PDP11

MULTIPLEXER DIAGNOSTIC

MD-11-DZDHK-C

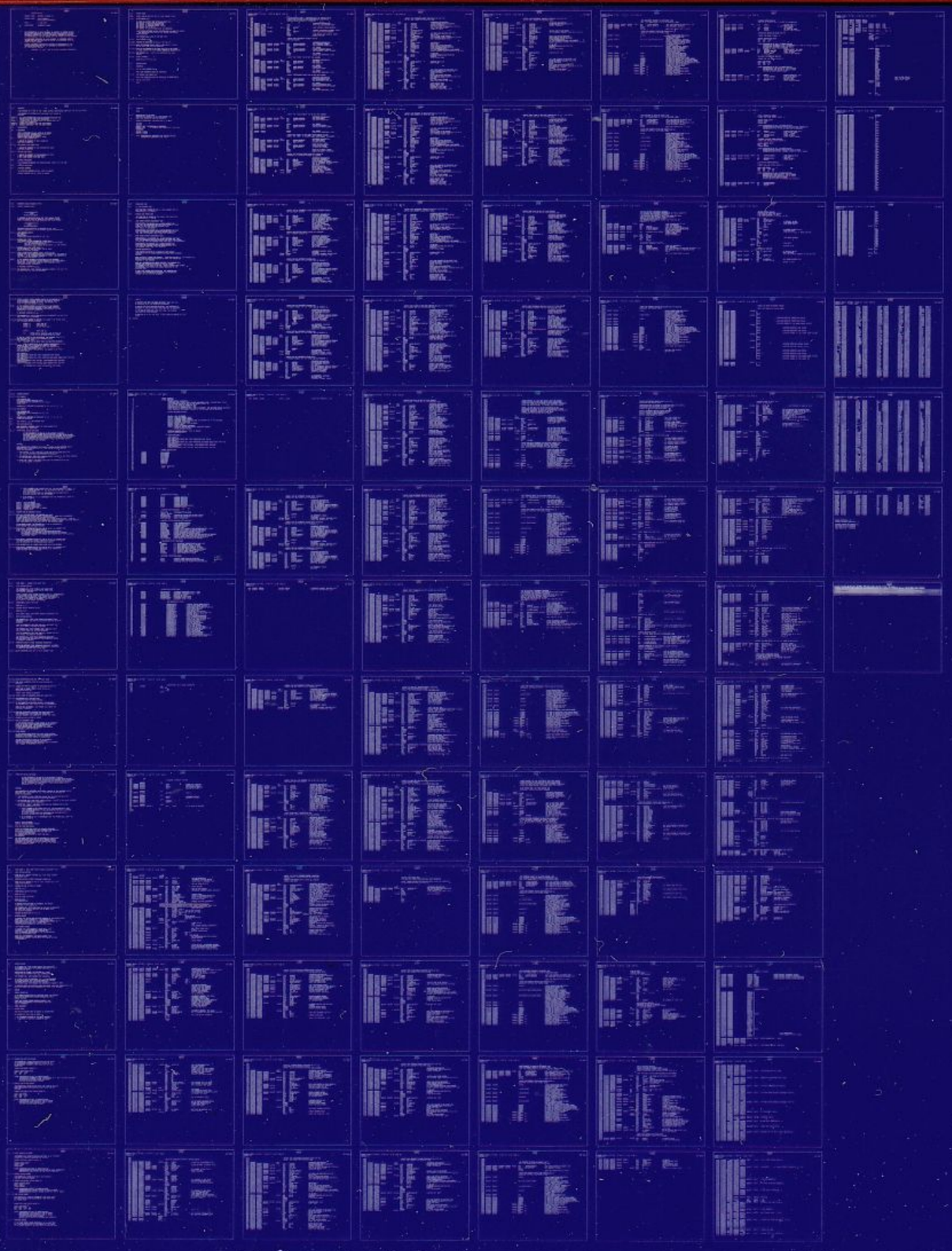
EP-DZDHK-C-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.A



IDENTIFICATION

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

PRODUCT NAME: MODEM CONTROL
MULTIPLEXER DIAGNOSTIC

DATE : 21 AUG 1976

MAINTAINER: DIAGNOSTIC GROUP

C01

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.

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 SW00=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 SW00=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>.
(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 TO 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 SEG 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 ERROR 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 OCCURED

6.1.1.4 FATAL TRANSITION ERROR

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   BBB   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

7.2 OPERATING

NONE.

7.3 WHEN ON ACT-11 OR "XOR"
PROGRAM WILL DEFAULT TO 16 LINE SCANNER TEST
H861 TEST CONNECTOR MUST BE INSTALLED.

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

VECTORS

DHMVEC: 300 (AUTOMATICALLY GENERATED
DHMLVL: 302 BY PROGRAM WHEN UNDER ACT-11 OR "XOR")

ADDRESSES

DHMCSR: 170500
DHMLSR: 170502

NOTE: SW00(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  DZDHK-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                          RESOS=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      START0                  ;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     START0          ;RESTORE TRAPCATCHER
001252  000000          XFLAG:  0                       ;XOR FLAG
001254  022626          XORSVC: POP2SP
001256  012637  000004          MOV     (SP)+,4 ;RESTORE 4
001262  005737  016710  START0: 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  104026                  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          MOV     #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  001404                          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

002210                          T0:                                     ;REFERENCE DESIGNATION
002210  104004                  TYPE                                    ;TYPE "16 LINE SCANNER TEST"
002212  017455                  M16
002214  005777  014364  INIT1:  TST     @DHMCSR                         ;TEST CONTROL STATUS REGISTER
002220  001401                  BEQ     .+4
002222  104012                  ERROR                                   ;CONTROL STATUS NOT CLEARED, ERROR
002224  005777  014356          TST     @DHMLSR                         ;TEST LINE STATUS REGISTER
002230  001401                  BEQ     .+4
002232  104012                  ERROR                                   ;LINE STATUS NOT CLEARED, ERROR
002234  104002                  SCOPE                                   ;CHECK FOR LOOP

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

002236                          T1:                                     ;REFERENCE DESIGNATION
002236  012777  000100  014340  CSTR1: MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
002244  032777  000100  014332  BIT     #INTENA,@DHMCSR                 ;WAS INTERRUPT ENABLE SET
002252  001001                  BNE     .+4
002254  104012                  ERROR                                   ;NO, ERROR
002256  042777  000100  014320  BIC     #INTENA,@DHMCSR                 ;CLEAR INTERRUPT ENABLE
002264  032777  000100  014312  BIT     #INTENA,@DHMCSR                 ;WAS INTERRUPT ENABLE CLEARED
002272  001401                  BEQ     .+4
002274  104012                  ERROR                                   ;NO, ERROR
002276  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 CCAUSE 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
```

```
                                        ;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, CONTINUE
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
```

F03


```
   563  003266  104002                INT7B:  SCOPE                   ;CHECK FOR ITERATION, LOOP
```

```
                                        ;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
```

```
  620  003526  022626                INT12A: POP2SP                  ;INTERRUPT OCCURED, RESTORE STACK
  621  003530  104002                INT12B: SCOPE                   ;CHECK FOR INTERATIONS, LOOP.
```

I03


```
                                                ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
                                                ;ENABLE" SET AND "DONE" SET AT PRIORITY 3.

