

TEXT LISTING

068-001061-01

PROGRAM

MICRO NOVA COMMUNICATION  
SUBSYSTEM RELIABILITY

TEXT TAPE

097-001061-01

ABSTRACT

THE COMMUNICATIONS SUBSYSTEM RELIABILITY TEST IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE THE MICRO NOVA COMMUNICATION SUBSYSTEM. THE METHOD OF TEST CONSISTS OF TRANSMISSION AND RECEPTION (VIA MAINTENANCE FEATURES OF THE HARDWARE) OF PSEUDO RANDOM CHARACTERS.

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PROGRAM NAME
MNCMM.SR

REVISION HISTORY
REV. 0      04/21/78
REV. 1      03/02/79

FACILITATE SECONDARY
DEVICE CODE

MACHINE REQUIREMENTS (MINIMUM)
MICRO NUVA PROCESSOR
8K READ/WRITE MEMORY
CONSOLE DEVICE
DISKETTE DRIVE OR PAPER TAPE READER
COMMUNICATION CONTROLLER BOARD
ASYNCHRONOUS OR SYNCHRONOUS
COMMUNICATION BOARD

TEST REQUIREMENTS (MAXIMUM CONFIGURATION)
COMMUNICATION CONTROLLER BOARD
CRC GENERATOR BOARD
ANY COMBINATION OF ASYNCHRONOUS AND SYNCHRONOUS
BOARDS NOT TO EXCEED FOUR
MODEM TEST PLUGS (ONE PER BOARD)

SUMMARY
THE COMMUNICATIONS SUBSYSTEM RELIABILITY TEST IS
A MAINTENANCE PROGRAM DESIGNED TO EXERCISE THE
MICRO NUVA COMMUNICATION SUBSYSTEM.
THE METHOD OF TEST CONSISTS OF TRANSMISSION
AND RECEPTION (VIA MAINTENANCE FEATURES OF THE
HARDWARE) OF PSEUDO RANDOM CHARACTERS. SINCE
CHARACTERISTICS ARE DETERMINED VIA A RANDOM NUMBER
GENERATOR AND ARE CHANGED PERIODICALLY, SELECTION
OF LINES FOR TESTING IS VIA THE CONSOLE.

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: NAME: MNCMM.TX          PART NUMBER: 097-001061
:
: DESCRIPTION: MICRO NUVA COMMUNICATION SUBSYSTEM RELIABILITY
:
: REVISION HISTORY:
:
: REV.      DATE
: 00      04/21/78
: 01      03/02/79
:
: FACILITATE SECONDARY
: DEVICE CODE
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: COPYRIGHT © DATA GENERAL CORPORATION, 1978, 1979
: ALL RIGHTS RESERVED.
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10003 \*MAIN

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RESTRICTIONS

WHEN RUNNING BOTH TYPES OF LINES, SYNC LINES SHOULD HAVE LOWER ADDRESSES THAN ASYNC LINES.

9600 AND 19200 BAUD ARE NOT INCLUDED IN RANDOM SELECTION OF CHARACTERISTICS

9600 OR 19200 BAUD MAY BE CHOSEN IF OPERATOR SELECTS CHARACTERISTICS BUT ONLY ONE LINE SHOULD BE RUN AT A TIME, OTHERWISE, "OVERRUN" ERRORS MAY OCCUR. FURTHERMORE, SYNC LINES RUNNING AT 19200 BAUD MUST BE ADDRESS 0 WITH 8 LEVEL CODE SELECTED AND NO CRC.

IF MODEMS ARE TESTED WITH THE LINE, CLEAR TO SEND (CTS) IS NOT CHECKED.

CTS MAY BE TESTED BY SELECTING MODEMS ONLY ON ASYNC LINES, THIS IS NOT PERMITTED ON SYNC LINES.

ALTERING SWRGS WHILE THE PROGRAM IS RUNNING MAY CAUSE "OVERRUN" ERRORS.

AN "OVERRUN" OR "RECEIVE BUFFER OVERFLOW" ERROR PRINTOUT MAY BE AN INDICATION THAT THE THROUGHPUT OF THIS PROGRAM (APPROXIMATELY 10000 CPS) IS BEING EXCEEDED. IT MAY BE NECESSARY ON A LARGE NUMBER OF HIGH BAUD RATE LINES (>4800) TO TEST SMALLER GROUPS OF LINES AT A TIME, FORCE A LOWER BAUD RATE FOR THE ASYNC LINES, OR CHANGE BAUD RATE JUMPERS. THE SUM OF THE BAUD RATE FOR ALL SYNC LINES SHOULD NOT EXCEED 9600.

