DH11

MULTIPLEXER DIAGNOSTIC

MD-11-DZDHK-C

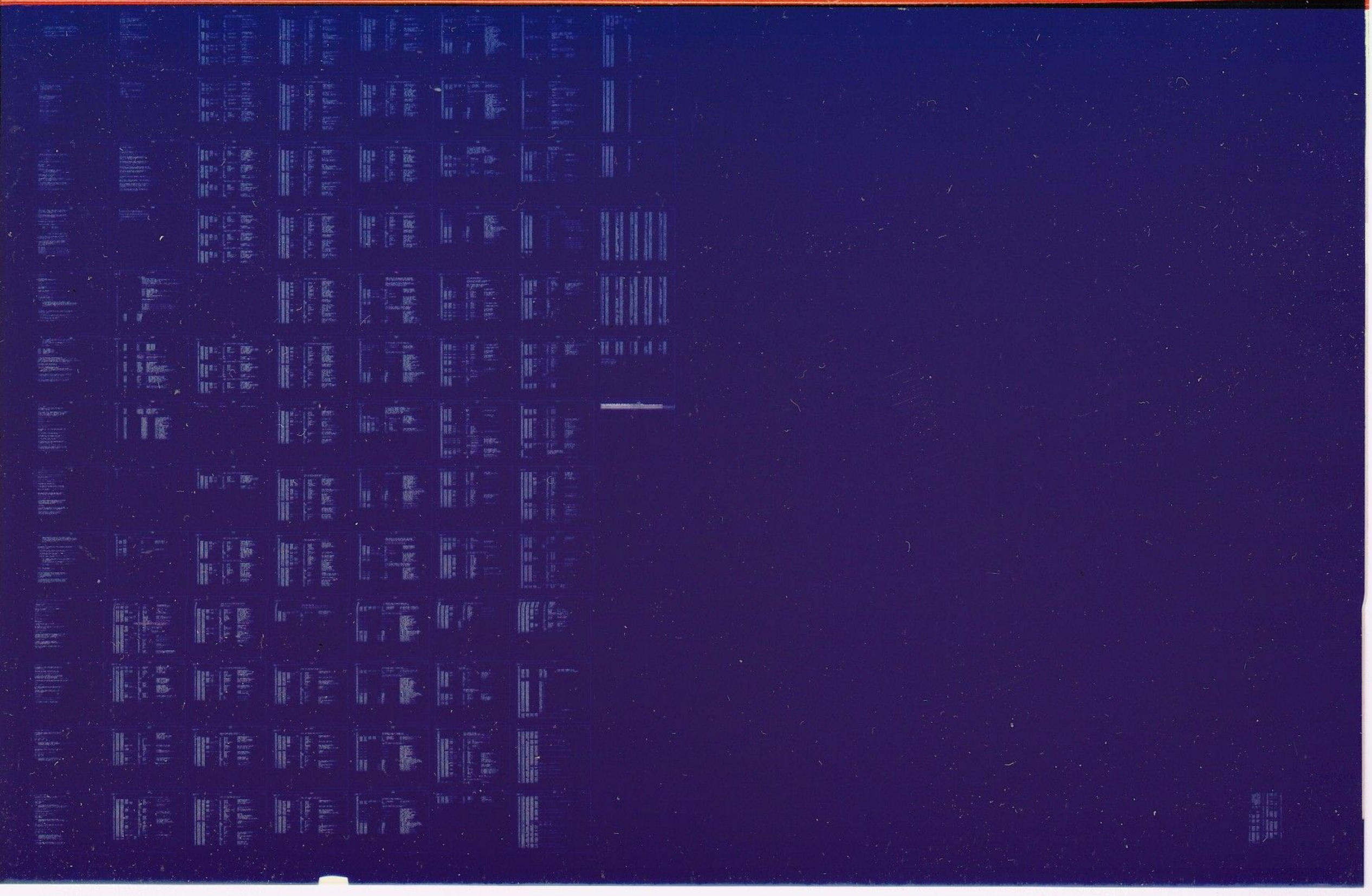
EP-DZDHK-C-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.A.



B01

IDENTIFICATION

SEC B0G1

PRODUCT CODE: MAINDEC-11-DZDHA-C-D

PRODUCT NAME: MODEM CONTROL
MULTIPLEXER DIAGNOSTIC

DATE : 21 AUG 1976

MAINTAINER: DIAGNOSTIC GROUP

1.0 ABSTRACT

THIS PROGRAM IS A TEST OF THE MODEM CONTROL MULTIPLEXER USED WITH THE DH11-AD OPTION

THE PROGRAM IS DIVIDED INTO FUNCTIONAL TEST GROUPS AS FOLLOWS:

GROUP 0: ALL LINE SCANNER AND LINE MULTIPLEXER FUNCTIONS ARE TESTED USING THE H861 TEST CONNECTOR
GROUP 1: A SINGLE LINE IS TESTED USING THE MODEM CABLE AND A H315 TEST CONNECTOR
GROUP 2: CONNECT-DISCONNECT TEST FOR 103A MODEMS
GROUP 3: CONNECT-DISCONNECT TEST FOR 202C MODEMS

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH AT LEAST 8K OF MEMORY
WITH OR WITHOUT HARDWARE SWITCH REGISTER
ASR-33 TELETYPE OR EQUIVALENT
MODEM CONTROL MODULES M7807 & M7808

2.1.1 FOR 16 LINE SCANNER TEST

4 CABLES TO CONNECT TO TEST CONNECTOR
H861 TEST CONNECTOR

2.1.2 FOR SINGLE LINE CABLE TEST

4 CABLES TO CONNECT TO THE DISTRIBUTION PANEL
H315 TEST CONNECTOR

2.1.3 FOR ON LINE TESTS

4 CABLES TO CONNECT TO THE DISTRIBUTION PANEL
2 BELL 103A MODEMS (FOR 103A TEST)
2 BELL 202C MODEMS (FOR 202C TEST)

3.0 LOADING PROCEDURE

THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED.

4.0 STARTING PROCEDURE

4.1 STARTING ADDRESS

THE STARTING ADDRESS FOR ALL TESTS IS 000200.

RESTART ADDRESS FOR ALL TESTS IS 000200

4.2 OPERATOR AND OR PROGRAM ACTION SEQ 0003

4.2.1 INITIAL PROGRAM START

****
NOTE
****

IF PROGRAM IS BEING RUN WITH THE "XOR" MODULE TESTER
LOCATION 1030(8) MUST BE MODIFIED TO CONTAIN A 240(8)
"NOP" TO ACTIVATE THAT CODE AFFECTING THE "XOR" TESTER.

****
NOTE
****

SOFTWARE SWITCH REGISTER IS DEFINED AS LOC. 176
(REFER TO SECTION 5.1.2 FOR DYNAMIC LOADING INSTRUCTIONS)

4.2.1.1 LOAD ADDRESS 000200
SET SW00 = 1
PRESS START
***SOFTWARE SWITCH REGISTER IS LOC. 176

4.2.1.2 PROGRAM WILL TYPE
"DH11-MODEM CONTROL DIAGNOSTIC "(ONCE ONLY)
***NOTE: IF USING SOFTWARE SWITCH REGISTER THE FOLLOWING
WILL BE TYPED BEFORE TITLE:
SWR=XXXXXX NEW= (REFER TO SECTION 5.1.2 FOR OPTIONS)

4.2.1.3 PROGRAM WILL TYPE (WITH SW00 = 1)
VECTOR ADDRESS-" AND WILL WAIT FOR AN INPUT
FROM THE TELETYPE KEYBOARD.

4.2.1.4 TYPE A THREE DIGIT NUMBER (OCTAL) WHICH IS THE
ADDRESS THAT THE MODEM CONTROL WILL INTERRUPT TO, FOLLOWED BY
(RETURN). IF AN INCORRECT ADDRESS IS TYPED, THE PROGRAM WILL
TYPE "?" AND THEN REPEAT 4.2.1.3.

NOTE: IF THE ADDRESS ENTERED IS ACCEPTIBLE TO THE PROGRAM,
BUT IS NOT THE INTERRUPT VECTOR ADDRESS OF THE MODEM CONTROL
UNDER TEST, A HALT WILL OCCUR AT THAT ADDRESS+2, WHEN
THE MODEM CONTROL INTERRUPTS.

TO RECOVER, PERFORM 4.2.2.1.

4.2.1.5 THE PROGRAM WILL TYPE "CONTROL REGISTER ADDRESS-" AND WAIT FOR
AN INPUT FROM THE TELETYPE KEYBOARD.

4.2.1.6 TYPE A 6 DIGIT (OCTAL NUMBER) WHICH IS THE ADDRESS OF THE MODEM CONTROL'S CONTROL REGISTER FOLLOWED BY <RETURN>. IF AN INCORRECT ADDRESS IS TYPED, THE PROGRAM WILL TYPE "?" AND THEN REPEAT 4.2.1.6. SEQ 0004

NOTE: IF THE ADDRESS ENTERED IS ACCEPTIBLE TO THE PROGRAM BUT IS A NON-EXISTANT REGISTER, A BUS ERROR TRAP WILL OCCUR WHEN THE PROGRAM ADDRESSES THE REGISTER, AND THE PROGRAM WILL HALT AT LOCATION 6.

TO RECOVER, PERFORM 4.2.2.1.

4.2.1.7 THE PROGRAM WILL TYPE "LINE SELECTION PARAMETER-" AND WAIT FOR INPUT FROM THE TTY KEYBOARD.

4.2.1.8 TYPE AN OCTAL NUMBER TO SPECIFY THE LINES TO BE TESTED USING THE FOLLOWING ENCODING SCHEME:

```
BIT00 = 1       TEST LINE 00
BIT01 = 1       TEST LINE 01
BIT02 = 0       DO NOT TEST LINE 2
   "
   "
BIT15 = 1       TEST LINE 15

EG:     TYPING 377(8) SELECTS LINES 00 THRU 07
        TYPING 177777(8) SELECTS ALL 16 LINES
```

IF THE NO. TYPED IS NOT ACCEPTABLE, THE PROGRAM TYPES A "?" AND ASKS FOR THE LINE SELECT PARAMETER AGAIN.

4.2.1.9 THE PROGRAM WILL TYPE "TEST-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD.

4.2.1.10 TYPE A THREE DIGIT OCTAL NUMBER CORRESPONDING TO THE NUMBER OF THE TEST TO BE RUN FOLLOWED BY <RETURN>. IF AN INCORRECT TEST NUMBER IS TYPED THE PROGRAM WILL TYPE "?" AND THEN REPEAT 4.2.1.7 THE AVAILABLE TESTS TOGETHER WITH THE NUMBER TO BE TYPED ARE GIVEN BELOW.

```
TEST GROUP 0:
OFF LINE TESTS USING H861 TEST CONNECTOR-FIRST TEST=0
TEST GROUP 1:
OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100
TEST GROUP 2:
CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200
TEST GROUP 3:
CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300
```

4.2.1.11 THE PROGRAM WILL ENTER THE SELECTED TEST GROUP.

4.2.2 PROGRAM RESTART

4.2.2.1 WITH SWOO=1

LOAD ADDRESS 200
SET SWOO=1 BEFORE PRESSING START.
SOFTWARE SWITCH REGISTER IS LOC 176
PRESS START

PROGRAM WILL PERFORM AS DESCRIBED IN 4.2.1.3 TO 4.2.1.10.

4.2.2.2 WITH SWOO=0

LOAD ADDRESS 200
***SOFTWARE SWITCH REGISTER IS LOC. 176
PRESS START

PROGRAM WILL PERFORM AS DESCRIBED IN 4.2.1.7 TO 4.2.1.10

5.0 OPERATING PROCEDURE

5.1 TEST GROUP 0 16 LINE SCANNER TEST

5.1.1 TEST INITIALIZATION

NONE REQUIRED. PROGRAM TYPES "16 LINE SCANNER TEST"
AND BEGINS TEST EXECUTION.

5.1.2 OPERATIONAL SWITCH SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH
REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS
THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER.
IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES
AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH
REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH
REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY
DOING THE FOLLOWING:

1) TYPE CONTROL G (^G); THIS WILL ALLOW THE TTY TO ENTER DATA INTO
LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS
OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE
OF THE FOLLOWING AT THE TTY:

A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. SEQ 0006
ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS
WILL BE ALLOWED)
IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH
REGISTER CONTENTS WILL NOT BE CHANGED.

B) IF A CONTROL U <↑U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU
BACK TO STEP 2.

SW15=1, HALT ON ERROR
SW14=1, LOOP ON CURRENT TEST
SW13=1, SUPPRESS ERROR TYPEOUT
SW11=1, SUPPRESS ITERATIONS
SW10=1, ESCAPE TO NEXT TEST ON ERROR
SW09=1, FREEZE DATA

5.1.3 PROGRAM AND/OR OPERATOR ACTION

5.1.3.1 WITH ALL SWITCHES DOWN, THE PROGRAM WILL RUN
ALL TESTS IN THE SELECTED GROUP, SEQUENTIALLY. EACH TEST IS REPEATED
A FIXED NUMBER OF TIMES (SEE LISTING FOR DETAILS),
EXCEPT FOR T0 WHICH IS EXECUTED ONCE ONLY AFTER START OF TEST. WHEN ALL
TESTS HAVE BEEN COMPLETED, THE PROGRAM WILL ISSUE A "RESET", RING THE TELETYPE
BELL, AND RESTART AT THE FIRST TEST OF THE SELECTED GROUP.

IF AN ERROR OCCURS, THE PROGRAM WILL TYPE AN APPROPRIATE
ERROR MESSAGE AND CONTINUE TESTING.

5.1.3.2 WITH SW15=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT
A HALT WILL OCCUR AFTER ERROR TYPEOUT.
NOTE: IF USING THE SOFTWARE SWITCH REGISTER AND AN EROR
HALT OCCURS. THE SOFTWARE SWITCH REGISTER CAN BE CHANGED
BY PRESSING CONTINUE THE PROGRAM WILL RESPOND WITH THE FOLLOWING:
SWR=XXXXXX NEW=

5.1.3.3 WITH SW13=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT
NO ERROR TYPEOUT WILL OCCUR. THE PC OF THE TEST THAT FAILED
WILL BE DISPLAYED IN THE COMPUTER DATA LIGHTS.

5.1.3.4 THIS PROGRAM WILL NO LONGER TRACE TRAP WITH THIS RELEASE

5.1.3.5 WITH SW10=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT
AFTER AN ERROR HAS OCCURED, THE PROGRAM WILL IMMEDIATELY
START THE NEXT TEST IN SEQUENCE.

5.2 TEST GROUP 1 SINGLE LINE CABLE TEST SEQ 0007

5.2.1 TEST INITIALIZATION

THE PROGRAM WILL TYPE "SINGLE LINE CABLE TEST
LINE NUMBER-" AND WILL WAIT FOR AN INPUT FROM
THE TELETYPE KEYBOARD.

TYPE A 2 DIGIT OCTAL NUMBER BETWEEN 0 AND 17, CORRESPONDING
TO THE NUMBER OF THE LINE TO BE TESTED, FOLLOWED BY
<RETURN>. THE PROGRAM WILL THEN BEGIN TEST EXECUTION.
IF THE TELETYPE INPUT IS INCORRECT, THE PROGRAM
WILL TYPE "?" AND REPEAT THE MESSAGE.

5.2.2 OPERATIONAL SWITCH SETTINGS

SAME AS 5.1.2

5.2.3 PROGRAM AND/OR OPERATOR ACTION

SAME AS 5.1.3

5.3 TEST GROUP 2 BELL 103A MODEM CONNECT-DISCONNECT TEST

5.3.1 TEST INITIALIZATION

THE PROGRAM WILL TYPE "103A CONNECT-DISCONNECT TEST
ORIGINATE LINE-" AND WAIT FOR AN INPUT FROM THE TELETYPE
KEYBOARD.

TYPE THE NUMBER OF THE LINE THAT WILL ORIGINATE THE
CALL (0-17 OCTAL) FOLLOWED BY RETURN.

THE PROGRAM WILL TYPE "ANSWER LINE-" AND WILL WAIT
FOR AN INPUT FROM THE TELETYPE KEYBOARD.

TYPE THE NUMBER OF THE LINE THAT WILL ANSWER THE CALL
(0-17 OCTAL) FOLLOWED BY <RETURN>.

THE PROGRAM WILL TYPE "DIAL ANSWERING DATA SET"
AND WILL WAIT FOR THE ORIGINATE AND ANSWERING MODEMS
TO GENERATE INTERRUPTS.

5.3.2 OPERATOR ACTION TO MAKE TELEPHONE CONNECTION

AFTER THE MESSAGE "DIAL ANSWERING DATA SET" IS TYPED
THE OPERATOR HAS APPROXIMATELY 5 MINUTES TO ESTABLISH
A CONNECTION BETWEEN THE 2 DATA SETS.

5.3.2.1 PLACE ANSWERING DATA SET IN "AUTO ANSWER" MODE

5.3.2.2 PLACE ORIGINATING DATA SET IN "TALK" MODE

5.3.2.3 DIAL DIAL ANSWERING DATA SET FROM ORIGINATING DATA SET

5.3.2.4 LISTEN FOR TONE IN HANDSET OF ORIGINATING DATA SET.

WHEN TONE IS HEARD, PRESS "DATA" BUTTON ON ORIGINATING DATA SET.

"DATA" LIGHT SHOULD ILLUMINATE

5.3.2.5 "DATA" LIGHT ON ANSWERING DATA SET SHOULD BE LIT.

5.3.2.6 THE PROGRAM WILL NOW WAIT FOR INTERRUPTS FROM THE MODEM CONTROL.

5.3.2.7 IF THE CONNECTION HAS BEEN PROPERLY ESTABLISHED, THE PROGRAM WILL TYPE "TYPE TTY KEY TO DISCONNECT".

WHEN TTY KEY IS STRUCK, THE PROGRAM WILL BEGIN THE DISCONNECT SEQUENCE.

5.3.2.8 WHEN THE DISCONNECT SEQUENCE HAS BEEN COMPLETED THE PROGRAM WILL TYPE "103A TEST COMPLETE", AND WILL REQUEST THE OPERATOR TO SELECT NEW LINES.

5.3.3 PROGRAM ACTION IN CASE OF ERROR

5.3.3.1 RING ON INCORRECT LINE

IF THE PROGRAM DETECTS A RING SIGNAL ON AN INCORRECT LINE, OR IF ANY OTHER TRANSITION BESIDES RING IS DETECTED BEFORE RING, THE PROGRAM WILL TYPE A FATAL ERROR MESSAGE AND REQUEST THE OPERATOR TO RESELECT LINES AND REDIAL.

5.3.3.2 OTHER ERRORS

IF ANY ERRORS OCCUR AFTER THE FIRST RING HAS BEEN DETECTED, THE PROGRAM WILL TYPE AN APPROPRIATE ERROR MESSAGE AND CONTINUE TESTING TO COMPLETION.

THE ONLY EXCEPTION TO THIS IS IF AN INTERRUPT OCCURS ON A LINE NOT SELECTED, IN WHICH CASE A FATAL ERROR WILL BE REPORTED, AND THE PROGRAM WILL PROCEED AS DESCRIBED IN 5.3.3.1

5.3.4 OPERATION SWITCH SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G (↑G); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW=`` HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A (CR). (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED) IF A (CR) IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U (↑U) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

SW15=1, HALT ON ERROR
SW13=1, SUPPRESS ERROR TYPEOUT

5.3.5 DATA SET MODE SWITCHING

AFTER THE PROGRAM HAS TYPED THE MESSAGE DESCRIBED IN 5.3.2.7, BUT BEFORE TTY KEY IS STRUCK, THE OPERATOR MAY SWITCH EITHER DATA SET FROM THE MODE THAT IT IS IN TO ANOTHER MODE. ALL TRANSITIONS DETECTED AT THIS TIME WILL BE REPORTED.

NOTE: THE ORIGINATE DATA SET MUST BE RETURNED TO "TALK" MODE AND THE ANSWERING DATA SET TO "AUTO ANSWER" BEFORE DISCONNECT IS STARTED TO PREVENT ERRORS FROM BEING DETECTED THAT ARE CAUSED BY THE FACT THAT THE MODEM IS IN THE INCORRECT STATE.

5.4 TEST GROUP 3 BELL 202C MODEM CONNECT-DISCONNECT TEST

5.4.1 TEST INITIALIZATION

SAME AS 5.3.1 EXCEPT PROGRAM WILL TYPE "202C CONNECT DISCONNECT TEST".

5.4.2 OPERATOR ACTION TO MAKE TELEPHONE CONNECTION

SAME AS 5.3.2 EXCEPT AT END OF TEST, PROGRAM WILL TYPE "202C TEST COMPLETE".

5.4.3 PROGRAM ACTION IN CASE OF ERRORS

SAME AS 5.3.3

5.4.4 OPERATIONAL SWITCH SETTINGS

SAME AS 5.3.4

5.4.5 DATA SET MODE SWITCHING

SAME AS 5.3.5

5.5 TEST RESELECTION

TO ESCAPE FROM THE TEST IN PROGRESS, AND SELECT A NEW TEST, TYPE <CONTOL C>.

THE PROGRAM WILL STOP EXECUTION OF THE TEST IN PROGRESS AND THEN TYPE "TEST-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD.

PROCEED AS DESCRIBED IN 4.2.1.8

5.5 ADDRESS CHANGE

TO CHANGE THE VECTOR AND REGISTER ADDRESS OF THE MODEM CONTROL UNDER TEST, TYPE <CONTROL V>. THE PROGRAM WILL STOP EXECUTION OF THE TEST IN PROGRESS AND PROCEED AS DESCRIBED IN SECTION 4.2.1, EXCEPT THAT "MODEM CONTROL DIAGNOSTIC" WILL NOT BE TYPED.

5.6 LINE NUMBER CHANGE

TO CHANGE THE LINE NUMBER(S) UNDER TEST, TYPE <CONTROL L>. THE PROGRAM WILL SUSPEND THE TEST IN PROGRESS AND RETURN TO THE INITIALIZATION STAGE OF THE SELECTED TEST.

WHEN THE LINE NUMBER(S) HAS BEEN CHANGED, THE PROGRAM WILL RESTART THE SELECTED TEST USING THE NEW LINE NUMBER(S).

5.7 POWER FAILURE

IF A POWER FAIL TRAP OCCURS DURING TEST EXECUTION THE PROGRAM WILL SAVE THE GENERAL REGISTERS OF THE PROCESSOR AND HALT.

WHEN POWER UP OCCURS, THE PROGRAM WILL TYPE "POWER FAILURE-CURRENT TEST WILL BE RESTARTED".

THE PROGRAM WILL THEN RUSUME TEST EXECUTION.

NOTE: IF A TEST IS NOT IN PROGRESS, I.E., IF THE PROGRAM IS WAITING FOR AN INPUT FROM THE TELETYPE KEYBOARD, THE ERROR MESSAGE WILL BE "POWER FAILURE". THE PROGRAM WILL THEN REQUEST THE OPERATOR TO SELECT A TEST.

NOTE: IF MACHINE HAS A SOLID-STATE SWITCH REGISTER, THEN THE CONTENTS WILL BE LOST ON A POWER FAIL AND THEREFORE WILL HAVE TO BE RELOADED.

6.0 ERRORS

6.1 NORMAL OPERATION

IF AN ERROR OCCURS WITH ALL SWITCHES DOWN, THE PROGRAM WILL TYPE AN APPROPRIATE ERROR MESSAGE AND THEN RESUME TESTING.

THERE ARE SEVERAL ERROR MESSAGE FORMATS, AND THE PARTICULAR MESSAGE TYPED DEPENDS UPON THE TEST IN PROGRESS.

6.1.1 ERROR MESSAGES

6.1.1.1 UNIQUE ERROR

ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER

AN EXAMPLE OF THIS TYPE OF ERROP IS:

1. AN INTERRUPT OCCURED AT THE WRONG PRIORITY
2. A REGISTER BIT WAS NOT CLEARED BY RESET

6.1.1.2 TRANSITION DETECTION ERROR

THIS ERROR WILL OCCUR IN ONE OF THE ON-LINE TESTS
IF AN EXPECTED INTERRUPT DOES NOT OCCUR, OR IF
AN UNEXPECTED INTERRUPT DOES OCCUR, ON THE LINES
UNDER TEST.

FORMAT FOR ERROR TYPEOUT IS

```
XXXXXX TRANSITION ERROR
EXP   REC   LINE
AA    BB    CC
```

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER
BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
CC=LINE ON WHICH ERROR OCCURED

6.1.1.3 SINGLE LINE STATUS ERROR

THIS ERROR WILL OCCUR IN ANY TEST, OFF LINE OR ON-LINE
WHEN THE EXPECTED AND RECEIVED LINE STATUS ARE NOT
THE SAME.

FORMAT FOR SINGLE LINE STATUS ERROR IS

```
XXXX LINE ERROR
EXP   REC   LINE
AAA   BBB   CC
```

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AAA=EXPECTED LINE STATUS AT TIME OF ERROR
BBB=RECEIVED LINE STATUS AT TIME OF ERROR
CC=LINE ON WHICH ERROR CCCURED

6.1.1.4 FATAL TRANSITION ERROR SEQ 0013

THIS ERROR WILL OCCUR IN AN ON-LINE TEST IF AN INTERRUPT
OCCURS ON A LINE NOT SELECTED FOR TESTING.

FORMAT FOR FATAL ERROR TYPEOUT IS

```
XXXXXX FATAL ERROR
CSTAT  LSTAT
AAAAAA BBB
```

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AAAAAA=RECEVICED CONTROL STATUS ON LINE THAT INTERRUPTED
BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED

6.1.1.4 CONTROL STATUS ERROR

THIS ERROR WILL OCCUR IN A TEST THAT PRIMARILY
INVOLVES THE LINE SCANNER

FORMAT FOR CONTROL STATUS ERROR IS

```
XXXXXX STATUS ERROR
EXP    REC
AAAAAA BBBBBB
```

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
BBBBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR

6.1.1.5 LINE STATUS ERROR

THIS ERROR WILL OCCUR IN THOSE OFF LINE TESTS THAT
SET ONE LINE TO A PARTICULAR STATE, AND THEN CHECK
ALL OTHER LINES

FORMAT FOR LINE STATUS ERROR IS

```
XXXX LINE ERROR
EXP   REC   LINE  SEL
AAA   DDD   CC    DD
```

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AAA=EXPECTED LINE STATUS AT TIME OF ERROR
BBB=RECEIVED LINE STATUS AT TIME OF ERROR
CC=LINE ON WHICH ERROR OCCURED
DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING

6.1.2 REPEATED ERRORS

IF THE SAME ERROR OCCURS REPEATEDLY IN A GIVEN TEST
ONLY THE DATA RELATING TO THAT ERROR WILL BE TYPED
IF THE ERROR OCCURS IN THE SAME TEST ON THE SAME PASS

6.2 SCOPE LOOPS SEQ 0014

NOTE: SCOPE LOOPING APPLIES ONLY TO TEST GROUPS 0 AND 1

6.2.1 AFTER ERROR HALT

TO LOOP ON A GIVEN TEST AFTER AN ERROR HALT,
SET SW15=0 TO RUN WITHOUT STOPPING
SET SW14=1 TO LOOP ON CURRENT TEST
SET SW13=1 TO SUPPRESS ERROR TYPEOUT
SET SW10=0 (IF IT IS 1)
SET SW09=1 TO LOOP ON SAME DATA (IF REQUIRED)

***IF USING SOFTWARE SWITCH REGISTER AND YOU WANT TO CHANGE
THE SWITCH SETTING TYPE A <^G> BEFORE CONTINUING.
PRESS CONTINUE

THE PROGRAM WILL LOOP ON THE SAME TEST.

6.2.2 FROM PROGRAM START

6.2.2.1 PROCEED AS DESCRIBED IN 4.2.1.1 TO 4.2.1.4

6.2.2.2 WHEN THE PROGRAM TYPES "TEST-", SET SW14=1 TO LOOP
ON THE TEST THAT WILL BE SELECTED.

6.2.2.3 TYPE IN THE NUMBER OF THE TEST THAT IS TO BE LOOPED
ON (SEE LISTING FOR TEST NUMBER REFERENCE DESIGNATIONS)

6.2.2.4 THE PROGRAM WILL LOOP ON THE SELECTED TEST UNTIL
SW14=0.

6.2.3 AFTER <CONTROL>

SAME AS 6.2.2.2 TO 6.2.2.4

7.0 RESTRICTIONS

7.1 STARTING

7.1.1 FOR 16 LINE SCANNER TEST

H861 TEST CONNECTOR MUST BE INSTALLED.

7.1.2 FOR SINGLE LINE CABLE TEST

H315 TEST CONNECTOR MUST BE INSTALLED ON MODEM CABLE

7.1.3 FOR ON LINE TESTS

NONE

NONE.

7.3 WHEN ON ACT-11 OR "XOR"
PROGRAM WILL DEFAULT TO 16 LINE SCANNER TEST
H8SI TEST CONNECTOR MUST BE INSTALLED.

7.4 DEFAULT PARAMETERS (INCLUDING ACT-11 & "XOR")

VECTORS

CHMVEC: 300 (AUTOMATICALLY GENERATED
CHMLVL: 302 BY PROGRAM WHEN UNDER ACT-11 OR "XOR")
ADDRESSES

CHMCSR: 170500
CHMLSR: 170502

NOTE: SWDD.RESELECT ADDRESSES AND VECTORS BECOMES
INOPERATIVE UNDER ACT-11 OR "XOR".

8.0 EXECUTION TIME

8.1 16 LINE SCANNER TEST

THE TIME FOR 2 PASSES OF THE 16 LINE SCANNER TEST IS APPROXIMATELY 1.5 MINUTES.

8.2 SINGLE LINE CABLE TEST

THE TIME FOR 12 PASSES OF THE SINGLE LINE CABLE TEST IS APPROXIMATELY 1 MINUTE.

8.3 103A MODEM CONNECT-DISCONNECT TEST

APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE TIME THAT THE ANSWERING DATA SET FIRST DETECTS A RING SIGNAL TO THE TIME THAT THE PROGRAM TYPES "SET SW01=1 TO DISCONNECT".

APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE TIME THAT THE PROGRAM TYPES THE ABOVE MESSAGE UNTIL THE TIME THAT THE PROGRAM TYPES "103A TEST COMPLETE".

8.4 202C MODEM CONNECT-DISCONNECT TEST

APPROXIMATELY 1.5 MINUTES WILL ELAPSE BETWEEN THE TIME THAT THE ANSWERING DATA SET DETECTS THE FIRST RING SIGNAL TO THE TIME THAT THE PROGRAM TYPES "SET SW01=1 TO DISCONNECT".

APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE TIME THAT THE PROGRAM TYPES THE ABOVE MESSAGE UNTIL THE PROGRAM TYPES "202C TEST COMPLETE".

9. PROGRAM DESCRIPTION

THIS PROGRAM CONSISTS OF A SERIES OF TEST GROUPS LINKED BY A SET OF COMMON SERVICE ROUTINES AND A KEYBOARD MONITOR.

WHEN INITIALLY LOADED AND STARTED ...SW00 MUST BE SET =1. THE PROGRAM WILL BEGIN A DIALOG WITH THE OPERATOR TO INPUT THE PARAMETERS REQUIRED BY THE PROGRAM.

WHEN ALL INFORMATION HAS BEEN INPUTTED, THE PROGRAM WILL REQUEST THE OPERATOR TO SELECT A TEST BY TYPING THE NUMBER OF THE TEST TO BE RUN. WHEN A CORRECT TEST NUMBER IS RECEIVED, THE PROGRAM WILL BEGIN EXECUTION OF THE SELECTED TEST.

AT ANY TIME DURING TEST EXECUTION, THE OPERATOR MAY CHANGE A TEST PARAMETER BY ENTERING THE APPROPRIATE COMMAND VIA THE TELETYPE KEYBOARD.