003532                          T20:                                    ;REFERENCE DESIGNATION
003532  005077  013046          INT13:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
003536  042737  000340  177776        BIC     #340,PS                 ;ALLOW INTERRUPTS
003544  012777  003614  013026        MOV     #INT13A,@DHMVEC         ;SET UP INTERRUPT SERVICE ADDRESS
003552  005077  013024                CLR     @DHMLVL                 ;SET UP INTERRUPT SERVICE PRIORITY
003556  052737  000140  177776        BIS     #140,PS                 ;SET PROCESSOR PRIORITY TO LEVEL 3.
003564  012777  000100  013012        MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
003572  052777  000200  013004        BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
003600  000240                        NOP                             ;WAIT FOR INTERRUPT
003602  000240                        NOP
003604  005077  012774                CLR     @DHMCSR
003610  104012                        ERROR                           ;NO INTERRUPT, ERROR
003612  000401                        BR      INT13B                  ;CONTINUE
003614  022626          INT13A: POP2SP                                ;INTERRUPT OCCURED, RESTORE STACK
003616  104002          INT13B: SCOPE                                 ;CHECK FOR INTERATIONS, LOOP.
```

```
                                        ;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 MAINTENANCE 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
```

```
                                                ;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
```

```
                                                ;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 MEICRY
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
```