A MAXIMUM TIME COUNTER IS PROVIDED TO DETECT A LOSS OF ACTIVITY ON A LINE (BLOCK DONE NEVER SETS AFTER STARTING). FOR MANY LOW BAUD RATES (<100), TIME COUNT (TIMEK) SHOULD BE INCREASED IF "LOSS OF LINE ACTIVITY" ERROR MESSAGES APPEAR.

THE RANDOM NUMBERS ARE TRANSMITTED IN BLOCKS AT A TIME AND COMPARED IN NON-INTERRUPT TIME. THE TRANSMIT/RECEIVE BUFFER AREAS ARE DIVIDED ACCORDING TO HOW MANY LINES ARE ACTIVE. THEN EACH LINE IS GIVEN A RANDOM BLOCK LENGTH EVERY TIME A NEW BLOCK IS SENT, WITHIN THE CONSTRAINTS OF THE MAXIMUM BLOCK SIZE. TO TRANSMIT LARGER BLOCKS OF CHARACTERS AT A TIME, THE OPERATOR MAY WANT TO SELECT FEWER LINES TO ACTIVATE.

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PROGRAM DESCRIPTION/THEORY OF OPERATION

FOR OPERATOR SELECTED LINES, THIS PROGRAM IS DESIGNED TO EXERCISE THE COMMUNICATIONS SYSTEM IN ALL MODES. FOR SYSTEM FAILURES, THE ASYNC OF SYNC CONTROLLER DIAGNOSTIC IS PREREQUISITE.

INITIALIZATION - OPERATOR INPUTS DEFINE THE LINES LINES TO BE TESTED, AND MODEM AND CRC LINES. THE PROGRAM WILL THEN DEFINE THE LCB BLOCKS FOR ACTIVE LINES, ALLOCATE TRANSMIT AND RECEIVE BUFFERS, CHOOSE RANDOM LINE CHARACTERISTICS AND BLOCK LENGTHS, AND FILL THE TRANSMIT BUFFERS WITH RANDOM DATA. RANDOM DLE WORDS, SPECIFIC ALLOWABLE SYNC WORDS (SEE STABLE), FORCED UNDERRUNS, ENTER AND LEAVE TRANSPARENCY, AND BREAK CHARACTERS ARE ALSO LOADED AT VARIOUS INTERVALS IN THE TRANSMIT TABLES. IF MODEM IS SELECTED, RANDOM CHANGE SEQUENCES ARE SELECTED FOR THE SYNC LINES AND SPECIFIC UN/OFF SEQUENCE FOR ASYNC ARE LOADED (SEE GMOD AND GAMOD).

AFTER ALL INITIALIZATION IS COMPLETED, DMAIN OUTPUTS LINE CHARACTERISTICS (AFTER TURNING OFF AND INITIALIZING ALL LINES), TURNS ON ACTIVE TRANSMITTERS AND RECEIVERS, AND OUTPUTS INITIAL MODEM STATES.

THE ACTUAL PROGRAM OPERATION HAS NOW BEGUN. IT IS A CAUSE-AND-EFFECT INTERACTION BETWEEN THE HOST MONITOR AND CHECKING ROUTINES AND DMAIN'S SUBROUTINE. DATA IS TRANSMITTED FROM THE BUFFERS ON A TRANSMIT INTERRUPT AND RECEIVED AND STORED (ALONG WITH ERROR STATUS) IN THE INTERRUPT ROUTINE WITH A MINIMUM OF ERROR CHECKING. THE DMAIN ROUTINE WILL MONITOR AND DETECT WHEN A LINE HAS TRANSMITTED AND RECEIVED (VIA EOT CHARACTER) A FULL BLOCK OF DATA, THEN SHUT DOWN THE LINE AND SET A BLOCK DONE BIT IN THE MCM FOR THE HOST. THE HOST WILL MONITOR LINE ACTIVITY, AND, UPON RECEIPT OF THE BLOCK DONE BIT, WILL COMPARE THE TRANSMIT AND RECEIVE DATA AND RECORD AND PRINT OUT ANY ERROR CONDITION. AFTER CHECKING ALL DATA, THE HOST WILL CHANGE LINE CHARACTERISTICS (IF NO ERRORS AND SWITCH I(1)), GENERATE A NEW BLOCK OF DATA, AND SIGNAL DMAIN (VIA BIT 1 OF THE MCM) TO START THE LINE AGAIN. THIS PROCESS IS REPEATED CONTINUALLY ON ALL LINES. MODEMS ARE HANDLED IN A SIMILAR MANNER.

