


11/11/76

## IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZDHK-C-D  
PRODUCT NAME: MODEM CONTROL  
MULTIPLEXER DIAGNOSTIC  
DATE : 21 AUG 1976  
MAINTAINER: DIAGNOSTIC GROUP

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## 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

## 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 ACCEPTABLE 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 SW00=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  
 OPERATING PROCEDURE

## 5.0

## 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:

# GO1

SEQ 0006

- 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 ERROR HALT OCCURS, THE SOFTWARE SWITCH REGISTER CAN BE CHANGED BY PRESSING CONTINUE THE PROGRAM WILL RESPOND WITH THE FOLLOWING:  
SMR=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****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

SEQ 0009

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 (<IG>); 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 (<IU>) 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 <CONTROL 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 RESUME 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=RECEIVED 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 BBBB
```

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

## 6.1.1.5 LINE STATUS ERROR

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

FORMAT FOR LINE STATUS ERROR IS

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

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

## 6.1.2 REPEATED ERRORS

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

## 6.2 SCOPE LOOPS

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 TIMEOUT  
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  
NB61 TEST CONNECTOR MUST BE INSTALLED.

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

VECTORS

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

ADDRESSES

DHMC SR: 170500  
DHML SR: 170502

NOTE: SM00 (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 MODEN 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 SMD1=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 MODEN 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 SMD1=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 ... SMD0 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

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.TITLE DZDHC-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  
040000  
020000  
010000  
004000  
002000  
001000  
000400  
000100

SW15=100000  
SW14=40000  
SW13=20000  
SW12=10000  
SW11=4000  
SW10=2000  
SW09=1000  
SW08=400  
SW06=100

.NLIST MC,MD,CND  
.LIST ME

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56  
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## ;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 15 TO INPUT OF SCRATCH PAD MEMORY
002000      CLRMUX=2000  ;CLEAR MULTIPLEXER FUNCTION FLIPFLOPS
004000      CLRSCN=4000  ;CLEARS SCANNER SCRATCHPAD MEMORY
010000      SECRCF=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      SECRCX=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

```

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141

## ; INSTRUCTION DEFINITIONS

005746        PUSH1SP=5746        ; DECREMENT PROCESSOR STACK 1 WORD  
 005726        POP1SP=5726        ; INCREMENT PROCESSOR STACK 1 WORD  
 010046        PUSHRO=10046        ; SAVE R0 ON STACK  
 012600        POPRO=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 CORRECT 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