```
                                                ;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     MUX2D           ;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
```

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

005252                          T30:                            ;REFERENCE DESIGNATION
005252  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     #RS,@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  0112 4                  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     #RS,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
```

```
                                                ;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
```

```
                                                ;VERIFY THAT CLEAR TO SEND AND CARRIER ARE SET IF "LINE ENABLE"
                                                ;AND TERMINAL ARE SET FOR SELECTED LINE.

005746                                  T32:                                    ;REFERENCE DESIGNATION
005746  005077  010632                MUX5:   CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
005752  042737  000340  177776              BIC     #340,PS                 ;ENABLE INTERRUPTS
005760  012700  000020                      MOV     #16.,R0                 ;SET UP TO TEST 16 LINES
005764  005001                              CLR     R1                      ;START AT LINE 0
005766  012737  000001  016714              MOV     #1,SELMSK               ;INIT LINE SELECT MASK
005774  012702  000020                MUX5A:  MOV     #16.,R2                 ;16 LINES
006000  133737  016714  016712              BIT     SELMSK,LINSEL           ;THIS LINE SELECTED FOR TEST ?
006006  001454                              BEQ     MUX5F                   ;BR IF NOT
006010  010177  010570                      MOV     R1,@DHMCSR              ;SELECT A LINE
006014  012777  000003  010564              MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE +TRMRDY
006022  005077  010556                      CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
006026  005005                        MUX5B:  CLR     R5                      ;CLEAR EXPECTED RESULT
006030  017704  010552                      MOV     @DHMLSR,R4              ;READ LINE STATUS
006034  117703  010544                      MOVB    @DHMCSR,R3              ;READ LINE NUMBER
006040  042703  177760                      BIC     #177760,R3              ;CLEAR UNWANTED BITS
006044  020103                              CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
006046  001002                              BNE     MUX5C                   ;EXPECT LINE ENABLE AND
006050  012705  000143                      MOV     #LINENA+TRMRDY+CO+CS,R5
                                                                            ;CLEAR TO SEND AND CARRIER ARE SET
005054  020405                        MUX5C:  CMP     R4,R5                   ;COMPARE EXPECTED AND
006056  001403                              BEQ     MUX5D                   ;RECEIVED RESULTS
006060  104001                              ERRORL                          ;LINE STATUS ERROR
006062  104003                              SCOPEF
006064  006066                              MUX5D
006066  052777  000400  010510        MUX5D:  BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
006074  005302                              DEC     R2                      ;CONTINUE IF ALL CHECKS
006076  001353                              BNE     MUX5B                   ;ARE NOT DONE FOR THIS LINE
006100  012705  000001                      MOV     #LINENA,R5              ;EXPECT LINE ENABLE
006104  010103                        MUX5E:  MOV     R1,R3                   ;ON SELECTED LINE
006106  010177  010472                      MOV     R1,@DHMCSR              ;SELECT LINE
006112  042777  000002  010466              BIC     #TRMRDY,@DHMLSR         ;CLEAR TERMINAL
006120  105227  000000                      INCB    #0                      ;DELAY FOR CABLE
006124  001375                              BNE     .-4                     ;DITTO
006126  017704  010454                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
006132  020504                              CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
006134  001401                              BEQ     MUX5F                   ;SET ON THIS LINE
006136  104001                              ERRORL                          ;LINE STATUS ERROR
006140  104003                        MUX5F:  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
006142  005774                              MUX5A
006144  005201                              INC     R1                      ;UPDATE LINE NUMBER
006146  005077  010434                      CLR     @DHMLSR                 ;CLEAR LINE STATUS REGISTER
006152  006337  016714                      ASL     SELMSK                  ;SHIFT MARK TO TEST NEXT LINE
006156  005300                              DEC     R0                      ;CONTINUE IF ALL LINES NOT
006160  001305                              BNE     MUX5A                   ;TESTED
006162  104002                              SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
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  005212                      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  006526  005302                       DEC     R2                  ;CONTINUE IF ALL CHECKS
1156  006530  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 IS 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                      ERROR   1                   ;LINE STATUS ERROR
1199  006730  104003                      SCOPE                       ;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     MUX8E
1206  006754  104001                      ERROR   1                   ;LINE STATUS ERROR
1207  006756  104003                      SCOPE                       ;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 INTERRUPT 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
```

```
                                        ;WRITE 1'S INTO ALL MULTIPLEXER FUNCTION FLIP-FLOPS
                                        ;CLEAR SCANNER MEMORY
                                        ;VERIFY THAT AN INTERRUPT OCCURS FOR EACH LINE

007252                          T37:                                    ;REFERENCE DESIGNATION
007252  012700  000020          SCNT2:  MOV     #16.,R0                 ;WRITE 1S INTO ALL
007256  012777  002000  007320          MOV     #CLRMUX,@DHMCSR         ;CLEAR MULTIPLEXER
007264  005077  007314                  CLR     @DHMCSR                 ;MULTIPLEXER FUNCTION
007270  042737  000340  177776          BIC     #340,PS                 ;ENABLE TELETYPE INTERRUPTS
007276  012737  000001  016714          MOV     #1,SELMSK               ;INIT LINE SELECT MASK
007304  012777  000017  007274  SCNT2A: MOV     #17,@DHMLSR             ;FLIPFLOPS
007312  052777  000400  007264          BIS     #STEP,@DHMCSR
007320  005300                          DEC     R0
007322  001370                          BNE     SCNT2A
007324  012777  004000  007252          MOV     #CLRSCN,@DHMCSR         ;CLEAR SCANNER MEMORY
007332  032777  000020  007244          BIT     #BUSY,@DHMCSR           ;WAIT FOR CLEAR CYCLE TO COMPLETE
007340  001374                          BNE     .-6
007342  012700  000020                  MOV     #16.,R0                 ;SET UP TO TEST 16 LINES
007346  012701  177777                  MOV     #-1,R1                  ;INIT LINE NO. GENERATOR
007352  012705  170340                  MOV     #170340,R5              ;FIRST EXPECTED RESULT
007356  012777  007462  007214          MOV     #SCNT2C,@DHMVEC         ;SET UP LOCAL INTERRUPT RETURN
007364  013777  177776  007210          MOV     PS,@DHMLVL
007372  012777  000117  007204          MOV     #INTENA+17,@DHMCSR      ;SET INTERRUPT ENABLE
007400  033737  016714  016712  SCNT2B: BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED ??
007406  001435                          BEQ     SCNT2D                  ;BR IF NOT
007410  052737  000340  177776          BIS     #340,PS                 ;LOCK OUT INTERRUPTS
007416  052777  000040  007160          BIS     #SCNENA,@DHMCSR         ;START SCANNER
007424  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
007432  105777  007146                  TSTB    @DHMCSR                 ;WAIT FOR DONE
007436  100375                          BPL     .-4                     ;PROGRAM WILL HANG HERE
                                                                        ;IF DONE NEVER SETS
007440  052737  000340  177776          BIS     #340,PS                 ;LOCK OUT INTERRUPTS
007446  017704  007132                  MOV     @DHMCSR,R4              ;READ CONTROL STATUS
007452  104000                          ERRORC                          ;INTERRUPT DID NOT OCCUR
007454  104003                          SCOPEF                          ;CHECK FOR LOOP ON CURRENT DATA
007456  007252                          SCNT2
007460  000410                          BR      SCNT2D                  ;CONTINUE
007462  022626                  SCNT2C: POP2SP                          ;INTERRUPT OCCURED, RESTORE STACK
007464  017704  007114                  MOV     @DHMCSR,R4              ;READ CONTROL STATUS REGISTER
007470  020504                          CMP     R5,R4                   ;COMPARE TO EXPECTED RESULT
007472  001403                          BEQ     SCNT2D
007474  104000                          ERRORC                          ;CONTROL STATUS ERROR