9. CONT'D

IF AN OFF LINE TEST HAS BEEN SELECTED, THAT TEST WILL BE REPEATED UNTIL THE OPERATOR INTERVENES.

IF AN ON LINE TEST HAS BEEN SELECTED, THE OPERATOR IS REQUIRED TO TAKE ACTION EACH TIME THE TEST IS COMPLETED.

AT THE END OF EVERY OFF LINE TEST PASS, THE PROGRAM WILL RING THE TELETYPE BELL.

AT THE END OF AN ON LINE TEST, A TEST COMPLETE MESSAGE WILL BE TYPED.

10. LISTING

```
                        .TITLE  D2DHK-C
                        .ENABLE ABS,AMA
                                ;MODEM CONTROL DIAGNOSTIC
                                ;COPYRIGHT 1971, 1972, 1976, DIGITAL EQUIPMENT CORP., MAYNARD,MASS. 01754
                                ;THIS PROGRAM CONTAINS TEST OF THE MODEM CONTROL IN
                                ;THE OFF LINE MODE OF OPERATION ONLY
                                ;MODIFIED BY ED CROWLEY APRIL, 1976
                                ;MODIFIED BY S. CARPENTER JULY, 1976 TO SUPPORT  THE SOFTWARE SWITCH REGISTER.
                                ;ALSO, SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER.

                                ;SWITCH REGISTER OPTIONS


                                ;SW15=1, HALT ON ERROR
                                ;SW14=1, LOOP ON CURRENT TEST
                                ;SW13=1, SUPPRESS ERROR TYPEOUT
                                ;SW12=1, SUPPRESS TRACE TRAPPING(THIS IS INOPERATIVE IN THIS RELEASE)
                                ;SW11=1, SUPPRESS ITERATIONS
                                ;SW10=1, ESCAPE TO NEXT TEST ON ERROR
                                ;SW09=1, FREEZE DATA
                                ;SW01=1, START DISCONNECT SEQUENCE
                                ;SW00=1, RESELECT VECTOR AND CONTROL REGISTER ADDRESS
                                        ;AFTER PROGRAM RESTART

                                ;STARTING ADDRESS FOR ALL TESTS IS 000200
                                ;RESTART ADDRESS=000200

                                ;TESTS AVAILABLE

                                ;TEST GROUP 0-
                                ;OFF LINE TESTS USING H861 TEST CONNECTOR-FIRST TEST=0
                                ;TEST GROUP 1-
                                ;OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100
                                ;TEST GROUP 2-
                                ;CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200
                                ;TEST GROUP 3-
                                ;CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300

                        ;SYMBOL DEFINITIONS

100000                  SW15=100000
040000                  SW14=40000
020000                  SW13=20000
010000                  SW12=10000
004000                  SW11=4000
002000                  SW10=2000
001000                  SW09=1000
000400                  SW08=400
000100                  SW06=100

                        .NLIST  MC,MD,CND
                        .LIST   ME
```

```
                                ;REGISTER DEFINITIONS

000000                          R0=%0           ;GENERAL REGISTER
000001                          R1=%1           ;GENERAL REGISTER
000002                          R2=%2           ;GENERAL REGISTER
000003                          R3=%3           ;GENERAL REGISTER
000004                          R4=%4           ;GENERAL REGISTER
000005                          R5=%5           ;GENERAL REGISTER
000006                          SP=%6           ;PROCESSOR STACK POINTER
000007                          PC=%7           ;PROGRAM COUNTER

                                ;LOCATION EQUIVALENCIES

177776                          PS=177776       ;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
015430                          RADIX=DIVIS     ;CONVERSION FACTOR FOR DECIMAL OUTPUT
015424                          BINWRD=DIVIDL   ;WORD TO BE CONVERTED TO OCTAL ASCII
015426                          DIGIT=DIVIDH    ;ASCII OCTAL DIGIT

                                ;CONTROL STATUS REGISTER BIT FUNCTIONS

000020                          BUSY=20         ;LINE SCANNER RUNNING
000040                          SCNENA=40       ;LINE SCANNER ENABLE
000100                          INTENA=100      ;INTERRUPT ENABLE
000200                          DONE=200        ;SCANNER DONE
000400                          STEP=400        ;CAUSES LINE COUNTER TO BE INCREMENTED BY 1 COUNT
001000                          MAINT=1000      ;FORCES IS TO INPUT OF SCRATCH PAD MEMORY
002000                          CLRMUX=2000     ;CLEAR MULTIPLEXER FUNCTION FLIPFLOPS
004000                          CLRSCN=4000     ;CLEARS SCANNER SCRATCHPAD MEMORY
010000                          SECRXF=10000    ;SECONDARY RECEIVE TRANSITION WAS DETECTED BY SCANNER
020000                          CSF=20000       ;CLEAR TO SEND TRANSITION WAS DETECTED BY SCANNER
040000                          COF=40000       ;CARRIER TRANSITION WAS DETECTED BY SCANNER
100000                          RINGF=100000    ;RING SIGNAL WAS DETECTED BY SCANNER

                                ;LINE REGISTER BIT FUNCTIONS

000001                          LINENA=1        ;=1, RECOGNIZE TRANSITIONS ON THIS LINE
000002                          TRMRDY=2        ;=1, SEND TERMINAL READY TO MODEM
000004                          RS=4            ;=1, SEND REQUEST TO SEND TO MODEM
000010                          SECTX=10        ;=1, SEND SECONDARY TRANSMIT TO MODEM
000020                          SECRX=20        ;=1, SECONDARY RECEIVE TURNED ON BY MODEM
000040                          CS=40           ;=1, CLEAR TO SEND TURNED ON BY MODEM
000100                          CO=100          ;=1, CARRIER TURNED ON BY MODEM
000200                          RING=200        ;=1, RING TURNED ON BY MODEM

                                ;SOFTWARE TRANSITION FLAGS

000004                          XCO=4           ;CARRIER TRANSITION WAS DETECTED
000002                          XCS=2           ;CLEAR TO SEND TRANSITION WAS DETECTED
000001                          XSCRX=1         ;SECONDARY RECEIVE TRANSITION WAS DETECTED
```

```
                                ;INSTRUCTION DEFINITIONS

005746                          PUSH1SP=5746    ;DECREMENT PROCESSOR STACK 1 WORD
005726                          POP1SP=5726     ;INCREMENT PROCESSOR STACK 1 WORD
010046                          PUSHR0=10046    ;SAVE R0 ON STACK
012600                          POPR0=12600     ;RESTORE R0 FROM STACK
024646                          PUSH2SP=24646   ;DECREMENT STACK TWICE
022626                          POP2SP=22626    ;INCREMENT STACK TWICE


                                        ;EMT DEFINITION TABLE

104000                                  ERRORC=EMT+X            ;CONTROL STATUS ERROR SERVICE
104001                                  ERRORL=EMT+X            ;LINE STATUS ERROR SERVICE
104002                                  SCOPE=EMT+X             ;SCOPE LOOP AND ITERATION SERVICE
104003                                  SCOPEF=EMT+X            ;DATA FREEZE SERVICE
104004                                  TYPE=EMT+X              ;TELETYPE OUTPUT
104005                                  SAVOSP=EMT+X            ;SAVE R0-R5, PC+2 OF CALL
104006                                  OCTASC=EMT+X            ;CONVERT DATA TO ASCII AND TYPE
104007                                  RESO5=EMT+X             ;RESTORE R0-R5
104010                                  CONVERT=EMT+X           ;ASCII CONVERSION ROUTINE
104011                                  EXTRACT=EMT+X           ;DIGIT EXTRACTION ROUTINE
104012                                  ERROR=EMT+X             ;TYPE PC OF FAILING TESTS ONLY
104013                                  INSTRG=EMT+X            ;INPUT OCTAL DATA STRING
104014                                  ERRORT=EMT+X            ;TRANSITION ERROR
104015                                  ERRORS=EMT+X            ;ON LINE STATUS ERROR
104016                                  ERRORN=EMT+X            ;FATAL TRANSITION
104017                                  GETLNS=EMT+X            ;INPUT LINE NUMBERS
104020                                  SETUP=EMT+X             ;SET UP FOR ON LINE TEST
104021                                  CKRING=EMT+X            ;CHECK FOR RING ON CORRERT LINE
104022                                  WAITRN=EMT+X            ;WAIT FOR TRANSITIONS
104023                                  CKTRAN=EMT+X            ;CHECK TRANSITIONS
104024                                  WAITS=EMT+X             ;DELAY FOR TRANSIENTS
104025                                  CNTLUU=EMT+X            ;CHANGE SWREG ROUTINE
104026                                  CKINTT=EMT+X            ;CHECK FOR INTERRUPTS-FLAG STYLE
104027                                  KBDIN=EMT+X             ;FAKE INTERRUPT ENTRY POINT
```

```
                                        ;TRAPCATCAER FOR ILLEGAL INTERRUPTS
000000                          .=0
                                .REPT 200
                                        .+2
                                        HALT
                                .ENDR
```

```
                                        ;STANDARD INTERRUPT VECTORS

                    000024          .=24
000024  016176                      PFAIL                   ;POWER FAIL HANDLER
000026  000340                      340                     ;SERVICE AT LEVEL 7
000030  014120                      EMTSRV                  ;EMT DISPATCH SERVICE
000032  000340                      340                     ;SERVICE AT LEVEL 7

                    000046          .=46
000046  014102                      LOGICAL                 ;ACT11?

                    000060          .=60
000060  001760                      KBDINT                  ;KEYBOARD MONITOR
000062  000340                      340                     ;SERVICE AT LEVEL 7
                    000174          .=174
000174  000000                      DISPREG:        0
000176  000000                      SWREG:  0

                    000200          .=200
000200  000137  001100              JMP     START           ;GO TO START OF PROGRAM
```

```
                        001100                  .=1100
001100                  STACK:
001100  012737  016176  000024  START:  MOV     #PFAIL,24               ;SET UP POWER FAIL
                                                                        ;INTERRUPT SERVICE VECTOR
001106  005037  001756          CLR     TIPFLG                          ;CLEAR TEST IN PROGRESS FLAG
001112  005077  015472          CLR     @TKCSR
001116  012706  001100          MOV     #STACK,SP                       ;SET UP STACK POINTER

001122  013746  000006  SUSWR:  MOV     @#6,-(SP)                       ;SAVE VECTORS
001126  013746  000004          MOV     @#4,-(SP)
001132  012737  001152  000004  MOV     #64$,@#4                        ;SET UP FOR TIMEOUT
001140  022777  177777  015452  CMP     #-1,@SWR                        ;REFERENCE HARDWARE SWITCH REGISTER
001146  001402                  BEQ     65$
001150  000407                  BR      66$
001152  022626          64$:    CMP     (SP)+,(SP)+                     ;ADJUST STACK
001154  012737  000176  016620  65$:    MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
001162  012737  000174  016622          MOV     #DISPREG,DISPLAY        ;POINT TO SOFT DISPLAY REG
001170  012637  000004          66$:    MOV     (SP)+,@#4               ;RESTORE VECTORS
001174  012637  000006          MOV     (SP)+,@#6
001200  012777  000100  015402          MOV     #INTENA,@TKCSR          :ENABLE TELETYPE INTERRUPTS
001206  005037  001252          CLR     XFLAG   ;XOR = NO
                                ;***************************************************************
                                ;REPLACE THE FOLLOWING BRANCH WITH A "NOP" (240) TO ACTIVATE "XOR" CODE
                                ;***************************************************************
001212  000423                  BR      STARTO                          ;SKIP XOR STUFF
001214  013746  000004          MOV     4,-(SP) ;SAVE 4
001220  012737  001254  000004  MOV     #XORSVC,4       ;SET UP SVC ROUTINE
001226  005737  177060          TST     177060  ;GOT AN XOR TESTER OUT THERE ?
001232  012637  000004          MOV     (SP)+,4 ;YES
001236  005137  001252          COM     XFLAG   ;XOR = YES
001242  004737  016320          JSR     PC,XOR          ;AUTO VECTOR
001246  000137  001262          JMP     STARTO          ;RESTORE TRAPCATCHER
001252  000000          XFLAG:  0                       ;XOR FLAG
001254  022626          XORSVC: POP2SP
001256  012637  000004          MOV     (SP)+,4 ;RESTORE 4
001262  005737  016710  STARTO: TST     TIFLG                           ;TYPED TITLE?
001266  001005                  BNE     .+14                            ;YES
001270  104004                  TYPE                                    ;TYPE "MODEM CONTROL DIAGNOSTIC"
001272  017510                  MTITLE
001274  012737  000001  016710  MOV     #1,TIFLG                        ;SET TITLE TYPED FLAG
001302  005737  001252          TST     XFLAG                           ;X OR
001306  100422                  BMI     VECSTR                          ;RESTORE TRAPCATCHER
001310  005737  000042          TST     42              ;ACT 11?
001314  001403                  BEQ     START1          ;NO
001316  004737  016320          JSR     PC,XOR          ;YES  AUTO VECTOR
001322  000414                  BR      VECSTR                  ;GET VECTOR AND REGISTER ADDRESS
001324  005737  000042  START1: TST     @#42                    ;UNDER MONITOR?
001330  001005                  BNE     1$
001332  022737  000176  016620  CMP     #SWREG,SWR              ;USING SWREG?
001340  001001                  BNE     1$
001342  104025                  CNTLUU
001344  032777  000001  015246  1$:     BIT     #1,@SWR                 ;IF SW BIT 0=1, ON PROGRAM RESTART
001352  001510                  BEQ     STARTN                  ;INPUT VECTOR AND REGISTER ADDRESSES
001354  012706  001100  VECSTR: MOV     #STACK,SP               ;SET UP PROCESSOR STACK POINTER
001360  012737  000300  014026          MOV     #300,DATA1              ;ADDRESS OF FIRST FLOATING VECTOR
```

```
   230  001366  012737  000302  014030          10$     #302,DATA2              ;ADDRESS OF STATUS WORD
   231  001374  013777  014030  012424  VECSTA. MOV     DATA2,@DATA1            ;MOVE ADDRESS OF STATUS WORD TO VECTOR
   232  001402  005077  012422                  CLR     @DATA2                  ;CLEAR STATUS WORD
   233                                                                          ;(FOR HALT ON ILLEGAL INTERRUPT)
   234  001406  062737  000004  014026          ADD     #4,DATA1                ;NEXT VECTOR
   235  001414  062737  000004  014030          ADD     #4,DATA2                ;NEXT STATUS WORD
   236  001422  023727  014026  001000          CMP     DATA1,#1000             ;IS TABLE CLEARED
   237  001430  001361                          BNE     VECSTA                  ;IF NOT, CONTINUE
   238  001432  005737  001252                  TST     XFLAG           ;XOR ?
   239  001436  100523                          BMI     TSTGO           ;YES
   240  001440  005737  000042                  TST     42              ;ACT 11 ?
   241  001444  001120                          BNE     TSTGO           ;YES
   242  001446  104013                          INSTRG                          ;GET VECTOR ADDRESS
   243  001450  017574                          MVECTOR                         ;MESSAGE "VECTOR ADDRESS-"
   244  001452  000300                          300                             ;LOWER LIMIT FOR ADDRESS
   245  001454  000774                          774                             ;UPPER LIMIT FOR ADDRESS
   246  001456  016600                          DHMVEC                          ;STORAGE FOR ADDRESS
   247  001460  032737  000003  016600  1$:     BIT     #3,DHMVEC               ;TEST 2 LSB OF ADDRESS
   248  001466  001404                          BEQ     VECST1                  ;IF 0, CONTINUE
   249  001470  012716  001460                  MOV     #1$,(SP)
   250  001474  000137  016026                  JMP     INSTER                  ;INCORRECT ADDRESS, TRY AGAIN
   251  001500  013737  016600  016602  VECST1: MOV     DHMVEC,DHMLVL           ;GENERATE ADDRESS OF
   252  001506  062737  000002  016602          ADD     #2,DHMLVL               ;INTERRUPT STATUS WORD
   253  001514  104013                          INSTRG                          ;GET ADDRESS OF CONTROL REGISTER
   254  001516  017616                          MREGAD                          ;MESSAGE "REGISTER ADDRESS-"
   255  001520  170500                          170500                          ;LOWER LIMIT FOR ADDRESS
   256  001522  170670                          170670                          ;UPPER LIMIT FOR ADDRESS
   257  001524  016604                          DHMCSR                          ;STORAGE FOR ADDRESS
   258  001526  032737  000007  016604  1$:     BIT     #7,DHMCSR               ;IF 3 LSB ARE NOT 0
   259  001534  001404                          BEQ     REGST1
   260  001536  012716  001526                  MOV     #1$,(SP)
   261  001542  000137  016026                  JMP     INSTER                  ;INCORRECT ADDRESS, TRY AGAIN
   262  001546  013737  016604  016606  REGST1: MOV     DHMCSR,DHMLSR           ;SET UP ADDRESS OF LINE STATUS REGISTER
   263  001554  062737  000002  016606          ADD     #2,DHMLSR
   264  001562  104013                          INSTRG                          ;GET LINE SELECT PARAMETER
   265  001564  017652                          MLINSL
   266  001566  000000                          0
   267  001570  177777                          177777
   268  001572  016712                          LINSEL
```

```
 269
 270  001574  012706  001100          STARTN: MOV     #STACK,SP               ;SET UP PROCESSOR STACK
 271  001600  104013                          INSTRG                          ;GET TEST NUMBER
 272  001602  017704                          MTEST                           ;MESSAGE "TEST-"
 273  001604  000000                          0                               ;LOWER LIMIT FOR TEST NUMBER
 274  001606  000777                          777                             ;UPPER LIMIT FOR TEST NUMBER
 275  001610  016632                          TSTNO                           ;STORAGE FOR TEST NUMBER
 276  001612  013705  016632          X1A:    MOV     TSTNO,R5                ;GET TEST NUMBER
 277  001616  042705  177077                  BIC     #177077,R5              ;EXTRACT TEST GROUP NUMBER
 278  001622  006205                          ASR     R5
 279  001624  006205                          ASR     R5
 280  001626  006205                          ASR     R5
 281  001630  006205                          ASR     R5
 282  001632  006205                          ASR     R5
 283  001634  016537  020426  016666          MOV     GRO(R5),TSTMAX          ;GET HIGHEST TEST IN GROUP
 284  001642  016537  020406  016664          MOV     TSTLST(R5),TSTPNT       ;GET POINTER TO TEST TABLE
 285  001650  005737  016664                  TST     TSTPNT                  ;IF 0, INVALID TEST GROUP
 286  001654  001004                          BNE     STRTOA
 287  001656  012716  001612          X1B:    MOV     #X1A,(SP)
 288  001662  000137  016026                  JMP     INSTER                  ;TRY AGAIN
 289  001666  042737  177700  016632  STRTOA: BIC     #177700,TSTNO           ;GET NUMBER OF FIRST TEST
 290                                                                          ;TO BE EXECUTED IN SELECTED GROUP
 291  001674  023737  016632  016666          CMP     TSTNO,TSTMAX            ;IS NUMBER TOO LARGE
 292  001702  003401                          BLE     TSTGO
 293  001704  000764                          BR      X1B
 294  001706  012746  000340          TSTGO:  MOV     #340,-(SP)              ;SET UP PRIORITY LEVEL
 295  001712  005746                          PUSH1SP
 296  001714  000005                          RESET
 297  001716  012737  002202  002204          MOV     #DMYRTI,KRET            ;SET UP DUMMY KEYBOARD RETURN
 298  001724  005037  016670                  CLR     LINFLG                  ;CLEAR LINE SELECTED FLAG
 299  001730  005037  016626                  CLR     TRACON                  ;CLEAR TRACE TRAP FLAG
 300  001734  005037  016630                  CLR     PASCNT                  ;CLEAR PASS COUNT
 301  001740  104004                          TYPE
 302  001742  017720                          MCRLF
 303  001744  012737  000001  001756  1$:     MOV     #1,TIPFLG               ;SET TEST IN PROGRESS FLAG
 304  001752  000137  014334                  JMP     TSTENT                  ;START TESTING
 305  001756  000000          TIPFLG: 0
```

```
                                        ;TELETYPE KEYBOARD INTERRUPT SERVICE ROUTINE

001760  005037  001756          KBDINT: CLR     TIPFLG                  ;CLEAR TEST IN PROGRESS FLAG
001764  005037  015254                  CLR     TMP1
001770  005037  002206                  CLR     SINTFL                  ;CLEAR SOFTWARE INTERRUPT FLAG
001774  117737  014612  015254          MOVB    @TKDBR,TMP1
002002  142737  000200  015254          BICB    #200,TMP1
002010  122737  000003  015254          CMPB    #3,TMP1                 ;IF <CNTROL C> WAS TYPED
002016  001011                          BNE     KBDIN1                  ;TYPE "↑C" AND
002020  104004                          TYPE                            ;SELECT NEW TEST
002022  020150                          MCONTC
002024  022626                          POP2SP
002026  005077  014552                  CLR     @DHMCSR
002032  005077  014552                  CLR     @TKCSR
002036  000137  001574                  JMP     STARTN
002042  122737  000026  015254  KBDIN1: CMPB    #26,TMP1                ;IF <CONTROL V> WAS TYPED
002050  001011                          BNE     KBDIN2                  ;TYPE "↑V" AND GET NEW
002052  104004                          TYPE                            ;VECTOR AND REGISTER ADDRESS
002054  020153                          MCONTV
002056  022626                          POP2SP
002060  005077  014520                  CLR     @DHMCSR
002064  005077  014520                  CLR     @TKCSR
002070  000137  001354                  JMP     VECSTR
002074  122737  000014  015254  KBDIN2: CMPB    #14,TMP1                ;IF <CONTROL L> WAS TYPED
002102  001015                          BNE     KBDIN3                  ;TYPE "↑L" AND GET NEW
002104  104004                          TYPE                            ;LINE NUMBERS, UNLESS
002106  020156                          MCONTL                          ;TEST GROUP 0 WAS IN PROGRESS
002110  022737  002202  002204          CMP     #DMYRTI,KRET            ;IF <CONTROL L> WAS TYPED IN TEST
002116  001431                          BEQ     DMYRTI                   GROUP 0, IGNORE
002120  022626                          POP2SP
002122  005077  014456                  CLR     @DHMCSR
002126  005077  014456                  CLR     @TKCSR
002132  000177  000046                  JMP     @KRET
002136  005737  000042          KBDIN3: TST     @#42
002142  001011                          BNE     1$
002144  022737  000176  016620          CMP     #SWREG,SWR
002152  001005                          BNE     1$
002154  122737  000007  015254          CMPB    #7,TMP1                 ;IS IT <↑G>
002162  001001                          BNE     1$
002164  104025                          CNTLUU
002166  012737  000001  002206  1$:     MOV     #1,SINTFL               ;SET SOFTWARE INTERRUPT FLAG
002174  012737  000001  001756          MOV     #1,TIPFLG               ;SET TEST IN PROGRESS FLAG
002202  000002                  DMYRTI: RTI
                                        .EVEN
002204  000000                  KRET:   0
002206  000000                  SINTFL: 0
```

```
                                        ;INITIALIZATION CHECK - PERFORMED ONLY AT PROGRAM START
                                        ;VERIFY THAT CONTROL STATUS REGISTER AND LINE STATUS
                                        ;REGISTER WERE CLEARED BY INITIALIZE

 002310                          T0:                                    ;REFERENCE DESIGNATION
 002310  104004                         TYPE                           ;TYPE "16 LINE SCANNER TEST"
 002312  017455                         M16
 002314  005737  014364        INIT1:  TST     @DHMCSR                ;TEST CONTROL STATUS REGISTER
 002320  001401                         BEQ     .+4
 002322  104012                         ERROR                          ;CONTROL STATUS NOT CLEARED, ERROR
 002324  005737  014356                 TST     @DHMLSR                ;TEST LINE STATUS REGISTER
 002330  001401                         BEQ     .+4
 002332  104012                         ERROR                          ;LINE STATUS NOT CLEARED, ERROR
 002334  104002                         SCOPE                          ;CHECK FOR LOOP

                                        ;VERIFY THAT "INTERRUPT ENABLE" CAN BE
                                        ;SET AND CLEARED.

 002336                          T1:                                    ;REFERENCE DESIGNATION
 002336  012777  000100  014340 CSTR1:  MOV     #INTENA,@DHMCSR        ;SET INTERRUPT ENABLE
 002344  032777  000100  014332         BIT     #INTENA,@DHMCSR        ;WAS INTERRUPT ENABLE SET
 002352  001001                         BNE     .+4
 002354  104012                         ERROR                          ;NO, ERROR
 002356  042777  000100  014320         BIC     #INTENA,@DHMCSR        ;CLEAR INTERRUPT ENABLE
 002364  032777  000100  014312         BIT     #INTENA,@DHMCSR        ;WAS INTERRUPT ENABLE CLEARED
 002372  001401                         BEQ     .+4
 002374  104012                         ERROR                          ;NO, ERROR
 002376  104002                         SCOPE                          ;CHECK FOR ITERATIONS, LOOP

                                        ;VERIFY THAT "DONE" CAN BE SET AND CLEARED

 002300                          T2:                                    ;REFERENCE DESIGNATION
 002300  012777  000200  014276 CSTR2:  MOV     #DONE,@DHMCSR          ;SET DONE
 002306  032777  000200  014270         BIT     #DONE,@DHMCSR          ;WAS DONE SET
 002314  001001                         BNE     .+4
 002316  104012                         ERROR                          ;NO, ERROR
 002320  042777  000200  014256         BIC     #DONE,@DHMCSR          ;CLEAR DONE
 002326  032777  000200  014250         BIT     #DONE,@DHMCSR          ;WAS DONE CLEARED
 002334  001401                         BEQ     .+4
 002336  104012                         ERROR                          ;NO, ERROR
 002340  104002                         SCOPE                          ;CHECK FOR ITERATIONS, LOOP

                                        ;VERIFY "MAINTENANCE MODE" CAN BE SET AND CLEARED

 002342                          T3:                                    ;REFERENCE DESIGNATION
 002342  012777  001000  014234 CSTR3:  MOV     #MAINT,@DHMCSR         ;SET MAINTENANCE MODE
 002350  032777  001000  014226         BIT     #MAINT,@DHMCSR         ;WAS MAINTENANCE MODE SET
 002356  001001                         BNE     .+4
 002360  104012                         ERROR                          ;NO, ERROR
 002362  042777  001000  014214         BIC     #MAINT,@DHMCSR         ;CLEAR MAINTENANCE MODE
 002370  032777  001000  014206         BIT     #MAINT,@DHMCSR         ;WAS MAINTENANCE MODE CLEARED
 002376  001401                         BEQ     .+4
 002400  104012                         ERROR                          ;NO, ERROR
 002402  104002                         SCOPE                          ;CHECK FOR ITERATIONS, LOOP
```

```
                                        ;VERIFY THAT "SCAN ENABLE" CAN BE SET AND CLEARED.

002404                          T4:                             ;REFERENCE DESIGNATION
002404  012777  000040  014172  CSTR4:  MOV     #SCNENA,@DHMCSR ;SET SCAN ENABLE
002412  032777  000040  014164          BIT     #SCNENA,@DHMCSR ;WAS SCAN ENABLE SET
002420  001001                          BNE     .+4

002422  104012                          ERROR                   ;NO, ERROR
002424  042777  000040  014152          BIC     #SCNENA,@DHMCSR ;CLEAR SCAN ENABLE
002432  032777  000040  014144          BIT     #SCNENA,@DHMCSR ;WAS SCAN ENABLE CLEARED
002440  001401                          BEQ     .+4

002442  104012                          ERROR                   ;NO, ERROR
002444  104002                          SCOPE                   ;CHECK FOR ITERATIONS, LOOP

                                        ;VERIFY THAT "BUSY" IS SET WHEN "SCAN ENABLE" IS SET
                                        ;VERIFY THAT "BUSY" IS CLEARED WHEN "SCAN ENABLE" IS CLEARED

002446                          T5:                             ;REFERENCE DESIGNATION
002446  012777  000040  014130  CSTR5:  MOV     #SCNENA,@DHMCSR ;SET SCAN ENABLE
002454  032777  000020  014122          BIT     #BUSY,@DHMCSR   ;IS BUSY BIT SET
002462  001001                          BNE     .+4
002464  104012                          ERROR                   ;BUSY NOT SET, ERROR
002466  042777  000040  014110          BIC     #SCNENA,@DHMCSR ;CLEAR SCAN ENABLE
002474  032777  000020  014102          BIT     #BUSY,@DHMCSR   ;IS BUSY BIT CLEARED
002502  001401                          BEQ     .+4
002504  104012                          ERROR                   ;BUSY NOT CLEARED, ERROR
002506  104002                          SCOPE                   ;CHECK FOR LOOP, ITERATIONS

                                        ;VERIFY THAT SETTING "DONE" DOES NOT CAUSE AN
                                        ;INTERRUPT IF "INTERRUPT ENABLE" IS CLEARED.

002510                          T6:                             ;REFERENCE DESIGNATION
002510  052737  000340  177776  INT1:   BIS     #340,PS         ;LOCK OUT INTERRUPTS
002516  005077  014062                  CLR     @DHMCSR         ;CLEAR CONTROL REGISTER
002522  012777  002556  014050          MOV     #INT1A,@DHMVEC  ;SET UP INTERRUPT SERVICE ADDRESS
002530  013777  177776  014044          MOV     PS,@DHMLVL      ;SET UP INTERRUPT PRIORITY
002536  052777  000200  014040          BIS     #DONE,@DHMCSR   ;SET DONE
002544  042737  000340  177776          BIC     #340,PS         ;ALLOW INTERRUPTS
002552  000240                          NOP                     ;DELAY FOR INTERRUPT
002554  000402                          BR      INT1B           ;NO INTERRUPT, CONTINUE
002556  022626          INT1A:  POP2SP                          ;RESTORE STACK, INTERRUPT
002560  104012                          ERROR                   ;OCCURED, ERROR
002562  104002          INT1B:  SCOPE                           ;CHECK FOR LOOP, ITERATIONS
```

```
                                        ;VERIFY THAT NO INTERRUPT OCCURS WITH "INTERRUPT ENABLE"
                                        ;SET AND "DONE" CLEARED.

002564                          T7:                             ;REFERENCE DESIGNATION
002564  052737  000340  177776  INT2:   BIS     #340,PS         ;LOCK OUT INTERRUPTS
002572  005077  014006          CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
002576  012777  002632  013774  MOV     #INT2A,@DHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
002604  013777  177776  013770  MOV     PS,@DHMLVL              ;SET UP INTERRUPT SERVICE LEVEL
002612  052777  000100  013764  BIS     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
002620  042737  000340  177776  BIC     #340,PS                 ;ALLOW INTERRUPTS
002626  000240                  NOP                             ;DELAY FOR INTERRUPTS
002630  000402                  BR      INT2B                   ;NO INTERRUPT, CONTINUE
002632  022626          INT2A:  POP2SP                          ;RESTORE STACK
002634  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
002636  104002          INT2B:  SCOPE                           ;CHECK FOR ITERATIONS, LOOP

                                        ;VERIFY THAT SETTING "DONE" CAUSES AN INTERRUPT
                                        ;WITH "INTERRUPT ENABLE" SET

002640                          T10:                            ;REFERENCE DESIGNATION
002640  052737  000340  177776  INT3:   BIS     #340,PS         ;LOCK OUT INTERRUPTS
002646  005077  013732          CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
002652  012777  002724  013720  MOV     #INT3A,@DHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
002660  012777  000100  013716  MOV     #INTENA,@DHMCSR         ;SET "INTERRUPT ENABLE"
002666  013777  177776  013706  MOV     PS,@DHMLVL              ;SET "INTERRUPT LEVEL"
002674  042737  000340  177776  BIC     #340,PS                 ;ALLOW INTERRUPTS
002702  052777  000200  013674  BIS     #DONE,@DHMCSR           ;SET "DONE"
002710  000240                  NOP                             ;DELAY FOR INTERRUPT
002712  000240                  NOP
002714  005077  013664          CLR     @DHMCSR
002720  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
002722  000401                  BR      INT3B                   ;CONTINUE
002724  022626          INT3A:  POP2SP                          ;INTERRUPT OCCURED, RESTOR STACK
002726  104002          INT3B:  SCOPE                           ;CHECK FOR ITERATION, LOOP


                                        ;VERIFY THAT NO INTERRUPT OCCURS WITH
                                        ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 7.

002730                          T11:                            ;REFERENCE DESIGNATION
002730  005077  013650          INT4:   CLR     @DHMCSR         ;CLEAR CONTROL REGISTER
002734  042737  000340  177776          BIC     #340,PS         ;SET PROCESSOR PRIORITY
002742  052737  000340  177776          BIS     #340,PS         ;TO LEVEL 7.
002750  012777  003012  013622          MOV     #INT4A,@DHMVEC  ;SET UP INTERRUPT SERVICE ADDRESS
002756  013777  177776  013616          MOV     PS,@DHMLVL      ;SET UP INTERRUPT SERVICE LEVEL
002764  012777  000100  013612          MOV     #INTENA,@DHMCSR ;SET INTERRUPT ENABLE
002772  052777  000200  013604          BIS     #DONE,@DHMCSR   ;GENERATE INTERRUPT
003000  000240                  NOP                             ;DELAY FOR INTERRUPT
003002  000240                  NOP
003004  005077  013574          CLR     @DHMCSR
003010  000402                  BR      INT4B                   ;NO INTERRUPT, CONTINUE
003012  022626          INT4A:  POP2SP                          ;RESTORE STACK
003014  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
003016  104002          INT4B:  SCOPE                           ;CHECK FOR ITERATION, LOOP
```

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                                        ;VERIFY THAT NO INTERRUPT OCCURS WITH
                                        ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 6.