142  
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148

000000

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

```

149
150
151
152
153 000024 000024      .=24
154 000026 016176      PFAIL          ;POWER FAIL HANDLER
155 000030 000340      340           ;SERVICE AT LEVEL 7
156 000032 014120      EMTSRV        ;EMT DISPATCH SERVICE
157 000032 000340      340           ;SERVICE AT LEVEL 7
158
159 000046 000046      .=46
160 000046 014102      LOGICAL       ;ACT11?
161
162 000060 000060      .=60
163 000062 001760      KBDINT        ;KEYBOARD MONITOR
164 000062 000340      340           ;SERVICE AT LEVEL 7
165 000174 000174      .=174
166 000176 000000      DISPREG:      0
167 000176 000000      SWREG: 0
168
169 000200 000200 001100      .=200
170 000200 000137      JMP          START ;GO TO START OF PROGRAM
171
172
173
    
```

```

174
175      001100      001100      =1100
176      001100      012737      016176      000024      STACK:
177      001100      012737      016176      000024      START:  MOV    #PFAIL,24      ;SET UP POWER FAIL
178                                          ;INTERRUPT SERVICE VECTOR
179      001106      005037      001756      CLR    TIPFLG      ;CLEAR TEST IN PROGRESS FLAG
180      001112      005077      015472      CLR    #TKCSR
181      001116      012706      001100      MOV    #STACK,SP      ;SET UP STACK POINTER
182
183      001122      013746      000006      SUSWR:  MOV    #6,-(SP)      ;SAVE VECTORS
184      001126      013746      000004      MOV    #4,-(SP)
185      001132      012737      001152      000004      MOV    #64,#J#4      ;SET UP FOR TIMEOUT
186      001140      022777      177777      015452      CMP    #-1,#J#4      ;REFERENCE HARDWARE SWITCH REGISTER
187      001146      001402      BEQ    65$
188      001150      000407      BR     66$
189      001152      022626      64$:    CMP    (SP)+,(SP)+      ;ADJUST STACK
190      001154      012737      000176      016620      65$:    MOV    #SWREG,SWR      ;POINT TO SOFTWARE SWITCH REG
191      001162      012737      000174      016622      MOV    #DISPREG,DISPLAY      ;POINT TO SOFT DISPLAY REG
192      001170      012637      000004      66$:    MOV    (SP)+,#4      ;RESTORE VECTORS
193      001174      012637      000006      MOV    (SP)+,#6
194      001200      012777      000100      015402      MOV    #INTENA,#TKCSR      ;ENABLE TELETYPE INTERRUPTS
195      001206      005037      001252      CLR    XFLAG      ;XOR = NO
196
197      ;*****
198      ;REPLACE THE FOLLOWING BRANCH WITH A "NOP" (240) TO ACTIVATE "XOR" CODE
199      ;*****
200      001212      000423      BR     START0      ;SKIP XOR STUFF
201      001214      013746      000004      MOV    4,-(SP)      ;SAVE 4
202      001220      012737      001254      000004      MOV    #XORSVC,4      ;SET UP SVC ROUTINE
203      001226      005737      177060      TST    177060      ;GOT AN XOR TESTER OUT THERE ?
204      001232      012637      000004      MOV    (SP)+,4      ;YES
205      001236      005137      001252      COM    XFLAG      ;XOR = YES
206      001242      004737      016320      JSR    PC,XOR      ;AUTO VECTOR
207      001246      000137      001262      JMP    START0      ;RESTORE TRAPCATCHER
208      001252      000000      XFLAG:  0      ;XOR FLAG
209      001254      022626      XORSVC: POP2SP
210      001256      012637      000004      MOV    (SP)+,4      ;RESTORE 4
211      001262      005737      016710      START0: TST    TIFLG      ;TYPED TITLE?
212      001266      001005      BNE    .+14      ;YES
213      001270      104004      TYPE    ;TYPE "MODEM CONTROL DIAGNOSTIC"