007476  104003                          SCOPEF                          ;CHECK FOR LOOP ON CURRENT DATA
007500  007252                          SCNT2
007502  042777  000257  007074  SCNT2D: BIC     #SCNENA+DONE+17,@DHMCSR ;CLEAR SCAN ENABLE AND DONE AND LINE NO.
007510  006337  016714                  ASL     SELMSK                  ;SHIFT SELECT BIT
007514  005201                          INC     R1                      ;GEN NEW LINE NO.
007516  150177  007062                  BISB    R1,@DHMCSR              ;SET IT IN CSR
007522  005205                          INC     R5                      ;UPDATE EXPECTED RESULT
007524  005300                          DEC     R0                      ;CONTINUE IF ALL
007526  001324                          BNE     SCNT2B                  ;LINES NOT TESTED
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  002304  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  006652               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  006632                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
```

```
1420                                                ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
1421                                                ;BE SET AND CLEARED FOR SELECTED LINE
1422
1423  010124                              T103:                                 ;REFERENCE DESIGNATION
1424  010124  005077  006454             MUX13:   CLR     @DHMCSR              ;CLEAR CONTROL STATUS REGISTER
1425  010130  042737  000340  177776             BIC     #340,PS              ;ENABLE INTERRUPTS
1426  010136  013701  016672                     MOV     LINE,R1
1427  010142  012777  002000  006434   MUX13A:   MOV     #CLRMUX,@DHMCSR
1428  010150  012702  000020                     MOV     #16.,R2
1429  010154  010177  006424                     MOV     R1,@DHMCSR           ;SELECT LINE TO BE TESTED
1430  010160  012777  000004  006420             MOV     #RS,@DHMLSR          ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
1431  010166  005077  006412                     CLR     @DHMCSR
1432  010172  005005                     MUX13B:  CLR     R5
1433  010174  017704  006406                     MOV     @DHMLSR,R4           ;READ LINE STATUS REGISTER
1434  010200  117703  006400                     MOVB    @DHMCSR,R3           ;READ CONTROL STATUS REGISTER
1435  010204  042703  177760                     BIC     #177760,R3           ;CLEAR UNWANTED BITS
1436  010210  020103                             CMP     R1,R3                ;IF LINE NUMBER=SELECTED LINE NUMBER,
1437  010212  001002                             BNE     MUX13C               ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
1438  010214  012705  000004                     MOV     #RS,R5
1439                                                                           ;TO BE SET
1440  010220  020504                     MUX13C:  CMP     R5,R4                ;COMPARE EXPECTED AND RECEIVED
1441  010222  001403                             BEQ     MUX13D               ;RESULTS
1442  010224  104001                             ERRORL                       ;LINE STATUS ERROR
1443  010226  104003                             SCOPEF
1444  010230  010232                             MUX13D
1445  010232  052777  000400  006344   MUX13D:  BIS     #STEF,@DHMCSR        ;EXAMINE NEXT LINE
1446  010240  005302                             DEC     R2
1447  010242  001353                             BNE     MUX13B
1448  010244  005005                             CLR     R5
1449  010246  010177  006332           MUX13E:  MOV     R1,@DHMCSR
1450  010252  010103                             MOV     R1,R3                ;SET LINE COUNTER TO SELECTED LINE
1451  010254  005077  006326                     CLR     @DHMLSR              ;CLEAR REQUEST TO SEND FLIP FLOP
1452  010260  105227  000000                     INCB    #0                   ;DELAY FOR CABLE
1453  010264  001375                             BNE     .-4                  ;DITTO
1454  010266  017704  006314                     MOV     @DHMLSR,R4           ;READ LINE STATUS REGISTER
1455  010272  005704                             TST     R4                   ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
1456  010274  001401                             BEQ     MUX13F               ;CLEARED
1457  010276  104001                             ERRORL                       ;NO, LINE STATUS ERROR
1458  010300  104002                     MUX13F:  SCOPE                        ;CHECK FOR ITERATIONS, LOOP
```

```
1459                                                    ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
1460                                                    ;BE SET AND CLEARED FOR SELECTED LINE
1461
1462  010302                                T104:                                   ;REFERENCE DESIGNATION
1463  010302  005077  006276               MUX14:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
1464  010306  042737  000340  177776               BIC     #340,PS                 ;ENABLE INTERRUPTS
1465  010314  013701  016672                       MOV     LINE,R1
1466  010320  012777  002000  006256  MUX14A: MOV     #CLRMUX,@DHMCSR
1467  010326  012702  000020                       MOV     #16.,R2
1468  010332  010177  006246                       MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
1469  010336  012777  000010  006242               MOV     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
1470  010344  005077  006234                       CLR     @DHMCSR
1471  010350  005005                MUX14B: CLR     R5
1472  010352  017704  006230                       MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1473  010356  117703  006222                       MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
1474  010362  042703  177760                       BIC     #177760,R3              ;CLEAR UNWANTED BITS
1475  010366  020103                               CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
1476  010370  001002                               BNE     MUX14C                  ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
1477  010372  012705  000010                       MOV     #SECTX,R5
1478                                                                            ;TO BE SET
1479  010376  020504                MUX14C: CMP     R5,R4                   ;COMPARE EXPECTED AND RECEIVED
1480  010400  001403                               BEQ     MUX14D                  ;RESULTS
1481  010402  104001                               ERRORL                          ;LINE STATUS ERROR
1482  010404  104003                               SCOPEF
1483  010406  010410                               MUX14D
1484  010410  052777  000400  006166  MUX14D: BIS     #STEP,@DHMCSR           ;EXAMINE NEXT LINE
1485  010416  005302                               DEC     R2
1486  010420  001353                               BNE     MUX14B
1487  010422  005005                               CLR     R5
1488  010424  010177  006154        MUX14E: MOV     R1,@DHMCSR
1489  010430  010103                               MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
1490  010432  005077  006150                       CLR     @DHMLSR                 ;CLEAR SECONDARY TRANSMIT FLIP FLOP
1491  010436  105227  000000                       INCB    #0                      ;DELAY FOR CABLE
1492  010442  001375                               BNE     .-4                     ;DITTO
1493  010444  017704  006136                       MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1494  010450  005704                               TST     R4                      ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
1495  010452  001401                               BEQ     MUX14F                  ;CLEARED
1496  010454  104001                               ERRORL                          ;NO, LINE STATUS ERROR
1497  010456  104002                MUX14F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
1498
1499                                        ;VERIFY THAT CLEAR TO SEND AND CARRIER ARE SET IF "LINE ENABLE"
1500                                        ;AND TERMINAL ARE SET FOR SELECTED LINE.
1501
1502  010460                        T105:                                 ;REFERENCE DESIGNATION
1503  010460  005077  006120       MUX15:  CLR     @DHMCSR               ;CLEAR CONTROL REGISTER
1504  010464  042737  000340  177776       BIC     #340,PS               ;ENABLE INTERRUPTS
1505  010472  013701  016672              MOV     LINE,R1
1506  010476  012702  000020       MUX15A: MOV     #16.,R2               ;16 LINES
1507  010502  010177  006076              MOV     R1,@DHMCSR            ;SELECT A LINE
1508  010506  012777  000003  006072      MOV     #LINENA+TRMRDY,@DHMLSR ;SET LINE ENABLE +TRMRDY
1509  010514  005077  006064              CLR     @DHMCSR               ;CLEAR CONTROL REGISTER
1510  010520  005005              MUX15B: CLR     R5                    ;CLEAR EXPECTED RESULT
1511  010522  017704  006060              MOV     @DHMLSR,R4            ;READ LINE STATUS
1512  010526  117703  006052              MOVB    @DHMCSR,R3            ;READ LINE NUMBER
1513  010532  042703  177760              BIC     #177760,R3            ;CLEAR UNWANTED BITS
1514  010536  020103                      CMP     R1,R3                 ;IF RECEIVED LI  =SELECTED LINE
1515  010540  001002                      BNE     MUX15C                ;EXPECT LINE ENABLE AND