17.1

17.2



10007 .MAIN

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01 THE PROGRAM WILL REQUEST THE DEVICE CODE (UCTAL)
02 OF THE SUBSYSTEM FOLLOWED BY A CARRIAGE RETURN.
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04
05 THE PROGRAM WILL REQUEST THE COMM. LINES THAT
06 ARE TO BE TESTED, FIRST THE ASYNC LINES, THEN
07 SYNC LINES. THE OPERATOR MAY DEFINE A GROUP OF
08 LINES FOR TESTING BY TYPING (FIRST LINE, SLASH,
09 LAST LINE). SINGLE LINES MAY BE TESTED BY TYPING
10 THE LINE NUMBER. ALL LINE NUMBERS ARE IN DECIMAL.
11 LINES OR GROUPS OF LINES ARE SEPERATED FROM EACH
12 OTHER VIA COMMAS WITH THE FINAL LINE OR GROUP
13 ENDING IN A CARRIAGE RETURN. FOR EXAMPLE: 4,8/11,
14 15 "CARRIAGE" LINES 4,8,9,10,11, AND 15 WILL BE
15 EXERCISED. THE LINE FEED CHARACTER MAY BE USED
16 LIKE A COMMA WHEN INPUT FORMATING IS NECESSARY.
17 TYPING AN "N" (NO LINES OF THIS TYPE) DOES NOT
18 REQUIRE A CARRIAGE RETURN.
19
20 IF MODEM LINES ARE TO BE TESTED (SWITCH "B"), TYPE
21 THE LINE NUMBERS IN THE FORMAT DESCRIBED ABOVE.
22 A TEST FIXTURE IS REQUIRED FOR THE MODEM TEST.
23
24
25 IF CRC IS TESTED (SWITCH "C"), THE DEVICE CODE
26 (UCTAL) FOLLOWED BY A CARRIAGE RETURN WILL BE
27 REQUESTED, THEN TYPE THE LINE NUMBERS IN THE
28 FORMAT DESCRIBED ABOVE.
29
30 NOTE: THE PROGRAM WILL DETECT AN ERROR AND REPEAT THE INPUT
31 REQUEST IF ANY OF THE FOLLOWING INPUT ERRORS ARE COM-
32 MITTED:
33
34 1. A LINE NUMBER GREATER THAN 15 (DECIMAL) IS
35 TYPED.
36 2. MULTIPLE DEFINED LINES.
37 3. A SECOND LINE (FOLLOWING SLASH) LESS THAN
38 FIRST LINE
39 4. A SYNC LINE OTHER THAN 0,4,8,12.
40 5. A SYNC LINE THAT HAS AN ASYNC LINE ALREADY
41 DEFINED IN THAT QUADRANT.
42 6. A DEVICE CODE OTHER THAN 34 OR 44
43 FOR THE SUBSYSTEM.
44 7. A DEVICE CODE OTHER THAN 35 OR 45
45 FOR THE CRC BOARD.
46
47 IF OPERATOR SELECTION OF CHARACTERISTICS DESIRED,
48 (SWITCH "A"), THE PROGRAM WILL ASK A SERIES OF
49 QUESTIONS TO BE ANSWERED AS OPERATOR INPUTS.
50 ONLY THE CHARACTERISTICS UNIQUE TO THAT TYPE OF
51 LINE (SYNC OR ASYNC) WILL BE REQUIRED. IF MORE
52 THAN ONE LINE IS DESIRED, THE PROGRAM WILL LOOP
53 UNTIL A 0 IS GIVEN TO THE LAST QUESTION. THESE
54 CHARACTERISTICS WILL REMAIN ON THOSE LINES
55 REQUESTED UNIL SWITCH 1 = 1. "ALL LINES
56 OF THIS TYPE" MEANS ALL DEFINED ASYNC, OR ALL
57 DEFINED SYNC LINES WILL RECEIVE THE OPERATOR
58 DESIRED PARAMETERS. IF A "1" IS ANSWERED TO
59 THIS QUESTION, TYPE THE ADDRESS OF THE FIRST
60 LINE NUMBER OF THE DESIRED TYPE (SYNC OR ASYNC).
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10008 .MAIN