214      001272      017510      MTITLE
215      001274      012737      000001      016710      MOV    #1,TIFLG      ;SET TITLE TYPED FLAG
216      001302      005737      001252      TST    XFLAG      ;X OR ?
217      001306      100422      BMI    VECSTR      ;RESTORE TRAPCATCHER
218      001310      005737      000042      TST    42      ;ACT 11?
219      001314      001403      BEQ    START1      ;NO
220      001316      004737      016320      JSR    PC,XOR      ;YES AUTO VECTOR
221      001322      000414      BR     VECSTR      ;GET VECTOR AND REGISTER ADDRESS
222      001324      005737      000042      START1: TST    #42      ;UNDER MONITOR?
223      001330      001005      BNE    1$
224      001332      022737      000176      016620      CMP    #SWREG,SWR      ;USING SWREG?
225      001340      001001      BNE    1$
226      001342      104025      CNTLUU
227      001344      032777      000001      015246      1$:    BIT    #1,#J#4      ;IF SW BIT 0=1, ON PROGRAM RESTART
228      001352      001510      BEQ    STARTN      ;INPUT VECTOR AND REGISTER ADDRESSES
229      001354      012706      001100      VECSTR: MOV    #STACK,SP      ;SET UP PROCESSOR STACK POINTER
230      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		
239	001436	100523				BMI	TSTGO	; XOR ?	
240	001440	005737	000042			TST	42	; YES	
241	001444	001120				BNE	TSTGO	; ACT 11 ?	
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	1S:	BIT	#3, DHMVEC		; TEST 2 LSB OF ADDRESS
248	001466	001404				BEQ	VECST1		; IF 0, CONTINUE
249	001470	012716	001460			MOV	#1S, (SP)		
250	001474	000137	016026			JMP	INSTR		; 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	1S:	BIT	#7, DHMCSR		; IF 3 LSB ARE NOT 0
259	001534	001404				BEQ	REGST1		
260	001536	012716	001526			MOV	#1S, (SP)		
261	001542	000137	016026			JMP	INSTR		; INCORRECT ADDRESS, TRY AGAIN
262	001546	013737	016604	016606	REGST1:	MOV	DHMCSR, DHMLSR		; SET UP ADDRESS OF LINE STATUS REGISTER
263	001554	062737	000002	016606		ADD	#2, DHMLSR		
264	001562	104013				INSTRG			; GET LINE SELECT PARAMETER
265	001564	017652				MLINSL			
266	001566	000000				0			
267	001570	177777				177777			
268	001572	016712				LINSEL			

269											
270	001574	012706	001100		STARTN:	MOV	#STACK, SP				;SET UP PROCESSOR STACK
271	001600	104013				INSTRG					;GET TEST NUMBER
272	001602	017704				MTEST					;MESSAGE "TEST-"
273	001604	000000				0					;LOWER LIMIT FOR TEST NUMBER
274	001606	000777				777					;UPPER LIMIT FOR TEST NUMBER
275	001610	016632				TSTNO					;STORAGE FOR TEST NUMBER
276	001612	013705	016632		X1A:	MOV	TSTNO, R5				;GET TEST NUMBER
277	001616	042705	177077			BIC	#177077, R5				;EXTRACT TEST GROUP NUMBER
278	001622	006205				ASR	R5				
279	001624	006205				ASR	R5				
280	001626	006205				ASR	R5				
281	001630	006205				ASR	R5				
282	001632	006205				ASR	R5				
283	001634	016537	020426	016666		MOV	GRO(R5), TSTMAX				;GET HIGHEST TEST IN GROUP
284	001642	016537	020406	016664		MOV	TSTLST(R5), TSTPNT				;GET POINTER TO TEST TABLE
285	001650	005737	016664			TST	TSTPNT				;IF 0, INVALID TEST GROUP
286	001654	001004				BNE	STRTOA				
287	001656	012716	001612		X1B:	MOV	#X1A, (SP)				;TRY AGAIN
288	001662	000137	016026			JMP	INSTER				;GET NUMBER OF FIRST TEST
289	001666	042737	177700	016632	STRTOA:	BIC	#177700, TSTNO				;TO BE EXECUTED IN SELECTED GROUP
290											;IS NUMBER TOO LARGE
291	001674	023737	016632	016666		CMP	TSTNO, TSTMAX				
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	IS:	MOV	#1, TIPFLG				;SET TEST IN PROGRESS FLAG
304	001752	000137	014334			JMP	TSTENT				;START TESTING
305	001756	000000			TIPFLG:	0					