1516  010542  012705  000143              MOV     #LINENA+TRMRDY+CO+CS,R5
1517                                                                    ;CLEAR TO SEND AND CARRIER ARE SET
1518  010546  020405              MUX15C: CMP     R4,R5                 ;COMPARE EXPECTED AND
1519  010550  001403                      BEQ     MUX15D                ;RECEIVED RESULTS
1520  010552  104001                      ERRORL                        ;LINE STATUS ERROR
1521  010554  104003                      SCOPEF
1522  010556  010560                      MUX15D
1523  010560  052777  000400  006016 MUX15D: BIS     #STEP,@DHMCSR         ;UPDATE LINE COUNTER
1524  010566  005302                      DEC     R2                    ;CONTINUE IF ALL CHECKS
1525  010570  001353                      BNE     MUX15B                ;ARE NOT DONE FOR THIS LINE
1526  010572  012705  000001              MOV     #LINENA,R5            ;EXPECT LINE ENABLE
1527  010576  010103              MUX15E: MOV     R1,R3                 ;ON SELECTED LINE
1528  010600  010177  006000              MOV     R1,@DHMCSR            ;SELECT LINE
1529  010604  042777  000002  005774      BIC     #TRMRDY,@DHMLSR       ;CLEAR TERMINAL
1530  010612  105227  000000              INCB    #0                    ;DELAY FOR CABLE
1531  010616  001375                      BNE     .-4                   ;DITTO
1532  010620  017704  005762              MOV     @DHMLSR,R4            ;READ LINE STATUS REGISTER
1533  010624  020504                      CMP     R5,R4                 ;ONLY LINE ENABLE SHOULD BE
1534  010626  001401                      BEQ     MUX15F                ;SET ON THIS LINE
1535  010630  104001                      ERRORL                        ;LINE STATUS ERROR
1536  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                            T106:                                   ;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
```

```
1576
1577                                        ;VERIFY THAT SECONDARY RECEIVE IS SET IF "LINE ENABLE"
1578                                        ;AND SECONDARY TRANSMIT ARE SET FOR SELECTED LINE.
1579
1580  011010                        T107:                               ;REFERENCE DESIGNATION
1581  011010  005077  005570       MUX17:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1582  011014  042737  000340 177776        BIC     #340,PS             ;ENABLE INTERRUPTS
1583  011022  013701  016672              MOV     LINE,R1
1584  011026  012702  000020       MUX17A: MOV     #16.,R2             ;16 LINES
1585  011032  010177  005546              MOV     R1,@DHMCSR          ;SELECT A LINE
1586  011036  012777  000011 005542      MOV     #LINENA+SECTX,@DHMLSR ;SET LINE ENABLE +SECTX
1587  011044  005077  005534              CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1588  011050  005005                MUX17B: CLR     R5                  ;CLEAR EXPECTED RESULT
1589  011052  017704  005530              MOV     @DHMLSR,R4          ;READ LINE STATUS
1590  011056  117703  005522              MOVB    @DHMCSR,R3          ;READ LINE NUMBER
1591  011062  042703  177760              BIC     #177760,R3          ;CLEAR UNWANTED BITS
1592  011066  020103                      CMP     R1,R3               ;IF RECEIVED LINE=SELECTED LINE
1593  011070  001002                      BNE     MUX17C              ;EXPECT LINE ENABLE AND
1594  011072  012705  000031              MOV     #LINENA+SECTX+SECRX,R5
1595                                                                   ;SECONDARY RECEIVE IS SET
1596  011076  020405                MUX17C: CMP     R4,R5               ;COMPARE EXPECTED AND
1597  011100  001403                      BEQ     MUX17D              ;RECEIVED RESULTS
1598  011102  104001                      ERRORL                      ;LINE STATUS ERROR
1599  011104  104003                      SCOPEF
1600  011106  011110                      MUX17D
1601  011110  052777  000400 005466 MUX17D: BIS     #STEP,@DHMCSR       ;UPDATE LINE COUNTER
1602  011116  005302                      DEC     R2                  ;CONTINUE IF ALL CHECKS
1603  011120  001353                      BNE     MUX17B              ;ARE NOT DONE FOR THIS LINE
1604  011122  012705  000001              MOV     #LINENA,R5          ;EXPECT LINE ENABLE
1605  011126  010103                MUX17E: MOV     R1,R3               ;ON SELECTED LINE
1606  011130  010177  005450              MOV     R1,@DHMCSR          ;SELECT LINE
1607  011134  042777  000010 005444      BIC     #SECTX,@DHMLSR      ;CLEAR SECONDARY TRANSMIT
1608  011142  105227  000000              INCB    #0                  ;DELAY FOR CABLE
1609  011146  001375                      BNE     .-4                 ;DITTO
1610  011150  017704  005432              MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1611  011154  020504                      CMP     R5,R4               ;ONLY LINE ENABLE SHOULD BE
1612  011156  001401                      BEQ     MUX17F              ;SET ON THIS LINE
1613  011160  104001                      ERRORL                      ;LINE STATUS ERROR
1614  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 SEQUENCES
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  000026           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
011300  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                          T10301                          ;GO HERE ON ANSWER LINE STATUS ERROR

011316  011332                          T10302                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
011320  011336                          T10303                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
011322  011342                          T10304                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
011324  011346                          T103E                           ;GO TO NEXT TEST IF NO ERRORS
011326  104015          T10301: ERRORS                                  ;ANSWER LINE STATUS ERROR
011330  000207                  RTS     PC                              ;CONTINUE CHECKING
011332  104015          T10302: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
011334  000207                  RTS     PC                              ;CONTINUE CHECKING
011336  104014          T10303: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
011340  000207                  RTS     PC                              ;CONTINUE CHECKING
011342  104014          T10304: 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 UP 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$:     TSTB    @TKCSR                          ;WAIT FOR TTY TO HIT
 1732  011416  100375                           BPL     1$
 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
```

```
                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED
                                        ;ORIGINATE AND ANSWER LINES
                                        ;
011456  104023                          CKTRAN                  ;CHECK TRANSITIONS AND
                                                                ;STATUS ON SELECTED
                                                                ;ANSWER AND ORIGINATE LINES
011460  000003                          LINENA+TRMRDY           ;EXPECT LINE ENABLE AND
                                                                ;TERMINAL READY STATUS BITS
                                                                ;SET ON ANSWER LINE
011462  000001                          LINENA                  ;EXPECT LINE ENABLE STATUS BIT
                                                                ;SET ON ORIGINATE LINE
011464  000006                          XCO+XCS                 ;EXPECT CARRIER AND CLEAR
                                                                ;TO SEND TRANSITIONS ON
                                                                ;ANSWER LINE
011466  000006                          XCO+XCS                 ;EXPECT CARRIER AND CLEAR
                                                                ;TO SEND TRANSITIONS ON
                                                                ;ORIGINATE LINE
011470  011502                          T103E1                  ;GO HERE ON ANSWER LINE STATUS ERROR

011472  011506                          T103E2                  ;GO HERE ON ORIGINATE LINE STATUS ERROR
011474  011512                          T103E3                  ;GO HERE ON ANSWER LINE TRANSITION ERROR
011476  011516                          T103E4                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
011500  011522                          T103EN                  ;GO TO NEXT TEST IF NO ERRORS
011502  104015          T103E1: ERRORS                          ;ANSWER LINE STATUS ERROR
011504  000207                  RTS     PC                      ;CONTINUE CHECKING
011506  104015          T103E2: ERRORS                          ;ORIGINATE LINE STATUS ERROR
011510  000207                  RTS     PC                      ;CONTINUE CHECKING
011512  104014          T103E3: ERRORT                          ;ANSWER LINE TRANSITION ERROR
011514  000207                  RTS     PC                      ;CONTINUE CHECKING
011516  104014          T103E4: ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
011520  000207                  RTS     PC                      ;CONTINUE CHECKING

011522                  T201:                                   ;REFERENCE DESIGNATION