003020                          T12:                                    ;REFERENCE DESIGNATION
003020  005077  013560          INT5:   CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003024  042737  000340  177776        BIC     #340,PS                 ;SET PROCESSOR PRIORITY
003032  052737  000300  177776        BIS     #300,PS                 ;TO LEVEL 6.
003040  012777  003102  013532        MOV     #INT5A,@DHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
003046  013777  177776  013526        MOV     PS,@DHMLVL              ;SET UP INTERRUPT SERVICE LEVEL
003054  012777  000100  013522        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003062  052777  000200  013514        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003070  000240                        NOP                             ;DELAY FOR INTERRUPT
003072  000240                        NOP
003074  005077  013504                CLR     @DHMCSR
003100  000402                        BR      INT5B                   ;NO INTERRUPT, CONTINLE
003102  022626          INT5A:  POP2SP                                  ;RESTORE STACK
003104  104012                  ERROR                                   ;INTERRUPT OCCURED, ERROR
003106  104002          INT5B:  SCOPE                                   ;CHECK FOR ITERATION, LOOP

                                        ;VERIFY THAT NO INTERRUPT OCCURS WITH
                                        ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 5.

003110                          T13:                                    ;REFERENCE DESIGNATION
003110  005077  013470          INT6:   CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003114  042737  000340  177776        BIC     #340,PS                 ;SET PROCESSOR PRIORITY
003122  052737  000240  177776        BIS     #240,PS                 ;TO LEVEL 5.
003130  012777  003172  013442        MOV     #INT6A,@DHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
003136  013777  177776  013436        MOV     PS,@DHMLVL              ;SET UP INTERRUPT SERVICE LEVEL
003144  012777  000100  013432        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003152  052777  000200  013424        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003160  000240                        NOP                             ;DELAY FOR INTERRUPT
003162  000240                        NOP
003164  005077  013414                CLR     @DHMCSR
003170  000402                        BR      INT6B                   ;NO INTERRUPT, CONTINUE
003172  022626          INT6A:  POP2SP                                  ;RESTORE STACK
003174  104012                  ERROR                                   ;INTERRUPT OCCURED, ERROR
003176  104002          INT6B:  SCOPE                                   ;CHECK FOR ITERATION, LOOP

                                        ;VERIFY THAT NO INTERRUPT OCCURS WITH
                                        ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 4.

003200                          T14:                                    ;REFERENCE DESIGNATION
003200  005077  013400          INT7:   CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003204  042737  000340  177776        BIC     #340,PS                 ;SET PROCESSOR PRIORITY
003212  052737  000200  177776        BIS     #200,PS                 ;TO LEVEL 4.
003220  012777  003262  013352        MOV     #INT7A,@DHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
003226  013777  177776  013346        MOV     PS,@DHMLVL              ;SET UP INTERRUPT SERVICE LEVEL
003234  012777  000100  013342        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003242  052777  000200  013334        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003250  000240                        NOP                             ;DELAY FOR INTERRUPT
003252  000240                        NOP
003254  005077  013324                CLR     @DHMCSR
003260  000402                        BR      INT7B                   ;NO INTERRUPT, CONTINUE
003262  022626          INT7A:  POP2SP                                  ;RESTORE STACK
003264  104012                  ERROR                                   ;INTERRUPT OCCURED, ERROR
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   563  003266  104002                  INTTB:  SCOPE                   ;CHECK FOR ITERATION, LOOP
```

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                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 0.

003270                          T15:                                    ;REFERENCE DESIGNATION
003270  005077  013310          INT10:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003274  042737  000340  177776        BIC     #340,PS                 ;ALLOW INTERRUPTS
003302  012777  003352  013270        MOV     #INT10A,@DHMVEC         ;SET UP INTERRUPT SERVICE ADDRESS
003310  005077  013266                CLR     @DHMLVL                 ;SET UP INTERRUPT SERVICE PRIORITY
003314  052737  000000  177776        BIS     #0,PS                   ;SET PROCESSOR PRIORITY TO LEVEL 0.
003322  012777  000100  013254        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003330  052777  000200  013246        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003336  000240                        NOP                             ;WAIT FOR INTERRUPT
003340  000240                        NOP
003342  005077  013236                CLR     @DHMCSR
003346  104012                        ERROR                           ;NO INTERRUPT, ERROR
003350  000401                        BR      INT10B                  ;CONTINUE
003352  022626          INT10A: POP2SP                                  ;INTERRUPT OCCURED, RESTORE STACK
003354  104002          INT10B: SCOPE                                   ;CHECK FOR INTERATIONS, LOOP.

                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 1.

003356                          T16:                                    ;REFERENCE DESIGNATION
003356  005077  013222          INT11:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003362  042737  000340  177776        BIC     #340,PS                 ;ALLOW INTERRUPTS
003370  012777  003440  013202        MOV     #INT11A,@DHMVEC         ;SET UP INTERRUPT SERVICE ADDRESS
003376  005077  013200                CLR     @DHMLVL                 ;SET UP INTERRUPT SERVICE PRIORITY
003402  052737  000040  177776        BIS     #40,PS                  ;SET PROCESSOR PRIORITY TO LEVEL 1.
003410  012777  000100  013166        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003416  052777  000200  013160        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003424  000240                        NOP                             ;WAIT FOR INTERRUPT
003426  000240                        NOP
003430  005077  013150                CLR     @DHMCSR
003434  104012                        ERROR                           ;NO INTERRUPT, ERROR
003436  000401                        BR      INT11B                  ;CONTINUE
003440  022626          INT11A: POP2SP                                  ;INTERRUPT OCCURED, RESTORE STACK
003442  104002          INT11B: SCOPE                                   ;CHECK FOR INTERATIONS, LOOP.

                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 2.

003444                          T17:                                    ;REFERENCE DESIGNATION
003444  005077  013134          INT12:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003450  042737  000340  177776        BIC     #340,PS                 ;ALLOW INTERRUPTS
003456  012777  003526  013114        MOV     #INT12A,@DHMVEC         ;SET UP INTERRUPT SERVICE ADDRESS
003464  005077  013112                CLR     @DHMLVL                 ;SET UP INTERRUPT SERVICE PRIORITY
003470  052737  000100  177776        BIS     #100,PS                 ;SET PROCESSOR PRIORITY TO LEVEL 2.
003476  012777  000100  013100        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003504  052777  000200  013072        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003512  000240                        NOP                             ;WAIT FOR INTERRUPT
003514  000240                        NOP
003516  005077  013062                CLR     @DHMCSR
003522  104012                        ERROR                           ;NO INTERRUPT, ERROR
003524  000401                        BR      INT12B                  ;CONTINUE
```

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   620  003526  022626                INT12A: POP2SF                  ;INTERRUPT OCCURED, RESTORE STACK
   621  003530  104002                INT12B: SCOPE                   ;CHECK FOR INTERATIONS, LOOP.
```

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622
623                                             ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
624                                             ;ENABLE" SET AND "DONE" SET AT PRIORITY 3.
625
626  003532                             T20:                                ;REFERENCE DESIGNATION
627  003532  005077  013046             INT13:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
628  003536  042737  000340  177776             BIC     #340,PS             ;ALLOW INTERRUPTS
629  003544  012777  003614  013026             MOV     #INT13A,@DHMVEC     ;SET UP INTERRUPT SERVICE ADDRESS
630  003552  005077  013024                     CLR     @DHMLVL             ;SET UP INTERRUPT SERVICE PRIORITY
631  003556  052737  000140  177776             BIS     #140,PS             ;SET PROCESSOR PRIORITY TO LEVEL 3.
632  003564  012777  000100  013012             MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
633  003572  052777  000200  013004             BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
634  003600  000240                             NOP                         ;WAIT FOR INTERRUPT
635  003602  000240                             NOP
636  003604  005077  012774                     CLR     @DHMCSR
637  003610  104012                             ERROR                       ;NO INTERRUPT, ERROR
638  003612  000401                             BR      INT13B              ;CONTINUE
639  003614  022626                 INT13A:     POP2SP                      ;INTERRUPT OCCURED, RESTORE STACK
640  003616  104002                 INT13B:     SCOPE                       ;CHECK FOR INTERATIONS, LOOP.
```

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                                        ;VERIFY THAT ALL LINE NUMBERS CAN BE WRITTEN INTO AND
                                        ;READ BACK FROM LINE COUNTER

003620                          T21:                                    ;REFERENCE DESIGNATION
003620  005077  012760          LINT1:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
003624  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
003632  012737  000001  016714        MOV     #1,SELMSK               ;INIT LINE SELECT MASK
003640  005005                        CLR     R5                      ;CLEAR EXPECTED LINE NUMBER
003642  012700  000020                MOV     #16.,R0                 ;SET UP TO TEST 16 LINE NUMBERS
003646  033737  016714  016712  LINT1A: BIT     SELMSK,LINSEL           ;THIS LINE SELECTED ??
003654  001407                        BEQ     LINT1B                  ;BR IF NOT
003656  010577  012722                MOV     R5,@DHMCSR              ;SET LINE NUMBER
003662  017704  012716                MOV     @DHMCSR,R4              ;READ BACK LINE NUMBER
003666  020504                        CMP     R5,R4                   ;ARE EXPECTED AND RECEIVED
003670  001401                        BEQ     LINT1B                  ;LINE NUBMERS THE SAME
003672  104000                        ERRORC                          ;LINE NUMBERS DIFFERENT, ERROR
003674  104003          LINT1B: SCOPEF                                  ;CHECK FOR DATA FREEZE
003676  003646                        LINT1A                          ;RETURN FOR DATA FREEZE
003700  005205                        INC     R5                      ;UPDATE LINE COUNT
003702  006337  016714                ASL     SELMSK                  ;SELECT NEXT LINE TO TEST
003706  005300                        DEC     R0                      ;UPDATE LINE NUMBER
003710  001356                        BNE     LINT1A                  ;CONTINUE
003712  104002                        SCOPE                           ;CHECK FOR ITERATION, LOOP

                                        ;USING "STEP" MODE, VERIFY THAT THE
                                        ;LINE COUNTER CAN BE STEPPED THRU ALL STATES.

003714                          T22:                                    ;REFERENCE DESIGNATION
003714  042737  000340  177776  LINT2:  BIC     #340,PS                 ;ENABLE INTERRUPTS
003722  005077  012656                CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
003726  005005                        CLR     R5                      ;CLEAR EXPECTED LINE COUNT
003730  012737  000001  016714        MOV     #1,SELMSK               ;SET UP SELECT MASK
003736  012701  177777                MOV     #-1,R1                  ;INIT LINE COUNTER
003742  012700  000020                MOV     #16.,R0                 ;SET UP TO TEST 16 VALUES
003746  012777  000017  012630        MOV     #17,@DHMCSR             ;FIRST VALUE =0
003754  033737  016714  016712  LINT2A: BIT     SELMSK,LINSEL           ;THIS LINE SELECTED ??
003762  001410                        BEQ     LINT2B                  ;BR IF NOT
003764  052777  000400  012612        BIS     #STEP,@DHMCSR           ;STEP LINE COUNTER
003772  017704  012606                MOV     @DHMCSR,R4              ;READ LINE COUNTER
003776  020504                        CMP     R5,R4                   ;COMPARE EXPECTED AND
004000  001401                        BEQ     LINT2B                  ;RECEIVED LINE NUMBERS
004002  104000                        ERRORC                          ;LINE COUNTER ERROR
004004  104003          LINT2B: SCOPEF                                  ;CHECK FOR DATA FREEZE
004006  003714                        LINT2
004010  005205                        INC     R5                      ;UPDATE EXPECTED LINE NUMBER
004012  006337  016714                ASL     SELMSK                  ;SHIFT SELECT MASK
004016  005201                        INC     R1                      ;GEN NEW LINE NO.
004020  010177  012560                MOV     R1,@DHMCSR              ;SET NEW LINE NO. IN CSR
004024  005300                        DEC     R0
004026  001352                        BNE     LINT2A
004030  104002                        SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
                                        ;WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS.
                                        ;VERIFY THAT ALL LOCATIONS HAVE BEEN WRITTEN
                                        ;TO 1'S.
                                        ;VERIFY THAT "CLEAR SCAN" CLEARS ALL SCANNER
                                        ;MEMORY LOCATIONS.

004032                          T23:                                    ;REFERENCE DESIGNATION
004032  012777  002000  012544  MEMT1:  MOV     #CLRMUX,@DHMCSR         ;CLEAR CONTROL STATUS REGISTER
004040  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
004046  012700  000020                  MOV     #16.,R0                 ;SET UP TO TEST 16 LOCATIONS
004052  052777  001017  012524          BIS     #MAINT+17,@DHMCSR       ;SET MAINTEANCE MODE
004060  052777  000400  012516  MEMT1A: BIS     #STEP,@DHMCSR           ;SET LINE COUNTER THRU ALL
004066  005300                          DEC     R0                      ;STATES, WRITING 1'S INTO
004070  001373                          BNE     MEMT1A                  ;ALL MEMORY WORDS
004072  012700  000020                  MOV     #16.,R0                 ;SET UP TO TEST 16 WORDS
004076  012705  070000                  MOV     #70000,R5               ;SET UP EXPECTED STATUS REGISTER
004102  012777  000017  012474          MOV     #17,@DHMCSR             ;START WITH LINE 0
004110  052777  000400  012466  MEMT1B: BIS     #STEP,@DHMCSR           ;ACCESS SCANNER MEMORY
004116  017704  012462                  MOV     @DHMCSR,R4              ;READ DATA
004122  020504                          CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
004124  001403                          BEQ     MEMT1C                  ;DATA
004126  104000                          ERRORC                          ;CONTROL STATUS OR MEMORY ERROR
004130  104003                          SCOPEF                          ;CHECK FOR DATA FREEZE
004132  004032                          MEMT1
004134  005205                  MEMT1C: INC     R5                      ;UPDATE EEXPECTED STATUS
004136  005300                          DEC     R0                      ;UPDATE LINE COUNT
004140  001363                          BNE     MEMT1B                  ;CONTINUE
004142  012777  004000  012434  MEMT1D: MOV     #CLRSCN,@DHMCSR         ;SET "CLEAR SCAN"
004150  032777  000020  012426          BIT     #BUSY,@DHMCSR           ;WAIT FOR "CLEAR CYCLES"
004156  001374                          BNE     .-6
004160  012700  000020                  MOV     #16.,R0                 ;SET UP TO TEST 16 MEMORY
004164  005005                          CLR     R5                      ;LOCATIONS
004166  012777  000017  012410          MOV     #17,@DHMCSR             ;FIRST TO BE TESTED=0
004174  052777  000400  012402  MEMT1E: BIS     #STEP,@DHMCSR           ;ACCESS SEANNER MEMORY
004202  017704  012376                  MOV     @DHMCSR,R4              ;READ DATA
004206  020504                          CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
004210  001403                          BEQ     MEMT1F                  ;DATA
004212  104000                          ERRORC                          ;CONTROL  STATUS OF MEMORY ERROR
004214  104003                          SCOPEFF                         ;CHECK FOR DATA FREEZE
004216  004142                          MEMT1D
004220  005205                  MEMT1F: INC     R5                      ;UPDATE EXPECTED DATA
004222  005300                          DEC     R0                      ;UPDATE LINE COUNT
004224  001363                          BNE     MEMT1E                  ;CONTTINUE
004226  104002                          SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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                                        ;WRITE 1'S INTO SELECTED SCANNER MEMORY LOCATION.
                                        ;VERIFY THAT ONLY SELECTED LOCATION WAS WRITTEN INTO.

004230                          T24:                            ;REFERENCE DESIGNATION
004230  005077  012350          MEMT2:  CLR     @DHMCSR         ;CLEAR CONTROL STATUS REGISTER
004234  042737  000340  177776          BIC     #340.PS         ;ENABLE INTERRUPTS
004242  012700  000020                  MOV     #16.,R0         ;SET UP TO TEST 16 ADDRESSES
004246  012702  000017                  MOV     #17,R2          ;FIRST ADDRESS TO BE TESTED=0
004252  012777  004000  012324  MEMT2A: MOV     #CLRSCN,@DHMCSR ;CLEAR ACANNER MEMORY
004260  032777  000020  012316          BIT     #BUSY,@DHMCSR   ;WAIT FOR CLEAR CYCLE
004266  001374                  BNE     .-6
004270  012777  001000  012306          MOV     #MAINT,@DHMCSR  ;SET "MAINTENANCE MODE"
004276  050277  012302                  BIS     R2,@DHMCSR      ;SET LINE COUNTER TO TEST ADDRESS-1
004302  052777  000400  012274          BIS     #STEP,@DHMCSR   ;WRITE 1'S INTO TEST ADDRESS
004310  042777  001000  012266          BIC     #MAINT,@DHMCSR  ;CLEAR "MAINTENANCE MODE"
004316  012703  000020                  MOV     #16.,R3         ;SET UP TO TEST ALL 16
004322  012777  000017  012254          MOV     #17,@DHMCSR     ;SCANNER MEMORY LOCATIONS
004330  005202                  INC     R2
004332  005001                  CLR     R1
004334  052777  000400  012242  MEMT2B: BIS     #STEP,@DHMCSR   ;ACCESS SCANNER MEMORY
004342  117704  012236                  MOVB    @DHMCSR,R4      ;READ CONPENTS OF MEMORY
004346  010105                  MOV     R1,R5           ;SET UP EXPECTED CONTENTS
004350  120402                  CMPB    R4,R2           ;OF SCANNER MEMORY
004352  001002                  BNE     MEMT2C
004354  052705  070000                  BIS     #70000,R5
004360  020405          MEMT2C: CMP     R4,R5           ;COMPARE EXPECTED AND RECEIVED
004362  001403                  BEQ     MEMT2D          ;VALUES
004364  104000                  ERRORC                  ;SCANNER MEMORY ERROR
004366  104003                  SCOPEF                  ;CHECK FOR DATA FREEZE
004370  004252                  MEMT2A
004372  005201          MEMT2D: INC     R1
004374  005303                  DEC     R3              ;TEST NEXT SCANNEB LOCATION
004376  001356                  BNE     MEMT2B
004400  005300                  DEC     R0              ;UPDATE LINE COUNT
004402  001323                  BNE     MEMT2A
004404  104002                  SCOPE                   ;CHECK FOR ITERATION, LOOP
```

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                                        ;WITH ALL ACANNER MEMORY LOCATIONS SET TO 1'S.
                                        ;WRITE 0'S INTO SELECTED LOCATION
                                        ;VERIFY THAT ONLY SELECTED LOCATION WAS CLEARED.

004406                          T25:                                    ;REFERENCE DESIGNATION
004406  005077  012172          MEMT3:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
004412  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
004420  012700  000020                MOV     #16.,R0                 ;SET UP TO TEST 16 ADDRESSES
004424  012702  000017                MOV     #17,R2                  ;FIRST ADDRESS TO BE TESTED=0
004430  012703  000020          MEMT3A: MOV     #16.,R3                 ;WRITE 1'S INTO ALL SCANNER
004434  012777  001017  012142        MOV     #MAINT+17,@DHMCSR       ;MEMORY LOCATIONS
004442  052777  000400  012134  MEMT3B: BIS     #STEP,@DHMCSR
004450  005303                        DEC     R3
004452  001373                        BNE     MEMT3B
004454  010277  012124                MOV     R2,@DHMCSR              ;SET LINE COUNTER TO TEST ADDRESS-1
004460  052777  000400  012116        BIS     #STEP,@DHMCSR           ;WRITE 0'S INTO TEST ADDRESS
004466  012703  000020                MOV     #16.,R3                 ;SET UP TO TEST ALL 16
004472  012777  000017  012104        MOV     #17,@DHMCSR             ;SCANNER MEMORY LOCATIONS
004500  005202                        INC     R2
004502  005001                        CLR     R1
004504  052777  000400  012072  MEMT3C: BIS     #STEP,@DHMCSR           ;ACESS SCANNER MEMORY
004512  117704  012066                MOVB    @DHMCSR,R4              ;READ CONTENTS OF MEMORY
004516  010105                        MOV     R1,R5                   ;SET UP EXPECTED CONTENTS
004520  120402                        CMPB    R4,R2                   ;OF SCANNER MEIORY
004522  001002                        BNE     MEMT3D
004524  052705  070000                BIS     #70000,R5
004530  020405          MEMT3D: CMP     R4,R5                   ;COMPARE EXPECTED AND
004532  001403                  BEQ     MEMT3E                  ;RECEIVED VALUES
004534  104000                  ERRORC                          ;SCANNER MEMORY ERROR
004536  104003                  SCOPEF                          ;CHECK FOR DATA FREEZE
004540  004430                  MEMT3A
004542  005201          MEMT3E: INC     R1
004544  005303                  DEC     R3                      ;TEST NEXT SCANNER LOCATION
004546  001356                  BNE     MEMT3C
004550  005300                  DEC     R0                      ;UPDATE ADDRESS COUNT
004552  001326                  BNE     MEMT3A
004554  104002                  SCOPE                           ;CHECK FOR ITERATION LOOP
```

```
                                                ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
                                                ;BE SET AND CLEARED FOR SELECTED LINE

004556                          T26:                                    ;REFERENCE DESIGNATION
004556  005077  012022          MUX1:   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
004562  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
004570  012700  000020                MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
004574  012737  000001  016714        MOV     #1,SELMSK               ;INIT LINE SELECT MASK
004602  005001                        CLR     R1                      ;START AT LINE 0
004604  012777  002000  011772  MUX1A: MOV     #CLRMUX,@DHMCSR
004612  012702  000020                MOV     #16.,R2
004616  033737  016714  016712        BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
004624  001463                        BEQ     MUX1F                   ;BR IF NOT
004626  010177  011752                MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
004632  012777  000001  011746        MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE FUNCTION FLIP-FLOP
004640  012737  000001  016716        MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
004646  005077  011732                CLR     @DHMCSR
004652  005005          MUX1B:        CLR     R5
004654  033737  016716  016712        BIT     SLMSK,LINSEL            ;SELECTED ??
004662  001417                        BEQ     MUX1D                   ;BR IF NOT
004664  017704  011716                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
004670  117703  011710                MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
004674  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
004700  020103                        CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
004702  001002                        BNE     MUX1C                   ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
004704  012705  000001                MOV     #LINENA,R5
                                                                        ;TO BE SET
004710  020504          MUX1C:        CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
004712  001403                        BEQ     MUX1D                   ;RESULTS
004714  104001                        ERRORL                          ;LINE STATUS ERROR
004716  104003                        SCOPEF
004720  004722                        MUX1D
004722  052777  000400  011654  MUX1D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
004730  006337  016716                ASL     SLMSK                   ;SHIFT MASK
004734  005302                        DEC     R2
004736  001345                        BNE     MUX1B
004740  005005                        CLR     R5
004742  010177  011636          MUX1E: MOV     R1,@DHMCSR
004746  010103                        MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
004750  005077  011632                CLR     @DHMLSR                 ;CLEAR LINE ENABLE FLIP FLOP
004754  105227  000000                INCB    #0                      ;DELAY FOR CABLE
004760  001375                        BNE     .-4                     ;DITTO
004762  017704  011620                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
004766  005704                        TST     R4                      ;WAS LINE ENABLE FUNCTION FLIP FLOP
004770  001401                        BEQ     MUX1F                   ;CLEARED
004772  104001                        ERRORL                          ;NO, LINE STATUS ERROR
004774  104003          MUX1F:        SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
004776  004604                        MUX1A
005000  006337  016714                ASL     SELMSK                  ;SHIFT SELECT MASK
005004  005201                        INC     R1                      ;SELECT NEXT LINE
005006  005300                        DEC     R0                      ;DECREMENT LINE COUNT
005010  001275                        BNE     MUX1A                   ;CONTINU IF NOT DONE
005012  104002                        SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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                                                ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN
                                                ;BE SET AND CLEARED FOR SELECTED LINE

005014                          T27:                                    ;REFERENCE DESIGNATION
005014  005077  011564          MUX2:  CLR     @DHMCSR                  ;CLEAR CONTROL STATUS REGISTER
005020  042737  000340  177776        BIC     #340,PS                  ;ENABLE INTERRUPTS
005026  012700  000020              MOV     #16.,R0                  ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
005032  012737  000001  016714        MOV     #1,SELMSK                ;INIT LINE SELECT MASK
005040  005001                      CLR     R1                       ;START AT LINE 0
005042  012777  002000  011534  MUX2A: MOV     #CLRMUX,@DHMCSR
005050  012702  000020              MOV     #16.,R2
005054  033737  016714  016712        BIT     SELMSK,LINSEL            ;IS THIS LINE SELECTED FOR TEST ?
005062  001463                      BEQ     MUX2F                    ;BR IF NOT
005064  010177  011514              MOV     R1,@DHMCSR               ;SELECT LINE TO BE TESTED
005070  012777  000002  011510      MOV     #TRMRDY,@DHMLSR          ;SET TERMINAL READY FUNCTION FLIP-FLOP
005076  012737  000001  016716      MOV     #1,SLMSK                 ;INIT ANOTHER SELECT MASK
005104  005077  011474              CLR     @DHMCSR
005110  005005                  MUX2B: CLR     R5
005112  033737  016716  016712        BIT     SLMSK,LINSEL             ;SELECTED ??
005120  001417                      BEQ     MUX2C                    ;BR IF NOT
005122  017704  011460              MOV     @DHMLSR,R4               ;READ LINE STATUS REGISTER
005126  117703  011452              MOVB    @DHMCSR,R3               ;READ CONTROL STATUS REGISTER
005132  042703  177760              BIC     #177760,R3               ;CLEAR UNWANTED BITS
005136  020103                      CMP     R1,R3                    ;IF LINE NUMBER=SELECTED LINE NUMBER,
005140  001002                      BNE     MUX2C                    ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
005142  012705  000002              MOV     #TRMRDY,R5
                                                                        ;TO BE SET
005146  020504                  MUX2C: CMP     R5,R4                    ;COMPARE EXPECTED AND RECEIVED
005150  001403                      BEQ     MUX2D                    ;RESULTS
005152  104001                      ERRORL                           ;LINE STATUS ERROR
005154  104003                      SCOPEF
005156  005160                      MUX2D
005160  052777  000400  011416  MUX2D: BIS     #STEP,@DHMCSR            ;EXAMINE NEXT LINE
005166  006337  016716              ASL     SLMSK                    ;SHIFT MASK
005172  005302                      DEC     R2
005174  001345                      BNE     MUX2B
005176  005005                      CLR     R5
005200  010177  011400      - : -MUX2E: MOV     R1,@DHMCSR
005204  010103                      MOV     R1,R3                    ;SET LINE COUNTER TO SELECTED LINE
005206  005077  011374              CLR     @DHMLSR                  ;CLEAR TERMINAL READY FLIP FLOP
005212  105227  000000              INCB    #0                       ;DELAY FOR CABLE
005216  001375                      BNE     .-4                      ;DITTO
005220  017704  011362              MOV     @DHMLSR,R4               ;READ LINE STATUS REGISTER
005224  005704                      TST     R4                       ;WAS TERMINAL READY FUNCTION FLIP FLOP
005226  001401                      BEQ     MUX2F                    ;CLEARED
005230  104001                      ERRORL                           ;NO, LINE STATUS ERROR
005232  104003                  MUX2F: SCOPEF                           ;CHECK FOR LOOP ON SAME DATA
005234  005042                      MUX2A
005236  006337  016714              ASL     SELMSK                   ;SHIFT SELECT MASK
005242  005201                      INC     R1                       ;SELECT NEXT LINE
005244  005300                      DEC     R0                       ;DECREMENT LINE COUNT
005246  001275                      BNE     MUX2A                    ;CONTINU IF NOT DONE
005250  104002                      SCOPE                            ;CHECK FOR ITERATIONS, LOOP
```

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                                        ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
                                        ;BE SET AND CLEARED FOR SELECTED LINE

005252                          T30:                                    ;REFERENCE DESIGNATION
005552  005077  011326          MUX3:   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
005256  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
005264  012700  000020                MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
005270  012737  000001  016714        MOV     #1,SELMSK               ;INIT LINE SELECT MASK
005276  005001                        CLR     R1                      ;START AT LINE 0
005300  012777  002000  011276  MUX3A: MOV     #CLRMUX,@DHMCSR
005306  012702  000020                MOV     #16.,R2
005312  033737  016714  016712        BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
005320  001463                        BEQ     MUX3F                   ;BR IF NOT
005322  010177  011256                MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
005326  012777  000004  011252        MOV     #R5,@DHMLSR             ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
005334  012737  000001  016716        MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
005342  005077  011236                CLR     @DHMCSR
005346  005005                MUX3B:  CLR     R5
005350  033737  016716  016712        BIT     SLMSK,LINSEL            ;SELECTED ??
005356  001417                        BEQ     MUX3D                   ;BR IF NOT
005360  017704  011222                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005364  117703  011214                MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
005370  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
005374  020103                        CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
005376  001002                        BNE     MUX3C                   ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
005400  012705  000004                MOV     #R5,R5
                                                                        ;TO BE SET
005404  020504                MUX3C:  CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
005406  001403                        BEQ     MUX3D                   ;RESULTS
005410  104001                        ERRORL                          ;LINE STATUS ERROR
005412  104003                        SCOPEF
005414  005416                        MUX3D
005416  052777  000400  011160  MUX3D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
005424  006337  016716                ASL     SLMSK                   ;SHIFT MASK
005430  005302                        DEC     R2
005432  001345                        BNE     MUX3B
005434  005005                        CLR     R5
005436  010177  011142          MUX3E: MOV     R1,@DHMCSR
005442  010103                        MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
005444  005077  011136                CLR     @DHMLSR                 ;CLEAR REQUEST TO SEND FLIP FLOP
005450  105227  000000                INCB    #0                      ;DELAY FOR CABLE
005454  001375                        BNE     .-4                     ;DITTO
005456  017704  011124                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005462  005704                        TST     R4                      ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
005464  001401                        BEQ     MUX3F                   ;CLEARED
005466  104001                        ERRORL                          ;NO, LINE STATUS ERROR
005470  104003                MUX3F:  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
005472  005300                        MUX3A
005474  006337  016714                ASL     SELMSK                  ;SHIFT SELECT MASK
005500  005201                        INC     R1                      ;SELECT NEXT LINE
005502  005300                        DEC     R0                      ;DECREMENT LINE COUNT
005504  001275                        BNE     MUX3A                   ;CONTINU IF NOT DONE
005506  104002                        SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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                                                ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
                                                ;BE SET AND CLEARED FOR SELECTED LINE