```

306
307
308 ;TELETYPE KEYBOARD INTERRUPT SERVICE ROUTINE
309 001760 005037 001756 KBDINT: CLR TIPFLG ;CLEAR TEST IN PROGRESS FLAG
310 001764 005037 015254 CLR TMP1
311 001770 005037 002206 CLR SINTFL ;CLEAR SOFTWARE INTERRUPT FLAG
312 001774 117737 014612 015254 MOVW @TKDBR, TMP1
313 002002 142737 000200 015254 BICB #200, TMP1
314 002010 122737 000003 015254 CMPB #3, TMP1 ;IF <CONTROL C> WAS TYPED
315 002016 001011 BNE KBDIN1 ;TYPE "↑C" AND
316 002020 104004 TYPE ;SELECT NEW TEST
317 002022 020150 MCONTC
318 002024 022626 POP2SP
319 002026 005077 014552 CLR @DHMCSR
320 002032 005077 014552 CLR @TKCSR
321 002036 000137 001574 JMP STARTN
322 002042 122737 000026 015254 KBDIN1: CMPB #26, TMP1 ;IF <CONTROL V> WAS TYPED
323 002050 001011 BNE KBDIN2 ;TYPE "↑V" AND GET NEW
324 002052 104004 TYPE ;VECTOR AND REGISTER ADDRESS
325 002054 020153 MCONTV
326 002056 022626 POP2SP
327 002060 005077 014520 CLR @DHMCSR
328 002064 005077 014520 CLR @TKCSR
329 002070 000137 001354 JMP VECSTR
330 002074 122737 000014 015254 KBDIN2: CMPB #14, TMP1 ;IF <CONTROL L> WAS TYPED
331 002102 001015 BNE KBDIN3 ;TYPE "↑L" AND GET NEW
332 002104 104004 TYPE ;LINE NUMBERS, UNLESS
333 002106 020156 MCONTL ;TEST GROUP D WAS IN PROGRESS
334 002110 022737 002202 002204 CMP #DMYRTI, KRET ;IF <CONTROL L> WAS TYPED IN TEST
335 002116 001431 BEQ DMYRTI ;GROUP D, IGNORE
336 002120 022626 POP2SP
337 002122 005077 014456 CLR @DHMCSR
338 002126 005077 014456 CLR @TKCSR
339 002132 000177 000046 JMP @KRET
340 002136 005737 000042 KBDIN3: TST @#42
341 002142 001011 BNE 1$
342 002144 022737 000176 016620 CMP #SWREG, SWR
343 002152 001005 BNE 1$
344 002154 122737 000007 015254 CMPB #7, TMP1 ;IS IT <↑G>
345 002162 001001 BNE 1$
346 002164 104025 CNLWU
347 002166 012737 000001 002206 1$: MOV #1, SINTFL ;SET SOFTWARE INTERRUPT FLAG
348 002174 012737 000001 001756 MOV #1, TIPFLG ;SET TEST IN PROGRESS FLAG
349 002202 000002 DMYRTI: RTI
350 .EVEN
351 002204 000000 KRET: 0
352 002206 000000 SINTFL: 0

```