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PROGRAM OUTPUT/ERROR DESCRIPTION
THE PROGRAM ENTERS AN ERROR STATE WHEN RECEIVER
AND TRANSMITTER DATA DO NOT COMPARE. A FAULTY
STATUS CONDITION EXISTS, AN OUT OF SEQUENCE OR
UNEXPECTED EVENT OCCURS. AN ERROR MESSAGE TO THE
OPERATOR WILL BE TYPED AT THE CONSOLE TELETYPE.
SWITCH "F" WILL DETERMINE WHICH ERROR REPORTING
IS TO BE USED. DURING THE PRESENTATION OF THE
ERROR MESSAGE, NORMAL OPERATION WILL CONTINUE
ON THE OTHER LINES. WHEN THE ERROR MESSAGE IS
COMPLETE, THE CONDITION OF THE LINE IS MAINTAINED.
THE OPERATOR MAY SCOPE THE LINE TO DETERMINE THE
CAUSE OF FAILURE.

SETTING SWITCH 1(1) WILL ALLOW NEW PSEUDO RANDOM
NUMBERS TO BE GENERATED AFTER THE ERROR STATE HAS
BEEN ENTERED. ERROR MESSAGES WILL CONTINUE TO BE
TYPED AS ERRORS ARE DETECTED.

CERTAIN ERRORS ARE DETECTED DURING INTERRUPT TIME.
THESE ERRORS WILL NOT BE PRINTED UNTIL BEFORE THE
NEXT ERROR IS TO BE PRINTED. POWER FAIL IS ALSO
DETECTED HERE.

TRAP NUMBER TO ERROR MESSAGE TABLE FOLLOWS:

001 LOSS OF LINE ACTIVITY
002 RECEIVER FAILED TO SET DUNE
003 XMIT FAILED TO SET DUNE
004 GOOD= BAD= (ASYNC)
005 FRAMING ERROR
006 OVERRUN (ASYNC)
007 PARITY ERROR (ASYNC)
010 FAILED TO DETECT BREAK
011 OVERRUN (SYNC)
012 PARITY ERROR (SYNC)
013 GOOD= BAD= (SYNC)
014 RECEIVE BUFFER OVERFLOW
015 FAILURE TO OPERATE IN
TRANSPARENT MODE
016 LINE FAILED TO UNDERRUN
017 UNDERRUN IN TRANSPARENT
MODE WITHOUT DLE
020 CRC DOES NOT CHECK
021 LINE FAILED TO INTERRUPT
MODEM INTERRUPT FROM
ILLEGAL LINE
023 MODEM FAILURE - RING BIT
024 MODEM FAILURE - DSR BIT
025 MODEM FAILURE - CTS BIT
026 MODEM FAILURE - CD BIT
027 FALSE INTERRUPT -
NO CHANGE IN STATUS
030 UNIDENTIFIABLE ERROR -
XMTS, RCVS TOO FAR APART
031 UNEXPECTED INTERRUPT FROM DEVICE
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00C AC,MUX (FOR ASYNC LINES)
BITS 0-1
BITS 2-4
BITS 5-8
BAUD RATE SELECT
0000 = 0
0001 = 19,200
0010 = 50
0011 = 75
0100 = 134.5
0101 = 200
0110 = 600
0111 = 2,400
1000 = 9,600
1001 = 4,800
1010 = 1,800
1011 = 1,200
1100 = 2,400
1101 = 300
1110 = 150
1111 = 110

SPECIFY NUMBER OF STOP BITS
(ASYNC ONLY)
00 = 1 STOP BIT
01 = 2 STOP BITS (1-1/2 FOR
5 LEVEL CODE)
10 = RESERVED
11 = RESERVED