005510                          T31:                                    ;REFERENCE DESIGNATION
005510  005077  011070          MUX4:   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
005514  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
005522  012700  000020              MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
005526  012737  000001  016714      MOV     #1,SELMSK               ;INIT LINE SELECT MASK
005534  005001                      CLR     R1                      ;START AT LINE 0
005536  012777  002000  011040  MUX4A: MOV     #CLRMUX,@DHMCSR
005544  012702  000020              MOV     #16.,R2
005550  033737  016714  016712      BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
005556  001463                      BEQ     MUX4F                   ;BR IF NOT
005560  010177  011020              MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
005564  012777  000010  011014      MOV     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
005572  012737  000001  016716      MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
005600  005077  011000              CLR     @DHMCSR
005604  005005                  MUX4B:  CLR     R5
005606  033737  016716  016712      BIT     SLMSK,LINSEL            ;SELECTED ??
005614  001417                      BEQ     MUX4D                   ;BR IF NOT
005616  017704  010764              MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005622  117703  010756              MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
005626  042703  177760              BIC     #177760,R3              ;CLEAR UNWANTED BITS
005632  020103                      CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
005634  001002                      BNE     MUX4C                   ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
005636  012705  000010              MOV     #SECTX,R5
                                                                    ;TO BE SET
005642  020504                  MUX4C:  CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
005644  001403                      BEQ     MUX4D                   ;RESULTS
005646  104001                      ERRORL                          ;LINE STATUS ERROR
005650  104003                      SCOPEF
005652  005654                      MUX4D
005654  052777  000400  010722  MUX4D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
005662  006337  016716              ASL     SLMSK                   ;SHIFT MASK
005666  005302                      DEC     R2
005670  001345                      BNE     MUX4B
005672  005005                      CLR     R5
005674  010177  010704          MUX4E:  MOV     R1,@DHMCSR
005700  010103                      MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
005702  005077  010700              CLR     @DHMLSR                 ;CLEAR SECONDARY TRANSMIT FLIP FLOP
005706  105227  000000              INCB    #0                      ;DELAY FOR CABLE
005712  001375                      BNE     .-4                     ;DITTO
005714  017704  010666              MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005720  005704                      TST     R4                      ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
005722  001401                      BEQ     MUX4F                   ;CLEARED
005724  104001                      ERRORL                          ;NO, LINE STATUS ERROR
005726  104003                  MUX4F:  SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
005730  005536                      MUX4A
005732  006337  016714              ASL     SELMSK                  ;SHIFT SELECT MASK
005736  005201                      INC     R1                      ;SELECT NEXT LINE
005740  005300                      DEC     R0                      ;DECREMENT LINE COUNT
005742  001275                      BNE     MUX4A                   ;CONTINU IF NOT DONE
005744  104002                      SCOPE                           ;CHECK FOR ITERATIONS, LOOP
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1025
1026                                        ;VERIFY THAT CLEAR TO SEND AND CARRIER ARE SET IF "LINE ENABLE"
1027                                        ;AND TERMINAL ARE SET FOR SELECTED LINE.
1028
1029  005746                          T32:                                ;REFERENCE DESIGNATION
1030  005746  005077  010632         MUX5:  CLR     @DHMCSR              ;CLEAR CONTROL REGISTER
1031  005752  042737  000340  177776       BIC     #340,PS              ;ENABLE INTERRUPTS
1032  005760  012700  000020              MOV     #16.,R0              ;SET UP TO TEST 16 LINES
1033  005764  005001                      CLR     R1                   ;START AT LINE 0
1034  005766  012737  000001  016714       MOV     #1,SELMSK            ;INIT LINE SELECT MASK
1035  005774  012702  000020         MUX5A: MOV     #16.,R2              ;16 LINES
1036  006000  033737  016714  016712       BIT     SELMSK,LINSEL        ;THIS LINE SELECTED FOR TEST ?
1037  006006  001454                      BEQ     MUX5F                ;BR IF NOT
1038  006010  010177  010570              MOV     R1,@DHMCSR           ;SELECT A LINE
1039  006014  012777  000003  010564       MOV     #LINENA+TRMRDY,@DHMLSR ;SET LINE ENABLE +TRMRDY
1040  006022  005077  010556              CLR     @DHMCSR              ;CLEAR CONTROL REGISTER
1041  006026  005005                 MUX5B: CLR     R5                   ;CLEAR EXPECTED RESULT
1042  006030  017704  010552              MOV     @DHMLSR,R4           ;READ LINE STATUS
1043  006034  117703  010544              MOVB    @DHMCSR,R3           ;READ LINE NUMBER
1044  006040  042703  177760              BIC     #177760,R3           ;CLEAR UNWANTED BITS
1045  006044  020103                      CMP     R1,R3                ;IF RECEIVED LINE=SELECTED LINE
1046  006046  001002                      BNE     MUX5C                ;EXPECT LINE ENABLE AND
1047  006050  012705  000143              MOV     #LINENA+TRMRDY+CO+CS,R5
1048                                                                    ;CLEAR TO SEND AND CARRIER ARE SET
1049  006054  020405                 MUX5C: CMP     R4,R5                ;COMPARE EXPECTED AND
1050  006056  001403                      BEQ     MUX5D                ;RECEIVED RESULTS
1051  006060  104001                      ERRORL                       ;LINE STATUS ERROR
1052  006062  104003                      SCOPEF
1053  006064  006066                      MUX5D
1054  006066  052777  000400  010510 MUX5D: BIS     #STEP,@DHMCSR        ;UPDATE LINE COUNTER
1055  006074  005302                      DEC     R2                   ;CONTINUE IF ALL CHECKS
1056  006076  001353                      BNE     MUX5B                ;ARE NOT DONE FOR THIS LINE
1057  006100  012705  000001              MOV     #LINENA,R5           ;EXPECT LINE ENABLE
1058  006104  010103                 MUX5E: MOV     R1,R3                ;ON SELECTED LINE
1059  006106  010177  010472              MOV     R1,@DHMCSR           ;SELECT LINE
1060  006112  042777  000002  010466       BIC     #TRMRDY,@DHMLSR      ;CLEAR TERMINAL
1061  006120  105227  000000              INCB    #0                   ;DELAY FOR CABLE
1062  006124  001375                      BNE     .-4                  ;DITTO
1063  006126  017704  010454              MOV     @DHMLSR,R4           ;READ LINE STATUS REGISTER
1064  006132  020504                      CMP     R5,R4                ;ONLY LINE ENABLE SHOULD BE
1065  006134  001401                      BEQ     MUX5F                ;SET ON THIS LINE
1066  006136  104001                      ERRORL                       ;LINE STATUS ERROR
1067  006140  104003                 MUX5F: SCOPEF                       ;CHECK FOR LOOP ON SAME DATA
1068  006142  005774                      MUX5A
1069  006144  005201                      INC     R1                   ;UPDATE LINE NUMBER
1070  006146  005077  010434              CLR     @DHMLSR              ;CLEAR LINE STATUS REGISTER
1071  006152  006337  016714              ASL     SELMSK               ;SHIFT MARK TO TEST NEXT LINE
1072  006156  005300                      DEC     R0                   ;CONTINUE IF ALL LINES NOT
1073  006160  001305                      BNE     MUX5A                ;TESTED
1074  006162  104002                      SCOPE                        ;CHECK FOR ITERATIONS, LOOP
```

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1075
1076                                        ;VERIFY THAT RING IS SET IF "LINE ENABLE"
1077                                        ;AND REQUEST TO SEND ARE SET FOR SELECTED LINE.
1078
1079  006164                          T33:                                ;REFERENCE DESIGNATION
1080  006164  005077  010414         MUX6:  CLR     @DHMCSR              ;CLEAR CONTROL REGISTER
1081  006170  042737  000340  177776        BIC     #340,PS              ;ENABLE INTERRUPTS
1082  006176  012700  000020              MOV     #16.,R0              ;SET UP TO TEST 16 LINES
1083  006202  005001                       CLR     R1                   ;START AT LINE 0
1084  006204  012737  000001  016714       MOV     #1,SELMSK            ;INIT LINE SELECT MASK
1085  006212  012702  000020         MUX6A: MOV     #16.,R2              ;16 LINES
1086  006216  033737  016714  016712       BIT     SELMSK,LINSEL        ;THIS LINE SELECTED FOR TEST ?
1087  006224  001454                       BEQ     MUX6F                ;BR IF NOT
1088  006226  010177  010352              MOV     R1,@DHMCSR           ;SELECT A LINE
1089  006232  012777  000005  010346       MOV     #LINENA+RS,@DHMLSR   ;SET LINE ENABLE +RS
1090  006240  005077  010340              CLR     @DHMCSR              ;CLEAR CONTROL REGISTER
1091  006244  005005                 MUX6B: CLR     R5                   ;CLEAR EXPECTED RESULT
1092  006246  017704  010334              MOV     @DHMLSR,R4           ;READ LINE STATUS
1093  006252  117703  010326              MOVB    @DHMCSR,R3           ;READ LINE NUMBER
1094  006256  042703  177760              BIC     #177760,R3           ;CLEAR UNWANTED BITS
1095  006262  020103                       CMP     R1,R3                ;IF RECEIVED LINE=SELECTED LINE
1096  006264  001002                       BNE     MUX6C                ;EXPECT LINE ENABLE AND
1097  006266  012705  000205              MOV     #LINENA+RS+RING,R5
1098                                                                     ;RING IS SET
1099  006272  020405                 MUX6C: CMP     R4,R5                ;COMPARE EXPECTED AND
1100  006274  001403                       BEQ     MUX6D                ;RECEIVED RESULTS
1101  006276  104001                       ERRORL                       ;LINE STATUS ERROR
1102  006300  104003                       SCOPEF
1103  006302  006304                       MUX6D
1104  006304  052777  000400  010272 MUX6D: BIS     #STEP,@DHMCSR        ;UPDATE LINE COUNTER
1105  006312  005302                       DEC     R2                   ;CONTINUE IF ALL CHECKS
1106  006314  001353                       BNE     MUX6B                ;ARE NOT DONE FOR THIS LINE
1107  006316  012705  000001              MOV     #LINENA,R5           ;EXPECT LINE ENABLE
1108  006322  010103                 MUX6E: MOV     R1,R3                ;ON SELECTED LINE
1109  006324  010177  010254              MOV     R1,@DHMCSR           ;SELECT LINE
1110  006330  042777  000004  010250       BIC     #RS,@DHMLSR          ;CLEAR REQUEST TO SEND
1111  006336  105227  000000              INCB    #0                   ;DELAY FOR CABLE
1112  006342  001375                       BNE     .-4                  ;DITTO
1113  006344  017704  010236              MOV     @DHMLSR,R4           ;READ LINE STATUS REGISTER
1114  006350  020504                       CMP     R5,R4                ;ONLY LINE ENABLE SHOULD BE
1115  006352  001401                       BEQ     MUX6F                ;SET ON THIS LINE
1116  006354  104001                       ERRORL                       ;LINE STATUS ERROR
1117  006356  104003                 MUX6F: SCOPEF                       ;CHECK FOR LOOP ON SAME DATA
1118  006360  006212                       MUX6A
1119  006362  005201                       INC     R1                   ;UPDATE LINE NUMBER
1120  006364  005077  010216              CLR     @DHMLSR              ;CLEAR LINE STATUS REGISTER
1121  006370  006337  016714              ASL     SELMSK               ;SHIFT MARK TO TEST NEXT LINE
1122  006374  005300                       DEC     R0                   ;CONTINUE IF ALL LINES NOT
1123  006376  001305                       BNE     MUX6A                ;TESTED
1124  006400  104002                       SCOPE                        ;CHECK FOR ITERATIONS, LOOP
```

```
1125
1126                                            ;VERIFY THAT SECONDARY RECEIVE IS SET IF "LINE ENABLE"
1127                                            ;AND SECONDARY TRANSMIT ARE SET FOR SELECTED LINE.
1128
1129  006402                            T34:                                ;REFERENCE DESIGNATION
1130  006402  005077  010176            MUX7:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1131  006406  042737  000340  177776            BIC     #340,PS             ;ENABLE INTERRUPTS
1132  006414  012700  000020                    MOV     #16.,R0             ;SET UP TO TEST 16 LINES
1133  006420  005001                            CLR     R1                  ;START AT LINE 0
1134  006422  012737  000001  016714            MOV     #1,SELMSK           ;INIT LINE SELECT MASK
1135  006430  012702  000020            MUX7A:  MOV     #16.,R2             ;16 LINES
1136  006434  033737  016714  016712            BIT     SELMSK,LINSEL       ;THIS LINE SELECTED FOR TEST ?
1137  006442  001454                            BEQ     MUX7F               ;BR IF NOT
1138  006444  010177  010134                    MOV     R1,@DHMCSR          ;SELECT A LINE
1139  006450  012777  000011  010130            MOV     #LINENA+SECTX,@DHMLSR ;SET LINE ENABLE +SECTX
1140  006456  005077  010122                    CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1141  006462  005005                    MUX7B:  CLR     R5                  ;CLEAR EXPECTED RESULT
1142  006464  017704  010116                    MOV     @DHMLSR,R4          ;READ LINE STATUS
1143  006470  117703  010110                    MOVB    @DHMCSR,R3          ;READ LINE NUMBER
1144  006474  042703  177760                    BIC     #177760,R3          ;CLEAR UNWANTED BITS
1145  006500  020103                            CMP     R1,R3               ;IF RECEIVED LINE=SELECTED LINE
1146  006502  001002                            BNE     MUX7C               ;EXPECT LINE ENABLE AND
1147  006504  012705  000031                    MOV     #LINENA+SECTX+SECRX,R5
1148                                                                        ;SECONDARY RECEIVE IS SET
1149  006510  020405                    MUX7C:  CMP     R4,R5               ;COMPARE EXPECTED AND
1150  006512  001403                            BEQ     MUX7D               ;RECEIVED RESULTS
1151  006514  104001                            ERRORL                      ;LINE STATUS ERROR
1152  006516  104003                            SCOPEF
1153  006520  006522                            MUX7D
1154  006522  052777  000400  010054    MUX7D:  BIS     #STEP,@DHMCSR       ;UPDATE LINE COUNTER
1155  006530  005302                            DEC     R2                  ;CONTINUE IF ALL CHECKS
1156  006532  001353                            BNE     MUX7B               ;ARE NOT DONE FOR THIS LINE
1157  006534  012705  000001                    MOV     #LINENA,R5          ;EXPECT LINE ENABLE
1158  006540  010103                    MUX7E:  MOV     R1,R3               ;ON SELECTED LINE
1159  006542  010177  010036                    MOV     R1,@DHMCSR          ;SELECT LINE
1160  006546  042777  000010  010032            BIC     #SECTX,@DHMLSR      ;CLEAR SECONDARY TRANSMIT
1161  006554  105227  000000                    INCB    #0                  ;DELAY FOR CABLE
1162  006560  001375                            BNE     .-4                 ;DITTO
1163  006562  017704  010020                    MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1164  006566  020504                            CMP     R5,R4               ;ONLY LINE ENABLE SHOULD BE
1165  006570  001401                            BEQ     MUX7F               ;SET ON THIS LINE
1166  006572  104001                            ERRORL                      ;LINE STATUS ERROR
1167  006574  104003                    MUX7F:  SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1168  006576  006430                            MUX7A
1169  006600  005201                            INC     R1                  ;UPDATE LINE NUMBER
1170  006602  005077  010000                    CLR     @DHMLSR             ;CLEAR LINE STATUS REGISTER
1171  006606  006337  016714                    ASL     SELMSK              ;SHIFT MARK TO TEST NEXT LINE
1172  006612  005300                            DEC     R0                  ;CONTINUE IF ALL LINES NOT
1173  006614  001305                            BNE     MUX7A               ;TESTED
1174  006616  104002                            SCOPE                       ;CHECK FOR ITERATIONS, LOOP
```

```
1175
1176                                        ;VERIFY THAT "CLEAR MULTIPLXER" CLEARS ALL MULTIPLEXER
1177                                        ;FUNCTION FLIP-FLOPS
1178
1179  006620                        T35:                                ;REFERENCE DESIGNATION
1180  006620  005077  007760        MUX8:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1181  006624  042737  000340  177776        BIC     #340,PS             ;ENABLE INTERRUPTS
1182  006632  012700  000020              MOV     #16.,R0             ;SET UP TO TEST 16 LINES
1183  006636  012777  000017  007742  MUX8A:  MOV     #17,@DHMLSR         ;WRITE 15 INTO  ALL MULTIPLEXER
1184  006644  052777  000400  007732        BIS     #STEP,@DHMCSR       ;FUNCTION FLIPFLOPS
1185  006652  005300                      DEC     R0
1186  006654  001370                      BNE     MUX8A
1187  006656  012737  000001  016714        MOV     #1,SELMSK           ;INIT SELECT MASK
1188  006664  005003                      CLR     R3                  ;SET UP FOR 16 LINES
1189  006666  012700  000020              MOV     #16.,R0
1190  006672  012777  002000  007704  MUX8B:  MOV     #CLRMUX,@DHMCSR     ;CLEAR MULTIPLEXER
1191  006700  033737  016714  016712  MUX8C:  BIT     SELMSK,LINSEL       ;SELECTED ??
1192  006706  001425                      BEQ     MUX8E               ;BR IF NOT
1193  006710  010377  007670              MOV     R3,@DHMCSR          ;SELECT LINE
1194  006714  017704  007666              MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1195  006720  005005                      CLR     R5                  ;EXPECT 0S
1196  006722  005704                      TST     R4                  ;WAS LINE STATUS REGISTER CLEARED
1197  006724  001403                      BEQ     MUX8D
1198  006726  104001                      ERRORL                      ;LINE STATUS ERROR
1199  006730  104003                      SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1200  006732  006672                      MUX8B
1201  006734  005205              MUX8D:  INC     R5                  ;EXPECT LINE ENABLE
1202  006736  052777  000001  007642        BIS     #LINENA,@DHMLSR     ;SET LINE ENABLE ON SELECTED LINE
1203  006744  017704  007636              MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1204  006750  020504                      CMP     R5,R4               ;IS ANYTHING BUT LINE ENABLE SET
1205  006752  001403                      BEQ     MUX9E
1206  006754  104001                      ERRORL                      ;LINE STATUS ERROR
1207  006756  104003                      SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1208  006760  006672                      MUX8B
1209  006762  005203              MUX8E:  INC     R3                  ;UPDATE LINE NUMBER
1210  006764  005077  007616              CLR     @DHMLSR             ;CLEAR CURRENT LINE
1211  006770  006337  016714              ASL     SELMSK              ;SHIFT SELECT MASK
1212  006774  005300                      DEC     R0                  ;CONTINUE IF ALL LINES NOT
1213  006776  001340                      BNE     MUX8C               ;TESTED
1214  007000  104002                      SCOPE                       ;CHECK FOR ITERATIONS, LOOP
```

```
1215
1216
1217                                        ;WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS
1218                                        ;SET "LINE ENABLE FOR ALL LINES
1219                                        ;VERIFY THAT AN INTERRUPP OCCURS FOR EACH LINE
1220
1221  007002                        T36:                                ;REFERENCE DESIGNATION
1222  007002  012777  002000  007574 SCNT1:  MOV   #CLRMUX,@DHMCSR       ;CLEAR ALL MULTIPLEXER FLIPFLOPS
1223  007010  005077  007570              CLR   @DHMCSR                 ;CLEAR CONTROL REGISTER
1224  007014  042737  000340  177776      BIC   #340,PS                 ;ENABLE INTERRUPTS
1225  007022  012700  000020              MOV   #16.,R0                 ;SET UP TO WRITE 1'S INTO
1226  007026  012777  001017  007550      MOV   #MAINT+17,@DHMCSR       ;ALL SCANNER MEMORY LOCATION
1227  007034  012737  000001  016714      MOV   #1,SELMSK               ;INIT SELECT MASK
1228  007042  052777  000400  007534 SCNT1A: BIS  #STEP,@DHMCSR         ;WRITE A LOCATION
1229  007050  012777  000001  007530      MOV   #LINENA,@DHMLSR         ;LET "LINE ENABLE"
1230  007056  005300              DEC   R0
1231  007060  001370              BNE   SCNT1A
1232  007062  012701  177777              MOV   #-1,R1                  ;INIT LINE NO. GEN.
1233  007066  012705  070340              MOV   #70340,R5               ;EXPECT "DONE"+"SCNENA"+"COF"+"CSF"+"SECRXF"
1234  007072  012777  007202  007500      MOV   #SCNT1C,@DHMVEC         ;SET UP LOCAL INTERRUPT SERVICE
1235  007100  013777  177776  007474      MOV   PS @DHMLVL              ;SERVICE AT LEVEL 7
1236  007106  012700  000020              MOV   #16.,R0
1237  007112  012777  000117  007464      MOV   #INTENA+17,@DHMCSR      ;SET INTERRUPT ENABLE
1238  007120  033737  016714  016712 SCNT1B: BIT   SELMSK,LINSEL         ;SELECTED ??
1239  007126  001435              BEQ   SCNT1D                  ;BR IF NOT
1240  007130  052737  000340  177776      BIS   #340,PS                 ;LOCK OUT INTERRUPTS
1241  007136  052777  000040  007440      BIS   #SCNENA,@DHMCSR         ;START SCANNER
1242  007144  042737  000340  177776      BIC   #340,PS                 ;ENABLE INTERRUPTS
1243  007152  105777  007426              TSTB  @DHMCSR                 ;WAIT FOR DONE
1244  007156  100375              BPL   .-4                     ;PROGRAM WILL HANG HERE
1245                                                              ;IF DONE NEVER SETS
1246  007160  052737  000340  177776      BIS   #340,PS                 ;INTERRUPT DID NOT OCCUR
1247  007166  017704  007412              MOV   @DHMCSR,R4              ;ERROR
1248  007172  104000              ERRORC                        ;CONTROL STATUS ERROR
1249  007174  104003              SCOPEF                        ;CHECK FOR LOOP ON SAME DATA
1250  007176  007002              SCNT1
1251  007200  000410              BR    SCNT1D
1252  007202  022626        SCNT1C: POP2SP                        ;INTERRUPT OCCURED, REPOSITION STACK
1253  007204  017704  007374              MOV   @DHMCSR,R4              ;READ CONTROL STATUS
1254  007210  020504              CMP   R5,R4                   ;ARE EXPECTED AND RECEIVED
1255  007212  001403              BEQ   SCNT1D                  ;REGISTERS THE SAME
1256  007214  104000              ERRORC                        ;NO, LINE STATUS ERROR
1257  007216  104003              SCOPEF                        ;CHECK FOR LOOP WITH CURRENT DATA
1258  007220  007002              SCNT1
1259  007222  042777  000257  007354 SCNT1D: BIC   #SCNENA+DONE+17,@DHMCSR ;CLEAR SCAN ENABLE AND DONE
1260  007230  005201              INC   R1                      ;GEN NXT LINE NO.
1261  007232  150177  007346              BISB  R1,@DHMCSR              ;SET LINE NO. BITS
1262  007236  006337  016714              ASL   SELMSK                  ;SHIFT SELECT MASK
1263  007242  005205              INC   R5                      ;UPDATE EXPECTED RESULT
1264  007244  005300              DEC   R0                      ;CONTINUE IF NOT DONE
1265  007246  001324              BNE   SCNT1B
1266  007250  104002              SCOPE                         ;CHECK FOR ITERATIONS, LOOP
```

```
1267
1268                                            ;WRITE 1'S INTO ALL MULTIPLEXER FUNCTION FLIP-FLOPS
1269                                            ;CLEAR SCANNER MEMORY
1270                                            ;VERIFY THAT AN INTERPUPT OCCURS FOR EACH LINE
1271
1272  007252                            T37:                                    ;REFERENCE DESIGNATION
1273  007252  012700  000020            SCNT2:  MOV     #16.,R0                 ;WRITE 1S INTO ALL
1274  007256  012777  002000  007320            MOV     #CLRMUX,@DHMCSR         ;CLEAR MULTIPLEXER
1275  007264  005077  007314                    CLR     @DHMCSR                 ;MULTIPLEXER FUNCTION
1276  007270  042737  000340  177776            BIC     #340,PS                 ;ENABLE TELETYPE INTERRUPTS
1277  007276  012737  000001  016714            MOV     #1,SELMSK               ;INIT LINE SELECT MASK
1278  007304  012777  000017  007274  SCNT2A:   MOV     #17,@DHM_SR             ;FLIPFLOPS
1279  007312  052777  000400  007264            BIS     #STEP,@DHMCSR
1280  007320  005300                            DEC     R0
1281  007322  001370                            BNE     SCNT2A
1282  007324  012777  004000  007252            MOV     #CLRSCN,@DHMCSR         ;CLEAR SCANNER MEMORY
1283  007332  032777  000020  007244            BIT     #BUSY,@DHMCSR           ;WAIT FOR CLEAR CYCLE TO COMPLETE
1284  007340  001374                            BNE     .-6
1285  007342  012700  000020                    MOV     #16.,R0                 ;SET UP TO TEST 16 LINES
1286  007346  012701  177777                    MOV     #-1,R1                  ;INIT LINE NO. GENERATOR
1287  007352  012705  170340                    MOV     #170340,R5              :FIRST EXPECTED RESULT
1288  007356  012777  007[illegible]  007214    MOV     #SCNT2C,@DHMVEC         ;SET UP LOCAL INTERRUPT RETURN
1289  007364  013777  177776  007210            MOV     PS,@DHMLVL
1290  007372  012777  000117  007204            MOV     #INTENA+17,@DHMCSR      ;SET INTERRUPT ENABLE
1291  007400  033737  016714  016712  SCNT2B:   BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED ??
1292  007406  001435                            BEQ     SCNT2D                  ;BR IF NOT
1293  007410  052737  000340  177776            BIS     #340,PS                 ;LOCK OUT INTERRUPTS
1294  007416  052777  000040  007160            BIS     #SCNENA,@DHMCSR         ;START SCANNER
1295  007424  042737  000340  177776            BIC     #340,PS                 ;ENABLE INTERRUPTS
1296  007432  105777  007146                    TSTB    @DHMCSR                 ;WAIT FOR DONE
1297  007436  100375                            BPL     .-4                     ;PROGRAM WILL HANG HERE
1298                                                                            ;IF DONE NEVER SETS
1299  007440  052737  000340  177776            BIS     #340,PS                 ;LOCK OUT INTERRUPTS
1300  007446  017704  007132                    MOV     @DHMCSR,R4              ;READ CONTROL STATUS
1301  007452  104000                            ERRORC                          ;INTERRUPT DID NOT OCCUR
1302  007454  104003                            SCOPEF                          ;CHECK FOR LOOP ON CURRENT DATA
1303  007456  007252                            SCNT2
1304  007460  000410                            BR      SCNT2D                  ;CONTINUE
1305  007462  022626                    SCNT2C: POP2SP                          ;INTERRUPT OCCURED, RESTORE STACK
1306  007464  017704  007114                    MOV     @DHMCSR,R4              ;READ CONTROL STATUS REGISTER
1307  007470  020504                            CMP     R5,R4                   ;COMPARE TO EXPECTED RESULT
1308  007472  001403                            BEQ     SCNT2D
1309  007474  104000                            ERRORC                          ;CONTROL STATUS ERROR
1310  007476  104003                            SCOPEF                          ;CHECK FOR LOOP ON CURRENT DATA
1311  007500  007252                            SCNT2
1312  007502  042777  000257  007074  SCNT2D:   BIC     #SCNENA+DONE+17,@DHMCSR ;CLEAR SCAN ENABLE AND DONE AND LINE NO.
1313  007510  006337  016714                    ASL     SELMSK                  ;SHIFT SELECT BIT
1314  007514  005201                            INC     R1                      ;GEN NEW LINE NO.
1315  007516  150177  007062                    BISB    R1,@DHMCSR              ;SET IT IN CSR
1316  007522  005205                            INC     R5                      ;UPDATE EXPECTED RESULT
1317  007524  005300                            DEC     R0                      ;CONTINUE IF ALL
1318  007526  001324                            BNE     SCNT2B                  ;LINES NOT TESTED
1319  007530  104002                            SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
1320
1321
1322                                    ;SINGLE LINE CABLE TEST
1323                                    ;FOR USE WITH MODEM CABLE AND DC11 TEST CONNECTOR
1324
1325                                    ;NOTE:  MODEM CONTROL MULTIPLEXER INPUTS SHOULD BE CONNECTED
1326                                    ;TO DISTRIBUTION PANEL WIA DM11-DC
1327
1328
1329  007532                          T100:                                   ;REFERENCE DESIGNATION
1330  007532  012737  007552  002204  STRLIN: MOV     #STRLNA,KRET           ;SET UP FOR NEW LINE SELECTION
1331  007540  042737  000340  177776          BIC     #340,PS                ;ENABLE INTERRUPTS
1332  007546  104004                          TYPE                           ;TYPE "SINGLE LINE CABLE TEST"
1333  007550  017723                          MLINE
1334  007552  104013                  STRLNA: INSTRG                         ;GET LINE NUMBER
1335  007554  017756                          MLINEI
1336  007556  000000                          0
1337  007560  000017                          17
1338  007562  016672                          LINE
1339  007564  104004                          TYPE
1340  007566  017720                          MCRLF
```

```
1341
1342                                            ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
1343                                            ;BE SET AND CLEARED FOR SELECTED LINE
1344
1345  007570                            T101:                                   ;REFERENCE DESIGNATION
1346  007570  005077  007010           MUX11:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
1347  007574  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
1348  007602  013701  016672                  MOV     LINE,R1
1349  007606  012777  002000  006770 MUX11A: MOV     #CLRMUX,@DHMCSR
1350  007614  012702  000020                  MOV     #16.,R2
1351  007620  010177  006760                  MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
1352  007624  012777  000001  006754          MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE FUNCTION FLIP-FLOP
1353  007632  005077  006746                  CLR     @DHMCSR
1354  007636  005005                  MUX11B: CLR     R5
1355  007640  017704  006742                  MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1356  007644  117703  006734                  MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
1357  007650  042703  177760                  BIC     #177760,R3              ;CLEAR UNWANTED BITS
1358  007654  020103                          CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
1359  007656  001002                          BNE     MUX11C                  ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1360  007660  012705  000001                  MOV     #LINENA,R5
1361                                                                          ;TO BE SET
1362  007664  020504                  MUX11C: CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
1363  007666  001403                          BEQ     MUX11D                  ;RESULTS
1364  007670  104001                          ERRORL                          ;LINE STATUS ERROR
1365  007672  104003                          SCOPEF
1366  007674  007676                          MUX11D
1367  007676  052777  000400  006700  MUX11D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
1368  007704  005302                          DEC     R2
1369  007706  001353                          BNE     MUX11B
1370  007710  005005                          CLR     R5
1371  007712  010177  006666          MUX11E: MOV     R1,@DHMCSR
1372  007716  010103                          MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
1373  007720  005077  006662                  CLR     @DHMLSR                 ;CLEAR LINE ENABLE FLIP FLOP
1374  007724  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
1375  007730  001375                          BNE     .-4                     ;DITTO
1376  007732  017704  006650                  MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1377  007736  005704                          TST     R4                      ;WAS LINE ENABLE FUNCTION FLIP FLOP
1378  007740  001401                          BEQ     MUX11F                  ;CLEARED
1379  007742  104001                          ERRORL                          ;NO, LINE STATUS ERROR
1380  007744  104002          MUX11F: SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
```

```
1381                                                    ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN
1382                                                    ;BE SET AND CLEARED FOR SELECTED LINE
1383
1384  007746                            T102:                                 ;REFERENCE DESIGNATION
1385  007746  005077  005632            MUX12:  CLR     @DHMCSR               ;CLEAR CONTROL STATUS REGISTER
1386  007752  042737  000340  177776          BIC     #340,PS               ;ENABLE INTERRUPTS
1387  007760  013701  016672                  MOV     LINE,R1
1388  007764  012777  002000  006612  MUX12A: MOV     #CLRMUX,@DHMCSR
1389  007772  012702  000020                  MOV     #16.,R2
1390  007776  010177  006602                  MOV     R1,@DHMCSR            ;SELECT LINE TO BE TESTED
1391  010002  012777  000002  006576          MOV     #TRMRDY,@DHMLSR       ;SET TERMINAL READY FUNCTION FLIP-FLOP
1392  010010  005077  006570                  CLR     @DHMCSR
1393  010014  005005                  MUX12B: CLR     R5
1394  010016  017704  006564                  MOV     @DHMLSR,R4            ;READ LINE STATUS REGISTER
1395  010022  117703  006556                  MOVB    @DHMCSR,R3            ;READ CONTROL STATUS REGISTER
1396  010026  042703  177760                  BIC     #177760,R3            ;CLEAR UNWANTED BITS
1397  010032  020103                          CMP     R1,R3                 ;IF LINE NUMBER=SELECTED LINE NUMBER,
1398  010034  001002                          BNE     MUX12C                ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
1399  010036  012705  000002                  MOV     #TRMRDY,R5
1400                                                                        ;TO BE SET
1401  010042  020504                  MUX12C: CMP     R5,R4                 ;COMPARE EXPECTED AND RECEIVED
1402  010044  001403                          BEQ     MUX12D                ;RESULTS
1403  010046  104001                          ERRORL                        ;LINE STATUS ERROR
1404  010050  104003                          SCOPEF
1405  010052  010054                          MUX12D
1406  010054  052777  000400  006522  MUX12D: BIS     #STEP,@DHMCSR         ;EXAMINE NEXT LINE
1407  010062  005302                          DEC     R2
1408  010064  001353                          BNE     MUX12B
1409  010066  005005                          CLR     R5
1410  010070  010177  006510          MUX12E: MOV     R1,@DHMCSR
1411  010074  010103                          MOV     R1,R3                 ;SET LINE COUNTER TO SELECTED LINE
1412  010076  005077  006504                  CLR     @DHMLSR               ;CLEAR TERMINAL READY FLIP FLOP
1413  010102  105227  000000                  INCB    #0                    ;DELAY FOR CABLE
1414  010106  001375                          BNE     .-4                   ;DITTO
1415  010110  017704  006472                  MOV     @DHMLSR,R4            ;READ LINE STATUS REGISTER
1416  010114  005704                          TST     R4                    ;WAS TERMINAL READY FUNCTION FLIP FLOP
1417  010116  001401                          BEQ     MUX12F                ;CLEARED
1418  010120  104001                          ERRORL                        ;NO, LINE STATUS ERROR
1419  010122  104002          MUX12F: SCOPE                                 ;CHECK FOR ITERATIONS, LOOP
```

```
                                                ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
                                                ;BE SET AND CLEARED FOR SELECTED LINE

010124                                  T103:                                   ;REFERENCE DESIGNATION
010124  005077  006454                MUX13:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
010130  042737  000340  177776              BIC     #340,PS                 ;ENABLE INTERRUPTS
010136  013701  016672                      MOV     LINE,R1
010142  012777  002000  006434        MUX13A: MOV     #CLRMUX,@DHMCSR
010150  012702  000020                      MOV     #16.,R2
010154  010177  006424                      MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
010160  012777  000004  006420              MOV     #RS,@DHMLSR             ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
010166  005077  006412                      CLR     @DHMCSR
010172  005005                        MUX13B: CLR     R5
010174  017704  006406                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
010200  117703  006400                      MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
010204  042703  177760                      BIC     #177760,R3              ;CLEAR UNWANTED BITS
010210  020103                              CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
010212  001002                              BNE     MUX13C                  ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
010214  012705  000004                      MOV     #RS,R5
                                                                            ;TO BE SET
010220  020504                        MUX13C: CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
010222  001403                              BEQ     MUX13D                  ;RESULTS
010224  104001                              ERRORL                          ;LINE STATUS ERROR
010226  104003                              SCOPEF
010230  010232                              MUX13D
010232  052777  000400  006344        MUX13D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
010240  005302                              DEC     R2
010242  001353                              BNE     MUX13B
010244  005005                              CLR     R5
010246  010177  006332                MUX13E: MOV     R1,@DHMCSR
010252  010103                              MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
010254  005077  006326                      CLR     @DHMLSR                 ;CLEAR REQUEST TO SEND FLIP FLOP
010260  105227  000000                      INCB    #0                      ;DELAY FOR CABLE
010264  001375                              BNE     .-4                     ;DITTO
010266  017704  006314                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
010272  005704                              TST     R4                      ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
010274  001401                              BEQ     MUX13F                  ;CLEARED
010276  104001                              ERRORL                          ;NO. LINE STATUS ERROR
010300  104002                        MUX13F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
                                                        ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
                                                        ;BE SET AND CLEARED FOR SELECTED LINE

010302                                  T104:                                   ;REFERENCE DESIGNATION
010302  005077  006276                  MUX14:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
010306  042737  000340  177776                BIC     #340,PS                 ;ENABLE INTERRUPTS
010314  013701  016672                        MOV     LINE,R1
010320  012777  002000  006256          MUX14A: MOV     #CLRMUX,@DHMCSR
010326  012702  000020                        MOV     #16.,R2
010332  010177  006246                        MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
010336  012777  000010  006242                MOV     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
010344  005077  006234                        CLR     @DHMCSR
010350  005005                          MUX14B: CLR     R5
010352  017704  006230                        MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
010356  117703  006222                        MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
010362  042703  177760                        BIC     #177760,R3              ;CLEAR UNWANTED BITS
010366  020103                                CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
010370  001002                                BNE     MUX14C                  ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
010372  012705  000010                        MOV     #SECTX,R5
                                                                                ;TO BE SET
010376  020504                          MUX14C: CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
010400  001403                                BEQ     MUX14D                  ;RESULTS
010402  104001                                ERRORL                          ;LINE STATUS ERROR
010404  104003                                SCOPEF
010406  010410                                MUX.4D
010410  052777  000400  006166          MUX14D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
010416  005302                                DEC     R2
010420  001353                                BNE     MUX14B
010422  005005                                CLR     R5
010424  010177  006154                MUX14E: MOV     R1,@DHMCSR
010430  010103                                MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
010432  005077  006150                        CLR     @DHMLSR                 ;CLEAR SECONDARY TRANSMIT FLIP FLOP
010436  105227  000000                        INCB    #0                      ;DELAY FOR CABLE
010442  001375                                BNE     .-4                     ;DITTO
010444  017704  006136                        MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
010450  005704                                TST     R4                      ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
010452  001401                                BEQ     MUX14F                  ;CLEARED
010454  104001                                ERRORL                          ;NO, LINE STATUS ERROR
010456  104002                          MUX14F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
:498
:499                                    ;VERIFY THAT CLEAR TO SEND AND CARRIER ARE SET IF "LINE ENABLE"
:500                                    ;AND TERMINAL ARE SET FOR SELECTED LINE.
:501
:502  010460                  T105:                                   ;REFERENCE DESIGNATION
:503  010460  005077  006120  MUX15:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
:504  010464  042737  000340  177776 BIC     #340,PS                 ;ENABLE INTERRUPTS
:505  010472  013701  016672          MOV     LINE,R1
:506  010476  012702  000020  MUX15A: MOV     #16.,R2                 ;16 LINES
:507  010502  010177  006076          MOV     R1,@DHMCSR              ;SELECT A LINE
:508  010506  012777  000003  006072 MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE +TRMRDY
:509  010514  005077  006064          CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
:510  010520  005005          MUX15B: CLR     R5                      ;CLEAR EXPECTED RESULT
:511  010522  017704  006060          MOV     @DHMLSR,R4              ;READ LINE STATUS
:512  010526  117703  006052          MOVB    @DHMCSR,R3              ;READ LINE NUMBER
:513  010532  042703  177760          BIC     #177760,R3              ;CLEAR UNWANTED BITS
:514  010536  020103                  CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
:515  010540  001002                  BNE     MUX15C                  ;EXPECT LINE ENABLE AND
:516  010542  012705  000143          MOV     #LINENA+TRMRDY+CD+CS,R5
:517                                                                  ;CLEAR TO SEND AND CARRIER ARE SET
:518  010546  020405          MUX15C: CMP     R4,R5                   ;COMPARE EXPECTED AND
:519  010550  001403                  BEQ     MUX15D                  ;RECEIVED RESULTS
:520  010552  104001                  ERRORL                          ;LINE STATUS ERROR
:521  010554  104003                  SCOPEF
:522  010556  010560                  MUX15D
:523  010560  052777  000400  006016 MUX15D: BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
:524  010566  005302                  DEC     R2                      ;CONTINUE IF ALL CHECKS
:525  010570  001353                  BNE     MUX15B                  ;ARE NOT DONE FOR THIS LINE
:526  010572  012705  000001          MOV     #LINENA,R5              ;EXPECT LINE ENABLE
:527  010576  010103          MUX15E: MOV     R1,R3                   ;ON SELECTED LINE
:528  010600  010177  006000          MOV     R1,@DHMCSR              ;SELECT LINE
:529  010604  042777  000002  005774 BIC     #TRMRDY,@DHMLSR         ;CLEAR TERMINAL
:530  010612  105227  000000          INCB    #0                      ;DELAY FOR CABLE
:531  010616  001375                  BNE     .-4                     ;DITTO
:532  010620  017704  005762          MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
:533  010624  020504                  CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
:534  010626  001401                  BEQ     MUX15F                  ;SET ON THIS LINE
:535  010630  104001                  ERRORL                          ;LINE STATUS ERROR
:536  010632  104002          MUX15F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
 1537
 1538                                        ;VERIFY THAT RING IS SET IF "LINE ENABLE"
 1539                                        ;AND REQUEST TO SEND ARE SET FOR SELECTED LINE.
 1540
 1541  010634                        T10E:                           ;REFERENCE DESIGNATION
 1542  010634  005077  005744       MUX16:  CLR     @DHMCSR         ;CLEAR CONTROL REGISTER
 1543  010640  042737  000340  177776      BIC     #340,PS         ;ENABLE INTERRUPTS
 1544  010646  013701  016672              MOV     LINE,R1
 1545  010652  012702  000020       MUX16A: MOV     #16.,R2         ;16 LINES
 1546  010656  010177  005722              MOV     R1,@DHMCSR      ;SELECT A LINE
 1547  010662  012777  000005  005716      MOV     #LINENA+RS,@DHMLSR ;SET LINE ENABLE +RS
 1548  010670  005077  005710              CLR     @DHMCSR         ;CLEAR CONTROL REGISTER
 1549  010674  005005              MUX16B: CLR     R5              ;CLEAR EXPECTED RESULT
 1550  010676  017704  005704              MOV     @DHMLSR,R4      ;READ LINE STATUS
 1551  010702  117703  005676              MOVB    @DHMCSR,R3      ;READ LINE NUMBER
 1552  010706  042703  177760              BIC     #177760,R3      ;CLEAR UNWANTED BITS
 1553  010712  020103                      CMP     R1,R3           ;IF RECEIVED LINE=SELECTED LINE
 1554  010714  001002                      BNE     MUX16C          ;EXPECT LINE ENABLE AND
 1555  010716  012705  000205              MOV     #LINENA+RS+RING,R5
 1556                                                              ;RING IS SET
 1557  010722  020405              MUX16C: CMP     R4,R5           ;COMPARE EXPECTED AND
 1558  010724  001403                      BEQ     MUX16D          ;RECEIVED RESULTS
 1559  010726  104001                      ERRORL                  ;LINE STATUS ERROR
 1560  010730  104003                      SCOPEF
 1561  010732  010734                      MUX16D
 1562  010734  052777  000400  005642 MUX16D: BIS     #STEP,@DHMCSR   ;UPDATE LINE COUNTER
 1563  010742  005302                      DEC     R2              ;CONTINUE IF ALL CHECKS
 1564  010744  001353                      BNE     MUX16B          ;ARE NOT DONE FOR THIS LINE
 1565  010746  012705  000001              MOV     #LINENA,R5      ;EXPECT LINE ENABLE
 1566  010752  010103              MUX16E: MOV     R1,R3           ;ON SELECTED LINE
 1567  010754  010177  005624              MOV     R1,@DHMCSR      ;SELECT LINE
 1568  010760  042777  000004  005620      BIC     #RS,@DHMLSR     ;CLEAR REQUEST TO SEND
 1569  010766  105227  000000              INCB    #0              ;DELAY FOR CABLE
 1570  010772  001375                      BNE     .-4             ;DITTO
 1571  010774  017704  005606              MOV     @DHMLSR,R4      ;READ LINE STATUS REGISTER
 1572  011000  020504                      CMP     R5,R4           ;ONLY LINE ENABLE SHOULD BE
 1573  011002  001401                      BEQ     MUX16F          ;SET ON THIS LINE
 1574  011004  104001                      ERRORL                  ;LINE STATUS ERROR
 1575  011006  104002              MUX16F: SCOPE                   ;CHECK FOR ITERATIONS, LOOP
```