```

407
408
409
410 002404 012777 000040 014172 T4:
411 002404 032777 000040 014164 CSTR4: MOV #SCNENA, @DHMCSR ;REFERENCE DESIGNATION
412 002412 001001 BNE .+4 ;SET SCAN ENABLE
413 002420 001001 ;WAS SCAN ENABLE SET
414
415 002422 104012 ERROR ;NO, ERROR
416 002424 042777 000040 014152 BIC #SCNENA, @DHMCSR ;CLEAR SCAN ENABLE
417 002432 032777 000040 014144 BIT #SCNENA, @DHMCSR ;WAS SCAN ENABLE CLEARED
418 002440 001401 BEQ .+4
419
420 002442 104012 ERROR ;NO, ERROR
421 002444 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP
422
423 ;VERIFY THAT "BUSY" IS SET WHEN "SCAN ENABLE" IS SET
424 ;VERIFY THAT "BUSY" IS CLEARED WHEN "SCAN ENABLE" IS CLEARED
425
426
427 002446 012777 000040 014130 T5:
428 002454 032777 000020 014122 CSTR5: MOV #SCNENA, @DHMCSR ;REFERENCE DESIGNATION
429 002462 001001 BNE .+4 ;SET SCAN ENABLE
430 002464 104012 ERROR ;IS BUSY BIT SET
431 002466 042777 000040 014110 BIC #SCNENA, @DHMCSR ;BUSY NOT SET, ERROR
432 002474 032777 000020 014102 BIT #BUSY, @DHMCSR ;CLEAR SCAN ENABLE
433 002502 001401 BEQ .+4 ;IS BUSY BIT CLEARED
434 002504 104012 ERROR ;BUSY NOT CLEARED, ERROR
435 002506 104002 SCOPE ;CHECK FOR LOOP, ITERATIONS
436
437 ;VERIFY THAT SETTING "DONE" DOES NOT CAUSE AN
438 ;INTERRUPT IF "INTERRUPT ENABLE" IS CLEARED.
439
440 002510 T6:
441 002510 052737 000340 177776 INT1: BIS #340, PS ;REFERENCE DESIGNATION
442 002516 005077 014062 CLR @DHMCSR ;LOCK OUT INTERRUPTS
443 002522 012777 002556 014050 MOV #INT1A, @DHMVEC ;CLEAR CONTROL REGISTER
444 002530 013777 177776 014044 MOV PS, @DHMLVL ;SET UP INTERRUPT SERVICE ADDRESS
445 002536 052777 000200 014040 BIS #DONE, @DHMCSR ;SET UP INTERRUPT PRIORITY
446 002544 042737 000340 177776 BIC #340, PS ;SET DONE
447 002552 000240 NOP ;ALLOW INTERRUPTS
448 002554 000402 BR INT1B ;DELAY FOR INTERRUPT
449 002556 022626 INT1A: POP2SP ;NO INTERRUPT, CONTINUE
450 002560 104012 ERROR ;RESTORE STACK, INTERRUPT
451 002562 104002 INT1B: SCOPE ;OCCURED, ERROR
;CHECK FOR LOOP, ITERATIONS

```

