AA020 and make another entry.

SVP Bus Control Display:

1. Set CE key to CE Mode.
2. Mode Select "MY" to display SVP Bus Control.
3. Enter "C0" in position X0-Y0.
4. Step ◄┘ cursor 8 times.
5. Enter "C".
6. Enter "00".
7. Enter "01".
8. Enter "0".
9. Press ENTER key.
10. Enter "S8" in X0-Y0.
11. Press ENTER key; i.e, SAT C XY00 LC 01 MODE 0.

Sample Display

SVP BUS CONTROL

```
X Y 0      1 2 3 4 5 6 7 8 9
0    S851  X X X X X X X X X
1    X
2    X
3    X
4    X
5    X
6    X
7    X
```

HX'51 in this example indicates Bits 1, 3, and 7 in the ABI are ON. (Note 2)

SAT C XY00 LC 01 MODE 0

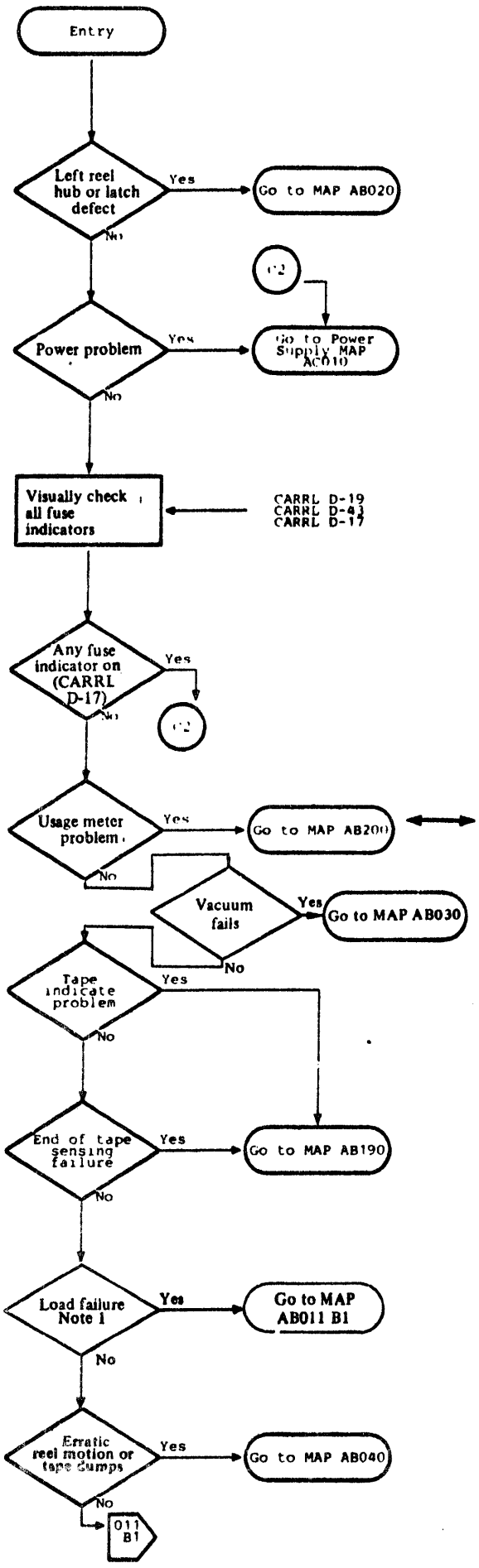
Refer to the ABI table below.

*1:ABI	0	1	2	3	4	5	6	7
HDWR ERROR	SPARE	IC	XFR	ALU	SPARE	ROS	TCU	OFF
μPGM ERROR	ALU	IC	WR CLK	INTER-FACE or MTA	DET. BOC	MSC	TU BUS	ON

* Decode this table in descending order.

XF2750 Seq. 2 of 2	1846044 Part Number	734852 26 Feb 73	734864 1 Aug 73	443751 20 Sept 74		

Tape Unit Entry



ENABLE/DISABLE

This switch allows the subsystem to be taken offline for maintenance. The switch setting can be changed at any time, but the subsystem changes status only when the system is stopped. The switch must be set to the DISABLE position to take the subsystem offline. A disabled subsystem is non-existent to the system program

To disable (or enable) the subsystem, proceed as follows:

1. Turn the ENABLE/DISABLE switch to the DISABLE (or ENABLE) position.

2. Press STOP and then START at the system console. The subsystem is now offline (or online).

Usage Meter

A time meter on the 3411 records the elapsed time that the tape control is in use. The meter runs whenever the subsystem is enabled (online) with the ENABLE/DISABLE switch, and the host system is operational.

A time meter on each 3410 records only the time that the tape is in use. The meter runs whenever the subsystem is enabled, tape is away from load point, and the host system is operational.

Note 1: *A loaded condition is tape looped in both columns without dumping. Following loading, the tape unit automatically initiates a load point search by moving tape to the right until the beginning of tape (BOT) marker is sensed by the BOT photocell or until the RESET switch is pressed.*

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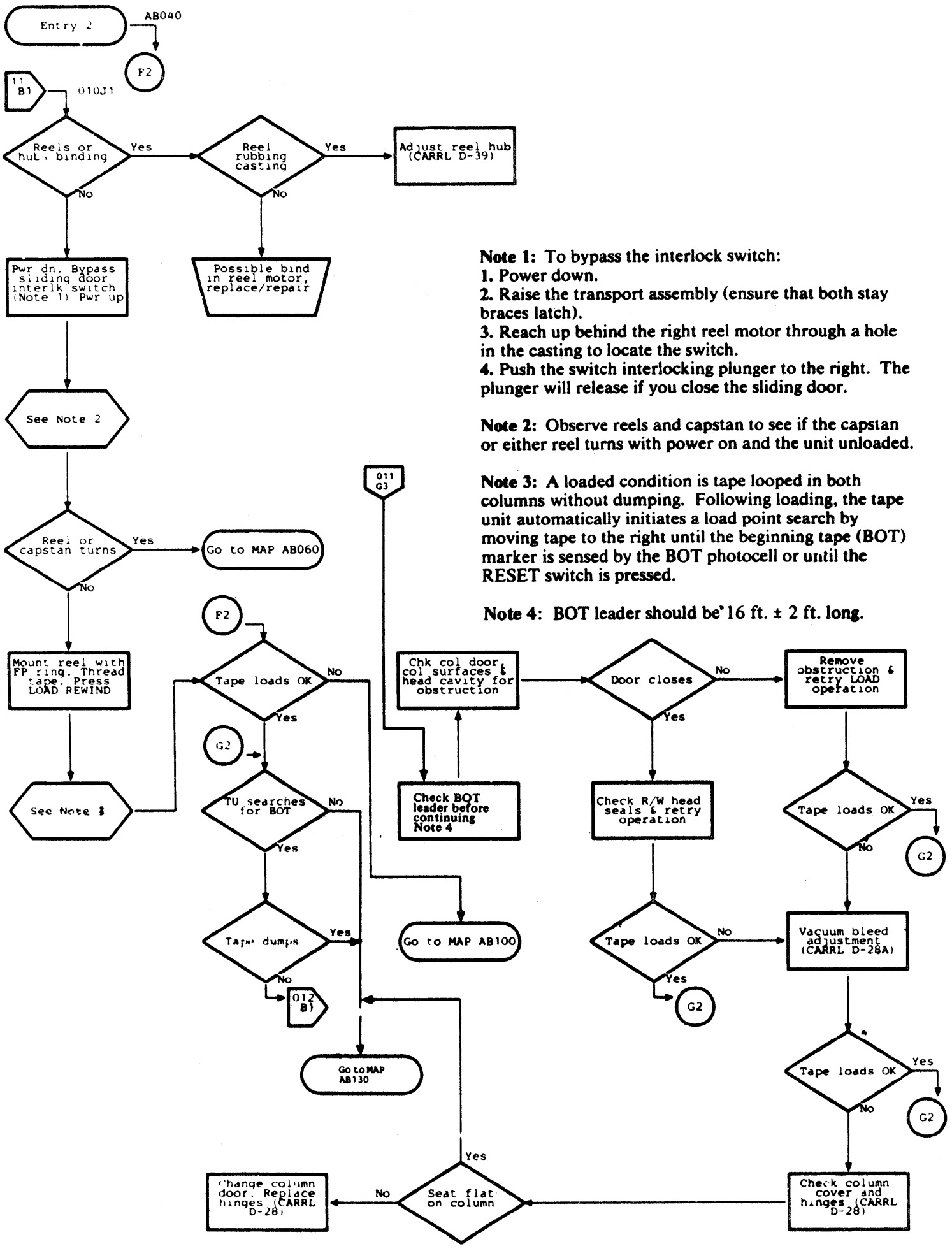
Tape Unit Entry



Note 1: To bypass the interlock switch:
1. Power down.
2. Raise the transport assembly (ensure that both stay braces latch).
3. Reach up behind the right reel motor through a hole in the casting to locate the switch.
4. Push the switch interlocking plunger to the right. The plunger will release if you close the sliding door.

Note 2: Observe reels and capstan to see if the capstan or either reel turns with power on and the unit unloaded.

Note 3: A loaded condition is tape looped in both columns without dumping. Following loading, the tape unit automatically initiates a load point search by moving tape to the right until the beginning tape (BOT) marker is sensed by the BOT photocell or until the RESET switch is pressed.

Note 4: BOT leader should be 16 ft. ± 2 ft. long.

XF2800	1845924	See EC	734884	443761	443808	848018		
Seq. 2 of 2	Part Number	History	1 Aug 73	20 Sept 74	2 May 77	31 May 78		

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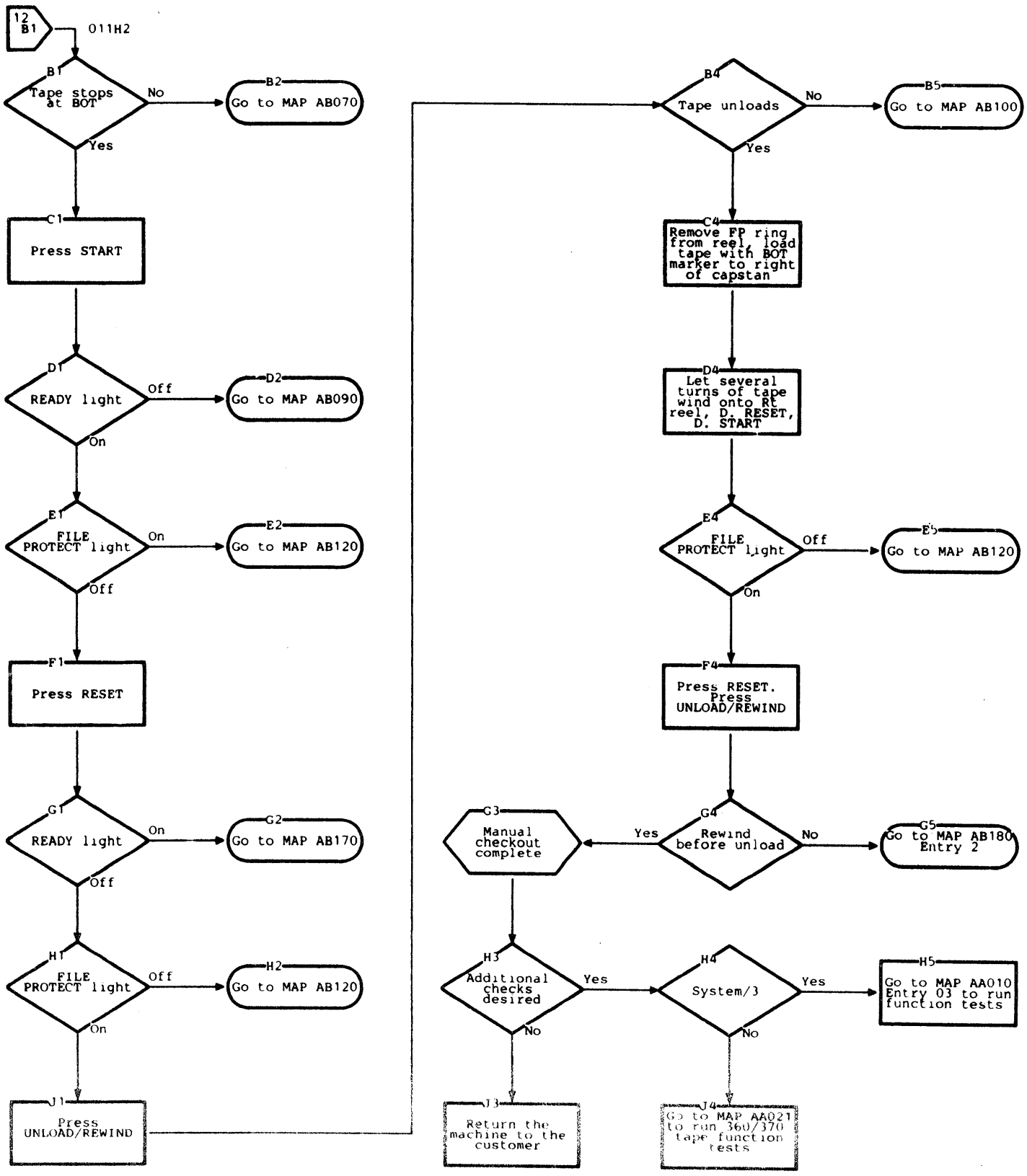
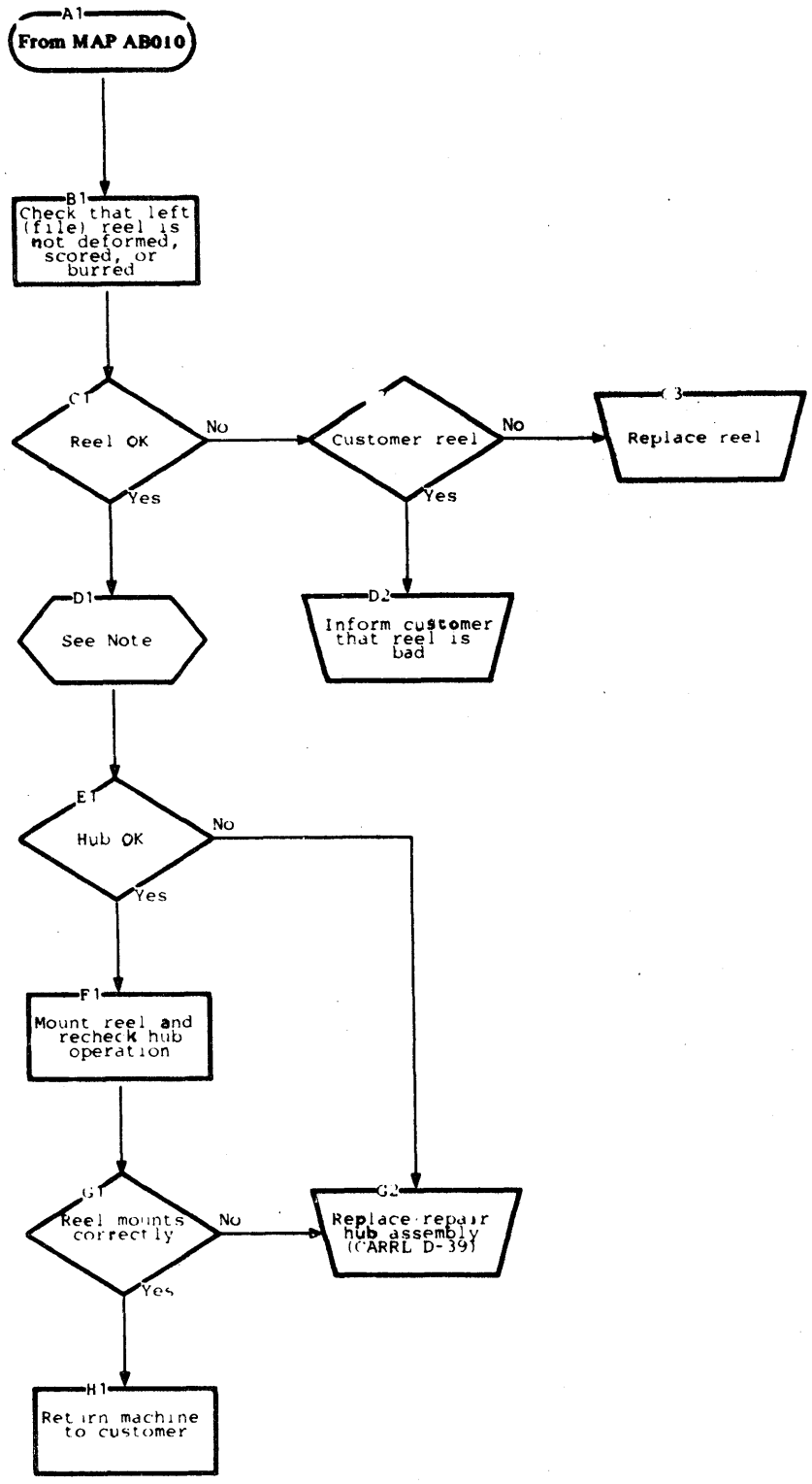
Tape Unit Entry



Left Reel Hub and Latch Mechanism



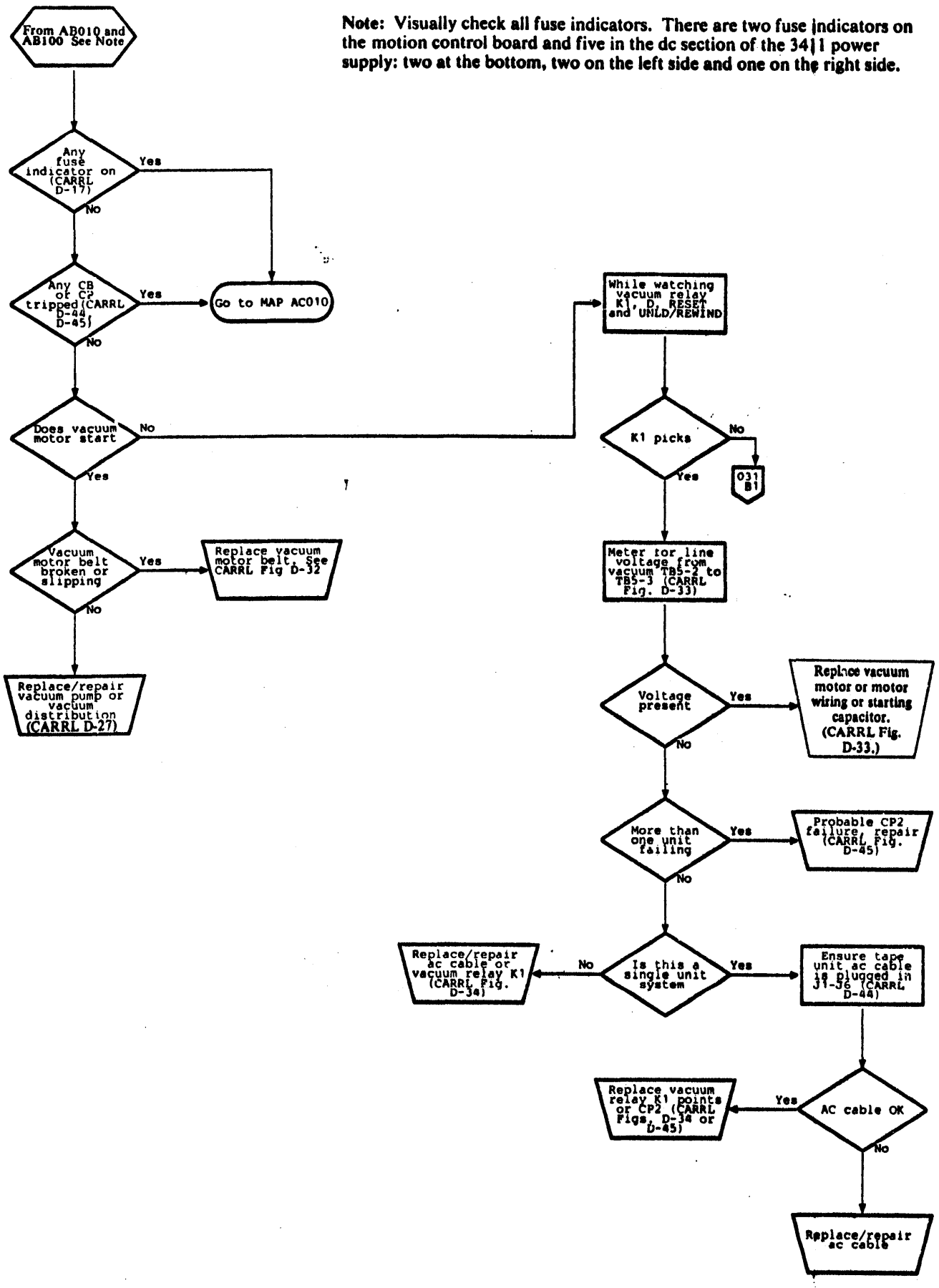
Discussion: Entry to this MAP assumes you had trouble mounting the left (file) reel

Note:

A. Check that the hub is free from obvious physical defects such as broken parts or contamination.

B. With the center of the hub depressed, check that:
1. Both "O" rings protrude at three points directly under the lugs.
2. The three locking lugs extend from the hub.

C. With the center of the hub released, check that:
1. The center of the hub extends automatically when no tape reel is mounted.
2. The "O" rings and the three locking lugs retract flush with the hub.



Note: Visually check all fuse indicators. There are two fuse indicators on the motion control board and five in the dc section of the 3411 power supply: two at the bottom, two on the left side and one on the right side.

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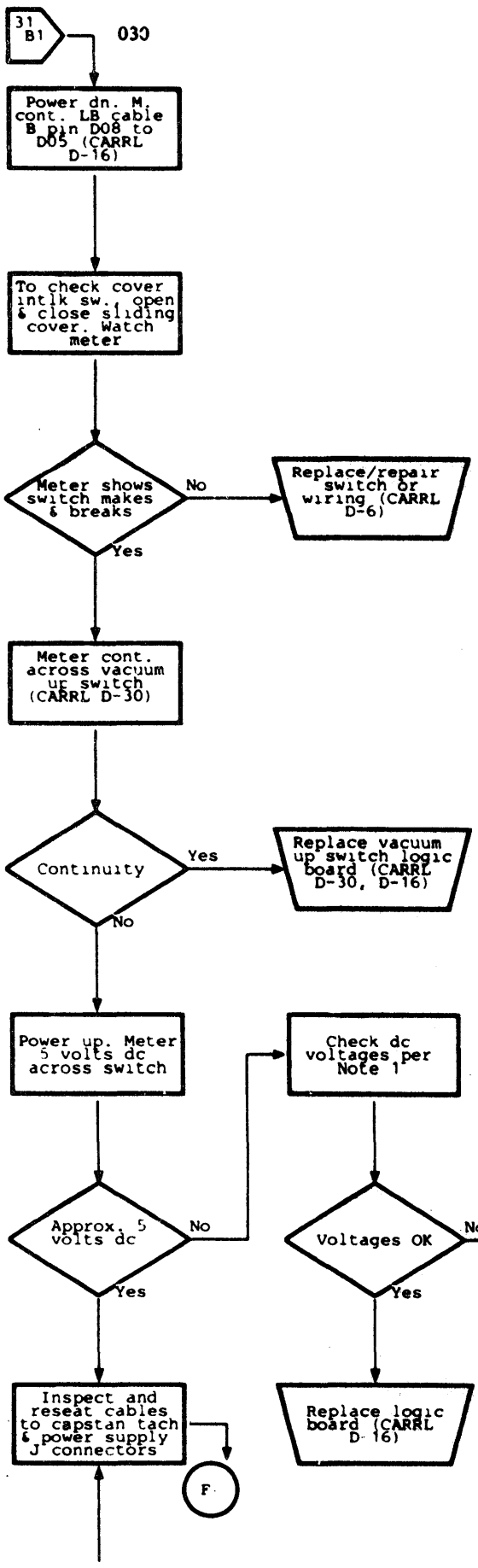

Note 1: Measure voltages in the failing tape unit at the following points on DC TB1:

Voltage	Measure at	Tolerance
+5	TB1-1 (+) to 1-4 (-)	+4.90 to +5.10
+6	TB1-9 (+) to 1-4 (-)	+5.99 to +6.01
+15	TB1-11 (+) to 1-14 (-)	+13.5 to +17.15
-15	TB1-17 (-) to 1-14 (+)	-13.5 to -17.15

Note 2: For missing dc voltage. go to the MAP listed below:

Voltage	MAP
+5	AC090
+6	AC100
+15	AC130
-15	AC130

For +5 or +6 volts out of tolerance, go to MAP AC120. For +15 or -15 volts out of tolerance, go to MAP AC134.

See CARRL D 35 and D-36

XF3000	1845926
Seq. 2 of 2	Part Number

734556	734556A	734864	443751	443806
1 Sept 72	20 Oct 72	1 Aug 73	20 Sept 74	2 May 77

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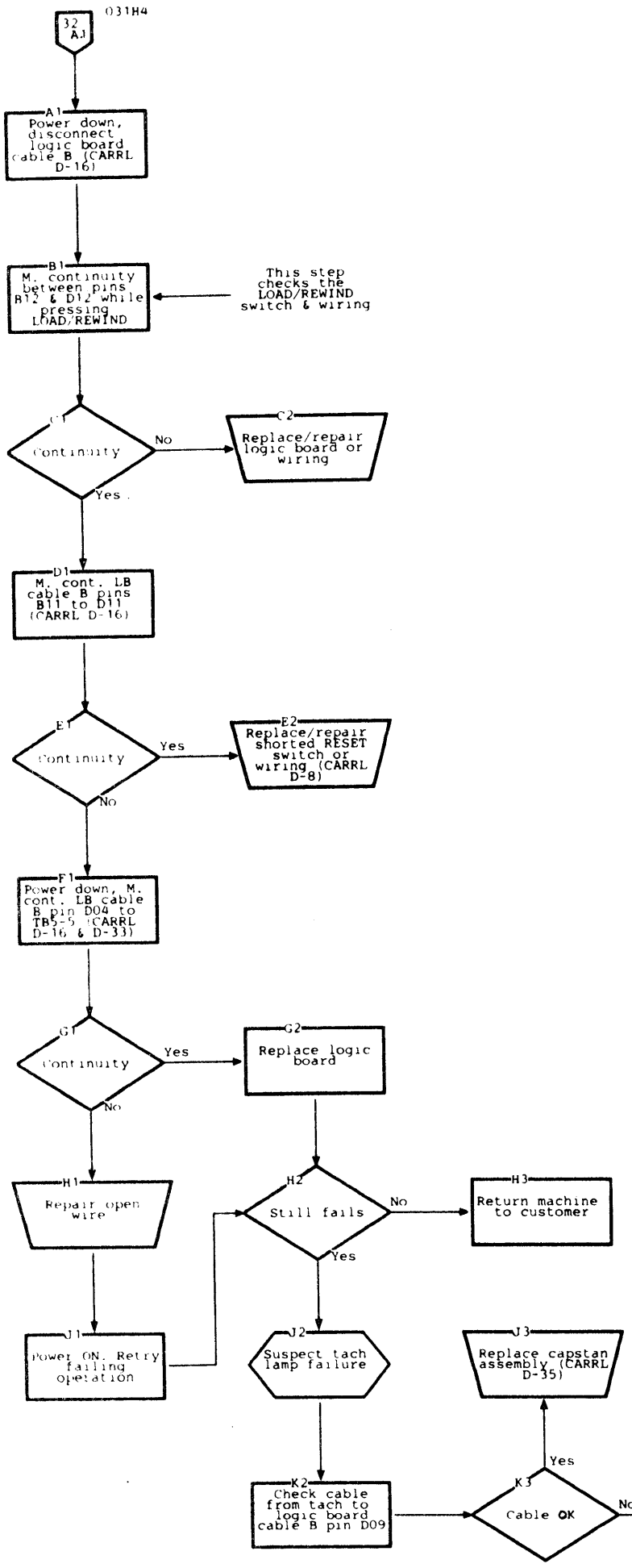
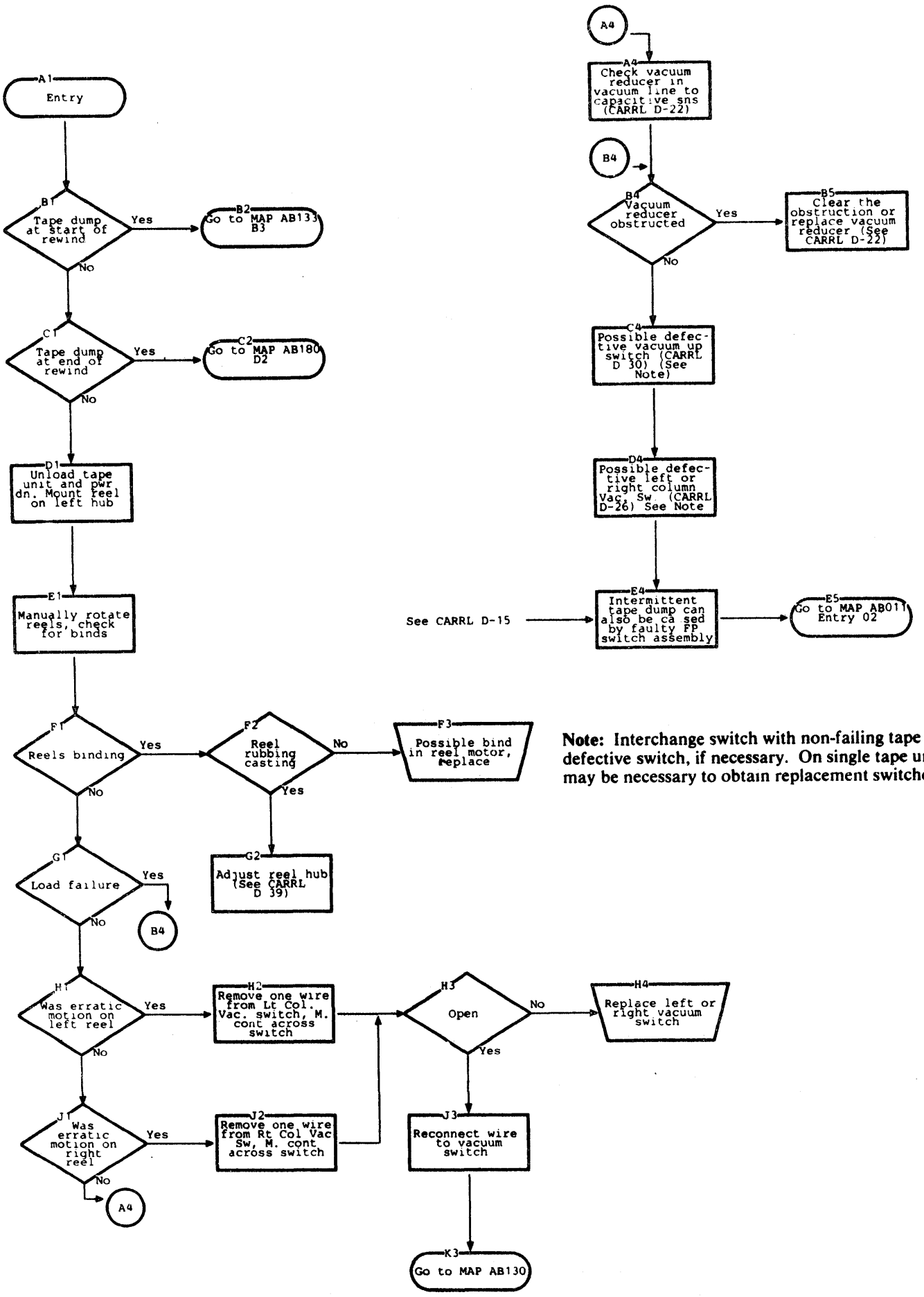
Vacuum Failures



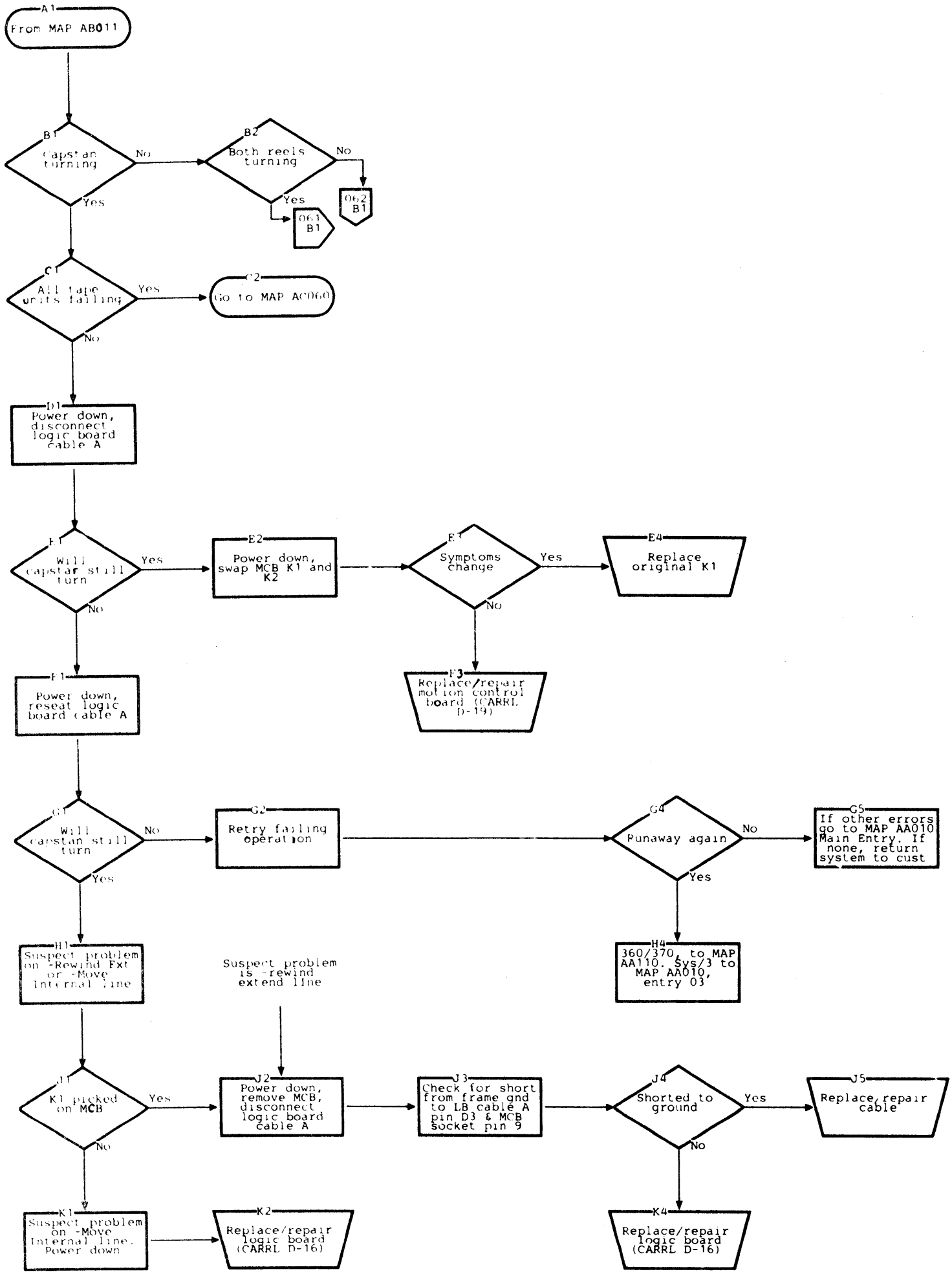
XF3100	1845927	734556A	734556B	734852	734864	736672
Seq 1 of 2	Part Number	20 Oct 72	20 Nov 72	26 Feb 73	1 Aug 73	26 Oct 73

Erratic Reel Motion and Intermittent Tape Dump



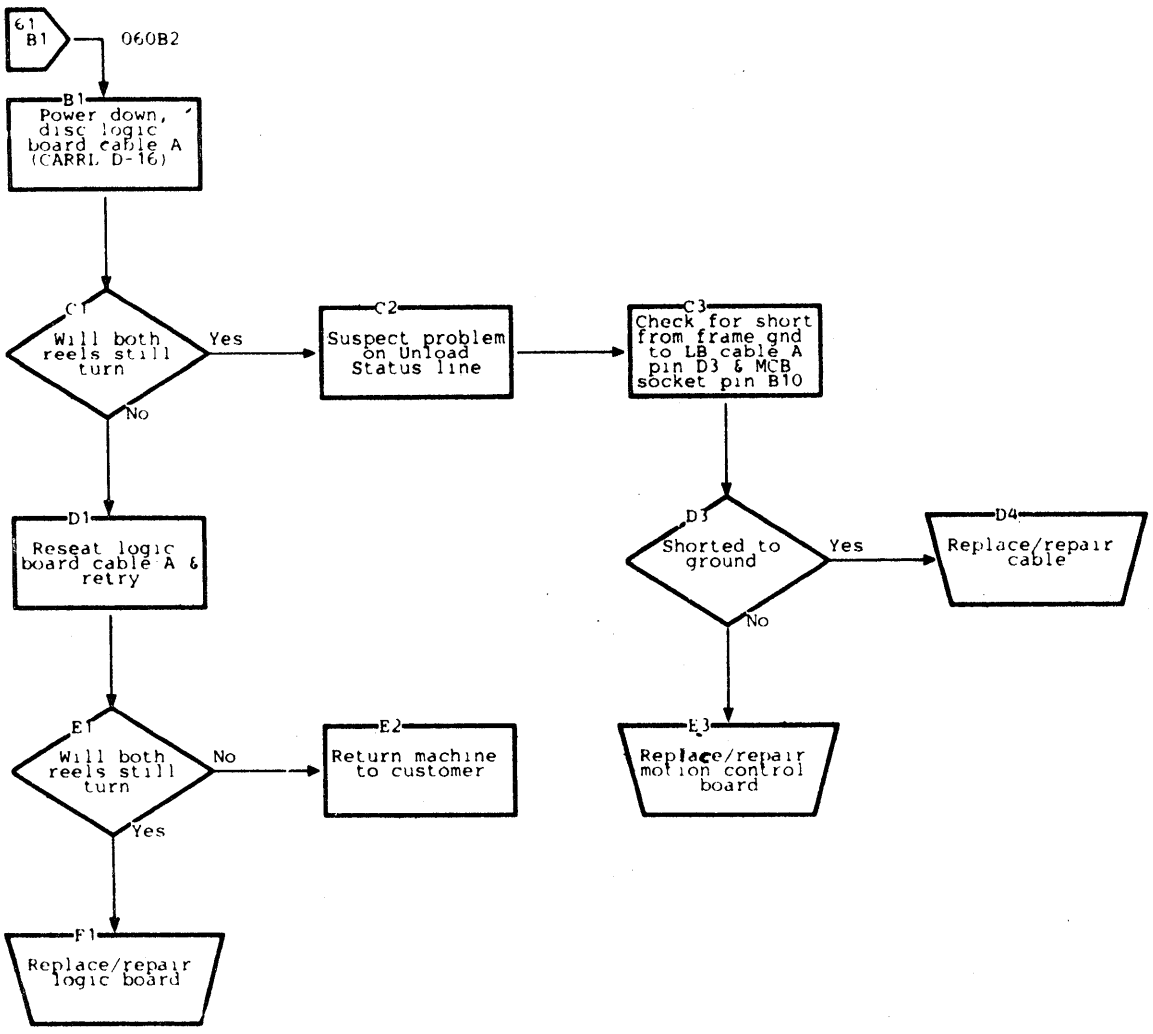
Note: Interchange switch with non-failing tape unit Replace defective switch, if necessary. On single tape unit subsystems, it may be necessary to obtain replacement switches.

Capstan/Reel Runaway



XF3200	1845928	734556	734556A	734852	734864	
Seq 1 of 2	Part Number	1 Sept 72	20 Oct 72	26 Feb 73	1 Aug 73	

Capstan/Reel Runaway

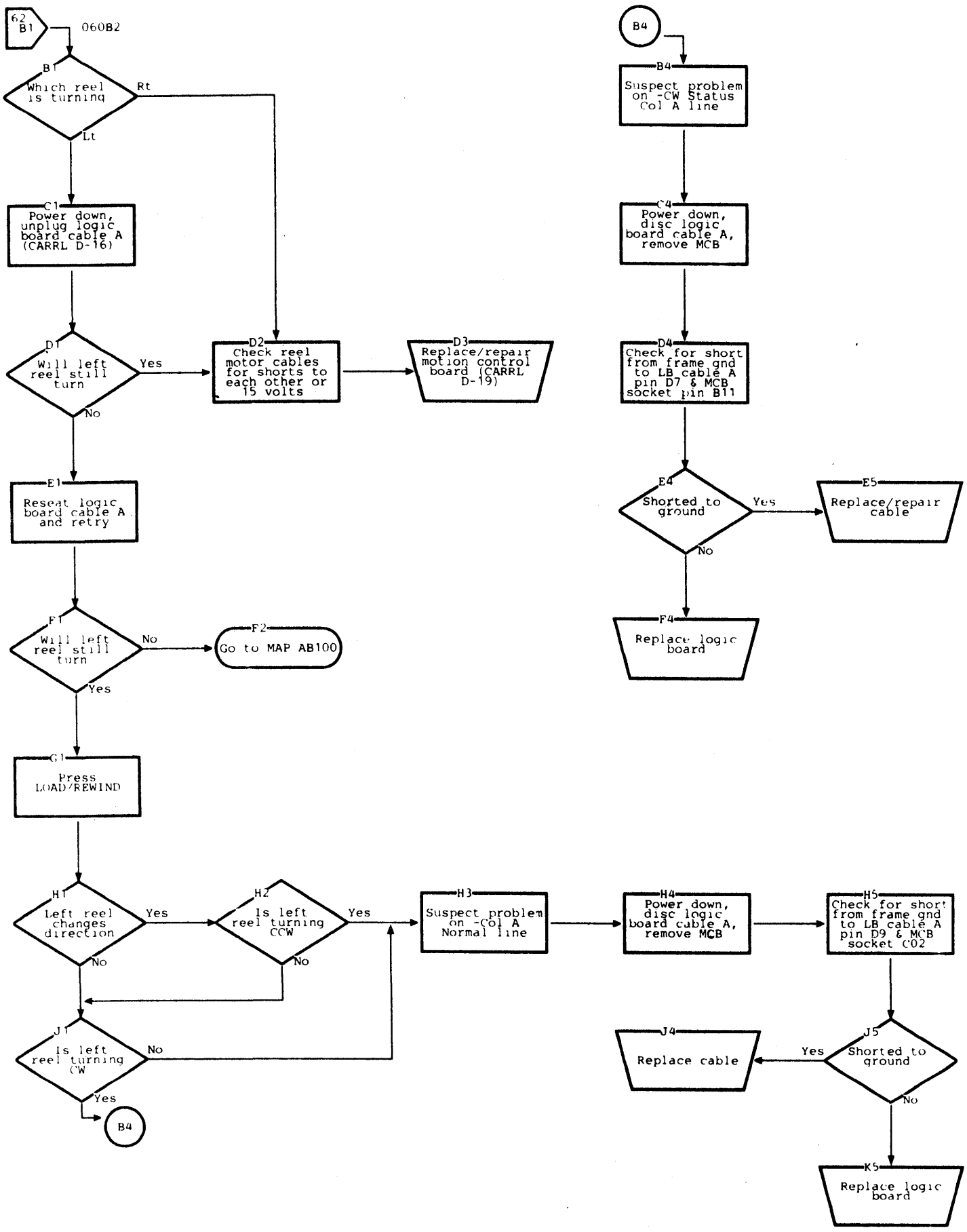


Capstan Reel Runaway

MAP AB061

XF3200	1845928	734556	734556A	734852	734864	
Seq 2 of 2	Part Number	1 Sept 72	20 Oct 72	26 Feb 73	1 Aug 73	

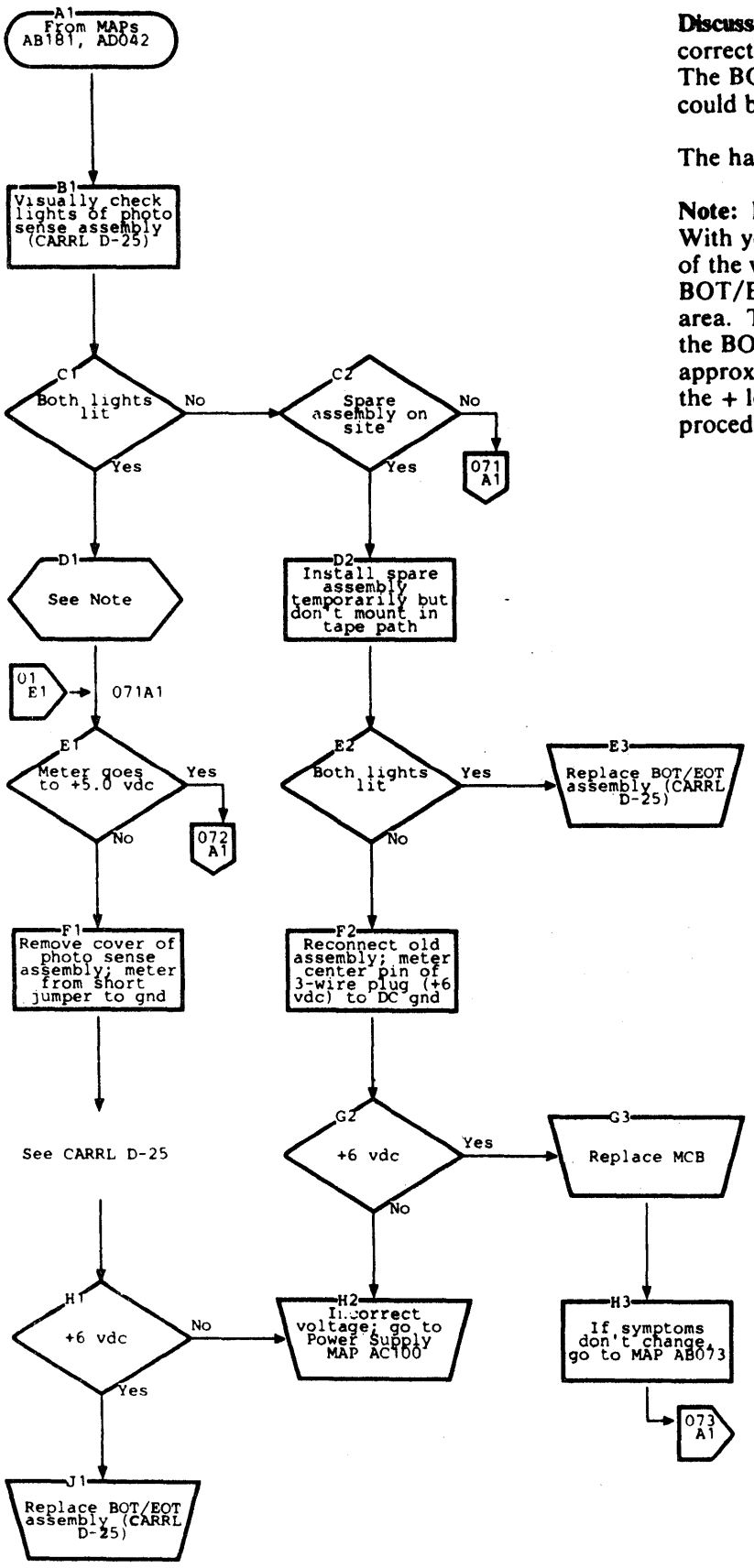
Capstan/Reel Runaway



XF3300	1845929
Seq 1 of 2	Part Number

734556	734556A	734556B	734852	
1 Sept 72	20 Oct 72	20 Nov 72	26 Feb 73	

BOT Sense Failure

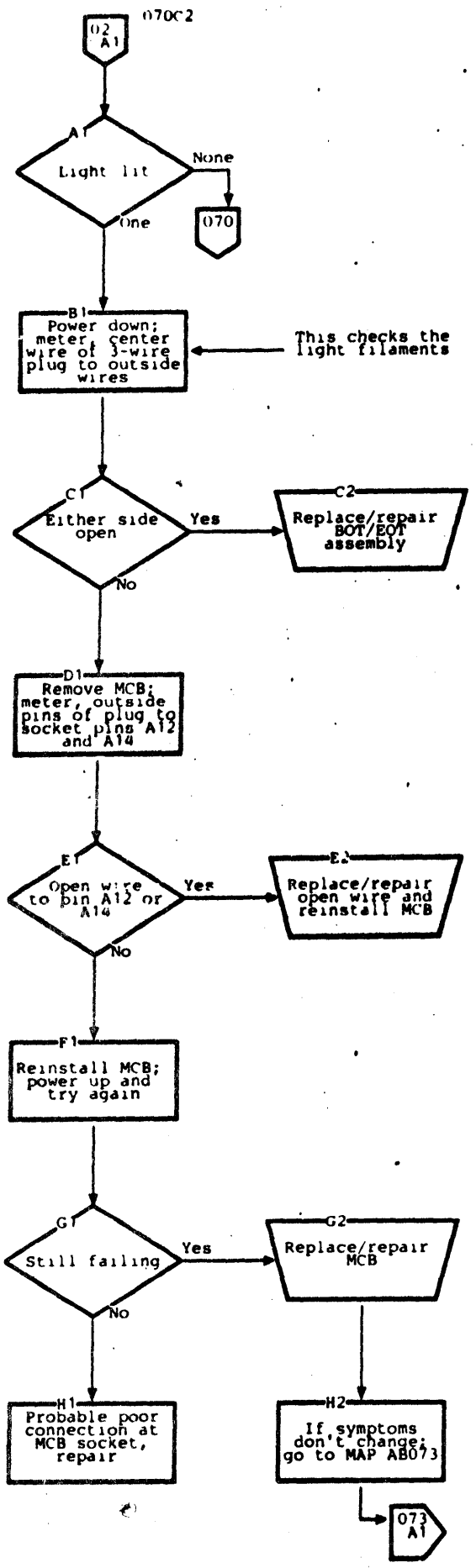


Discussion: Entry to this MAP assumes that the tape unit loads correctly, but fails to recognize a correctly installed BOT marker. The BOT/EOT sensing assembly or motion control board (MCB) could be defective.

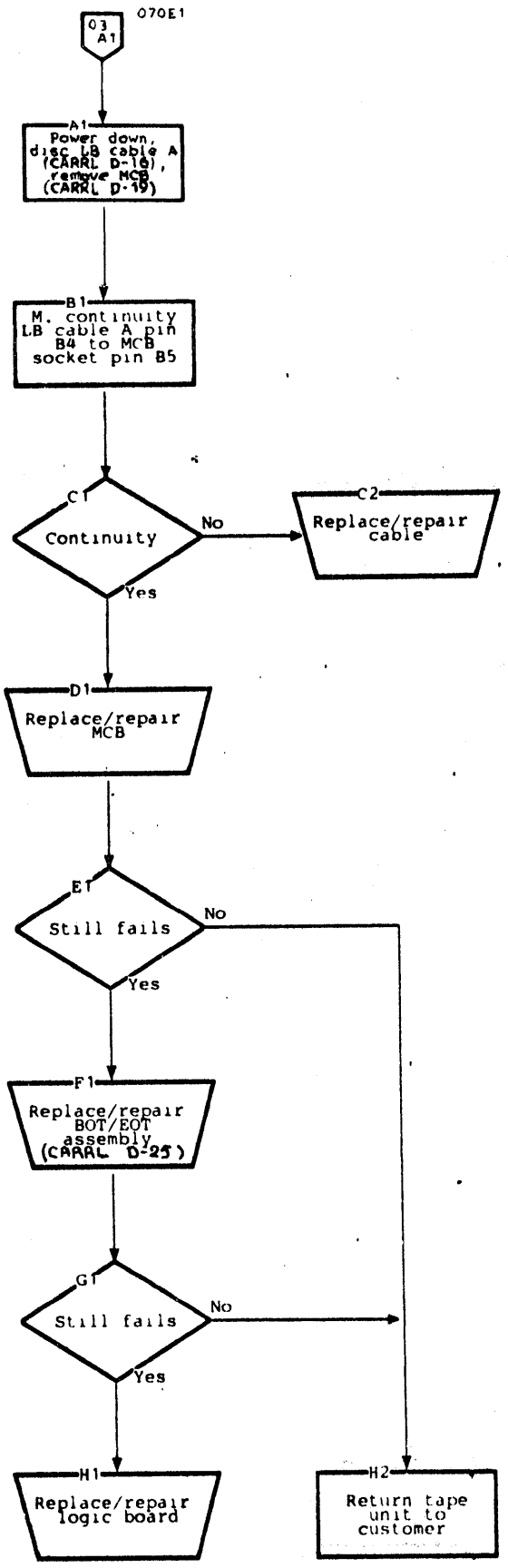
The half-column cover must be in place when using this MAP.

Note: Disconnect the two-wire plug from the BOT/EOT assembly. With your meter on the 15 volt dc scale, connect + lead to either pin of the wire plug and – lead to DC TB1–4. Hold the tape over the BOT/EOT assembly with the BOT marker just outside the sensing area. The meter should read approximately 3.5 volts. Now move the BOT marker into the sensing area; the meter should now read approximately 5.0 volts. If the voltage does not change, connect the + lead to the other pin of the two-wire plug and repeat the procedure.

BOT Sense Failure



BOT Sense Failure

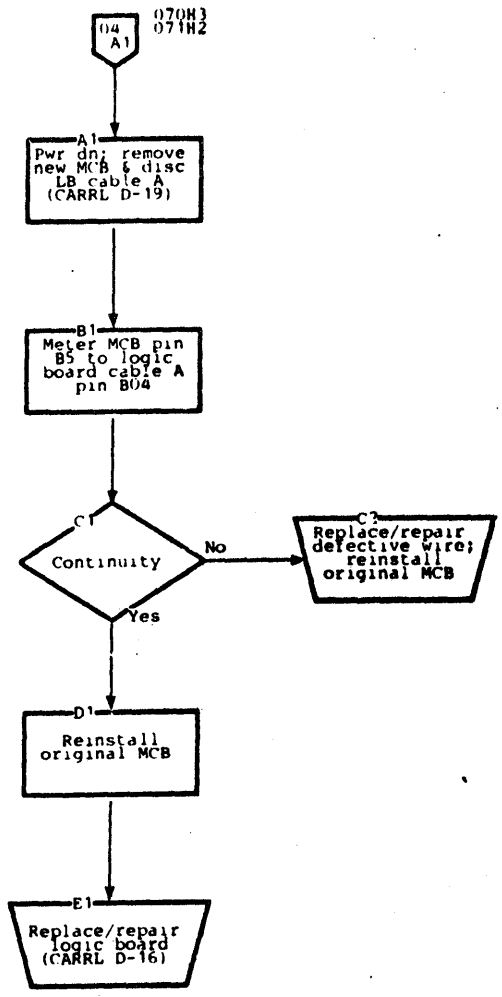


BOT Sense Failure

MAP AB072

XF3400	1845930	734556	734556A			
Seq 2 of 2	Part Number	1 Sept 72	20 Oct 72			

BOT Sense Failure

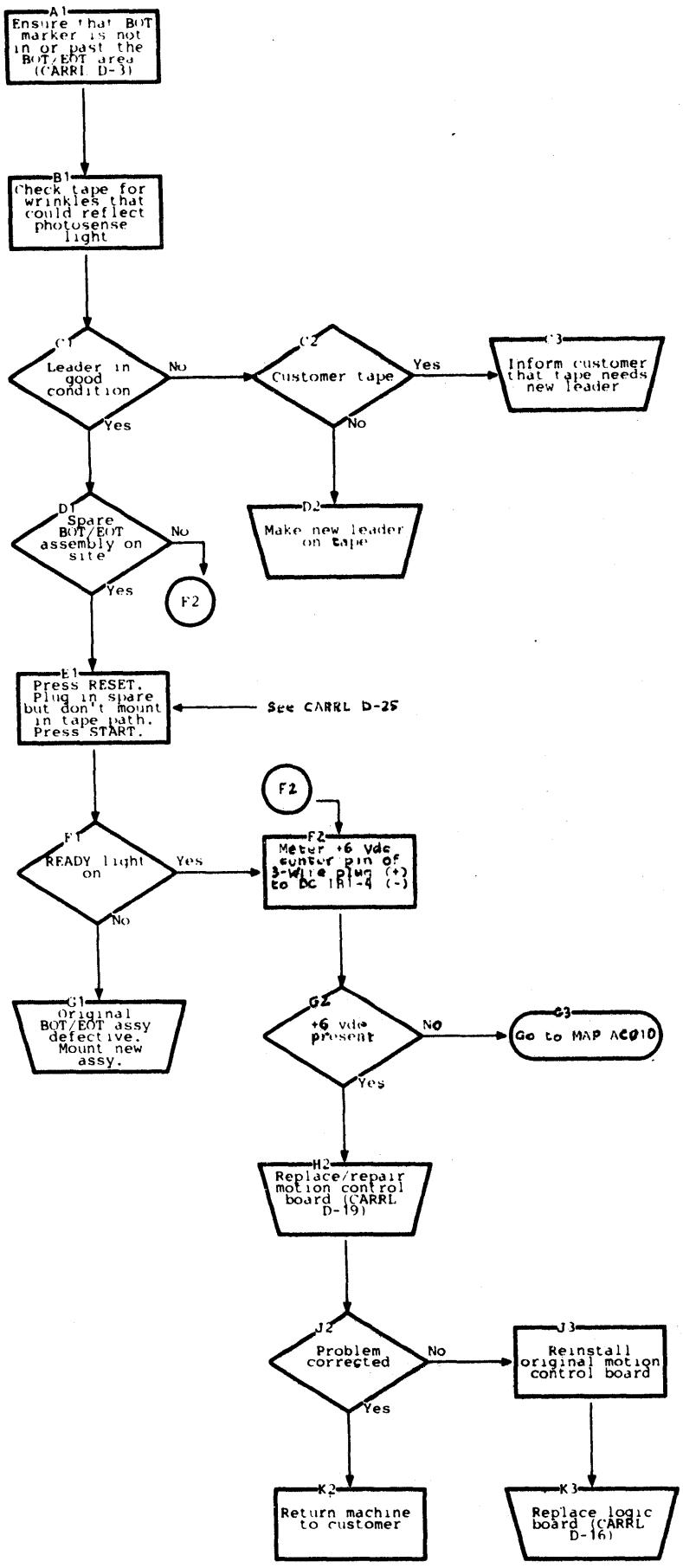


XF3500	1845931	734556	734556A			
Seq 1 of 2	Part Number	1 Sept 72	20 Oct 72			

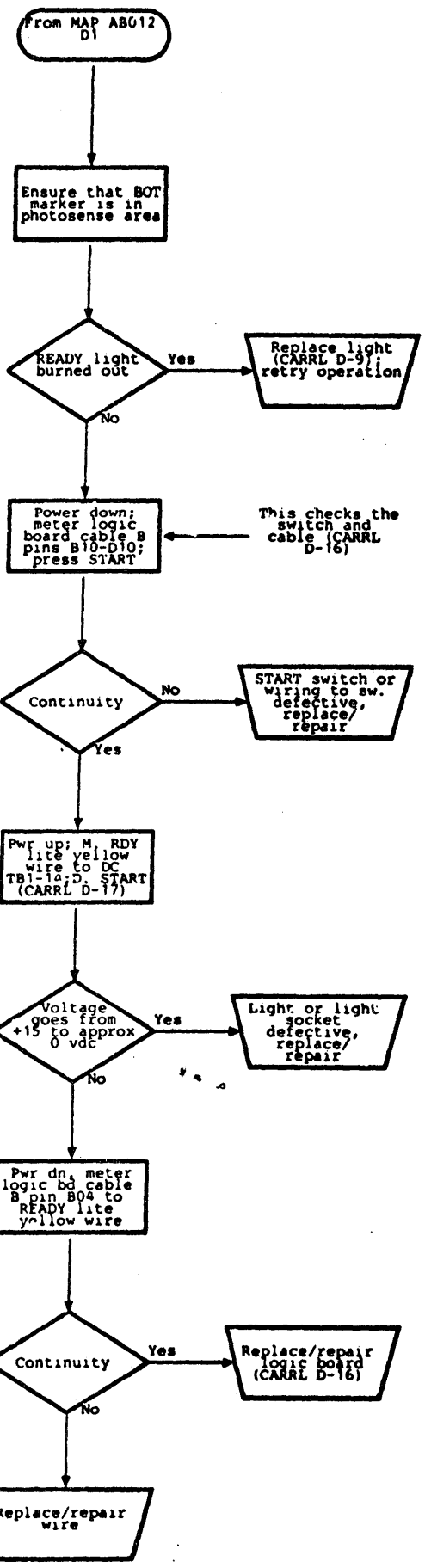
BOT Sense Failure

MAP AB073

False BOT Sensing



START Switch Failure



Discussion: Entry to this MAP assumes that tape loads correctly and stops with the BOT marker in the BOT sensing area, but READY light doesn't come on when START switch is pressed. The START switch, READY light, or logic board could be defective.

XF3600	1845932	734556	734556A	734556B	738672	443806	846018	
Seq. 1 of 2	Part Number	1 Sept 72	20 Oct 72	20 Nov 72	26 Oct 73	2 May 77	31 May 78	

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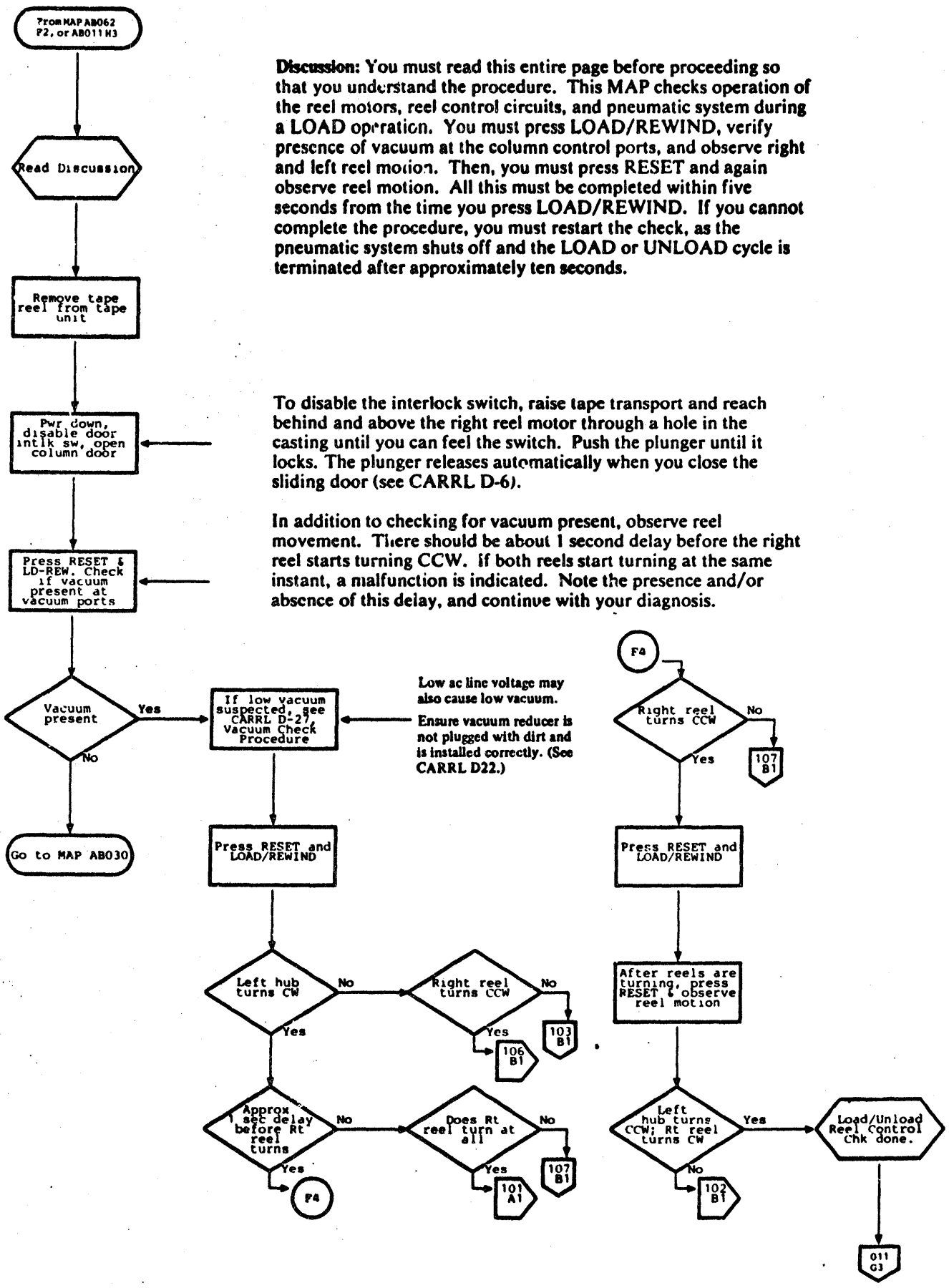
Load/Unload Reel Control Check



Discussion: You must read this entire page before proceeding so that you understand the procedure. This MAP checks operation of the reel motors, reel control circuits, and pneumatic system during a LOAD operation. You must press LOAD/REWIND, verify presence of vacuum at the column control ports, and observe right and left reel motion. Then, you must press RESET and again observe reel motion. All this must be completed within five seconds from the time you press LOAD/REWIND. If you cannot complete the procedure, you must restart the check, as the pneumatic system shuts off and the LOAD or UNLOAD cycle is terminated after approximately ten seconds.