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                                                ;VERIFY THAT SECONDARY RECEIVE IS SET IF "LINE ENABLE"
                                                ;AND SECONDARY TRANSMIT ARE SET FOR SELECTED LINE.

011010                          T107:                                   ;REFERENCE DESIGNATION
011010  005077  005570          MUX17:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
011014  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
011022  013701  016672                  MOV     LINE,R1
011026  012702  000020          MUX17A: MOV     #16.,R2                 ;16 LINES
011032  010177  005546                  MOV     R1,@DHMCSR              ;SELECT A LINE
011036  012777  000011  005542          MOV     #LINENA+SECTX,@DHMLSR   ;SET LINE ENABLE +SECTX
011044  005077  005534                  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
011050  005005                  MUX17B: CLR     R5                      ;CLEAR EXPECTED RESULT
011052  017704  005530                  MOV     @DHMLSR,R4              ;READ LINE STATUS
011056  117703  005522                  MOVB    @DHMCSR,R3              ;READ LINE NUMBER
011062  042703  177760                  BIC     #177760,R3              ;CLEAR UNWANTED BITS
011066  020103                          CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
011070  001002                          BNE     MUX17C                  ;EXPECT LINE ENABLE AND
011072  012705  000031                  MOV     #LINENA+SECTX+SECRX,R5
                                                                        ;SECONDARY RECEIVE IS SET
011076  020405                  MUX17C: CMP     R4,R5                   ;COMPARE EXPECTED AND
011100  001403                          BEQ     MUX17D                  ;RECEIVED RESULTS
011102  104001                          ERRORL                          ;LINE STATUS ERROR
011104  104003                          SCOPEF
011106  011110                          MUX17D
011110  052777  000400  005466  MUX17D: BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
011116  005302                          DEC     R2                      ;CONTINUE IF ALL CHECKS
011120  001353                          BNE     MUX17B                  ;ARE NOT DONE FOR THIS LINE
011122  012705  000001                  MOV     #LINENA,R5              ;EXPECT LINE ENABLE
011126  010103                  MUX17E: MOV     R1,R3                   ;ON SELECTED LINE
011130  010177  005450                  MOV     R1,@DHMCSR              ;SELECT LINE
011134  042777  000010  005444          BIC     #SECTX,@DHMLSR          ;CLEAR SECONDARY TRANSMIT
011142  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
011146  001375                          BNE     .-4                     ;DITTO
011150  017704  005432                  MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
011154  020504                          CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
011156  001401                          BEQ     MUX17F                  ;SET ON THIS LINE
011160  104001                          ERRORL                          ;LINE STATUS ERROR
011162  104002                  MUX17F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
 1615
 1616                                   ;MODEM CONTROL ON LINE TEST USING 103A TYPE MODEMS
 1617                                   ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
 1618                                   ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQLENCES
 1619                                   ;USING THE MODEM CONTROL TO CONTROL 103A TYPE MODEMS
 1620
 1621                                   ;NOTE:  IF THE DM11-AA IS NOT CONNECTED TO THE
 1622                                   ;DISTRIBUTION PANEL, AN M974 DM11 MAINTENANCE JUMPER
 1623                                   ;SHOULD BE INSTALLED IN SLOT B1 OR B3 OF THE DISTRIBUTION
 1624                                   ;PANNEL TO PREVENT A POSSIBLE LONG SPACE
 1625                                   ;DISCONNECT FROM HANGING UP THE MODEM
 1626
 1627
 1628  011164                  T200:                                  ;REFERENCE DESIGNATION
 1629  011164  000005          ST103A: RESET                          ;INITIALIZE INTERFACE
 1630  011166  012737  000340  177776  MOV     #340,PS                ;DISABLE ALL INTERRUPTS
 1631  011174  104004                  TYPE                           ;TYPE "103A MODEM CONNECT-
 1632  011176  017142                  MT103T                         ;DISCONNECT TEST"
 1633  011200  022737  000176  016620  CMP     #SWREG,SWR
 1634  011206  001001                  BNE     1$
 1635  011210  104025                  CNTLUU
 1636  011212  012737  011230  013020  1$:     MOV     #T103A,FATRET  ;SET UP FOR FATAL ERROR
 1637  011220  012737  011226  002204          MOV     #ST103B,KRET   ;SET UP FOR LINE CHANGE
 1638  011226  104017          ST103B: GETLNS                         ;INPUT ORIGINATE AND
 1639                                                                 ;AND ANSWER LINE NUMBERS
 1640  011230  104020          T103A:  SETUP                          ;SET UP TO RECEIVE INTERRUPTS
 1641                                                                 ;WAIT FOR RING
 1642  011232  011242                  T103B                          ;GO HERE IF RING OK
 1643  011234  011236                  T103A1                         ;GO HERE IF NO RING
 1644  011236  104012          T103A1: ERROR                          ;NO RING WITHIN 5 MINUTES
 1645  011240  000772                  BR      ST103B                 ;SELECT NEW LINES AND REDIAL
 1646
 1647                                   ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
 1648                                   ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
 1649                                   ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
 1650                                   ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
 1651
 1652  011242  104021          T103B:  CKRING                         ;CHECK FOR RING INTERRUPT
 1653                                                                 ;ONLY ON ANSWER LINE
 1654                                                                 ;AND NO TRANSITIONS ON
 1655                                                                 ;ORIGINATE LINE
 1656  011244  011262                  T103C                          ;GO HERE IF TRANSITIONS
 1657                                                                 ;ARE CORRECT
 1658  011246  011252                  T103B1                         ;GO HERE IF INCORRECT
 1659                                                                 ;TRANSITION ON ANSWER LINE
 1660  011250  011256                  T103B2                         ;GO HERE IF INCORRECT TRANSITION
 1661                                                                 ;ON ORIGINATE LINE
 1662  011252  104014          T103B1: ERRORT                         ;TRANSITION ERROR ON ANSWER LINE
 1663  011254  000207                  RTS     PC                     ;CONTINUE CHECKING
 1664  011256  104014          T103B2: ERRORT                         ;TRANSITION ERROR ON ORIGINATE LINE
 1665  011260  000762                  BR      ST103B                 ;RESELECT LINES AND REDIAL
```

```
                                        ;SET TERMINAL READY ON SELECTED ANSWER LINE
                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

011262  013777  016676  005314  T103C:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO
                                                                        ;ANSWER LINE NUMBER
011270  052777  000002  005310          BIS     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON
                                                                        ;SELECTED ANSWER LINE
011276  104026                          CKINTT
01130C  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                        ;SELECTED ORIGINATE AND ANSWER LINES

011302  104023                          CKTRAN                          ;CHECK TRANSITIONS AND
                                                                        ;STATUS ON SELECTED
                                                                        ;ANSWER AND ORIGINATE LINES
011304  000143                          CO+CS+LINENA+TRMRDY             ;EXPECT CARRIER, CLEAR TO SEND,
                                                                        ;LINE ENABLE AND TERMINAL
                                                                        ;READY STATUS BITS SET ON
                                                                        ;ANSWER LINE
011306  000143                          CO+CS+LINENA+TRMRDY             ;EXPECT CARRIER, CLEAR TO SEND,
                                                                        ;LINE ENABLE    AND TERMINAL
                                                                        ;READY STATUS BITS ON
                                                                        ;ORIGINATE LINE
011310  100006                          RINGF+XCO+XCS                   ;EXPECT CARRIER, CLEAR TO SEND
                                                                        ;AND POSSIBLE RING TRANSITIONS
                                                                        ;ON ANSWER LINE
011312  000006                          XCO+XCS                         ;EXPECT CARRIER AND CLEAR
                                                                        ;TO SEND TRANSITIONS ON
                                                                        ;ORIGINATE LINE
011314  011326                          T103D1                          ;GO HERE ON ANSWER LINE STATUS ERROR

011316  011332                          T103D2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
011320  011336                          T103D3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
011322  011342                          T103D4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
011324  011346                          T103E                           ;GO TO NEXT TEST IF NO ERRORS
011326  104015          T103D1:         ERRORS                          ;ANSWER LINE STATUS ERROR
011330  000207                          RTS     PC                      ;CONTINUE CHECKING
011332  104015          T103D2:         ERRORS                          ;ORIGINATE LINE STATUS ERROR
011334  000207                          RTS     PC                      ;CONTINUE CHECKING
011336  104014          T103D3:         ERRORT                          ;ANSWER LINE TRANSITION ERROR
011340  000207                          RTS     PC                      ;CONTINUE CHECKING
011342  104014          T103D4:         ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
011344  000207                          RTS     PC                      ;CONTINUE CHECKING
```

```
 1711
 1712                                   ;SET UP TO TEST DISCONNECT SEQUENCE
 1713                                   ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
 1714                                   ;TO INITIATE THE DISCONNECT SEQUENCE
 1715                                   ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
 1716                                   ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
 1717                                   ;BEFORE THE SWITCH SEETIN IS MADE
 1718                                   ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
 1719                                   ;REPORTED BY TYPEOUT
 1720
 1721  011346  104004          T103E:  TYPE                            ;TYPE "STRIKE ANY TTY KEY
 1722  011350  017405                  MDISC                           ;TEST DISCONNECT"
 1723  011352  012737  000340  177776  MOV     #340,PS                 ;LOCK OUT INTERRUPTS
 1724  011360  012777  013042  005212  MOV     #TRNTYP,@DHMVEC ;SET JP TO DETECT TRANSITIONS
 1725                                                                  ;BEFORE DISCONNECT SEQUENCE STARTS
 1726  011366  012737  011406  016724  MOV     #T103ES,RNGRET          ;SET UP DUMMY RETURN FOR
 1727                                                                  ;RING INTERRUPT
 1728  011374  012777  000140  005202  MOV     #SCNENA+INTENA,@DHMCSR  ;SET SCAN ENABLE AND INTERRUPT ENABLE
 1729  011402  005037  177776          CLR     PS                      ;ALLOW INTERRUPTS
 1730  011406  005077  005200  T103ES: CLR     @TKDBR
 1731  011412  105777  005172  1$:     TSTB    @TKCSR                  ;WAIT FOR TTY TO HIT
 1732  011416  100375                  BPL     .-6
 1733  011420  005777  005166          TST     @TKDBR
 1734  011424  012737  000340  177776  MOV     #340,PS                 ;START DISCONNECT SEQUENCE
 1735  011432  005077  005146          CLR     @DHMCSR                 ;CLEAR CONROL REGISTER .
 1736  011436  013777  016674  005140  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
 1737  011444  042777  000002  005134  BIC     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON SELECTED LINE
 1738  011452  104026                  CKINTT
 1739  011454  104022                  WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
```

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 1740
 1741                                   ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED
 1742                                   ;ORIGINATE AND ANSWER LINES
 1743
 1744  011456  104023                   CKTRAN                  ;CHECK TRANSITIONS AND
 1745                                                           ;STATUS ON SELECTED
 1746                                                           ;ANSWER AND ORIGINATE LINES
 1747  011460  000003                   LINENA+TRMRDY           ;EXPECT LINE ENABLE AND
 1748                                                           ;TERMINAL READY STATUS BITS
 1749                                                           ;SET ON ANSWER LINE
 1750  011462  000001                   LINENA                  ;EXPECT LINE ENABLE STATUS BIT
 1751                                                           ;SET ON ORIGINATE LINE
 1752  011464  000006                   XCO+XCS                 ;EXPECT CARRIER AND CLEAR
 1753                                                           ;TO SEND TRANSITIONS ON
 1754                                                           ;ANSWER LINE
 1755  011466  000006                   XCO+XCS                 ;EXPECT CARRIER AND CLEAR
 1756                                                           ;TO SEND TRANSITIONS ON
 1757                                                           ;ORIGINATE LINE
 1758  011470  011502                   T103E1                  ;GO HERE ON ANSWER LINE STATUS ERROR
 1759
 1760  011472  011506                   T103E2                  ;GO HERE ON ORIGINATE LINE STATUS ERROR
 1761  011474  011512                   T103E3                  ;GO HERE ON ANSWER LINE TRANSITION ERROR
 1762  011476  011516                   T103E4                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
 1763  011500  011522                   T103EN                  ;GO TO NEXT TEST IF NO ERRORS
 1764  011502  104015          T103E1:  ERRORS                  ;ANSWER LINE STATUS ERROR
 1765  011504  000207                   RTS     PC              ;CONTINUE CHECKING
 1766  011506  104015          T103E2:  ERRORS                  ;ORIGINATE LINE STATUS ERROR
 1767  011510  000207                   RTS     PC              ;CONTINUE CHECKING
 1768  011512  104014          T103E3:  ERRORT                  ;ANSWER LINE TRANSITION ERROR
 1769  011514  000207                   RTS     PC              ;CONTINUE CHECKING
 1770  011516  104014          T103E4:  ERRORT                  ;ORIGINATE LINE TRANSITION ERROR
 1771  011520  000207                   RTS     PC              ;CONTINUE CHECKING
 1772
 1773  011522                   T201:                           ;REFERENCE DESIGNATION
 1774  011522  104004          T103EN:  TYPE                    ;TYPE " 103A TEST COMPLETE"
 1775  011524  017327                   MT103A
 1776  011526  005037  016632           CLR     TSTNO           ;CLEAR TEST NUMBER FOR LOOPING
 1777  011532  104026                   CKINTT
 1778  011534  000137  011226           JMP     ST103B          ;SELECT NEW LINE NUMBERS AND
 1779                                                           ;RESTART TEST
```

```
1780
1781                                        ;MODEM CONTROL ON LINE TEST USING 202C TYPE MODEMS
1782                                        ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
1783                                        ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
1784                                        ;USING THE MODEM CONTROL TO CONTROL 202C TYPE MODEMS
1785
1786                                        ;ALSO TESTED ARE LINE TURN-AROUND AND
1787                                        ;SECONDARY TRANSMIT-SECONDARY RECEIVE
1788
1789  011540                          T300:                                 ;REFERENCE DESIGNATION
1790  011540  000005                 ST202A: RESET                         ;INITIALIZE INTERFACE
1791  011542  012737  000340  177776        MOV     #340,PS               ;DISABLE ALL INTERRUPTS
1792  011550  104004                        TYPE                          ;TYPE "202C MODEM CONNECT-
1793  011552  017213                        MT202T                        ;DISCONNECT TEST"
1794  011554  022737  000176  016620        CMP     #SWREG,SWR
1795  011562  001001                        BNE     1$
1796  011564  104025                        CNTLUU
1797  011566  012737  011604  013020  1$:   MOV     #T202A,FATRET         ;SET UP FOR FATAL ERROR
1798  011574  012737  011602  002204        MOV     #ST202B,KRET          ;SET UP FOR LINE CHANGE
1799  011602  104017                 ST202B: GETLNS                        ;INPUT ORIGINATE AND
1800                                                                       ;ANSWER LINE NUMBERS
1801  011604  104020                 T202A:  SETUP                         ;SET UP TO RECEIVE INTERRUPTS
1802                                                                       ;WAIT FOR RING
1803  011606  011616                        T202B                         ;GO HERE IF RING OK
1804  011610  011612                        T202A1                        ;GO HERE IF NO RING
1805  011612  104012                 T202A1: ERROR                         ;NO RING WITHIN 5 MINUTES
1806  011614  000772                        BR      ST202B                ;SELECT NEW LINES AND REDIAL
1807
1808                                        ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
1809                                        ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
1810                                        ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
1811                                        ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
1812
1813  011616  104021                 T202B:  CKRING                        ;CHECK FOR RING INTERRUPT
1814                                                                       ;ONLY ON ANSWER LINE
1815                                                                       ;AND NO TRANSITIONS ON
1816                                                                       ;ORIGINATE LINE
1817  011620  011636                        T202C                         ;GO HERE IF TRANSITIONS
1818                                                                       ;ARE CORRECT
1819  011622  011626                        T202B1                        ;GO HERE IF INCORRECT
1820                                                                       ;TRANSITION ON ANSWER LINE
1821  011624  011632                        T202B2                        ;GO HERE IF INCORRECT
1822                                                                       ;TRANSITION ON ORIGINATE LINE
1823  011626  104014                 T202B1: ERRORT                        ;ANSWER LINE TRANSITION ERROR
1824  011630  000207                        RTS     PC                    ;CONTINUE CHECKING
1825  011632  104014                 T202B2: ERRORT                        ;ORIGINATE LINE TRANSITION ERROR
1826  011634  000762                        BR      ST202B                ;RESELECT LINES AND REDIAL
```

```
                                        ;SET TERMINAL READY ON SELECTED ANSWER LINE
                                        ;SET REQUEST TO SEND ON SELECTED ORIGINATE LINE
                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

011636  013777  016676  004740  T202C:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
011644  052777  000002  004734          BIS     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON ANSWER LINE
011652  013777  016674  004724  T202D:  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
011660  052777  000004  004720          BIS     #RS,@DHMLSR             ;SET REQUEST TO SEND ON ORIGINATE LINE
011666  104026                          CKINTT
011670  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                        ;SELECTED ORIGINATE AND ANSWER LINES

011672  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                                        ;ON SELECTED ANSWER AND
                                                                        ;ORIGINATE LINES
011674  000103                          CO+LINENA+TRMRDY                ;EXPECT CARRIER, LINE ENABLE
                                                                        ;AND TERMINAL READY STATUS
                                                                        ;BITS SET ON ANSWER LINE
011676  000147                          RS+CO+CS+LINENA+TRMRDY          ;EXPECT REQUEST TO SEND, CLEAR
                                                                        ;TO SEND, CARRIER, LINE ENABLE
                                                                        ;AND TERMINAL READY STATUS BITS
                                                                        ;SET ON ORIGINATE LINE
011700  100004                          RINGF+XCO                       ;EXPECT CARRIER AND POSSIBLE
                                                                        ;RING TRANSITIONS ON
                                                                        ;ANSWER LINE
011702  000006                          XCO+XCS                         ;EXPECT CARRIER AND CLEAR
                                                                        ;TO SEND TRANSITIONS ON
                                                                        ;ORIGINATE LINE
011704  011716                          T202D1                          ;GO HERE ON ANSWER LINE STATUS ERROR
011706  011722                          T202D2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
011710  011726                          T202D3                          ;GO HERE ON ANSWER LINE STATUS ERROR
011712  011732                          T202D4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
011714  011736                          T202E                           ;GO TO NEXT TEST IF NO ERRORS
011716  104015          T202D1: ERRORS                                  ;ANSWER LINE SATAUS ERROR
011720  000207                  RTS     PC                              ;CONTINUE CHECKING
011722  104015          T202D2: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
011724  000207                  RTS     PC                              ;CONTINUE CHECKING
011726  104014          T202D3: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
011730  000207                  RTS     PC                              ;CONTINUE CHECKING
011732  104014          T202D4: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
011734  000207                  RTS     PC                              ;CONTINUE CHECKING
```

```
                                        ;SET SECONDARY TRANSMIT ON ANSWER LINE
                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

011736  013777  016676  004640  T202E:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
011744  052777  000010  004634          BIS     #SECTX,@DHMLSR          ;SET SECONDARY RECEIVE ON ANSWER LINE
011752  104026                          CKINTT
011754  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                        ;SELECTED ORIGINATE AND ANSWER LINES

011756  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                                        ;ON SELECTED ANSWER AND
                                                                        ;ORIGINATE LINES
011760  000133                          SECTX+CO+LINENA+TRMRDY+SECRX    ;EXPECT SECONDARY TRANSMIT
                                                                        ;SECONDARY RECEIVE, CARRIER
                                                                        ;LINE ENABLE AND TERMINAL READY
                                                                        ;STATUS BITS SET ON ANSWER LINE
011762  000167                          SECRX+RS+CO+CS+LINENA+TRMRDY    ;EXPECT SECONDARY RECEIVE,
                                                                        ;REQUEST TO SEND, CLEAR TO SEND
                                                                        ;CARRIER, LINE ENABLE AND
                                                                        ;TERMINAL READY STATUS BITS
                                                                        ;SET ON ORIGINATE LINE
011764  000001                          XSCRX                           ;EXPECT SECONDARY RECEIVE
                                                                        ;TRANSITION ON ANSWER LINE
011766  000001                          XSCRX                           ;EXPECT SECONDARY RECEIVE
                                                                        ;TRANSITION ON ORIGINATE LINE
011770  012002                          T202E1                          ;GO HERE ON ANSWER LINE STATUS ERROR
011772  012006                          T202E2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
011774  012012                          T202E3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
011776  012016                          T202E4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
012000  012022                          T202F                           ;GO TO NEXT TEST IF NO ERRORS
012002  104015          T202E1: ERRORS                                  ;ANSWER LINE STATUS ERROR
012004  000207                  RTS     PC                              ;CONTINUE CHECKING
012006  104015          T202E2: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
012010  000207                  RTS     PC                              ;CONTINUE CHECKING
012012  104014          T202E3: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
012014  000207                  RTS     PC                              ;CONTINUE CHECKING
012016  104014          T202E4: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
012020  000207                  RTS     PC                              ;CONTINUE CHECKING
```

```
                                        ;DROP REQUEST TO SEND ON ORIGINATE LINE
                                        ;DROP SECONDARY TRANSMIT ON ANSWER LINE
                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

012022  013777  016674  004554  T202F:  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
012030  042777  000004  004550          BIC     #RS,@DHMLSR             ;DROP REQUEST TO SEND
012036  013777  016676  004540          MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
012044  042777  000010  004534          BIC     #SECTX,@DHMLSR          ;DROP SECONDARY RECEIVE
012052  104026                          CKINTT
012054  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                        ;SELECTED ORIGINATE AND ANSWER LINES

012056  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                                        ;ON SELECTED ANSWER AND
                                                                        ;ORIGINATE LINES
012060  000003                          LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
                                                                        ;TERMINAL READY STATUS BITS
                                                                        ;SET ON ANSWER LINE
012062  000003                          LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
                                                                        ;TERMINAL READY STATUS BITS
                                                                        ;SET ON ORIGINATE LINE
012064  000005                          XCO+XSCRX                       ;EXPECT CARRIER AND SECONDARY
                                                                        ;RECEIVE TRANSITIONS ON
                                                                        ;ANSWER LINE
012066  000007                          XCO+XCS+XSCRX                   ;EXPECT CARRIER, CLEAR TO SEND
                                                                        ;AND SECONDARY RECEIVE
                                                                        ;TRANSITIONS ON ORIGINATE LINE
012070  012102                  T202F2                                  ;GO HERE ON ANSWER LINE STAATUS ERROR
012072  012106                  T202F3                                  ;GO HERE ON CRIGINATE LINE STATUS ERRORO
012074  012112                  T202F4                                  ;GO HERE ON ANSWER LINE TRANSITION ERROR
012076  012116                  T202F5                                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
012100  012122                  T202G                                   ;GO TO NEXT TEST IF NO ERRORS
012102  104015          T202F2: ERRORS                                  ;ANSWER LINE STATUS ERROR
012104  000207                  RTS     PC                              ;CONTINUE CHECKING
012106  104015          T202F3: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
012110  000207                  RTS     PC                              ;CONTINUE CHECKING
012112  104014          T202F4: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
012114  000207                  RTS     PC                              ;CONTINTUE CHECKING
012116  104014          T202F5: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
012120  000207                  RTS     PC                              ;CONTINUE CHECKING
```

```
                                                ;SET REQUEST TO SEND ON ANSWER LINE
                                                ;WAIT FOR TRANSITIONS ON SELECTED LINES
012122  013777  016676  004454  T202G:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
012130  052777  000004  004450          BIS     #RS,@DHMLSR             ;SET REQUEST TO SEND
012136  104026                          CKINTT
012140  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                                ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                                ;SELECTED ORIGINATE AND ANSWER LINES

012142  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                ;ON SELECTED ANSWER AND
                                                ;ORIGINATE LINES
012144  000147                          RS+CO+CS+LINENA+TRMRDY          ;EXPECT LINE ENABLE, TERMINAL
                                                ;READY, REQUEST TO SEND, CLEAR
                                                ;TO SEND, AND CARRIER
                                                ;STATUS BITS SET ON  ANSWER LINE
012146  000103                          CO+LINENA+TRMRDY                ;EXPECT LINE ENABLE, TERMINAL
                                                ;READY AND CARRIER STATUS
                                                ;BITS SET ON ORIGINATE LINE
012150  000006                          XCO+XCS                         ;EXPECT CARRIER AND CLEAR
                                                ;TO SEND TRANSITIONS ON
                                                ;ANSWER LINE
012152  000004                          XCO                             ;EXPECT CARRIER TRANSITION
                                                ;ON ORIGINATE LINE
012154  012166                          T202G1                          ;GO HERE ON  ANSWER LINE STATUS ERROR
012156  012172                          T202G2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
012160  012176                          T202G3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
012162  012202                          T202G4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
012164  012206                          T202H                           ;GO TO NEXT TEST IF NO ERRORS
012166  104015          T202G1: ERRORS                                  ;ANSWER LINE STATUS ERROR
012170  000207                  RTS     PC                              ;CONTINUE TESTING
012172  104015          T202G2: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
012174  000207                  RTS     PC                              ;CONTINUE TESTING
012176  104014          T202G3: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
012200  000207                  RTS     PC                              ;CONTINUE TESTING
012202  104014          T202G4: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
012204  000207                  RTS     PC                              ;CONTINUE TESTING
```

```
                                        ;SET SECONDARY TRANSMIT ON ORIGINATE LINE
                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

012206  013777  016674  004370  T202H:  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
012214  052777  000010  004364          BIS     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT
012222  104026                          CKINTT
012224  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                        ;SELECTED ORIGINATE AND ANSWER LINES

012226  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                                        ;ON SELECTED ANSWER AND
                                                                        ;ORIGINATE LINES
012230  000167                          RS+CS+CO+LINENA+TRMRDY+SECRX    ;EXPECT LINE ENABLE, TERMINAL
                                                                        ;READY, REQUEST TO SEND, CLEAR
                                                                        ;TO SEND, CARRIER AND SECONDARY
                                                                        ;RECEIVE STATUS BITS SET
                                                                        ;ON ANSWER LINE
012232  000133                          SECTX+CO+LINENA+TRMRDY+SECRX    ;EXPECT LINE ENABLE, TERMINAL
                                                                        ;READY, CARRIER, SECONDARY
                                                                        ;TRANSMIT AND SECONDARY
                                                                        ;RECEIVE STATUS BITS SET
                                                                        ;ON ORIGINATE LINE
012234  000001                          XSCRX                           ;EXPECT SECONDARY RECEIVE
                                                                        ;TRANSITION ON ANSWER LINE
012236  000001                          XSCRY                           ;EXPECT SECONDARY RECEIVE
                                                                        ;TRANSITION ON ORIGINATE LINE
012240  012252                          T202H2                          ;GO HERE ON ANSWER LINE STATUS ERROR
012242  012256                          T202H3                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
012244  012262                          T202H4                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
012246  012266                          T202H5                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
012250  012272                          T202I                           ;GO TO NEXT TEST IF NO ERRORS
012252  104015          T202H2: ERRORS                                  ;ANSWER LIN STATUS ERROR
012254  000207                  RTS     PC                              ;CONTINUE CHECKING
012256  104015          T202H3: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
012260  000207                  RTS     PC                              ;CONTINUE CHECKING
012262  104014          T202H4: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
012264  000207                  RTS     PC                              ;CONTINUE CHECKING
012266  104014          T202H5: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
012270  000207                  RTS     PC                              ;CONTINUE CHECKING
```