011522  104004          T103EN: TYPE                            ;TYPE " 103A TEST COMPLETE"
011524  017327                  MT103A
011526  005037  016632          CLR     TSTNO                   ;CLEAR TEST NUMBER FOR LOOPING
011532  104026                  CKINTT
011534  000137  011226          JMP     ST103B                  ;SELECT NEW LINE NUMBERS AND
                                                                ;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                          T2C2B                            ;GO HERE IF RING OK
 1804  011610  011612                          T2C2A1                           ;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          ;DROF 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 ORIGINATE 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
```

```
 1996
 1997                                           ;SET SECONDARY TRANSMIT ON ORIGINATE LINE
 1998                                           ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
 1999
 2000  012206  013777  016674  004370  T202H:  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
 2001  012214  052777  000010  004364          BIS     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT
 2002  012222  104026                          CKINTT
 2003  012224  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
 2004
 2005                                           ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
 2006                                           ;SELECTED ORIGINATE AND ANSWER LINES
 2007
 2008  012226  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
 2009                                                                          ;ON SELECTED ANSWER AND
 2010                                                                          ;ORIGINATE LINES
 2011  012230  000167                          RS+CS+CO+LINENA+TRMRDY+SECRX     ;EXPECT LINE ENABLE, TERMINAL
 2012                                                                          ;READY, REQUEST TO SEND, CLEAR
 2013                                                                          ;TO SEND, CARRIER AND SECONDARY
 2014                                                                          ;RECEIVE STATUS BITS SET
 2015                                                                          ;ON ANSWER LINE
 2016  012232  000133                          SECTX+CO+LINENA+TRMRDY+SECRX     ;EXPECT LINE ENABLE, TERMINAL
 2017                                                                          ;READY, CARRIER, SECONDARY
 2018                                                                          ;TRANSMIT AND SECONDARY
 2019                                                                          ;RECEIVE STATUS BITS SET
 2020                                                                          ;ON ORIGINATE LINE
 2021  012234  000001                          XSCRX                           ;EXPECT SECONDARY RECEIVE
 2022                                                                          ;TRANSITION ON ANSWER LINE
 2023  012236  000001                          XSCRX                           ;EXPECT SECONDARY RECEIVE
 2024                                                                          ;TRANSITION ON ORIGINATE LINE
 2025  012240  012252                          T202H2                          ;GO HERE ON ANSWER LINE STATUS ERROR
 2026  012242  012256                          T202H3                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
 2027  012244  012262                          T202H4                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
 2028  012246  012266                          T202H5                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
 2029  012250  012272                          T202I                           ;GO TO NEXT TEST IF NO ERRORS
 2030  012252  104015          T202H2:         ERRORS                          ;ANSWER LIN STATUS ERROR
 2031  012254  000207                          RTS     PC                      ;CONTINUE CHECKING
 2032  012256  104015          T202H3:         ERRORS                          ;ORIGINATE LINE STATUS ERROR
 2033  012260  000207                          RTS     PC                      ;CONTINUE CHECKING
 2034  012262  104014          T202H4:         ERRORT                          ;ANSWER LINE TRANSITION ERROR
 2035  012264  000207                          RTS     PC                      ;CONTINUE CHECKING
 2036  012266  104014          T202H5:         ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
 2037  012270  000207                          RTS     PC                      ;CONTINUE CHECKING
```

```
                                                ;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     #^C<2>,@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                          T202J                           ;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
```

```
2080
2081                                            ;SET UP TO TEST DISCONNECT SEQUENCE
2082                                            ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
2083                                            ;TO INITIATE THE DISCONNECT SEQUENCE
2084                                            ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
2085                                            ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
2086                                            ;BEFORE THE SWITCH SEETIN IS MADE
2087                                            ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
2088                                            ;REPORTED BY TYPEOUT
2089
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     #RNTYP,@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
                                        ;
012504  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
```

```
                                        ;DETECT AND RECORD TRANSITIONS ON SELECTED
                                        ;ORIGINATE AND ANSWER LINES

                                        ;TRANSITION DATA IS STORED IN LOCATIONS ANSFLG AND ORGFLG
                                        ;FOR ANSWER AND ORIGINATE LINES RESPECTIVELY
                                        ;FORMAT OF DATA IS (FOR BOTH LINES)

                                        ;BIT0=1,SECONDARY RECEIVE CAUSED INTERRUPT
                                        ;BIT1=1, CLEAR TO SEND CAUSED INTERRUPT
                                        ;BIT2=1, CARRIER CAUSED INTERRUPT
                                        ;BIT3=1, RING CAUSED INTERRUPT

012562  017704  004016        TRANS:  MOV     @DHMCSR,R4              ;GET LINE NUMBER AND
                                                                        ;INTERRUPT FLAGS
012566  010405                        MOV     R4,R5
012570  042705  177760                BIC     #177760,R5              ;EXTRACT LINE NUMBER
012574  023705  016674                CMP     LINORG,R5               ;DID ORIGINATE LINE INTERRUPT
012600  001411                        BEQ     ORGTR                   ;IF YES, SERVICE
012602  023705  016676                CMP     LINANS,R5               ;DID ANSWER LINE INTERRUPT
012606  001443                        BEQ     ANSTR                   ;IF YES, SERVICE
012610  010577  003770                MOV     R5,@DHMCSR
012614  017703  003766                MOV     @DHMLSR,R3
012620  104016                        ERRORN                          ;INTERRUPT ON INCORRECT LINE
012622  000471                        BR      FATEX

                                        ;RECORD TRANSITIONS FOR ORIGINATE LINE

012624  032704  100000        ORGTR:  BIT     #RINGF,R4               ;IF RING CAUSED INTERRUPT,
012630  001403                        BEQ     ORGTR1                  ;SET RING TRANSITION BIT
012632  052737  000010  016702        BIS     #10,ORGFLG
012640  032704  040000        ORGTR1: BIT     #COF,R4                 ;IF CARRIER CAUSED INTERRUPT
012644  001403                        BEQ     ORGTR2                  ;SET CARRIER TRANSITION BIT
012646  052737  000004  016702        BIS     #4,ORGFLG
012654  032704  020000        ORGTR2: BIT     #CSF,R4                 ;IF CLEAR TO SEND
                                                                        ;CAUSED INTERRUPT
012660  001403                        BEQ     ORGTR3                  ;SET CLEAR TO SEND
                                                                        ;TRANSITION BIT
012662  052737  000002  016702        BIS     #2,ORGFLG
012670  032704  010000        ORGTR3: BIT     #SECRXF,R4              ;IF SECONDARY RECEIVE
                                                                        ;CAUSED INTERRUPT
012674  001403                        BEQ     ORGTR4                  ;SET SECONDARY RECEIVE
012676  052737  000001  016702        BIS     #1,ORGFLG               ;TRANSITION BIT
012704  032704  170000        ORGTR4: BIT     #RINGF+COF+CSF+SECRXF,R4

                                                                        ;IF NO INTERRUPT FLAGS SET
012710  001044                        BNE     TRANEX                  ;EXIT TRANSITION DETECTION
012712  104016                ORGTRR: ERRORN
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 HAS 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  177776        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,RNGRET          ;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     LOCPX           ;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