SPECIFY CODE LEVEL
00 = 5 LEVEL CODE
01 = 6 LEVEL CODE
10 = 7 LEVEL CODE
11 = 8 LEVEL CODE

PARITY SELECT
00 = NO PARITY
01 = ODD PARITY
10 = EVEN PARITY
11 = RESERVED

LOOPBACK CONTROL
0 = LOOPBACK OFF
1 = LOOPBACK ON

DIA AC,MUX
SPECIFIES IMPLICIT ADDRESS OF INT-
ERRUPTING LINE, RECEIVE, MODEM, OR
TRANSMIT, AND FORCES A DOA AS EXPLICIT
ADDRESS FOR OUTPUTTING.
BITS 0-10 NOT USED
BITS 11-14 EXPLICIT ADDRESS
BIT 15 TRANSMIT OR RECV/MODEM CONTROL
0 = RECEIVE OR MODEM INTERRUPT
1 = TRANSMIT INTERRUPT

OIB AC,MUX
SPECIFIES RECEIVED DATA ON RECEIVE INT-
ERRUPT.
BITS 0-6 NOT USED
BIT 7 PHASE OF T/R CLOCK (OFFLINE)
BITS 8-15 RECEIVE DATA

OIC AC,MUX
SPECIFIES RECEIVER DONE/STATUS OR
MODEM DONE/STATUS
BITS 0-11 NOT USED
RECEIVER STATUS
BIT 12 FRAMING ERROR (ASYNC ONLY)
BIT 13 PARITY ERROR
BIT 14 OVERRUN
BIT 15 0 = RECEIVER STATUS

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!0013 \*MAIN

UIC AC,MUX (CONTINUED)

MUDEM STATUS

BITS 0-10 NOT USED

BIT 11 CU STATUS

1 = CD IS ON  
0 = CD IS OFF

BIT 12 CTS STATUS

1 = CTS ON  
0 = CTS OFF

BIT 13 DSR STATUS

1 = DSK ON  
0 = DSK OFF

BIT 14 RING STATUS

1 = RING ON  
0 = RING OFF

BIT 15 MUDEM STATUS CONTROL

1 = MUDEM STATUS

DUB AC,CRC

LOAD

PARTIAL RESULT

BITS 0-15

UIB AC,CRC

READ

PARTIAL RESULT

BITS 0-15

!0014 \*MAIN

EFFECT OF 'BUSY' AND 'DONE' ON COMMUNICATIONS CONTROL

!11.6

BUSY: BUSY IS SET ON THE CONTROLLER WITH AN I/O RESET OR START PULSE. THIS STARTS AN ICLR CYCLE WHICH CLEARS MUDEM MEMORY AND RESETS THE INTERNAL LOGIC FOR ALL LINES. ON COMPLETION OF THE ICLR CYCLE, BUSY RESETS, AND THE BOARD IS PLACED IN THE OFFLINE ('DIAGNOSTIC') MODE.

DONE: DONE SETS ON BOTH SYNC AND ASYNC LINES WHEN ONE OF THE FOLLOWING EVENTS OCCURS:

1. CHARACTER RECEIVED.
  2. TRANSMIT BUFFER EMPTY
  3. MUDEM STATUS HAS CHANGED.
  4. IN OFFLINE MODE XMT/RCV DOC WITH BIT 7. INTERRUPTS OCCUR IN THE ABOVE ORDER OF PRIORITY, AND FROM LOWEST TO HIGHEST NUMBERED LINES. A 'NIOC MUX' WILL CLEAR 'DONE', AS WELL AS A 'NIOB MUX' AND 'IURST'.
- IN OFFLINE MODE, A XMT/RCV DOC WITHOUT BIT 7 CLEARS 'DONE'

IURESET: CLEARS LOGIC AND PLACES CONTROLLERS IN OFFLINE (DIAGNOSTIC) MODE.

START: SAME AS IURESET.

CLEAR: CLEARS 'DONE', AND INTERRUPT LOGIC AND PLACES CONTROLLERS IN ONLINE MODE.

IUPLS(MUX): STEPS T/R AND INTERNAL STATE CLOCKS IN 'DIAGNOSTIC' MODE.

IUPLS(CRC): STEPS CRC CLOCK IN 'DIAGNOSTIC' MODE.