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                                                        ;DROP REQUEST TO SEND ON ANSWER LINE
                                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES

012272  013777  016676  004304  T2021:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
012300  042777  000004  004300          BIC     #RS,@DHMLSR             ;CLEAR REQUEST TO SEND
012306  013777  016674  004270          MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
012314  042777  000010  004264          BIC     #SECTX,@DHMLSR          ;CLEAR SECONDARY TRANSMIT
012322  104026                          CKINTT
012324  104022                          WAITRN                          ;WAIT FRO TRANSITIONS TO OCCUR

                                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
                                                        ;SELECTED ORIGINATE AND ANSWER LINES

012326  104023                          CkTRAN                          ;CHECK TRANSITION S AND STATUS
                                                                        ;ON SELECTED ANSWE AND
                                                                        ;ORIGINATE LINES
012330  000003                          LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
                                                                        ;TERMINAL READY STATUS BITS SET
                                                                        ;ON ANSWER LINE
012332  000003                          LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
                                                                        ;TERMINAL READY STATUS BITS
                                                                        ;SET ON ORIGINATE LINE
012334  000007                          XCO+XCS+XSCRX                   ;EXPECT CARRIER, CLEAR TO SEND
                                                                        ;AND SECONDARY RECEIVE TRANSITIONS
                                                                        ;ON ANSWER LINE
012336  000005                          XCO+XSCRX                       ;EXPECT CARRIER AND SECONDARY
                                                                        ;RECEIVE TRANSITIONS ON
                                                                        ;ORIGINATE LINE
012340  012352                          T2021Z                          ;GO HERE ON ANSWER LINE STATUS ERROR
012342  012356                          T2021Z                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
012344  012362                          T2021Z                          ;GO HERE ON ANSWER LINE TRANSITIN ERROR
012346  012366                          T2021Z                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
012350  012372                          T2021Z                          ;GO TO NEXT TEST IF NO ERRORS
012352  104015          T2021Z:         ERRORS                          ;ANSWER LINE STATUS ERROR
012354  000207                          RTS     PC                      ;CONTINUE CHECKING
012356  104015          T2021Z:         ERRORS                          ;ORIGINATE LINE STATUS ERROR
012360  000207                          RTS     PC                      ;CONTINUE CHECKING
012362  104014          T2021Z:         ERRORT                          ;ANSWE LINE TRANSITION ERROR
012364  000207                          RTS     PC                      ;CONTINUE CHECKING
012366  104014          T2021Z:         ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
012370  000207                          RTS     PC                      ;CONTINUE CHECKING
```

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2090
2091                                        ;SET UP TO TEST DISCONNECT SEQUENCE
2092                                        ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
2093                                        ;TO INITIATE THE DISCONNECT SEQUENCE
2094                                        ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
2095                                        ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
2096                                        ;BEFORE THE SWITCH SEETIN IS MADE
2097                                        ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
2098                                        ;REPORTED BY TYPEOUT
2099
2090  012372  104004            T202J:  TYPE                            ;TYPE "STRIKE ANY TTY KEY
2091  012374  017405                    MDISC                           ;TEST DISCONNECT"
2092  012376  012737  000340  177776    MOV     #340,PS                 ;LOCK OUT INTERRUPTS
2093  012404  012777  013042  004166    MOV     #TRNTYP,@DHMVEC         ;SET UP TO DETECT TRANSITIONS
2094  012412  012737  012432  016724    MOV     #T202JS,RNGRET          ;SET UP DUMMY RETURN FOR RING
2095                                                                    ;FROM RING INTERRUPT
2096  012420  012777  000140  004156    MOV     #SCNENA+INTENA,@DHMCSR  ;ENABLE LINE SCANNER
2097                                                                    ;START SCANNER
2098  012426  005037  177776            CLR     PS                      ;ENABLE INTERRUPTS
2099  012432  005077  004154    T202JS: CLR     @TKDBR
2100  012436  105777  004146    1$:     TSTB    @TKCSR
2101  012442  100375                    BPL     1$
2102  012444  005777  004142            TST     @TKDBR
2103
2104                                        ;DISCONNECT SEQUENCE REQUESTED
2105
2106  012450  012737  000340  177776    MOV     #340,PS                 ;LOCK OUT INTERRUPTS
2107  012456  005077  004122            CLR     @DHMCSR                 ;STOP SCANNER
2108  012462  013777  016674  004114    MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
2109  012470  042777  000002  004110    BIC     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON SELECTED LINE
2110  012476  104024                    WAITS                           ;DELAY
2111  012500  104026                    CKINTT
2112  012502  104022                    WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
```

```
                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED
                                        ;ORIGINATE AND ANSWER LINES

012E04  104023                          CKTRAN                  ;CHECK TRANSITIONS AND STATUS
                                                                ;ON SELECTED ASNWER AND
                                                                ;ORIGINATE LINES
012506  000003                          LINENA+TRMRDY           ;EXPECT LINE ENABLE AND
                                                                ;TERMINAL READY STATUS BITS
                                                                ;SET ON ANSWER LINE
012510  000001                          LINENA                  ;EXPECT LINE ENABLE STATUS
                                                                ;BIT SET ON ORIGINATE LINE
012512  000000                          0                       ;EXPECT NO TRANSITIONS ON
                                                                ;ANSWER LINE
012514  000000                          0                       ;EXPECT NO TRANSITIONS ON
                                                                ;ORIGINATE LINE
012516  012530                          T202J1                  ;GO HERE IF ANSWER LINE STATUS ERROR
012520  012534                          T202J2                  ;GO HERE IF ORIGINATE LINE STATUS ERROR
012522  012540                          T202J3                  ;GO HERE IF ANSWER LINE TRANSITION ERROR
012524  012544                          T202J4                  ;GO HERE IF ORIGINATE LINE TRANSITIONS ERROR
012526  012550                          T202JN                  ;GO TO END OF TEST IF NO ERRORS
012530  104015          T202J1: ERRORS                          ;ANSWER LINE STATUS ERRORO
012532  000207                  RTS     PC                      ;CONTINUE CHECKING
012534  104015          T202J2: ERRORS                          ;ORIGINATE LINE STATUS ERRROR
012536  000207                  RTS     PC                      ;CONTINUE CHECKING
012540  104014          T202J3: ERRORT                          ;ANSWER LINE TRANSITION ERROR
012542  000207                  RTS     PC                      ;CONTINUE CHECKING
012544  104014          T202J4: ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
012546  000207                  RTS     PC                      ;CONTINUE CHECKING

012550  104004          T202JN: TYPE                            ;TYPE "202C TEST COMPLETE"
012552  017356                  MT202A
012554  104026                  CKINTT
012556  000137  011602          JMP     ST202B                  ;GET NEW LINE NUMBERS
                                                                ;RESTART TEST
```

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2148
2149                                    ;DETECT AND RECORD TRANSITIONS ON SELECTED
2150                                    ;ORIGINATE AND ANSWER LINES
2151
2152                                    ;TRANSITION DATA IS STORED IN LOCATIONS ANSFLG AND ORGFLG
2153                                    ;FOR ANSWER AND ORIGINATE LINES RESPECTIVELY
2154                                    ;FORMAT OF DATA IS (FOR BOTH LINES)
2155
2156                                    ;BIT0=1,SECONDARY RECEIVE CAUSED INTERRUPT
2157                                    ;BIT1=1, CLEAR TO SEND CAUSED INTERRUPT
2158                                    ;BIT2=1, CARRIER CAUSED INTERRUPT
2159                                    ;BIT3=1, RING CAUSED INTERRUPT
2160
2161  012562  017704  004016    TRANS: MOV     @DHMCSR,R4              ;GET LINE NUMBER AND
2162                                                                    ;INTERRUPT FLAGS
2163  012566  010405                   MOV     R4,R5
2164  012570  042705  177760          BIC     #177760,R5              ;EXTRACT LINE NUMBER
2165  012574  023705  016674          CMP     LINORG,R5               ;DID ORIGINATE LINE INTERRUPT
2166  012600  001411                   BEQ     ORGTR                   ;IF YES, SERVICE
2167  012602  023705  016676          CMP     LINANS,R5               ;DID ANSWER LINE INTERRUPT
2168  012606  001443                   BEQ     ANSTR                   ;IF YES, SERVICE
2169  012610  010577  003770          MOV     R5,@DHMCSR
2170  012614  017703  003766          MOV     @DHMLSR,R3
2171  012620  104016                   ERRORN                          ;INTERRUPT ON INCORRECT LINE
2172  012622  000471                   BR      FATEX
2173
2174                                    ;RECORD TRANSITIONS FOR ORIGINATE LINE
2175
2176  012624  032704  100000  ORGTR:   BIT     #RINGF,R4               ;IF RING CAUSED INTERRUPT,
2177  012630  001403                   BEQ     ORGTR1                  ;SET RING TRANSITION BIT
2178  012632  052737  000010  016702          BIS     #10,ORGFLG
2179  012640  032704  040000  ORGTR1: BIT     #COF,R4                 ;IF CARRIER CAUSED INTERRUPT
2180  012644  001403                   BEQ     ORGTR2                  ;SET CARRIER TRANSITION BIT
2181  012646  052737  000004  016702          BIS     #4,ORGFLG
2182  012654  032704  020000  ORGTR2: BIT     #CSF,R4                 ;IF CLEAR TO SEND
2183                                                                    ;CAUSED INTERRUPT
2184  012660  001403                   BEQ     ORGTR3                  ;SET CLEAR TO SEND
2185                                                                    ;TRANSITION BIT
2186  012662  052737  000002  016702          BIS     #2,ORGFLG
2187  012670  032704  010000  ORGTR3: BIT     #SECRXF,R4              ;IF SECONDARY RECEIVE
2188                                                                    ;CAUSED INTERRUPT
2189  012674  001403                   BEQ     ORGTR4                  ;SET SECONDARY RECEIVE
2190  012676  052737  000001  016702          BIS     #1,ORGFLG               ;TRANSITION BIT
2191  012704  032704  170000  ORGTR4: BIT     #RINGF+COF+CSF+SECRXF,R4
2192                                                                    ;IF NO INTERRUPT FLAGS SET
2193  012710  001044                   BNE     TRANEX                  ;EXIT TRANSITION DETECTION
2194  012712  104016  ORGTRR: ERRORN
2195  012714  000434                   BR      FATEX
```

```
2196
2197                                        ;RECORD TRANSITIONS FOR ANSWER LINE
2198
2199  012716  032704  100000        ANSTR:  BIT     #RINGF,R4               ;IF RING CAUSED INTERRUPT,
2200  012722  001403                        BEQ     ANSTR1                  ;SET RING TRANSITION BIT
2201  012724  052737  000010  016700        BIS     #10,ANSFLG
2202  012732  032704  040000        ANSTR1: BIT     #COF,R4                 ;IF CARRIER CAUSED INTERRUPT
2203  012736  001403                        BEQ     ANSTR2                  ;SET CARRIER TRANSITION BIT
2204  012740  052737  000004  016700        BIS     #4,ANSFLG
2205  012746  032704  020000        ANSTR2: BIT     #CSF,R4                 ;IF CLEAR TO SEND
2206                                                                        ;CAUSED INTERRUPT
2207  012752  001403                        BEQ     ANSTR3                  ;SET CLEAR TO SEND
2208                                                                        ;TRANSITION BIT
2209  012754  052737  000002  016700        BIS     #2,ANSFLG
2210  012762  032704  010000        ANSTR3: BIT     #SECRXF,R4              ;IF SECONDARY RECEIVE
2211                                                                        ;CAUSED INTERRUPT
2212  012766  001403                        BEQ     ANSTR4                  ;SET SECONDARY RECEIVE
2213  012770  052737  000001  016700        BIS     #1,ANSFLG               ;TRANSITION BIT
2214  012776  032704  170000        ANSTR4: BIT     #RINGF+COF+CSF+SECRXF,R4
2215                                                                        ;IF NO INTERRUPT FLAGS SET
2216  013002  001007                        BNE     TRANEX                  ;EXIT TRANSITION DETECTION
2217  013004  104016                ANSTRR: ERRORN
2218  013006  005037  016632        FATEX:  CLR     TSTNO
2219  013012  022626                        POP2SP
2220  013014  000177  000000                JMP     @FATRET
2221  013020  000000                FATRET: 0
2222
2223                                        ;EXIT TRANSITION DETECTION
2224
2225  013022  005704                TRANEX: TST     R4                      ;IF RING FLAG WAS SET
2226  013024  100002                        BPL     .+6                     ;SET UP SPECIAL RETURN
2227  013026  013716  016724                MOV     RNGRET,(SP)
2228  013032  012777  000140  003544  TRANX1: MOV     #SCNENA+INTENA,@DHMCSR  ;RESTART SCANNER
2229  013040  000002                        RTI
2230
2231                                        ;TYPE TRANSITION DATA AND RETURN
2232
2233  013042  017737  003536  014026  TRNTYP: MOV     @DHMCSR,DATA1
2234  013050  017737  003532  014030          MOV     @DHMLSR,DATA2
2235  013056  104004                        TYPE
2236  013060  020027                        MTRNDET
2237  013062  104006                        OCTASC
2238  013064  013070                        TRNTAB
2239  013066  000761                        BR      TRANX1
2240  013070  000002                TRNTAB: 2
2241  013072  000006                        6
2242  013074  014026                        DATA1
2243  013076  000003                        3
2244  013100  014030                        DATA2
```

```
2245
2246                                        ;INPUT ORIGINATE AND ANSWER LINES FROM TELETYPE KEYBOARD
2247
2248  013102  000005                GETLIN: RESET
2249  013104  104013                        INSTRG                          ;TYPE "ORIGINATE LINE-"
2250  013106  017264                        MSELOR                          ;AND GET LINE NUMBER
2251  013110  000000                        0
2252  013112  000017                        17
2253  013114  016674                        LINORG
2254  013116  104013                        INSTRG                          ;TYPE "ANSWER LINE-"
2255  013120  017310                        MSELANS                         ;AND GET LINE NUMBER
2256  013122  000000                        0
2257  013124  000017                        17
2258  013126  016676                        LINANS
2259  013130  104004                        TYPE
2260  013132  017720                        MCRLF
2261  013134  000002                        RTI                             ;RETURN TO CALLING ROUTINE
2262
2263                                        ;INITIALIZE INTERFACE
2264
2265  013136  000005                SETUPS: RESET
2266  013140  012737  000340  177775        MOV     #340,PS                 ;LOCK OUT ALL INTERRUPTS
2267  013146  011605                        MOV     (SP),R5
2268  013150  012537  014036                MOV     (R5)+,NXTTS
2269  013154  012537  014016                MOV     (R5)+,ERR1
2270  013160  010516                        MOV     R5,(SP)
2271  013162  012777  006000  003414        MOV     #CLRSCN+CLRMUX,@DHMCSR  ;CLEAR LINE SCANNER AND MULTIPLEXER
2272  013170  032777  000020  003406 SETUP1: BIT     #BUSY,@DHMCSR           ;WAIT FOR SCANNER TO CLEAR
2273  013176  001374                        BNE     SETUP1
2274  013200  005037  016624                CLR     ERRFLG
2275
2276                                        ;ENABLE SELECTED LINES
2277                                        ;SET TERMINAL READY ON SELECTED ORIGINATE LINE
2278
2279  013204  013777  016674  003372 SETUP2: MOV     LINORG,@DHMCSR          ;SET UP TO ENABLE ORIGINATE LINE
2280                                                                          ;ORIGINATE LINE NUMBER
2281  013212  012777  000003  003366        MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE AND
2282                                                                          ;TERMINAL READY ON ORIGINATE LINE
2283  013220  013777  016676  003356        MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2284  013226  012777  000001  003352        MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE ON ANSWER LINE
2285
2286                                        ;REQUEST OPERATOR TO DIAL SELECTED ANSWER TERMINAL
2287                                        ;SET UP TO RECEIVE INTERRUPTS
2288                                        ;START LINE SCANNER
2289
2290  013234  012777  012562  003336        MOV     #TRANS,@DHMVEC          ;SET UP INTERRUPT VECTOR
2291                                                                          ;FOR TRANSITION DETECTION
2292  013242  012777  000340  003332        MOV     #340,@DHMLVL            ;SET UP INTERRUPT SERVICE LEVEL
2293  013250  012777  000140  003326        MOV     #SCNENA+INTENA,@DHMCSR  ;START SCANNER, ENABLE INTERRUPTS
2294  013256  005037  016700                CLR     ANSFLG                  ;CLEAR TRANSITION DETECTED FLAGS
2295  013262  005037  016702                CLR     ORGFLG
2296  013266  012737  013316  016724        MOV     #SETUP4,RNGRET          ;SET UP RETURN FROM
2297                                                                          ;DETECTION OF RING INTERRUPT
2298  013274  104004                        TYPE                            ;REQUEST OPERATOR TO DIAL
2299  013276  017104                        DIALM
2300  013300  005037  177776                CLR     PS                      ;CLEAR PROCESSOR STATUS WORD
```

```
2301  013304  005037  016704                  CLR     TIME1                   ;CLEAR TIMER
2302  013310  012737  001000  016706          MOV     #1000,TIME2             ;SET UP FOR 5 MINUTE DELAY
2303  013316  005737  016700          SETUP4: TST     ANSFLG                  ;IF TRANSITION HAS OCCURED,
2304  013322  001014                          BNE     SETUPB                  ;EXIT WAIT LOOP
2305  013324  005737  016702                  TST     ORGFLG
2306  013330  001011                          BNE     SETUPB
2307  013332  005237  016704                  INC     TIME1                   ;ALLOW OPERATOR 5 MINUTES TO DIAL
2308  013336  001367                          BNE     SETUP4
2309  013340  005337  016706                  DEC     TIME2
2310  013344  001364                          BNE     SETUP4
2311  013346  022626                          POP2SP
2312  013350  000177  000442                  JMP     @ERR1
2313  013354  022626                  SETUPB: POP2SP
2314  013356  000177  000454                  JMP     @NXTTS
2315  013362  012766  000340  000002          MOV     #340,+2(SP)
2316  013370  000002                          RTI
2317
2318                                          ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2319
2320  013372  011605                  CKRNG:  MOV     (SP),R5
2321  013374  012537  014036                  MOV     (R5)+,NXTTS
2322  013400  012537  014016                  MOV     (R5)+,ERR1
2323  013404  012537  014020                  MOV     (R5)+,ERR2
2324  013410  010516                          MOV     R5,(SP)
2325  013412  012705  000010                  MOV     #10,R5                  ;EXPECT RING ONLY ON ANSWER LINE
2326  013416  013704  016700                  MOV     ANSFLG,R4               ;GET ACTUAL TRANSITION DATA
2327  013422  013703  016676                  MOV     LINANS,R3               ;SET UP LINE NUMBER
2328  013426  020504                          CMP     R5,R4           ;DID RING CAUSE INTERRUPT
2329  013430  001402                          BEQ     CKRNG1                  ;ON ANSWER LINE
2330  013432  004777  000360                  JSR     PC,@ERR1
2331  013436  005005                  CKRNG1: CLR     R5
2332  013440  013704  016702                  MOV     ORGFLG,R4
2333  013444  013703  016674                  MOV     LINORG,R3
2334  013450  005704                          TST     R4                      ;IF TRANSITION OCCURED
2335  013452  001403                          BEQ     CKRNG2                  ;ON ORIGINATE LINE, ERROR
2336  013454  022626                          POP2SP
2337  013456  000177  000336                  JMP     @ERR2
2338  013462  022626                  CKRNG2: POP2SP
2339  013464  000177  000346                  JMP     @NXTTS
```

```
2340
2341  013470  005037  016700          WAITR:  CLR     ANSFLG
2342  013474  005037  016702                  CLR     ORGFLG
2343  013500  012777  012562  003072          MOV     #TRANS,@DHMVEC
2344  013506  012737  013526  016724          MOV     #WAITRR,PNGRET          ;SET UP FOR RETURN
2345                                                                          ;FROM RING DETECTION
2346  013514  012777  000140  003062          MOV     #SCNENA+INTENA,@DHMCSR  ;START SCANNER
2347  013522  005037  177776                  CLR     PS
2348  013526  005037  016704          WAITRR: CLR     TIME1
2349  013532  012737  000025  016706          MOV     #25,TIME2
2350  013540  005237  016704          WAITR1: INC     TIME1                   ;WAIT FOR TRANSITIONS OF
2351  013544  001375                          BNE     WAITR1                  ;CARRIER AND CLEAR TO SEND
2352  013546  005337  016706                  DEC     TIME2
2353  013552  001372                          BNE     WAITR1
2354  013554  000002                          RTI
2355
2356                                          ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2357                                          ;SELECTED ORIGINATE AND ANSWER LINES
2358
2359  013556  012737  000340  177776  CKTRN:  MOV     #340,PS                 ;LOCK OUT FURTHER INTERRUPTS
2360  013564  005077  003014                  CLR     @DHMCSR                 ;STOP LINE SCANNER
2361  013570  011605                          MOV     (SP),R5
2362  013572  012537  014026                  MOV     (R5)+,DATA1
2363  013576  012537  014030                  MOV     (R5)+,DATA2
2364  013602  012537  014032                  MOV     (R5)+,DATA3
2365  013606  012537  014034                  MOV     (R5)+,DATA4
2366  013612  012537  014016                  MOV     (R5)+,ERR1
2367  013616  012537  014020                  MOV     (R5)+,ERR2
2368  013622  012537  014022                  MOV     (R5)+,ERR3
2369  013626  012537  014024                  MOV     (R5)+,ERR4
2370  013632  012537  014036                  MOV     (R5)+,NXTTS
2371  013636  010516                          MOV     R5,(SP)
2372  013640  013705  014026                  MOV     DATA1,R5
2373  013644  013777  016676  002732          MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2374  013652  017704  002730                  MOV     @DHMLSR,R4              ;GET ACTUAL ANSWER LINE STATUS
2375  013656  013703  016676                  MOV     LINANS,R3
2376  013662  020504                          CMP     R5,R4                   ;COMPARE
2377  013664  001402                          BEQ     CKTRN1
2378  013666  004777  000124                  JSR     PC,@ERR1
2379  013672  013777  016674  002704  CKTRN1: MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
2380  013700  017704  002702                  MOV     @DHMLSR,R4              ;GET ACTUAL ORIGINATE LINE STATUS
2381  013704  013705  014030                  MOV     DATA2,R5
2382  013710  013703  016674                  MOV     LINORG,R3
2383  013714  020504                          CMP     R5,R4                   ;COMPARE
2384  013716  001402                          BEQ     CKTRN2
2385  013720  004777  000074                  JSR     PC,@ERR2
```