To disable the interlock switch, raise tape transport and reach behind and above the right reel motor through a hole in the casting until you can feel the switch. Push the plunger until it locks. The plunger releases automatically when you close the sliding door (see CARRL D-6).

In addition to checking for vacuum present, observe reel movement. There should be about 1 second delay before the right reel starts turning CCW. If both reels start turning at the same instant, a malfunction is indicated. Note the presence and/or absence of this delay, and continue with your diagnosis.

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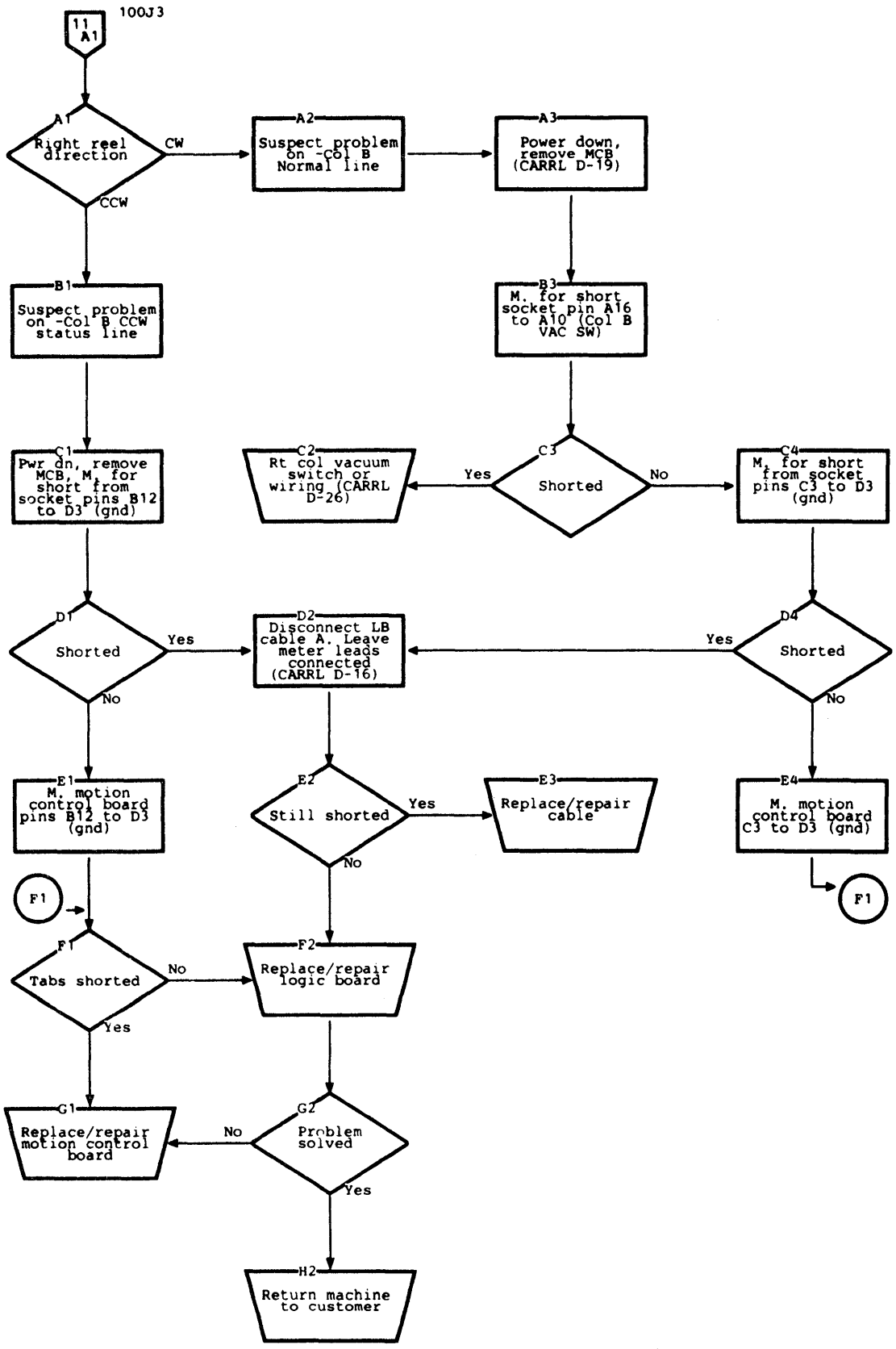
Load/Unload Reel Control Check



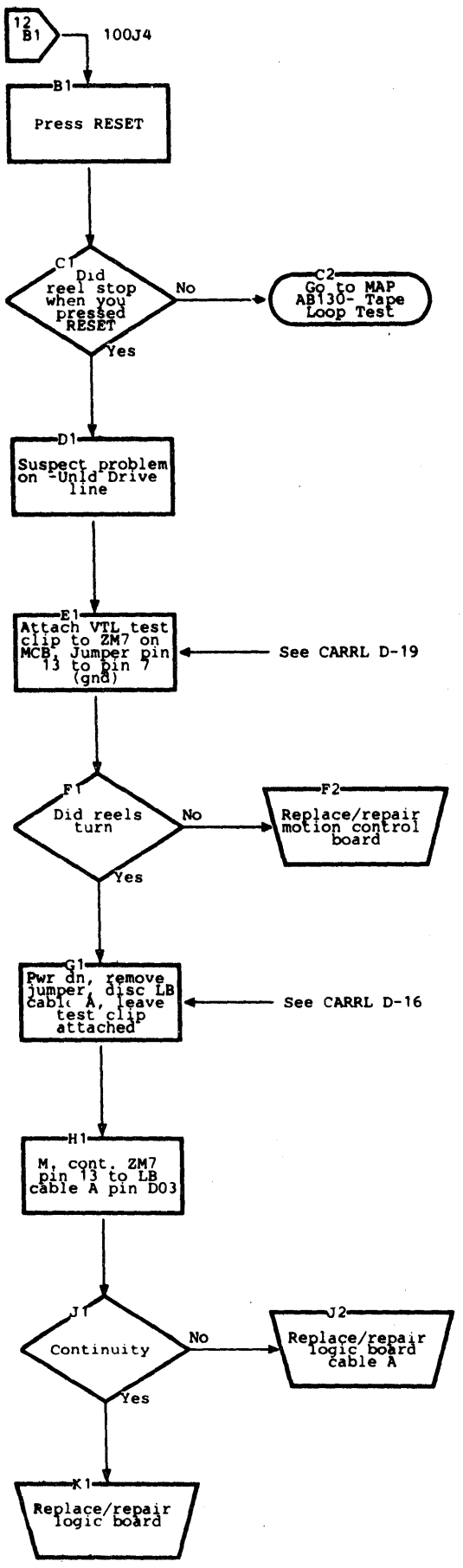
XF3700 Seq 1 of 2	1845933 Part Number

734556 1 Sept 72	734556A 20 Oct 72	734556B 20 Nov 72	734852 26 Feb 73	

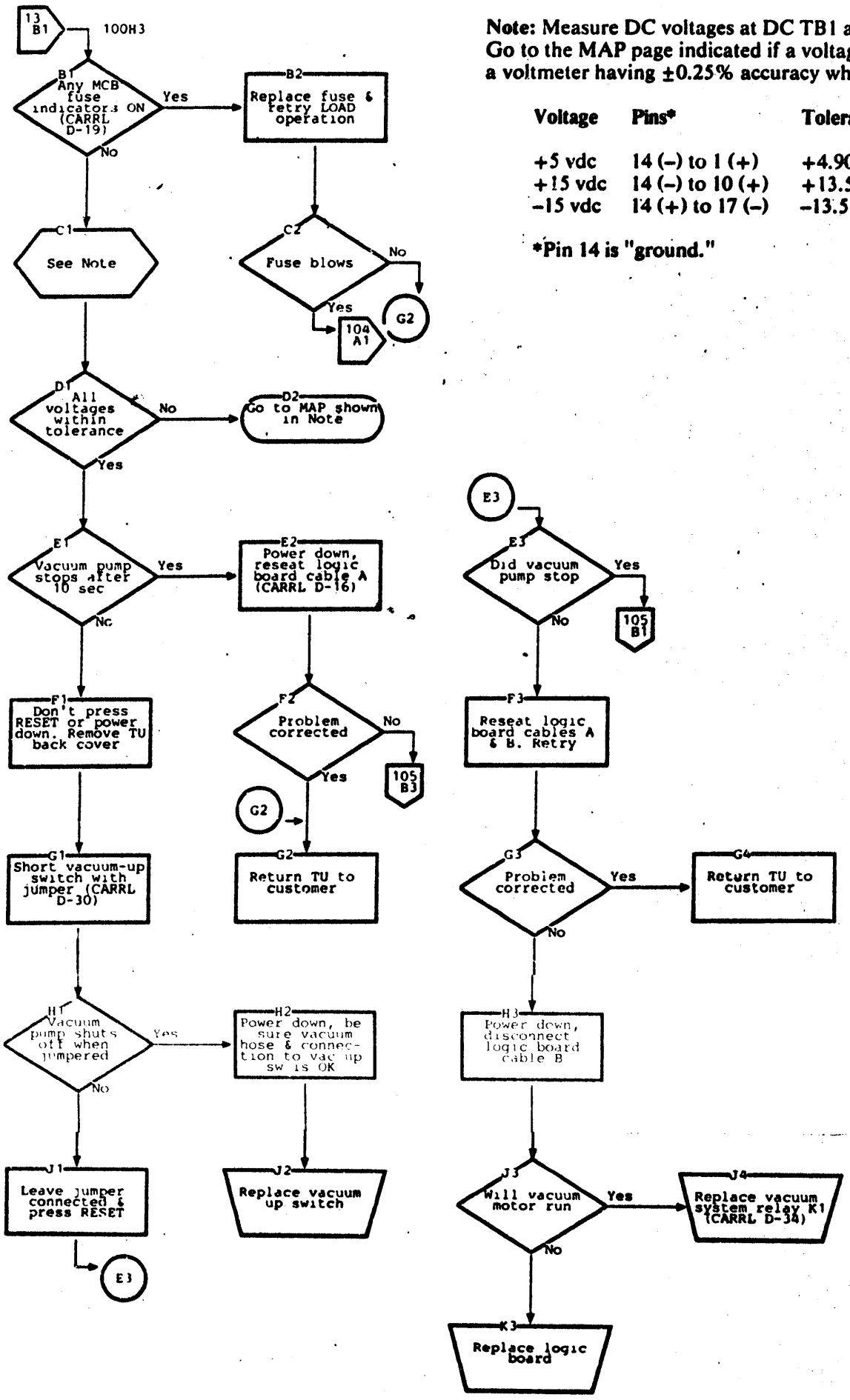
Load/Unload Reel Control Check

MAP AB101

Load/Unload Reel Control Check



Load/Unload Reel Control Check



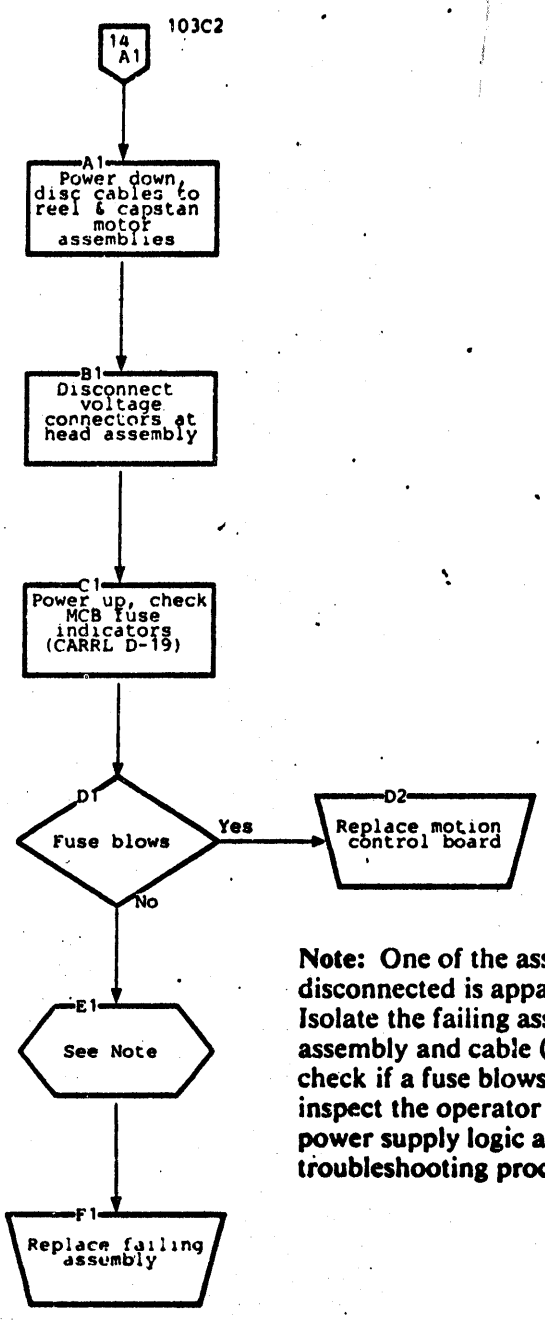
Discussion: Vacuum pump may attain vacuum level slowly, preventing either reel from loading. If you suspect this problem, check vacuum pump pulley and belt tension.

Note: Measure DC voltages at DC TB1 at the pins shown below. Go to the MAP page indicated if a voltage is out of tolerance. Use a voltmeter having ±0.25% accuracy when measuring these voltages.

Voltage	Pins*	Tolerance	MAP Page
+5 vdc	14 (–) to 1 (+)	+4.90 to 5.10	AC090
+15 vdc	14 (–) to 10 (+)	+13.5 to +17.2	AC120
–15 vdc	14 (+) to 17 (–)	–13.5 to –17.2	AC130

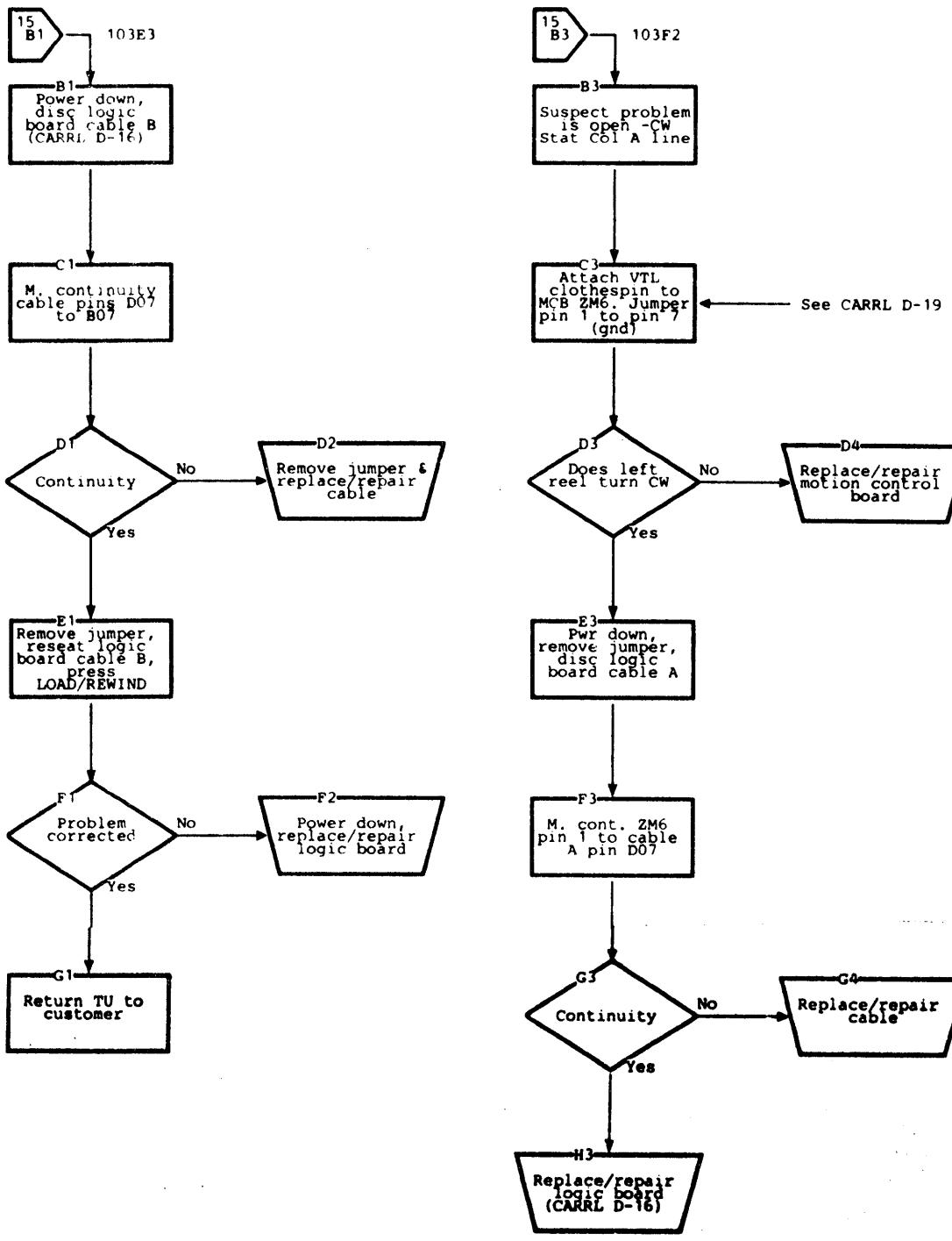
*Pin 14 is "ground."

Load/Unload Reel Control Check



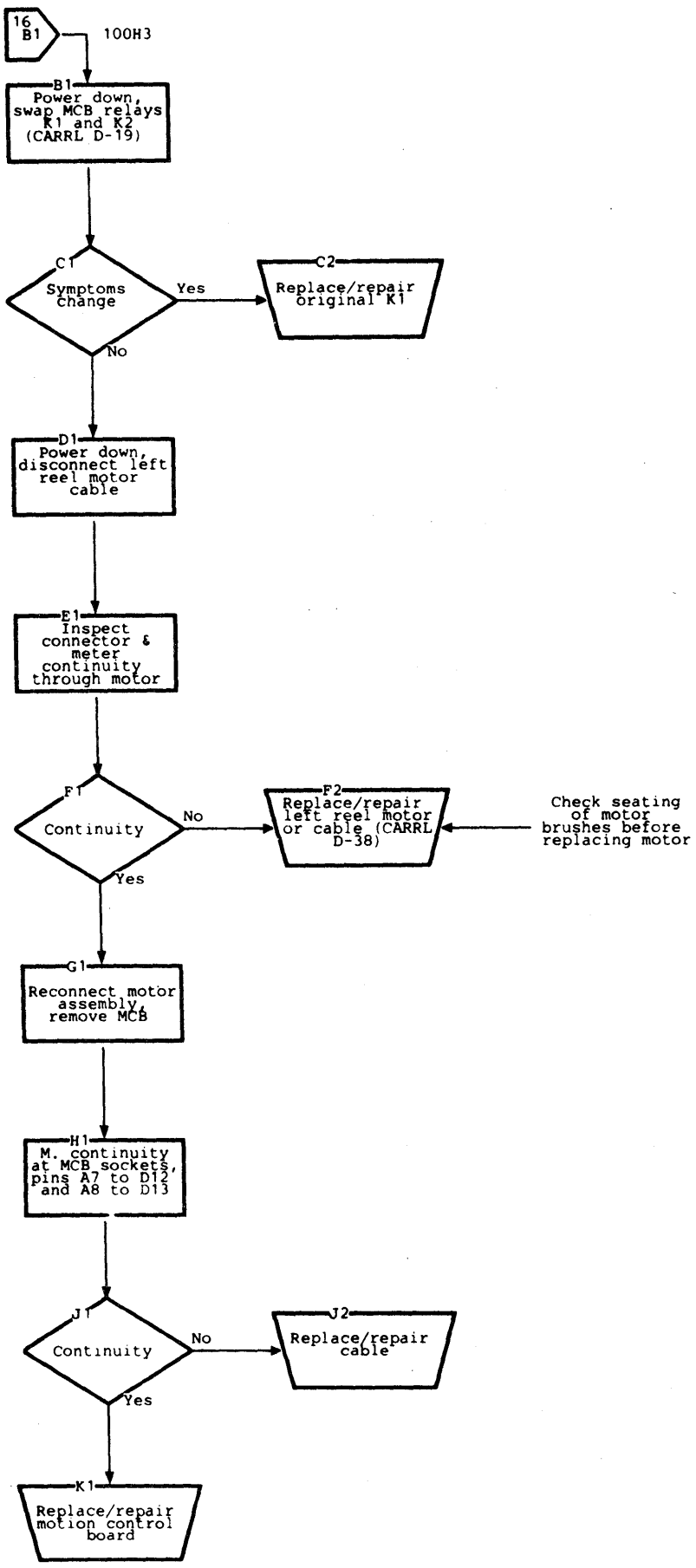
Note: One of the assemblies or cables that is disconnected is apparently shorted. Power down. Isolate the failing assembly or cable by reconnecting each assembly and cable (one at a time) and powering up to check if a fuse blows. If no assembly or cable is shorted, inspect the operator panel assembly, or refer to ±15 vdc power supply logic and follow your normal troubleshooting procedure.

Load/Unload Reel Control Check



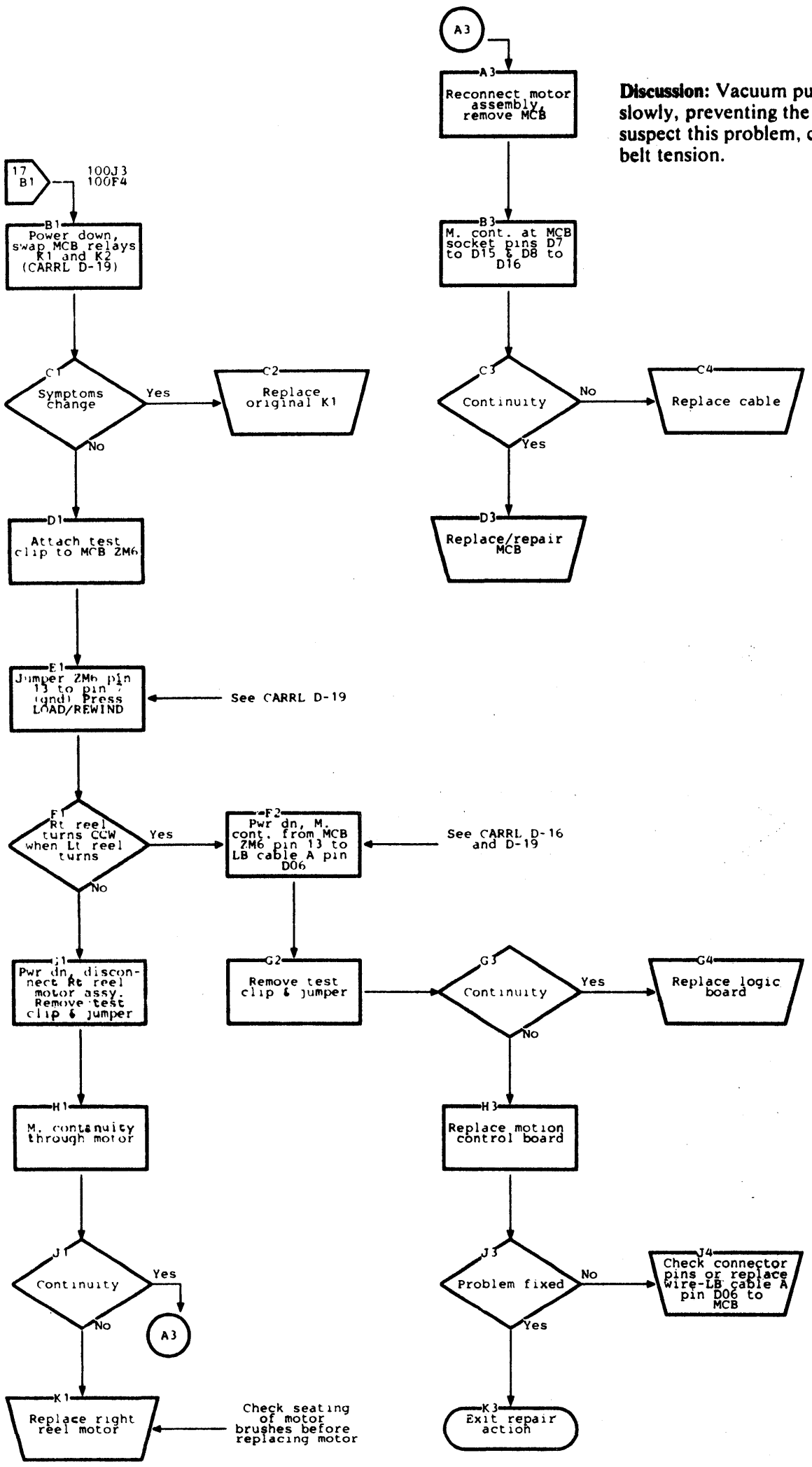
XF3900 Seq. 1 of 2	1845935 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734852 26 Feb 73		

Load/Unload Reel Control Check



Discussion: Vacuum pump may attain vacuum level slowly, preventing the left reel from loading. If you suspect this problem, check vacuum pump pulley and belt tension.

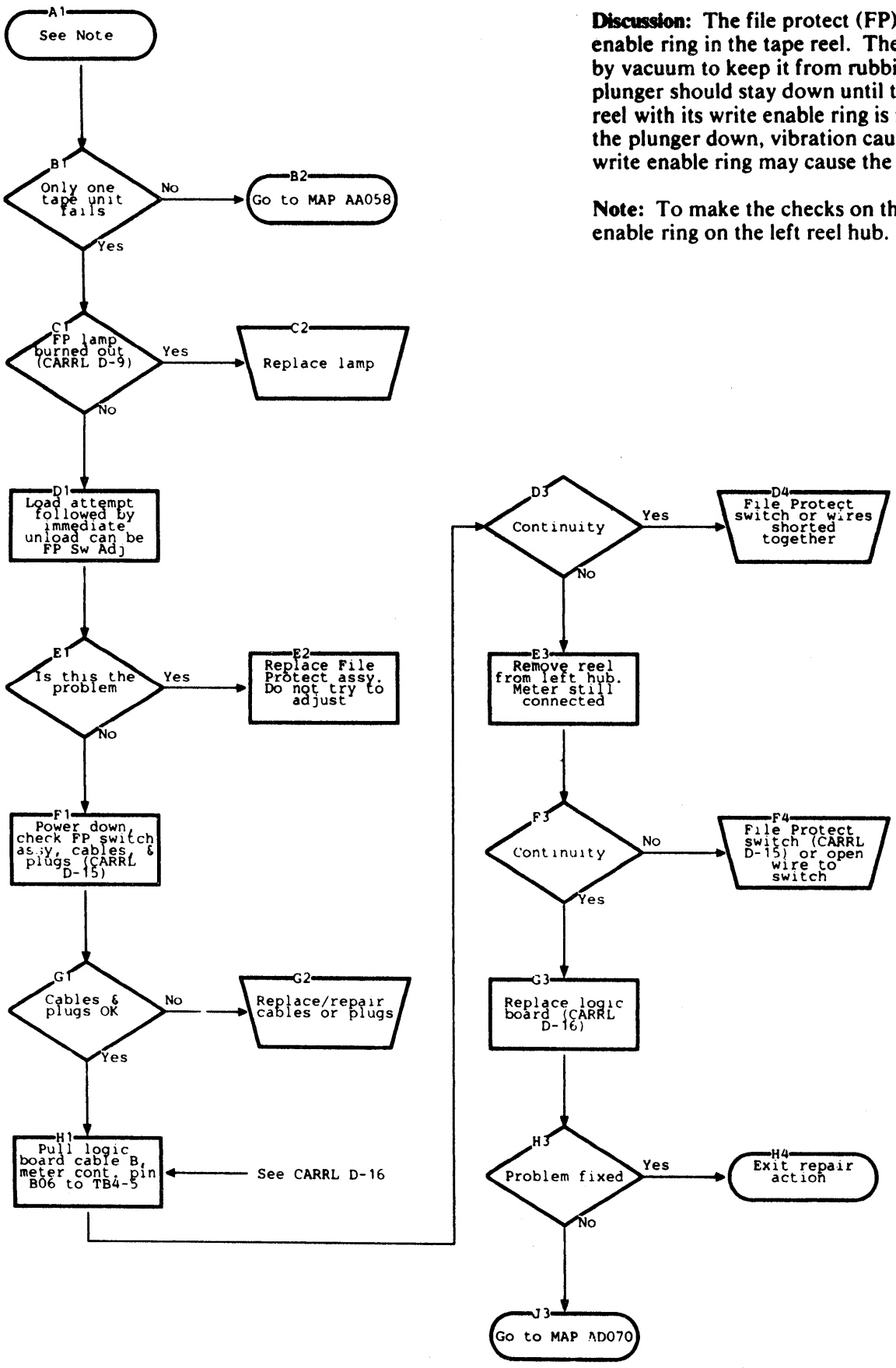
Load/Unload Reel Control Check



Discussion: Vacuum pump may attain vacuum level slowly, preventing the right reel from loading. If you suspect this problem, check vacuum pump pulley and belt tension.

XF4000	1845936
Seq 1 of 2	Part Number

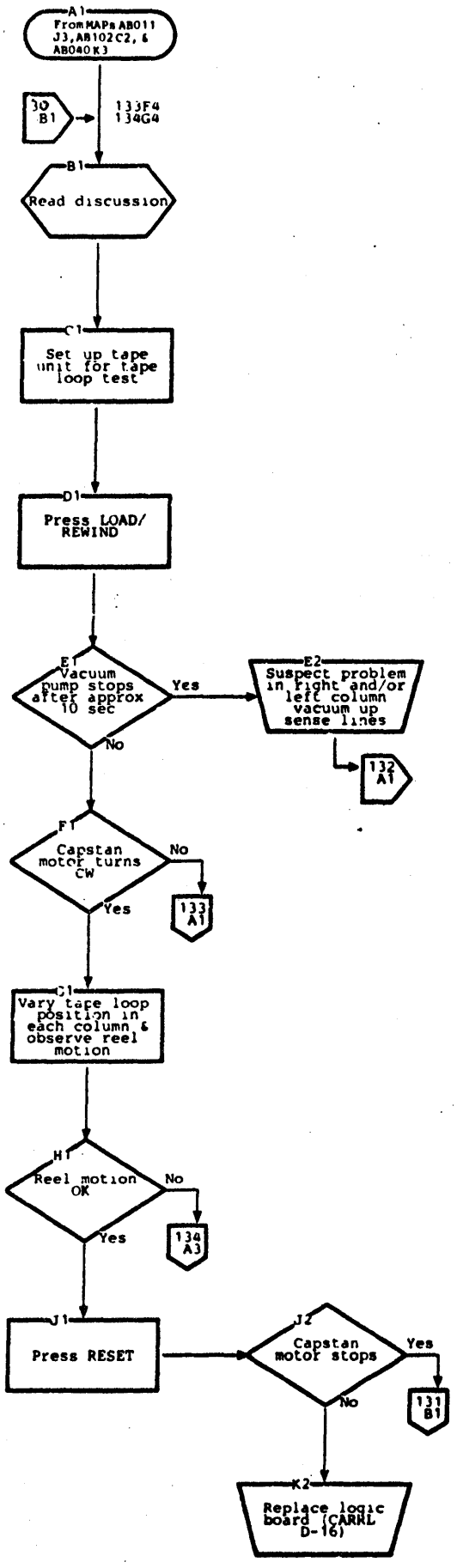
734556A	734556B	734852	735107	734864
20 Oct 72	20 Nov 72	26 Feb 73	11 May 73	1 Aug 73



Discussion: The file protect (FP) switch is actuated by the write enable ring in the tape reel. The switch plunger is then held down by vacuum to keep it from rubbing on the write enable ring. The plunger should stay down until the vacuum pump stops, even if the reel with its write enable ring is removed. If vacuum does not hold the plunger down, vibration caused by the plunger rubbing on the write enable ring may cause the switch to transfer intermittently.

Note: To make the checks on this MAP, mount a reel with a write enable ring on the left reel hub. Do not load the tape unit.

Tape Loop Check



Discussion: Read the Tape Loop Check procedure in CARRL Figure D-3 before starting this MAP. Keep the CARRL section open to Figure D-3 for reference to this MAP to perform the tape loop check.
If the completion of "Load Op" is unsuccessful and tape dump has occurred in the right column, check the capstan for proper sequencing including LP search. If capstan appears to run away in a forward direction, go to MAP AB131-A2 and check the tachometer. If tachometer is OK, return here and continue on this MAP. If it is not OK, take the corrective action indicated on MAP AB131.

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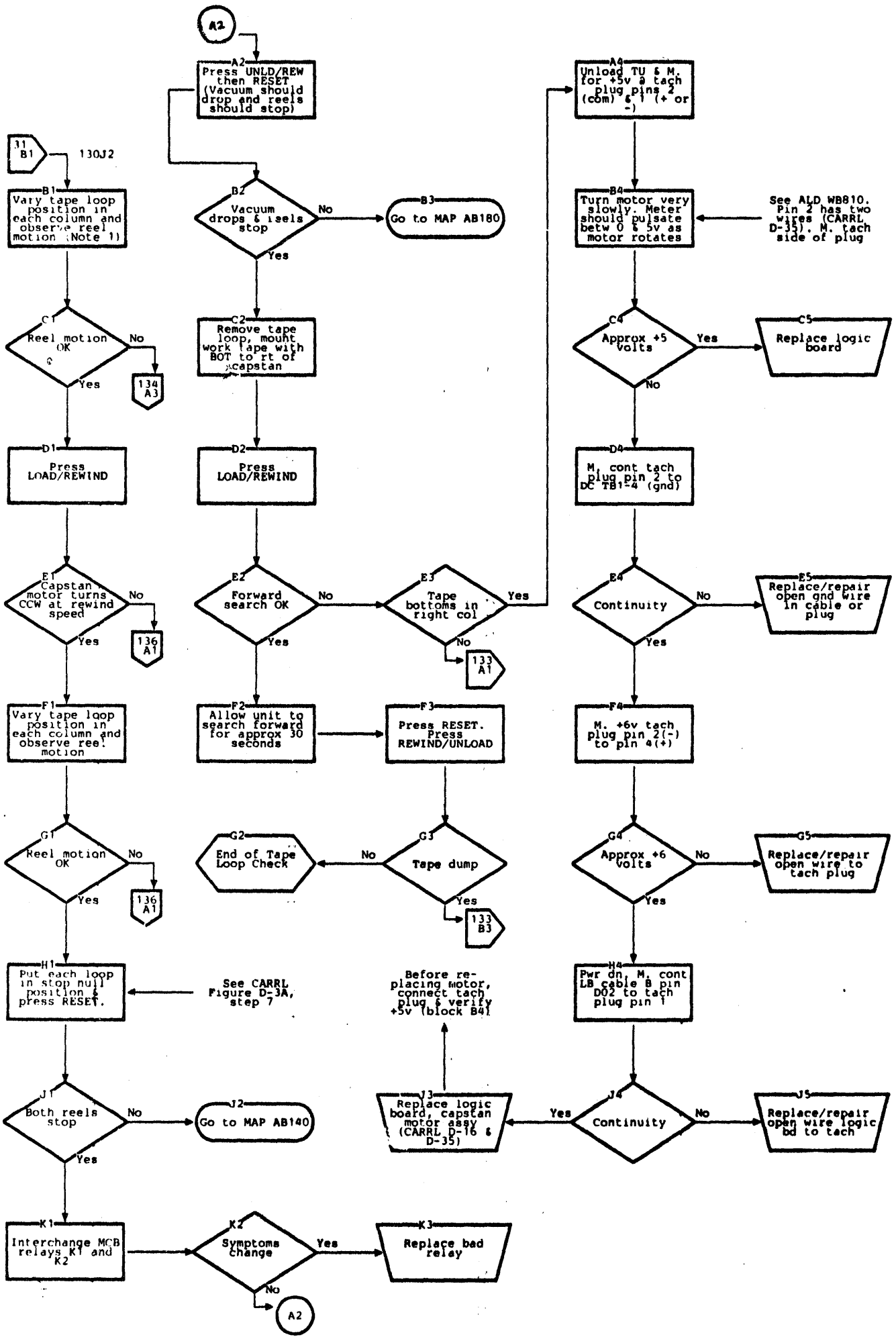
Tape Loop Check

Note 1: Read CARRL D-3 for instructions for mounting work tape or 8 ft. loop.



XF4100	1845937	734556	734556A	734556B	734864	443751	846018	
Seq 2 of 2	Part Number	1 Sept 72	20 Oct 72	20 Nov 72	1 Aug 73	20 Sept 74	31 May 78	

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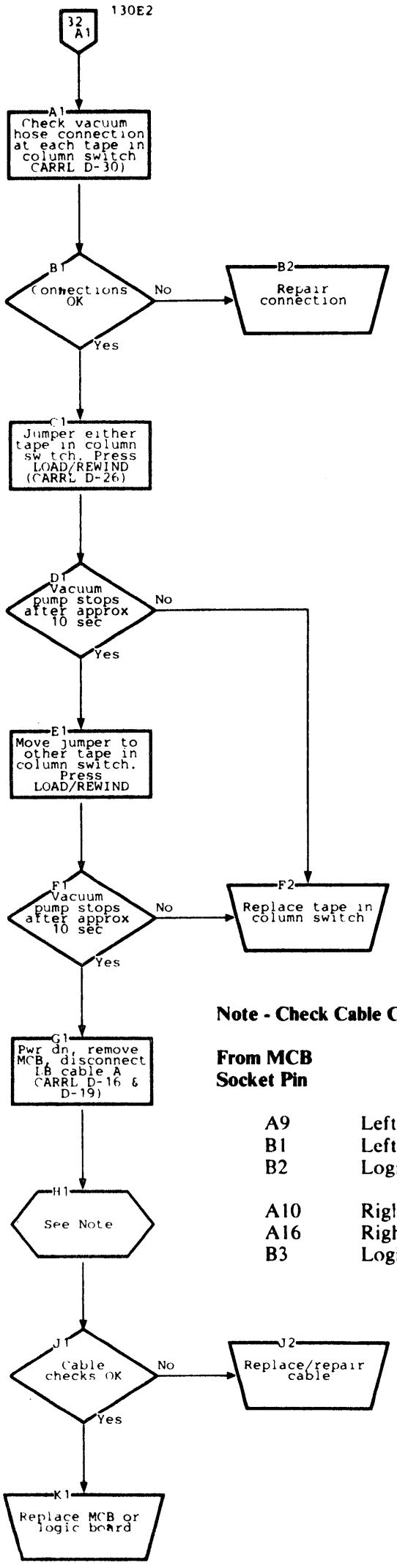
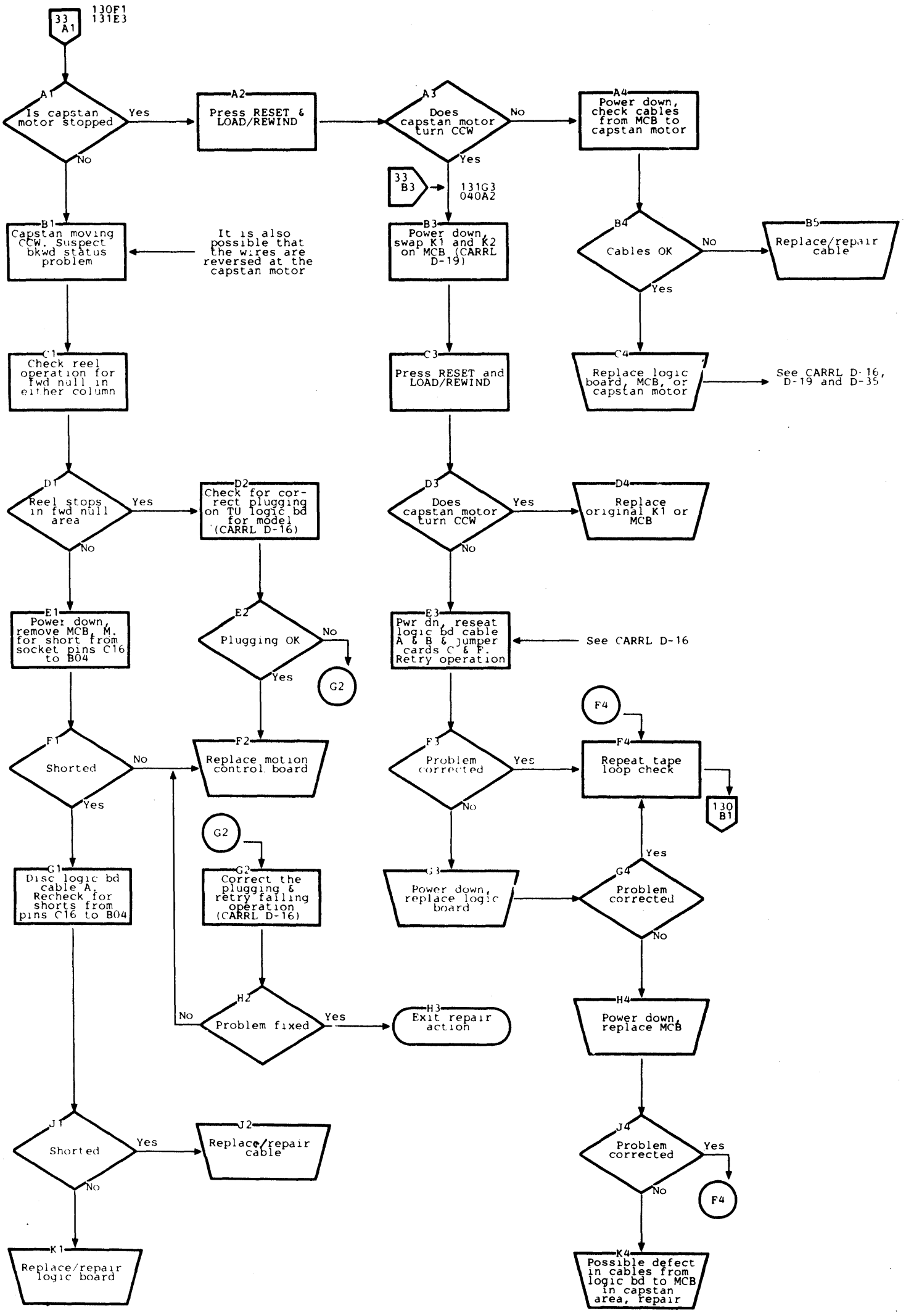
Tape Loop Check



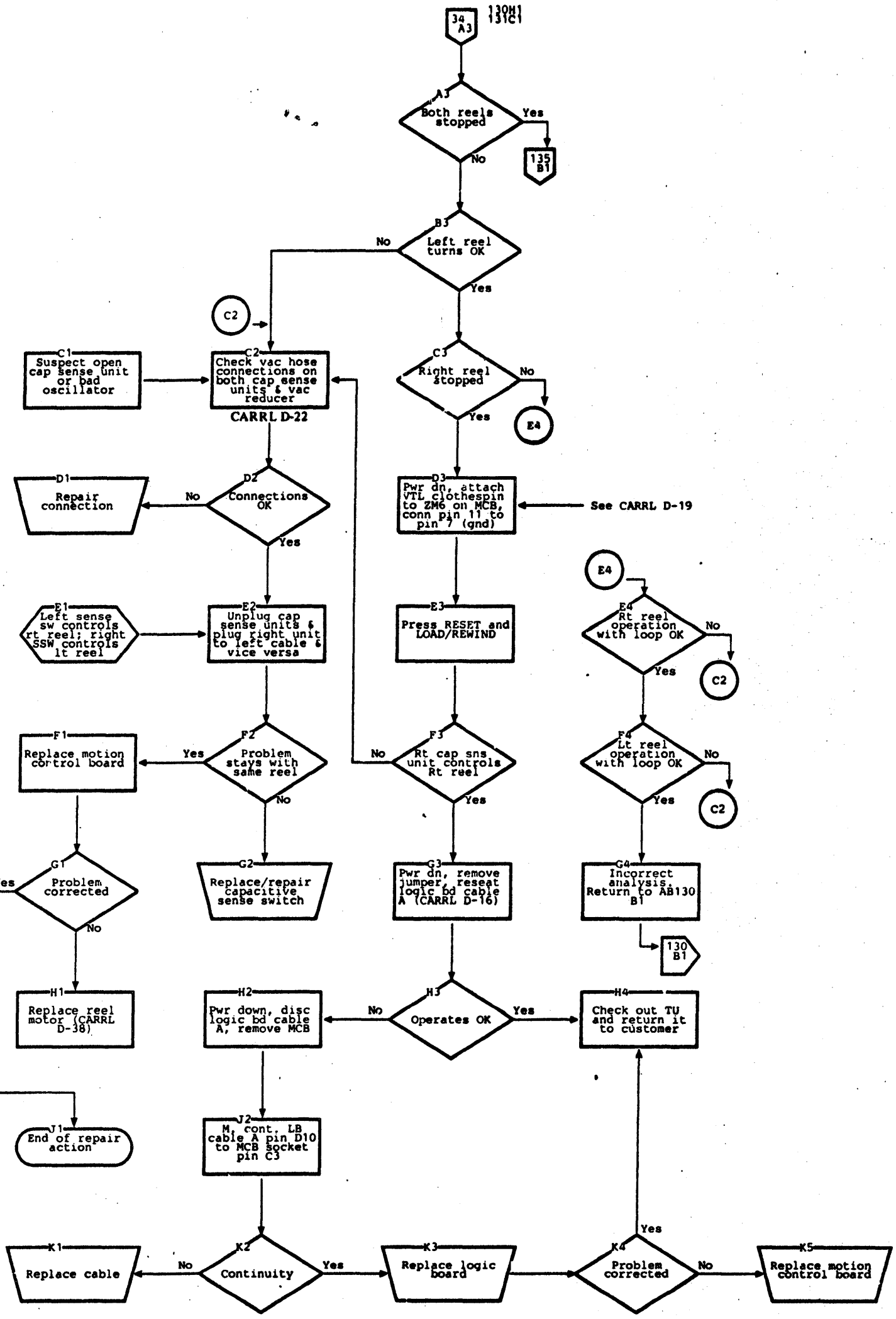
Note - Check Cable Continuity:

From MCB Socket Pin	To
A9	Left column vacuum up switch (yellow wire)
B1	Left column vacuum up switch (black wire)
B2	Logic board cable A Pin B05
A10	Right column vacuum up switch (yellow wire)
A16	Right column vacuum up switch (black wire)
B3	Logic board cable A Pin B08

Tape Loop Check

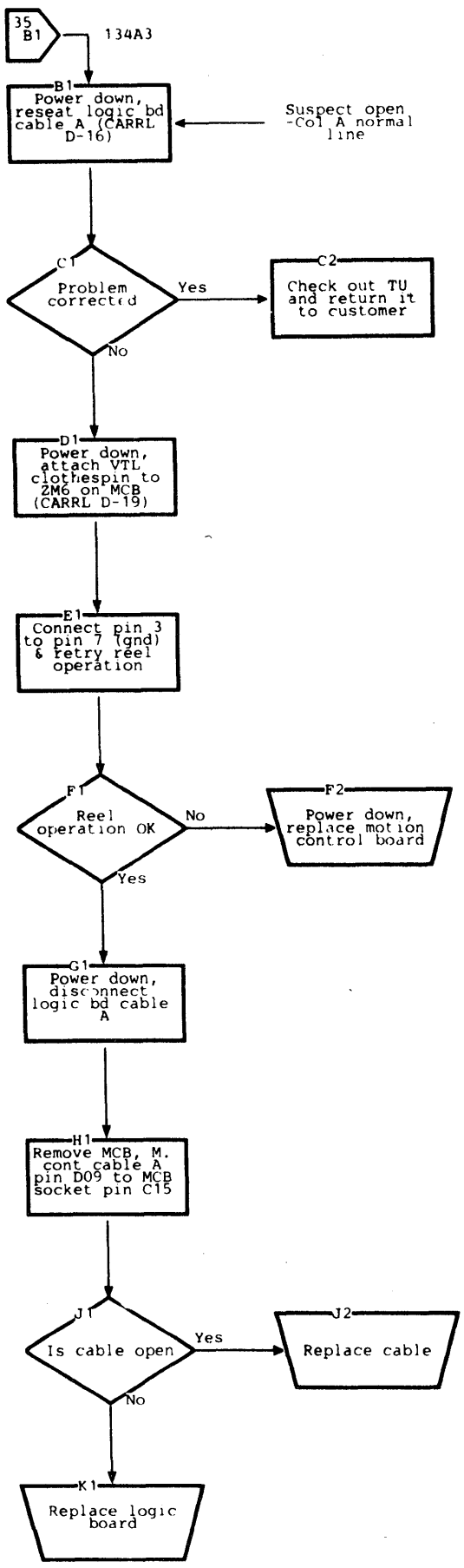


Tape Loop Check



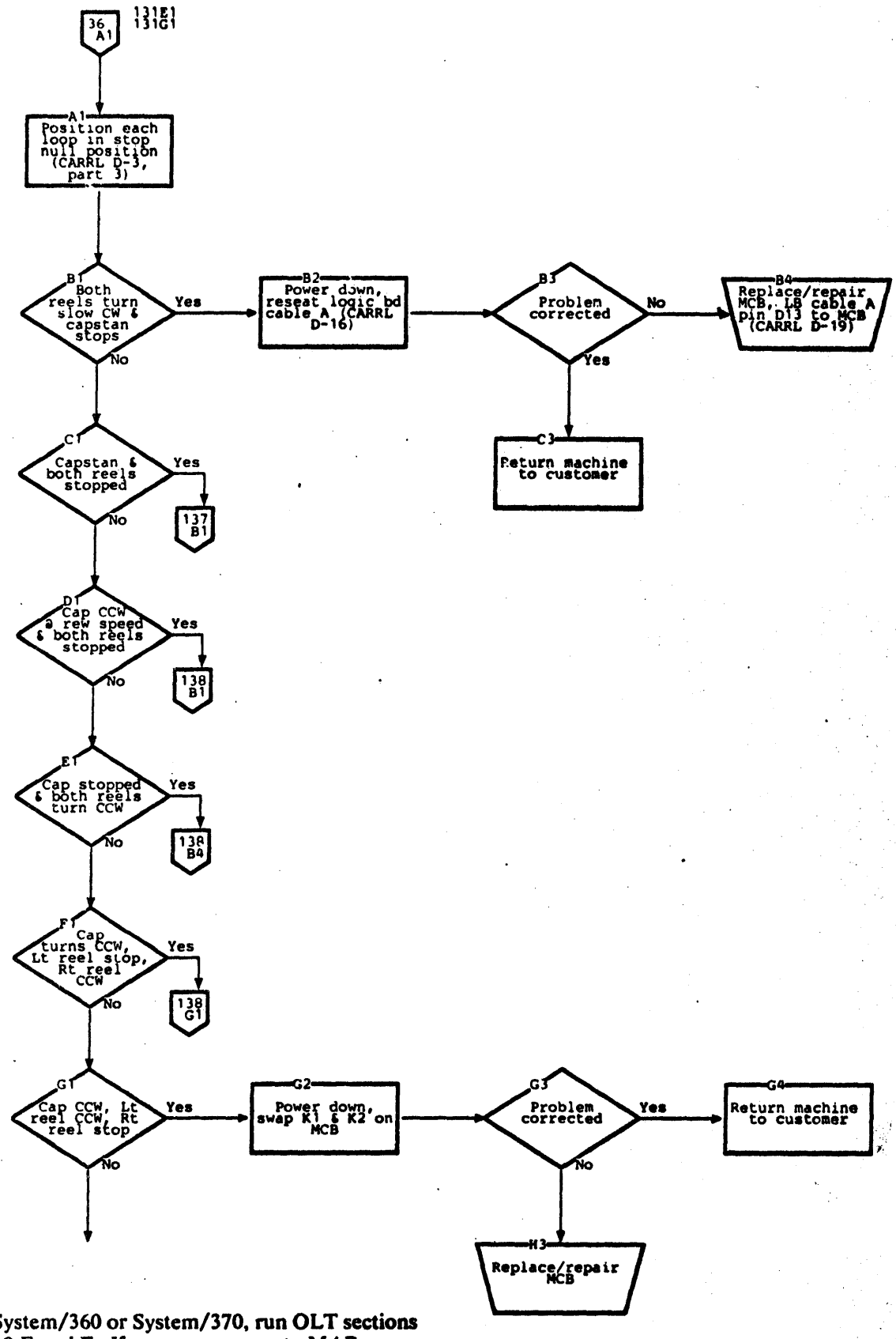
XF4300	1845939	734556	734556A	734852		
Seq 1 of 2	Part Number	1 Sept 72	20 Oct 72	26 Feb 73		

Tape Loop Check



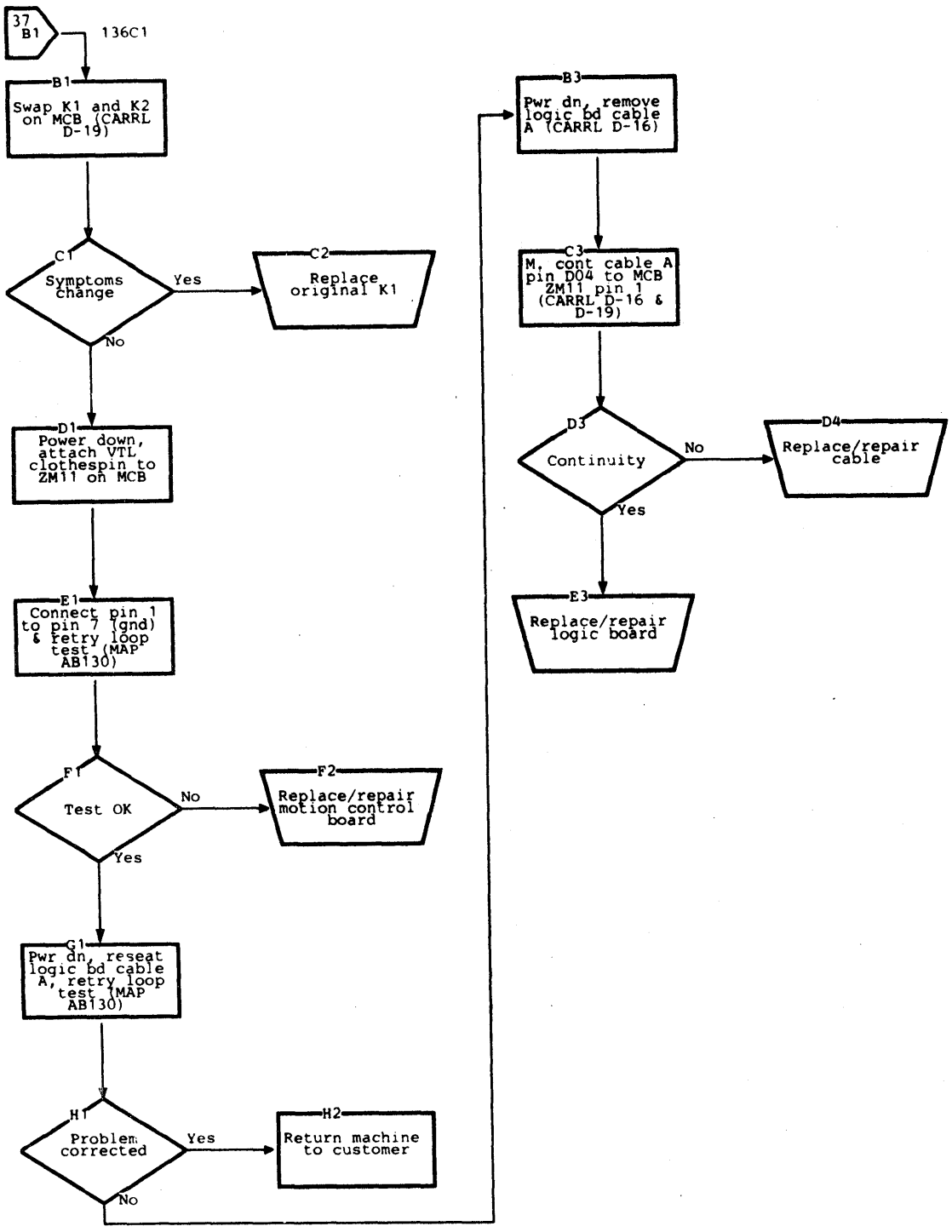
XF4300	1845939	734556	734556A	734852		
Seq 2of 2	Part Number	1 Sept 72	20 Oct 72	26 Feb 73		

Tape Loop Check

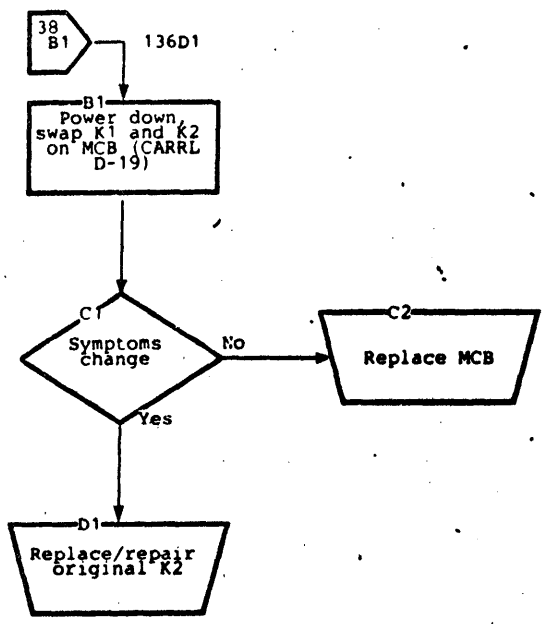


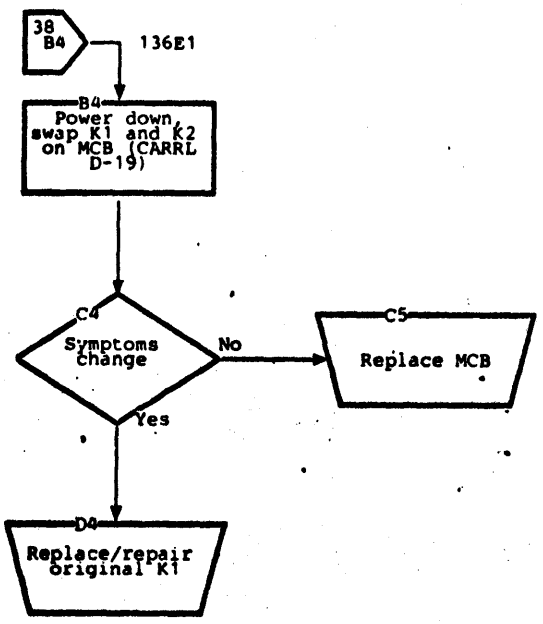
On System/360 or System/370, run OLT sections T3410 E and F. If errors occur, go to MAP AA035.
On System/3, run Diagnostic Section 708. If errors occur, go to MAP AD046.