```

```
2523
2524                                    ;GENERAL ERROR SERVICE
2525                                    ;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER
2526
2527  014452  005037  016624    ERR:    CLR     ERRFLG                  ;ALWAYS TYPE PC+2
2528                                                                    ;OF TEST THAT FAILED
2529  014456  005037  014672            CLR     ERRMSG                  ;NO MESSAGE
2530  014462  005037  014704            CLR     ERTAB                   ;NO TABLE OF DATA
2531  014466  000451                    BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
2532
2533                                    ;TRANSITION DETECTION ERROR SERVICE
2534
2535                                    ;FORMAT FOR ERROR TYPEOUT IS
2536
2537                                    ;XXXXXX TRANSITION ERROR
2538                                    ;EXP    REC    LINE
2539                                    ;AA     BB     CC
2540
2541                                    ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
2542                                    ;       AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER
2543                                    ;       BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
2544                                    ;       CC=LINE ON WHICH ERROR OCCURED
2545  014470  005037  016624    ERRT:   CLR     ERRFLG                  ;ALWAYS OUTPUT  ALL DATA
2546  014474  012737  017045  014672    MOV     #MTRANE,ERRMSG          ;TYPE "TRANSITION ERROR
2547  014502  012737  014760  014704    MOV     #ERTAB1,ERTAB           ;TABLE OF DATA
2548  014510  000440                    BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
2549
2550                                    ;ON-LINE STATUS ERROR SERVICE
2551
2552                                    ;FORMAT FOR LINE STATUS ERROR IS
2553
2554                                    ;XXXX LINE ERROR
2555                                    ;EXP    REC    LINE
2556                                    ;AAA    BBB    CC
2557
2558                                    ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
2559                                    ;       AAA=EXPECTED LINE STATUS AT TIME OF ERROR
2560                                    ;       BBB=RECEIVED LINE STATUS AT TIME OF ERROR
2561                                    ;       CC=LINE ON WHICH ERROR OCCURED
2562
2563
2564  014512  005037  016624    ERRS:   CLR     ERRFLG                  ;ALWAYS OUTPUT ALL DATA
2565  014516  012737  017014  014672    MOV     #MLINE1,ERRMSG          ;TYPE "LINE ERROR
2566                                                                    ;EXP REC LINE"
2567  014524  012737  014776  014704    MOV     #ERTAB2,ERTAB           ;TABLE OF DATA
2568  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  017775  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  012777  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                          SAVDSP
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:     RESDS                                   ;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                          CNTLUU
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 S OF DATA FOR ERROR TYPEOUT
                                        ;TABLE FOR TRANSITION STATUS ERROR

014752  000001          ERTAB0: 1
014754  000006                  6
014756  016656                  SAVPC
014760  000003          ERTAB1: 3
014762  000002                  2
014764  016652                  SAVR5           ;CONTAINS EXPECTED TRANSITION STATUS
014766  000002                  2
014770  016650                  SAVR4           ;CONTAINS RECEIVED TRANSITION STATUS
014772  000002                  2
014774  016646                  SAVR3           ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
014776  000003          ERTAB2: 3
015000  000003                  3
015002  016652                  SAVR5                   ;CONTAINS EXPECTED LINE STATUS
015004  000003                  3
015006  016650                  SAVR4                   ;CONTAINS RECEIVED LINE STATUS
015010  000002                  2
015012  016646                  SAVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
015014  000002          ERTAB3: 2
015016  000006                  6
015020  016650                  SAVR4
015022  000003                  3
015024  016646                  SAVR3
015026  000002          ERTAB4: 2
015030  000006                  6
015032  016652                  SAVR5                   ;CONTAINS EXPECTED CONTROL STATUS
015034  000006                  6
015036  016650                  SAVR4                   ;CONTAINS RECEIVED CONTROL STATUS
015040  000004          ERTAB5: 4
015042  000003                  3
015044  016652                  SAVR5                   ;CONTAINS EXPECTED LINE STATUS
015046  000003                  3
015050  016650                  SAVR4                   ;CONTAINS RECEIVED LINE STATUS
015052  000002                  2
015054  016646                  SAVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
015056  000002                  2
015060  016642                  SAVR1                   ;CONTAINS NUMBER OF LINE UNDER TEST


015062  000001          SWRTB:  1
015064  000006                  6
015066  000176                  SWREG
```

```
2706
2707                                        ;CONVERT OCTAL TO ASCII AND
2708                                        ;OUTPUT ON TELETYPE
2709
2710  015070  017605  000000        OCTASN: MOV     @(SP),R5                ;GET POINTER TO TABLE OF DATA
2711  015074  062716  000002                ADD     #2,(SP)
2712  015100  012737  000010  015430        MOV     #10,RADIX
2713  015106  012704  020206                MOV     #MBCD+2,R4              ;SET UP POINTER FOR CONVERTED DATA
2714  015112  012537  016660                MOV     (R5)+,WRDCNT            ;GET NUMBER OF WORDS TO BE CONVERTED
2715  015116  012537  016662        OCTAS1: MOV     (R5)+,CHRCNT            ;GET NUMBER OF DIGITS IN WORD
2716  015122  013537  015424                MOV     @(R5)+,BINWRD           ;GET DATA TO BE CONVERTED
2717  015126  104010                        CONVERT                         ;CONVERT TO ASCII
2718  015130  005337  016660                DEC     WRDCNT                  ;IF ALL DATA IS NOT CONVERTED
2719  015134  001370                        BNE     OCTAS1                  ;CONTINUE
2720  015136  112714  000100                MOVB    #100,(R4)               ;PUT TERMINATOR AT END OF MESSAGE
2721  015142  005737  015260                TST     SMLN
2722  015146  001002                        BNE     1$
2723  015150  104004                        TYPE                            ;OUTPUT CONVERTED DATA
2724  015152  020204                        MBCD                            ;TO TELETYPE
2725  015154  000002          1$:           RTI                             ;RETURN TO CALLING ROUTINE
2726
2727
2728
2729  015156  005037  015254        CNTLU:  CLR     TMP1
2730  015162  012737  000001  015256        MOV     #1,TMP2
2731  015170  104004                        TYPE
2732  015172  020161                        $SWREQ
2733  015174  052737  000001  015260        BIS     #1,SMLN
2734  015202  104006                        OCTASC
2735  015204  015062                        SWRTB
2736  015206  104004                        TYPE
2737  015210  020206                        MBCD+2
2738  015212  104013                        INSTRG
2739  015214  020172                        $NEWIS
2740  015216  000000                        0
2741  015220  177777                        177777
2742  015222  015254                        TMP1
2743  015224  123727  016154  000015        CMPB    INBUF,#15
2744  015232  001403                        BEQ     1$
2745  015234  013777  015254  001356        MOV     TMP1,@SWR
2746  015242  005037  015256          1$:   CLR     TMP2
2747  015246  005037  015260                CLR     SMLN
2748  015252  000002                        RTI
2749  015254  000000          TMP1:         0
2750  015256  000000          TMP2:         0
2751  015260  000000          SMLN:         0
2752
2753
```

```
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 RU-R5
2794
2795  015432  016637  000004  016656 SVDSP:  MOV     4(SP),SAVPC
2796
2797                                        ;SAVE R0-R5
2798
2799  015440  010537  016652        SVDS:   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        RSOS:  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$:    MOVB    FILL+1,@TPDBF   ;OUT PUT ONE FILLER
 2847  015650  105777  000740        2$:    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                                        ;INPUT OCTAL CHARACTER STRING
 2854                                        ;TERMINATOR IS CARRIAGE RETURN
 2855                                        ;IF MORE THAN SEVEN (7) CHARACTERS INCLUDING
 2856                                        ;CARRIAGE RETURN ARE TYPED, THE IN  PUT WILL
 2857                                        ;BE RE-REQUESTED
 2858
 2859  015666                        INSTR:
 2860  015666  011605                       MOV     (SP),R5         ;GET POINTER TO ARGUMENTS
 2861  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                          MOM