10017 .MAIN

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01 TRANSMIT TABLE POINTER (XTP)
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TRANSMIT TABLE POINTER (XTP)  
BITS 0-15 STARTING ADDRESS OF TRANSMIT BLOCK FOR THIS LINE  
TRANSMIT TABLE SIZE (XTS)  
BITS 0-15 NUMBER OF CHARACTERS IN BLOCK TO BE TRANSMITTED  
TRANSMITTED WORD COUNT (XC)  
BITS 0-15 NUMBER OF CHARACTERS IN BLOCK ALREADY TRANSMITTED  
RECEIVE TABLE POINTER (RTP)  
BITS 0-15 STARTING ADDRESS OF RECEIVE BLOCK FOR THIS LINE  
RECEIVE TABLE SIZE (XRS)  
BITS 0-15 MAXIMUM ALLOWABLE NUMBER OF RECEIVE WORDS (2\*XRS)  
RECEIVED WORD COUNT (RC)  
BITS 0-15 NUMBER OF CHARACTERS RECEIVED IN THIS BLOCK

10018 .MAIN

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SYNC WORD (SYWC)  
BITS 0-7 NOT USED  
BITS 8-15 SYN CHARACTER  
DLE WORD (DLE)  
BITS 0-7 NOT USED  
BITS 8-15 DLE CHARACTER  
CRC TEMPORARY (SCRC)  
BITS 0-15 PRESENT CRC TEMPORARY  
TIME COUNTER (TIME)  
BITS 0-15 NUMBER OF TIMES THROUGH MONITOR ROUTINE  
TRANSMIT WORD TABLE (XTBL)  
BIT 0 NOT USED  
BIT 1 UNDERKUN FOR THE REST OF THE BLOCK SIZE  
BIT 2 DLE CHARACTER FOLLOWS  
BIT 3 0=LEAVE TRANSPARENCY  
1=ENTER TRANSPARENCY  
BITS 4-7 NOT USED  
BITS 8-15 TRANSMIT DATA  
RECEIVE WORD TABLE (XTBL+BL)  
BITS 0-3 NOT USED  
BITS 4-7 ERROR STATUS  
BITS 8-15 RECEIVE DATA WORD

10019 .MAIN

10020 .MAIN

\*\*00005 TOTAL ERRORS, 00000 PASS 1 ERRORS

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01 SPECIAL NOTES/FEATURES
02 CAT/KITTEN IS NOT INCLUDED IN THIS PROGRAM
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:12.1 SPECIAL NOTES/FEATURES  
:12.1 CAT/KITTEN IS NOT INCLUDED IN THIS PROGRAM  
:12.2 IF NO SYNC, SYNC, OR MODEMS LINES ARE  
:12.2 SELECTED THIS PROGRAM WILL RUN ERROR FREE  
:12.2 BUT NO XFERS WILL TAKE PLACE.  
:13. RUN TIME  
:13.1 A PRINTOUT OF THE ACCUMULATED TRANSMIT AND  
:13.1 RECEIVED WORDS IS PROVIDED AFTER EACH PASS  
:13.1 (IF SWITCH 450). THE INITIAL PASS IS SHORT  
:13.1 TO INDICATE PROGRAM IS RUNNING. SUBSEQUENT  
:13.1 PASSES ARE OF EQUAL DURATION AND DEPEND ON  
:13.1 THE VALUE OF THE INTERNAL PASS COUNTER (NO.)  
:13.1 AND SYSTEM CONFIGURATION.  
:13.2 THE OPERATOR MAY VARY THE FREQUENCY OF THE  
:13.2 PRINTOUT BY ALTERING THE VALUE OF THE INTERNAL  
:13.2 PASS COUNTER (NO.) BY USING THE ODT DESCRIBED  
:13.2 IN PARAGRAPH 11.  
:13.3 IF ANY MODEMS ARE SELECTED RUN TIME IS  
:13.3 APPROXIMATELY DOUBLED.  
:13.4 A TYPICAL SYSTEM OF ONE SYNC LINE WITH  
:13.4 MODEM AND CRC, FOUR ASYNC LINES WITH MODEMS,  
:13.4 AND THE VALUE OF NO. = 1000  
:13.4 THE DURATION OF EACH PASS WOULD BE APPROX-  
:13.4 IMATELY SIX AND A HALF MINUTES.

0021 \*MAIN

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SPMPD 0000000

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