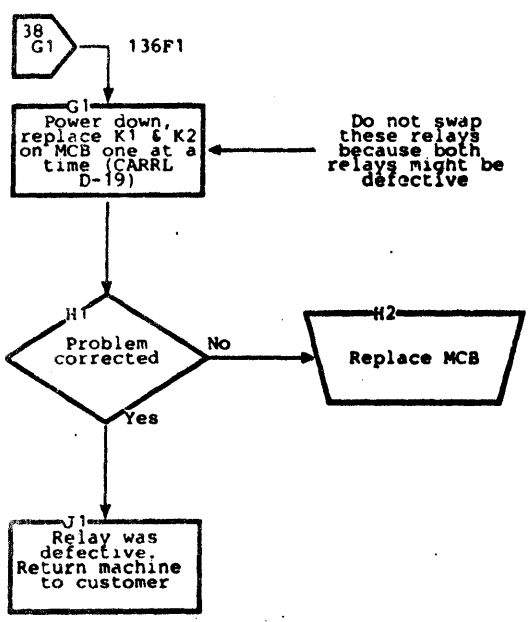
Tape Loop Check



Tape Loop Check

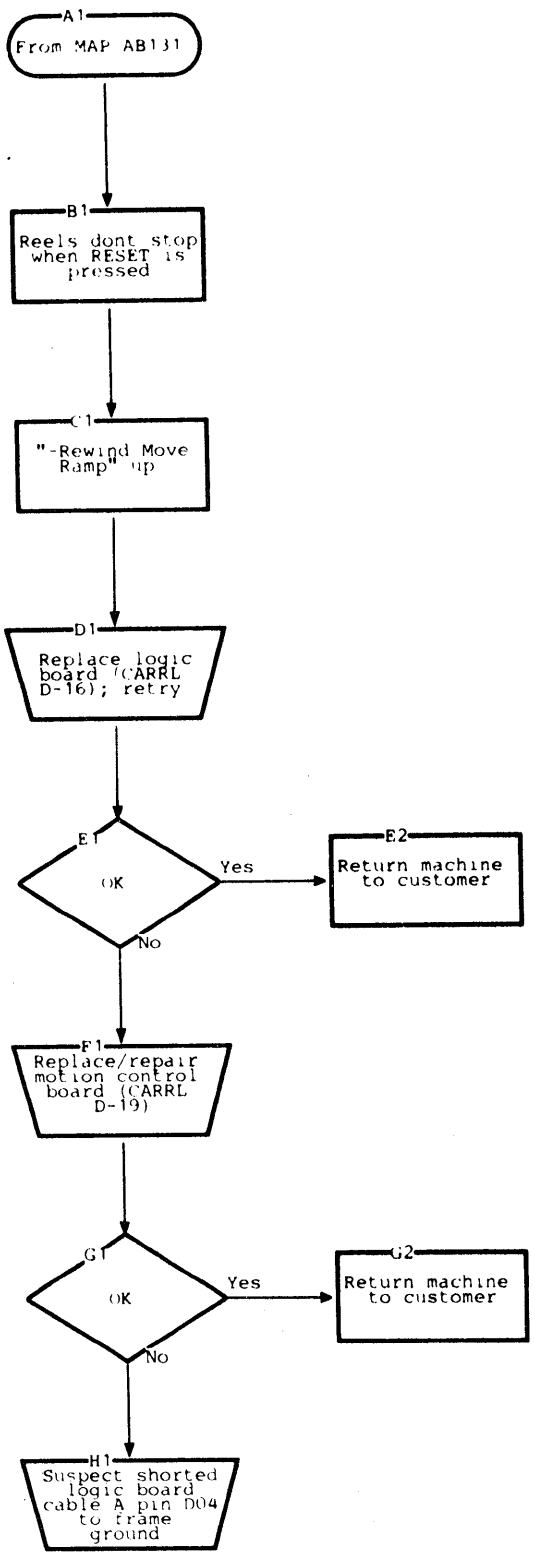






XF4500 Seq 1 of 2	1845941 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734852 26 Feb 73	734864 1 Aug 73	

Load Rewind-Reset

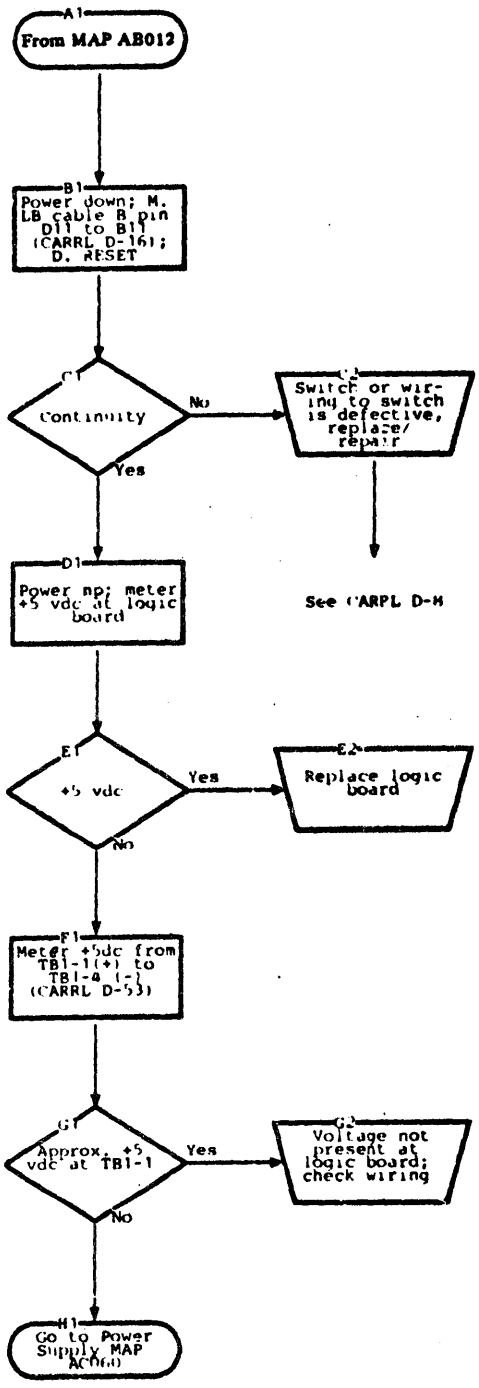


Load Rewind-Reset

MAP AB140

XF4500	1845941	734556	734556A	734852	734864	
Seq 2 of 2	Part Number	1 Sept 72	20 Oct 72	26 Feb 73	1 Aug 73	

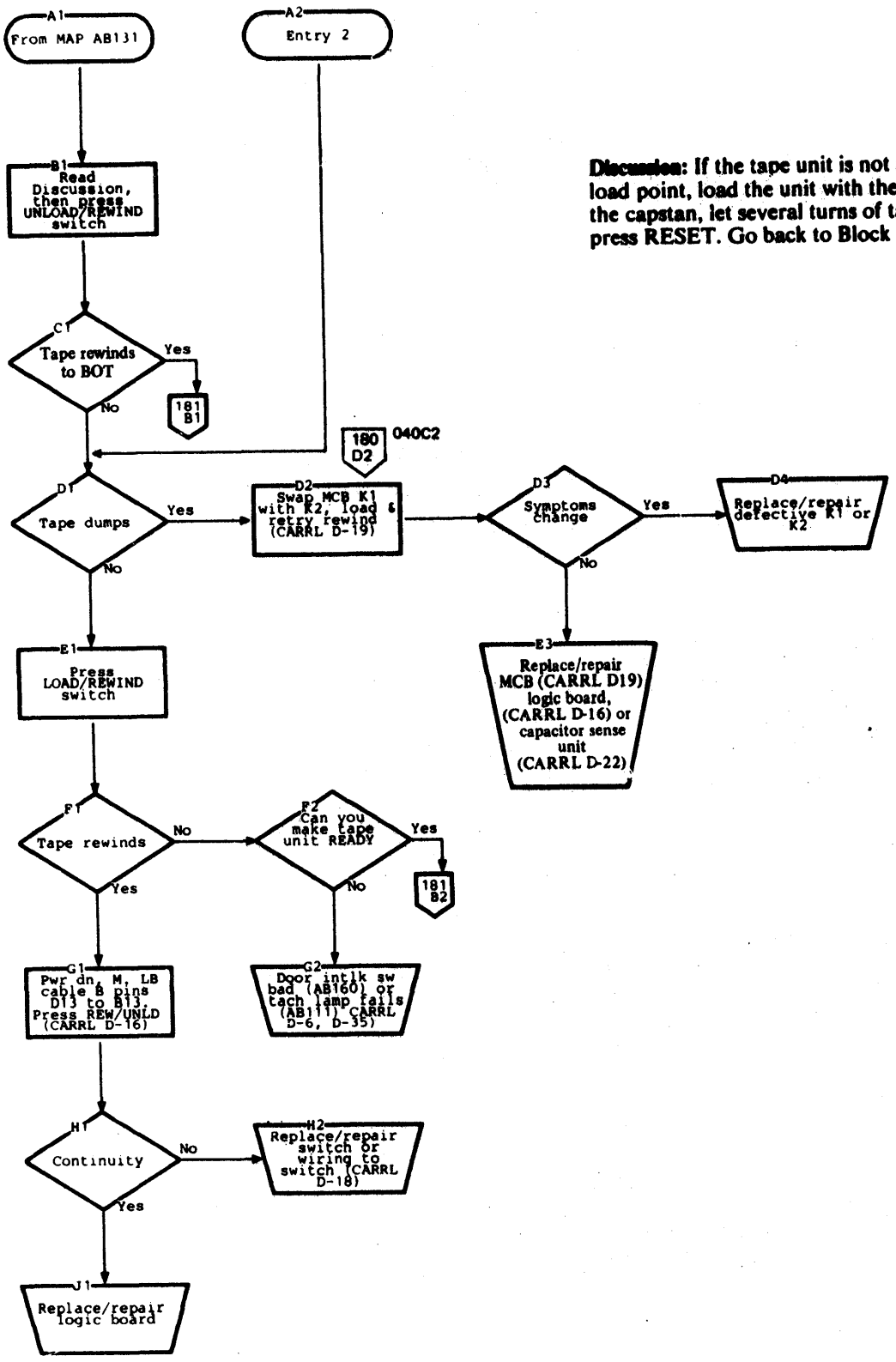
Reset Problems



Discussion: Entry to this MAP assumes that the READY light remains on when the RESET button is pressed. This condition could be caused by a faulty switch or wire, or a power supply problem.

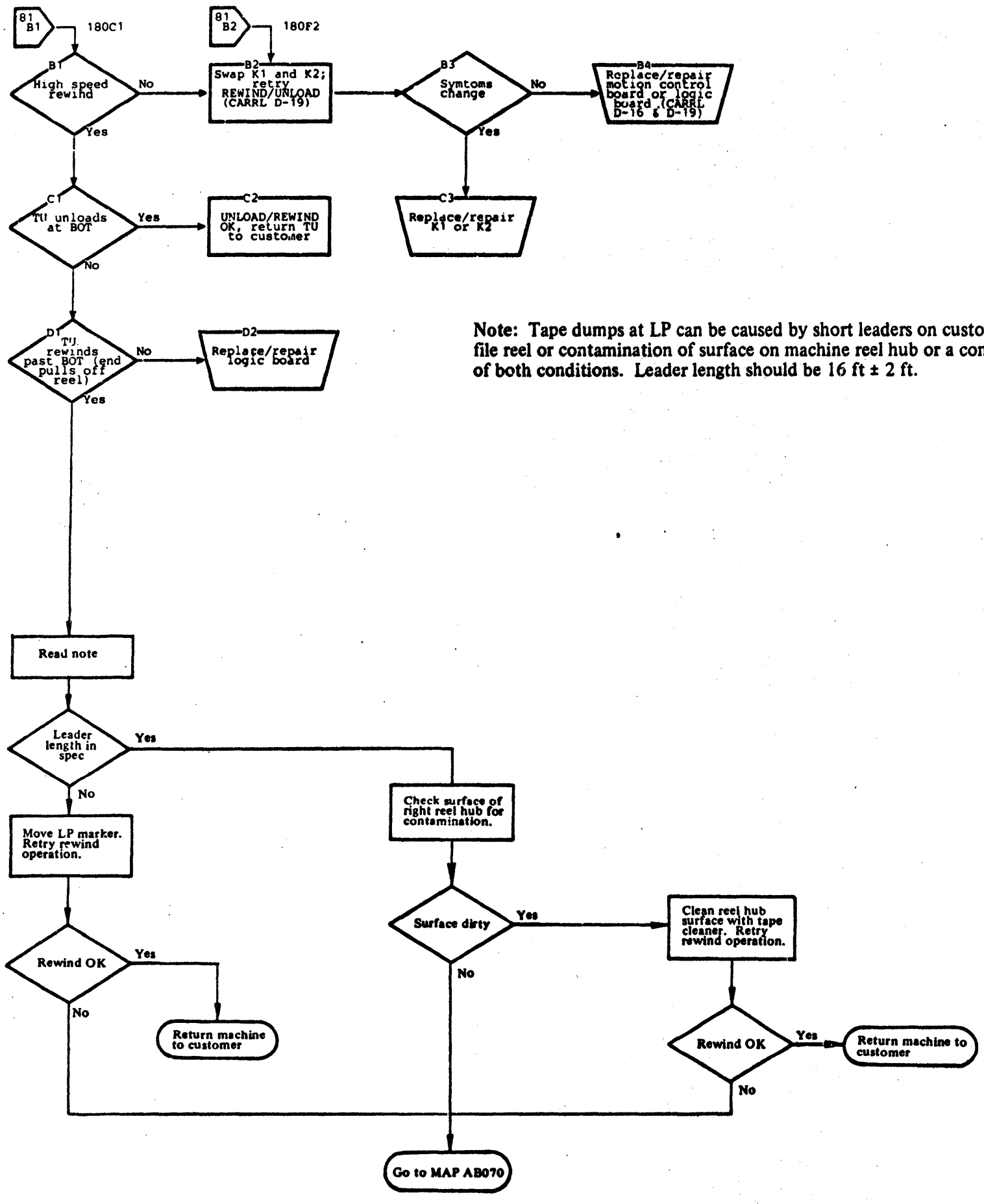
Note: The tape control can cause a hang-up condition that disables the RESET switch.

Unload/Rewind Failures



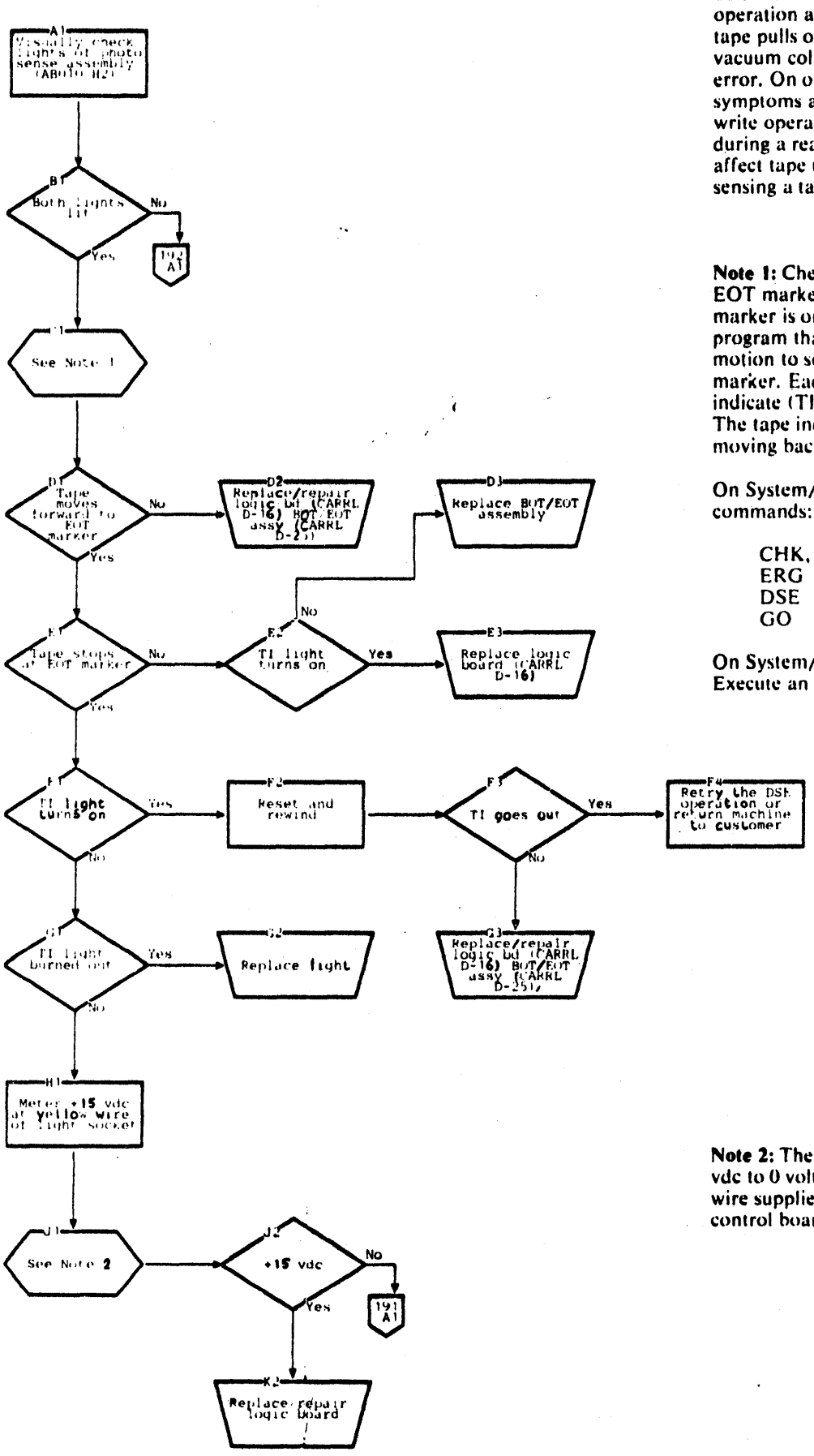
Discussion: If the tape unit is not already loaded and away from load point, load the unit with the BOT marker on the right side of the capstan, let several turns of tape wind onto the right reel, and press RESET. Go back to Block B1.

Unload/Rewind Failures



Note: Tape dumps at LP can be caused by short leaders on customer file reel or contamination of surface on machine reel hub or a combination of both conditions. Leader length should be 16 ft ± 2 ft.

EOT Sense Problems



Discussion: Failure to sense end of tape during a write operation allows the tape unit to continue writing until tape pulls off the file reel. Tape then bottoms in the vacuum column, which drops READY and signals an error. On operations such as data security erase, the symptoms are similar to those encountered during a write operation. Failure to sense EOT reflective marker during a read or forward space operation doesn't usually affect tape unit operation since the program relies on sensing a tape mark block to indicate end of tape.

Note 1: Check EOT sensing with a work tape that has an EOT marker about two feet from the BOT. The EOT marker is on the lower or back edge of the tape. Run a program that executes a DSE command and observe tape motion to see if the tape unit is failing to sense the EOT marker. Each time the EOT marker is sensed, the tape indicate (TI) light should turn on and tape should stop. The tape indicate light should turn off when tape starts moving backward.

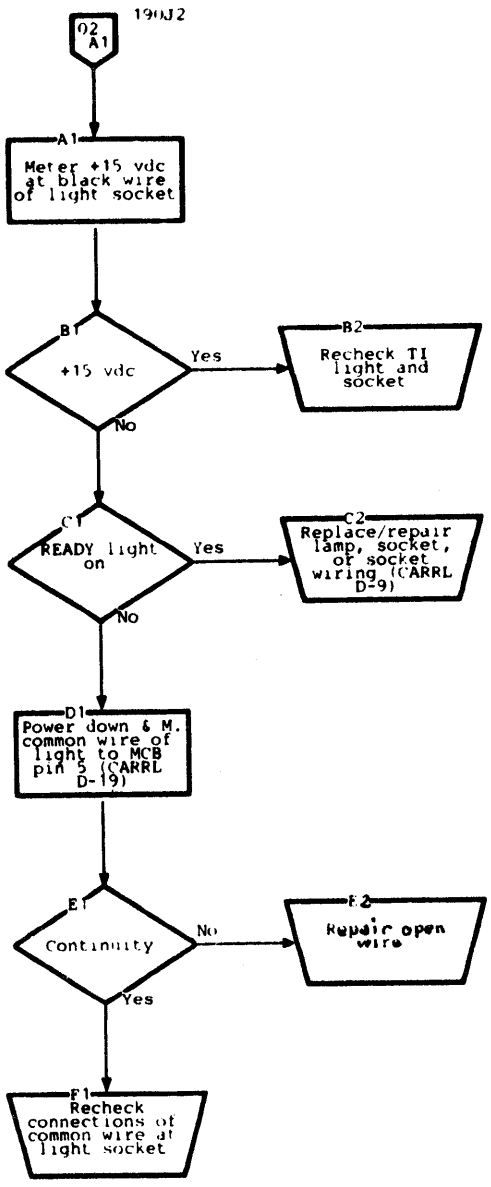
On System/3, use Section 70E. Enter the following commands:

```
CHK, X   ("X" = TU number (0–3)
ERG
DSE
GO
```

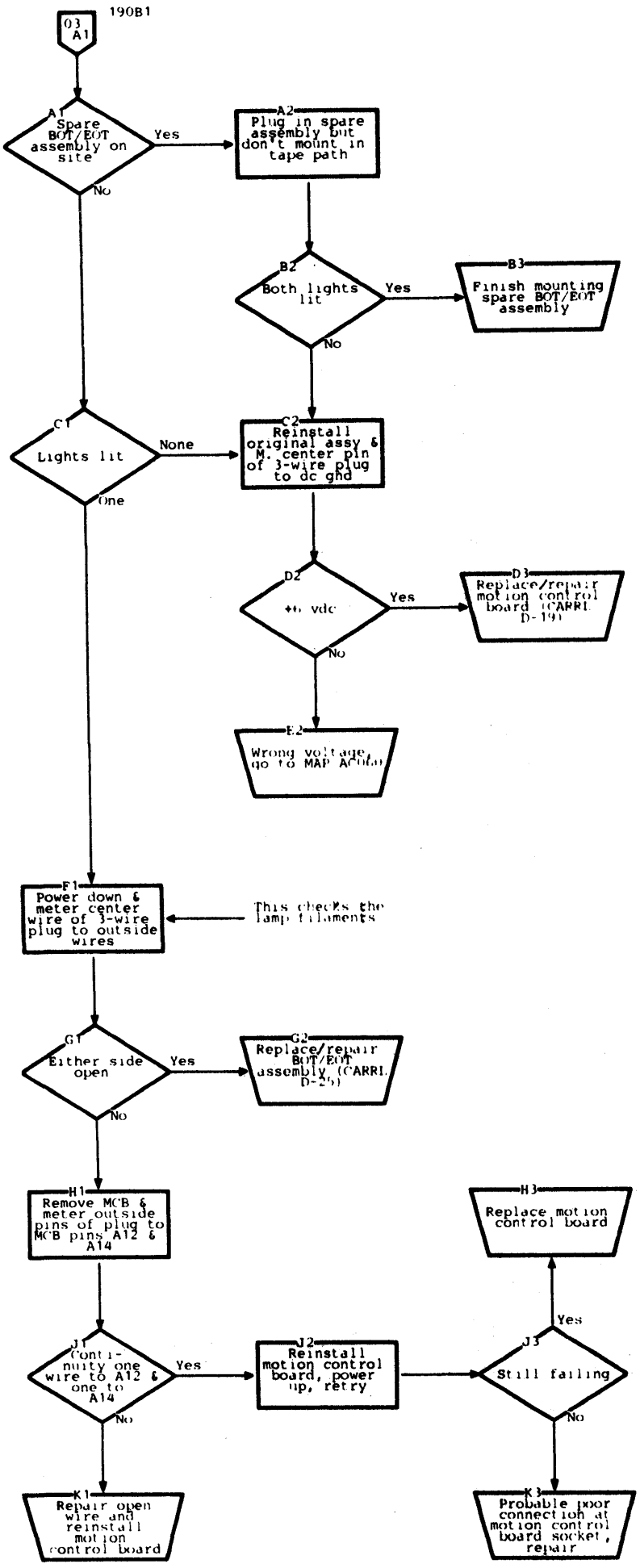
On System/360 or System/370, use the "Friend" program. Execute an ERG chained to a DSE.

Note 2: The voltage at the yellow wire should go from +15 vdc to 0 volts when the lamp driver conducts. The black wire supplies the +15 vdc to the lamps from motion control board pin A5.

EOT Sense Problems



EOT Sense Problems



EOT Sense Problems

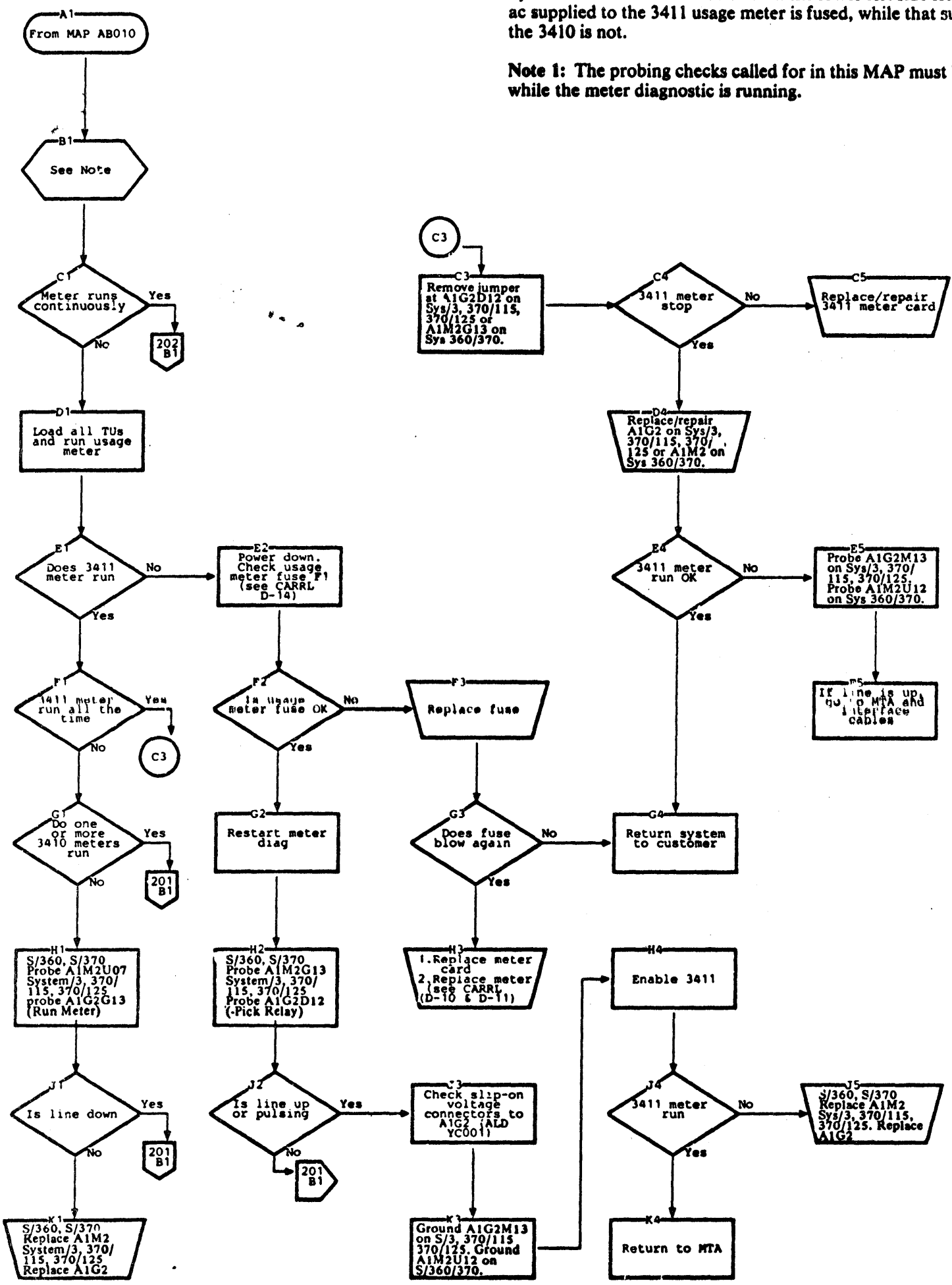
MAP AB192

XF4300 Seq 2 of 2	1845944 Part Number	734556 1 Sept 72	734556A 20 Oct 72			

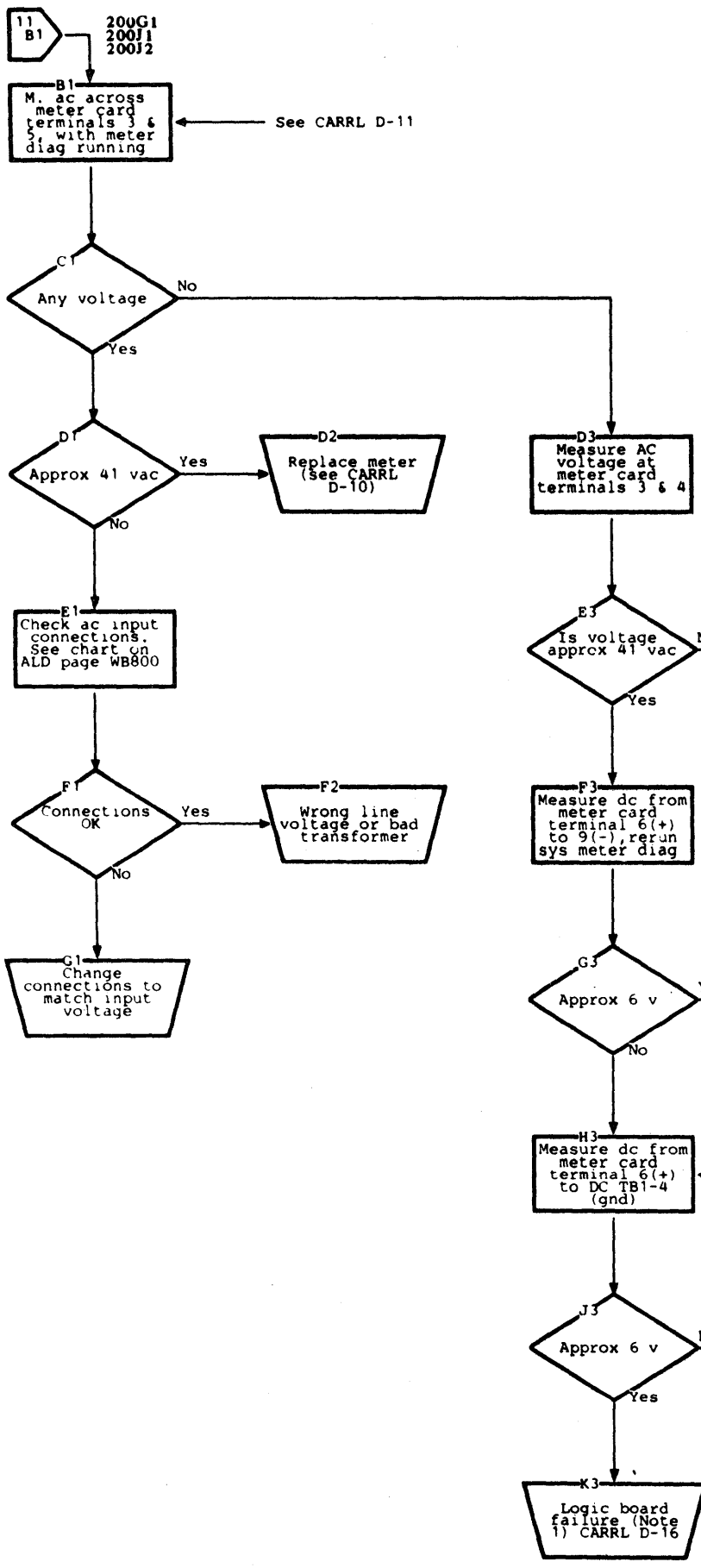
Usage Meter Problems

Discussion: The 41 volts ac for the 3411 usage meter is supplied by transformer T1. The voltage for the 3410 usage meter is supplied by a small transformer mounted on the lower left side frame. The ac supplied to the 3411 usage meter is fused, while that supplied to the 3410 is not.

Note 1: The probing checks called for in this MAP must be made while the meter diagnostic is running.



XF4900 Seq.1 of 2	1845945 Part Number	See EC History	734004 1 Aug 73	443751 20 Sept 74		

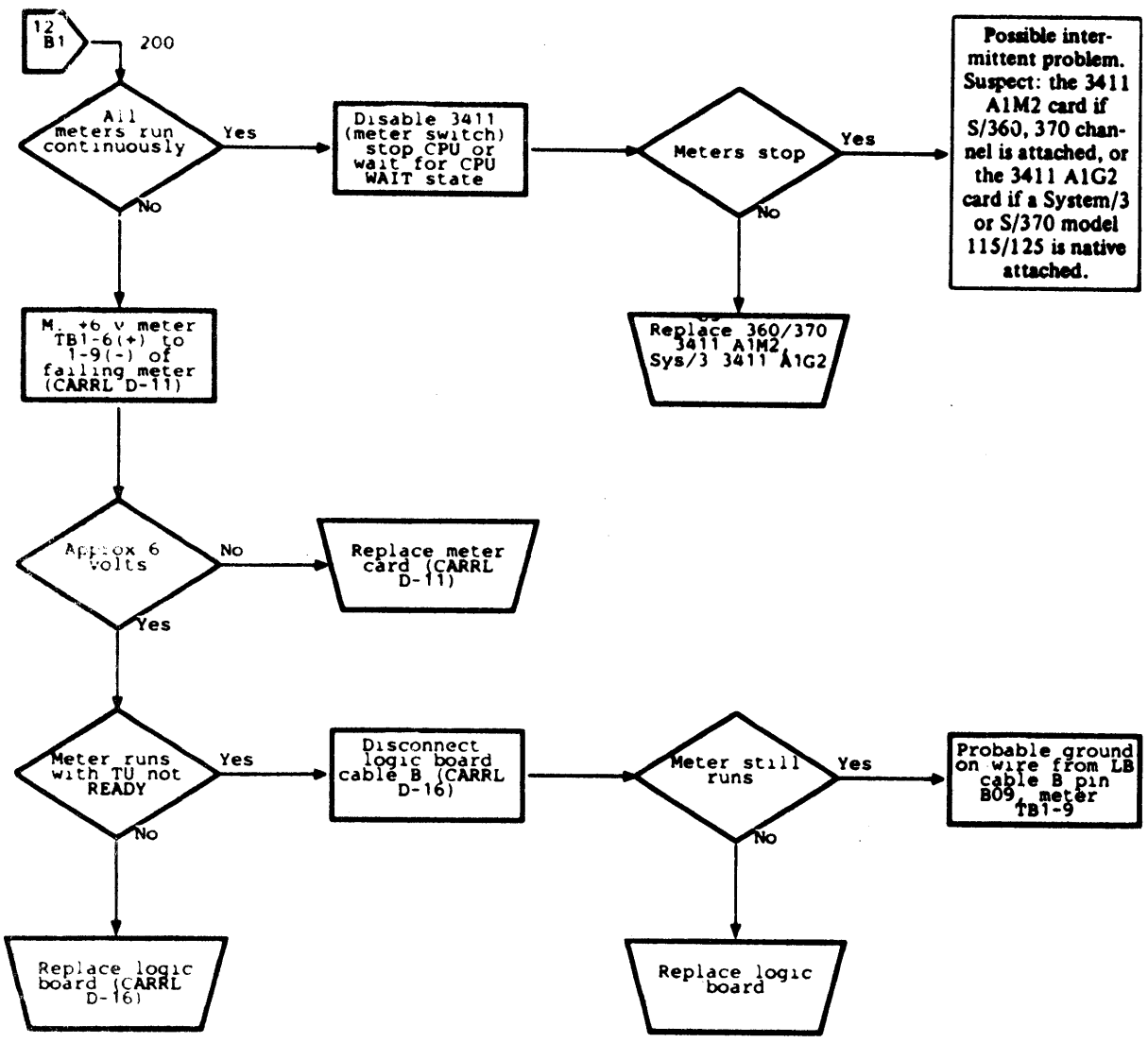


Note 1: The logic board circuit completes the meter relay pick circuit. See ALD page WB800.

Before replacing the logic board, check logic board cable B pin B09 to meter card terminal 9. See CARRL Figure D-16, "Logic Board Removal and Replacement."

Note 2:
3410: +6 volts is supplied to tape unit meter card terminal 6 from the 3411 DC J plug, via the tape unit dc cable, tape unit DC TB 1-7, and tape unit TB 4-5 (under the upper base, to the right of the capstan motor). Meter card terminals are numbered 1 to 6, front to back.
3411: +6 volts is supplied to meter card terminal 6 from TB2-2.

Usage Meter Problems



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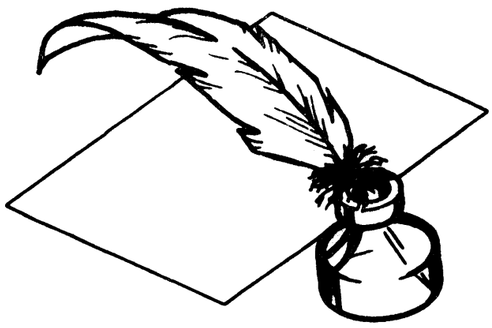

Notes

MAP AB203

XF5000	1845946	734556	734556A	734864	443806	
Seq. 2 of 2	Part Number	1 Sept 72	20 Oct 72	1 Aug 73	2 May 77	

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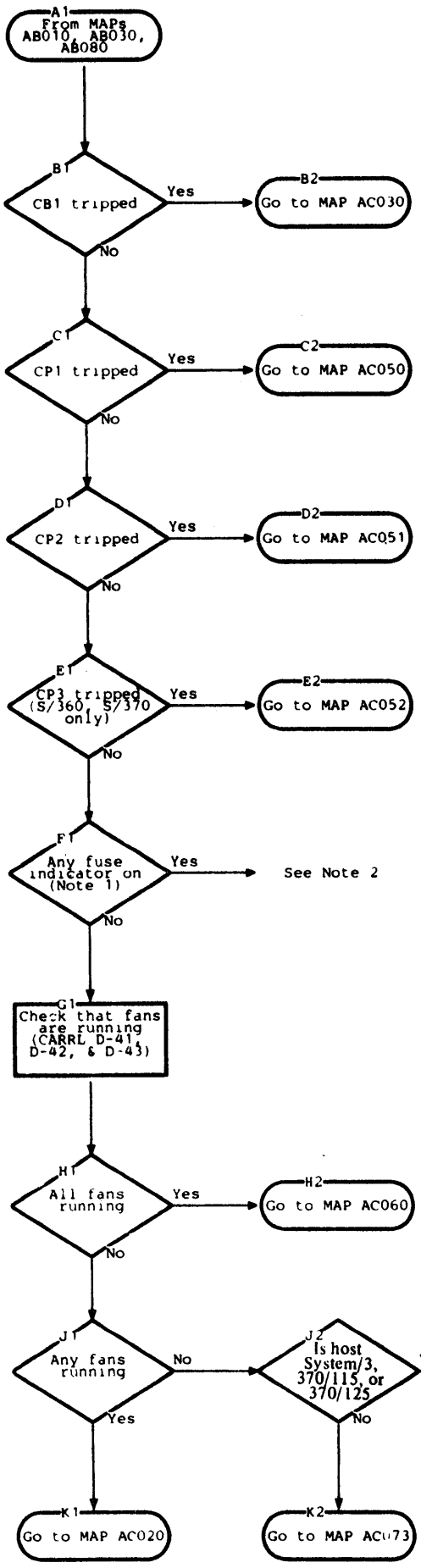
Power Supply Entry



Discussion: This MAP is the general entry for all power supply problems. It lists symptoms and routes you to the appropriate MAP or diagnostic for further analysis. Approach power supply problems from this MAP unless directed to a different MAP by another MAP or diagnostic printout.

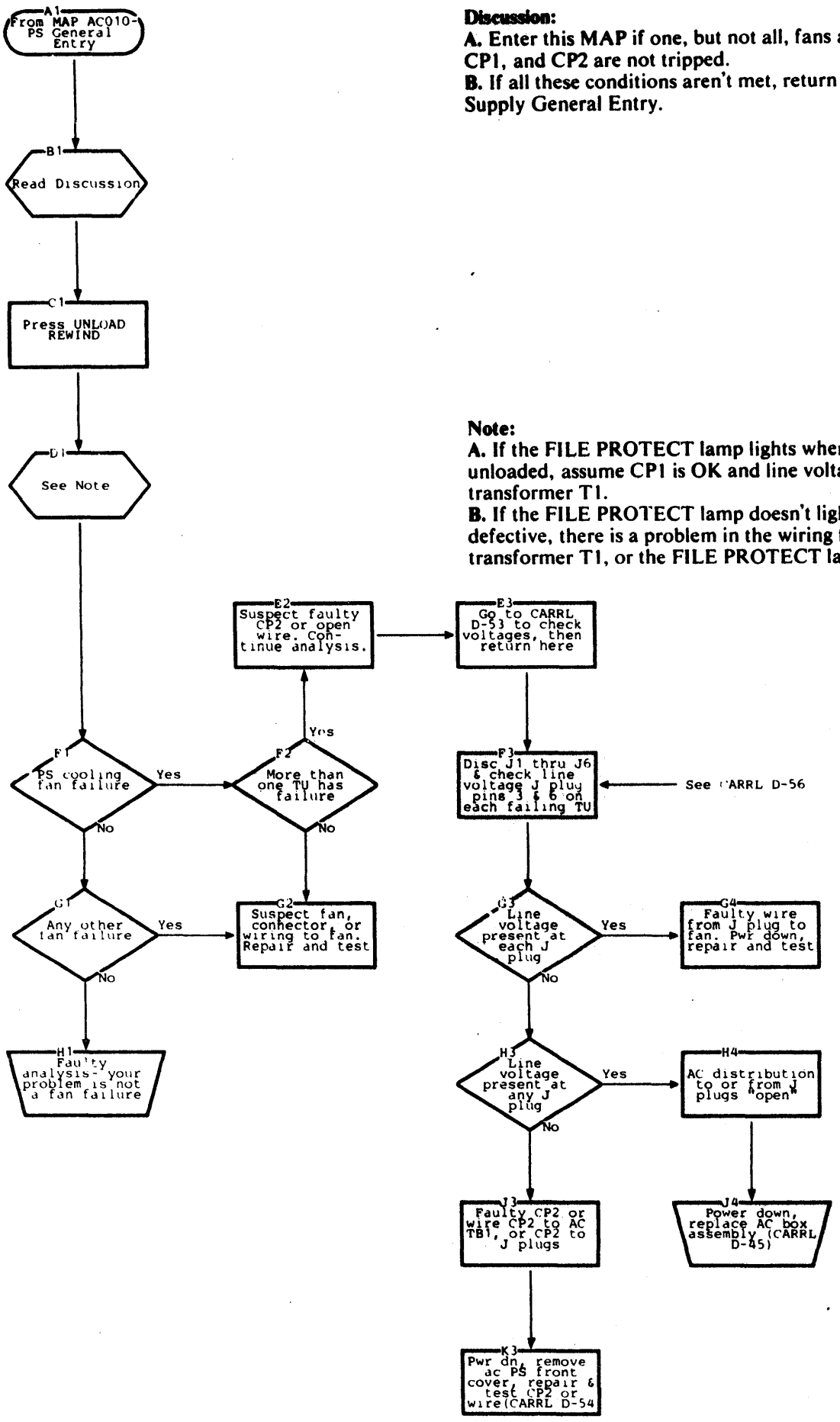
Note 1: There are two fuse indicators on the motion control board, and five in the dc section of the 3411 power supply. In the dc section of the 3411 power supply, two indicators are located at the bottom, two on the left side, and one on the right side.

Note 2: If any fuse indicator is on, proceed as follows: (see ALD page YG160 for locations).

A. Switch CB1 off.
B. Replace fuse associated with that fuse indicator.
C. Reset CB1 and power up.
D. If fuse indicator comes on again, go to the following MAP:

Fuse Ind	Power Supply	MAP
A2DS1	+5 volts	AC090
A2DS2	+6 volts	AC100
A3DS1	–4 volts	AC110
A5DS1	+15 volts	AC130
A5DS2	–15 volts	AC130

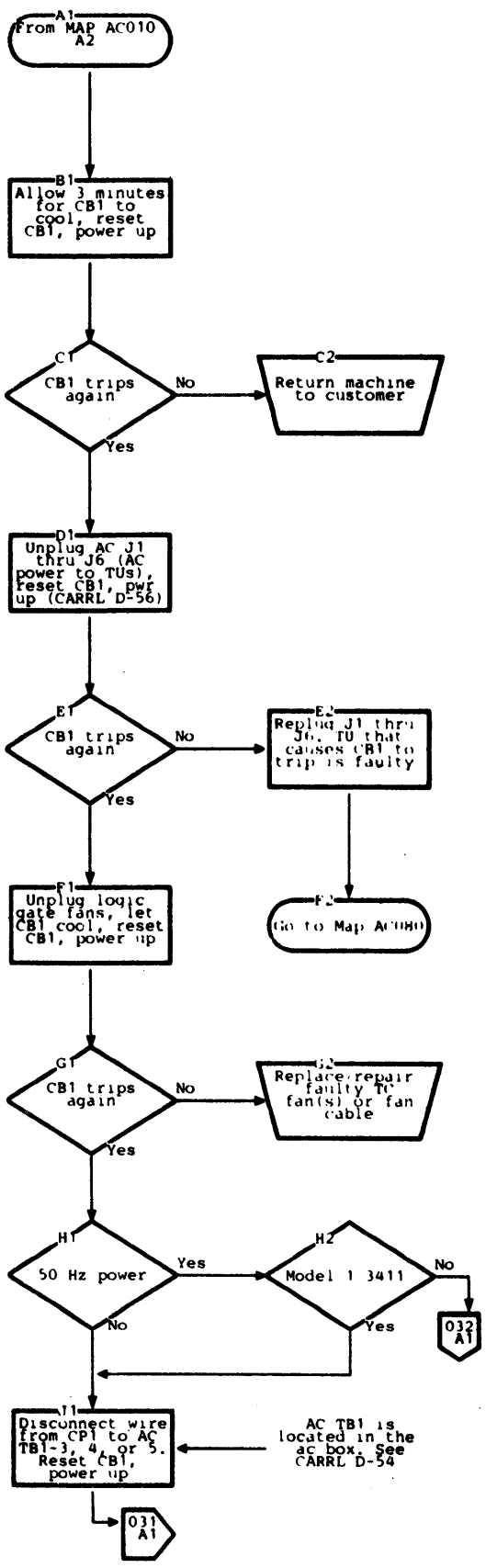
Fuse Ind	MCB	MAP
F1	-15 volts	AC131
F2	+15 volts	AC131



Discussion:
A. Enter this MAP if one, but not all, fans are running, and CB1, CP1, and CP2 are not tripped.
B. If all these conditions aren't met, return to MAP AC010, Power Supply General Entry.

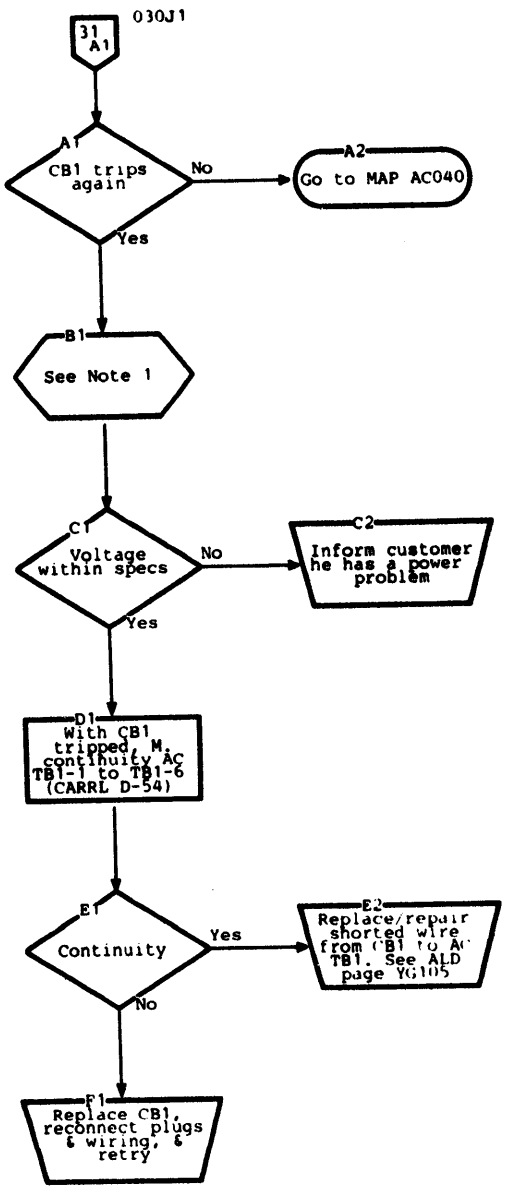
Note:
A. If the FILE PROTECT lamp lights when the tape unit is unloaded, assume CP1 is OK and line voltage is present at transformer T1.
B. If the FILE PROTECT lamp doesn't light, CP1 is tripped or defective, there is a problem in the wiring from AC TB1 to transformer T1, or the FILE PROTECT lamp is burned out.

CB1 Tripped



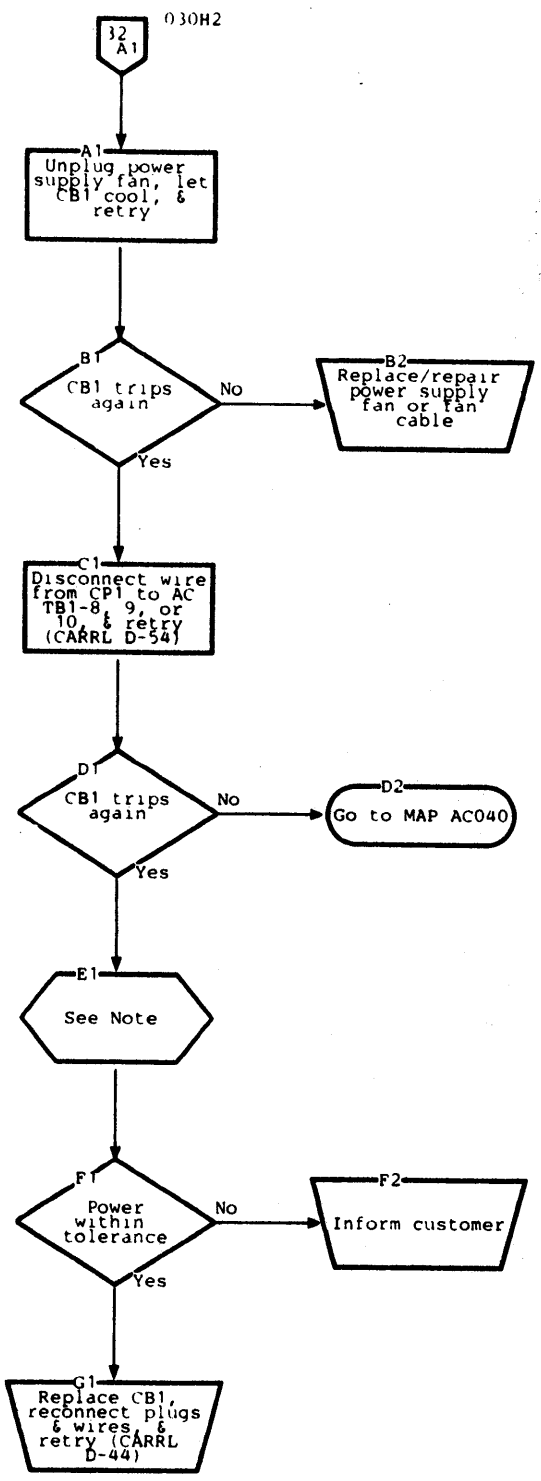
XF5200	1845948	734556	734556A			
Seq. 1 of 2	Part Number	1 Sept 72	20 Oct 72			

CB1 Tripped



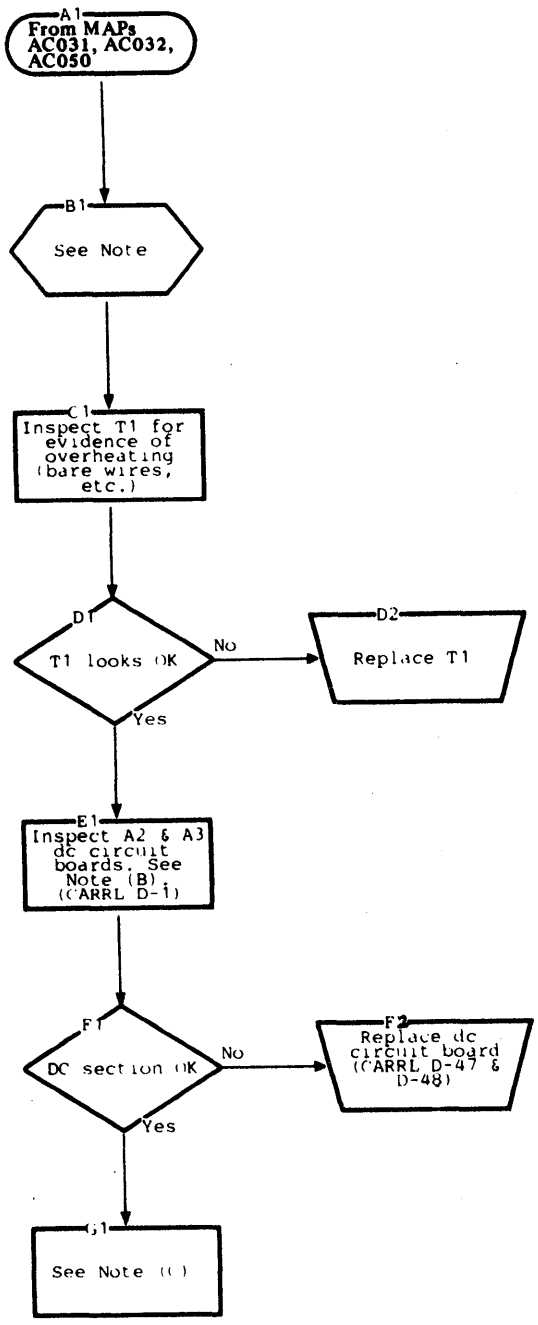
Note 1: Measure input line voltage at AC TB1. Input voltage should be 200, 208, or 230 vac ±10%. Check input connections on ALD page YG105 and make sure that AC TB1-3, -4, and -5 are wired correctly. The wires disconnected at block AC030 J1 will still be disconnected and J1-J6 will still be unplugged. Do not reconnect them at this time.

CB1 Tripped



Note: Disconnect power cable from wall and measure input line voltage. Input voltage should be 200, 208 or 230 vac ±10% for 60 Hz machines, and 200, 220, 235, 380, or 408 vac ±10% for 50 Hz machines.

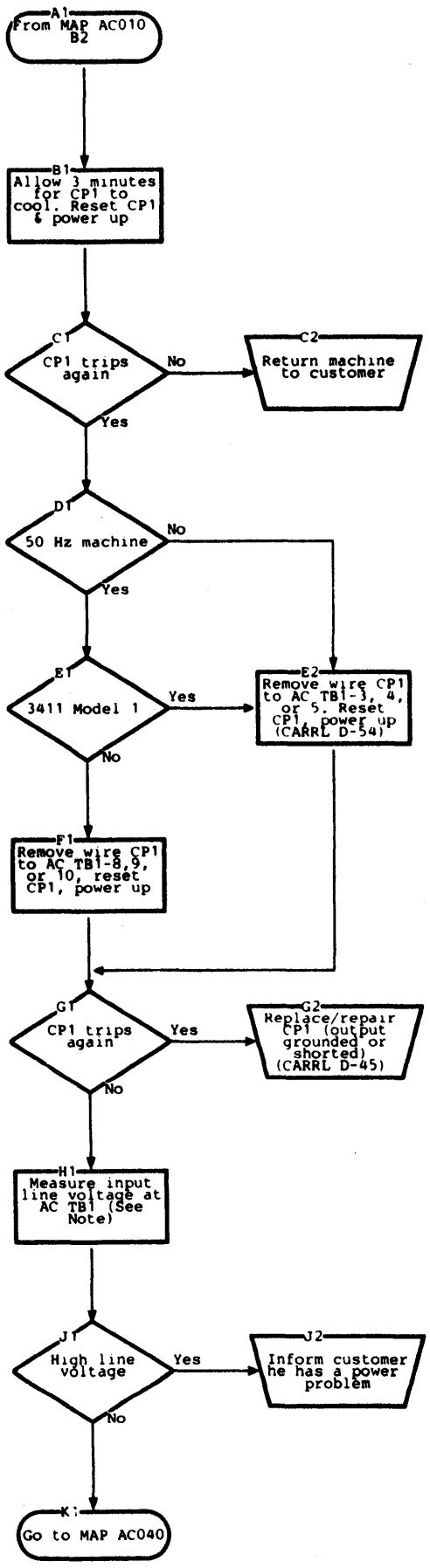
Transformer T1 Overload



Discussion: Entry to this MAP assumes that either CB1 or CP1 keeps tripping, and following MAP AC030, AC032, or AC050 hasn't corrected the problem. A defective transformer (T1), or a faulty dc power supply could cause this condition.

Note: Your problem appears to be caused by overloading transformer T1. Since diagnosis from this point may be difficult, you should probably call for assistance, and check the following while waiting for help:
A. Try replacing CB1 or CP1 if it has not already been replaced.
B. Carefully inspect the two circuit boards in the dc section. Look for anything that might short to the metal cover.
C. Further diagnosis requires isolating the loads on T1. While individual dc regulators can be isolated, isolating a given load may cause CB1 or CP1 to stop tripping even though the regulator is not the one causing the overload. Try replacing T1 and the dc circuit boards.

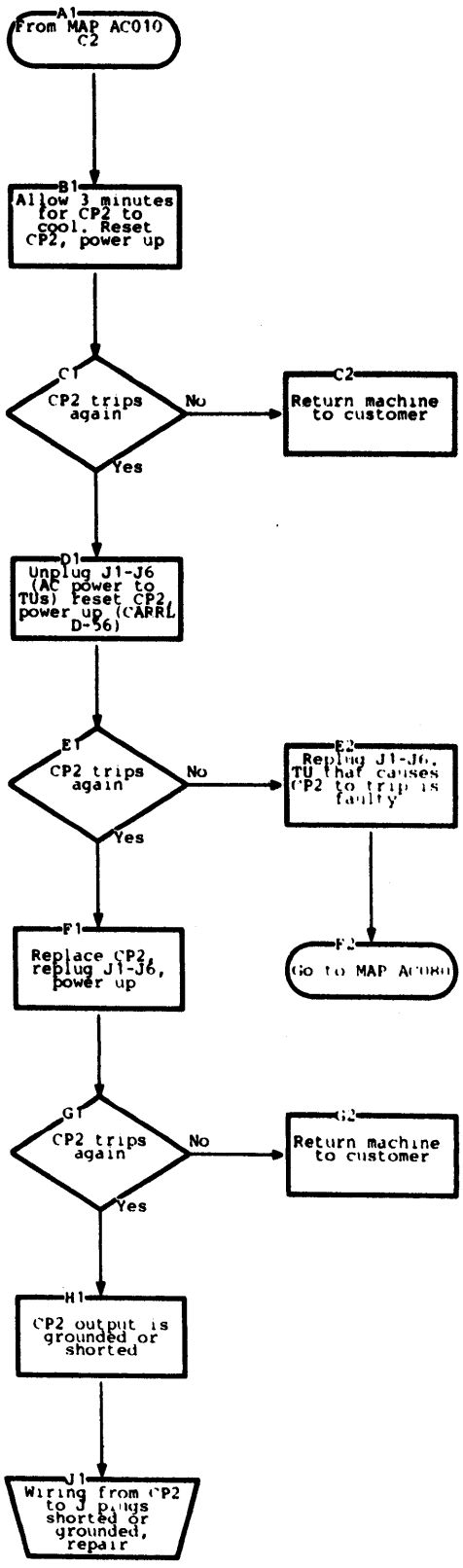
CP1 Tripped



Discussion: Entry to this MAP assumes that CP1 is tripped. CP1 protects the ac distribution to the primary side of transformer T1.

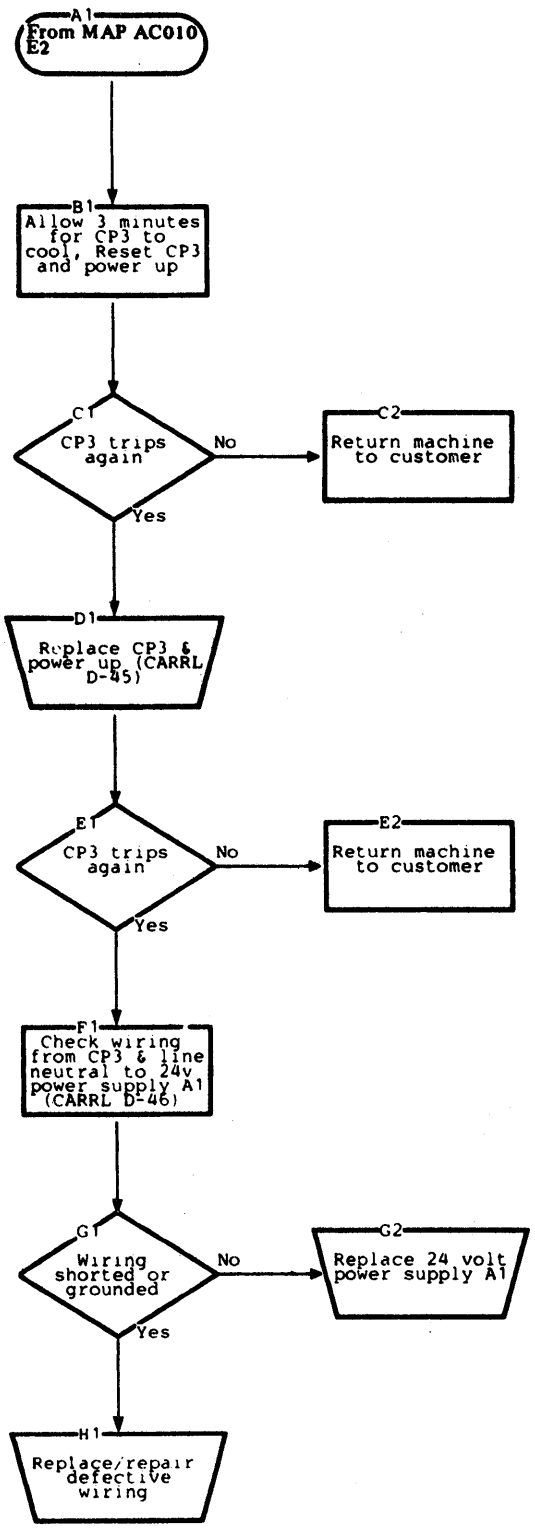
Note–Input Voltage: Input voltage should be 200, 208, or 230 vac ±10% for 60 Hz machines, and 200, 220, 235, 380, or 408 vac ±10% for 50 Hz machines.

CP2 Tripped

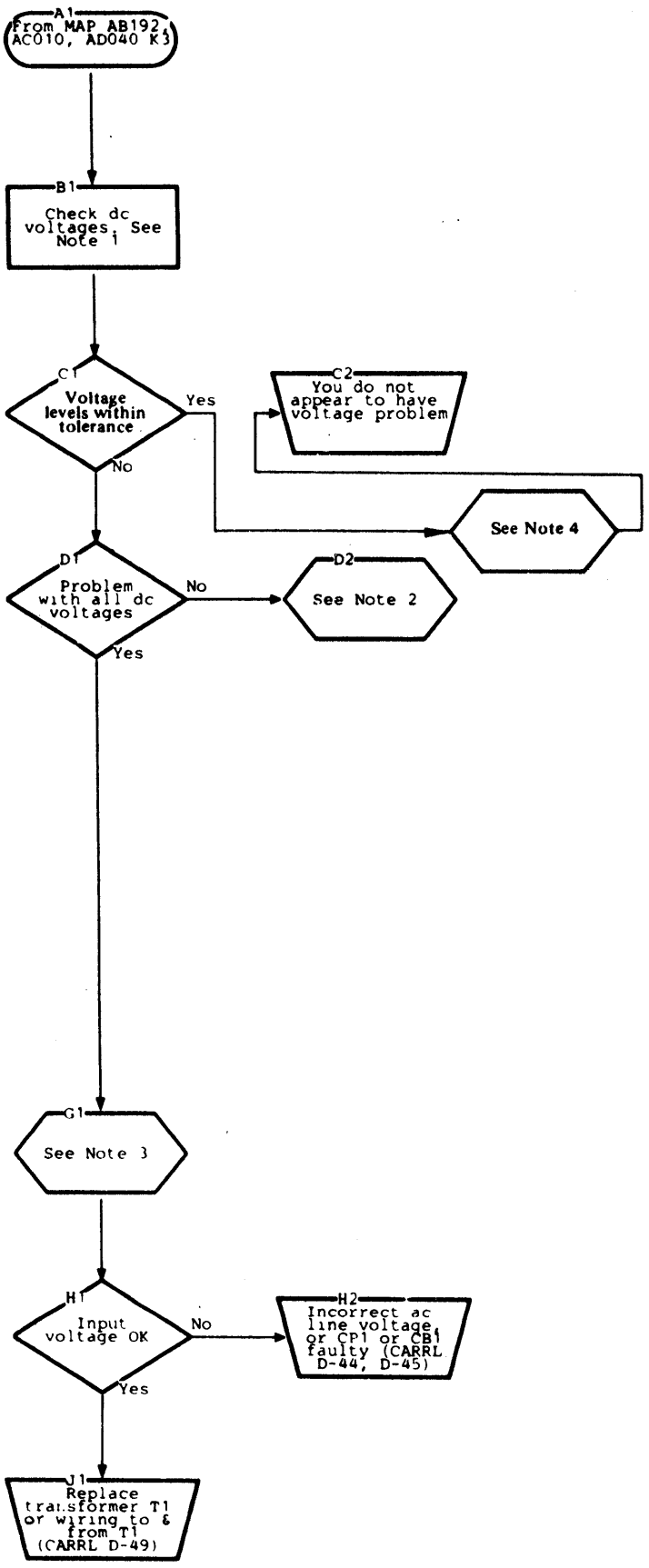


Discussion: Entry to this MAP assumes that CP2 is tripped. CP2 protects the ac distribution to the tape units. When CP2 trips, it interrupts the ac to J1–J6.

CP3 Tripped



Discussion: Entry to this MAP assumes that CP3 is tripped. CP3 protects the 24-volt ac power supply A1. This power supply activates the tape control power-on circuitry when the subsystem is attached to a System/360 or System/370.



Discussion: Enter this MAP if ac voltages are present but you suspect a dc voltage is outside allowable limits or missing.

Note 1: Measure power supply output voltages at the following test points on DC TB1 (see CARRL D-17):

Voltage	Measure At			Tolerance
+5	TB1-1(+)	To	TB1-4(–)	(+4.90 to +5.10)
+6	TB1-9(+)	To	TB1-4(–)	(+5.99 to +6.01)
+15	TB1-11(+)	To	TB1-14(–)	(+13.5 to +17.15)
–15	TB1-17(–)	To	TB1-14(+)	(–13.5 to –17.15)

–4 is to be measured at the tape control logic gate 01A–A1Q4B06 (–) to 01A–A1Q4D08 (+). Allowable range is –3.99 to –4.01 volts.

Use a voltmeter having ±0.25% accuracy to measure voltages.

Note 2:
If –4, +5, or +6v is out of tolerance, go to MAP AC120.
If +15 or –15v is out of tolerance, go to MAP AC134.