```
2386
2387                                        ;CHECK FOR CORRECT TRANSITIONS ON
2388                                        ;SELECTED ORIGINATE AND ANSWER LINES
2389
2390  013724  105737  014033        CKTRN2: TSTB    DATA3+1
2391  013730  100003                        BPL     .+10
2392  013732  042737  000010  016700        BIC     #10,ANSFLG
2393  013740  113704  016700                MOVB    ANSFLG,R4               ;GET TRANSITION DATA FOR
2394  013744  113705  014032                MOVB    DATA3,R5
2395  013750  013703  016676                MOV     LINANS,R3
2396  013754  020504                        CMP     R5,R4                   ;DID CORRECT TRANSITIONS OCCUR
2397  013756  001402                        BEQ     CKTRN3
2398  013760  004777  000036                JSR     PC,@ERR3
2399  013764  013704  016702        CKTRN3: MOV     ORGFLG,R4               ;GET TRANSITION DATA FOR
2400  013770  013705  014034                MOV     DATA4,R5
2401  013774  013703  016674                MOV     LINORG,R3
2402  014000  020504                        CMP     R5,R4                   ;DID CORRECT TRANSITIONS OCCUR
2403  014002  001402                        BEQ     CKTRN4
2404  014004  004777  000014                JSR     PC,@ERR4
2405  014010  022626                CKTRN4: POP2SP
2406  014012  000177  000020                JMP     @NXTTS
2407  014016  000000                ERR1:   0
2408  014020  000000                ERR2:   0
2409  014022  000000                ERR3:   0
2410  014024  000000                ERR4:   0
2411  014026  000000                DATA1:  0
2412  014030  000000                DATA2:  0
2413  014032  000000                DATA3:  0
2414  014034  000000                DATA4:  0
2415  014036  000000                NXTTS:  0
```

```
                                        ;END OF PASS
                                        ;UPDATE PASS COUNT
                                        ;TYPE END OF PASS MESSAGE

014040                                  EOP:
014040  005237  016630                          INC     PASCNT                  ;UPDATE PASS COUNT
014044  012737  000001  016632                  MOV     #1,TSTNO                ;START AT FIRST TEST OF GROUP
014052  000005                                  RESET                           ;CLEAR THE WORLD
014054  005037  016722                          CLR     FILLA                   ;INIT COUNTER
014060  005337  016722          1$:             DEC     FILLA                   ;COUNT THE CTR
014064  001375                                  BNE     1$                      ;BR TIL STALL TIMES OUT
014066  104004                                  TYPE                            ; RING BELL
014070  020306                                  MEPASS
014072  013701  000042                          MOV     42,R1                   ;ARE YOU ON ACT11?
014076  001516                                  BEQ     TSTENT          ;NO
014100  000005                                  RESET
014102  004711                  LOGICAL:        JSR     PC,(R1)
014104  000240                                  NOP
014106  000240                                  NOP
014110  000240                                  NOP
014112  000240                                  NOP
014114  000137  014334                          JMP     TSTENT                  ;GET ADDRESS OF FIRST TEST

                                        ;EMT DISPATCH SERVICE
                                        ;ARGUMENT OF EMT IS EXTRACTED
                                        ;AND USED AS OFFSET TO OBTAIN POINTER
                                        ;TO SELECTED SUBROUTINE

014120  011646                  EMTSRV: MOV     (SP),-(SP)              ;GET PC OF RETURN
014122  162716  000002                  SUB     #2,(SP)                 ;=PC OF EMT
014126  017616  000000                  MOV     @(SP),(SP)              ;GET EMT
014132  006316                  EMTOK:  ASL     (SP)                    ;MULTIPLY EMT ARG BY 2
014134  042716  177001                  BIC     #177001,(SP)            ;CLEAR UNWANTED BITS
014140  062716  020324                  ADD     #EMTTAB,(SP)            ;POINTER TO SUBROUTINE ADDRESS
014144  017616  000000                  MOV     @(SP),(SP)              ;SUBROUTINE ADDRESS
014150  000136                          JMP     @(SP)+                  ;GO TO SUBROUTINE

014152  105777  002432          CKINT:  TSTB    @TKCSR
014156  100001                          BPL     1$
014160  104027                          KBDIN
014162  000002                  1$:     RTI
```

```
2459
2460                                        ;END OF SUBTEST SERVICE
2461                                        ;CHECK FOR LOOP ON CURRENT TEST
2462                                        ;CHECK FOR ESCAPE TO NEXT TEST ON ERROR
2463                                        ;UPDATE ITERATION COUNT AND EXIT TO NEXT TEST IF 0
2464
2465                                        ;TEST XOR FLAG (XFLAG) FOR EXISTANCE OF XOR TESTER.
2466
2467  014164  005737  001252          LOOP: TST     XFLAG    ;IS THERE AN XOR TESTER OUT THERE ?
2468  014170  100022                        BPL     4$       ;NO
2469  014172  013746  000004                MOV     4,-(SP)  ;SAVE 4
2470  014176  012737  014216  000004        MOV     #1$,4    ;SET UP SVC ROUTINE
2471  014204  005737  177060                TST     177060   ;GOT SOMETHING LIKE SLAVE SYNC
2472  014210  012637  000004                MOV     (SP)+,4  ;YOU BETCHUM
2473  014214  000404                        BR      2$
2474  014216  022626                  1$:   POP2SP           ;RESTORE STACK
2475  014220  012637  000004                MOV     (SP)+,4  ;RESTORE 4
2476  014224  000402                        BR      3$
2477  014226  000137  014330          2$:   JMP     LOOPX    ;GO TO NEXT TEST
2478  014232  000137  014334          3$:   JMP     TSTENT   ;GO
2479  014236                          4$:
2480  014236  005037  177776                CLR     PSW
2481  014242  042777  000100  002340        BIC     #INTENA,@TKCSR
2482  014250  005737  016624          5$:   TST     ERRFLG                  ;IF ERROR OCCURED FLAG=1,
2483  014254  001404                        BEQ     LOOPS                   ;CHECK FOR ESCAPE TO NEXT TEST
2484  014256  032777  002000  002334        BIT     #SW10,@SWR              ;IF SW10=1,
2485  014264  001021                        BNE     LOOPX                   ;ESCAPE TO NEXT TEST
2486  014266  032777  040000  002324  LOOPS: BIT     #SW14,@SWR              ;IF SW14=1,
2487  014274  001041                        BNE     LOOPL                   ;LOOP ON CURRENT TEST
2488  014276  032777  004000  002314        BIT     #SW11,@SWR              ;IF SW11=1,
2489  014304  001011                        BNE     LOOPX                   ;INHIBIT ITERATIONS
2490  014306  005337  016636                DEC     ICOUNT                  ;UPDATE ITERATION COUNT
2491  014312  001406                        BEQ     LOOPX                   ;IF ICOUNT=0, GO TO NEXT TEST
2492  014314  013716  016634          LOOPER: MOV     RETURN,(SP)             ;SET UP FOR RETURN TO CURRENT TEST
2493  014320  042777  000100  002262        BIC     #INTENA,@TKCSR
2494  014326  000002                        RTI                             ;RETURN TO CURRENT TEST
2495  014330  005237  016632          LOOPX: INC     TSTNO                   ;UPDATE TEST NUMBER
2496  014334  013705  016632          TSTENT: MOV    TSTNO,R5                ;GET TEST NUMBER
2497  014340  006305                        ASL     R5                      ;MULTIPLY TEST NUMBER BY 4
2498  014342  006305                        ASL     R5
2499  014344  063705  016664                ADD     TSTPNT,R5               ;GET POINTER FOR TEST ENTRY
2500  014350  011537  016634                MOV     (R5),RETURN             ;GET STARTING ADDRESS OF NEXT TEST
2501  014354  001631                        BEQ     EOP                     ;IF ADDRESS=0, GO TO END OF PASS
2502  014356  012516                        MOV     (R5)+,(SP)              ;PUT STARTING ADDRSS ON STACK
2503  014360  011537  016636                MOV     (R5),ICOUNT             ;GET ITERATION COUNT FOR TEST
2504  014364  005037  016624                CLR     ERRFLG                  ;CLEAR ERROR OCCURED FLAG
2505  014370  042777  000100  002212        BIC     #INTENA,@TKCSR
2506  014376  000002                        RTI                             ;GO TO TEST
2507  014400  012737  000001  016636  LOOPL: MOV     #1,ICOUNT               ;SET UP TO EXIT TEST AFTER LOOP
2508  014406  000742                        BR      LOOPER                  ;GO TO LOOP SERVICE
2509
2510                                        ;CHECK FOR LOOPING WITH SAME DATA
2511                                        ;CHECK FOR ESCAPE TO NEXT TEST ON ERROR
2512
2513  014410  005737  016624          FREEZE: TST    ERRFLG                  ;IF ERROR FLAG=0,
2514  014414  001413                        BEQ     FREEZX                  ;DO NOT TEST FOR ESCAPE
```

```
 2515  014416  032777  002000  002174          BIT     #SW10,@SWR              ;IF SW10=1,
 2516  014424  001341                          BNE     LOOPX                   ;ESCAPE TO NEXT TEST
 2517  014426  032777  001000  002164          BIT     #SW09,@SWR              ;IF SW09=1,
 2518  014434  001403                          BEQ     FREEZX                  ;FREEZE CURRENT DATA
 2519  014436  017616  000000                  MOV     @(SP).(SP)              ;GET LOOPING ADDRESS
 2520  014442  000002                          RTI                             ;LOOP
 2521  014444  062716  000002          FREEZX: ADD     #2,(SP)                 ;CONTINUE IN CURRENT TEST
 2522  014450  000002                          RTI
```

```
                                        ;GENERAL ERROR SERVICE
                                        ;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER

014452  005037  016624        ERR:    CLR     ERRFLG                  ;ALWAYS TYPE PC+2
                                                                ;OF TEST THAT FAILED
014456  005037  014672                CLR     ERRMSG                  ;NO MESSAGE
014462  005037  014704                CLR     ERTAB                   ;NO TABLE OF DATA
014466  000451                        BR      ERRGEN                  ;OUTPUT ERROR MESSAGE

                                        ;TRANSITION DETECTION ERROR SERVICE

                                        ;FORMAT FOR ERROR TYPEOUT IS

                                        ;XXXXXX TRANSITION ERROR
                                        ;EXP   REC   LINE
                                        ;AA    BB    CC

                                        ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
                                        ;       AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER
                                        ;       BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
                                        ;       CC=LINE ON WHICH ERROR OCCURED

014470  005037  016624        ERRT:   CLR     ERRFLG                  ;ALWAYS OUTPUT  ALL DATA
014474  012737  017045  014672        MOV     #MTRANE,ERRMSG          ;TYPE "TRANSITION ERROR
014502  012737  014763  014704        MOV     #ERTAB1,ERTAB           ;TABLE OF DATA
014510  000440                        BR      ERRGEN                  ;OUTPUT ERROR MESSAGE

                                        ;ON-LINE STATUS ERROR SERVICE

                                        ;FORMAT FOR LINE STATUS ERROR IS

                                        ;XXXX LINE ERROR
                                        ;EXP   REC   LINE
                                        ;AAA   BBB   CC

                                        ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
                                        ;       AAA=EXPECTED LINE STATUS AT TIME OF ERROR
                                        ;       BBB=RECEIVED LINE STATUS AT TIME OF ERROR
                                        ;       CC=LINE ON WHICH ERROR OCCURED .

014512  005037  016624        ERRS:   CLR     ERRFLG                  ;ALWAYS OUTPUT ALL DATA
014516  012737  017014  014672        MOV     #MLINE1,ERRMSG          ;TYPE "LINE ERROR
                                                                        ;EXP REC LINE"
014524  012737  014776  014704        MOV     #ERTAB2,ERTAB           ;TABLE OF DATA
014532  000427                        BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
```

```
                                                ;FATAL TRANSITION ERROR
                                                ;FORMAT FOR FATAL ERROR TYPEOUT IS

                                                ;XXXXXX FATAL ERROR
                                                ;CSTAT  LSTAT
                                                ;AAAAAA BBB

                                                ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
                                                :      AAAAAA=RECEVICED CONTROL STATUS ON LINE THAT INTERRUPTED
                                                :      BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED

014534  005037  016624          ERRN:   CLR     ERRFLG                  ;ALWAYS OUTPUT ALL DATA
014540  012737  016775  014672          MOV     #MFATAL,ERRMSG          ;TYPE "FATAL ERROR
                                                                        ;CSTAT   LSTAT"
014546  012737  015014  014704          MOV     #ERTAB3,ERTAB           ;TABLE OF DATA
014554  000416                          BR      ERRGEN                  ;OUTPUT ERROR MESSAGE

                                                ;"CONTROL STATUS" ERROR SERVICE
                                                ;FORMAT FOR CONTROL STATUS ERROR IS

                                                ;XXXXXX STATUS ERROR
                                                ;EXP    REC
                                                ;AAAAAA BBBBBB

                                                ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
                                                :      AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
                                                :      BBBBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR

014556  012737  016726  014672  ERRCS:  MOV     #MSTATE,ERRMSG          ;TYPE "STATUS ERROR
                                                                        ;"EXP REC"
014564  012737  015026  014704          MOV     #ERTAB4,ERTAB           ;TABLE OF DATA
014572  000407                          BR      ERRGEN                  ;OUTPUT DATA

                                                ;LINE STATUS ERROR SERVICE

                                                ;FORMAT FOR LINE STATUS ERROR IS

                                                ;XXXX LINE ERROR
                                                ;EXP   REC   LINE  SEL
                                                ;AAA   DDD   CC    DD

                                                ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
                                                :      AAA=EXPECTED LINE STATUS AT TIME OF ERROR
                                                :      BBB=RECEIVED LINE STATUS AT TIME OF ERROR
                                                :      CC=LINE ON WHICH ERROR OCCURED
                                                :      DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING

014574  012737  016757  014672  ERRLS:  MOV     #MLINER,ERRMSG
014602  012737  015040  014704          MOV     #ERTAB5,ERTAB
014610  000400                          BR      ERRGEN
```

```
                                        ;GENERAL ERROR HANDLER
                                        ;TYPE PC+2 OF TEST THAT FAILED
                                        ;TYPE ERROR MESSAGE (IF ANY)
                                        ;TYPE DATA RELATING TO FAILURE (IF ANY)

014612  005037  177776          ERRGEN: CLR     PSW
014616  012737  000100  001764          MOV     #INTENA,@TKCSR
014624  032777  020000  001766          BIT     #SW13,@SWR              ;IF SW13=1, DO NOT
014632  001026                          BNE     .3                      ;TYPE ERROR MESSAGE
014634  021637  016656                  CMP     (SP),SAVPC              ;SAME ERROR AGAIN
014640  001402                          BEQ     .+6
014642  005037  016624                  CLR     ERRFLG
014646  104005                          SAVOSP
014650  005737  016624                  TST     ERRFLG                  ;IF ERROR OCCURED FLAG=1,
014654  001007                          BNE     .1                      ;TYPE DATA ONLY
014656  104006                          OCTASC                          ;TYPE PC+2 OF CALL TO ERROR ROUTINE
014660  014752                          ERTABO
014662  005737  014672                  TST     ERRMSG
014666  001407                          BEQ     .2
014670  104004                          TYPE                            ;TYPE ERROR MESSAGE
014672  000000          ERRMSG: 0
014674  005737  014704          .1:     TST     ERTAB
014700  001402                          BEQ     .2
014702  104006                          OCTASC                          ;TYPE DATA
014704  000000          ERTAB:  0
014706  104007          .2:     RESOS                                   ;RESTORE R0-R5

                                        ;ERROR HALT SERVICE

014710  032777  100000  001702  .3:     BIT     #SW15,@SWR              ;IF SW15=0, DO NOT
014716  001406                          BEQ     .4                      ;HALT ON ERROR
014720  000000                          HALT                            ;HALT AND DISPLAY ADDRESS OF FAILING TEST
014722  022737  000176  016620          CMP     #SWREG,SWR
014730  001001                          BNE     .4
014732  104025                          CNTLU0
014734  012737  000001  016624  .4:     MOV     #1,ERRFLG               ;SET ERROR OCCURED FLAG
014742  042777  000100  001640          BIC     #INTENA,@TKCSR
014750  000002                          RTI                             ;RETURN TO TEST
```

```
                                        ;TABLE 5 OF DATA FOR ERROR TYPEOUT
                                        ;TABLE FOR TRANSITION STATUS ERROR
                                ERTAB0: 1
                                        6
                                        $AVPC
                                ERTAB1: 3
                                        2
                                        $AVR5           ;CONTAINS EXPECTED TRANSITION STATUS
                                        2
                                        $AVR4           ;CONTAINS RECEIVED TRANSITION STATUS
                                        2
                                        $AVR3           ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
                                ERTAB2: 3
                                        3
                                        $AVR5                   ;CONTAINS EXPECTED LINE STATUS
                                        3
                                        $AVR4                   ;CONTAINS RECEIVED LINE STATUS
                                        2
                                        $AVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
                                ERTAB3: 2
                                        6
                                        $AVR4
                                        3
                                        $AVR3
                                ERTAB4: 2
                                        6
                                        $AVR5                   ;CONTAINS EXPECTED CONTROL STATUS
                                        6
                                        $AVR4                   ;CONTAINS RECEIVED CONTROL STATUS
                                ERTAB5: 4
                                        3
                                        $AVR5                   ;CONTAINS EXPECTED LINE STATUS
                                        3
                                        $AVR4                   ;CONTAINS RECEIVED LINE STATUS
                                        2
                                        $AVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
                                        2
                                        $AVR1                   ;CONTAINS NUMBER OF LINE UNDER TEST


                                SWRTB:  1
                                        6
                                        $WREG
```

```
                                        ;CONVERT OCTAL TO ASCII AND
                                        ;OUTPUT ON TELETYPE
                                        ;
015070  017605  000000        OCTASN: MOV     @(SP),R5                ;GET POINTER TO TABLE OF DATA
015074  062716  000002                ADD     #2,(SP)
015100  012737  000010  015430        MOV     #10.,RADIX
015106  012704  020206                MOV     #MBCD+2,R4              ;SET UP POINTER FOR CONVERTED DATA
015112  012537  016660                MOV     (R5)+,WRDCNT            ;GET NUMBER OF WORDS TO BE CONVERTED
015116  012537  016662        OCTAS1: MOV     (R5)+,CHRCNT            ;GET NUMBER OF DIGITS IN WORD
015122  013537  015424                MOV     @(R5)+,BINWRD           ;GET DATA TO BE CONVERTED
015126  104010                        CONVERT                         ;CONVERT TO ASCII
015130  005337  016660                DEC     WRDCNT                  ;IF ALL DATA IS NOT CONVERTED
015134  001370                        BNE     OCTAS1                  ;CONTINUE
015136  112714  000100                MOVB    #100,(R4)               ;PUT TERMINATOR AT END OF MESSAGE
015142  005737  015260                TST     SMLN
015146  001002                        BNE     1$
015150  104004                        TYPE                            ;OUTPUT CONVERTED DATA
015152  020204                        MBCD                            ;TO TELETYPE
015154  000002                1$:     RTI                             ;RETURN TO CALLING ROUTINE
                                        ;
                                        ;
                                        ;
015156  005037  015254        CNTLU:  CLR     TMP1
015162  012737  000001  015256        MOV     #1,TMP2
015170  104004                        TYPE
015172  020161                        $SWREQ
015174  052737  000001  015260        BIS     #1,SMLN
015202  104006                        OCTASC
015204  015062                        SWRTB
015206  104004                        TYPE
015210  020206                        MBCD+2
015212  104013                        INSTRG
015214  020172                        $NEWIS
015216  000000                        0
015220  177777                        177777
015222  015254                        TMP1
015224  123727  016154  000015        CMPB    INBUF,#15
015232  001403                        BEQ     1$
015234  013777  015254  001356        MOV     TMP1,@SWR
015242  005037  015256        1$:     CLR     TMP2
015246  005037  015260                CLR     SMLN
015252  000002                        RTI
015254  000000                TMP1:   0
015256  000000                TMP2:   0
015260  000000                SMLN:   0
```

```
2754
2755                                    ;INTEGER BINARY TO ASCII CONVERSION COMMON ROUTINE
2756
2757  015262  013700  016662    BINASC: MOV     CHRCNT,R0               ;SET UP COUNT FOR DIGITS TO BE CONVERTED
2758  015266  012701  020310            MOV     #TEMTAB,R1              ;SET UP POINTER FOR TEMPORARY STORAGE
2759  015272  104011            BINASA: EXTRACT                         ;EXTRACT ONE DIGIT
2760  015274  062737  000060  015426    ADD     #60,DIGIT               ;CONVERT FROM BCD TO ASCII
2761  015302  113721  015426            MOVB    DIGIT,(R1)+             ;STORE DIGIT
2762  015306  005300                    DEC     R0                      ;IF ALL DIGITS NOT DONE,
2763  015310  001370                    BNE     BINASA                  ;CONTINUE
2764  015312  114124            BINASB: MOVB    -(R1),(R4)+             ;REVERSE ORDER OF DIGITS
2765  015314  005337  016662            DEC     CHRCNT                  ;IF ALL CHARACTERS ARE NOT
2766  015320  001374                    BNE     BINASB                  ;IN ORDER, CONTINUE
2767  015322  112724  000040            MOVB    #40,(R4)+               ;INSERT SPACE AFTER LAST DIGIT
2768  015326  000002                    RTI                             ;RETURN TO CALLING ROUTINE
2769
2770                                    ;SINGLE PRECISION UNSIGNED DIVIDE LOOP
2771
2772  015330  005037  015426    DIVI:   CLR     DIVIDH
2773  015334  023737  015426  015430 DIVIU:   CMP     DIVIDH,DIVIS
2774  015342  103027                    BHIS    DIVIB
2775  015344  012737  000021  015404            MOV     #17.,DIVCNT
2776  015352  000407                    BR      DIVIC
2777  015354  023737  015426  015430 DIVIA:   CMP     DIVIDH,DIVIS
2778  015362  103403                    BLO     DIVIC
2779  015364  163737  015430  015426            SUB     DIVIS,DIVIDH
2780  015372  006137  015424    DIVIC:  ROL     DIVIDL
2781  015376  006137  015426            ROL     DIVIDH
2782  015402  005327                    DEC     (PC)+
2783  015404  000000            DIVCNT: 0
2784  015406  001362                    BNE     DIVIA
2785  015410  006037  015426            ROR     DIVIDH
2786  015414  005137  015424            COM     DIVIDL
2787  015420  000002                    RTI
2788  015422  000000            DIVIB:  HALT
2789  015424  000000            DIVIDL: 0
2790  015426  000000            DIVIDH: 0
2791  015430  000000            DIVIS:  0
2792
2793                                    ;SAVE PC OF TEST THAT FAILED AND R0-R5
2794
2795  015432  016637  000004  016656 SVOSP:  MOV     4(SP),SAVPC
2796
2797                                    ;SAVE R0-R5
2798
2799  015440  010537  016652    SVOS:   MOV     R5,SAVR5
2800  015444  010437  016650            MOV     R4,SAVR4
2801  015450  010337  016646            MOV     R3,SAVR3
2802  015454  010237  016644            MOV     R2,SAVR2
2803  015460  010137  016642            MOV     R1,SAVR1
2804  015464  010037  016640            MOV     R0,SAVR0
2805  015470  000002                    RTI
```

```
2806
2807                                            ;RESTORE R0-R5
2808
2809  015472  013700  016640          RS05:   MOV     SAVR0,R0
2810  015476  013701  016642                  MOV     SAVR1,R1
2811  015502  013702  016644                  MOV     SAVR2,R2
2812  015506  013703  016646                  MOV     SAVR3,R3
2813  015512  013704  016650                  MOV     SAVR4,R4
2814  015516  013705  016652                  MOV     SAVR5,R5
2815  015522  000002                          RTI
2816
2817                                            ;TELETYPE OUTPUT ROUTINE
2818
2819  015524  017605  000000          TYPER:  MOV     @(SP),R5        ;GET POINTER TO MESSAGE (ON STACK)
2820  015530  062716  000002                  ADD     #2,(SP)         ;CORRECT STACK FOR RETURN
2821  015534  105777  001054          TYPERA: TSTB    @TPCSR          ;WAIT FOR TELEPRINTER READY
2822  015540  100375                          BPL     TYPERA
2823  015542  122765  000012  177777        CMPB    #12,-1(R5)      ;WAS LAST ONE A L.F. ??
2824  015550  001405                          BEQ     1$              ;BR IF YES
2825  015552  122765  000015  177777        CMPB    #15,-1(R5)      ;WAS LAST ONE A C.R. ??
2826  015560  001401                          BEQ     1$              ;BR IF YES
2827  015562  000402                          BR      2$              ;CONTINUE IF NEITHER
2828  015564  004737  015634          1$:     JSR     PC,TYFILL       ;GO OUT PUT FILLERS
2829  015570  122715  000100          2$:     CMPB    #100,(R5)       ;IF CHARACTER IS NOT TERMINATOR, TYPE IT
2830  015574  001001                          BNE     TYPER1
2831  015576  000002                          RTI                     ;CHARACTER IS TERMINATOR, EXIT
2832  015600  122715  000042          TYPER1: CMPB    #42,(R5)        ;IF CHARACTER=42,
2833  015604  001406                          BEQ     TYPECL          ;TYPE LINE FEED
2834  015606  122715  000045                  CMPB    #45,(R5)        ;IF CHARACTER=45,
2835  015612  001403                          BEQ     TYPECL          ;TYPE CARRIAGE RETURN
2836  015614  112577  000776          TYPER2: MOVB    (R5)+,@TPDBR    ;GET CHARACTER
2837  015620  000745                          BR      TYPERA          ;TYPE IT
2838  015622  142715  000040          TYPECL: BICB    #40,(R5)        ;CONVERT CODE OF 42 OR 45
2839  015626  152715  000010                  BISB    #10,(R5)        ;TO 12 OR 15
2840  015632  000770                          BR      TYPER2          ;TYPE IT
2841
2842
2843                                            ;OUTPUT FILLERS AFTER <CR> OR <LF> CHAR IS OUT PUTTED.
2844
2845  015634  113737  016720  016722  TYFILL: MOVB    FILL,FILLA              ;GET FILL COUNT
2846  015642  113777  016721  000746  1$:     MOVB    FILL+1,@TPDBR           ;OUT PUT ONE FILLER
2847  015650  105777  000740          2$:     TSTB    @TPCSR                  ;WAIT FOR TTY TO FINISH OUTPUT
2848  015654  100375                          BPL     2$                      ;BR IF TTY NOT DONE
2849  015656  105337  016722                  DECB    FILLA                   ;COUNT ONE FILLER
2850  015662  001367                          BNE     1$                      ;BR TIL ALL DONE
2851  015664  000207                          RTS     PC                      ;RETURN TO CALLER ABOVE
2852
2853
2854                                            ;INPUT OCTAL CHARACTER STRING
2855                                            ;TERMINATOR IS CARRIAGE RETURN
2856                                            ;IF MORE THAN SEVEN (7) CHARACTERS INCLUDING
2857                                            ;CARRIAGE RETURN ARE TYPED, THE IN  PUT WILL
2858                                            ;BE RE-REQUESTED
2859
2860  015666                          INSTR:
2861  015666  011605                          MOV     (SP),R5                 ;GET POINTER TO ARGUMENTS
2862  015670  012537  015714                  MOV     (R5)+,MSG               ;GET MESAGE TO BE TYPED
```

```
2862  015674  012537  016146                  MOV     (R5)+,LOLIM             ;GET LOWER LIMIT
2863  015700  012537  016150                  MOV     (R5)+,HILIM             ;GET UPPER LIMIT
2864  015704  012537  016152                  MOV     (R5)+,STORE             ;GET DATA STORAGE LOCATION
2865  015710  010516                          MOV     R5,(SP)                 ;RESTORE STACK
2866  015712  104004                  INSTR1: TYPE                            ;TYPE MESSAGE
2867  015714  000000                  MSG:    0
2868  015716  012704  016154                  MOV     #INBUF,R4               ;SET UP CHARACTER INPUT BUFFER
2869  015722  012703  000007                  MOV     #7,R3                   ;SET UP INPUT COUNT
2870  015726  105777  000656          INSTRB: TSTB    @TKCSR                  ;WAIT FOR CHARACTER
2871  015732  100375                          BPL     INSTRB
2872  015734  005037  002206          INSTBB: CLR     SINTFL
2873  015740  017737  000646  015254          MOV     @TKDBR,TMP1
2874  015746  142737  000200  015254          BICB    #200,TMP1
2875  015754  113714  015254                  MOVB    TMP1,(R4)
2876  015760  121427  000007                  CMPB    (R4),#7
2877  015764  001420                          BEQ     INSTER
2878  015766  121427  000015                  CMPB    (R4),#15                ;IS CHARACTER TERMINATOR
2879  015772  001420                          BEQ     INSTR2                  ;IF IT IS, CONVERT INPUT STRING
2880  015774  121427  000025                  CMPB    (R4),#25
2881  016000  001003                          BNE     1$
2882  016002  005037  015254                  CLR     TMP1
2883  016006  000741                          BR      INSTR1
2884  016010  112477  000602          1$:     MOVB    (R4)+,@TPDBR
2885  016014  105777  000574          INSTRC: TSTB    @TPCSR                  ;WAIT TO FINISH TYPING
2886  016020  100375                          BPL     INSTRC
2887  016022  005303                          DEC     R3                      ;UPDATE RECEIVED COUNT
2888  016024  001340                          BNE     INSTRB                  ;AND CONTINUE
2889  016026  104004                  INSTER: TYPE                            ;TYPE "?" AND RE-REQUEST INPUT
2890  016030  017714                          MQM
2891  016032  000727                          BR      INSTR1
2892
2893                                          ;CONVERT ASCII STRING TO OCTAL
2894
2895  016034  104004                  INSTR2: TYPE
2896  016036  017720                          MCRLF
2897  016040  012704  016154                  MOV     #INBUF,R4               ;GET POINTER TO ASCII STRING
2898  016044  005003                          CLR     R3
2899  016046  122714  000015                  CMPB    #15,(R4)                ;IS TERMINATOR FIRST
2900                                                                          ;CHARACTER IN STRING
2901  016052  001431                          BEQ     CHCK
2902  016054  121427  000060          INSTRD: CMPB    (R4),#60                ;IS CHARACTER OCTAL DIGIT
2903  016060  002762                          BLT     INSTER                  ;IF 67>=CHAR>=60
2904  016062  121427  000067                  CMPB    (R4),#67                ;CHARACTER IS OCTAL DIGIT
2905  016066  003357                          BGT     INSTER
2906  016070  142714  000060                  BICB    #60,(R4)                ;STRIP ASCII
2907  016074  152403                          BISB    (R4)+,R3                ;GENERATE OCTAL NUMBER
2908  016076  121427  000015                  CMPB    (R4),#15                ;IF END OF STRING, CHECK LIMITS
2909  016102  001404                          BEQ     INSTR3
2910  016104  006303                          ASL     R3                      ;MULTIPLY DIGIT BY 10 (OCTAL
2911  016106  006303                          ASL     R3
2912  016110  006303                          ASL     R3
2913  016112  000760                          BR      INSTRD                  ;GET NEXT DIGIT
2914
2915                                          ;TEST NUMBER TO SEE IF IT IS WITHIN LIMITS
2916
2917  016114  020337  016150          INSTR3: CMP     R3,HILIM                ;TEST HI LIMIT
```