```

453
454
455
456
457 002564 052737 000340 177776 T7:
458 002572 005077 014006 INT2: BIS #340,PS
459 002576 012777 002632 013774 CLR #DMMCSR
460 002604 013777 177776 013770 MOV #INT2A,#DMMVEC
461 002612 052777 000100 013764 MOV PS,#DMMVL
462 002620 042737 000340 177776 BIS #INTENA,#DMMCSR
463 002626 000240 NOP #340,PS
464 002630 000402 BR INT2B
465 002632 022626 INT2A: POP2SP
466 002634 104012 ERROR
467 002636 104002 INT2B: SCOPE
468
469
470
471
472 002640 052737 000340 177776 T10:
473 002646 005077 013732 INT3: BIS #340,PS
474 002652 012777 002724 013720 CLR #DMMCSR
475 002660 012777 000100 013716 MOV #INT3A,#DMMVEC
476 002666 013777 177776 013706 MOV #INTENA,#DMMCSR
477 002674 042737 000340 177776 MOV PS,#DMMVL
478 002702 052777 000200 013674 BIC #340,PS
479 002710 000240 BIS #DONE,#DMMCSR
480 002712 000240 NOP
481 002714 005077 013664 CLR #DMMCSR
482 002720 104012 ERROR
483 002722 000401 BR INT3B
484 002724 022626 INT3A: POP2SP
485 002726 104002 INT3B: SCOPE
486
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491
492 002730 005077 013650 T11:
493 002734 042737 000340 177776 INT4: CLR #DMMCSR
494 002742 052737 000340 177776 BIC #340,PS
495 002750 012777 003012 013622 BIS #340,PS
496 002756 013777 177776 013616 MOV #INT4A,#DMMVEC
497 002764 012777 000100 013612 MOV PS,#DMMVL
498 002772 052777 000200 013604 MOV #INTENA,#DMMCSR
499 003000 000240 BIS #DONE,#DMMCSR
500 003002 000240 NOP
501 003004 005077 013574 CLR #DMMCSR
502 003010 000402 BR INT4B
503 003012 022626 INT4A: POP2SP
504 003014 104012 ERROR
505 003016 104002 INT4B: SCOPE

```

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

;REFERENCE DESIGNATION  
;LOCK OUT INTERRUPTS  
;CLEAR CONTROL REGISTER  
;SET UP INTERRUPT SERVICE ADDRESS  
;SET UP INTERRUPT SERVICE LEVEL  
;SET INTERRUPT ENABLE  
;ALLOW INTERRUPTS  
;DELAY FOR INTERRUPTS  
;NO INTERRUPT, CONTINUE  
;RESTORE STACK  
;INTERRUPT OCCURED, ERROR  
;CHECK FOR ITERATIONS, LOOP

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

;REFERENCE DESIGNATION  
;LOCK OUT INTERRUPTS  
;CLEAR CONTROL REGISTER  
;SET UP INTERRUPT SERVICE ADDRESS  
;SET "INTERRUPT ENABLE"  
;SET "INTERRUPT LEVEL"  
;ALLOW INTERRUPTS  
;SET "DONE"  
;DELAY FOR INTERRUPT

;INTERRUPT OCCURED, ERROR  
;CONTINUE  
;INTERRUPT OCCURED, RESTOR STACK  
;CHECK FOR ITERATION, LOOP

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

;REFERENCE DESIGNATION  
;CLEAR CONTROL REGISTER  
;SET PROCESSOR PRIORITY  
;TO LEVEL 7.  
;SET UP INTERRUPT SERVICE ADDRESS  
;SET UP INTERRUPT SERVICE LEVEL  
;SET INTERRUPT ENABLE  
;GENERATE INTERRUPT  
;DELAY FOR INTERRUPT

;NO INTERRUPT, CONTINUE  
;RESTORE STACK  
;INTERRUPT OCCURED, ERROR  
;CHECK FOR ITERATION, LOOP

# E03

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511 003020
512 003020 005077 013560
513 003024 042737 000340 177776
514 003032 052737 000300 177776
515 003040 012777 003102 013532
516 003046 013777 177776 013526
517 003054 012777 000100 013522
518 003062 052777 000200 013514
519 003070 000240
520 003072 000240
521 003074 005077 013504
522 003100 000402
523 003102 022626
524 003104 104012
525 003106 104002

                    T12:
                    INT5: CLR      2DHMCSR
                        BIC      #340,PS
                        BIS      #300,PS
                        MOV      #INT5A,2DHMVEC
                        MOV      PS,2DHMLVL
                        MOV      #INTENA,2DHMCSR
                        BIS      #DONE,2DHMCSR
                        NOP
                        NOP
                        CLR      2DHMCSR
                        BR       INT5B
                    INT5A: POP2SP
                        ERROR
                    INT5B: SCOPE

                    :VERIFY THAT NO INTERRUPT OCCURS WITH
                    :;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 6.
                    :REFERENCE DESIGNATION
                    :CLEAR CONTROL REGISTER
                    :SET PROCESSOR PRIORITY
                    :TO LEVEL 6.
                    :SET UP INTERRUPT SERVICE ADDRESS
                    :SET UP INTERRUPT SERVICE LEVEL
                    :SET INTERRUPT ENABLE
                    :GENERATE INTERRUPT
                    :DELAY FOR INTERRUPT
                    :NO INTERRUPT, CONTINUE
                    :RESTORE STACK
                    :INTERRUPT OCCURED, ERROR
                    :CHECK FOR ITERATION, LOOP

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

530 003110
531 003110 005077 013470
532 003114 042737 000340 177776
533 003122 052737 000240 177776
534 003130 012777 003172 013442
535 003136 013777 177776 013436
536 003144 012777 000100 013432
537 003152 052777 000200 013424
538 003160 000240
539 003162 000240
540 003164 005077 013414
541 003170 000402
542 003172 022626
543 003174 104012
544 003176 104002

                    T13:
                    INT6: CLR      2DHMCSR
                        BIC      #340,PS
                        BIS      #240,PS
                        MOV      #INT6A,2DHMVEC
                        MOV      PS,2DHMLVL
                        MOV      #INTENA,2DHMCSR
                        BIS      #DONE,2DHMCSR
                        NOP
                        NOP
                        CLR      2DHMCSR
                        BR       INT6B
                    INT6A: POP2SP
                        ERROR
                    INT6B: SCOPE

                    :VERIFY THAT NO INTERRUPT OCCURS WITH
                    :;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 5.
                    :REFERENCE DESIGNATION
                    :CLEAR CONTROL REGISTER
                    :SET PROCESSOR PRIORITY
                    :TO LEVEL 5.
                    :SET UP INTERRUPT SERVICE ADDRESS
                    :SET UP INTERRUPT SERVICE LEVEL
                    :SET INTERRUPT ENABLE
                    :GENERATE INTERRUPT
                    :DELAY FOR INTERRUPT
                    :NO INTERRUPT, CONTINUE
                    :RESTORE STACK
                    :INTERRUPT OCCURED, ERROR
                    :CHECK FOR ITERATION, LOOP

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

549 003200
550 003200 005077 013400
551 003204 042737 000340 177776