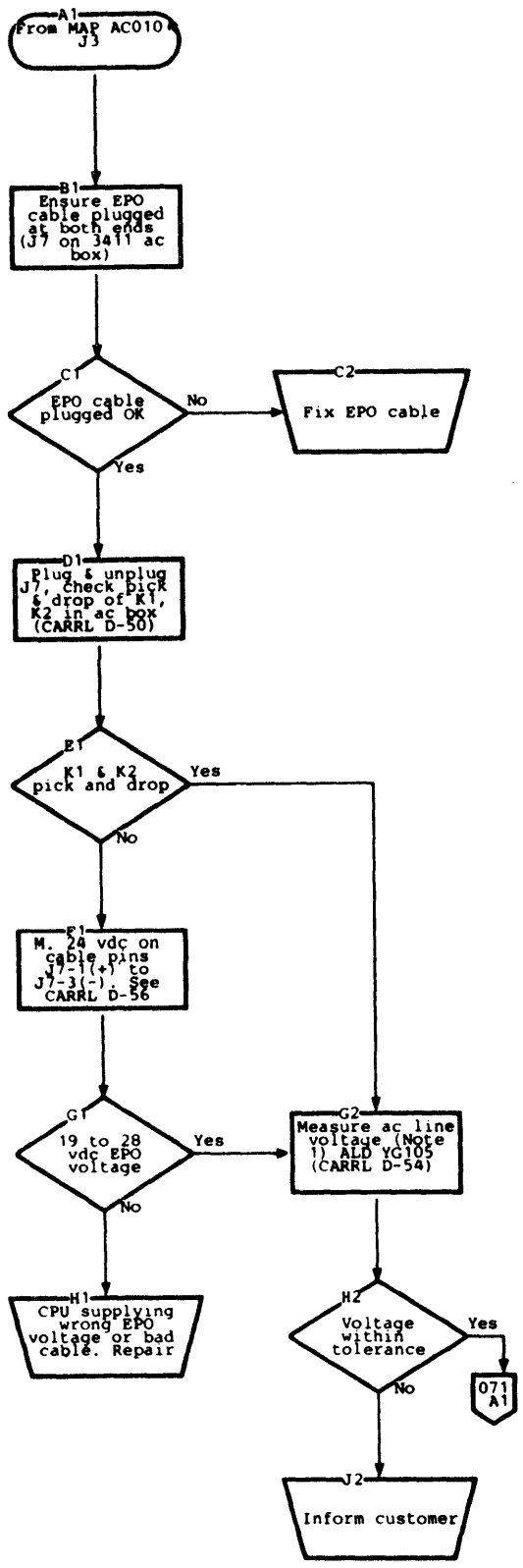
If -4v, +5v, or +6v is missing, check for a defective regulator card by swapping regulator cards to see if the symptoms change. Do not adjust any voltages while making this check, and be sure to return the cards to their correct sockets when the check is completed. If you decide that the problem is a defective regulator card, see CARRL Figure D-53 for replacement and adjustment procedures. If this check does not isolate your problem or if your problem is with the ±15 volt supply, go to the following MAP:

Voltage	MAP
–4	AC110
+5	AC090
+6	AC100
+15	AC130
–15	AC130

Note 3:
A. Power down.
B. See input connection chart on ALD page YG105.
C. Connect meter to correct TB1 points to measure input voltage. Set meter on correct scale.
D. Power up.
E. Voltage should be ±10% of that listed in the chart on page YG105.

Note 4: If entry to this page was due to clock stoppage, intermittant, or unrelated failures, check –4, +5, and +6 voltages for ripple. Use an oscilloscope grounded to dc common and check for ripple or noise with all tape units loaded. It should not exceed ±2.5% or a total of 5%. If ripple exceeds tolerance, replace the power supply (see CARRL D-47 and D-48).

System/3 Power-On Sequencing

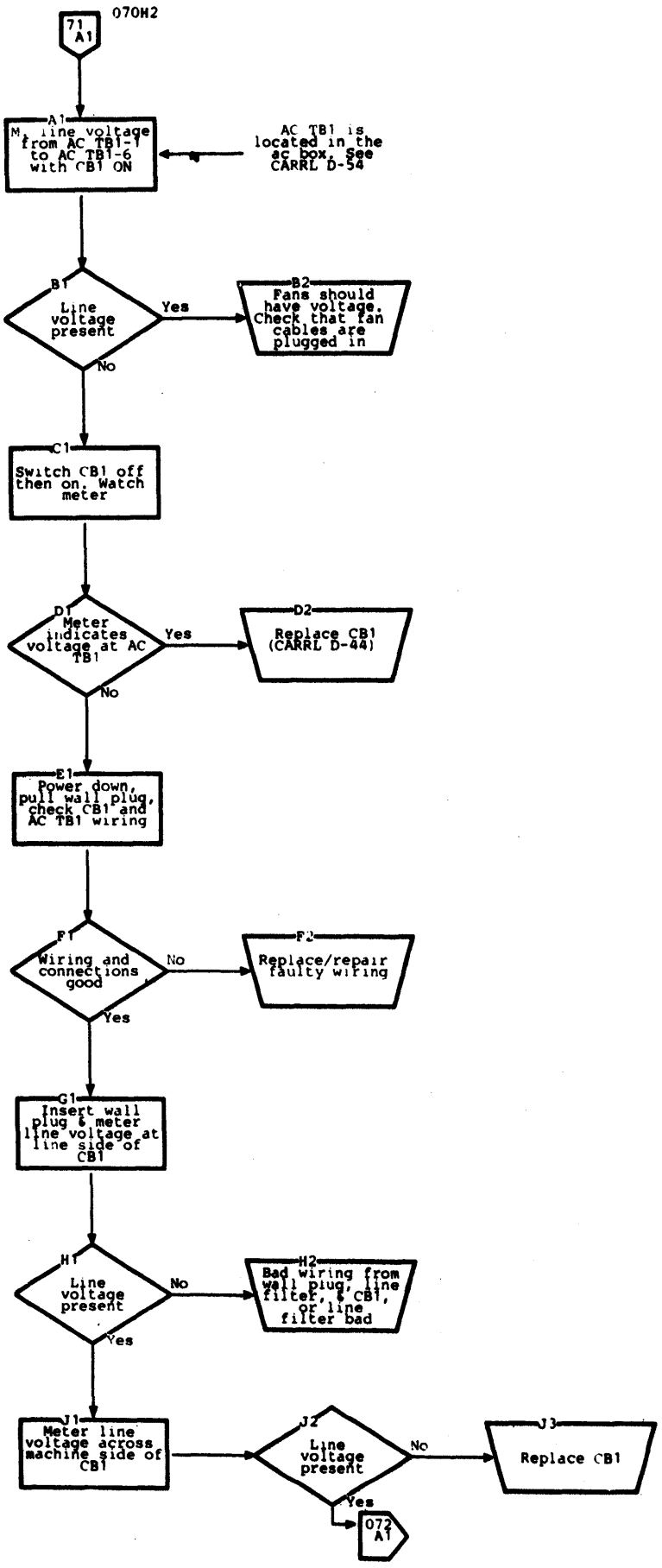


Discussion: Entry to this MAP assumes you have power-on sequencing problems when attached to a System/3 "host" system.

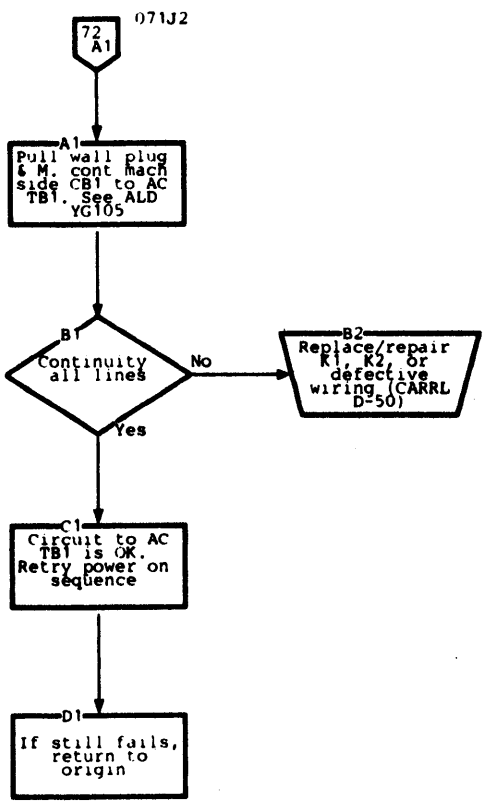
Note 1–Input Voltage: Input voltage should be 200, 208, or 230 vac ±10% for 60 Hz machines, and 200, 220, 235, 380, or 408 vac ±10% for 50 Hz machines. Ensure that primary input voltage is present at subsystem from main CB, if possible.

XF5600	1845952	734556	734556A	734556B		
Seq. 1 of 2	Part Number	1 Sept 72	20 Oct 72	20 Nov 72		

System/3 Power-On Sequencing

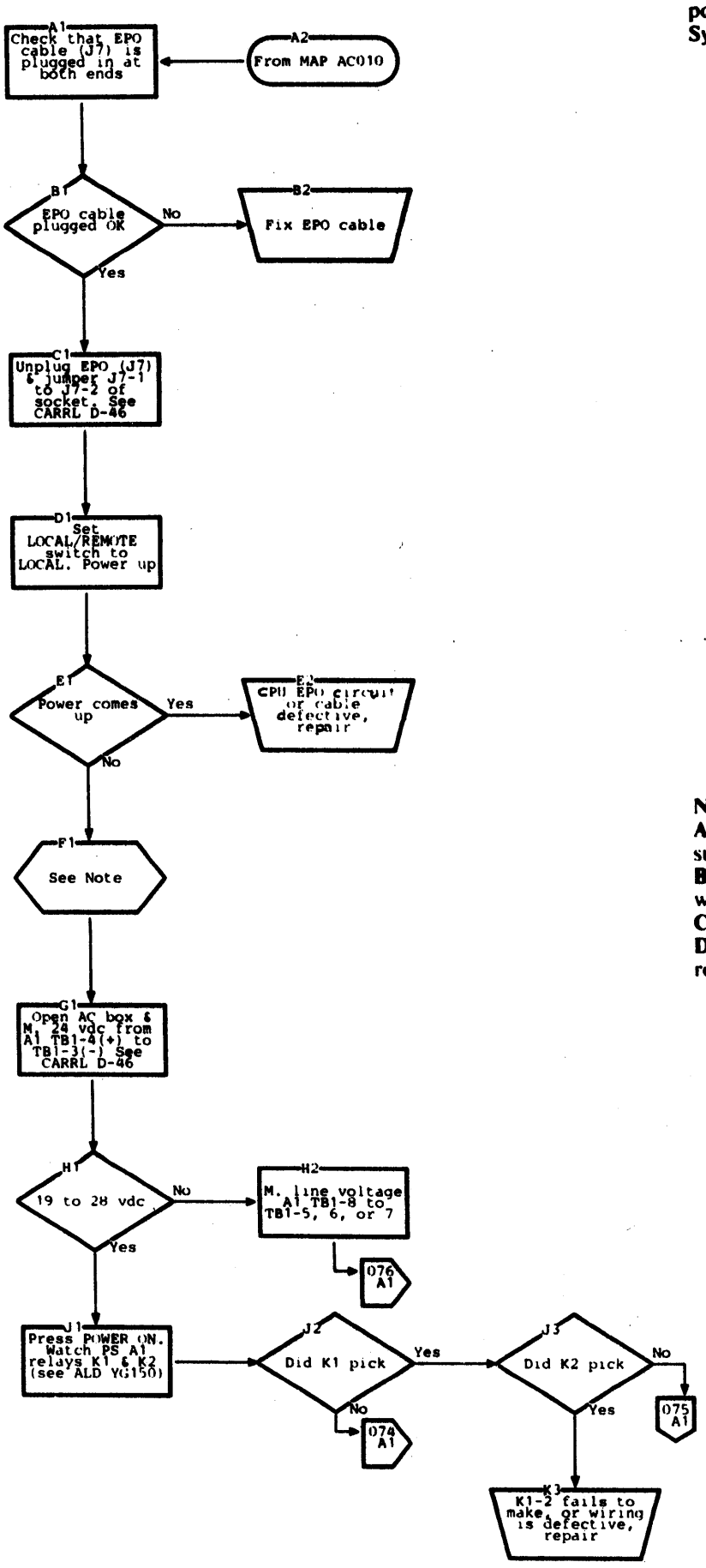


System/3 Power-On Sequencing



XF5700	1845953	734556	734556A			
Sht 1 of 2	Part Number	1 Sept 72	20 Oct 72			

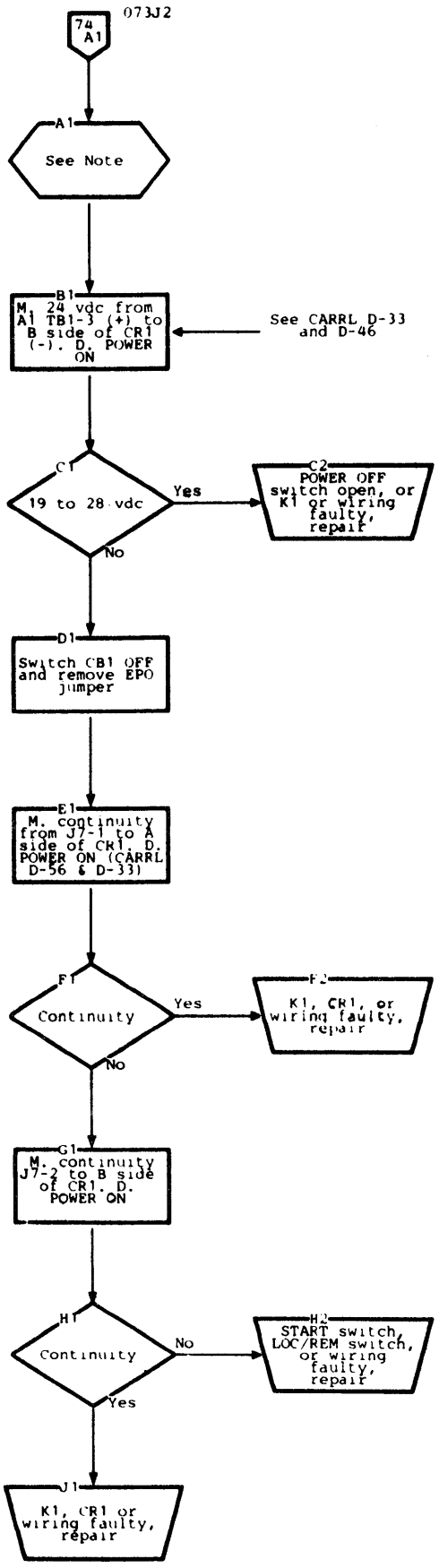
System/360 and System/370 Power-On Sequencing



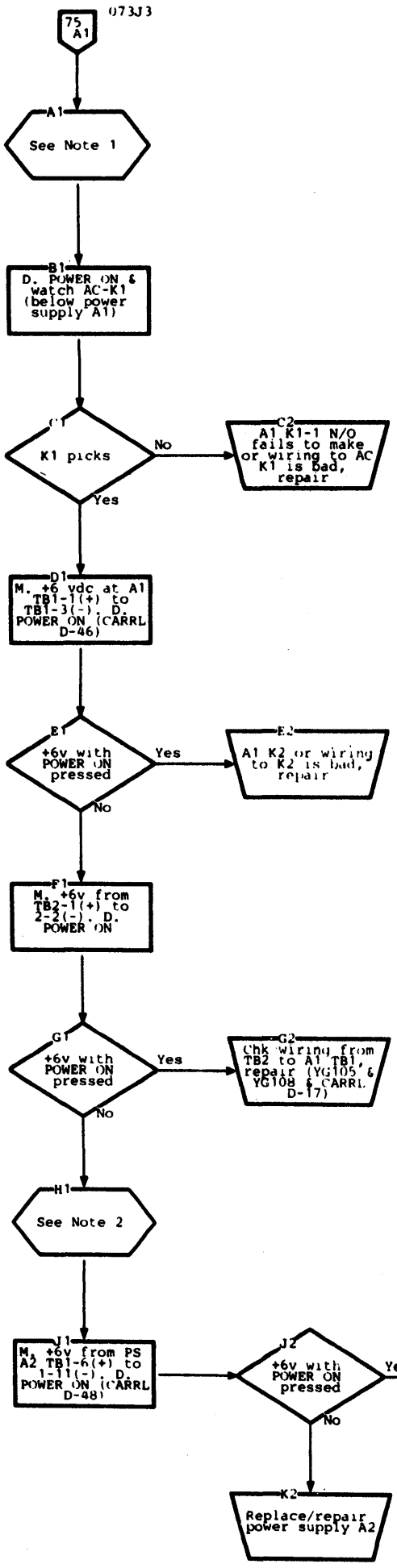
Discussion: Entry to this MAP assumes you have power-on sequencing problems when attached to a System/360 or System/370 "host" system.

Note:
A. ALD page YG108 is a circuit diagram of the 24V supply A1.
B. ALD page YG150 view AA is a location diagram that will help you locate components of power supply A1.
C. If K1 or K2 relay points fail, replace the relay.
D. Attempts to clean or adjust the relay points will not result in permanent fixes.

System/360 and System/370 Power-On Sequencing



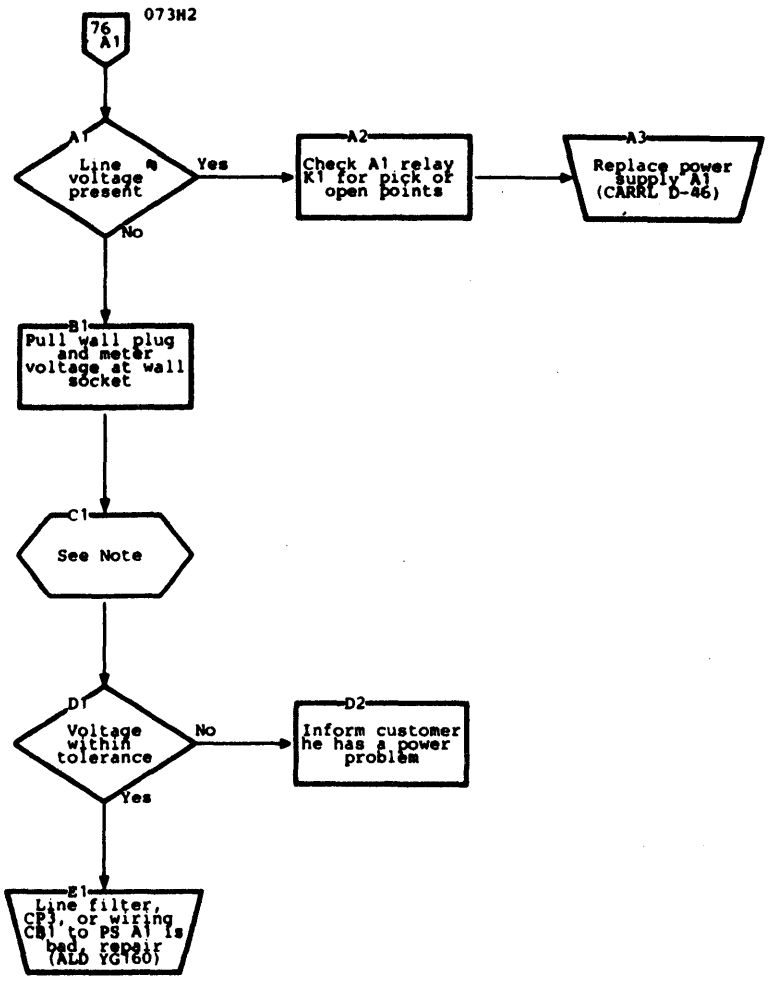
Note:
A. See ALD page YG108 for circuit diagram of the 24 volt supply A1.
B. See YG150 for component location chart for power supply A1.
C. If the POWER ON, POWER OFF, or LOCAL/REMOTE switch is defective, the A1 power supply circuit board must be replaced.



Note 1:
A. See ALD page YG108 for 24 volt supply A1 circuit diagram.
B. See YG150 for component location chart for power supply A1.
C. If K1 or K2 relay points are failing, replace the relay. Attempts to adjust or clean relay points will not result in permanent fixes.

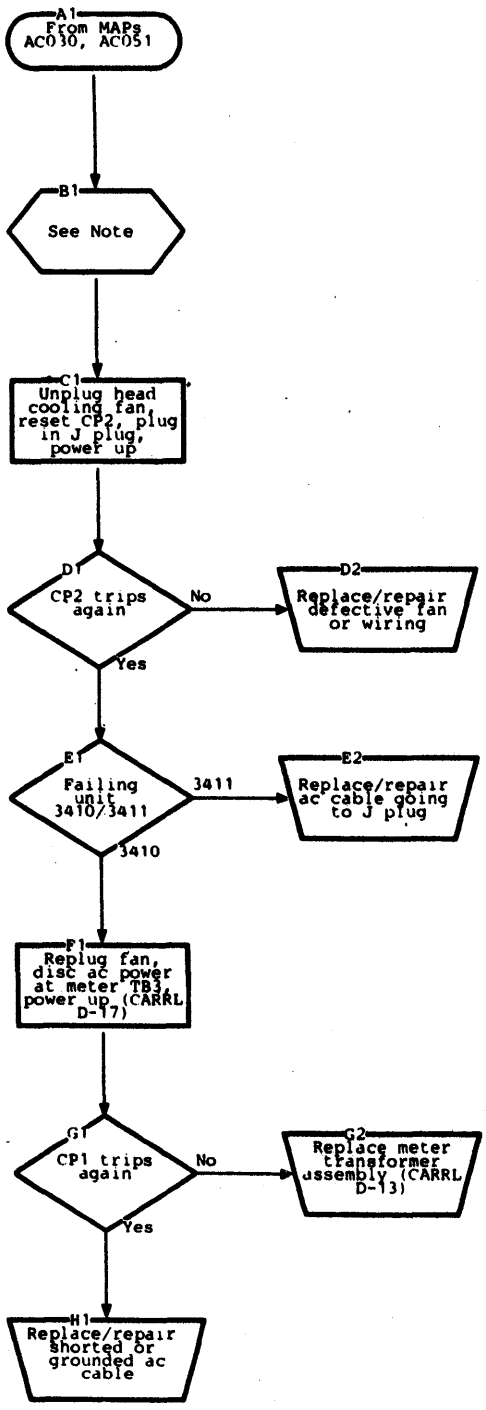
Note 2:
A. Power supply A2 is the large circuit board on the left side of the dc section.
B. TB1 is at the rear of the board, with terminal 1 at the top.
C. See ALD page YG160, section A-A.
D. Power supply A2 circuit diagram is on ALD logic page YG110.

System/360 and System/370 Power-On Sequencing



Note:
A. Input voltage should be 200, 208, or 230 vac ±10% for all 60 Hz machines and for 3411 Model 1 (50 Hz).
B. Input voltage should be 200, 220, 235, 380, or 408 vac ±10% for 3411 Models 2 and 3 (50 Hz).
C. See ALD page YG105 for input connections chart.

3410 AC Distribution

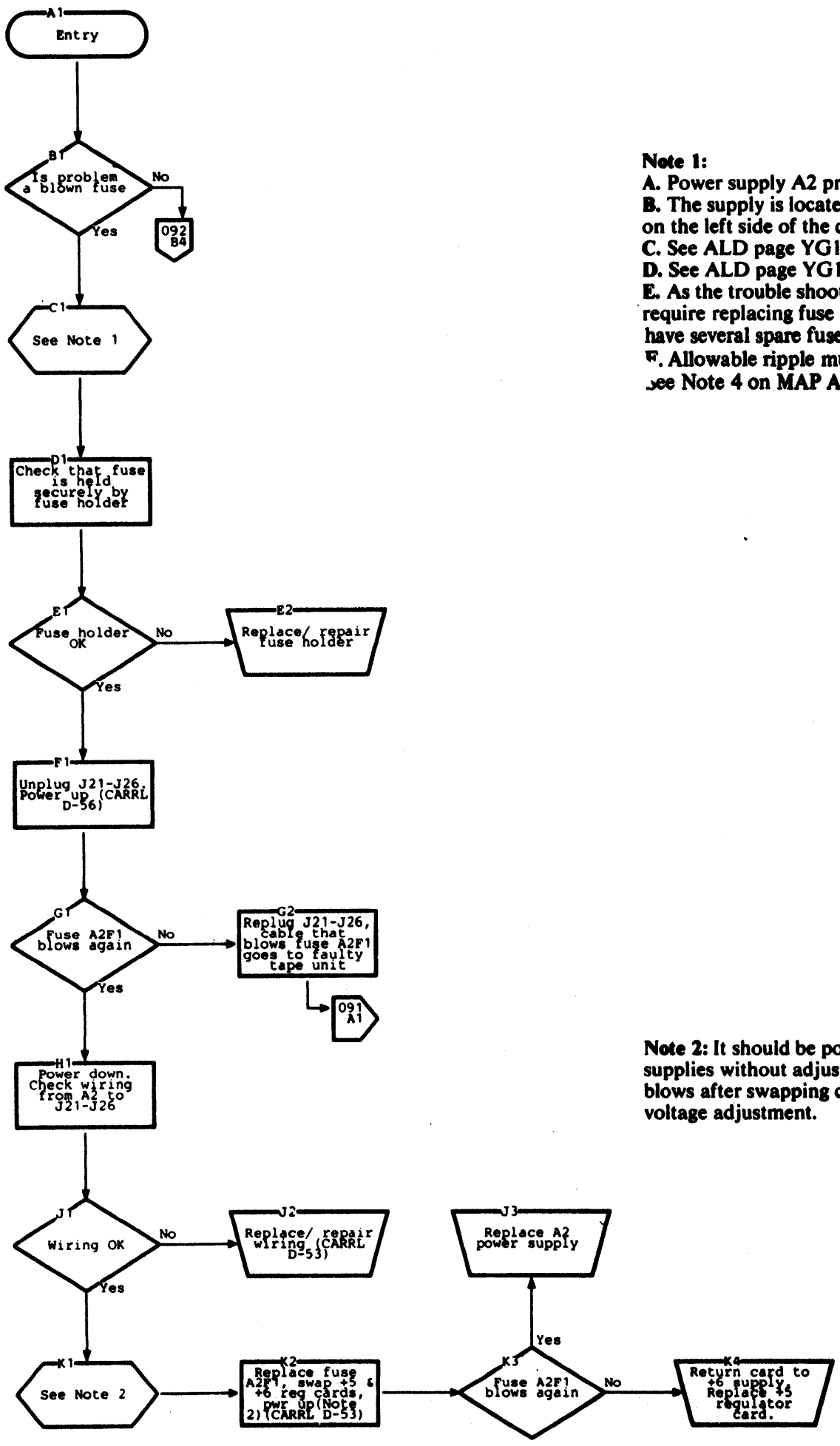


Discussion: Entry to this MAP assumes you have ac distribution problems in one of the tape units, causing CP2 to trip. In the tape units, ac is distributed to the head cooling fan and the pneumatic motor, and to the 3410 usage meter transformer.

Note: AC is distributed to the tape units (including the one in the 3411) via connectors J1–J6, located near the bottom of the 3411 ac section. Make the tests and observations called for in this MAP on the tape unit that is causing CP2 to trip.

XF5900 Seq 2 of 2	1845955 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734556B 20 Nov 72		

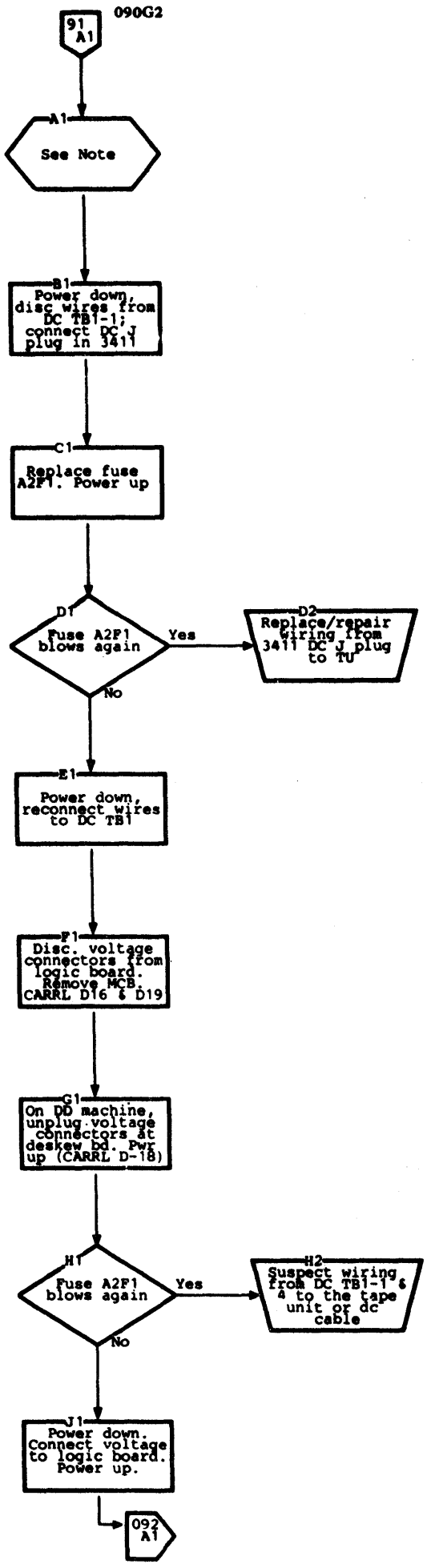
+5 Volt Power Supply Failures



Note 1:
A. Power supply A2 provides both +5 vdc and +6 vdc.
B. The supply is located on a large printed circuit board on the left side of the dc section.
C. See ALD page YG160 for the location diagram.
D. See ALD page YG110 for the circuit diagram.
E. As the trouble shooting procedure outlined here may require replacing fuse A2F1 several times, you should have several spare fuses on hand.
F. Allowable ripple must not exceed ±2.5%.
See Note 4 on MAP AC060.

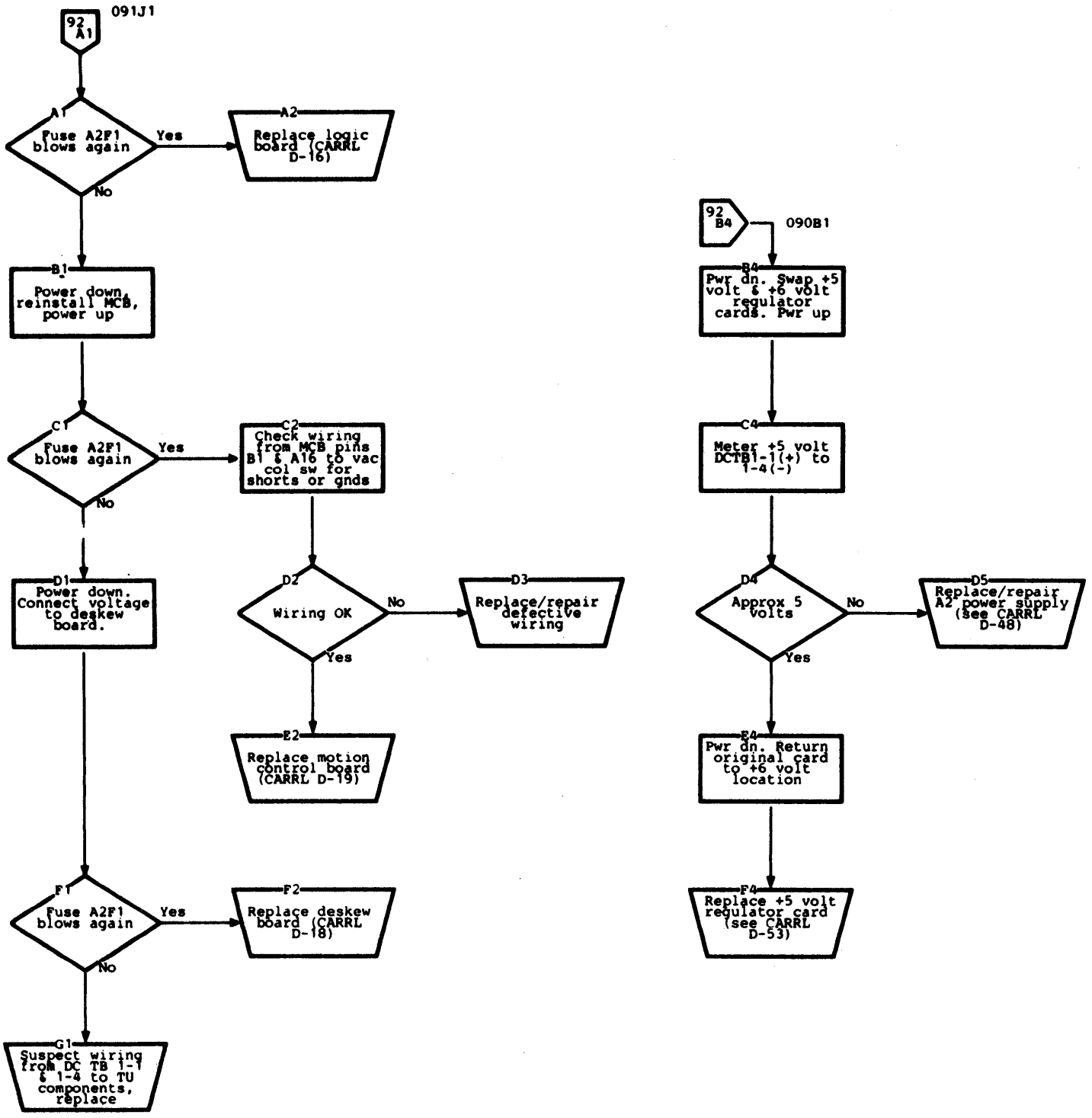
Note 2: It should be possible to swap cards between supplies without adjusting the voltage. If fuse A2F1 blows after swapping cards, it is not due to improper voltage adjustment.

+5 Volt Power Supply Failures



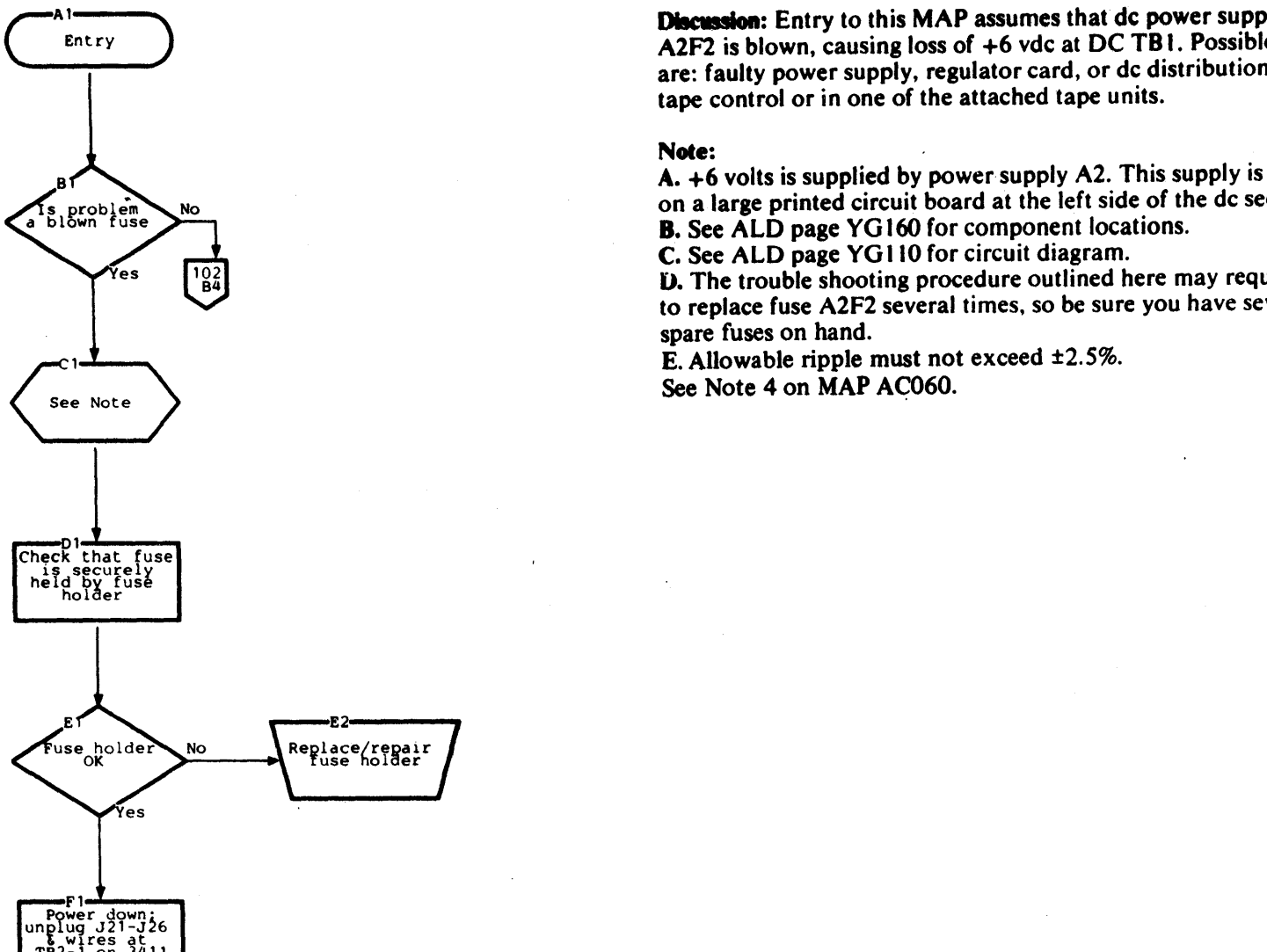
Note:
A. Make the tests and observations called for in this MAP on the tape unit that caused fuse A2F1 to blow.
B. The +5 volts is distributed through the cable from the 3411 J plug to tape unit DC TB1–1 (+5) and 1–4 (–). It is then distributed to the motion control board, the logic board and (if the NRZI feature is installed) to the skew board.
C.The +5 volts is supplied to the vacuum column switches from MCB pins A16 and B1.
D. See ALD pages YG112 and YG125 for voltage distribution diagrams.

+5 Volt Power Supply Failures



XF6100 Seq 1 of 2	1845857 Part Number	734556 1 Sept 72	734556A 20 Oct 72	443751 20 Sept 74		

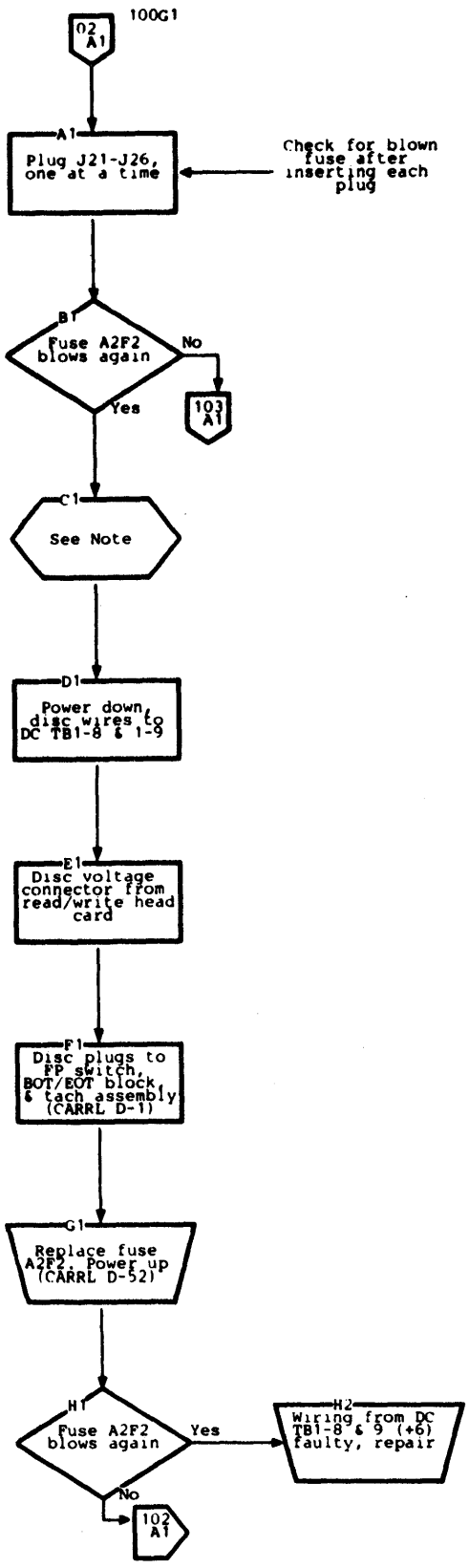
+6 Volt Power Supply Failures



Discussion: Entry to this MAP assumes that dc power supply fuse A2F2 is blown, causing loss of +6 vdc at DC TB1. Possible causes are: faulty power supply, regulator card, or dc distribution in the tape control or in one of the attached tape units.

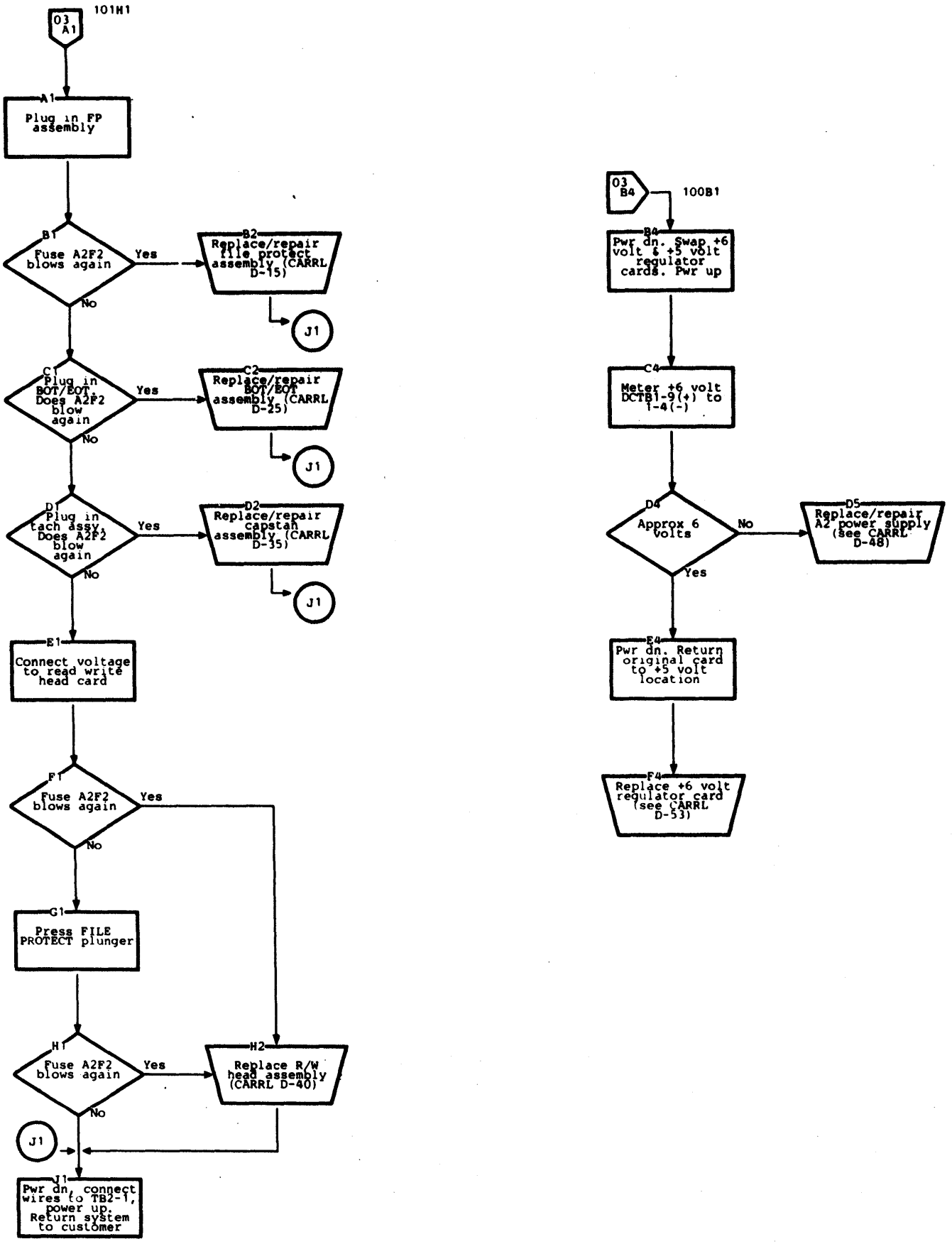
Note:
A. +6 volts is supplied by power supply A2. This supply is located on a large printed circuit board at the left side of the dc section.
B. See ALD page YG160 for component locations.
C. See ALD page YG110 for circuit diagram.
D. The trouble shooting procedure outlined here may require you to replace fuse A2F2 several times, so be sure you have several spare fuses on hand.
E. Allowable ripple must not exceed ±2.5%.
See Note 4 on MAP AC060.

+6 Volt Power Supply Failures



Note:
A. Make the checks called for in this MAP on the tape unit that caused fuse A2F2 to blow.
B. The +6 volts in the tape unit is distributed from the 3411 J plug to DC TB 1–9 (+6) and TB1–4 (dc common).
C. From DC TB1–9 +6 volts goes to the capstan tachometer assembly, the BOT/EOT block, and TB4-5. (TB4 is below the upper base, to the right of the capstan motor).
D. TB4 terminals are numbered front-to-back.
E. +6 volts goes to TB4-5, then to the file protect switch and, in the 3410, to the meter relay card (adjacent to the meter).
In the 3411 the +6 to the meter relay card comes from tape control TB2-2.
F. When the FP plunger is pressed, +6 volts is applied to TB4-2, and from there to the head read/write head card.

+6 Volt Power Supply Failures

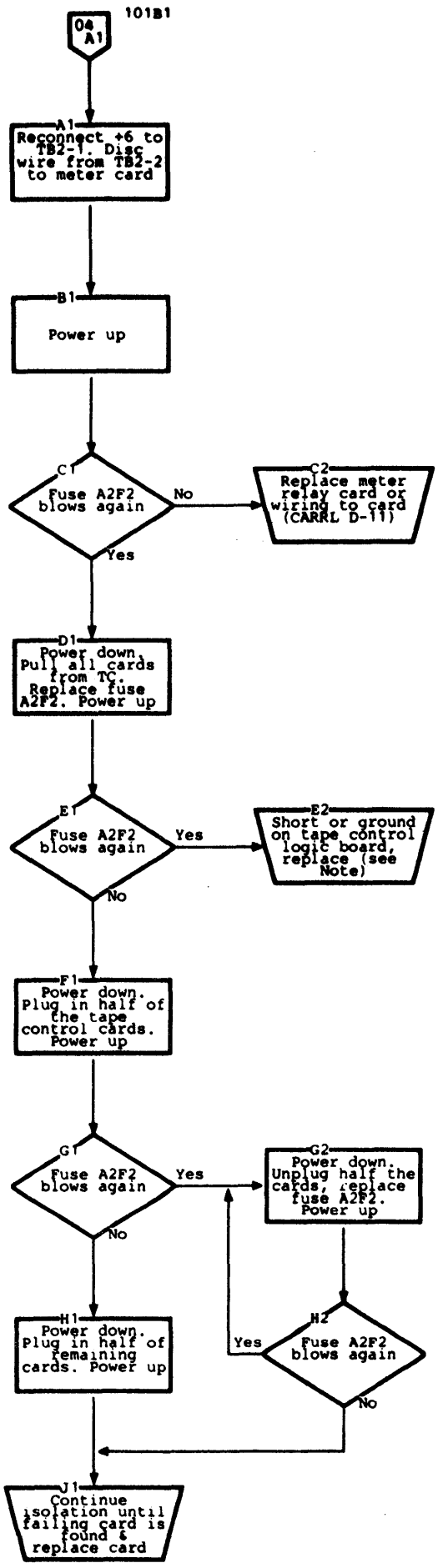


+6 Volt Power Supply Failures

MAP AC102

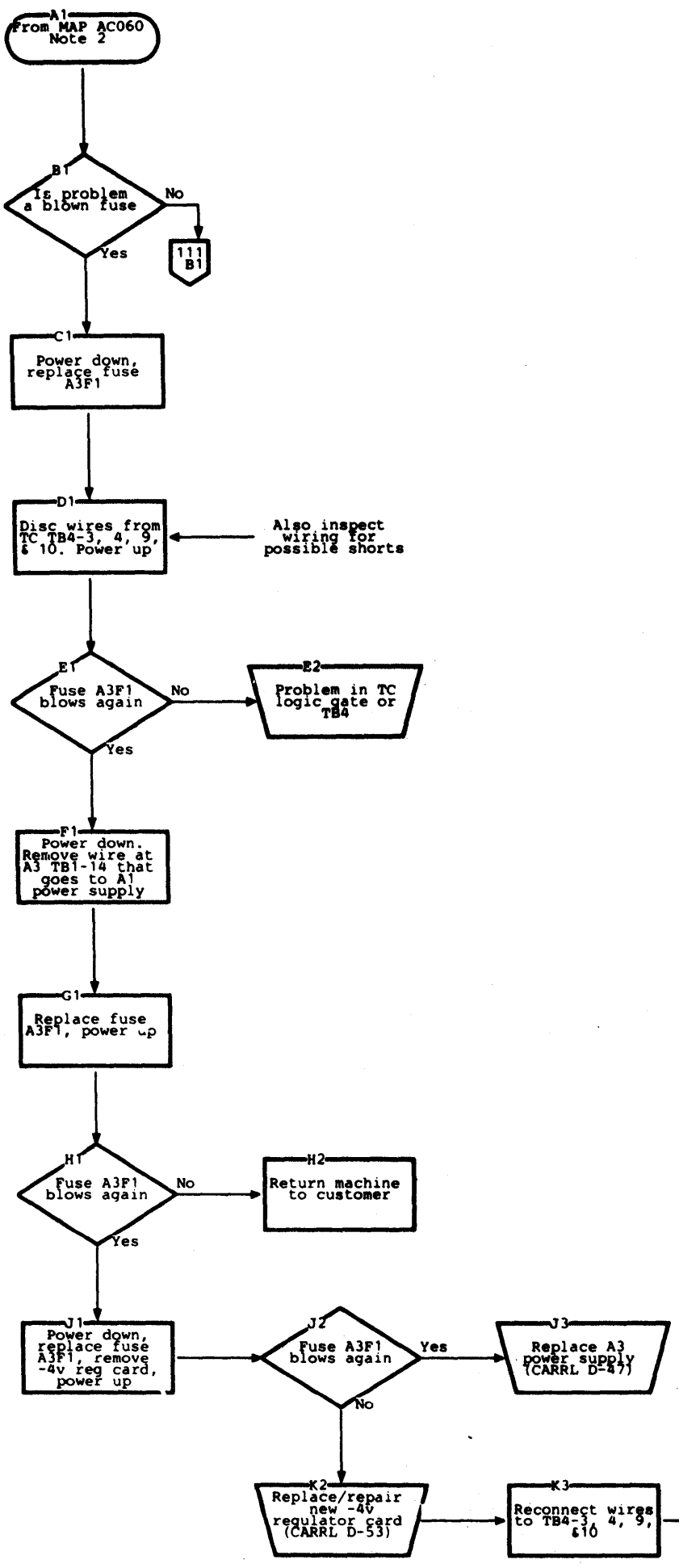
XF6200 Seq. 2 of 2	1845958 Part Number	734556 1 Sept 72	734556A 20 Oct 72			

+6 Volt Power Supply Failures



Note:
A. Carefully inspect TB2 for shorts.
B. Inspect the pin side of the board for any pieces of wire or other foreign matter that might cause shorts.
C. Look for signs of overheating of wires and board land patterns.
D. Look for shorted pins on the card side.
E. It may be necessary to replace the board.

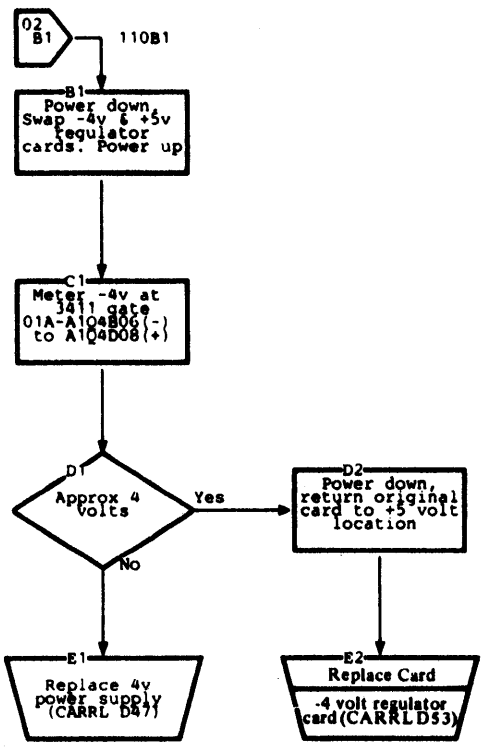
-4 Volt Power Supply Failures



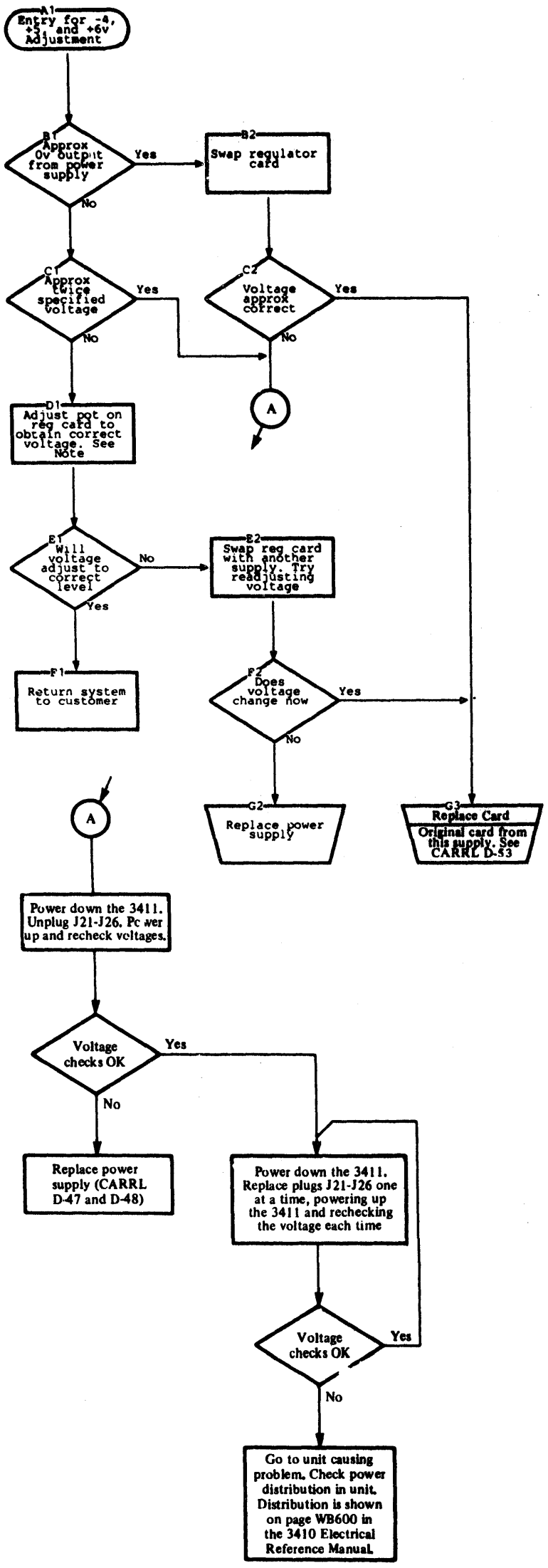
Discussion:

A. –4 volts is supplied by power supply A3, which is located on a large printed circuit board on the right side of the dc section.
B. See ALD page YG120 for circuit diagram.
C. See ALD page YG160 Section B-B for component locations.
D. –4 volts is distributed from power supply A3 to the tape control logic gate TB4–3, 4, 9 and 10 (–4) and 5 through 8 (ground return).
E. –4 volts is used only in the 3411 tape control logic gate and in power supply A2.
F. The troubleshooting procedure outlined here may require you to replace fuse A3F1 several times, so be sure you have several spare fuses on hand.
G. Allowable ripple should not exceed ±2.5%.
See Note 4, MAP AC060.

-4 Volt Power Supply Failures



-4, +5, and +6 Volt Power Supply Adjustments



Discussion: Entry to this MAP assumes you found the –4, +5, or +6 volts dc outside allowable limits. Your problem could be a defective power supply or regulator card, or incorrect regulator card adjustment.

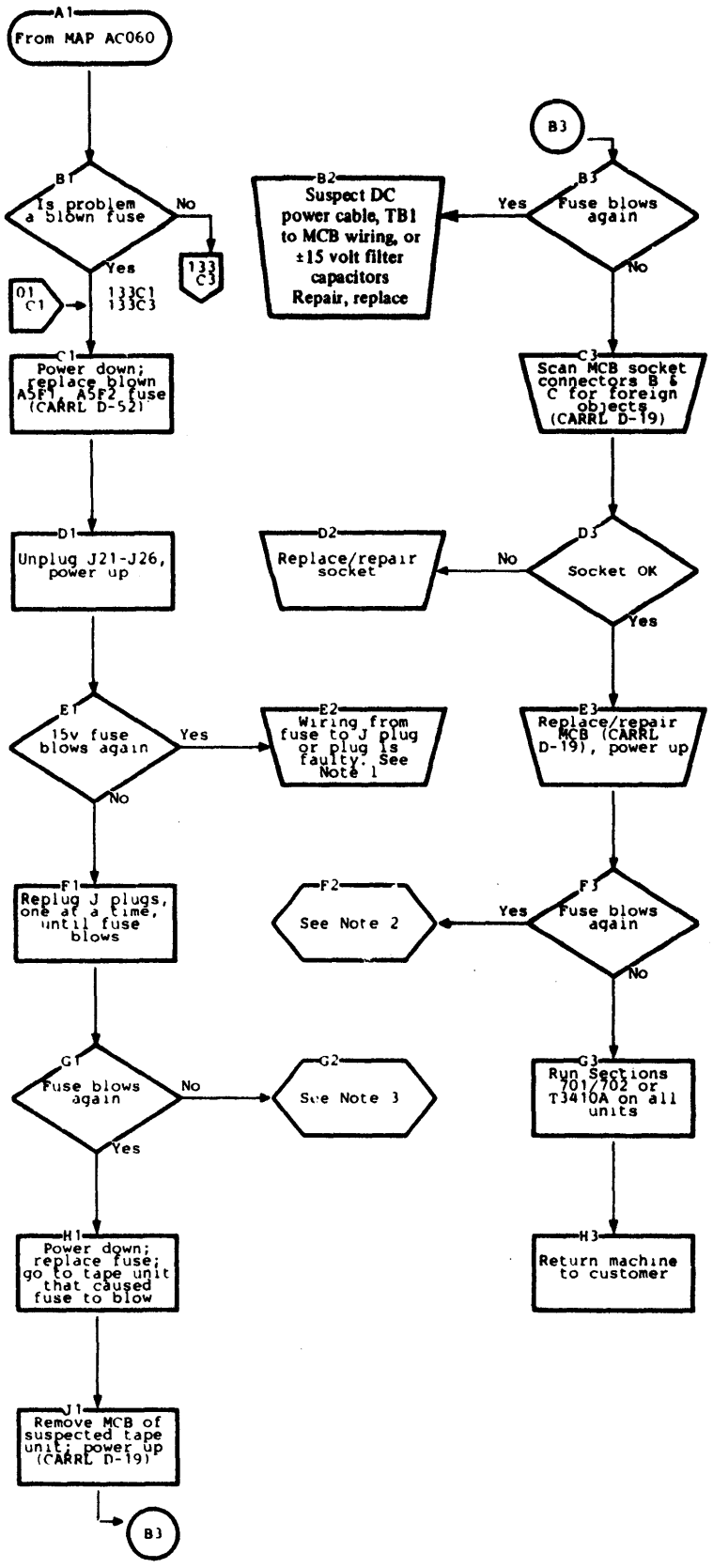
Note: Measure power supply output voltages at DC TB1:

Voltage	Measure At			Tolerance
+5	TB1-1 (+)	To	TB1-4 (-)	(+4.90 to +5.10)
+6	TB1-9 (+)	To	TB1-4 (-)	(+5.99 to +6.01)

Measure –4v at the tape control logic gate 01A–A1Q4B06 (–) to 01A–A1Q4D08 (+). Tolerance is –3.99 to –4.01 volts. Allowable ripple must not exceed ±2.5%. See Note 4, MAP AC060.

Use a voltmeter having ±0.25% accuracy to measure voltages.

+15 and -15 Volt Power Supply Out of Tolerance



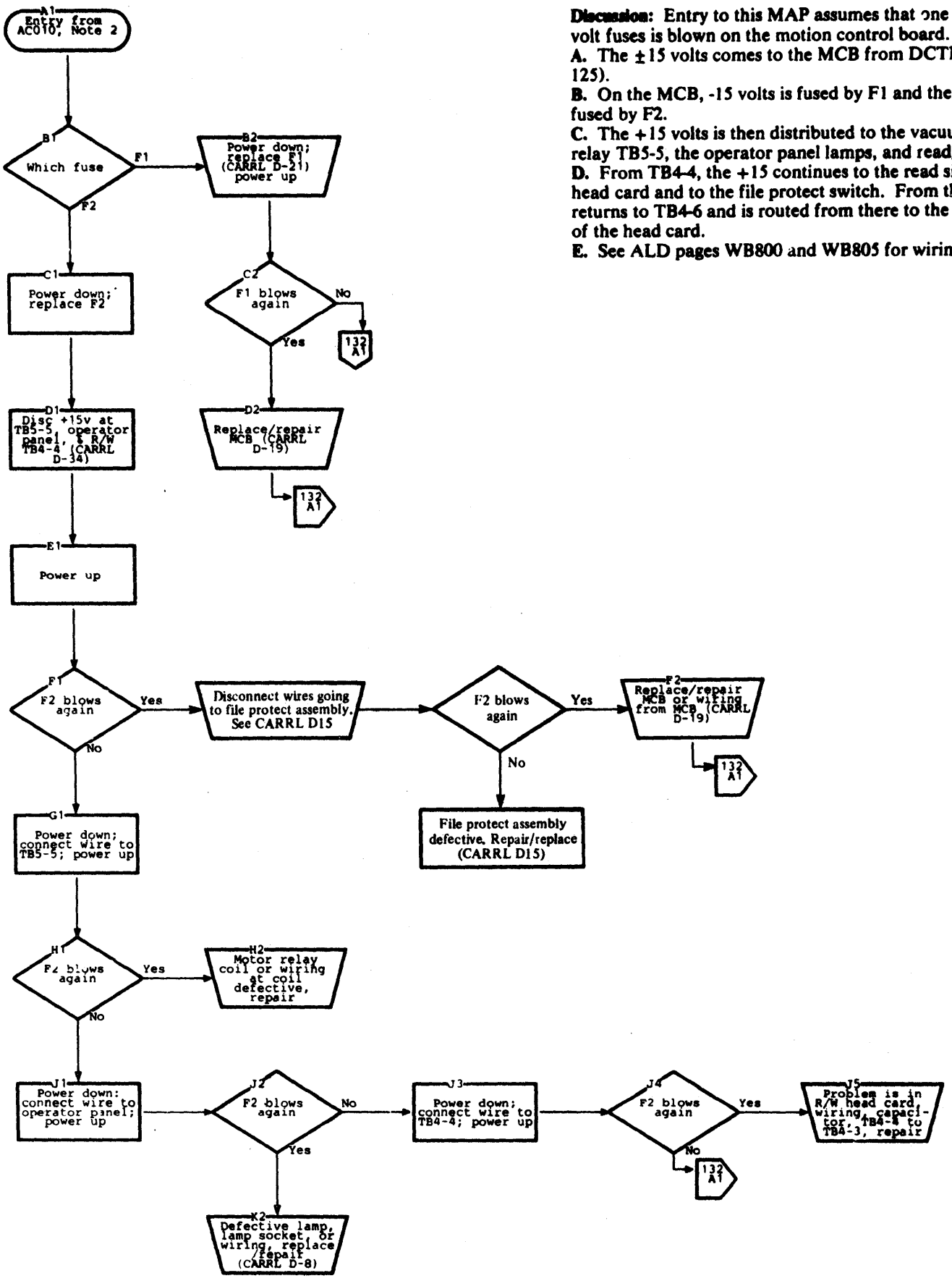
Discussion: Entry to this MAP assumes that one of the 15 volt dc power supply fuses is blown, causing loss of +15 vdc or -15 vdc at DC TB1. Possible causes are a faulty power supply, or dc distribution in the attached tape units.
A. 15 vdc is supplied through the fuses to J21–J26, then through the dc cables to the DC TB in each tape unit.
B. In each tape unit, the voltage is filtered by two large capacitors, C4 and C5.
C. Voltage then goes to the motion control board.
D. See ALD pages YG110, YG112; and YG125 for wiring diagrams.
E. See ALD pages YG135 and YG160 for component locations.