```
2918  016120  101342                        BHI     INSTER                  ;IF R3>HILIM, ERROR
2919  016122  020337  016146                CMP     R3,LOLIM                ;TEST LOW LIMIT
2920  016126  103737                        BLO     INSTER                  ;IF R3<LOLIM, ERROR
2921  016130  010377  000016                MOV     R3,@STORE               ;STORE NUMBER
2922  016134  000002                        RTI                             ;EXIT
2923  016136  005737  015256        CHCK:   TST     TMP2
2924  016142  001731                        BEQ     INSTER
2925  016144  000002                        RTI
2926  016146  000000        LOLIM:  0
2927  016150  000000        HILIM:  0
2928  016152  000000        STORE:  0
2929  016154  000000        INBUF:  0
2930           016176                 .=.+20
2931                                  ;ENTER HERE ON POWER FAILURE
2932
2933
2934  016176  010046        PFAIL:  MOV     R0,-(SP)                ;SAVE R0-R5 ON PROCESSOR STACK
2935  016200  010146                MOV     R1,-(SP)
2936  016202  010246                MOV     R2,-(SP)
2937  016204  010346                MOV     R3,-(SP)
2938  016206  010446                MOV     R4,-(SP)
2939  016210  010546                MOV     R5,-(SP)
2940  016212  013746  000024        MOV     24,-(SP)
2941  016216  010637  016654        MOV     SP,SAVSP                ;SAVE STACK POINTER
2942  016222  012737  016234  000024        MOV     #RESTART,24             ;SET UP FOR POWER UP TRAP
2943  016230  000000                HALT                            ;HALT ON POWER DOWN NORMAL
2944  016232  000776                BR      .-2
2945
2946                                  ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
2947
2948  016234  013706  016654        RESTAR: MOV     SAVSP,SP                ;RESTORE STACK POINTER
2949  016240  012605                MOV     (SP)+,R5                ;RESTORE R0-R5
2950  016242  012604                MOV     (SP)+,R4
2951  016244  012603                MOV     (SP)+,R3
2952  016246  012602                MOV     (SP)+,R2
2953  016250  012601                MOV     (SP)+,R1
2954  016252  012600                MOV     (SP)+,R0
2955  016254  012737  016176  000024        MOV     #PFAIL,24               ;SET UP FOR POWER FAILURE
2956  016262  005726                POP1SP
2957  016264  104004                TYPE
2958  016266  020073                MPFAIL
2959  016270  005737  001756                TST     TIPFLG
2960  016274  001002                BNE     RESTA1
2961  016276  000137  001262                JMP     START0
2962  016302  104004        RESTA1: TYPE
2963  016304  020113                MPF1
2964  016306  012746  000340                MOV     #340,-(SP)
2965  016312  005746                PUSH1SP
2966  016314  000137  014334                JMP     TSTENT
2967
2968
2969                                  ;THE FOLLOWING AUTO VECTORS USING THE FIRST BASE ADDRESS
2970  016320  013746  000020        XOR:    MOV     20.-(SP)        ;SAVE 20
2971  016324  013746  000022                MOV     22.-(SP)        ;SAVE 22
2972  016330  012737  016522  000020        MOV     #2$,20          ;IOT INTR VECTOR
2973  016336  012737  000340  000022        MOV     #340,22         ;IOT INTR LVL
```

```
 2974  016344  012737  000300  014026          MOV     #300,DATA1
 2975  016352  012737  000302  014030          MOV     #302,DATA2
 2976  016360  013777  014030  175440  1$:     MOV     DATA2,@DATA1
 2977  016366  012777  000004  175434          MOV     #IOT,@DATA2     ;IOT TRAP
 2978  016374  062737  000004  014026          ADD     #4,DATA1
 2979  016402  062737  000004  014030          ADD     #4,DATA2
 2980  016410  023727  014026  001000          CMP     DATA1,#1000
 2981  016416  001360                          BNE     1$
 2982  016420  012737  000000  016632          MOV     #0,TSTNO        ;SET UP DEFAULT
 2983  016426  012737  020436  016664          MOV     #TSTTBO,TSTPNT  ;
 2984  016434  052737  000340  177776          BIS     #340,PS         ;PREVENT INTERRUPTS
 2985  016442  005077  000136                  CLR     @DHMCSR         ;
 2986  016446  012777  000100  000130          MOV     #INTENA,@DHMCSR ;SET INTERRUPT ENABLE
 2987  016454  042737  000340  177776          BIC     #340,PS ;ALLOW INTERRUPTS
 2988  016462  052777  000200  000114          BIS     #DONE,@DHMCSR   ;SET DONE..AND INTERRUPT
 2989  016470  000240                          NOP
 2990  016472  012637  000022                  MOV     (SP)+,22        ;YOU DIDN'T INTERRUPT ?
 2991  016476  012637  000020                  MOV     (SP)+,20        ;RESTORE 20 & 22
 2992  016502  005077  000076                  CLR     @DHMCSR         ;STOP ALL INTERRUPT
 2993  016506  052737  000340  177776          BIS     #340,PS         ;
 2994  016514  104012                          ERROR
 2995  016516  000000                          HALT                    ;YOU SHOULD HAVE INTERRUPTED
 2996  016520  000426                          BR      3$
 2997  016522  011637  016600          2$:     MOV     (SP),DHMVEC     ;EXTRACT VECTOR +4
 2998  016526  162737  000002  016600          SUB     #2,DHMVEC       ;CREATE LVL
 2999  016534  013737  016600  016602          MOV     DHMVEC,DHMLVL   ;SAVE
 3000  016542  162737  000002  016600          SUB     #2,DHMVEC       ;CREATE AND SAVE VEC
 3001  016550  012737  000340  177776          MOV     #340,PS         ;PREVENT INTERRUPTS
 3002  016556  005077  000022                  CLR     @DHMCSR         ;
 3003  016562  022626                          POP2SP
 3004  016564  022626                          POP2SP
 3005  016566  012637  000022                  MOV     (SP)+,22        ;RESTORE 22
 3006  016572  012637  000020                  MOV     (SP)+,20        ;RESTORE 20
 3007  016576  000207                  3$:     RTS     PC
 3008
```

```
                                        ;I/O DIRECT POINTERS
016600  000300                DHMVEC: 300                     ;MODEM CONTROL INTERRUPT VECTOR
016602  000302                DHMLVL: 302                     ;MODEM CONTROL INTERRUPT PRIORITY
016604  170500                DHMCSR: 170500                  ;MODEM CONTROL CONTROL STATUS REGISTER
016606  170502                DHMLSR: 170502                  ;MODEM CONTROL CONTROL STATUS REGISTER
016610  177560                TKCSR:  177560
016612  177562                TKDBR:  177562
016614  177564                TPCSR:  177564
016616  177566                TPDBR:  177566
016620  177570                SWR:    177570
016622  177570                DISPLAY:177570

                                        ;PROGRAM VARIABLES

016624  000000                ERRFLG: 0
016626  000000                TRACON: 0
016630  000000                PASCNT: 0
016632  000000                TSTNO:  0
016634  000000                RETURN: 0
016636  000000                ICOUNT: 0
016640  000000                SAVR0:  0
016642  000000                SAVR1:  0
016644  000000                SAVR2:  0
016646  000000                SAVR3:  0
016650  000000                SAVR4:  0
016652  000000                SAVR5:  0
016654  000000                SAVSP:  0
016656  000000                SAVPC:  0
016660  000000                WRDCNT: 0
016662  000000                CHRCNT: 0
016664  020436                TSTPNT: TSTTBO
016666  000000                TSTMAX: 0
016670  000000                LINFLG: 0
016672  000000                LINE:   0
016674  000000                LINORG: 0
016676  000000                LINANS: 0
016700  000000                ANSFLG: 0
016702  000000                ORGFLG: 0
016704  000000                TIME1:  0
016706  000000                TIME2:  0
016710  000000                TIFLG:  0
016712  177777                LINSEL: 177777
016714  000000                SELMSK: 0
016716  000000                SLMSK:  0
016720  000002                FILL:   2                       ;FILL CHAR/COUNT
016722  000000                FILLA:  0                       ;TEMP STORAGE FOR FILL COUNT
016724  000000                RNGRET: 0

016726  052123  052101  051525  MSTATE: .ASCII  ;STATUS ERROR%"EXP    REC@;
016734  042440  051122  051117
016742  021045  054105  020120
016750  020040  051040  041505
016756     100
016757     114  047111  020105  MLINER: .ASCII  ;LINE ERROR%"EXP REC LINE SEL@;
```

```
 3065  016764  051105  047522  022522
 3066  016772  042442  050130  051040
 3067  017000  041505  046040  047111
 3068  017006  020105  042523  040114
 3069  017014  044514  042516  042440  MLINE1: .ASCII  ;LINE ERROR%"EXP REC LINE@;
 3070  017022  051122  051117  021045
 3071  017030  054105  020120  042522
 3072  017036  020103  044514  042516
 3073  017044     100
 3074  017045     124  040522  051516  MTRANE: .ASCII  ;TRANSITION ERROR%"EXP REC LINE@;
 3075  017052  052111  047511  020116
 3076  017060  051105  047522  022522
 3077  017066  042442  050130  051040
 3078  017074  041505  046040  047111
 3079  017102  040105
 3080  017104  021045  021045  044504  DIALM:  .ASCII  ;%"%"DIAL ANSWERING DATA SET%"@;
 3081  017112  046101  040440  051516
 3082  017120  042527  044522  043516
 3083  017126  042040  052101  020101
 3084  017134  042523  022524  040042
 3085  017142  021045  021045  030061  MT103T: .ASCII  ;%"%"103A MODEM CONNECT-DISCONNECT TEST%"@;
 3086  017150  040463  046440  042117
 3087  017156  046505  041440  047117
 3088  017164  042516  052103  042055
 3089  017172  051511  047503  047116
 3090  017200  041505  020124  042524
 3091  017206  052123  021045     100
 3092  017213     045  022442  031042  MT202T: .ASCII  ;%"%"202C MODEM CONNECT-DISCONNECT TEST%"@;
 3093  017220  031060  020103  047515
 3094  017226  042504  020115  047503
 3095  017234  047116  041505  026524
 3096  017242  044504  041523  047117
 3097  017250  042516  052103  052040
 3098  017256  051505  022524  040042
 3099  017264  021045  021045  051117  MSELOR: .ASCII  ;%"%"ORIGINATE LINE-@;
 3100  017272  043511  047111  052101
 3101  017300  020105  044514  042516
 3102  017306  040055
 3103  017310  021045  047101  053523  MSELAN: .ASCII  ;%"ANSWER LINE-@;
 3104  017316  051105  046040  047111
 3105  017324  026505     100
 3106  017327     045  030442  031460  MT103A: .ASCII  ;%"103A TEST COMPLETE%"@;
 3107  017334  020101  042524  052123
 3108  017342  041440  046517  046120
 3109  017350  052105  022505  040042
 3110  017356  021045  030062  041462  MT202A: .ASCII  ;%"202C TEST COMPLETE%"@;
 3111  017364  052040  051505  020124
 3112  017372  047503  050115  042514
 3113  017400  042524  021045     100
 3114  017405     045  051442  051124  MDISC:  .ASCII  ;%"STRIKE ANY TTY KEY TO TEST DISCONNECT@;
 3115  017412  045511  020105  047101
 3116  017420  020131  052124  020131
 3117  017426  042513  020131  047524
 3118  017434  052040  051505  020124
 3119  017442  044504  041523  047117
 3120  017450  042516  052103     100
```

```
 3121  017455     045  022442  030442  M16:    .ASCII  ;%"%"16 LINE SCANNER TEST%"@;
 3122  017462  020066  044514  042516
 3123  017470  051440  040503  047116
 3124  017476  051105  052040  051505
 3125  017504  022524  040042
 3126  017510  021045  021045  055104  MTITLE: .ASCII  ;%"%"DZDHK-C    -----MODEM CONTROL DIAGNOSTIC-----%"@;
 3127  017516  044104  026513  020103
 3128  017524  020040  026440  026455
 3129  017532  026455  047515  042504
 3130  017540  020115  047503  052116
 3131  017546  047522  020114  044504
 3132  017554  043501  047516  052123
 3133  017562  041511  026455  026455
 3134  017570  022455  040042
 3135  017574  021045  042526  052103  MVECTO: .ASCII  ;%"VECTOR ADDRESS-@;
 3136  017602  051117  040440  042104
 3137  017610  042522  051523  040055
 3138  017616  021045  047503  052116  MREGAD: .ASCII  ;%"CONTROL REGISTER ADDRESS-@;
 3139  017624  047522  020114  042522
 3140  017632  044507  052123  051105
 3141  017640  040440  042104  042522
 3142  017646  051523  040055
 3143  017652  021045  044514  042516  MLINSL: .ASCII  ;%"LINE SELECT PARAMETER -@;
 3144  017660  051440  046105  041505
 3145  017666  020124  040520  040522
 3146  017674  042515  042524  020122
 3147  017702  040055
 3148  017704  021045  042524  052123  MTEST:  .ASCII  ;%"TEST-@;
 3149  017712  040055
 3150  017714  020040  040077          MQM:    .ASCII  ;  ?@;
 3151  017720  021045     100          MCRLF:  .ASCII  ;%"@;
 3152  017723     045  051442  047111  MLINE:  .ASCII  ;%"SINGLE LINE CABLE TEST%"@;
 3153  017730  046107  020105  044514
 3154  017736  042516  041440  041101
 3155  017744  042514  052040  051505
 3156  017752  022524  040042
 3157  017756  021045  044514  042516  MLINEI: .ASCII  ;%"LINE NUMBER-@;
 3158  017764  047040  046525  042502
 3159  017772  026522     100
 3160  017775     106  052101  046101  MFATAL: .ASCII  ;FATAL ERROR%"CSTAT  LSTAT@;
 3161  020002  042440  051122  051117
 3162  020010  021045  051503  040524
 3163  020016  020124  046040  052123
 3164  020024  052101     100
 3165  020027     045  052042  040522  MTRNDE: .ASCII  ;%"TRANSITION DETECTED%"CSTAT  LSTAT@;
 3166  020034  051516  052111  047511
 3167  020042  020116  042504  042524
 3168  020050  052103  042105  021045
 3169  020056  051503  040524  020124
 3170  020064  046040  052123  052101
 3171  020072     100
 3172  020073     045  050042  053517  MPFAIL: .ASCII  ;%"POWER FAILURE@;
 3173  020100  051105  043040  044501
 3174  020106  052514  042522     100
 3175  020113     055  052503  051122  MPF1:   .ASCII  ;-CURRENT TEST WILL RESTART%"@;
 3176  020120  047105  020124  042524
```

```
        020126  052123  053440  046111
        020134  020114  042522  052123
        020142  051101  022524  040042
        020150  041536     100                  MCONTC: .ASCII  :↑C@:
        020153     136  040126                  MCONTV: .ASCII  :↑V@:
        020156  046136     100                  MCONTL: .ASCII  :↑L@:
        020161     045  051442  051127          $SWREQ: .ASCII  ;%"SWR=  @;
        020166  020075  040040
        020172  020040  047040  053505          $NEWIS: .ASCII  ;    NEW=  @;
        020200  020075  040040
        020204  021045                          MBCD:   .ASCII  ;%";
                020306                          .=.+100
                                                .EVEN
        020306  040007                          MEPASS: 40007
        020310  000000                          TEMTAB: 0
                020322                          .=.+10

        020322  000000                                  0

                                                        ;EMT DISPATCH TABLE

        020324  014556                          EMTTAB: ERRCS
        020326  014574                                  ERRLS
        020330  014164                                  LOOP
        020332  014410                                  FREEZE
        020334  015524                                  TYPER
        020336  015432                                  SVOSP
        020340  015070                                  OCTASN
        020342  015472                                  RSOS
        020344  015262                                  BINASC
        020346  015330                                  DIVI
        020350  014452                                  ERR
        020352  015666                                  INSTR
        020354  014470                                  ERRT
        020356  014512                                  ERRS
        020360  014534                                  ERRN
        020362  013102                                  GETLIN
        020364  013136                                  SETUPS
        020366  013372                                  CKRNG
        020370  013470                                  WAITR
        020372  013556                                  CKTRN
        020374  013526                                  WAITRP
        020376  015156                                  CNTLU                           ;CALL BY EMT CNTLUU
        020400  014152                                  CKINT                           ;CALL  BY EMT CKINTT
        020402  001760                                  KBDINT                          ;CALLBY EMT  KBDIN
        020404  000000                          EMTLIM: 0
        020406  020436                          TSTLST: TSTTB0
        020410  020640                                  TSTTB1
        020412  020702                                  TSTTB2
        020414  020710                                  TSTTB3
        020416  000000                                  0
        020420  000000                                  0
        020422  000000                                  0
        020424  000000                                  0
        020426  000037                          GRC:    N0-1
        020430  000007                                  N1-100-1
```

C08


```
 3233  020432  000001                       N2-200-1
 3234  020434  000000                       N3-300-1
 3235  020436  002210              TSTTBO:  T0
 3236  020440  000001                       1
 3237  020442  002236                       T1
 3238  020444  004000                       TIMES
 3239  020446  002300                       T2
 3240  020450  004000                       TIMES
 3241  020452  002342                       T3
 3242  020454  004000                       TIMES
 3243  020456  002404                       T4
 3244  020460  004000                       TIMES
 3245  020462  002446                       T5
 3246  020464  004000                       TIMES
 3247  020466  002510                       T6
 3248  020470  004000                       TIMES
 3249  020472  002564                       T7
 3250  020474  004000                       TIMES
 3251  020476  002640                       T10
 3252  020500  004000                       TIMES
 3253  020502  002730                       T11
 3254  020504  004000                       TIMES
 3255  020506  003020                       T12
 3256  020510  004000                       TIMES
 3257  020512  003110                       T13
 3258  020514  004000                       TIMES
 3259  020516  003200                       T14
 3260  020520  004000                       TIMES
 3261  020522  003270                       T15
 3262  020524  004000                       TIMES
 3263  020526  003356                       T16
 3264  020530  004000                       TIMES
 3265  020532  003444                       T17
 3266  020534  004000                       TIMES
 3267  020536  003532                       T20
 3268  020540  004000                       TIMES
 3269  020542  003620                       T21
 3270  020544  004000                       TIMES
 3271  020546  003714                       T22
 3272  020550  000400                       TIMES
 3273  020552  004032                       T23
 3274  020554  000400                       TIMES
 3275  020556  004230                       T24
 3276  020560  000400                       TIMES
 3277  020562  004406                       T25
 3278  020564  000200                       TIMES
 3279  020566  004556                       T26
 3280  020570  000200                       TIMES
 3281  020572  005014                       T27
 3282  020574  000200                       TIMES
 3283  020576  005252                       T30
 3284  020600  000200                       TIMES
 3285  020602  005510                       T31
 3286  020604  000200                       TIMES
 3287  020606  005746                       T32
 3288  020610  000200                       TIMES
```

```
3289  020612  006164                          T33
3290  020614  000200                          TIMES
3291  020616  006402                          T34
3292  020620  000200                          TIMES
3293  020622  006620                          T35
3294  020624  004000                          TIMES
3295  020626  007002                          T36
3296  020630  004000                          TIMES
3297  020632  007362                          T37
3298  020634  004000                          TIMES
3299  020636  000000                          0
3300  020640  007532                TSTTB1:   T100
3301  020642  000001                          1
3302  020644  007520                          T101
3303  020646  004000                          TIMES
3304  020650  007746                          T102
3305  020652  004000                          TIMES
3306  020654  010124                          T103
3307  020656  004000                          TIMES
3308  020660  010302                          T104
3309  020662  004000                          TIMES
3310  020664  010460                          T105
3311  020666  004000                          TIMES
3312  020670  010634                          T106
3313  020672  004000                          TIMES
3314  020674  011010                          T107
3315  020676  004000                          TIMES
3316  020700  000000                          0
3317  020702  011164                TSTTB2:   T200
3318  020704  000001                          1
3319  020706  000000                          0
3320  020710  011540                TSTTB3:   T300
3321  020712  000001                          1
3322          000001                .END
```

E08


```
ANSELG  016700        DIVI    015330        ICOUNT  016636        LINANS  016676        MPF1    020113
ANSTR   012716        DIVIA   015354        INBUF   016154        LINE    016672        MSM     017714
ANSTRR  013004        DIVIB   015422        INIT1   002214        LINENA= 000001        MPEGAD  017616
ANSTR1  012732        DIVIC   015372        INSTBB  015734        LINFLG  016670        MSELAN  017316
ANSTR2  012746        DIVIDH  015426        INSTER  016026        LINORG  016674        MSELOR  017264
ANSTR3  012762        DIVIDL  015424        INSTR   015666        LINSEL  016712        MSG     015714
ANSTR4  013006        DIVIS   015430        INSTRB  015726        LINT1   003620        MSTATE  015726
BINASA  015272        DIVIU   015334        INSTRC  016014        LINT1A  003646        MTEST   017704
BINASB  015312        DMYRTI  002202        INSTRD  016054        LINT1B  003674        MTITLE  017510
BINASC  015262        DONE    = 000200      INSTRG= 104013        LINT2   003714        MTRANE  017045
BINWRD= 015424        EMTDEF= ****** U      INSTR1  015712        LINT2A  003754        MTRNDE  020027
BUSY    = 000020      EMTLIM  020404        INSTR2  016034        LINT2B  004004        MT103A  017327
CHCK    016136        EMTOK   014132        INSTR3  016114        LOGICA  014102        MT103T  017142
CHRCNT  016662        EMTSRV  014120        INTENA= 000100        LOLIM   016146        MT202A  017356
CKINT   014152        EMTTAB  020324        INTI    002510        LOOP    014164        MT202T  017213
CKINTT= 104026        EOP     014040        INTIA   002556        LOOPER  014314        MUX1    004556
CKRING= 104021        ERR     014452        INT1B   002562        LOOPL   014400        MUX1A   004604
CKRNG   013372        ERRCS   014556        INT10   003270        LOOPS   014266        MUX1B   004652
CKRNG1  013436        ERRFLG  016624        INT10A  003352        LOOPX   014330        MUX1C   004710
CKRNG2  013462        ERRGEN  014612        INT10B  003354        LVL     = 000004      MUX1D   004722
CKTRAN= 104023        ERRLS   014574        INT11   003356        MAINT   = 001000      MUX1E   004742
CKTRN   013556        ERRMSG  014672        INT11A  003440        MBCD    020204        MUX1F   004774
CKTRN1  013672        ERRN    014534        INT11B  003442        MCONTC  020150        MUX11   007570
CKTRN2  013724        ERROR   = 104012      INT12   003444        MCONTL  020156        MUX11A  007606
CKTRN3  013764        ERRORC= 104000        INT12A  003526        MCONTV  020153        MUX11B  007636
CKTRN4  014010        ERRORL= 104001        INT12B  003530        MCRLF   017720        MUX11C  007664
CLRMUX= 002000        ERRORN= 104016        INT13   003532        MDISC   017405        MUX11D  007676
CLRSCN= 004000        ERRORS= 104015        INT13A  003614        MEMT1   004032        MUX11E  007712
CNTLD   015156        ERRORT= 104014        INT13B  003616        MEMT1A  004060        MUX11F  007744
CNTLDD= 104025        ERRS    014512        INT2    002564        MEMT1B  004110        MUX12   007746
CO      = 000100      ERRT    014470        INT2A   002632        MEMT1C  004134        MUX12A  007764
COF     = 040000      ERR1    014016        INT2B   002636        MEMT1D  004142        MUX12B  010014
CONVER= 104010        ERR2    014020        INT3    002640        MEMT1E  004174        MUX12C  010042
CS      = 000040      ERR3    014022        INT3A   002724        MEMT1F  004220        MUX12D  010054
CSF     = 020000      ERR4    014024        INT3B   002726        MEMT2   004230        MUX12E  010070
CSTR1   002236        ERTAB   014704        INT4    002730        MEMT2A  004252        MUX12F  010122
CSTR2   002300        ERTAB0  014752        INT4A   003012        MEMT2B  004334        MUX13   010124
CSTR3   002342        ERTAB1  014760        INT4B   003016        MEMT2C  004360        MUX13A  010142
CSTR4   002404        ERTAB2  014776        INT5    003020        MEMT2D  004372        MUX13B  010172
CSTR5   002446        ERTAB3  015014        INT5A   003102        MEMT3   004406        MUX13C  010220
DATA1   014026        ERTAB4  015026        INT5B   003106        MEMT3A  004430        MUX13D  010232
DATA2   014030        ERTAB5  015040        INT6    003110        MEMT3B  004442        MUX13E  010246
DATA3   014032        EXTRAC= 104011        INT6A   003172        MEMT3C  004504        MUX13F  010300
DATA4   014034        FATEX   013006        INT6B   003176        MEMT3D  004530        MUX14   010302
DHMCSR  016604        FATRET  013020        INT7    003200        MEMT3E  004542        MUX14A  010320
DHMLSR  016606        FILL    016720        INT7A   003262        MEPASS  020306        MUX14B  010350
DHMLVL  016602        FILLA   016722        INT7B   003266        MFATAL  017775        MUX14C  010376
DHMVEC  016600        FREEZE  014410        KBDIN   = 104027      MLINE   017723        MUX14D  010410
DIALM   017104        FREEZX  014444        KBDINT  001760        MLINEI  017756        MUX14E  010424
DIGIT   = 015426      GETLIN  013102        KBDIN1  002042        MLINER  016757        MUX14F  010456
DISPLA  016622        GETLNS= 104017        KBDIN2  002074        MLINEI  017014        MUX15   010460
DISPRE  000174        GPO     020426        KBDIN3  002136        MLINSL  017652        MUX15A  010476
DIVCNT  015404        HILIM   016150        KRET    002204        MPFAIL  020073        MUX15B  010520
```

```
MUX15C  010546          MUX7    006402          RS    = 000004          STRLIN  007532          TYPE  = 104004
MUX15D  010560          MUX7A   006430          RSDS    015472          STRLNA  007552          TYPECL  015622
MUX15E  010576          MUX7B   006462          R0    =%000000          STRTOA  001666          TYPER   015524
MUX15F  010632          MUX7C   006510          R1    =%000001          ST103A  011164          TYPERA  015534
MUX16   010634          MUX7D   006522          R2    =%000002          ST103B  011226          TYPER1  015600
MUX16A  010652          MUX7E   006540          R3    =%000003          ST202A  011540          TYPER2  015614
MUX16B  010674          MUX7F   006574          R4    =%000004          ST202B  011602          T0      002210
MUX16C  010722          MUX8    006620          R5    =%000005          SUSWR   001122          T1      002236
MUX16D  010734          MUX8A   006636          SAVPC   016656          SVDS    015440          T10     002640
MUX16E  010752          MUX8B   006672          SAVR0   016640          SVDSP   015432          T100    007532
MUX16F  011006          MUX8C   006700          SAVR1   016642          SWR     016620          T101    007570
MUX17   011010          MUX8D   006734          SAVR2   016644          SWPEG   000176          T102    007746
MUX17A  011026          MUX8E   006762          SAVR3   016646          SWRTB   015062          T103    010124
MUX17B  011050          MVECTO  017574          SAVR4   016650          SW06  = 000100          T103A   011230
MUX17C  011076          M0    = 000040          SAVR5   016652          SW08  = 000400          T103A1  011236
MUX17D  011110          M1    = 000110          SAVSP   016654          SW09  = 001000          T103B   011242
MUX17E  011126          M16     017455          SAVDSP= 104005          SW10  = 002000          T103B1  011252
MUX17F  011162          M     = 000300          SCNENA= 000040          SW11  = 004000          T103B2  011256
MUX2    005014          MXTTS   014036          SCNT1   007002          SW12  = 010000          T103C   011262
MUX2A   005042          N0    = 000040          SCNT1A  007042          SW13  = 020000          T103D1  011326
MUX2B   005110          N1    = 000110          SCNT1B  007120          SW14  = 040000          T103D2  011332
MUX2C   005146          N2    = 000202          SCNT1C  007202          SW15  = 100000          T103D3  011336
MUX2D   005160          N3    = 000301          SCNT1D  007222          T     = 000014          T103D4  011342
MUX2E   005200          OCTASC= 104006          SCNT2   007252          TEMTAB  020310          T103E   011346
MUX2F   005232          OCTASN  015070          SCNT2A  007304          TIFLG   016710          T103EN  011522
MUX3    005252          OCTBS1  015116          SCNT2B  007400          TIMES = 004000          T103ES  011406
MUX3A   005300          ORGFLG  016702          SCNT2C  007462          TIME1   016704          T103E1  011502
MUX3B   005346          ORGTR   012624          SCNT2D  007502          TIME2   016706          T103E2  011506
MUX3C   005404          ORGTRR  012712          SCOPE = 104002          TIPFLG  001756          T103E3  011512
MUX3D   005416          ORGTR1  012640          SCOPEF= 104003          TKCSR   016610          T103E4  011516
MUX3E   005436          ORGTR2  012654          SECRX = 000020          TKDBR   016612          T104    010302
MUX3F   005470          ORGTR3  012670          SECRXF= 010000          TMP1    015254          T105    010460
MUX4    005510          ORGTR4  012704          SECTX = 000010          TMP2    015256          T106    010634
MUX4A   005536          PASCNT  016630          SELMSK  016714          TPCSR   016614          T10?    011010
MUX4B   005604          PC    =%000007          SETUP = 104020          TPDBR   016616          T11     002730
MUX4C   005642          PFAIL   016176          SETUPB  013354          TRACON  016626          T12     003020
MUX4D   005654          POPR0 = 012600          SETUPS  013136          TRANEX  013022          T13     003110
MUX4E   005674          POP1SP= 005726          SETUP1  013170          TRANS   012562          T14     003200
MUX4F   005726          POP2SP= 022626          SETUP2  013204          TRANX1  013032          T15     003270
MUX5    005746          PS    = 177776          SETUP4  013316          TRMRDY= 000002          T16     003356
MUX5A   005774          PSW   = 177776          SINGLE= 000001          TRNTAB  013070          T17     003444
MUX5B   006026          PUSHR0= 010046          SINTFL  002206          TRNTYP  013042          T2      002300
MUX5C   006054          PUSH1S= 005746          SLMSK   016716          TSTENT  014334          T20     003532
MUX5D   006066          PUSH2S= 024646          SMLN    015260          TSTGO   001706          T200    011164
MUX5E   006104          RADIX = 015430          SP    =%000006          TSTLST  020406          T201    011522
MUX5F   006140          REGST1  001546          ST    = 000200          TSTMAX  016666          T202A   011634
MUX6    006164          RESTAR  016234          STACK   001100          TSTNO   016632          T202A1  011612
MUX6A   006212          RESTA1  016302          START   001100          TSTPNT  016664          T202B   011616
MUX6B   006244          RESDS = 104007          STARTN  001574          TSTTB0  020436          T202B1  011626
MUX6C   006272          RETURN  016634          STARTO  001262          TSTTB1  020640          T202B2  011632
MUX6D   006304          RING  = 000200          START1  001324          TSTTB2  020702          T202C   011636
MUX6E   006322          RINGF = 100000          STEP  = 000400          TSTTB3  020710          T202D   011652
MUX6F   006356          RNGRET  016724          STORE   016152          TYFILL  015634          T202D1  011716
```

G08

DZDHKC.P11 SYMBOL TABLE

```
T202D2  011722          T202G4  012202          T202J4  012544          T37     007252          XFLAG   001252
T202D3  011726          T202H   012206          T21     003620          T4      002404          XM      = 000101
T202D4  011732          T202H2  012252          T22     003714          T5      002446          XN      = 000300
T202E   011736          T202H3  012256          T23     004032          T6      002510          XOR     016320
T202E1  012002          T202H4  012262          T24     004230          T7      002564          XORSVC  001254
T202E2  012006          T202H5  012266          T25     004406          VECSTA  001374          XSCRX = 000001
T202E3  012012          T202I   012272          T26     004556          VECSTR  001354          XIA     001612
T202E4  012016          T202I2  012352          T27     005014          VECST1  001500          X1B     001656
T202F   012022          T202I3  012356          T3      002342          WAITR   013470          $NEWIS  020172
T202F2  012102          T202I4  012362          T30     005252          WAITRN= 104022          $SWREQ  020161
T202F3  012106          T202I5  012366          T300    011540          WAITRR  013526          .1      014674
T202F4  012112          T202J   012372          T31     005510          WAITR1  013540          .2      014706
T202F5  012116          T202JN  012550          T32     005746          WAITS = 104024          .3      014710
T202G   012122          T202JS  012432          T33     006164          WRDCNT  016660          .4      014734
T202G1  012166          T202J1  012530          T34     006402          X       = 000000          .       = 020714
```

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

*DZDHKC,DZDHKC/SOL=DZDHKC.P11
RUN-TIME: 14 26 2 SECONDS
RUN-TIME RATIO: 79/43=1.8
CORE USED: 8K (15 PAGES)

H08

Spooler runtime 13 Seconds, 391 KCS, 356 disk reads, 4 disk writes, 97 pages

[redacted]