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  000024MOV     #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  016654RESTAR: 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  000024MOV     #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                MPFI
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  000020XOR:     MOV     20,-(SP)        ;SAVE 20
2971  016324  013746  000022        MOV     22,-(SP)        ;SAVE 22
2972  016330  012737  016522  000020MOV     #2$,20          ;IOT INTR VECTOR
2973  016336  012737  000340  000022MOV     #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$:     MOV     DATA2,@DATA1
 2977  016366  012777  000004  175434          MOV     #IOT,@DATA2     ;IOT TRAP
 2978  016374  062737  000004  014026          ADD     #4,DATA1
 2979  016402  062737  000004  014030          ADD     #4,DATA2
 2980  016410  023727  014026  001000          CMP     DATA1,#1000
 2981  016416  001360                          BNE     1$
       016420  012737  000000  016632          MOV     #0,TSTNO        ;SET UP DEFAULT
       016426  012737  020436  016664          MOV     #TSTTBO,TSTPNT  ;
       016434  052737  000340  177776          BIS     #340,PS         ;PREVENT INTERRUPTS
       016442  005077  000136                  CLR     @DHMCSR         ;
       016446  012777  000100  000130          MOV     #INTENA,@DHMCSR ;SET INTERRUPT ENABLE
       016454  042737  000340  177776          BIC     #340,PS ;ALLOW INTERRUPTS
       016462  052777  000200  000114          BIS     #DONE,@DHMCSR   ;SET DONE..AND INTERRUPT
       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
```

```
                                        ;INDIRECT POINTERS
016600  000300            DHMVEC: 300                 ;MODEM CONTROL INTERRUPT VECTOR
016602  000302            DHMLVL: 302                 ;MODEM CONTROL ONTERRUPT 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
```

```
  3177  020126  052123  053440  046111
  3178  020134  020114  042522  052123
  3179  020142  051101  022524  040042
  3180  020150  041536     100            MCONTC: .ASCII  ;↑C@;
  3181  020153     136  040126            MCONTV: .ASCII  ;↑V@;
  3182  020156  046136     100            MCONTL: .ASCII  ;↑L@;
  3183  020161     045  051442  051127  $SWREQ: .ASCII  ;%"SWR=  @;
  3184  020166  020075  040040
  3185  020172  020040  047040  053505  $NEWIS: .ASCII  ;   NEW=  @;
  3186  020200  020075  040040
  3187  020204  021045                  MBCD:   .ASCII  ;%";
  3188           020306                  .=.+100
  3189                                   .EVEN
  3190  020306  040007                  MEPASS: 40007
  3191  020310  000000                  TEMTAB: 0
  3192           020322                  .=.+10
  3193
  3194  020322  000000                          0
  3195
  3196                                   ;EMT DISPATCH TABLE
  3197
  3198  020324  014556                  EMTTAB: ERRCS
  3199  020326  014574                          ERRLS
  3200  020330  014164                          LOOP
  3201  020332  014410                          FREEZE
  3202  020334  015524                          TYPER
  3203  020336  015432                          SVOSP
  3204  020340  015070                          OCTASN
  3205  020342  015472                          RSOS
  3206  020344  015262                          BINASC
  3207  020346  015330                          DIVI
  3208  020350  014452                          ERR
  3209  020352  015666                          INSTR
  3210  020354  014470                          ERRT
  3211  020356  014512                          ERRS
  3212  020360  014534                          ERRN
  3213  020362  013102                          GETLIN
  3214  020364  013136                          SETUPS
  3215  020366  013372                          CKRNG
  3216  020370  013470                          WAITR
  3217  020372  013556                          CKTRN
  3218  020374  013526                          WAITRR
  3219  020376  015156                          CNTLU           ;CALL BY EMT CNTLUU
  3220  020400  014152                          CKINT           ;CALL  BY EMT CKINTT
  3221  020402  001760                          KBDINT          ;CALLBY EMT  KBDIN
  3222  020404  000000                  EMTLIM: 0
  3223  020406  020436                  TSTLST: TSTTBO
  3224  020410  020440                          TSTTB1
  3225  020412  020702                          TSTTB2
  3226  020414  020710                          TSTTB3
  3227  020416  000000                          0
  3228  020420  000000                          0
  3229  020422  000000                          0
  3230  020424  000000                          0
  3231  020426  000037                  GRO:    NO-1
  3232  020430  000007                          N1-100-1
```

```
 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  004000                        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  000230                          TIMES
 3293  020622  006620                          T35
 3294  020624  004000                          TIMES
 3295  020626  007002                          T36
 3296  020630  004000                          TIMES
 3297  020632  007252                          T37
 3298  020634  004000                          TIMES
 3299  020636  000000                          0
 3300  020640  007532              TSTTB1:     T100
 3301  020642  000001                          1
 3302  020644  007570                          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
```

```
ANSFLG  016700        DIVI    015330        ICOUNT  016636        LINCNS  016676        MPF1    020113
ANSTR   012716        DIVIA   015354        INBUF   016154        LINE    016672        MQM     017714
ANSTRR  013004        DIVIB   015422        INIT1   002214        LINENA= 000001        MREGAD  017616
ANSTR1  012732        DIVIC   015372        INSTBB  015734        LINFLG  016670        MSELAN  017310
ANSTR2  012746        DIVIDH  015426        INSTER  016026        LINORG  016674        MSELOR  017264
ANSTR3  012762        DIVIDL  015424        INSTR   015666        LINSEL  016712        MSG     015714
ANSTR4  012776        DIVIS   015430        INSTRB  015726        LINT1   003620        MSTATE  016726
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
BINBRD= 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        INT1    002510        LOOP    014164        MT202T  017213
CKINTT= 104026        EOP     014040        INT1A   002556        LOOPER  014314        MUX1    004556
CKPING= 104021        EPR     014452        INT1B   002562        LOOPL   014400        MUX1A   004604
CKRNG   013372        ERRCS   014556        INT1D   003270        LOOPS   014266        MUX1B   004652
CKRNG1  013436        ERRFLG  016624        INT1DA  003352        LOOPX   014330        MUX1C   004710
CKRNG2  013462        ERRGEN  014612        INT1DB  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        ERRORM= 104016        INT13   003532        MDISC   017405        MUX11D  007676
CLRSCN= 004000        ERRORS= 104015        INT13A  003614        MEMT1   004032        MUX11E  007712
CNTLU   015156        ERRORT= 104014        INT13B  003616        MEMT1A  004060        MUX11F  007744
CNTLUU= 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        MUX13L  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
DISPSE  000174        GRO     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          RSOS    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          TYPERI  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          SVOS    015440          T10     002640
MUX16E  010752          MUX8B   006672          SAVR0   016640          SVOSP   015432          T100    007532
MUX16F  011006          MUX8C   006700          SAVR1   016642          SWR     016620          T101    007570
MUX17   011010          MUX8D   006734          SAVR2   016644          SWREG   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          SAVUSP= 104005          SW10  = 002000          T10381  011252
MUX17F  011142          N     = 000300          SCNENA= 000040          SW11  = 004000          T10382  011256
MUX2    005014          NXTTS   014036          SCNT1   007002          SW12  = 010000          T103C   011262
MUX2A   005042          N0    = 000040          SCNT1A  007042          SW13  = 020000          T10301  011326
MUX2B   005110          N1    = 000110          SCNT1B  007120          SW14  = 040000          T10302  011332
MUX2C   005146          N2    = 000202          SCNT1C  007202          SW15  = 100000          T10303  011336
MUX2D   005160          N3    = 000301          SCNT1D  007222          T     = 000014          T10304  011342
MUX2E   005200          OCTASC= 104006          SCNT2   007252          TEMTAB  020310          T103E   011346
MUX2F   005232          OCTASN  015070          SCNT2A  007304          TIFLG   016710          T103EN  011522
MUX3    005252          OCTAS1  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          T107    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= 023626          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   011604
MUX6    006164          RESTAR  016234          STACK   001100          TSTNO   016632          T202A1  011612
MUX6A   006212          RESTA1  016302          START   001100          TSTPNT  016664          T202B   011616
MUX6B   006244          RESOS = 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          X1A     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