Note 1:
A. The wires from F1 go to J plug, pins 7 and 8.
B. From F2, the wires go to J plug pins 9 and 10.
C. The J plug pins are numbered 1 through 12, top to bottom.

Note 2:
A. Check for loose connections at power supply A2TB1 (see YG150 and YG160 for location).
B. Check diodes CR5-CR14 (YG110 and YG160). Failure of one of the diodes affects the 15 volt supply; if one is defective, power supply A2 must be replaced.

Note 3:
A. Examine capacitors C4 and C5 for swelling of the can or safety vent.
B. See CARRL Figure D-51 for locations of C4 and C5.
C. Examine the resistors on C4 and C5 for signs of shorting.
D. C4 filters the +15 volts, and C5 filters the -15 volts.

+15 and -15 Volt Power Supply Out of Tolerance



Discussion: Entry to this MAP assumes that one of the 15 volt fuses is blown on the motion control board.

A. The ±15 volts comes to the MCB from DCTB1 (Ref. YG 125).

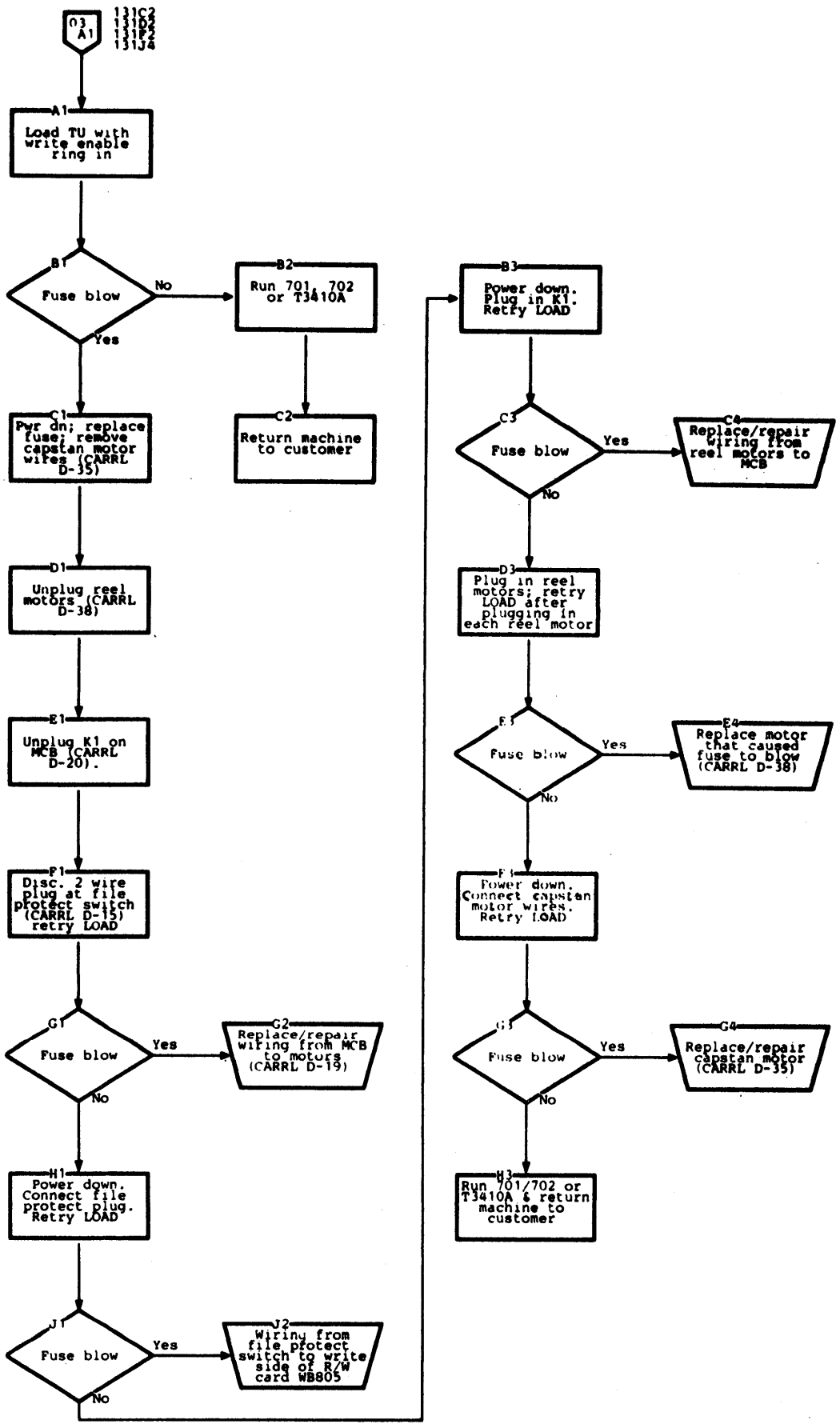
B. On the MCB, -15 volts is fused by F1 and the +15 volts is fused by F2.

C. The +15 volts is then distributed to the vacuum motor relay TB5-5, the operator panel lamps, and read/write TB4-4.

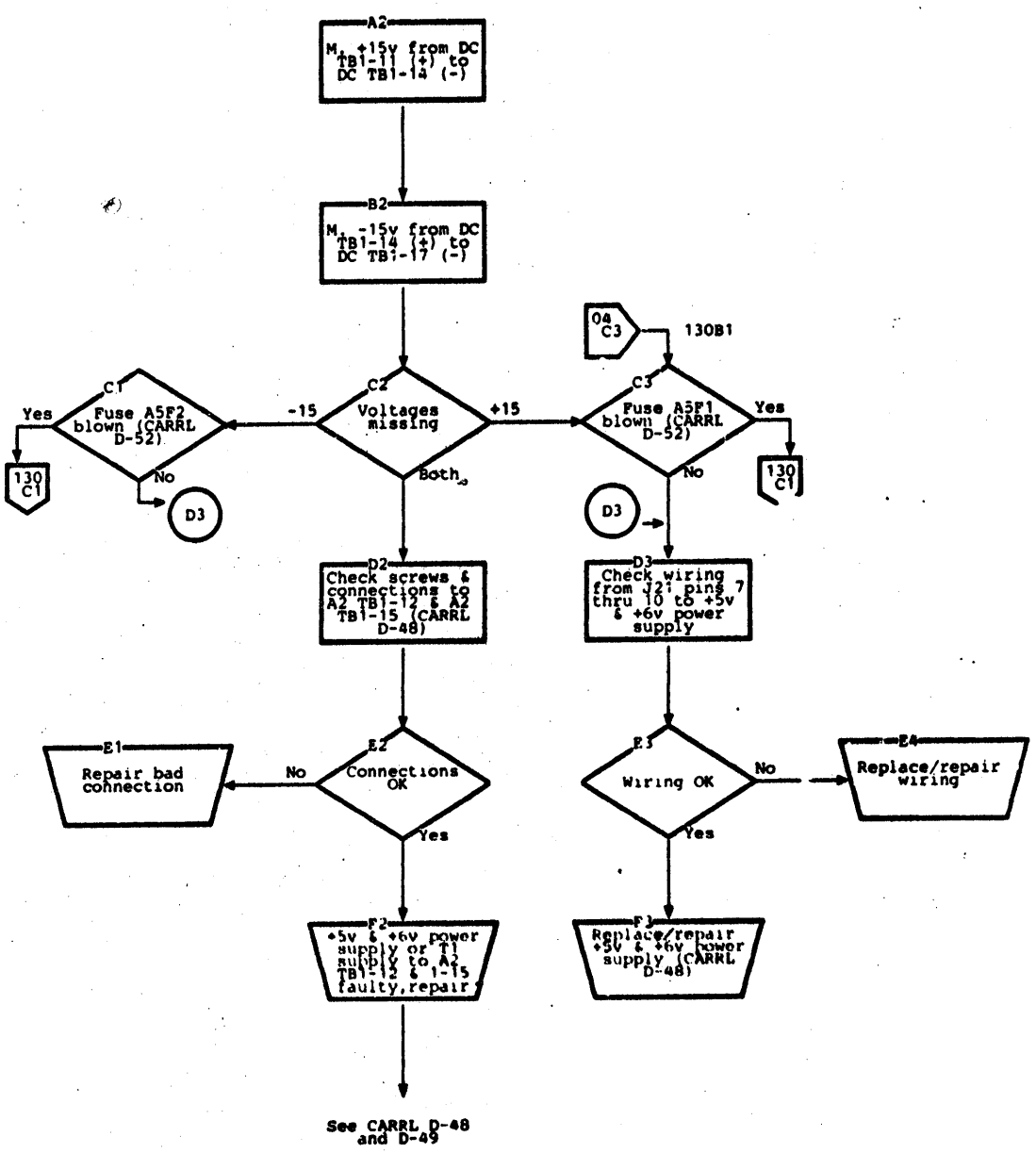
D. From TB4-4, the +15 continues to the read side of the head card and to the file protect switch. From the switch, it returns to TB4-6 and is routed from there to the write side of the head card.

E. See ALD pages WB800 and WB805 for wiring.

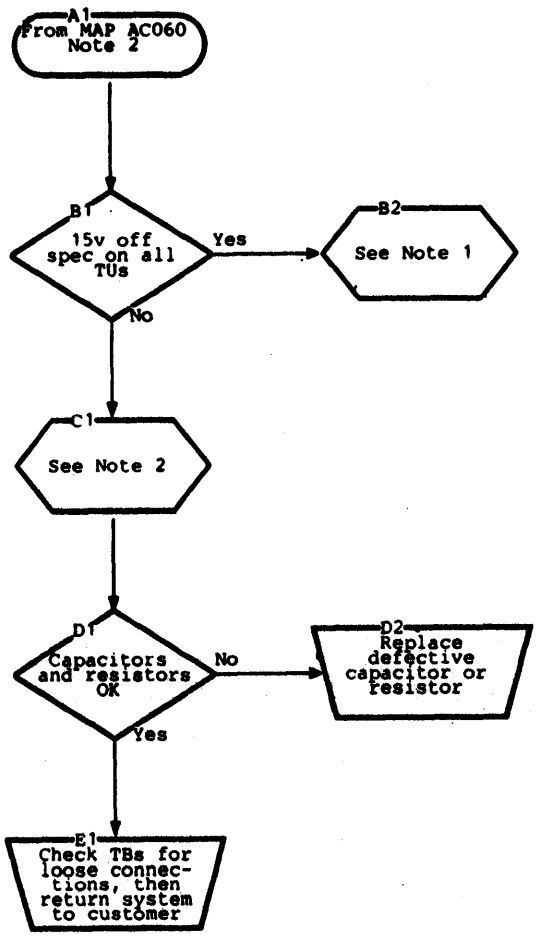
+15 and -15 Volt Power Supply Out of Tolerance



+15 and -15 Volt Power Supply Out of Tolerance



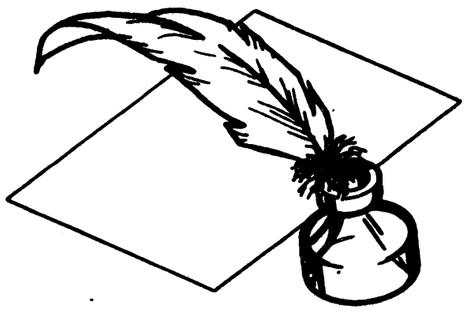
+15 and -15 Volt Power Supply Out of Tolerance



Note 1:
A. Check for loose connections at power supply A2 TB1 (see YG150 and YG160 for location).
B. Check diodes CR5–CR14 (YG110 and YG160). Failure of one of the diodes affects the 15v supply; if one is defective, power supply A2 must be replaced.

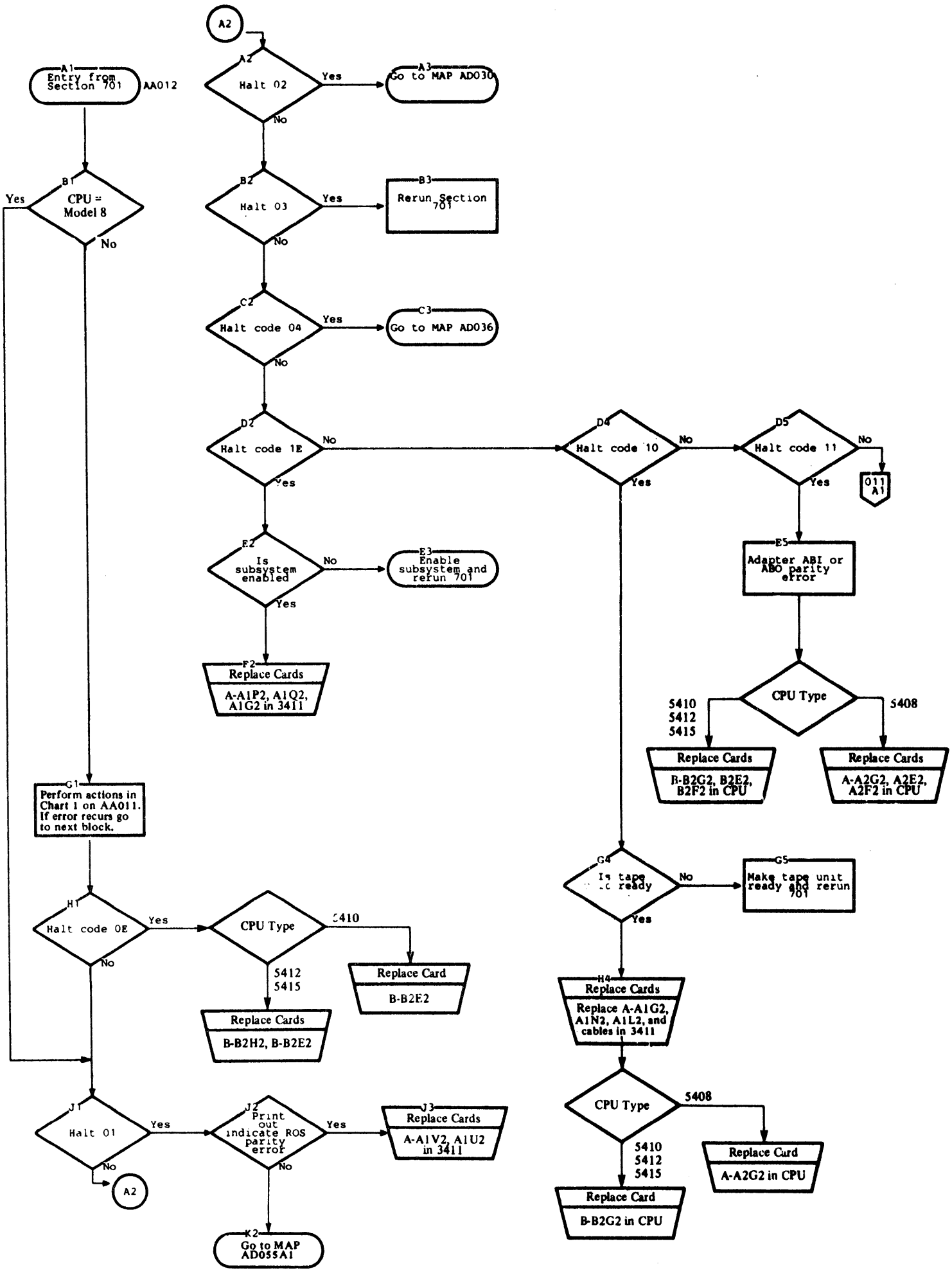
Note 2:
A. Examine capacitors C4 and C5 in the failing tape unit for swelling of the can or the safety vent.
B. See CARRL Figure D-51 for locations of C4 and C5.
C. Examine the resistors on C4 and C5 for signs of shorting.
D. C4 filters the +15 volts, and C5 filters the –15 volts.

CAUTION: Allow two minutes to discharge capacitors, after turning power off and disconnecting line cord from service.



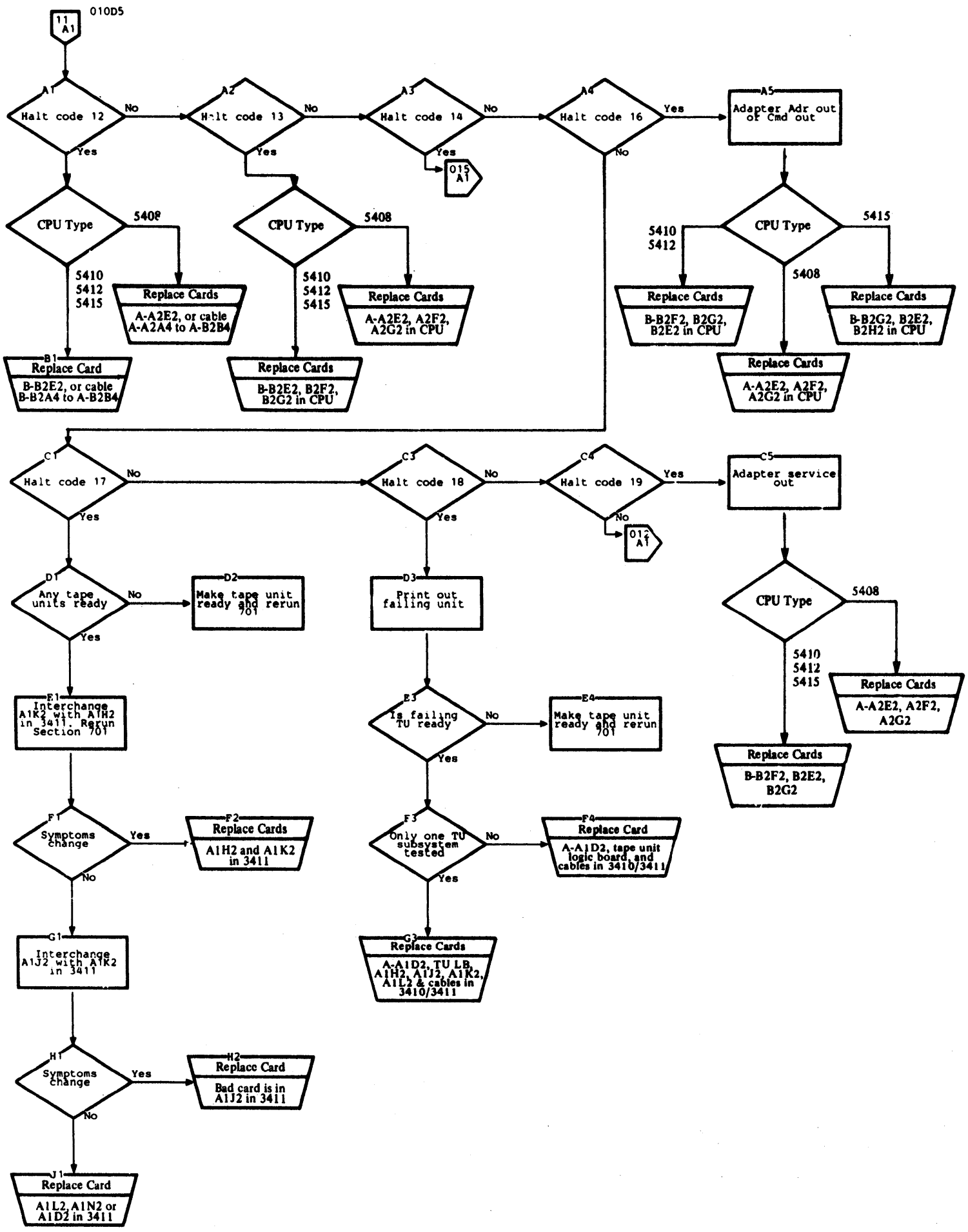
Notes

701 Halt Analysis

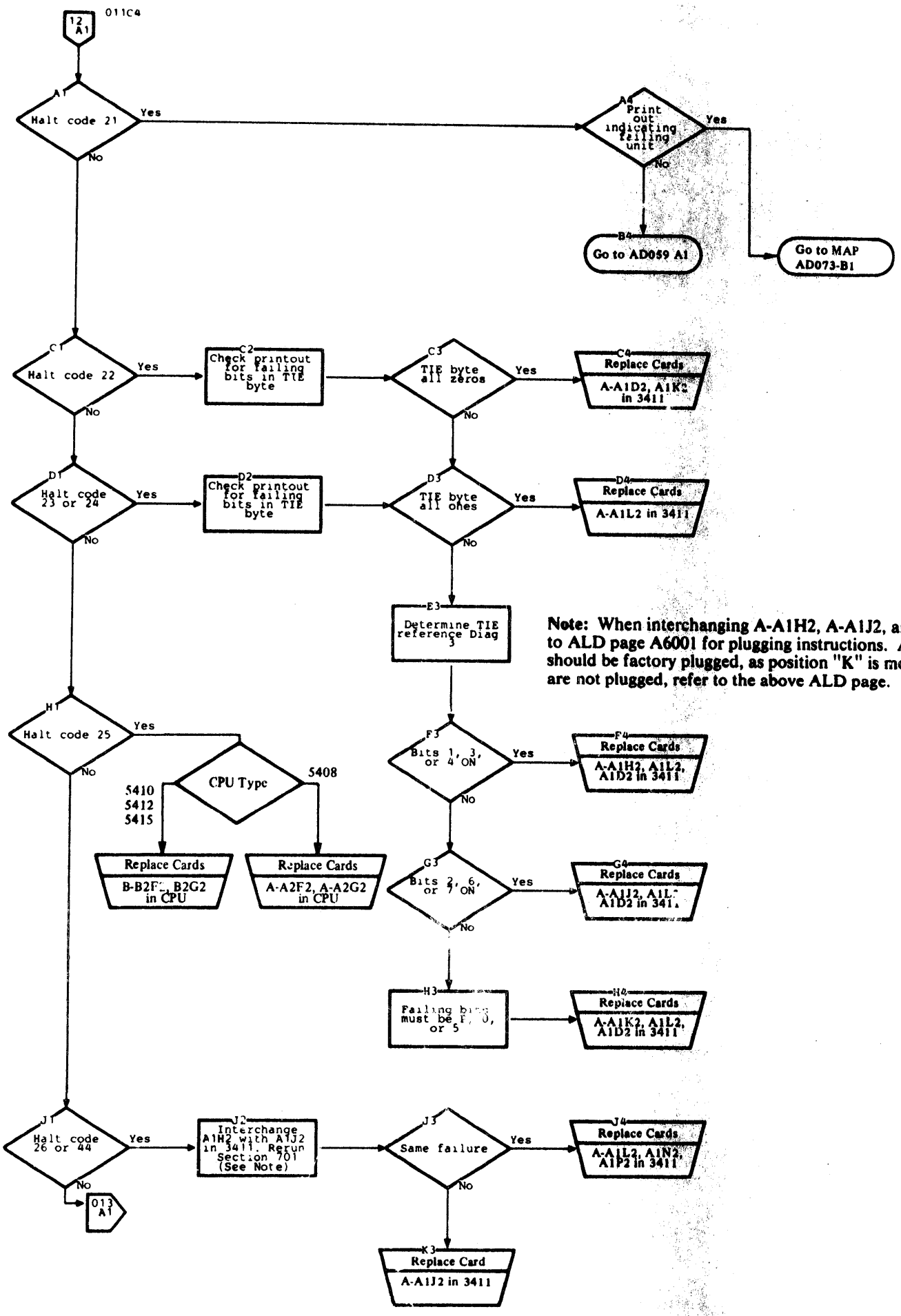


XF6800 Seq 1 of 2	1845964 Part Number	See EC History	443751 20 Sept 74	443800 31 Oct 75		

701 Halt Analysis

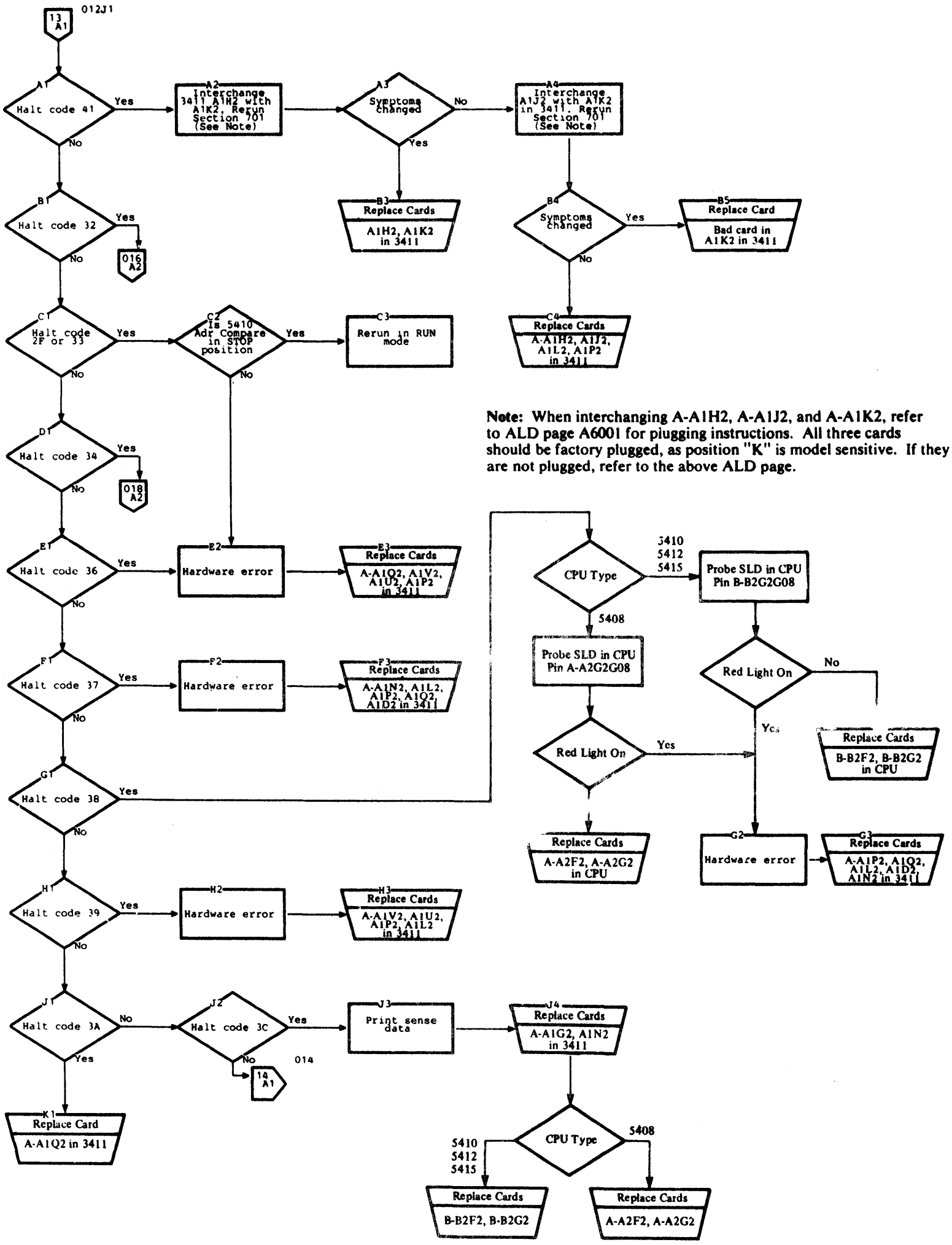


701 Halt Analysis



Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

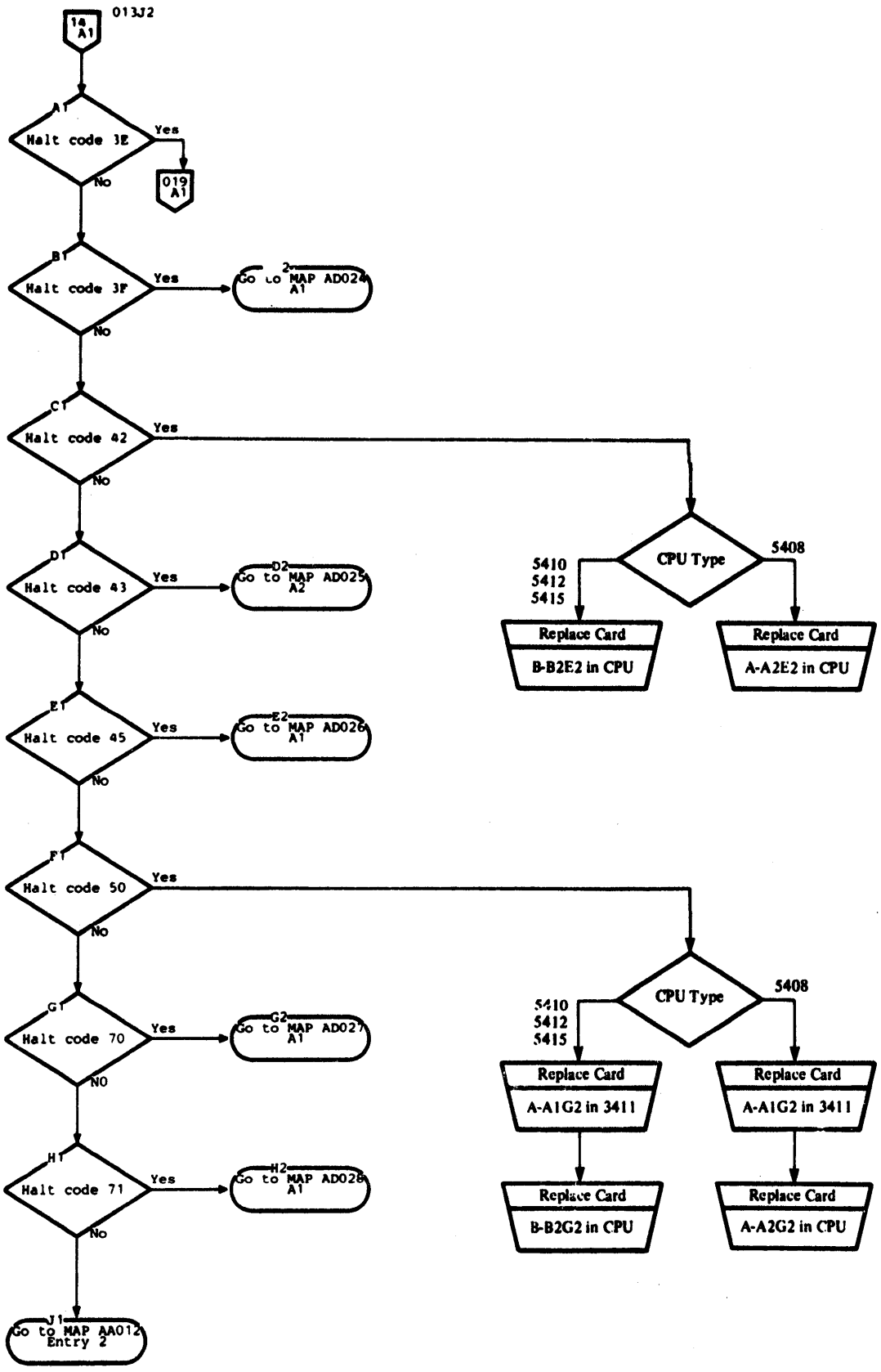
701 Halt Analysis



Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

XF6900 Seq 2 of 2	1845865 Part Number	734556 1 Sept 72	736872 26 Oct 73	443751 20 Sept 74	443800 31 Oct 75	

701 Halt Analysis



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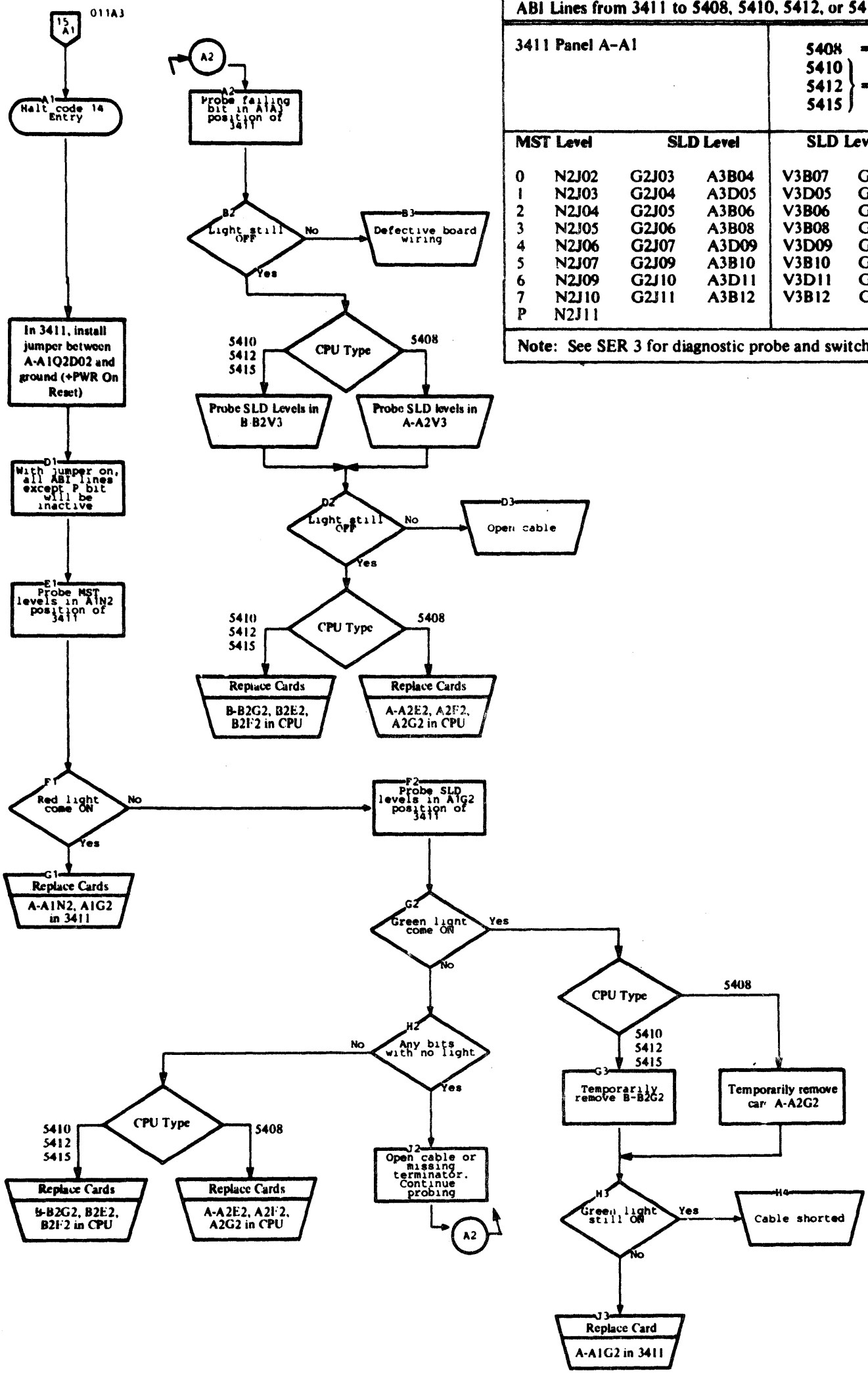

ABI Lines from 3411 to 5408, 5410, 5412, or 5415					
3411 Panel A-A1				5408 = Panel A-A2 5410, 5412, 5415 = Panel B-B2	
MST Level	**SLD Level**			**SLD Level**	
0	N2J02	G2J03	A3B04	V3B07	G2D12
1	N2J03	G2J04	A3D05	V3D05	G2D13
2	N2J04	G2J05	A3B06	V3B06	G2J02
3	N2J05	G2J06	A3B08	V3B08	G2J03
4	N2J06	G2J07	A3D09	V3D09	G2J04
5	N2J07	G2J09	A3B10	V3B10	G2J05
6	N2J09	G2J10	A3D11	V3D11	G2J06
7	N2J10	G2J11	A3B12	V3B12	G2J07
P	N2J11				

Note: See SER 3 for diagnostic probe and switching levels.

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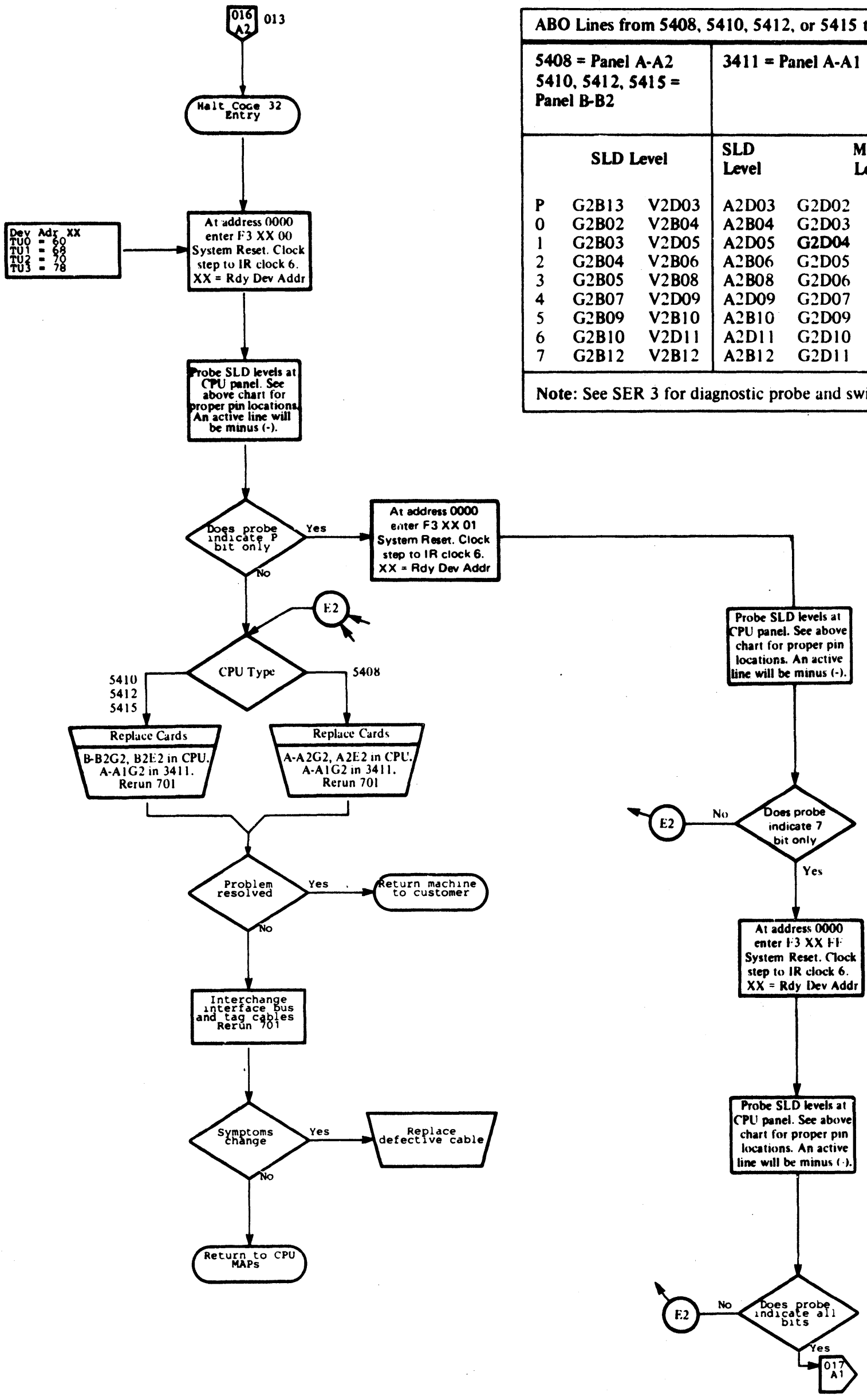

ABO Lines from 5408, 5410, 5412, or 5415 to 3411					
5408 = Panel A-A2 5410, 5412, 5415 = Panel B-B2			3411 = Panel A-A1		
	SLD Level		SLD Level	MST Level	
P	G2B13	V2D03	A2D03	G2D02	G2B13
0	G2B02	V2B04	A2B04	G2D03	G2B02
1	G2B03	V2D05	A2D05	G2D04	G2B03
2	G2B04	V2B06	A2B06	G2D05	G2B04
3	G2B05	V2B08	A2B08	G2D06	G2B05
4	G2B07	V2D09	A2D09	G2D07	G2B07
5	G2B09	V2B10	A2B10	G2D09	G2B09
6	G2B10	V2D11	A2D11	G2D10	G2B10
7	G2B12	V2B12	A2B12	G2D11	G2B12

Note: See SER 3 for diagnostic probe and switching levels.

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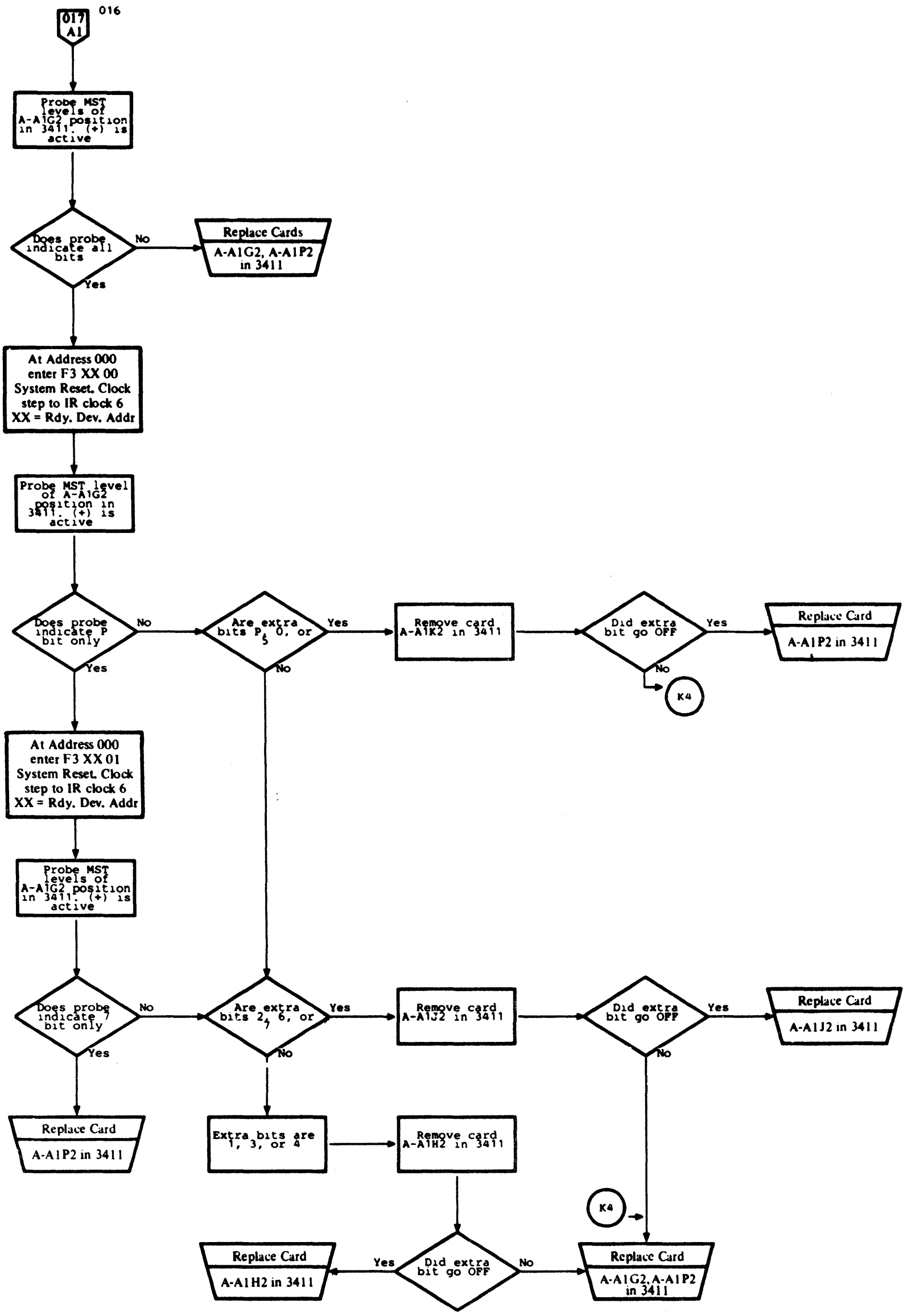
701 Halt Analysis



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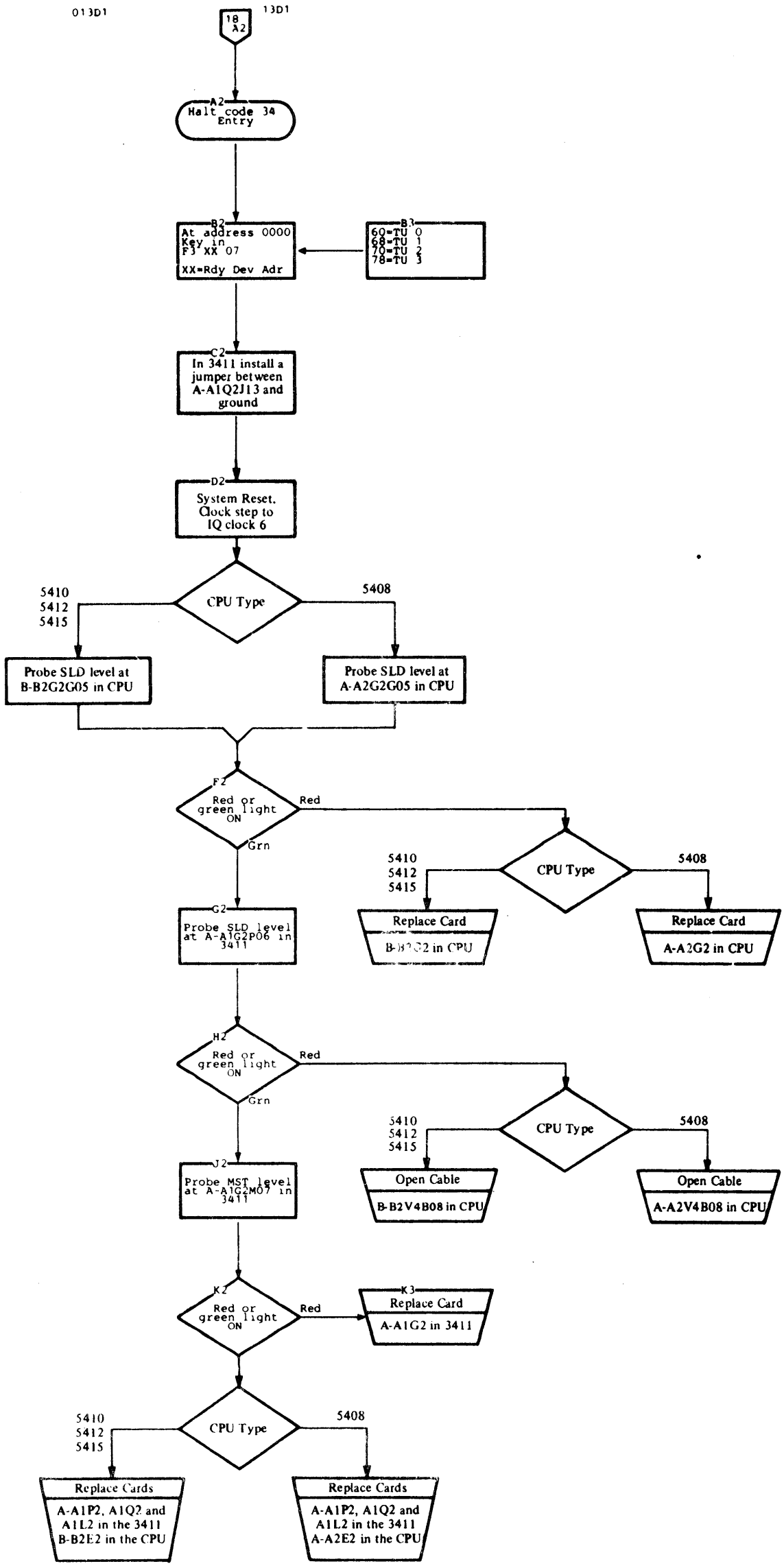
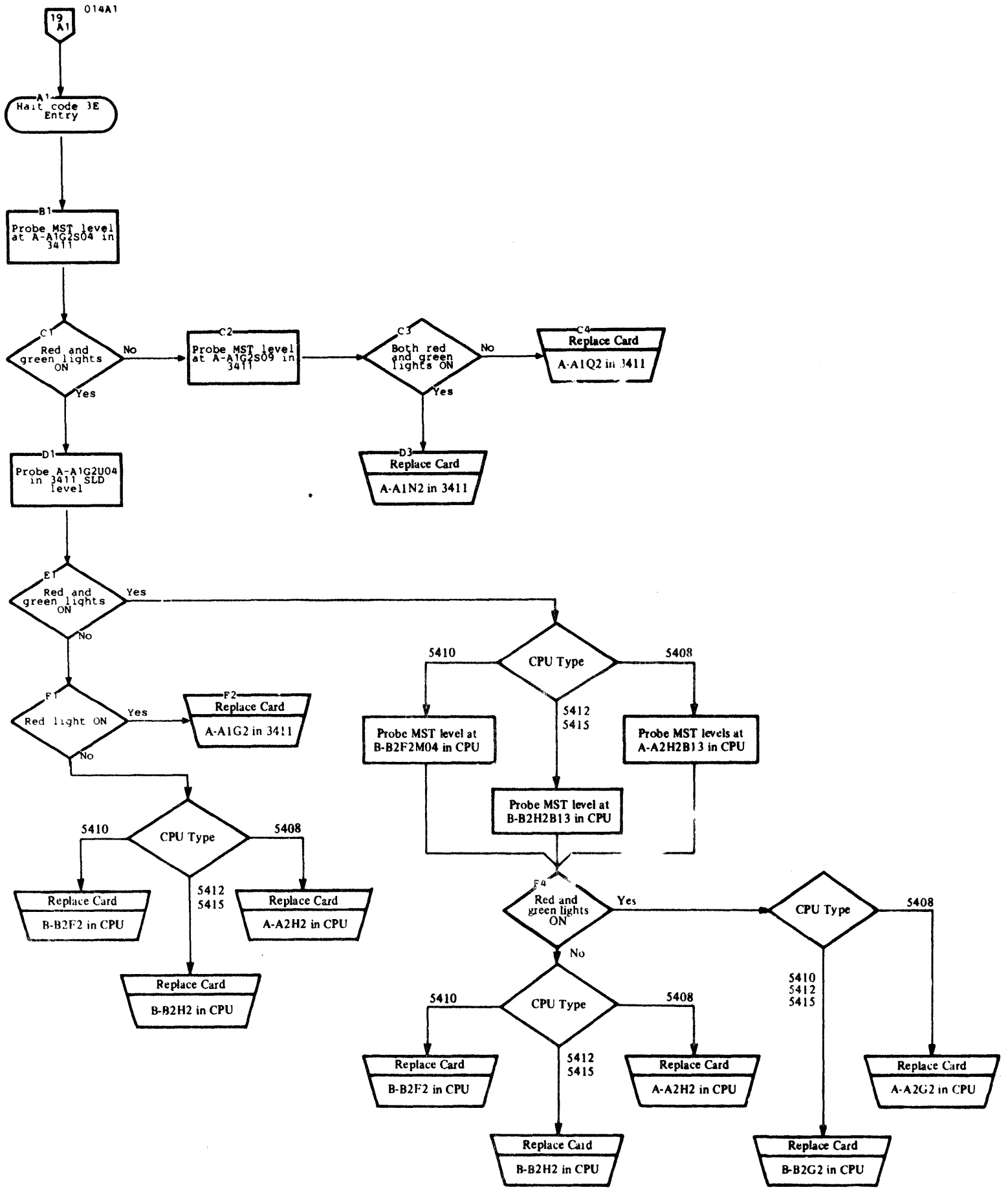
701 Halt Analysis



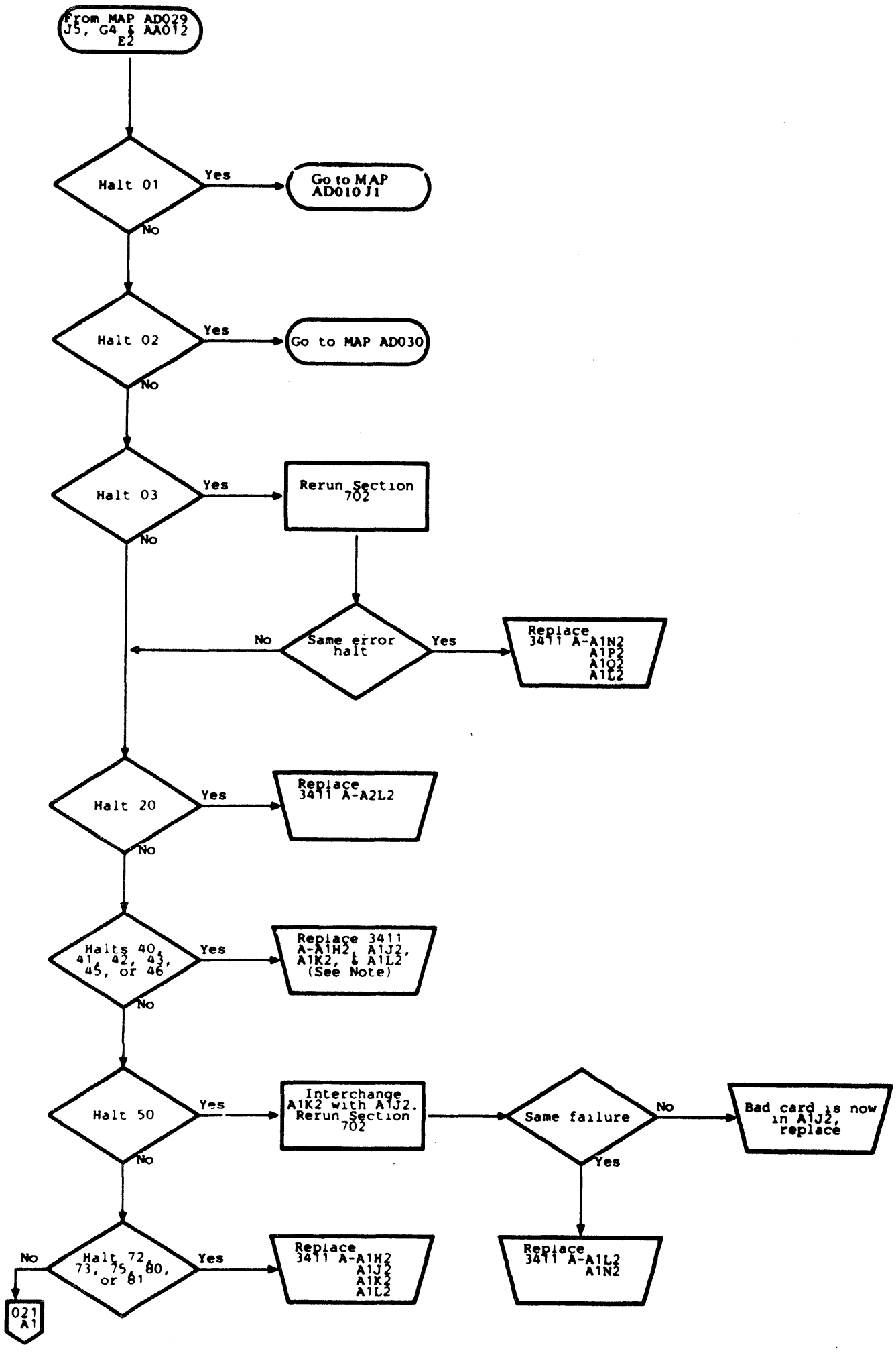
XF6950	1846056	736672	443800			
Set 1 of 2	Part Number	26 Oct 73	31 Oct 75			

701 Halt Analysis



XF6950	1846056	736672	443800			
Seq 2 of 2	Part Number	26 Oct 73	31 Oct 75			

Note: See tape control ALD page A6001 for all detection cards in positions A1H, A1J, and A1K.



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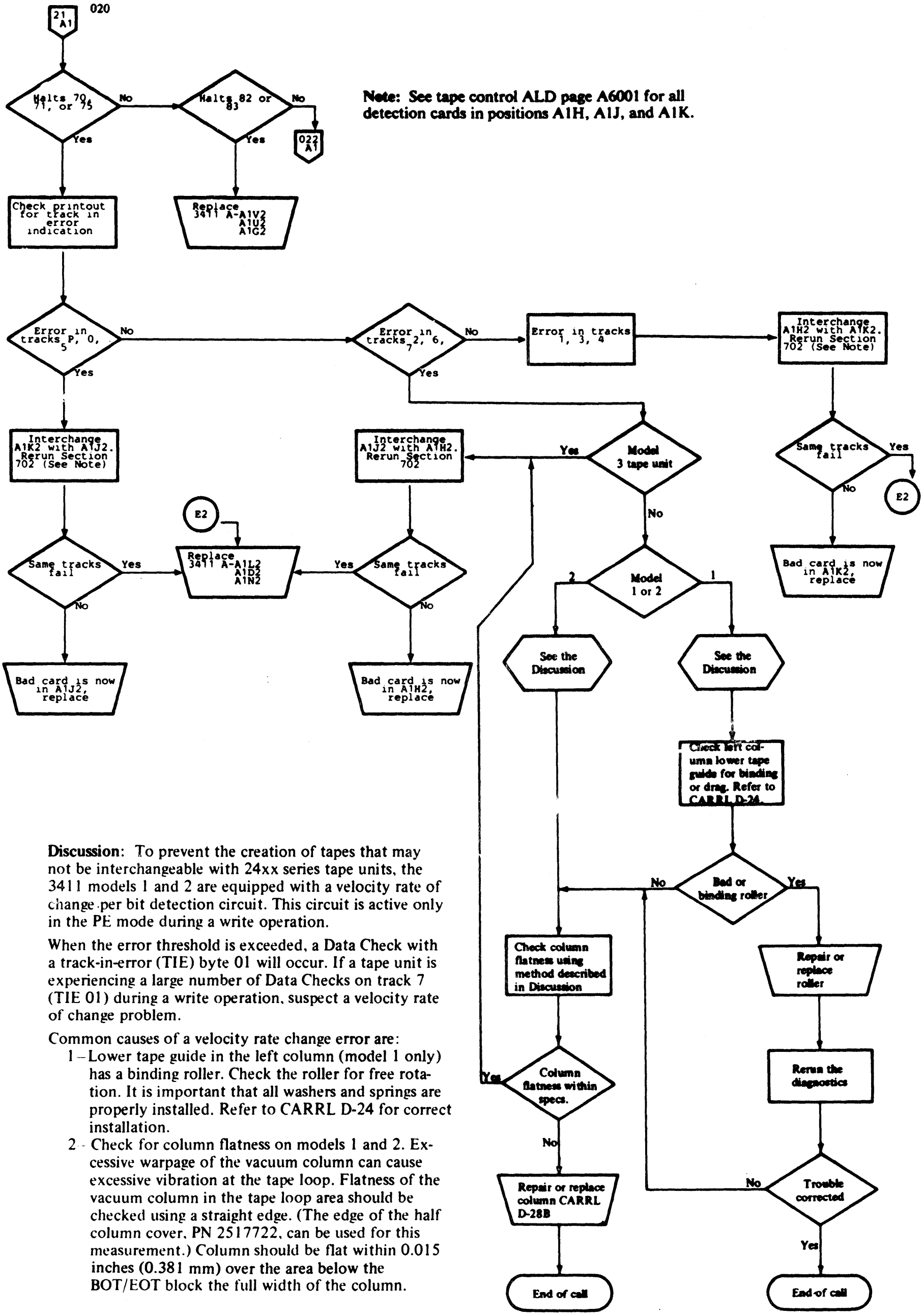
702 Diagnostic Entry (Dead Track Failure)



Note: See tape control ALD page A6001 for all detection cards in positions A1H, A1J, and A1K.

Discussion: To prevent the creation of tapes that may not be interchangeable with 24xx series tape units, the 3411 models 1 and 2 are equipped with a velocity rate of change per bit detection circuit. This circuit is active only in the PE mode during a write operation.

When the error threshold is exceeded, a Data Check with a track-in-error (TIE) byte 01 will occur. If a tape unit is experiencing a large number of Data Checks on track 7 (TIE 01) during a write operation, suspect a velocity rate of change problem.

Common causes of a velocity rate change error are:

1 – Lower tape guide in the left column (model 1 only) has a binding roller. Check the roller for free rotation. It is important that all washers and springs are properly installed. Refer to CARRL D-24 for correct installation.

2 - Check for column flatness on models 1 and 2. Excessive warpage of the vacuum column can cause excessive vibration at the tape loop. Flatness of the vacuum column in the tape loop area should be checked using a straight edge. (The edge of the half column cover, PN 2517722, can be used for this measurement.) Column should be flat within 0.015 inches (0.381 mm) over the area below the BOT/EOT block the full width of the column.

XF7000 Seq. 2 of 2	1845986 Part Number

734556 1 Sept 72	734556A 20 Oct 72	738672 26 Oct 73	443751 20 Sept 74	443806 2 May 77

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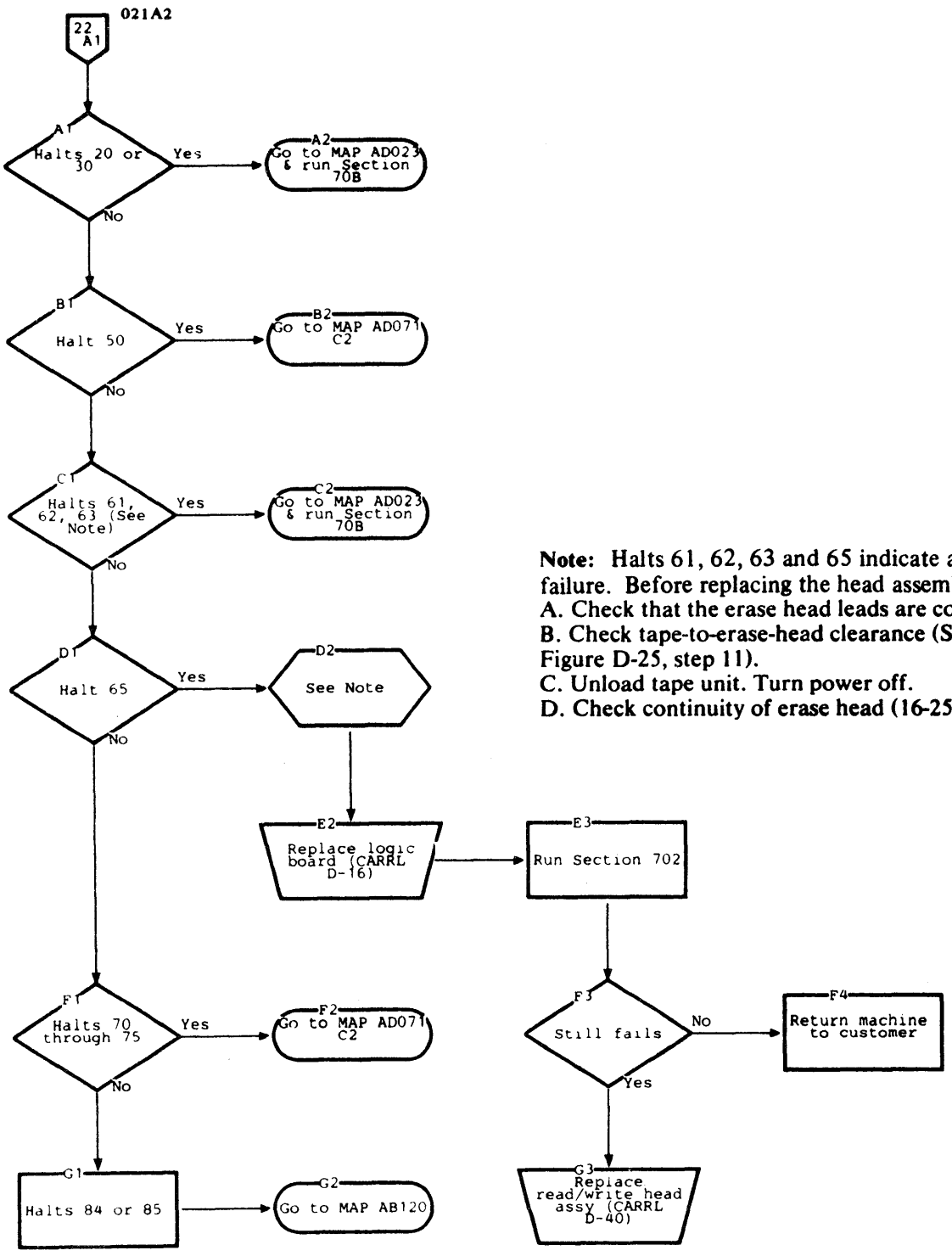
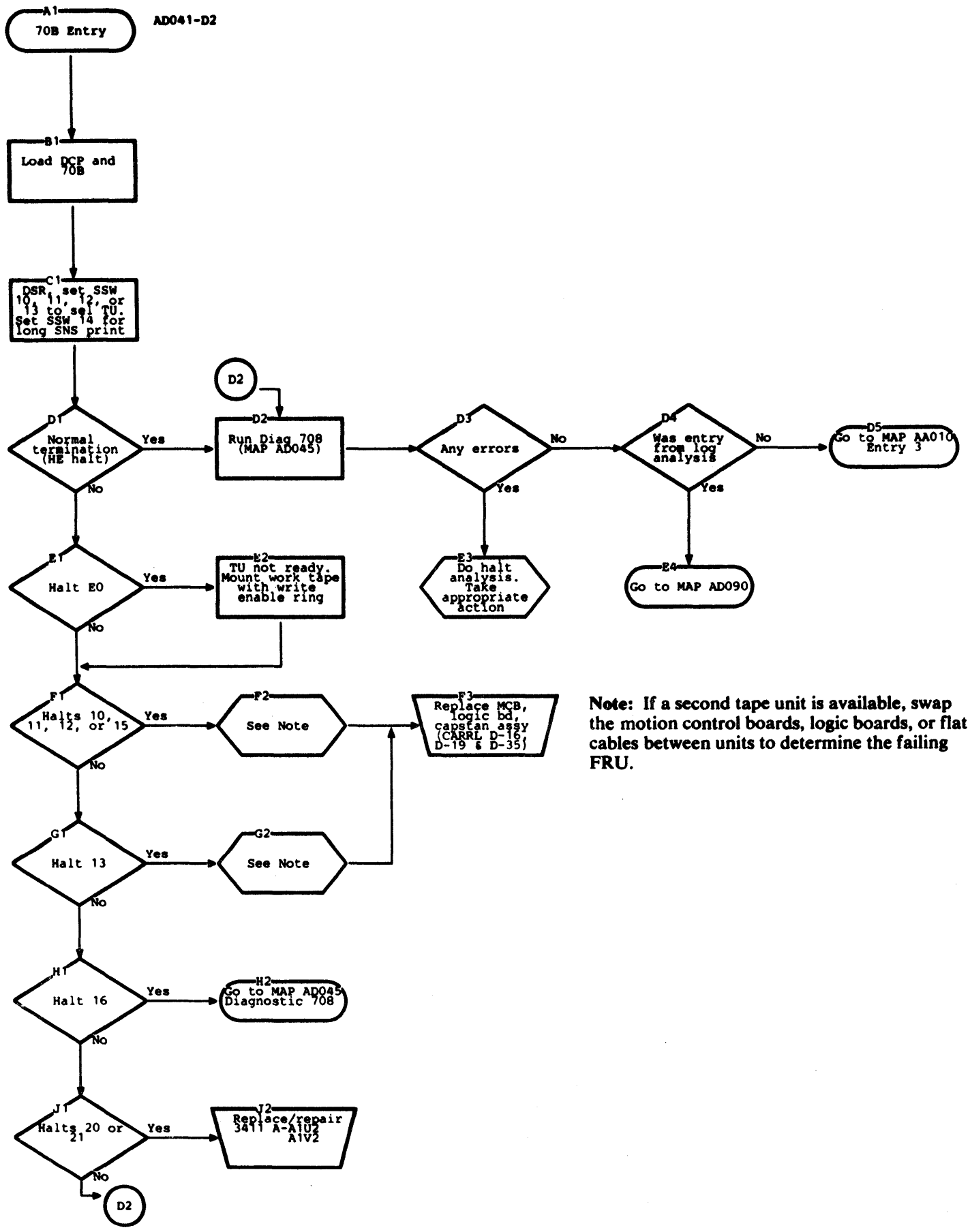
702 Diagnostic Entry (Tape Analysis Chart)



Note: Halts 61, 62, 63 and 65 indicate an erase head failure. Before replacing the head assembly:
A. Check that the erase head leads are connected.
B. Check tape-to-erase-head clearance (See CARRL Figure D-25, step 11).
C. Unload tape unit. Turn power off.
D. Check continuity of erase head (16-25 ohms).

70B Tachometer Check



Note: If a second tape unit is available, swap the motion control boards, logic boards, or flat cables between units to determine the failing FRU.

Halt code 3F Entry

System Reset

CPU Type
- 5408 → Probe SLD level at A-A2E2G08 LIO R, A-A2E2G09 SNS R, A-A2E2G05 SIO G
- 5410, 5412, 5415 → Probe SLD level B2E2G08 LIO R, B2E2G09 SNS R, B2E2G05 SIO G

Red light ON for all three
- Yes → Check the printout for the following conditions.
- No

Only one light green
- No → J2
- Yes

Which one is green
- SIO → 24A B1
- SNS
- LIO → F1

At address 0000 Key in 31 XX 01 00 XX=Rdy Dev Adr See Note

System Reset. Clock step to IQ clock 0

CPU Type
- 5408 → Probe SLD level at A-A2E2G08 in CPU
- 5410, 5412, 5415 → Probe SLD level at B-B2E2G08 in CPU

Red or green light ON
- Red → Replace card B-B2E2 in CPU
- Grn → B4

Note:
60=TU 0
68=TU 1
70=TU 2
78=TU 3

Did Load I/O, Start I/O or SNS fail
- SIO → 24A B1
- SNS
- LIO → F1

At address 0000 Key in 30 XX 01 00 XX=Rdy Dev Adr See Note

System Reset. Clock step to IQ clock 0

CPU Type
- 5408 → Probe SLD level at A-A2E2G09 in CPU
- 5410, 5412, 5415 → Probe SLD level at B-B2E2G09 in CPU

J2

Red or green light ON
- Red → Replace Card A-A1P2 in 3411
- Grn

Probe SLD level at A-A1G2P03 in 3411

Red or green light ON
- Red → CPU Type
  - 5408 → Cable open between adapter & tape control pin A-A2V4B04
  - 5410, 5412, 5415 → Cable open between adapter & tape control pin B-B2V4B04
- Grn → Probe MST level at A-A1G2M03 in 3411

Red or green light ON
- Red → Replace Card A-A1G2 in 3411
- Grn → Replace Card A-A1P2 in 3411

B4

Probe SLD level at A-A1G2P04 in 3411

Red or green light ON
- Red → CPU Type
  - 5408 → Cable open between adapter & tape control pin A-A2V4D05
  - 5410, 5412, 5415 → Cable open between adapter & tape control pin B-B2V4D05
- Grn → Probe MST level at A-A1G2M04 in 3411

Red or green light ON
- Red → Replace Card A-A1G2 in 3411
- Grn → Replace Card A-A1P2 in 3411

XF7115	1846055	736672	443800	443806		
Sec 1 of 2	Part Number	26 Oct 73	31 Oct 75	2 May 77		

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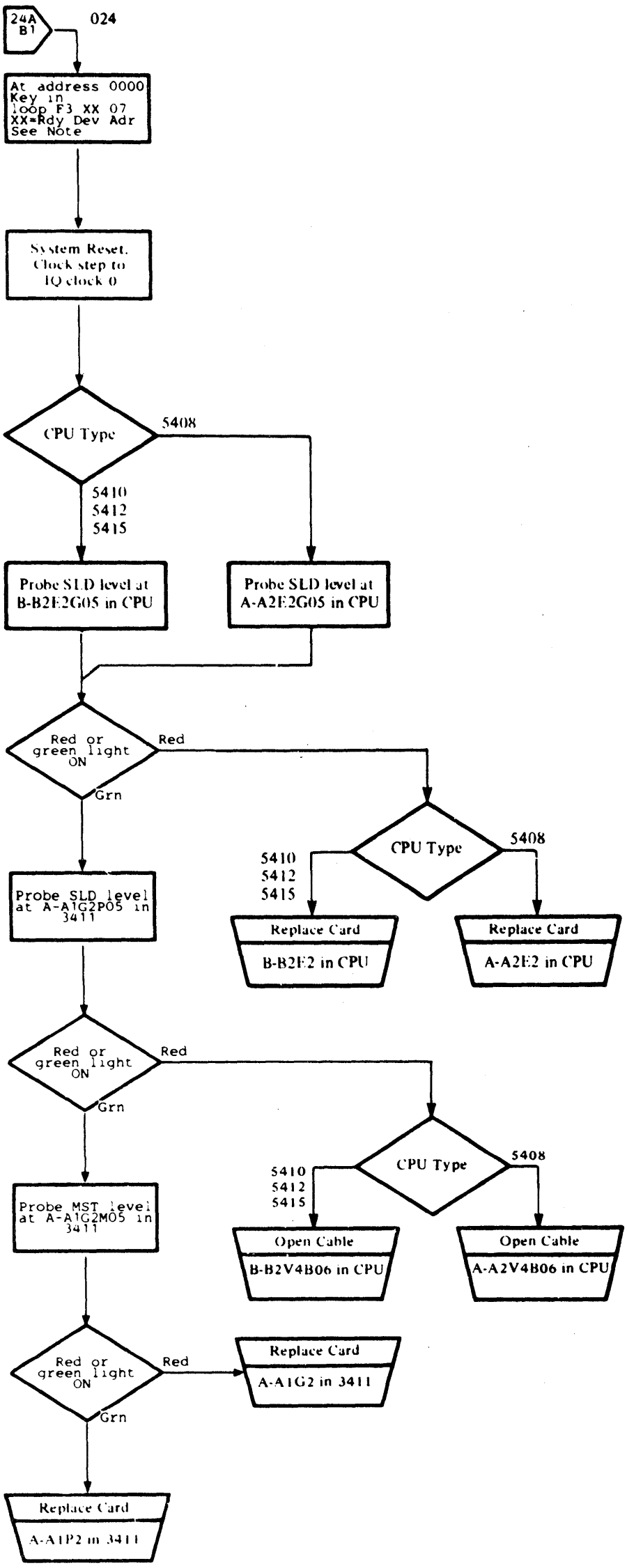
Note:
60=TU 0
68=TU 1
70=TU 2
78=TU 3



XF7115	1846055
Sect 2 of 2	Part Number

736672	443800	443806		
26 Oct 73	31 Oct 75	2 May 77		

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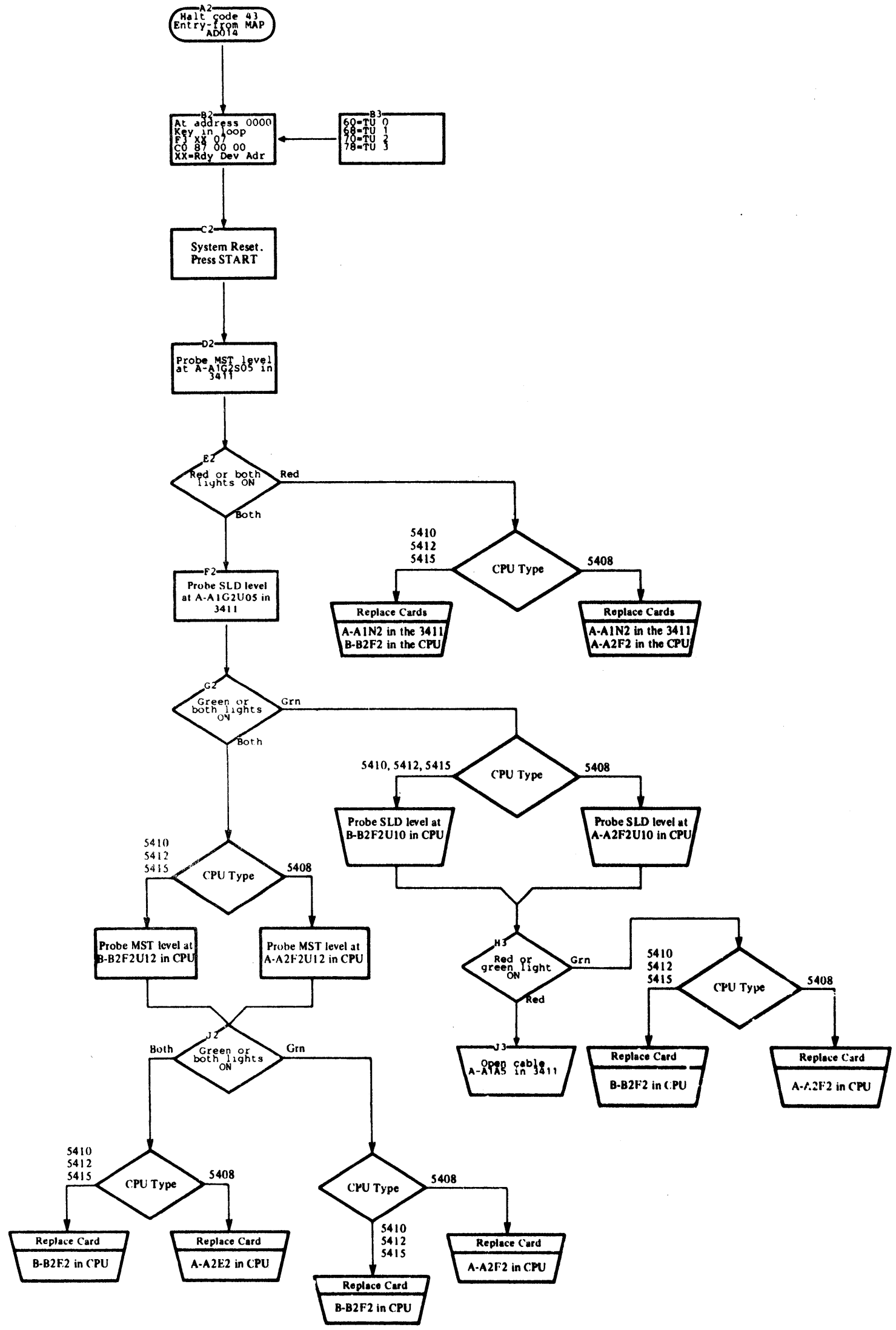
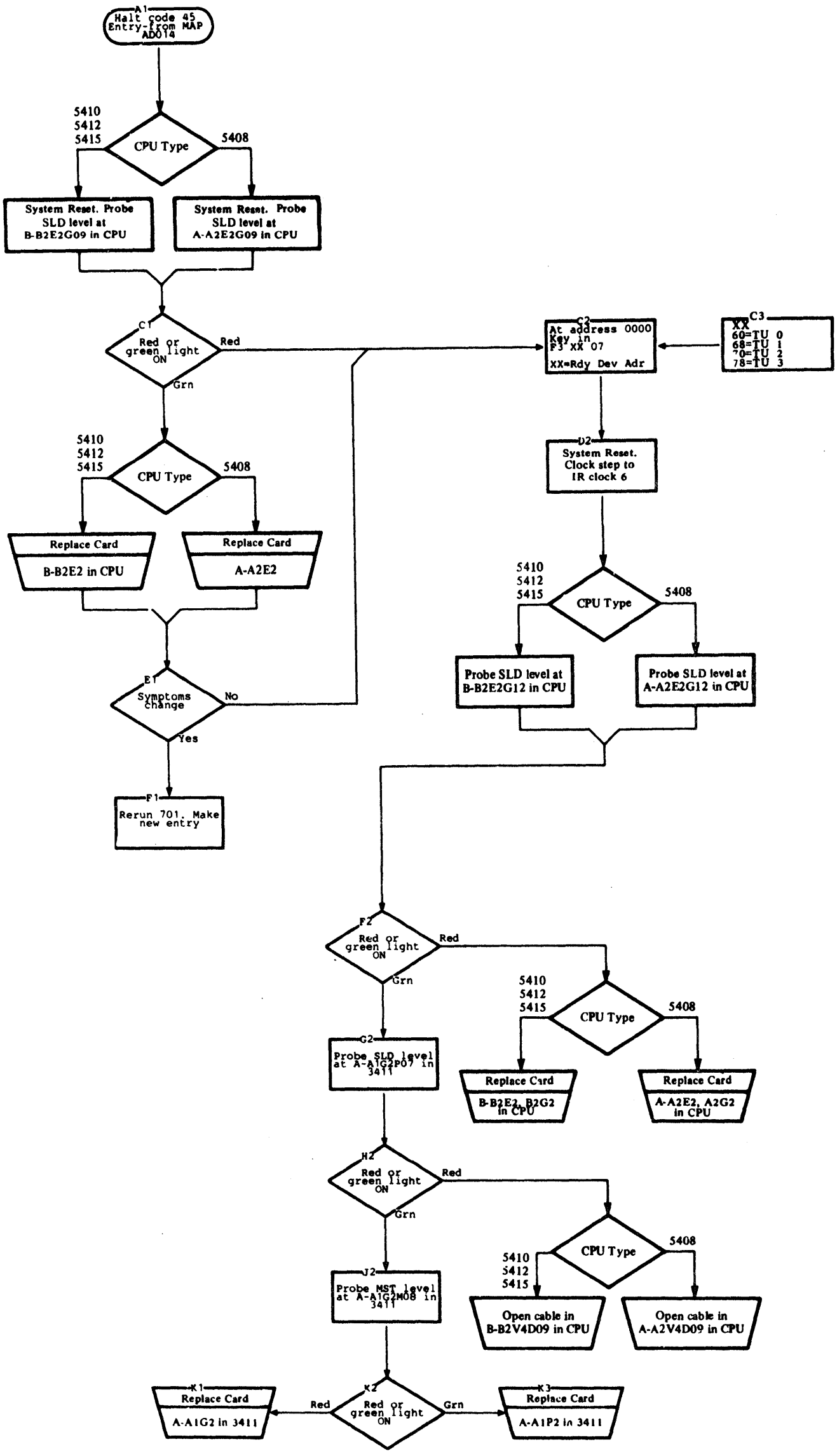
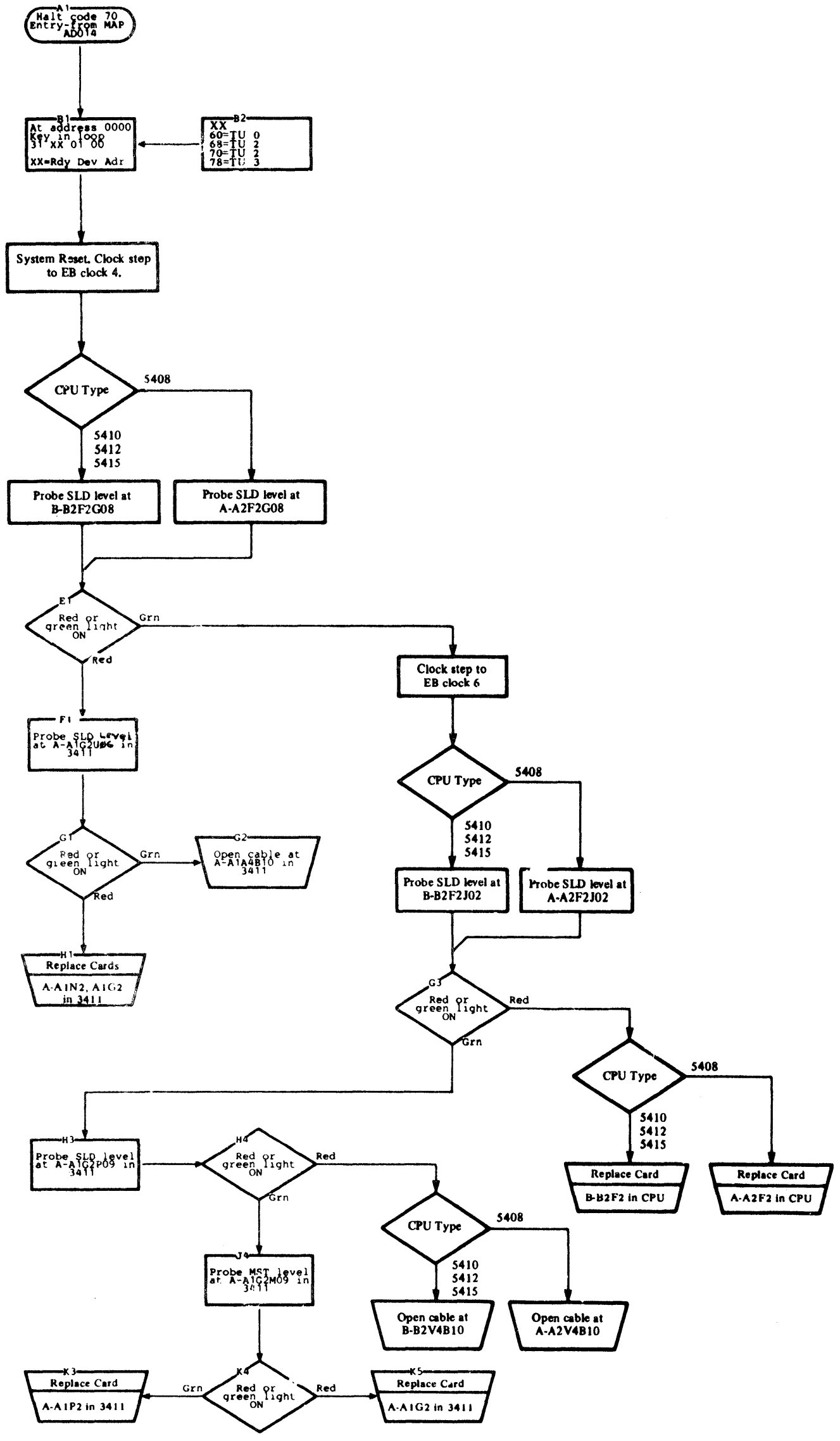


XF7125	1846054	736672	443800			
Seq 1 of 2	Part Number	26 Oct 73	31 Oct 75			

701 Halt Analysis



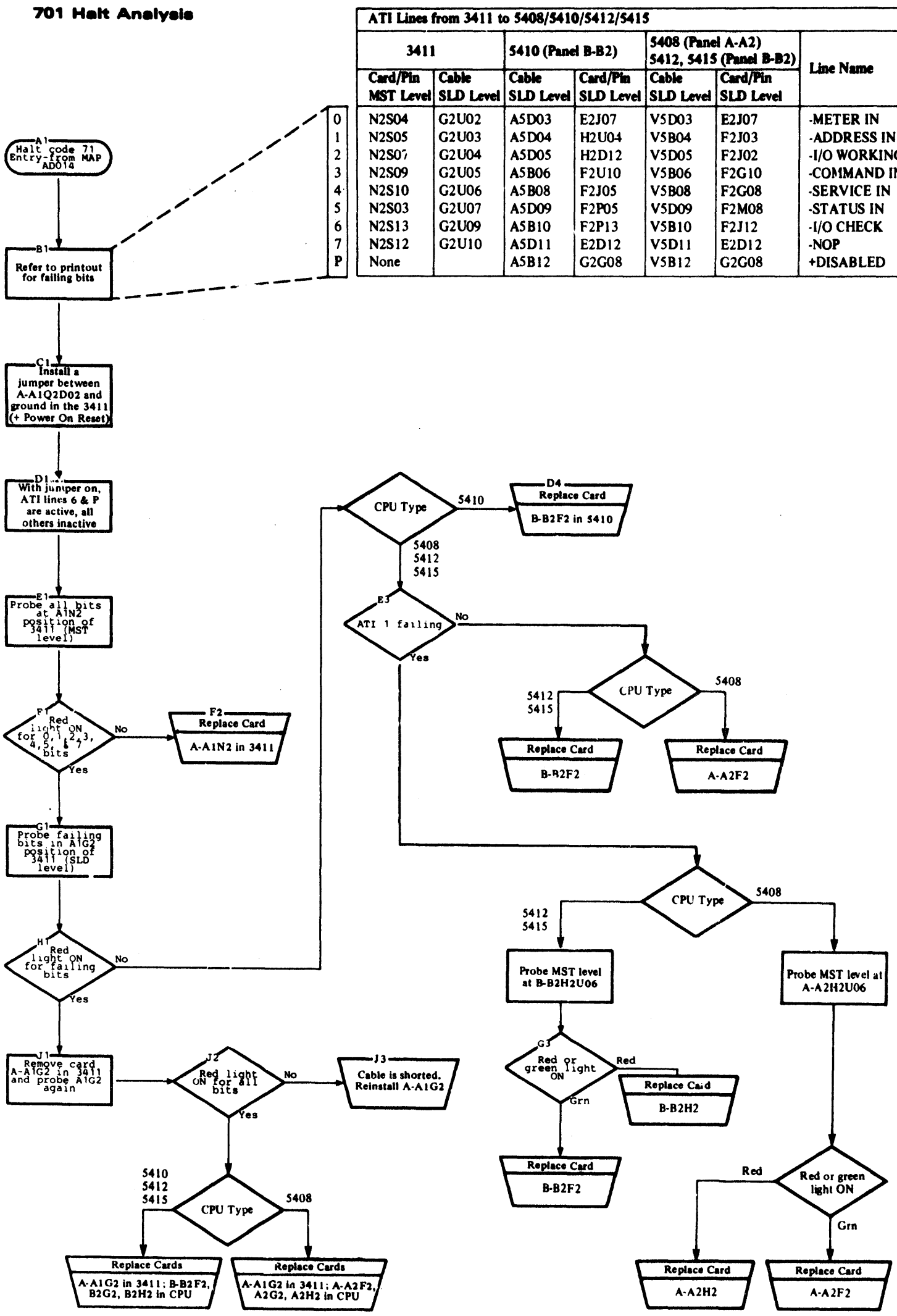
701 Halt Analysis



XF7160 Seq 1 of 2	1846053 Part Number	736672 28 Oct 73	443751 20 Sept 74	443800 31 Oct 75		

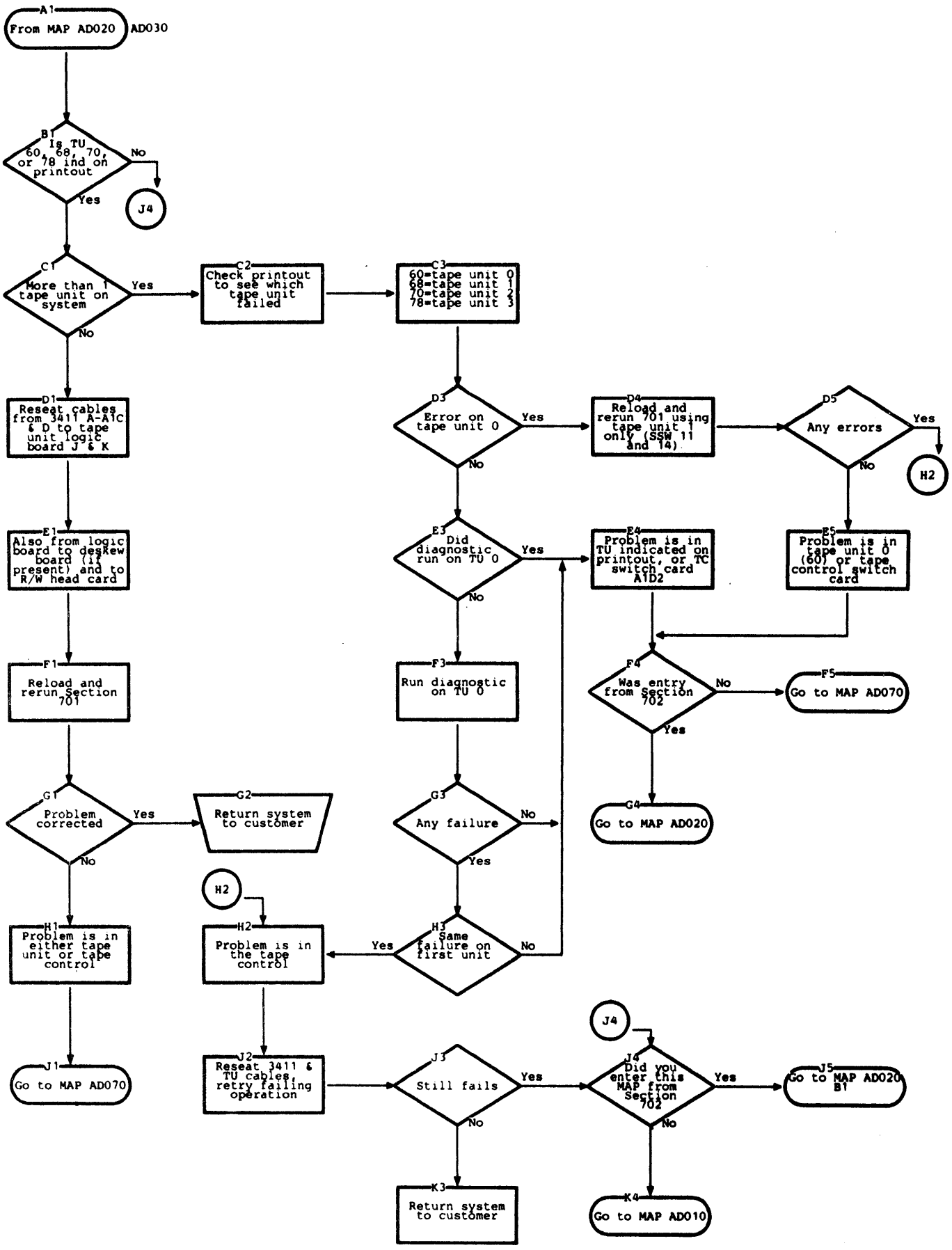
701 Halt Analysis

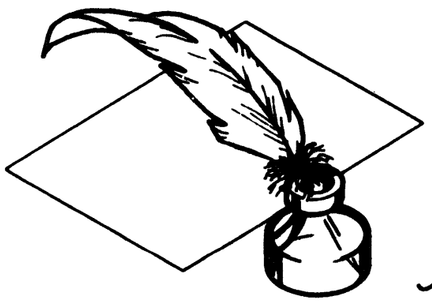
ATI Lines from 3411 to 5408/5410/5412/5415						
3411		5410 (Panel B-B2)		5408 (Panel A-A2) 5412, 5415 (Panel B-B2)		Line Name
Card/Pin MST Level	Cable SLD Level	Cable SLD Level	Card/Pin SLD Level	Cable SLD Level	Card/Pin SLD Level	
N2S04	G2U02	A5D03	E2J07	V5D03	E2J07	-METER IN
N2S05	G2U03	A5D04	H2U04	V5B04	F2J03	-ADDRESS IN
N2S07	G2U04	A5D05	H2D12	V5D05	F2J02	-I/O WORKING
N2S09	G2U05	A5B06	F2U10	V5B06	F2G10	-COMMAND IN
N2S10	G2U06	A5B08	F2J05	V5B08	F2G08	-SERVICE IN
N2S03	G2U07	A5D09	F2P05	V5D09	F2M08	-STATUS IN
N2S13	G2U09	A5B10	F2P13	V5B10	F2J12	-I/O CHECK
N2S12	G2U10	A5D11	E2D12	V5D11	E2D12	-NOP
None		A5B12	G2G08	V5B12	G2G08	+DISABLED



XF7160 Seq. 2 of 2	1846063 Part Number	736672 26 Oct 73	443761 20 Sept 74	443800 31 Oct 75		

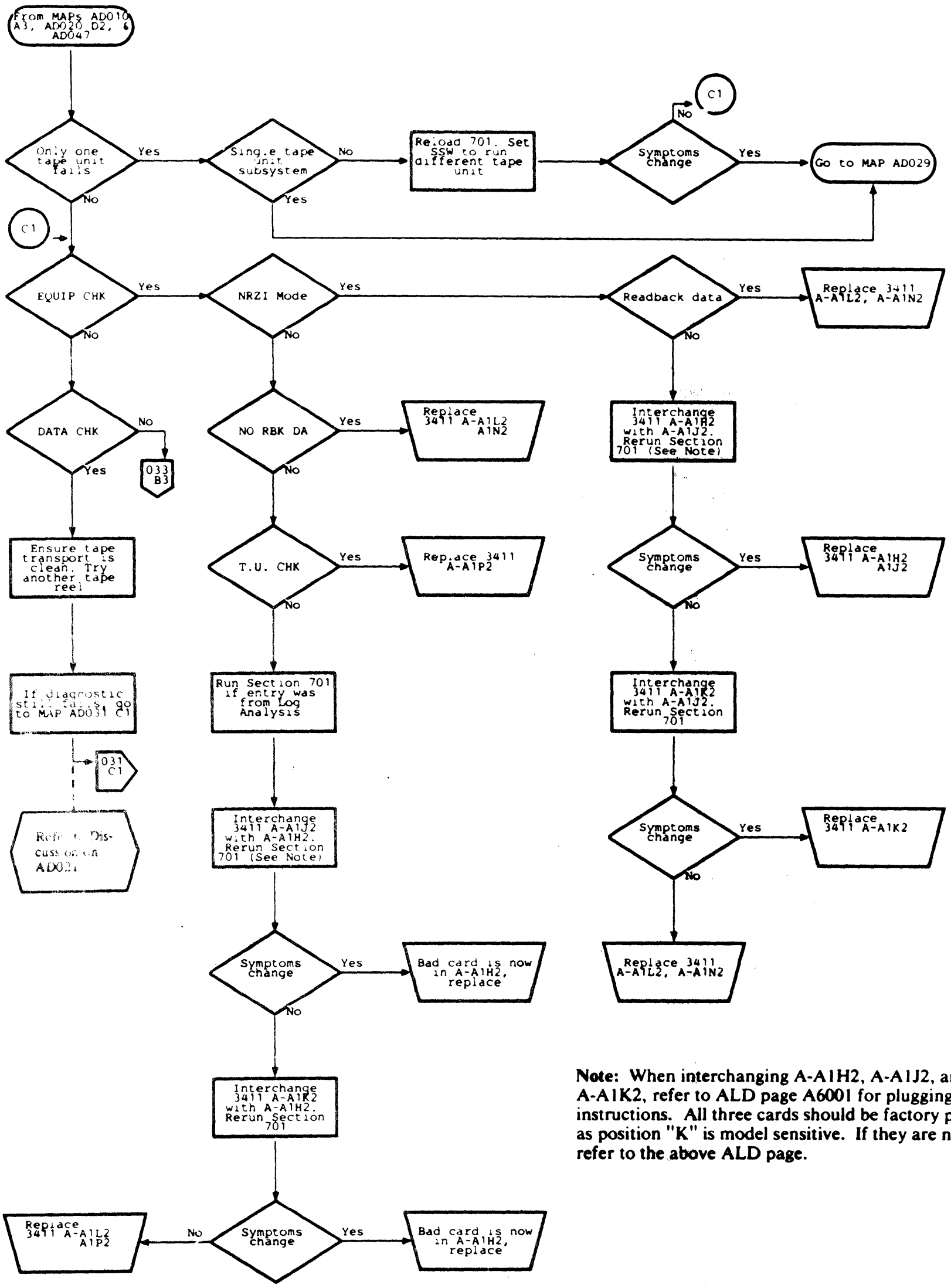
701 Halt Analysis





Notes

701 Halt 02 Analysis



Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

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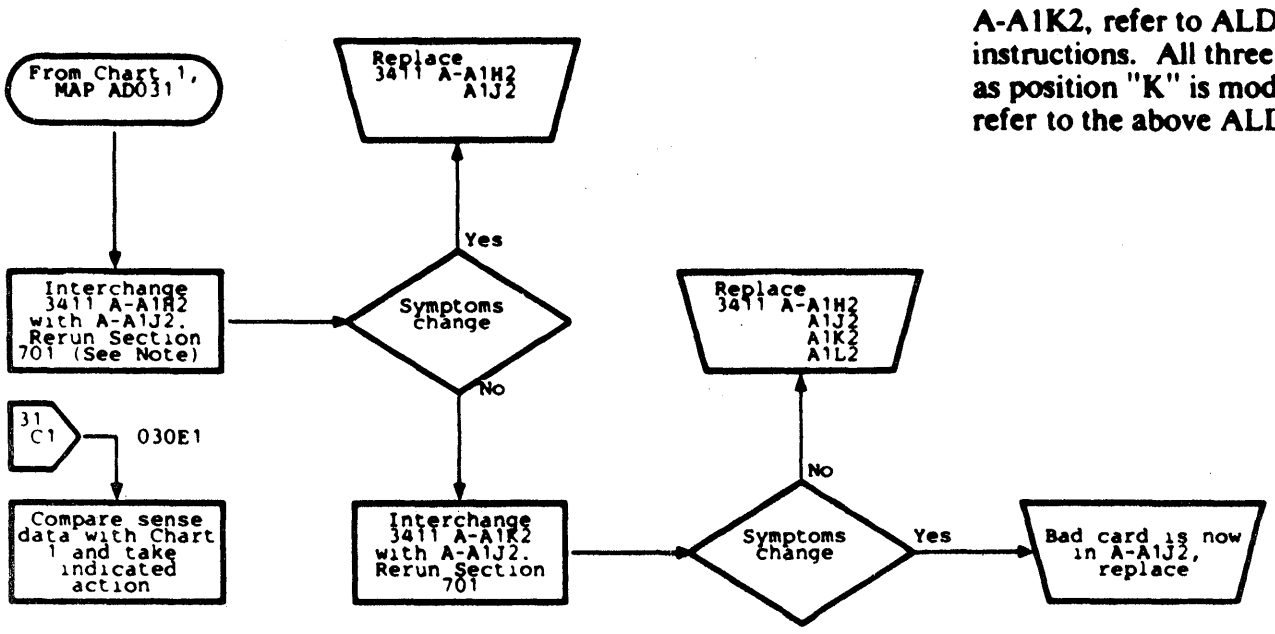

Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

CHART NO. 1: 701 HALT 02 DATA CHECK

MODE		TIE DATA	SENSE BITS									ACTION: Replace card(s) indicated or go the MAP chart indicated
PE	NRZI		MTE	END DATA	ENV CHK	FALSE END	PEID BURST	VRC ER	LRCR	TIME ER	CRCR	
X		FF	X	X	X							3411 A-A1L2 A-A1P2
X		01			X			X				Suspect A-A1J2. Go to MAP AD031 A1. Refer to Discussion on AD021.
X		02			X			X				Go to MAP AD031 A1
X		08			X			X				Suspect A-A1H2 Go to MAP AD031 A1
X		40			X			X				Suspect A-A1H2 Go to MAP AD031 A1
X		80			X			X				Suspect A-A1K2 Go to MAP AD031 A1
X		EF	X		X			X				3411 A-A1L2
X		FF	X	X	X			X				Go to MAP AD032 A1
X		03								X		3411 A-A1L2 A-A1P2
X		03				X						Go to MAP AD032 A3
X		03				X		X				3411 A-A1L2 A-A1P2
X		00					X					Go to MAP AD032 E3
X		03						X				3411 A-A1N2
	X	03		X				X		X		Suspect A-A1K2 Go to MAP AD031 A1
	X	03						X		X	X	Suspect A-A1H2 Go to MAP AD031 A1
	X	03	X					X		X		Suspect A-A1H2 Go to MAP AD031 A1
	X	03							X			Go to MAP AD031 A1
	X	03						X	X	X		Go to MAP AD031 A1
	X	03						X	X			Go to MAP AD032 A1
	X	03						X			X	Suspect A-A1K2 Go to MAP AD031 A1
	X	03									X	3411 A-A1Q2
Any combination not shown												Go to MAP AD033 A1

XF7200 Ser 2 of 2 | 1845968 Part Number
See EC History | 443751 20 Sept 74 | 443806 2 May 77

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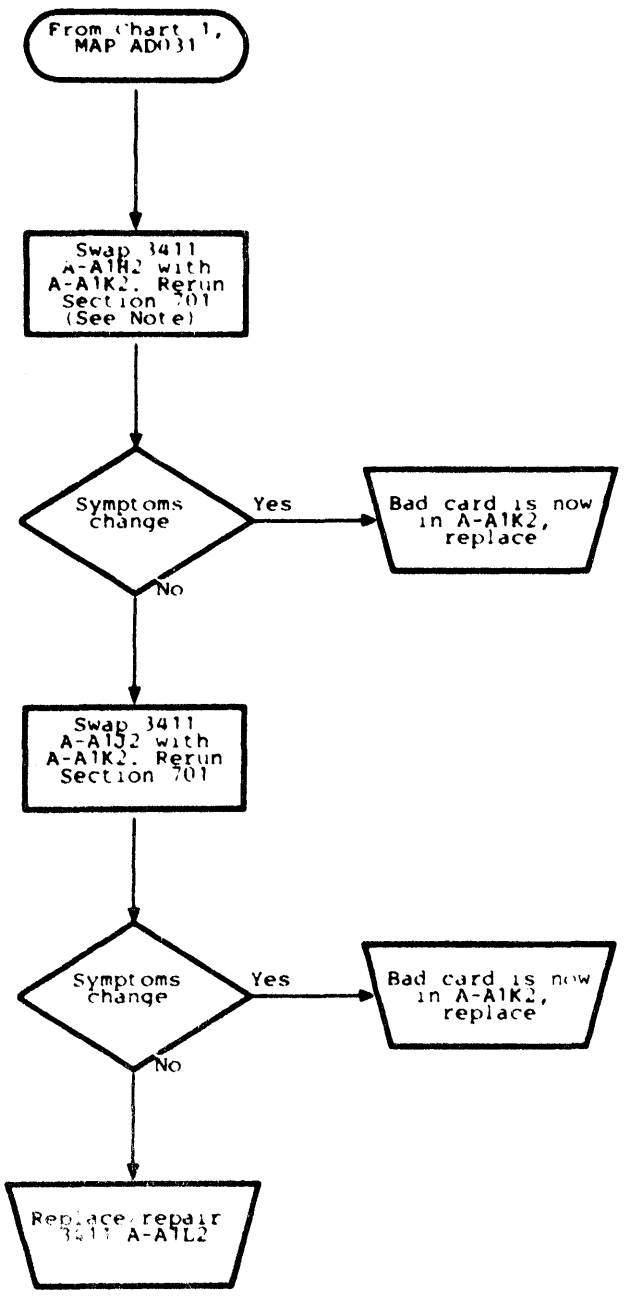
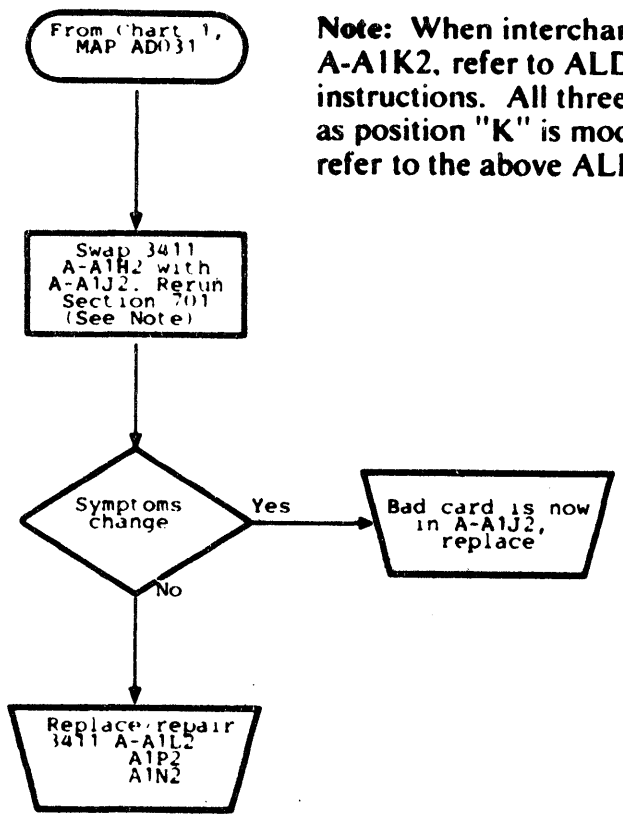
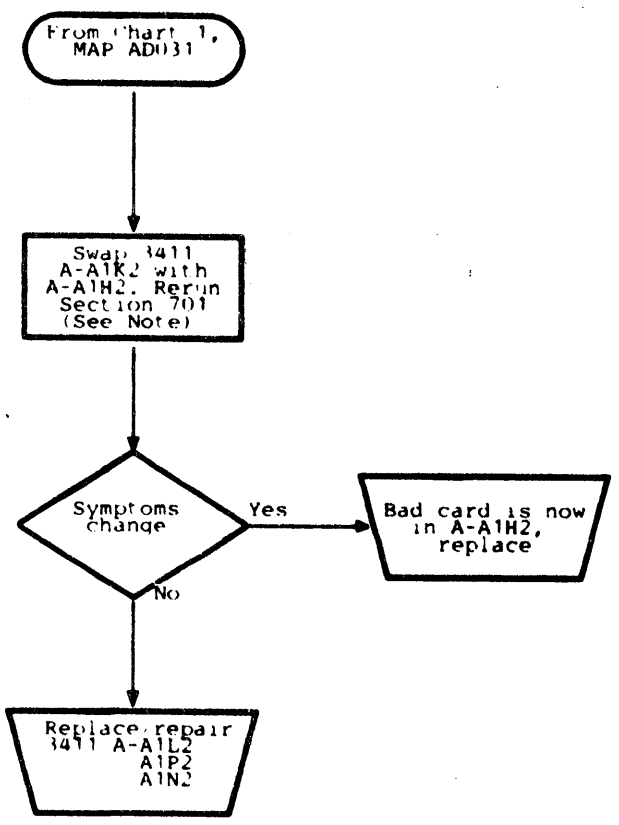




Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.



XF7300	1845969	734556	734556A	443751	443806	
Seq 1 of 2	Part Number	1 Sept 72	20 Oct 72	20 Sept 74	2 May 77	

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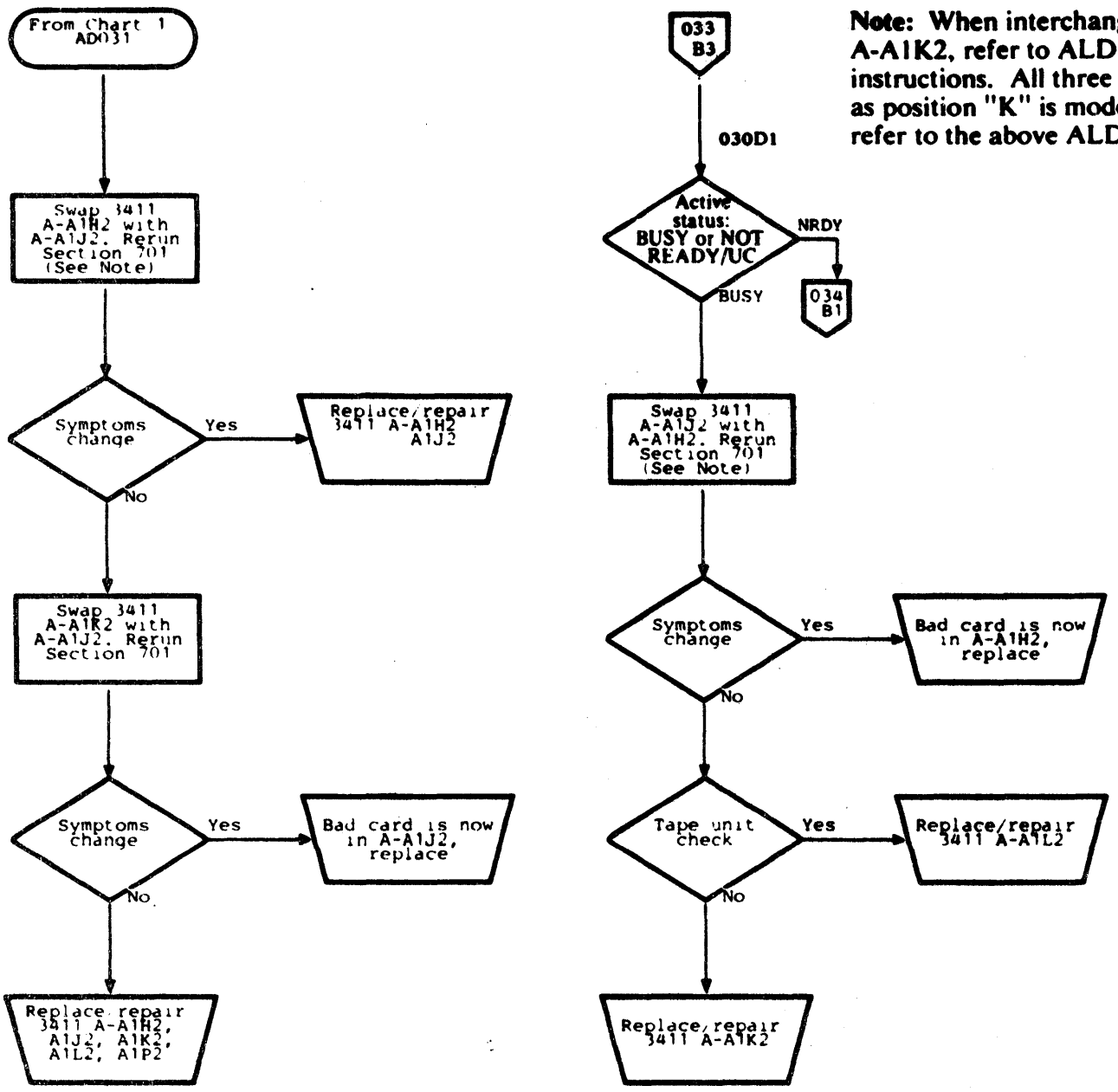

Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

MAP AD033

XF7300 Seq 2 of 2	1845969 Part Number	734556 1 Sept 72	734556A 20 Oct 72	443751 20 Sept 74	443806 2 May 77	

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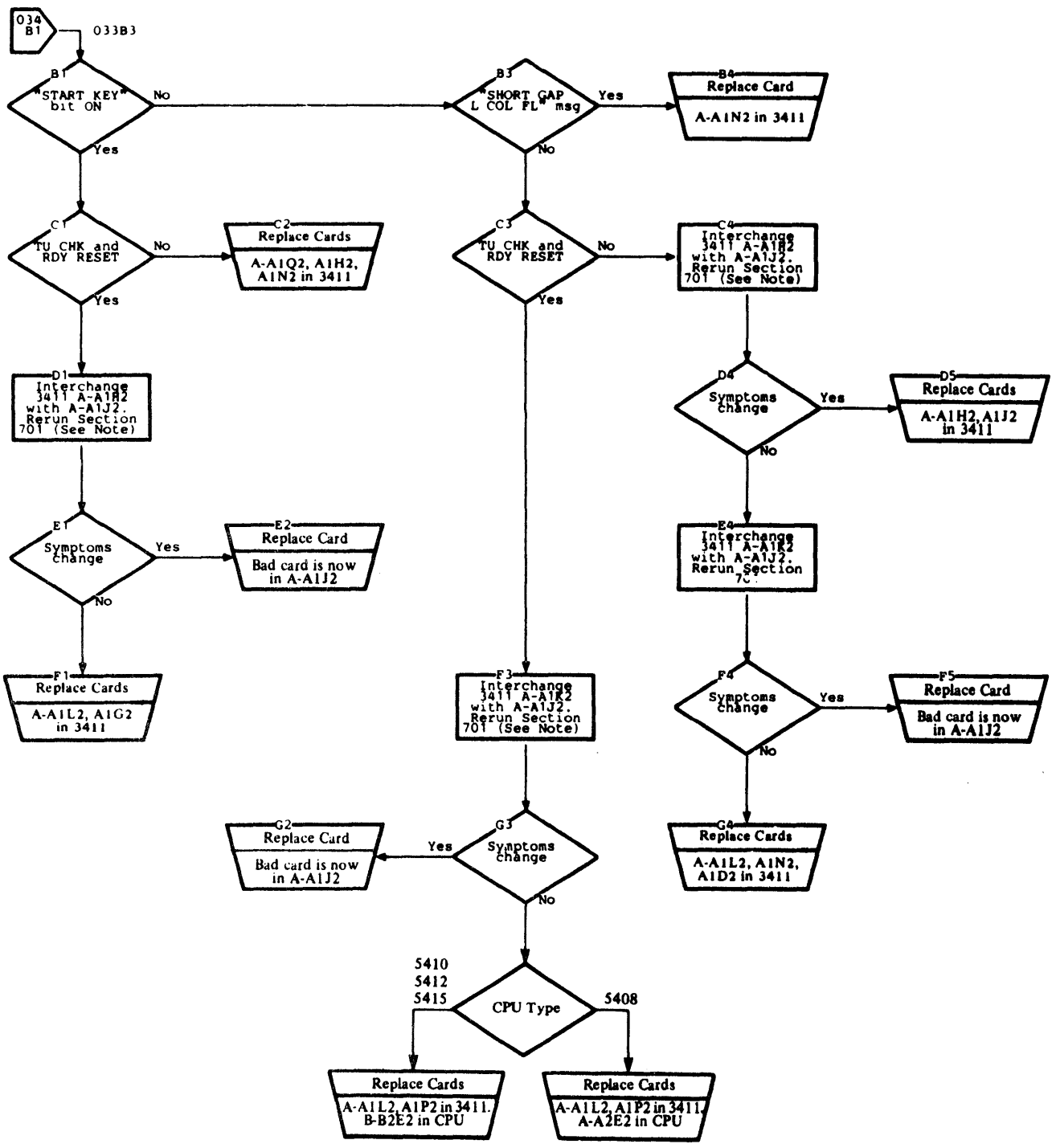
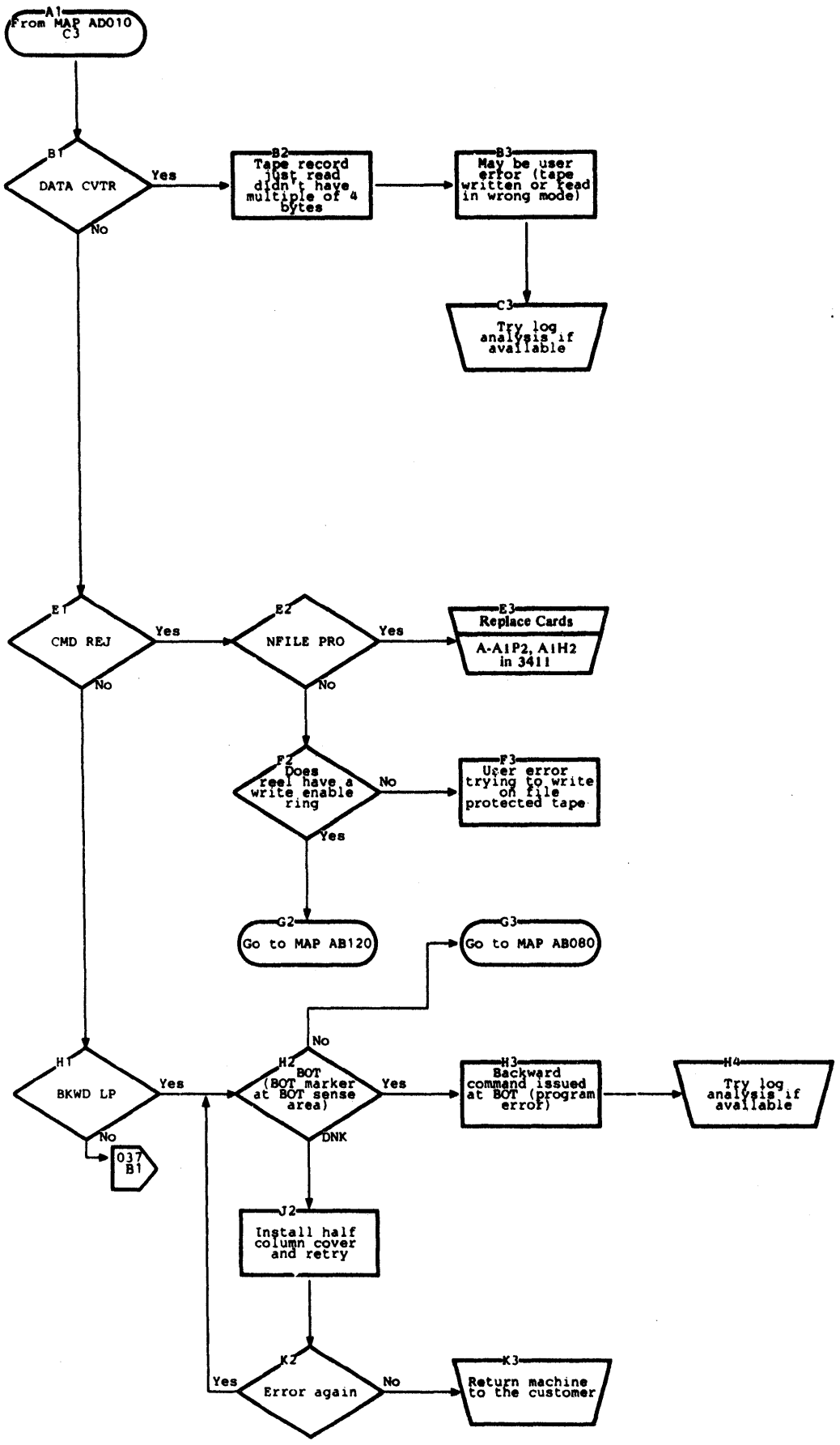
701 Halt 02 Analysis

Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.



NO-OP Conditions



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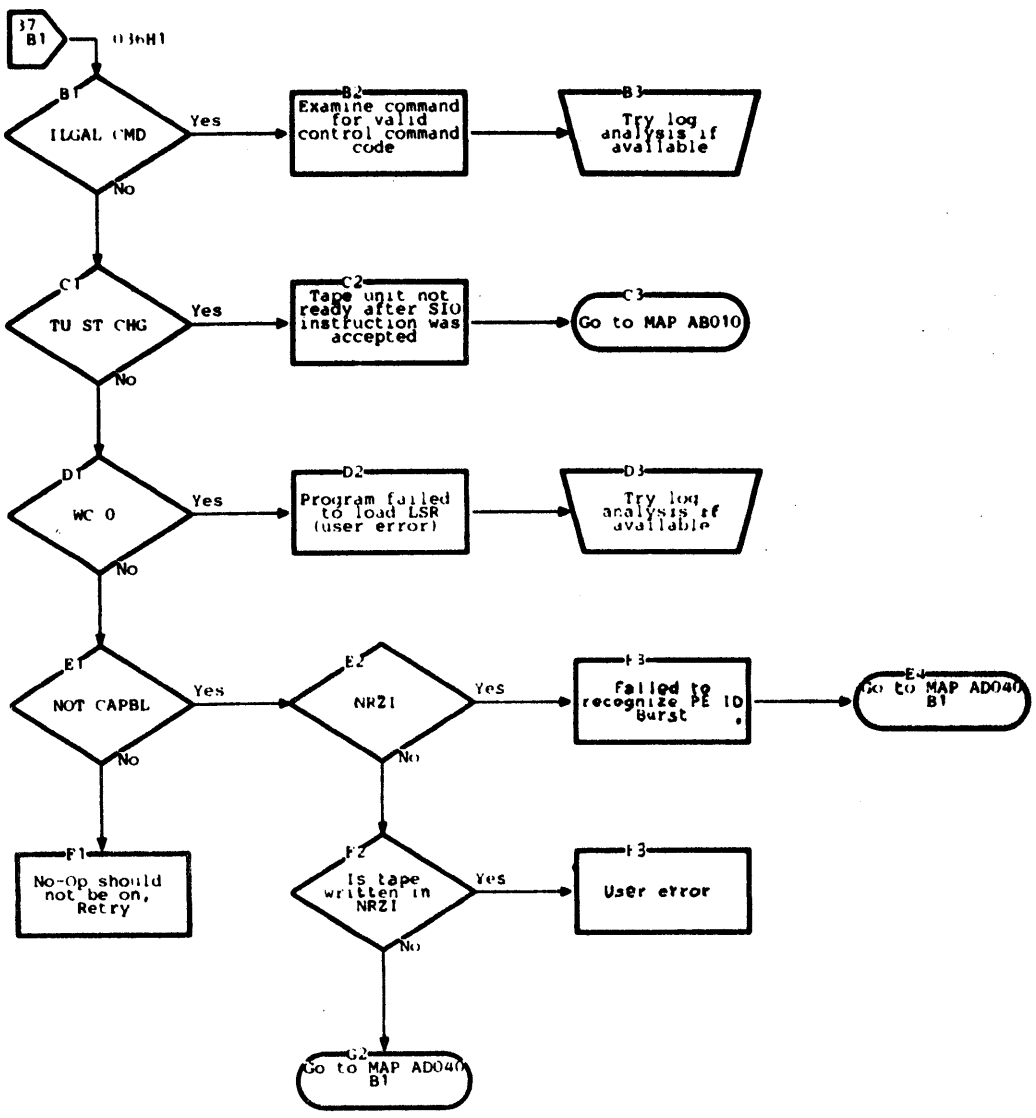
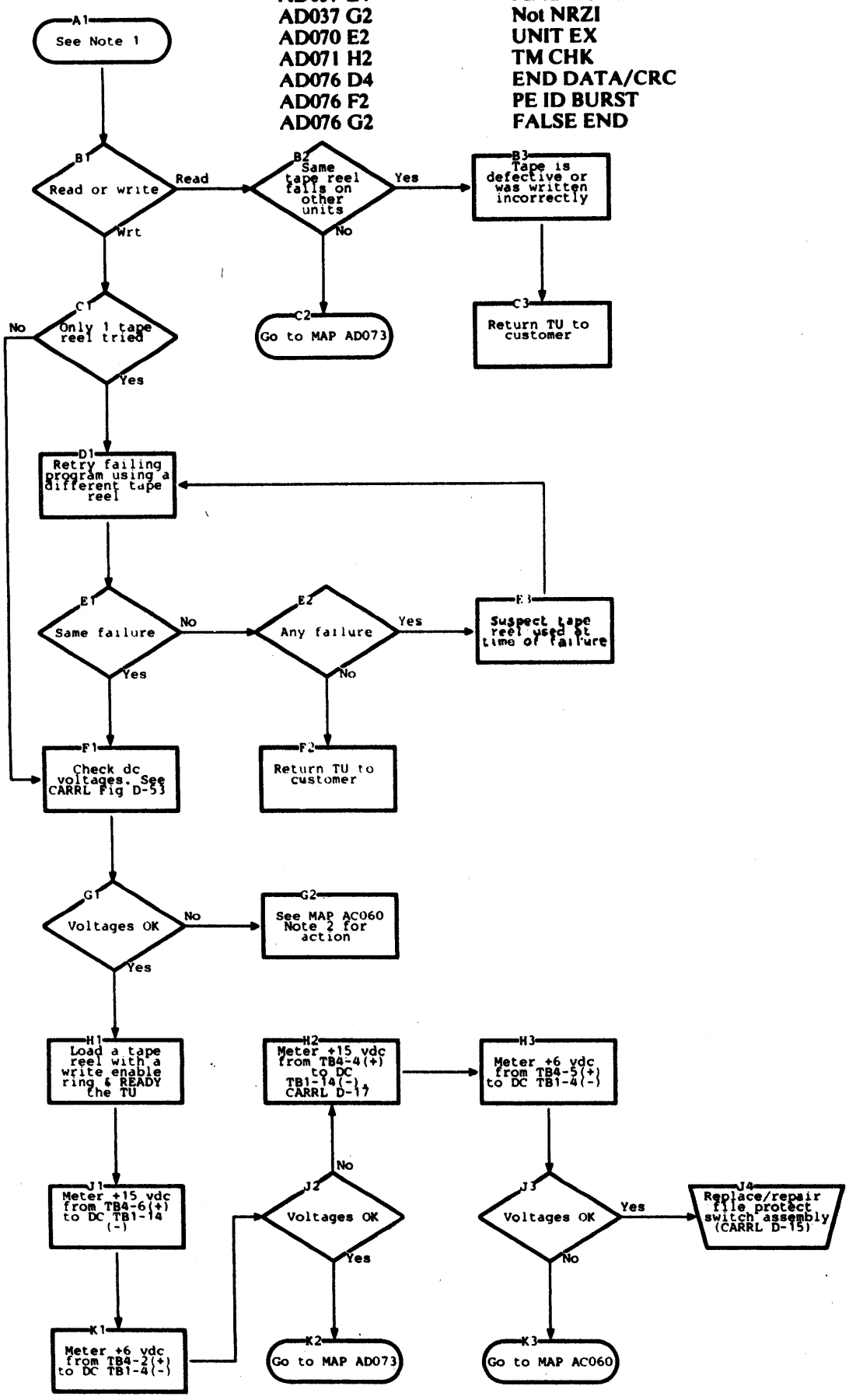


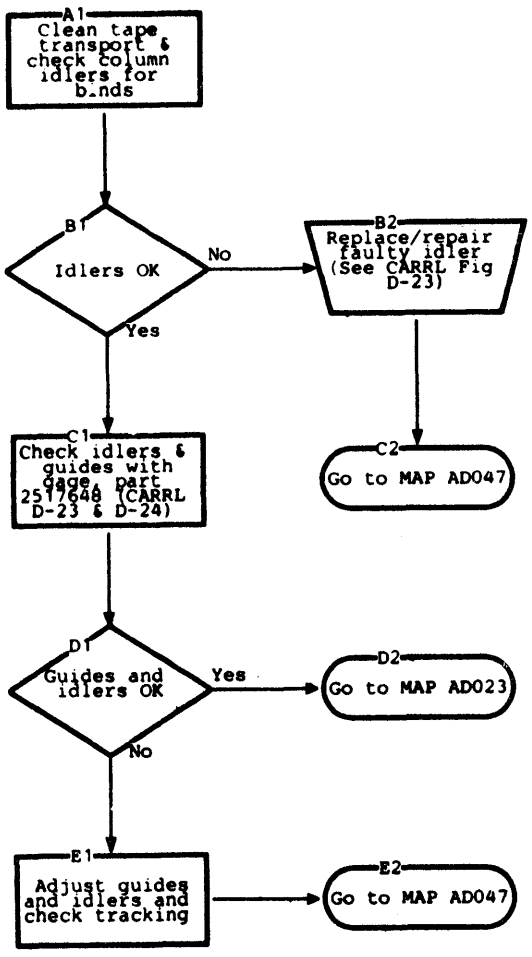
Tape Unit Analysis

Note 1: From MAP

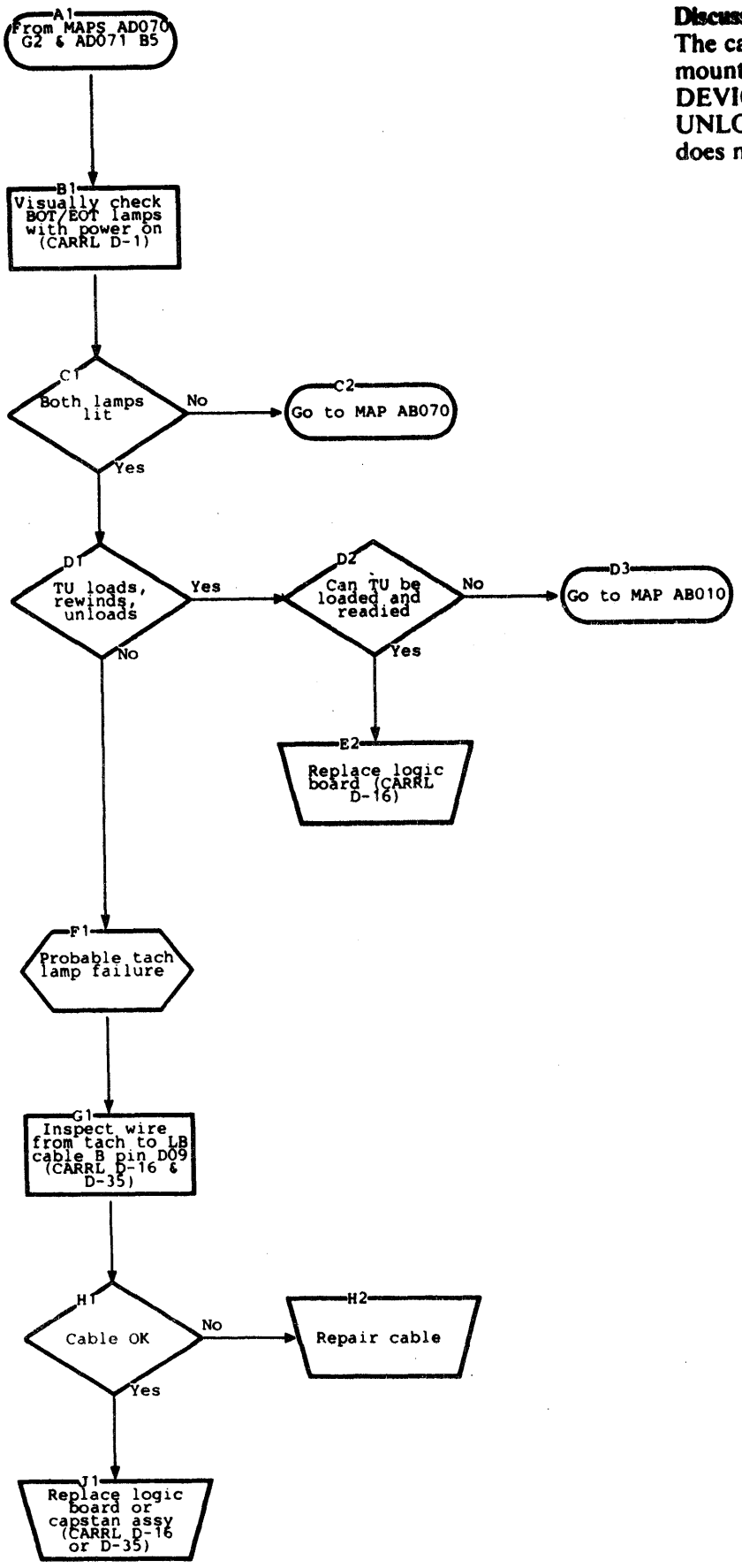
AD037 E4	PE ID BURST
AD037 G2	Not NRZI
AD070 E2	UNIT EX
AD071 H2	TM CHK
AD076 D4	END DATA/CRC
AD076 F2	PE ID BURST
AD076 G2	FALSE END



End Velocity Check

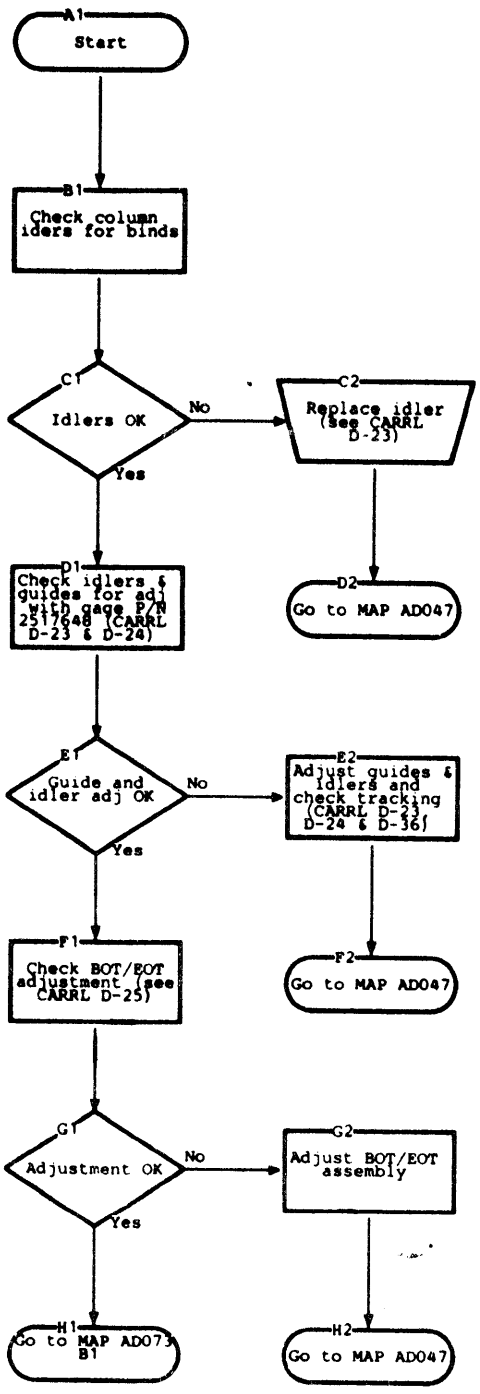


Lamp Check

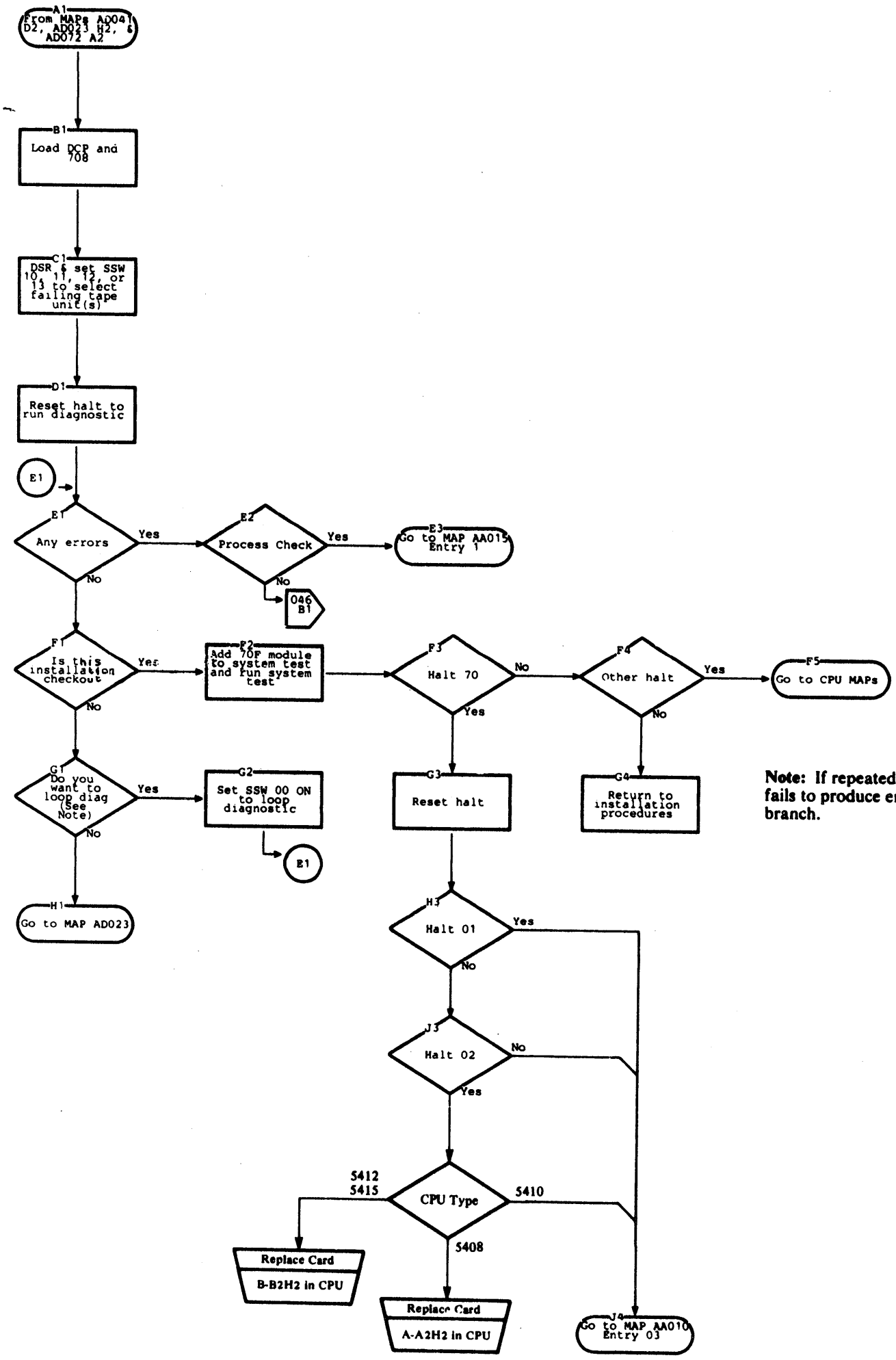


Discussion: The BOT and EOT lamps can be checked visually. The capstan tach lamp is more difficult to check since it is mounted on the capstan motor. A tach lamp failure brings up DEVICE RESET which disables the LOAD, REWIND, and UNLOAD functions of the tape unit. A BOT or EOT lamp failure does not force DEVICE RESET.

Envelope or Phase Error Check



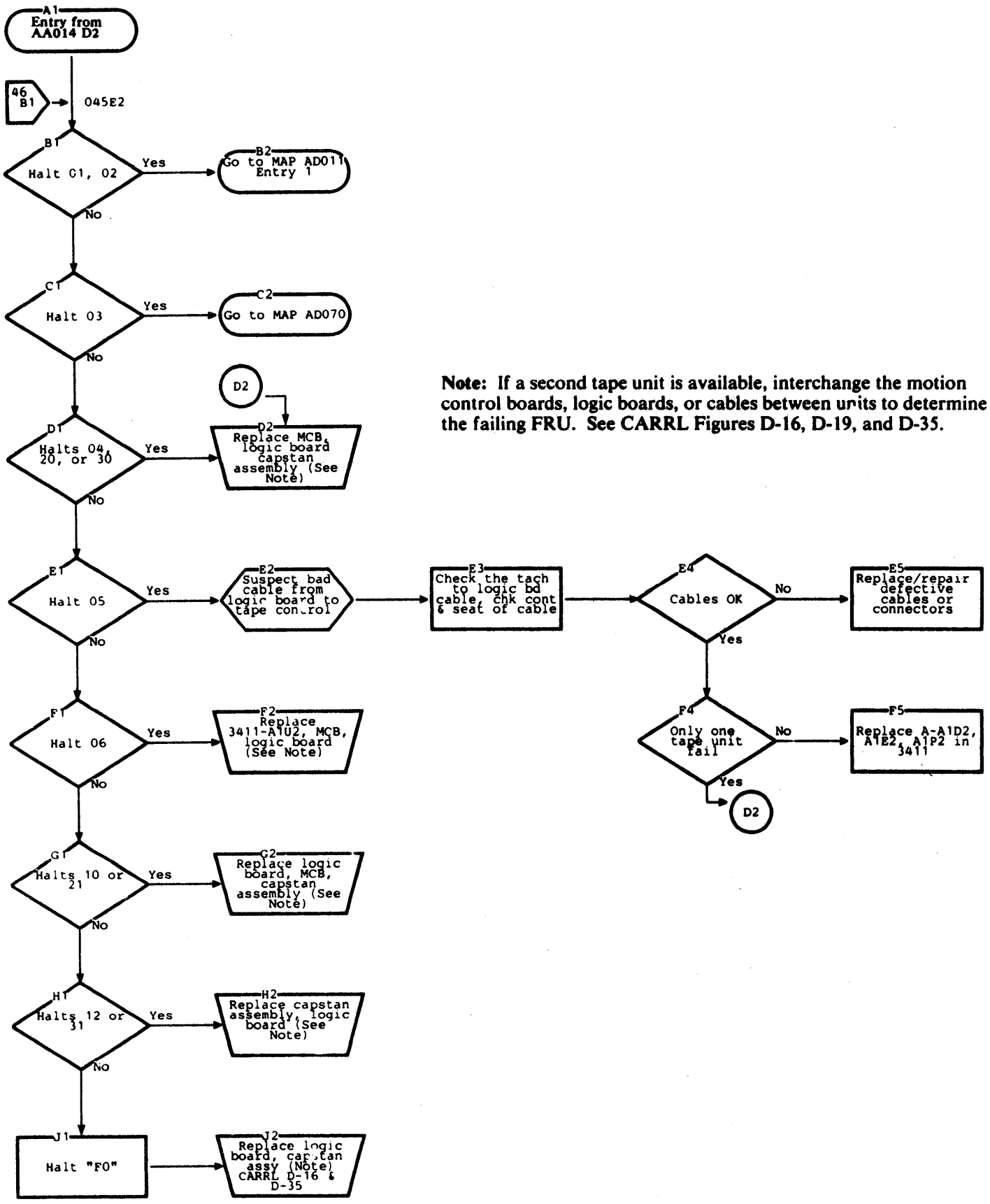
708 Tachometer Failure



Note: If repeated loop of Section 708 fails to produce errors, take the "No" branch.

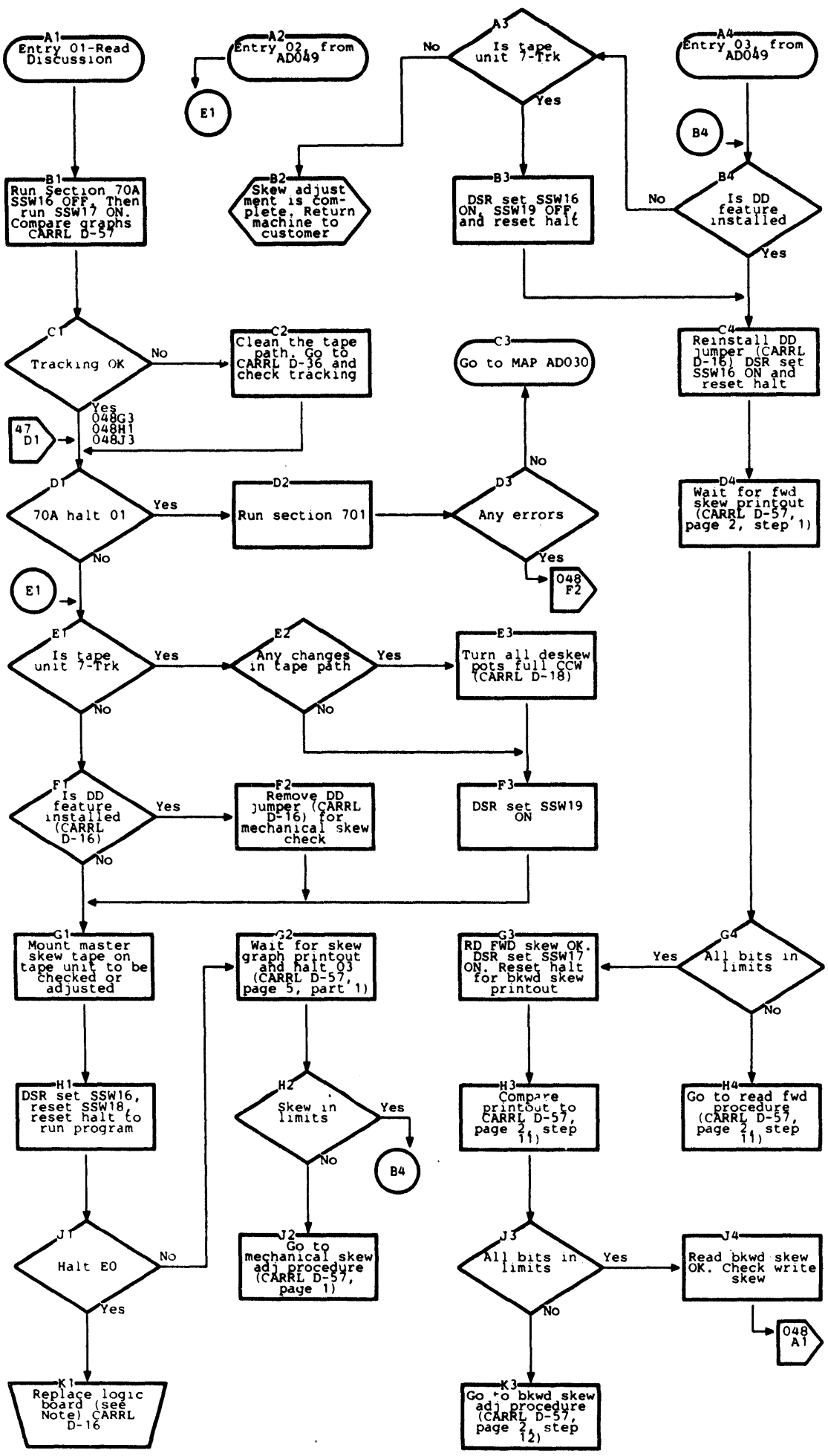
XF7700	1845973	See	738672	443800		
Seq 2 of 2	Part Number	EC History	26 Oct 73	31 Oct 75		

708 Tachometer Failure



Note: If a second tape unit is available, interchange the motion control boards, logic boards, or cables between units to determine the failing FRU. See CARRL Figures D-16, D-19, and D-35.

Tracking and Skew Checks and Adjustments



Discussion: Tracking and skew adjustment must be made if the read/write head assembly, columns, or guides are replaced. Order of adjustment is: tracking, mechanical skew, read forward skew, read backward skew, and write skew. Clean the tape path and column cover before making skew checks and adjustments.

CAUTION:
Do not attempt to adjust skew unless you are sure tracking is correct. Reference MAP AD049 for tracking.

Program Halts:

01 Wait timed out.

03 Skew measurement completed and logged on printer.

0A Set sense switch 10, 11, 12, or 13.

E0 Can't set alternate density.

Sense Switches: PE Only and Dual Density

15, 16, 17, and 18 Off – Forward Tracking

15 and 16 Write skew mode.

16 Forward mechanical skew or forward electrical NRZI mode.

16, 17 Backward electrical NRZI mode.

17 Backward tracking.

18 Tracking adjustment loop (shoeshine).

Sense Switches: 7-Track Only

19 Forward tracking (7-track feature).

17, 19 Backward tracking. (7-track feature).

16, 19 Forward mechanical skew.

16, 17, 19 Backward mechanical skew.

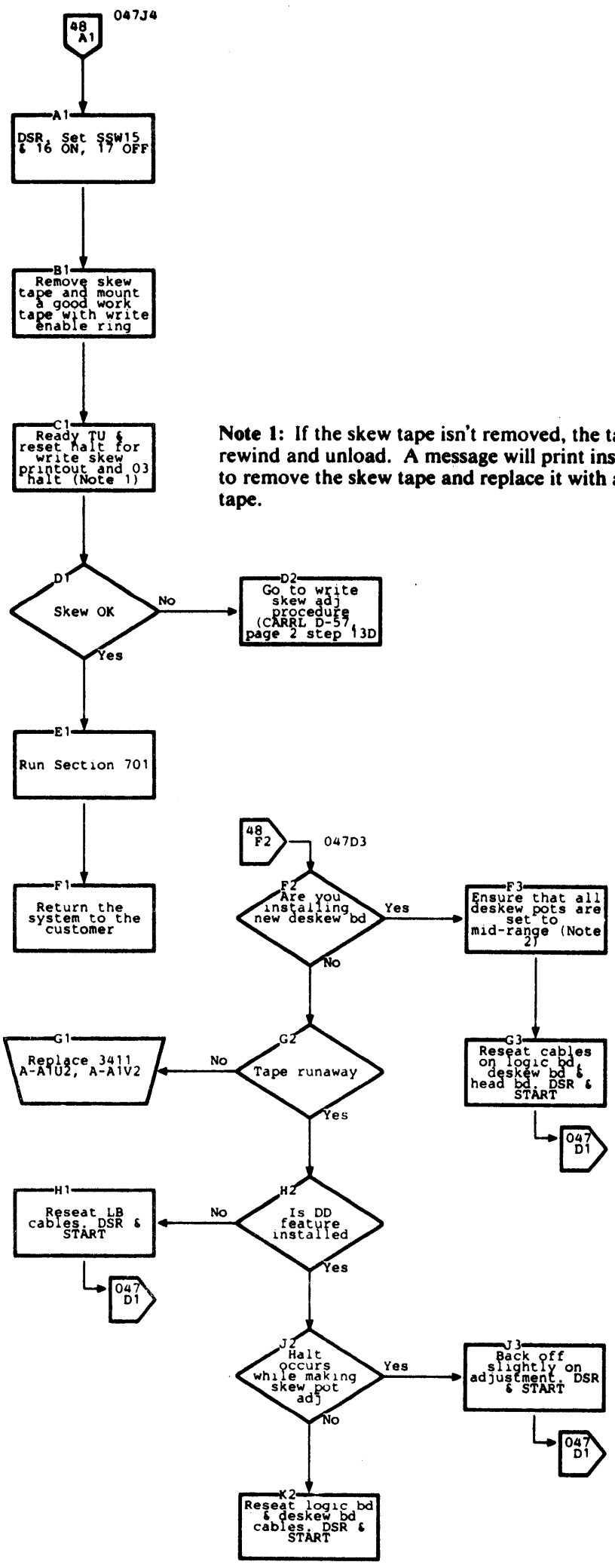
16 Forward electrical.

16, 17 Backward electrical.

15, 16 Write skew.

Note: Swap logic board with another tape unit, if possible, and rerun diagnostics. Assure on PE-only machine that DD jumper is not installed. See CARRL D-16.

Tracking and Skew Checks and Adjustments



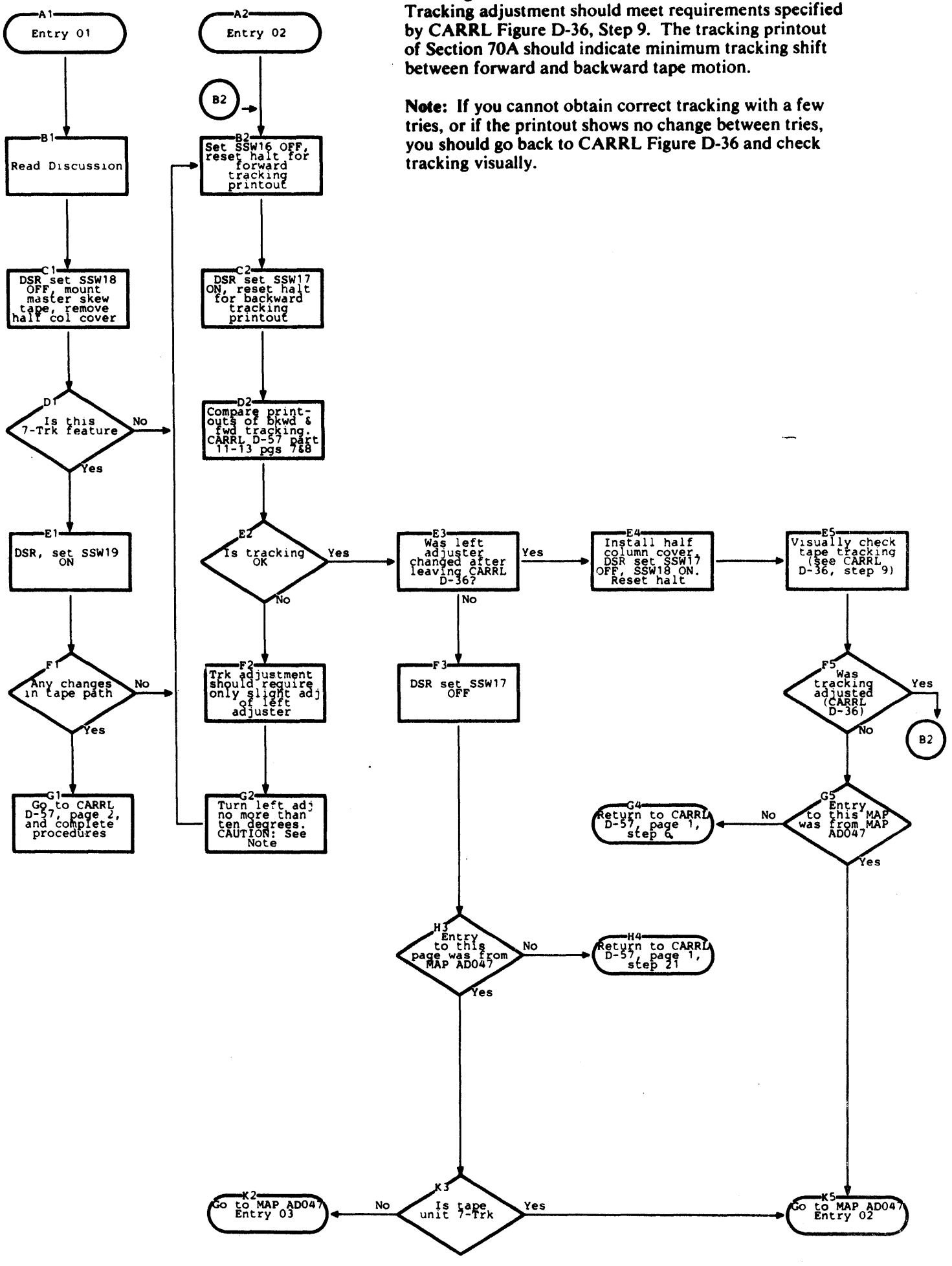
Note 1: If the skew tape isn't removed, the tape unit will rewind and unload. A message will print instructing you to remove the skew tape and replace it with a good work tape.

Note 2: If 7-Track, set all deskew pots fully CW.

XF7900	1845975
Seq 1 of 2	Part Number

See EC	734852	443751		
History	26 Feb 73	20 Sept 74		

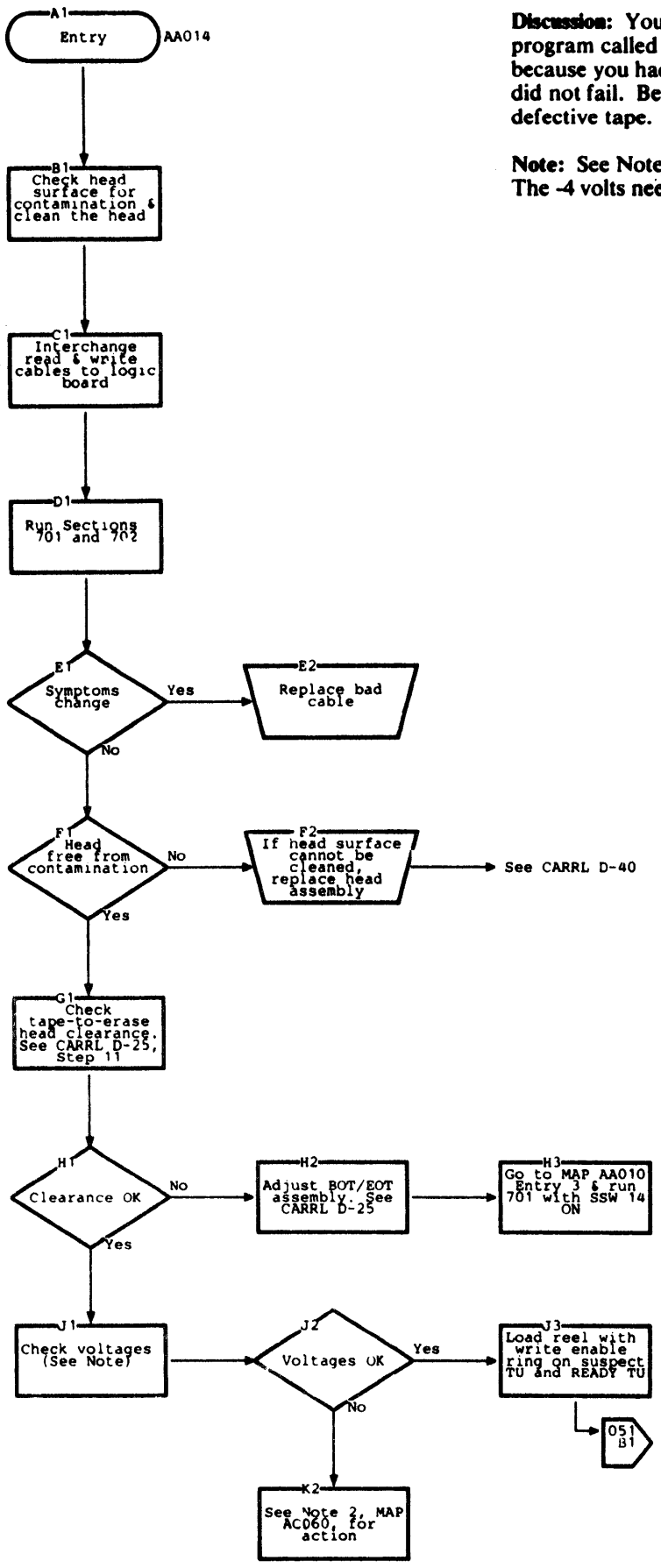
Tracking Check



Discussion: Entry to this MAP assumes that you have checked tracking visually (see CARRL Figure D-36) and that diagnostic section 70A is loaded and ready to run. Tracking adjustment should meet requirements specified by CARRL Figure D-36, Step 9. The tracking printout of Section 70A should indicate minimum tracking shift between forward and backward tape motion.

Note: If you cannot obtain correct tracking with a few tries, or if the printout shows no change between tries, you should go back to CARRL Figure D-36 and check tracking visually.

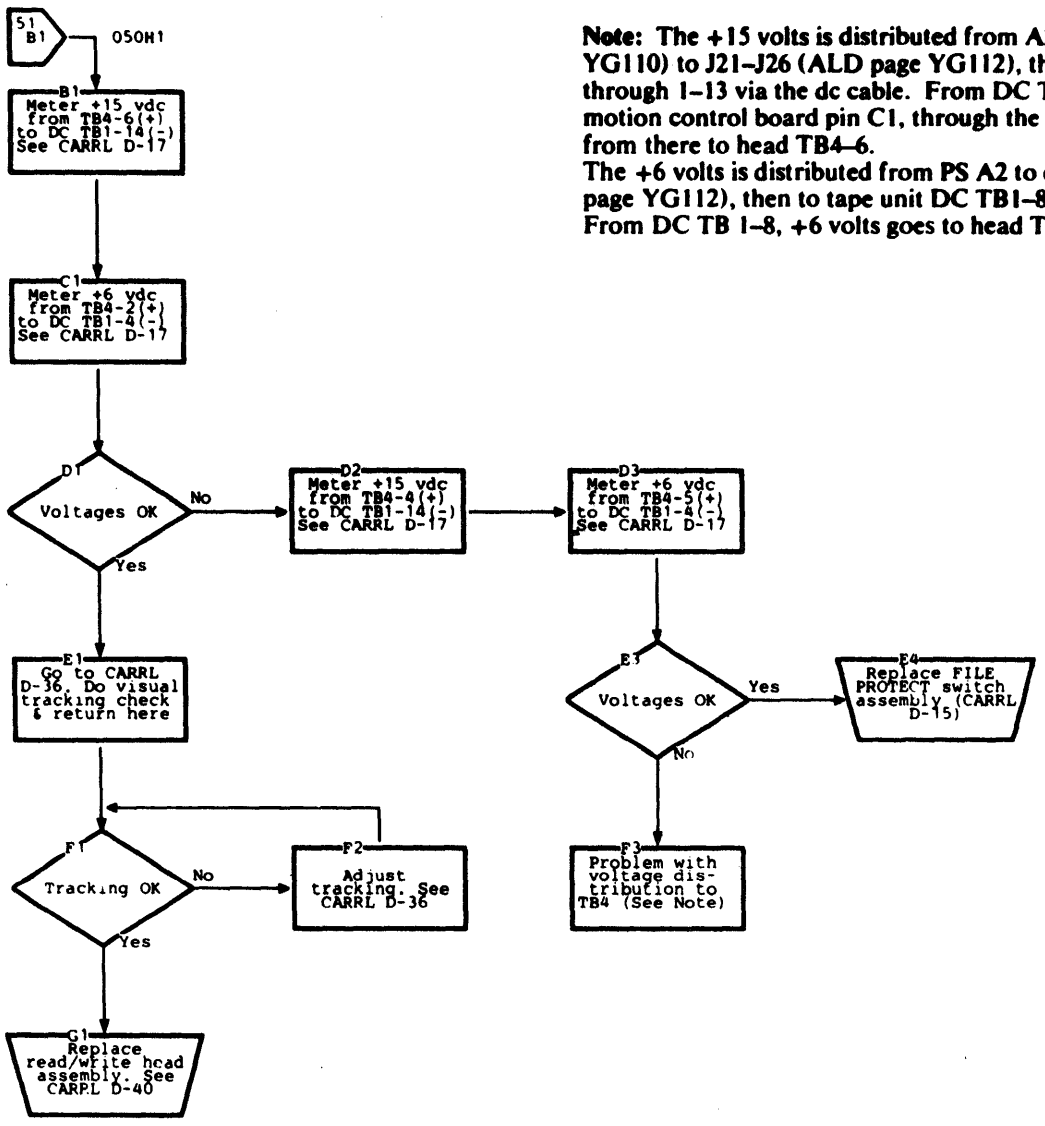
Read/Write Head Assembly



Discussion: You should enter this MAP if the Log Analysis program called out the read/write head assembly as suspect, or because you had a data check and a loop-write-to-read command did not fail. Be sure that the data check was not caused by defective tape. Try more than one tape reel.

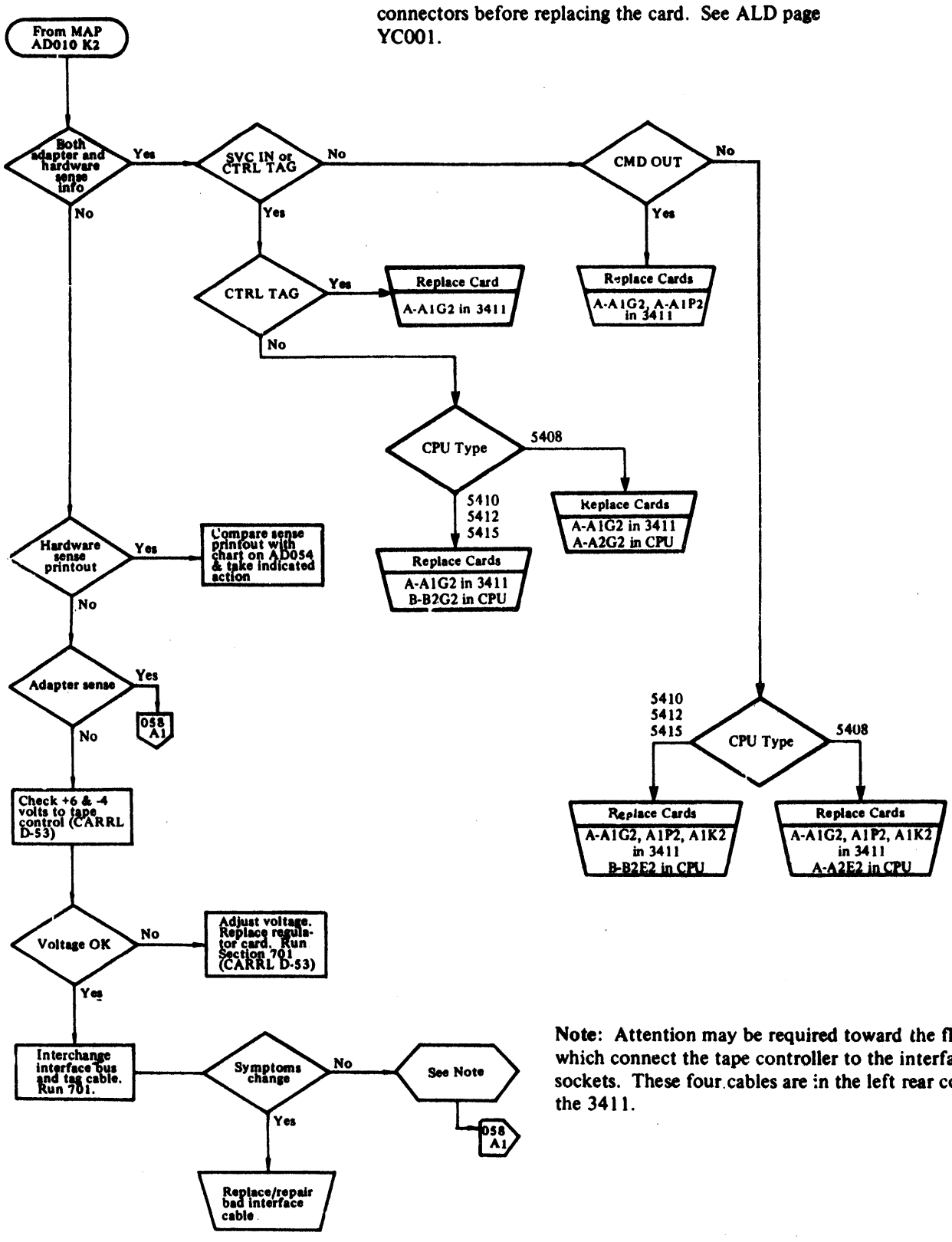
Note: See Note 1 on MAP AC060 for voltage check procedure. The -4 volts need not be checked at this time.

Read/Write Head Assembly



Note: The +15 volts is distributed from A2 TB1-16 (ALD page YG110) to J21-J26 (ALD page YG112), then to tape unit DC TB1-10 through 1-13 via the dc cable. From DC TB1-13, +15 volts goes to motion control board pin C1, through the board to pin B14, and from there to head TB4-6.
The +6 volts is distributed from PS A2 to connectors J21-J26 (ALD page YG112), then to tape unit DC TB1-8 and 1-9 via the dc cable. From DC TB 1-8, +6 volts goes to head TB4-2.

CHART NO. 1: 701 HALT 01 HARDWARE ERRORS									
HARDWARE SENSE BITS									ACTION: Replace card(s) indicated or go to MAP chart indicated
ALU FRU	IC CHECK	ABO P ERROR	CTRL TAG	INST TAG	ALU ERROR	ROS P ERROR	XFR ERROR	WRT CLK	
									Go to MAP AD056 A1
X									Go MAP AD057 A1
X	X								3411: A-A1P2 A-A1G2 A-A1H2 A-A1J2 A-A1K2
X			X						Go to MAP AD056 G3
X				X					Go to MAP AD056 G1
X	X	X							3411: A-A1G2
X	X	X	X						3411: A-A1G2
X		X							Go to MAP AD057 B1
	X								3411: A-A1Q2 A-A1P2
	X				X	X			3411: A-A1P2
		X							3411: A-A1G2, A1P2, A1Q2 5408: A-A2E2, A2G2 5410/12/15: B-B2E2, B2G2 Cables attached to CU.
							X		Go to MAP AD057 B1
		X		X					Go to MAP AD056 B3
			X						3411: A-A1G2, A1N2 5408: A-A2E2, A2F2, A2G2 5410/12/15: B-B2E2, B2F2, B2G2
					X				3411: A-A1P2 A-A1Q2 A-A1D2 A-A1L2 A-A1N2
				X					3411: A-A1G2
						X			3411: A-A1U2 A-A1V2 A-A1N2 A-A1P2
	X					X			3411: A-A1U2 A-A1V2 A-A1Q2
					X	X			3411: A-A1U2 A-A1V2 A-A1P2
						X	X		3411: A-A1U2 A-A1V2
								X	3411: A-A1L2 A-A1P2
Any combination of bits not shown above									Go to MAP AD057 B4

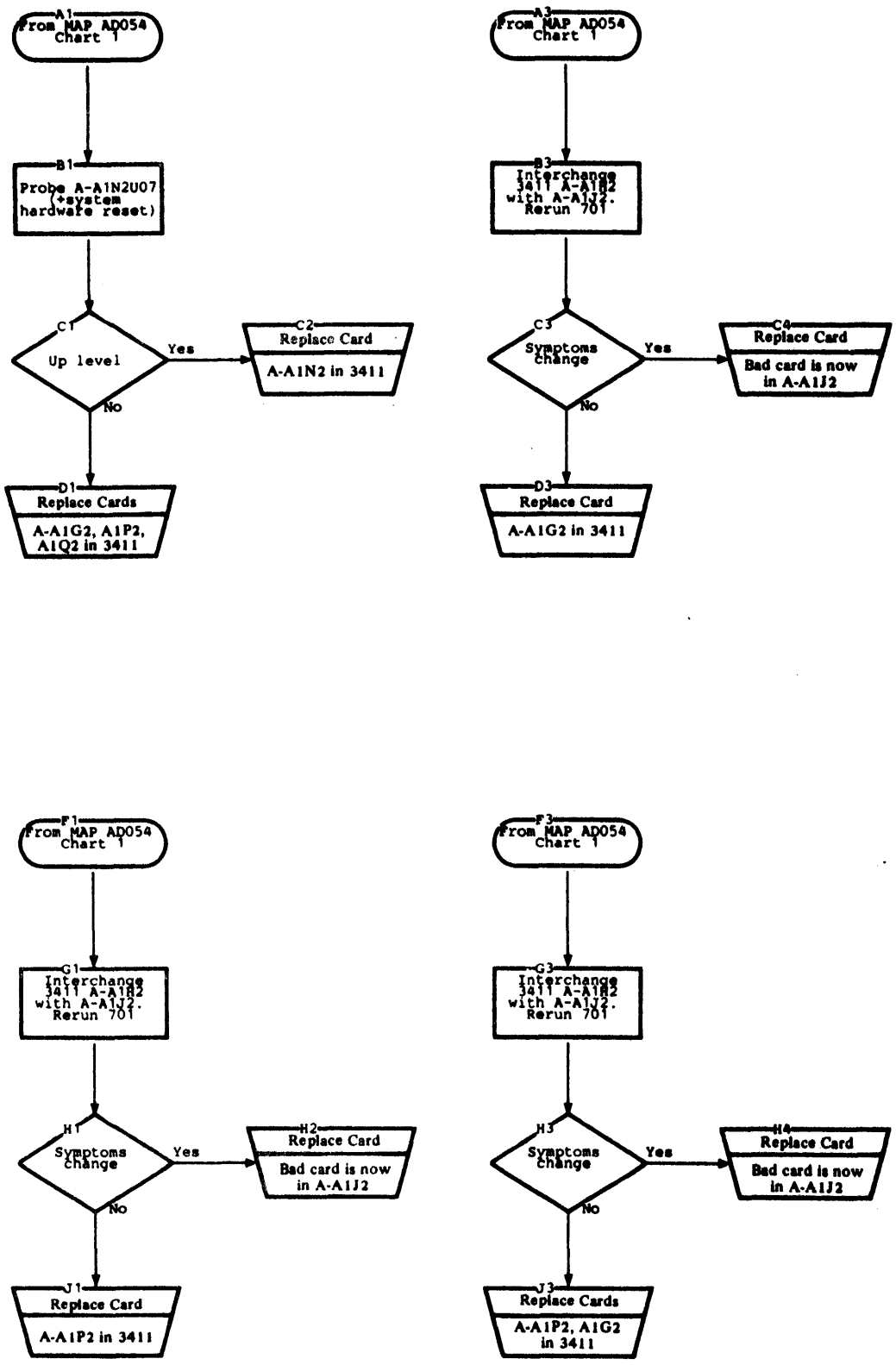


Discussion: Whenever you are instructed to replace/repair card A1G2, check the slip-on voltage connectors before replacing the card. See ALD page YC001.

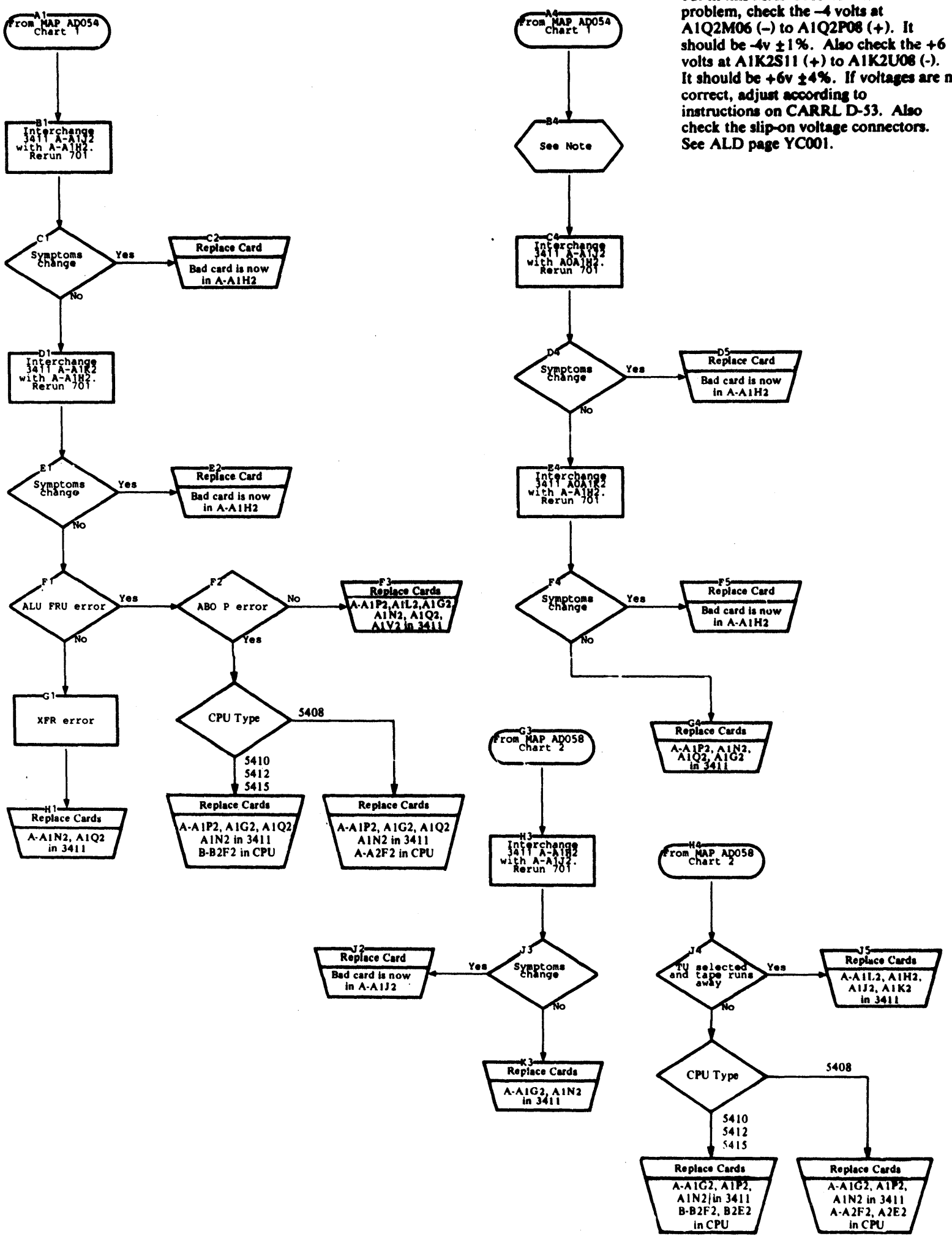
Note: Attention may be required toward the flat cables which connect the tape controller to the interface sockets. These four cables are in the left rear corner of the 3411.

XF8200 Seq. 2 of 2	1845878 Part No. ( )	See EC History	736872 26 Oct 73	443751 20 Sept 74	443800 31 Oct 75			

701 Halt 01 Analysis



701 Halt 01 Analysis



Note: If replacing the cards called out in this MAP does not fix the problem, check the –4 volts at A1Q2M06 (–) to A1Q2P08 (+). It should be -4v ±1%. Also check the +6 volts at A1K2S11 (+) to A1K2U08 (-). It should be +6v ±4%. If voltages are not correct, adjust according to instructions on CARRL D-53. Also check the slip-on voltage connectors. See ALD page YC001.

XF8300 Seq. 2 of 2	1845979 Part Number

See EC History	736672 26 Oct 73	443751 20 Sept 74	443800 31 Oct 75	

701 Halt 01 Analysis

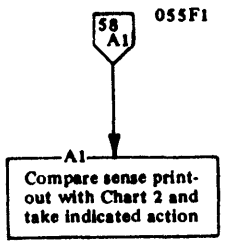
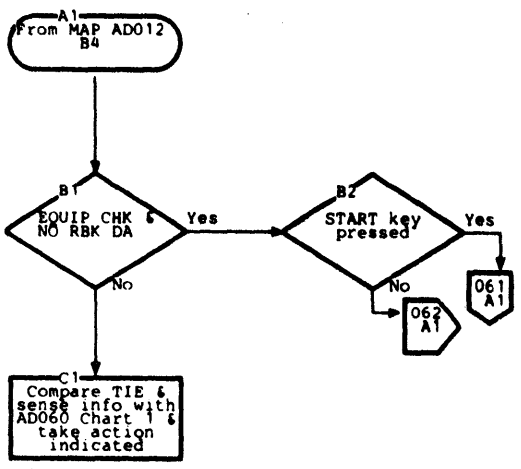


CHART NO. 2: ADAPTER SENSE ANALYSIS

ADAPTER SENSE BITS													ACTION: Replace card(s) indicated or go to MAP indicated.
ABI P ER	ABO P ER	CU OFF	2 TAG ER	CU BUSY	SEQ ER	ADD OUT	SVC OUT	CMD OUT	ADD IN	SVC IN	CMD IN	STAT IN	
													3411: A-A1G2 5408: A-A2E2 5410/12/15: B-B2E2
					X	X							3411: A-A1G2, A-A1P2, A-A1Q2
				X	X	X							3411: A-A1G2
X				X		X							3411: A-A1G2
					X	X	X						3411: A-A1G2, A-A1N2
					X		X	X					3411: A-A2G2 5408: A-A2G2 5410/12/15: B-B2G2
				X			X			X			3411: A-A1L2
				X	X		X			X			3411: A-A1G2
					X		X			X		X	3411: A-A1P2
X				X									3411: A-A1G2, A-A1N2 5408: A-A2G2 5410/12/15: B-B2G2
X				X			X						3411: A-A1G2, A-A1N2
X				X						X			3411: A-A1G2, A-A1N2
X				X				X					3411: A-A1G2, A-A1N2
X				X					X				3411: A-A1G2, A-A1N2
					X			X					3411: A-A1G2 5408: A-A2E2 5410/12/16: B-B2E2
				X	X			X					3411: A-A1G2
			X						X				3411: A-A1K2
			X						X			X	Go to MAP AD057 G3
			X										3411: A-A1G2
			X							X		X	3411: A-A1G2
			X		X					X		X	3411: A-A1G2
				X									Go to MAP AD057 H4
				X					X				3411: A-A1P2
	X			X									5408: A-A2E2 5410/12/15: B-B2E2
	X		X							X	X	54	5408: A-A2F2 5410/12/15: B-B2F2
				X						X			5408: A-A2E2 5410/12/15: B-B2E2
					X								5408: A-A2E2 5410/12/15: B-B2E2
					X	X	X			X	X		5408: A-A2E2 5410/12/15: B-B2E2
X				X							X		3411: A-A1G2, A-A1N2
Any combination of bits not shown													3411: A-A1G2, A-A1L2, A-A1N2, A-A1P2 5408: A-A2E2 5410/12/15: B-B2E2

701 Halt 21 Analysis



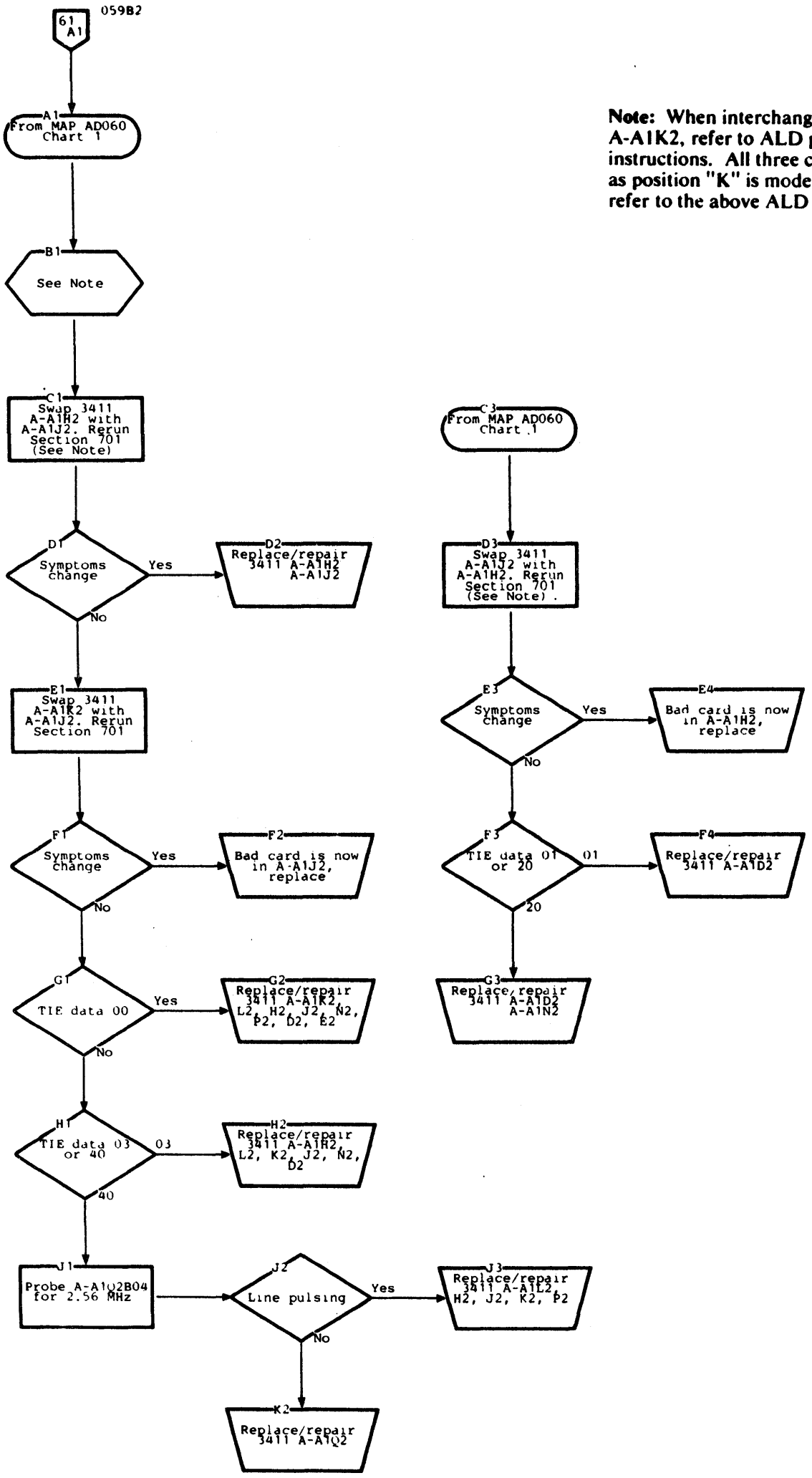
XF8400 Seq 2 of 2	1845980 Part Number

See EC History	443751 20 Sept 74	443800 31 Oct 75		

701 Halt 21 Analysis

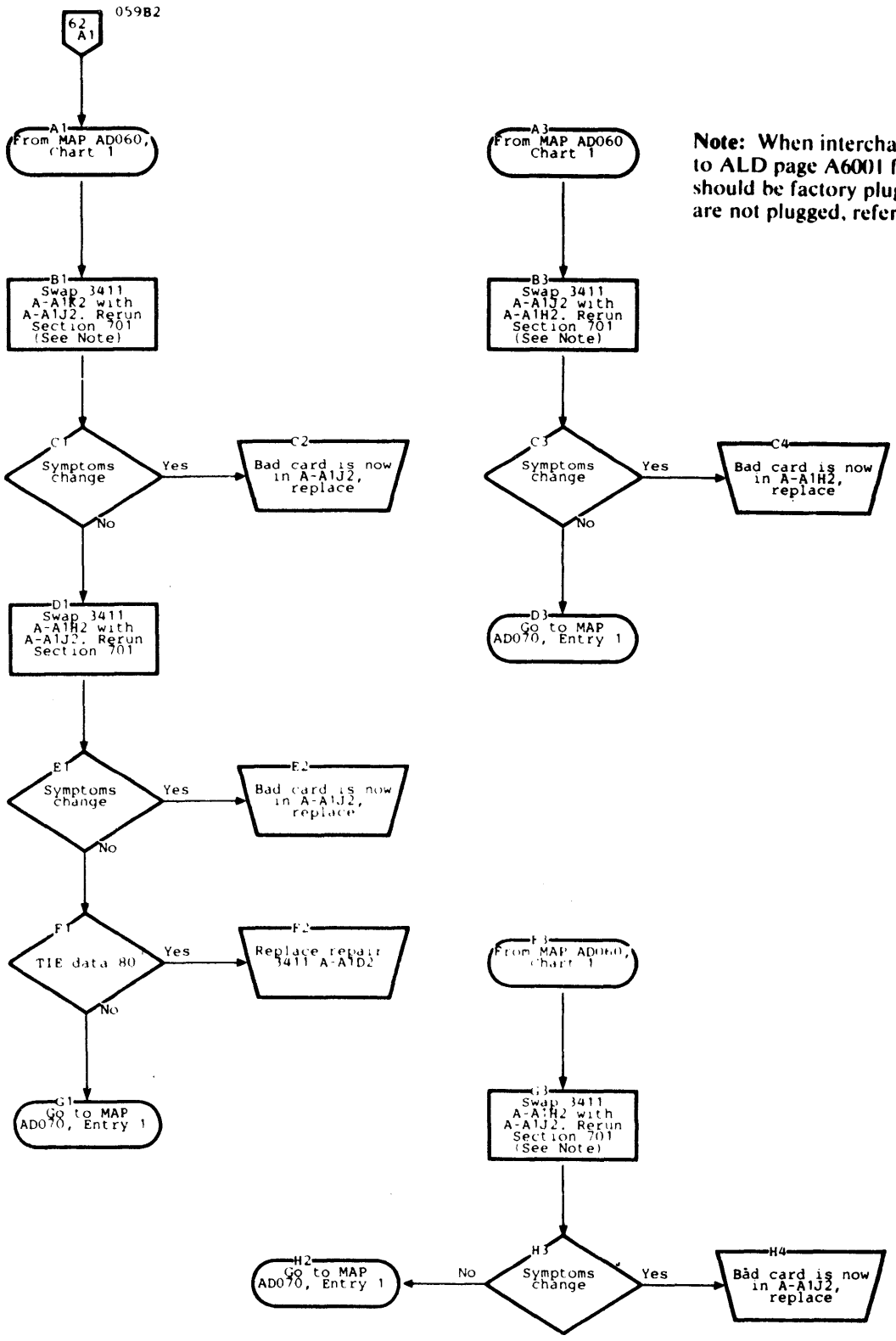
CHART NO. 1: 701 HALT 21 ANALYSIS					
TIE DATA	SENSE BITS				ACTION: Replace card(s) indicated or go the MAP indicated. NOTE: If this is a single tape unit system and the MAP called out doesn't correct the problem, go to MAP AD070, entry 1.
	START KEY	TU CHK	RDY RESET	EQUIP CHK	
00	X				Go to MAP AD061 A1
00	X	X	X		Go to MAP AD062 A1
00		X	X		Go to MAP AD062 A1
01	X				Go to MAP AD061 C3
02	X				Single tape unit system, go to MAP AD062 A3. More that one tape unit, change 3411: A-A1J2.
02		X	X		Single tape unit system, go to MAP AD062 A3. Otherwise, change 3411: A-A1J2.
02	X	X			Single tape unit system, go to MAP AS062 A3. Otherwise, change 3411: A-A1J2.
03	X				Go to MAP AD061 A1
03		X	X		Go to MAP AD063 A1
04	X				Go to MAP AD064 F3
04		X	X		Single tape unit system, go to MAP AD063 A3. Otherwise, change 3411: A-A1K2.
04	X	X	X		3411: A-A1N2 (see Note)
08	X				Go to MAP AD063 E1
08		X	X		Go to MAP AD063 E3
10	X				Go to MAP AD063 E1
10		X			Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
10	X	X	X		Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
10		X	X		Go to MAP AD063 E3
10	X		X		Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
18	X				Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411 A-A1H2.
20	X				Single tape unit system, go to MAP AD062 A3. Otherwise, change 3411: A-A1J2.
20				X	Go to MAP AD064 F1
23	X				Single tape unit system, go to MAP AD062 A3. Otherwise, change 3411: A-A1J2.
28	X				Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
40	X				Go to MAP AD061 A1
40		X	X		Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
48	X				Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
50	X				Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
58	X				3411: A-A1L2 A-A1N2 A-A1P2 A-A1H2 (see Note)
80	X				Go to MAP AD062 A1
80		X	X		Single tape unit system, go to MAP AD063 A3. Otherwise, change 3411: A-A1K2.
84	X				Go to MAP AD063 A1
84		X	X		Go to MAP AD063 A3
AB	X				3411: A-A1D2 (see Note)
AB	X	X	X		3411: A-A1N2 (see Note)
BF	X				Go to MAP AD064 A3
C4	X				Go to MAP AD064 A3
DF					Single tape unit system, go to MAP AD062 A3. Otherwise, change 3411: A-A1J2.
FF	X				Go to MAP AD064 A1
FF		X	X		Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
FF				X	Single tape unit system, go to MAP AD062 F3. Otherwise, change 3411: A-A1H2.
FF	X	X	X	X	Go to MAP AD064 A3
Any combination not shown above					Go to MAP AD061 A1. Take the NO branch at block F1.

701 Halt 21 Analysis



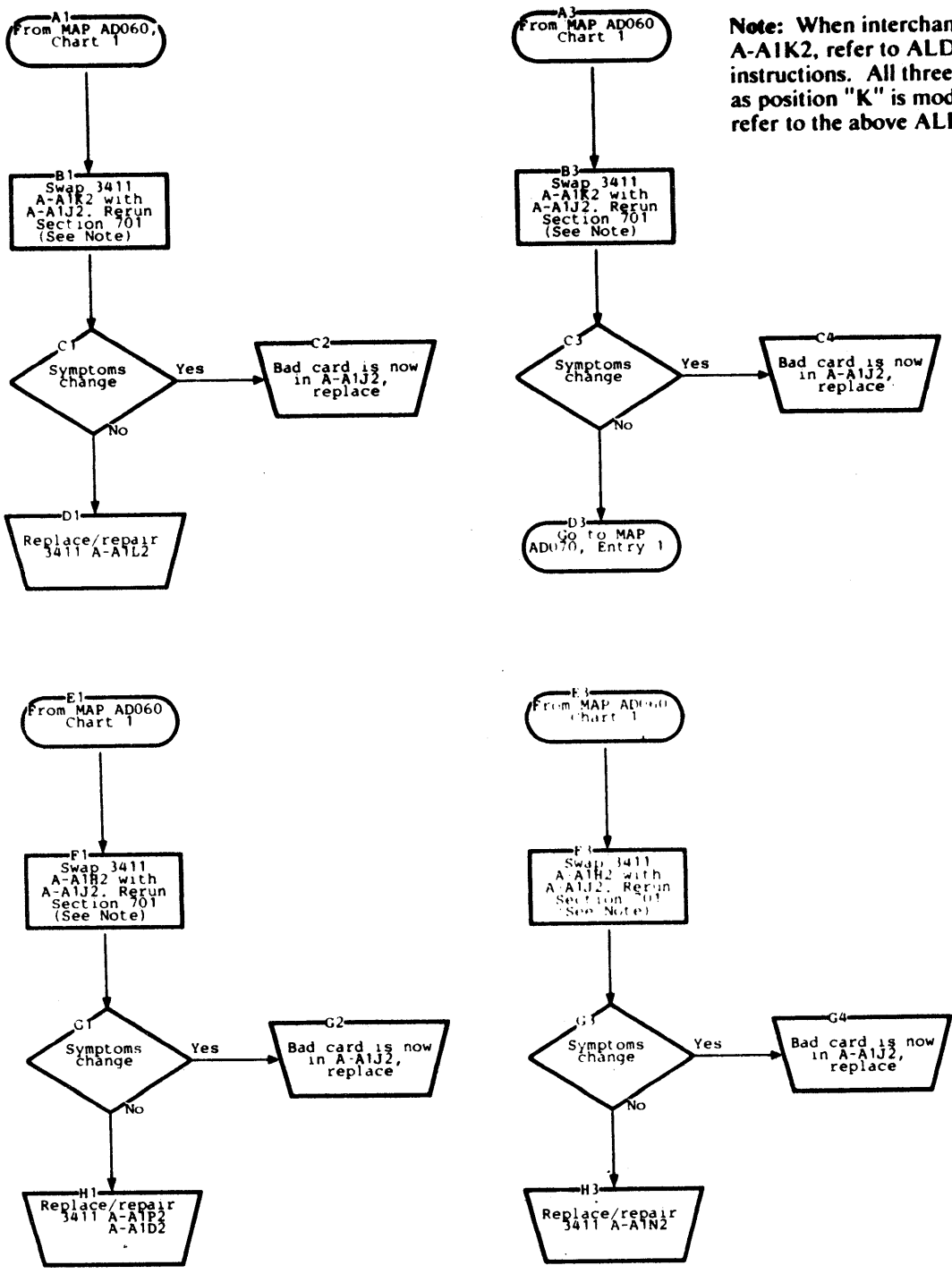
Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

701 Halt 21 Analysis

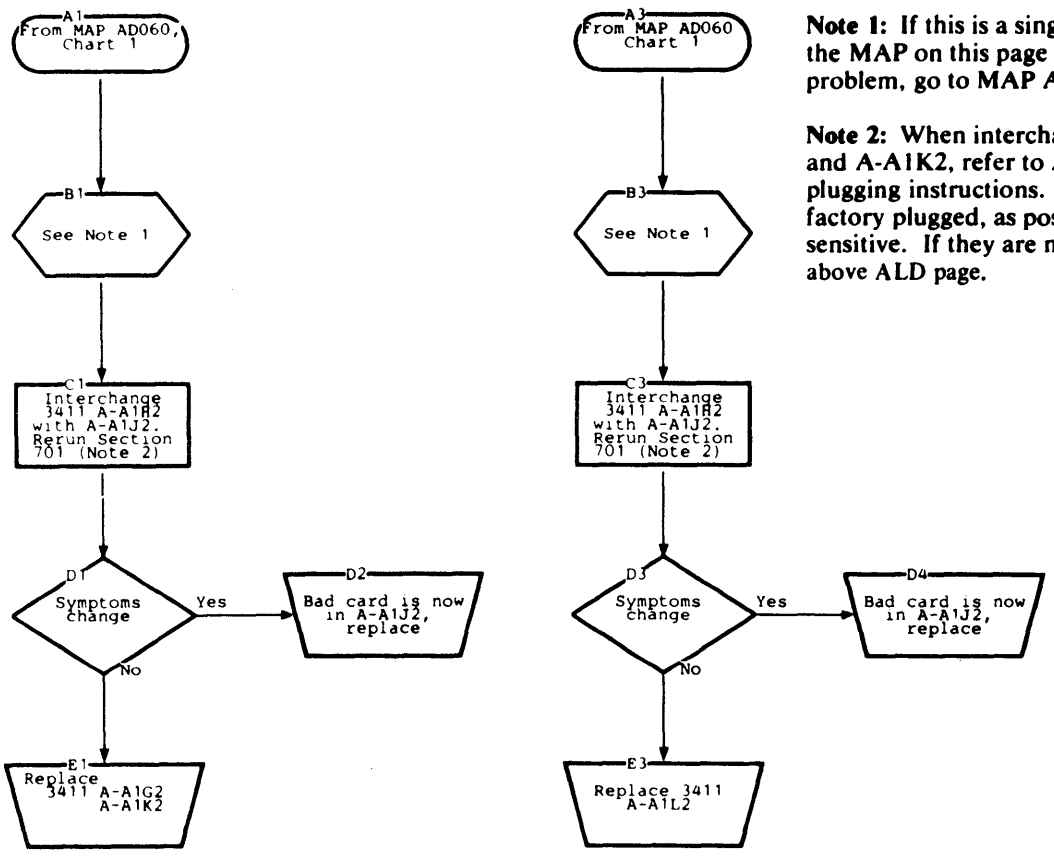


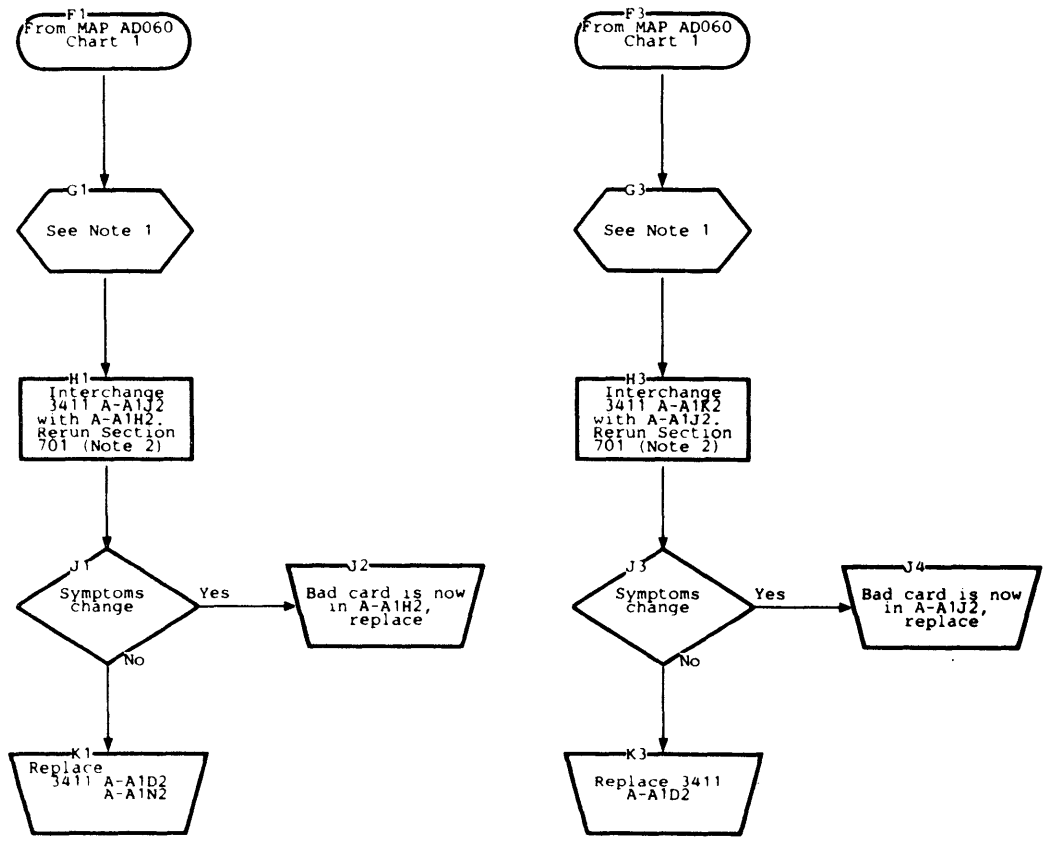
Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

701 Halt 21 Analysis



Note: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

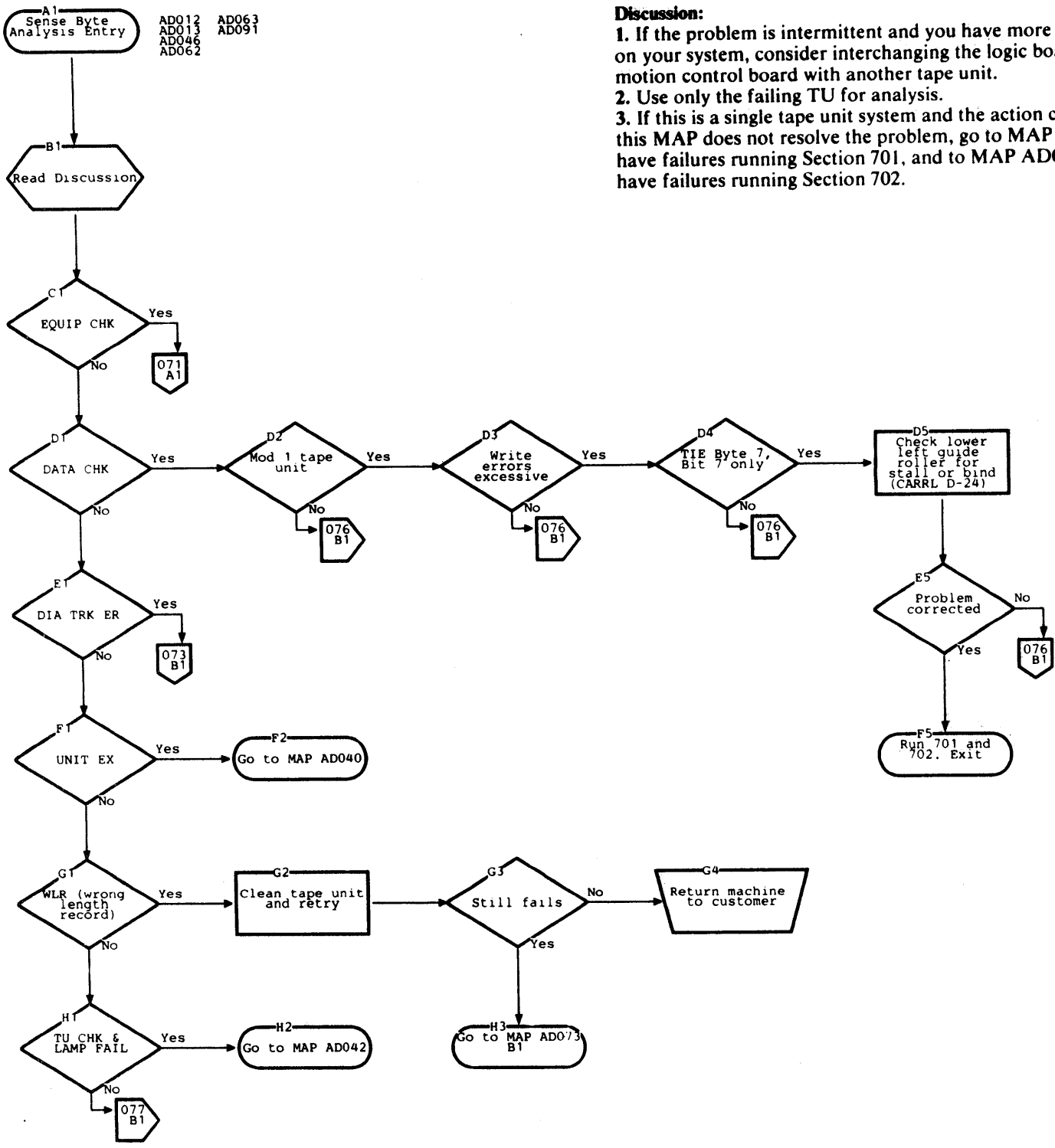




Note 1: If this is a single tape unit system and the MAP on this page doesn't correct your problem, go to MAP AD070, Entry 1.

Note 2: When interchanging A-A1H2, A-A1J2, and A-A1K2, refer to ALD page A6001 for plugging instructions. All three cards should be factory plugged, as position "K" is model sensitive. If they are not plugged, refer to the above ALD page.

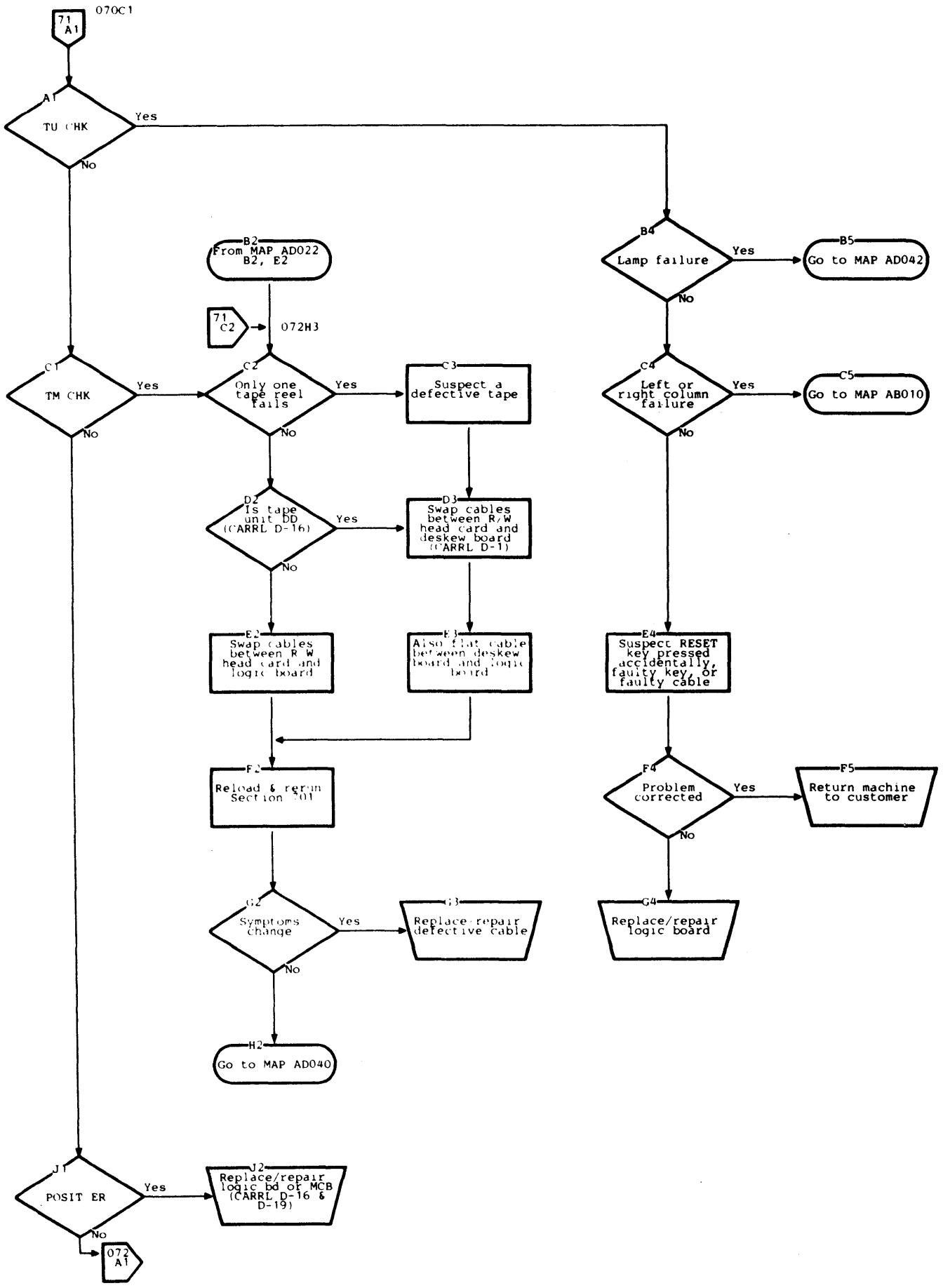
Sense Byte Analysis



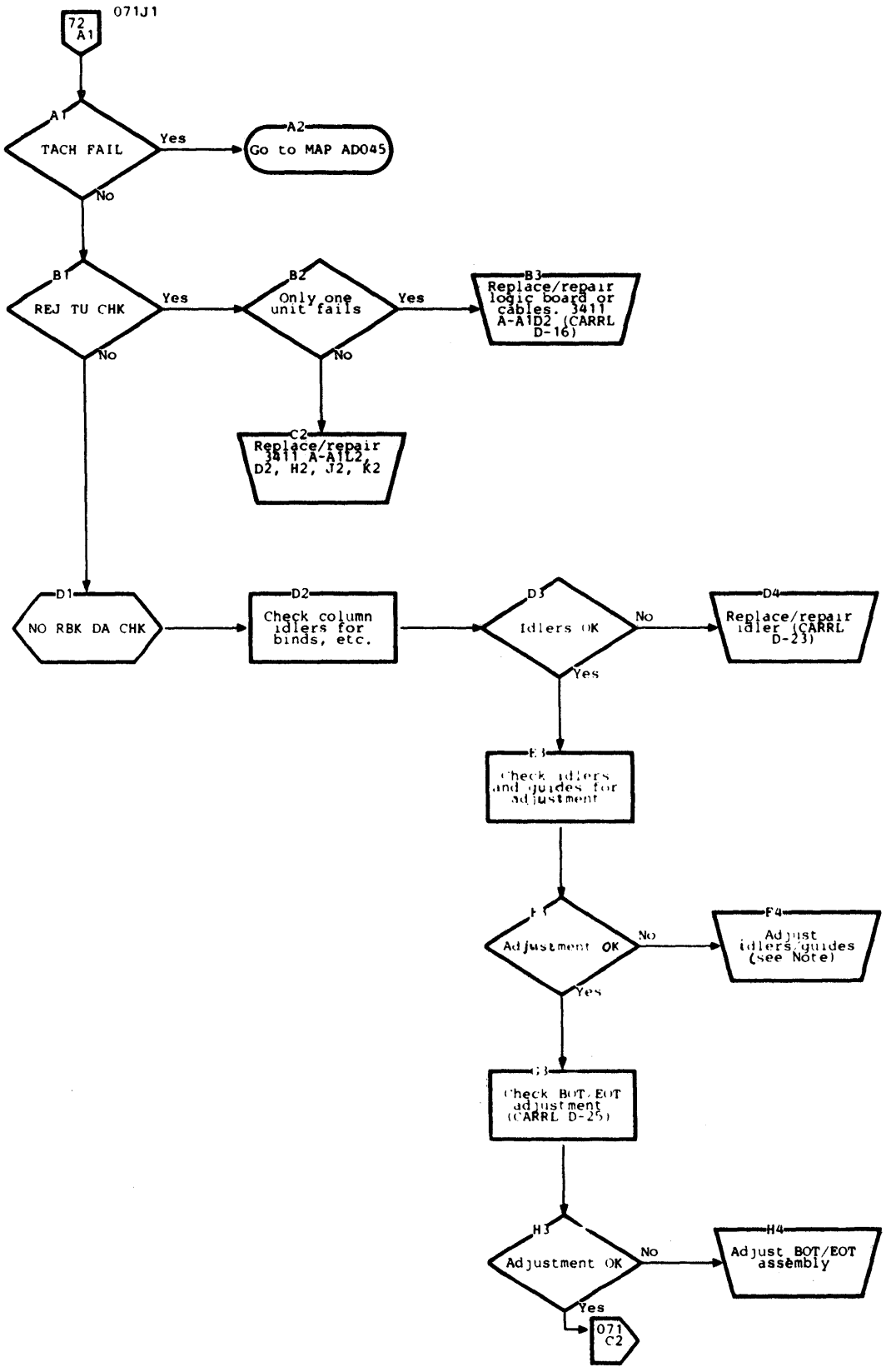
Discussion:

1. If the problem is intermittent and you have more than one TU on your system, consider interchanging the logic board and/or motion control board with another tape unit.
2. Use only the failing TU for analysis.
3. If this is a single tape unit system and the action called for by this MAP does not resolve the problem, go to MAP AD010 if you have failures running Section 701, and to MAP AD020 C1 if you have failures running Section 702.

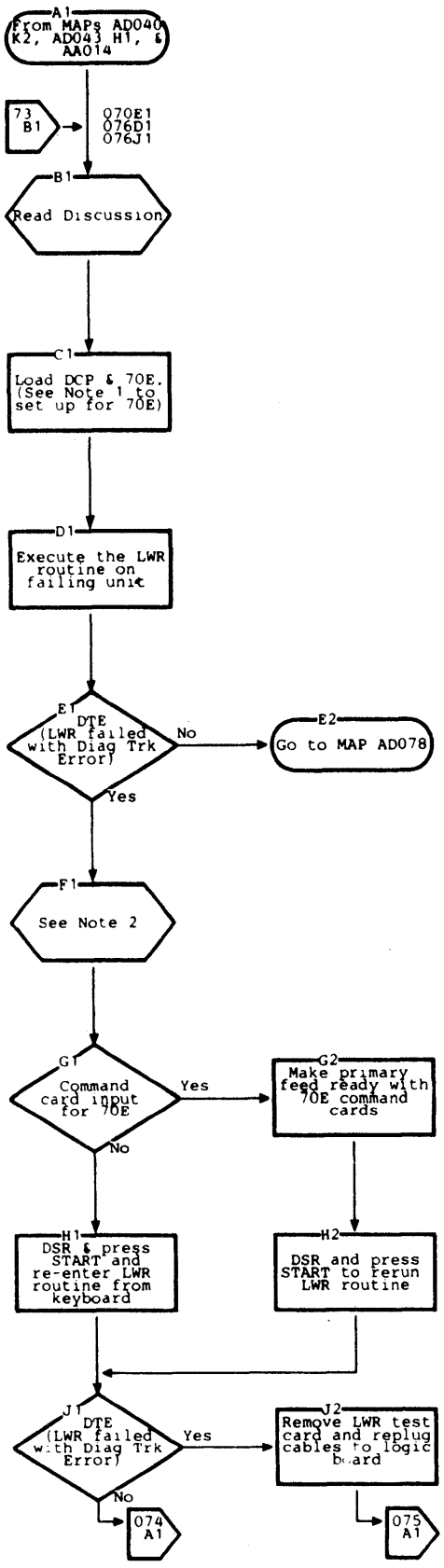
Sense Byte Analysis



Sense Byte Analysis



Note: If you adjust the guides, you must recheck tracking and skew.



Discussion: If this is a single tape unit system and the action called for by this MAP does not resolve the problem, go to MAP AD010 if you had failures running Section 701 and to MAP AD020 C1 if you had failures running Section 702.

Note 1: To get Section 70E to perform a loop-write-to-read routine, enter the following via keyboard or cards

```
CHK, X (X=TU Number 0,1,2 or 3)
LWR,100,00,00,FF,55,AA
BUC,2
LOP,100
STP
GO
```

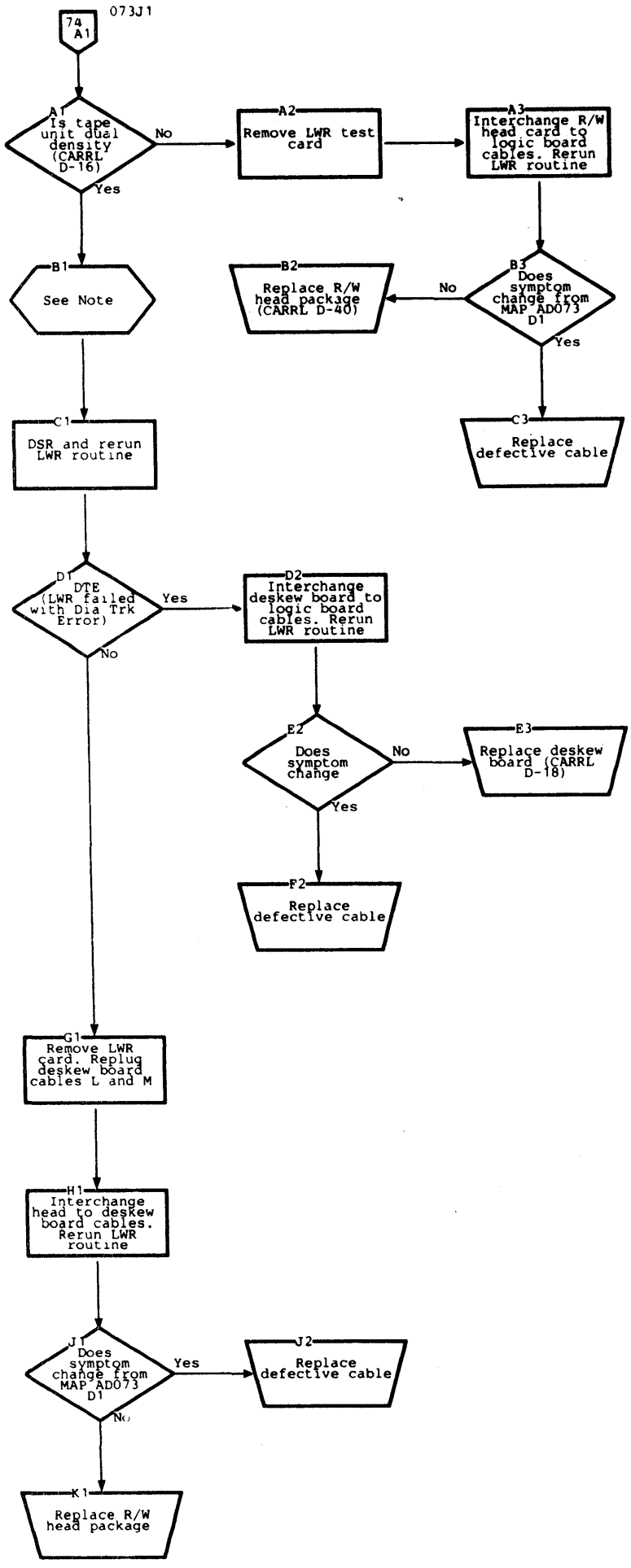
(See User's Guide for complete write up of 70E).
This routine will loop a 100-byte block 100 times in loop-write-to-read mode. If an error occurs, the sense data will print out and the routine will terminate.

Suggestion: If this is not a single tape unit system, try the routine on another unit to ensure that it works correctly.

Note 2: Unplug logic board cables L & M (CARRL Figure D-16). Plug loop- write-to-read test card Part 5861454 into these sockets. Press SYSTEM RESET and return to block G1.

XF8900	1845985	734556	734556A	734556B	736672	
Seq 1 of 2	Part Number	1 Sept 72	20 Oct 72	20 Nov 72	26 Oct 73	

Sense Byte Analysis



Discussion: When interchanging cables, be sure cables are returned to their original positions after the analysis is completed.

Note:
1. Remove the LWR test card from the logic board.
2. Replug logic board cables L & M.
3. Unplug deskew board cables L & M (the top two cables).
4. Plug the LWR test card into these two sockets.

Sense Byte Analysis

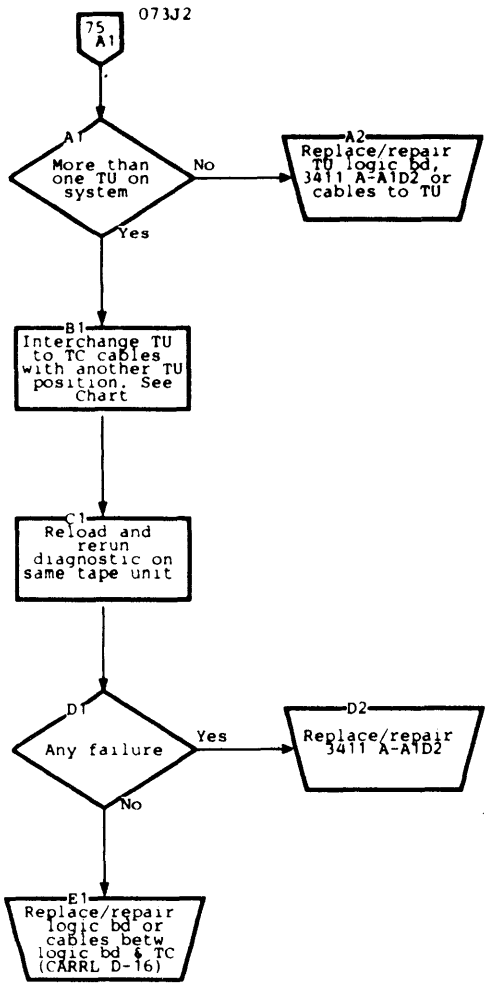
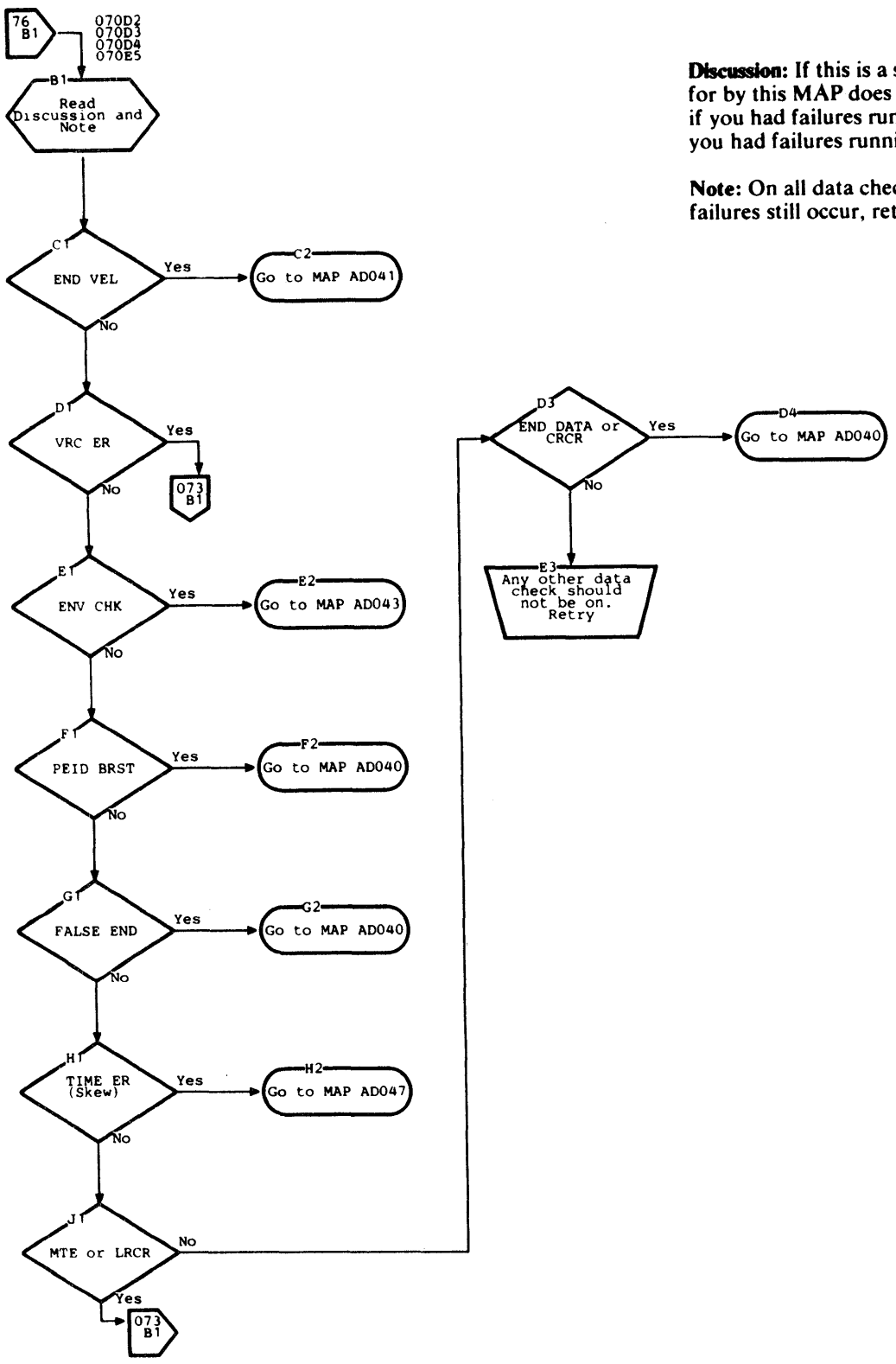


CHART		
TAPE UNIT POSITION FOR:	TAPE CONTROL CABLES	
	TO TC	FROM TC
TU 60	A-A1C2	A-A1D2
TU 68	A-A1C3	A-A1D3
TU 70	A-A1C4	A-A1D4
TU 78	A-A1C5	A-A1D5

Example:
Failure on tape unit 60
Move cable at C2 to C3
Move cable at D2 to D3

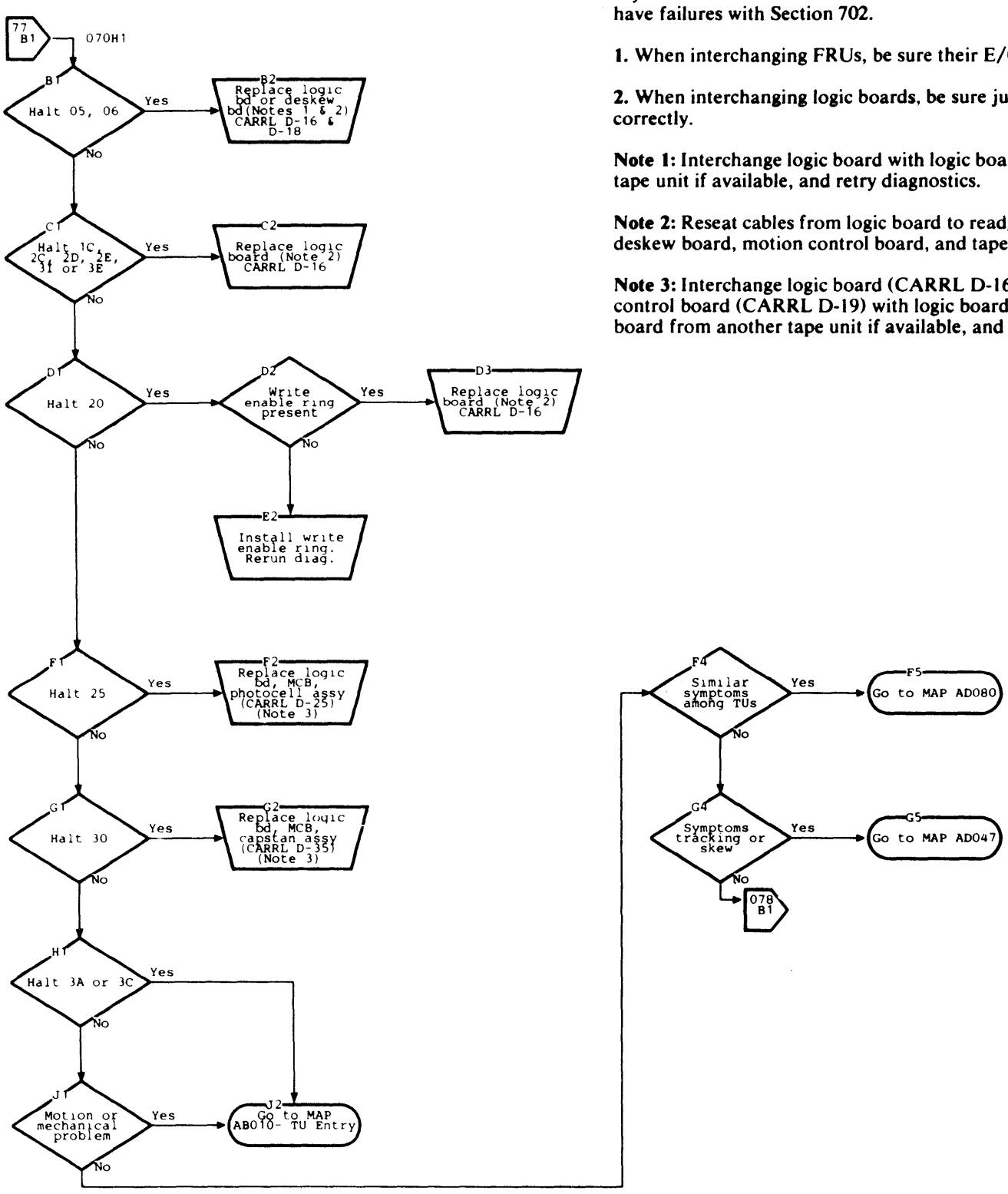
Sense Byte Analysis



Discussion: If this is a single tape unit system and the action called for by this MAP does not resolve the problem, go to MAP AD010 if you had failures running Section 701 and to MAP AD020 C1 if you had failures running Section 702.

Note: On all data checks, clean the failing tape unit and retry. If failures still occur, retry operation with a different reel of tape.

Sense Byte Analysis



Discussion: If this is a single unit tape system and the action called for by this MAP does not resolve the problem, go to MAP AD010 if you have failures with Section 701 and to MAP AD020 C1 if you have failures with Section 702.

1. When interchanging FRUs, be sure their E/C levels are the same.

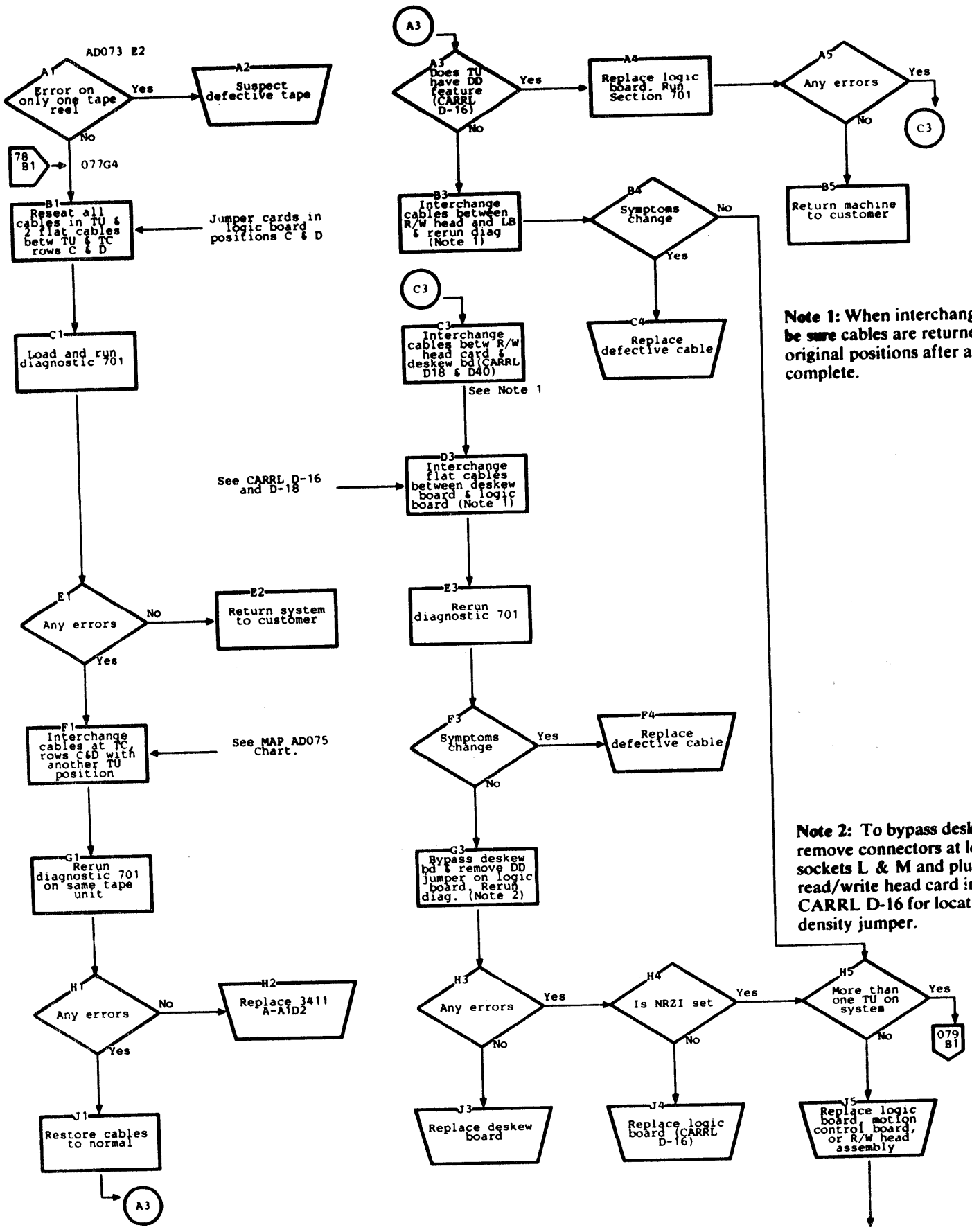
2. When interchanging logic boards, be sure jumpers are plugged correctly.

Note 1: Interchange logic board with logic board from another tape unit if available, and retry diagnostics.

Note 2: Reseat cables from logic board to read/write head card, deskew board, motion control board, and tape control.

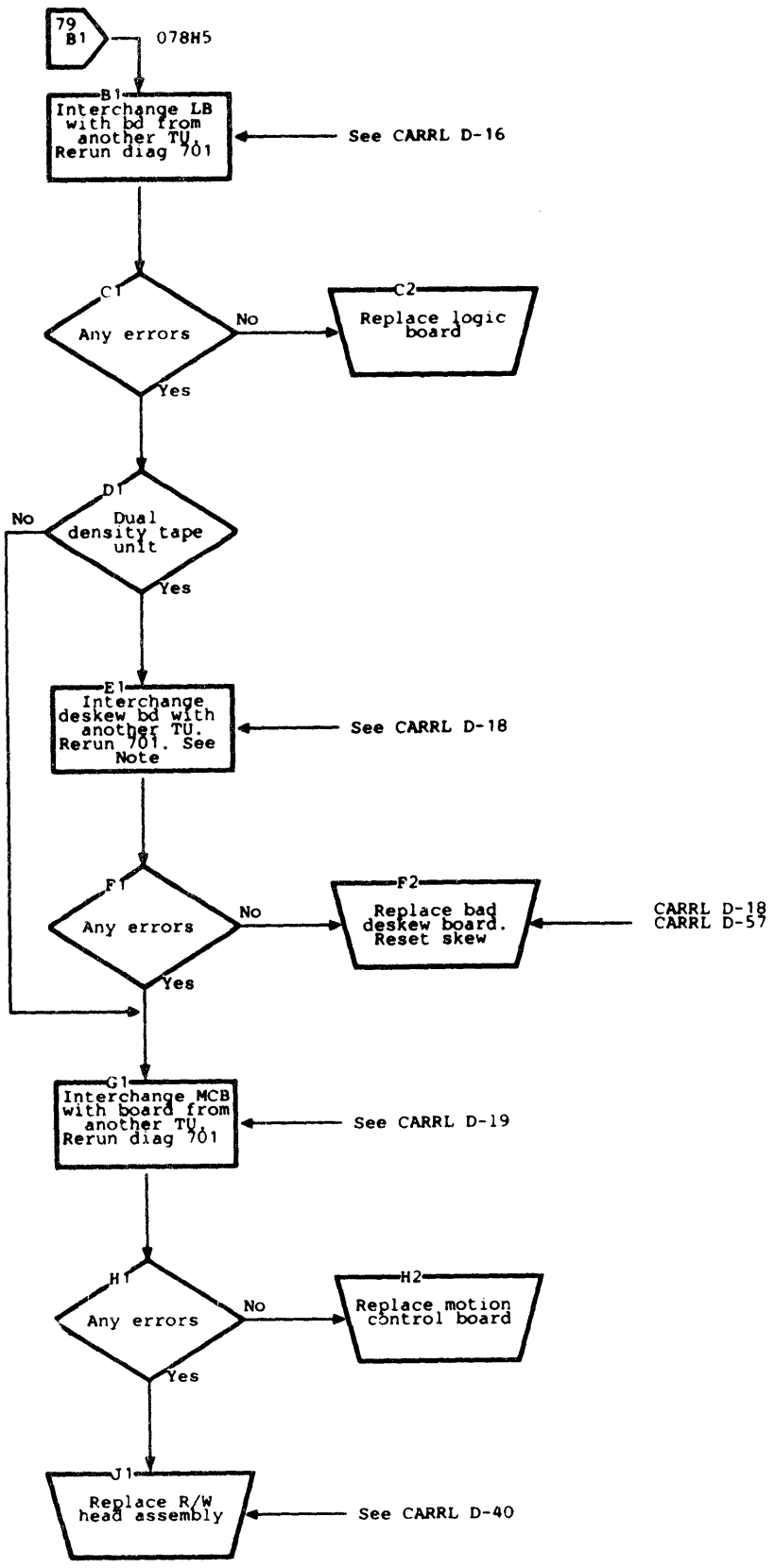
Note 3: Interchange logic board (CARRL D-16) and motion control board (CARRL D-19) with logic board and motion control board from another tape unit if available, and rerun diagnostic.

Sense Byte Analysis



Note 1: When interchanging cables, **be sure** cables are returned to their original positions after analysis is complete.

Note 2: To bypass deskew board, remove connectors at logic board sockets L & M and plug cables from read/write head card into sockets. See CARRL D-16 for location of dual density jumper.

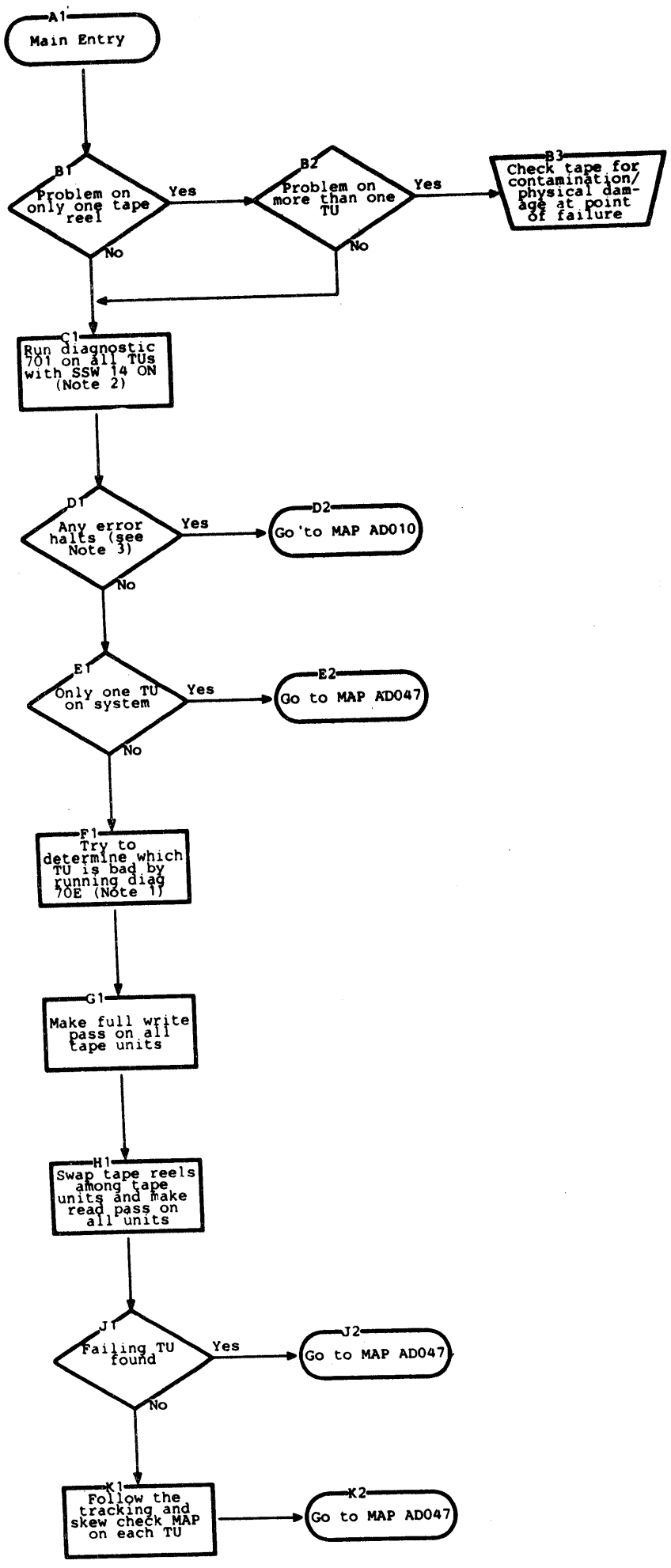


Discussion:

1. When interchanging FRUs, be sure their E/C levels are the same.
2. When interchanging logic boards, be sure jumpers are plugged correctly.
3. A model 3 logic board cannot be interchanged with a model 1 or 2 logic board.

Note: If this is a single tape unit subsystem, transfer the deskew board cables in locations J, K, L, and M to the corresponding locations on the tape unit logic board. You must temporarily remove the short crossover cables in positions L and M to do this. Run the tape unit in PE Mode. If no errors occur, the deskew board is bad or read detention cards H, J, or K are bad. If errors still occur, continue from block D1 on this MAP.

XF9200 Seq 1 of 2	1845968 Part Number	734556 1 Sept 72	734556A 20 Oct 72	734842 8 Dec 72	734864 1 Aug 73	



Note 1: Punch the following program in cards to write one hundred 100-byte records on each tape unit.

```
CHK, 0
WRS, 100, FF, 55, AA
LOP, 100
REW
GO
CHK, 1
RPT
CHK, 2
RPT
CHK, 3
RPT
```

To read the tapes after writing, replace the WRS,100,FF,55,AA card with the following

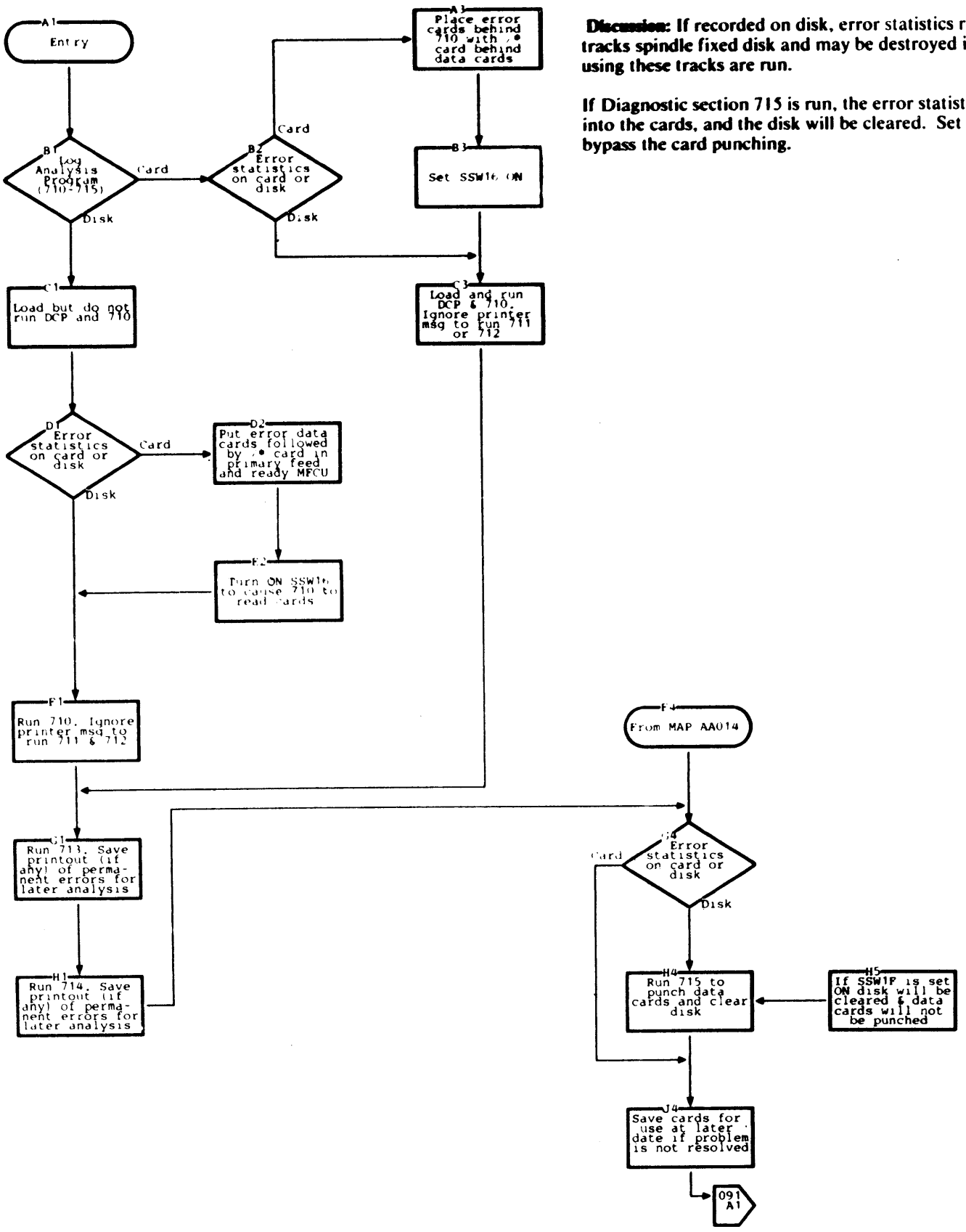
```
RDF,100
RDB,100
RDF,100
```

This routine writes tapes that are then interchanged among tape units to ensure that all units have compatible tracking and skew characteristics.

Note 2: Common problems on dual density tape units which cause interchange problems are failure to mode set properly, failure to erase LP area, or incompatible skew setting between tape units.

Note 3: If subsystem is a Mod 1, check for excessive write errors on TIE Data track 7. If excessive and predominantly this track, go to CARRL D-24 and check the lower left guide roller for stall or bind.

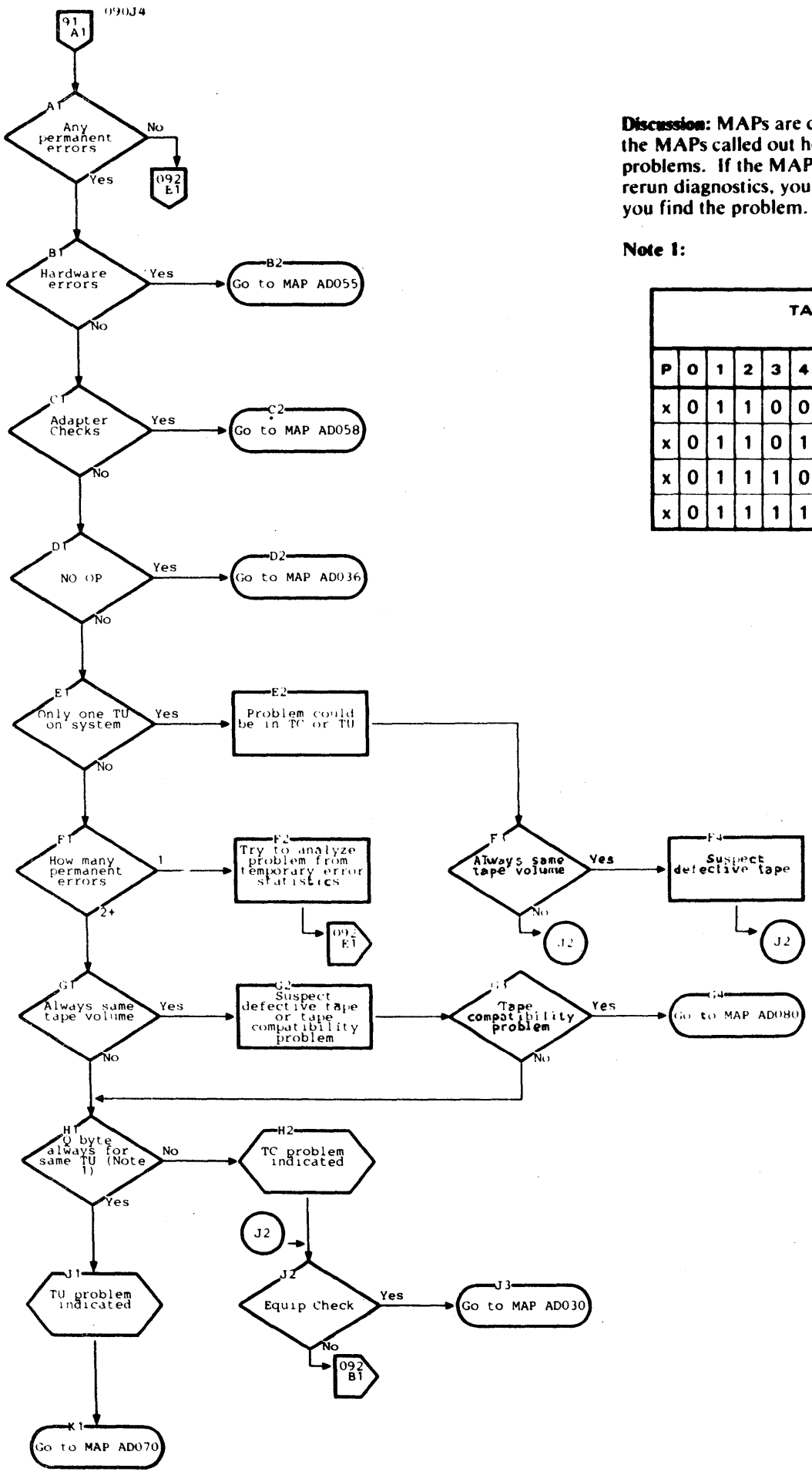
Tape Error Statistics Analysis



Discussion: If recorded on disk, error statistics reside on the CE tracks spindle fixed disk and may be destroyed if any programs using these tracks are run.

If Diagnostic section 715 is run, the error statistics will be punched into the cards, and the disk will be cleared. Set SSW1F ON to bypass the card punching.

Tape Error Statistics Analysis

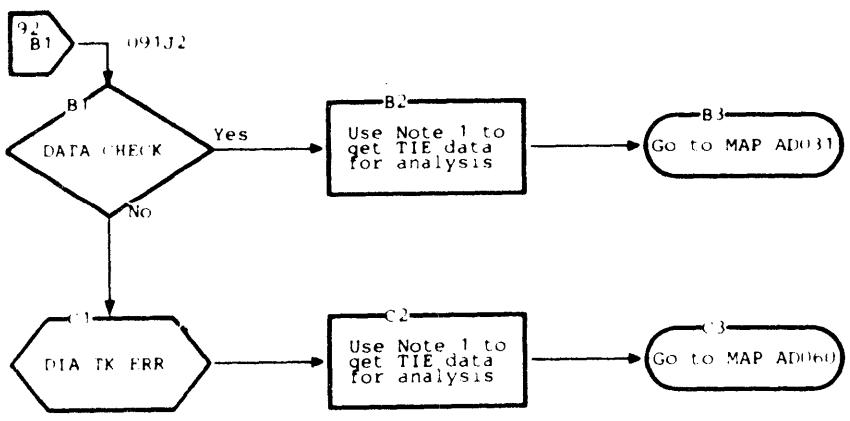


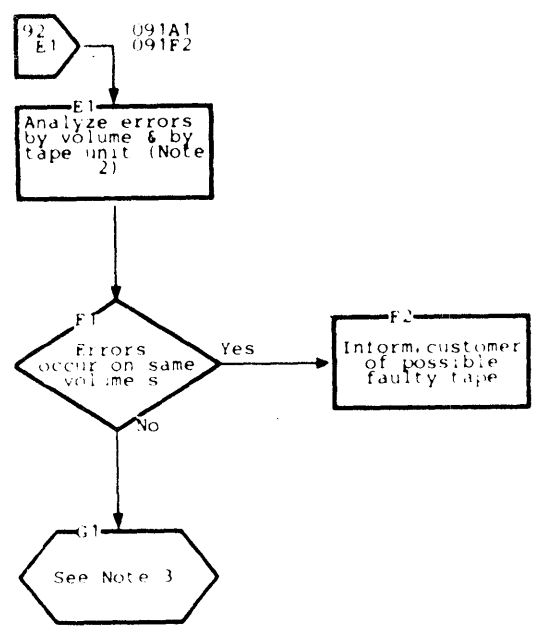
Discussion: MAPs are designed to detect solid failures; however, the MAPs called out here may be helpful in analyzing intermittent problems. If the MAPs ask you to swap cables, FRUs, etc., and rerun diagnostics, you must decide whether such action will help you find the problem. Ignore instructions to try log analysis.

Note 1:

TAPE UNIT ADDRESSING Q BYTE									
P	0	1	2	3	4	5	6	7	TAPE UNIT
x	0	1	1	0	0	x	x	x	0
x	0	1	1	0	1	x	x	x	1
x	0	1	1	1	0	x	x	x	2
x	0	1	1	1	1	x	x	x	3

Tape Error Statistics Analysis





Note 1:

To determine TIE DATA use byte 7 of printout										
TRACK ERROR	P	0	1	2	3	4	5	6	7	
VALUE		8	4	2	1	8	4	2	1	
EXAMPLES										TIE DATA
	0	0	0	0	0	0	0	0	1	01
	0	0	0	1	0	0	0	1	1	23
	1	1	1	1	1	1	1	1	1	FF
	1	0	0	0	0	0	0	0	0	00

Note 2:

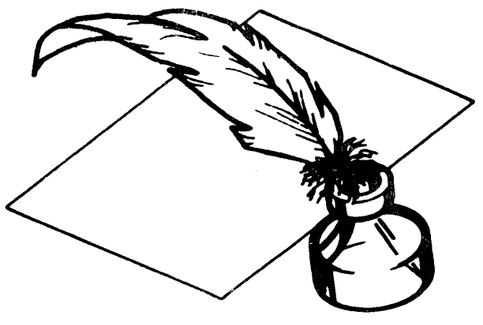
Q in the heading column refers to the tape units as follows:

CODE	TAPE UNIT	HEX
C	0	60
D	1	68
E	2	70
F	3	78

When analyzing the printout, note the SIO CNT columns as well as VOLUME and TAPE UNIT columns.

Note 3: Scan the "Summary of Tape Error Statistics By Tape Unit" to find any tape unit having a high ratio of errors to start I/Os. Then look at the "Detail Tape Error Statistics by Tape Unit" for any unit that has a higher-than-average error ratio to get a detailed listing of errors that occurred on the suspect tape unit. For instance, high error counts in the "Temp Read Backward" and "Envelope Check" columns could furnish the symptoms to be analyzed by using MAP AD076 (Data Check). If you suspect tape control problems because more than one tape unit has a high error count, go to MAP AD031 and try to analyze your problems on the basis of error counts, TIE data, etc.

If you have a single tape unit system, try to analyze the problem as a tape unit failure before looking for tape control problems.



Notes