552 003212 052737 000200 177776
553 003220 012777 003262 013352
554 003226 013777 177776 013346
555 003234 012777 000100 013342
556 003242 052777 000200 013334
557 003250 000240
558 003252 000240
559 003254 005077 013324
560 003260 000402
561 003262 022626
562 003264 104012

                    T14:
                    INT7: CLR      2DHMCSR
                        BIC      #340,PS
                        BIS      #200,PS
                        MOV      #INT7A,2DHMVEC
                        MOV      PS,2DHMLVL
                        MOV      #INTENA,2DHMCSR
                        BIS      #DONE,2DHMCSR
                        NOP
                        NOP
                        CLR      2DHMCSR
                        BR       INT7B
                    INT7A: POP2SP
                        ERROR

                    :VERIFY THAT NO INTERRUPT OCCURS WITH
                    :;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 4.
                    :REFERENCE DESIGNATION
                    :CLEAR CONTROL REGISTER
                    :SET PROCESSOR PRIORITY
                    :TO LEVEL 4.
                    :SET UP INTERRUPT SERVICE ADDRESS
                    :SET UP INTERRUPT SERVICE LEVEL
                    :SET INTERRUPT ENABLE
                    :GENERATE INTERRUPT
                    :DELAY FOR INTERRUPT
                    :NO INTERRUPT, CONTINUE
                    :RESTORE STACK
                    :INTERRUPT OCCURED, ERROR

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F03

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DZDHC.P11

SEQ 0031

563 003266 104002

INT7B: SCOPE

;CHECK FOR ITERATION, LOOP

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564
565
566                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
567                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 0.
568
569 003270                                T15:                                ;REFERENCE DESIGNATION
570 003270 005077 013310                INT10: CLR      @DHMCSR                ;CLEAR CONTROL REGISTER
571 003274 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
572 003302 012777 003352 013270        MOV      @INT10A,@DHMVEC        ;SET UP INTERRUPT SERVICE ADDRESS
573 003310 005077 013266                CLR      @DHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY
574 003314 052737 000000 177776        BIS      #0,PS                  ;SET PROCESSOR PRIORITY TO LEVEL 0.
575 003322 012777 000100 013254        MOV      @INTENA,@DHMCSR        ;SET INTERRUPT ENABLE
576 003330 052777 000200 013246        BIS      @DONE,@DHMCSR         ;GENERATE INTERRUPT
577 003336 000240                        NOP                                ;WAIT FOR INTERRUPT
578 003340 000240                        NOP
579 003342 005077 013236                CLR      @DHMCSR
580 003346 104012                        ERROR                                ;NO INTERRUPT, ERROR
581 003350 000401                        BR      INT10B                    ;CONTINUE
582 003352 022626                INT10A: POP2SP                    ;INTERRUPT OCCURED, RESTORE STACK
583 003354 104002                INT10B: SCOPE                      ;CHECK FOR INTERATIONS, LOOP.
584
585                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
586                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 1.
587
588 003356                                T16:                                ;REFERENCE DESIGNATION
589 003356 005077 013222                INT11: CLR      @DHMCSR                ;CLEAR CONTROL REGISTER
590 003362 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
591 003370 012777 003440 013202        MOV      @INT11A,@DHMVEC        ;SET UP INTERRUPT SERVICE ADDRESS
592 003376 005077 013200                CLR      @DHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY
593 003402 052737 000040 177776        BIS      #40,PS                  ;SET PROCESSOR PRIORITY TO LEVEL 1.
594 003410 012777 000100 013166        MOV      @INTENA,@DHMCSR        ;SET INTERRUPT ENABLE
595 003416 052777 000200 013160        BIS      @DONE,@DHMCSR         ;GENERATE INTERRUPT
596 003424 000240                        NOP                                ;WAIT FOR INTERRUPT
597 003426 000240                        NOP
598 003430 005077 013150                CLR      @DHMCSR
599 003434 104012                        ERROR                                ;NO INTERRUPT, ERROR
600 003436 000401                        BR      INT11B                    ;CONTINUE
601 003440 022626                INT11A: POP2SP                    ;INTERRUPT OCCURED, RESTORE STACK
602 003442 104002                INT11B: SCOPE                      ;CHECK FOR INTERATIONS, LOOP.
603
604                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
605                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 2.
606
607 003444                                T17:                                ;REFERENCE DESIGNATION
608 003444 005077 013134                INT12: CLR      @DHMCSR                ;CLEAR CONTROL REGISTER
609 003450 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
610 003456 012777 003526 013114        MOV      @INT12A,@DHMVEC        ;SET UP INTERRUPT SERVICE ADDRESS
611 003464 005077 013112                CLR      @DHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY
612 003470 052737 000100 177776        BIS      #100,PS                ;SET PROCESSOR PRIORITY TO LEVEL 2.
613 003476 012777 000100 013100        MOV      @INTENA,@DHMCSR        ;SET INTERRUPT ENABLE
614 003504 052777 000200 013072        BIS      @DONE,@DHMCSR         ;GENERATE INTERRUPT
615 003512 000240                        NOP                                ;WAIT FOR INTERRUPT
616 003514 000240                        NOP
617 003516 005077 013062                CLR      @DHMCSR
618 003522 104012                        ERROR                                ;NO INTERRUPT, ERROR
619 003524 000401                        BR      INT12B                    ;CONTINUE

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H03

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DZDNKC.P11

SEQ 0033

620 003526 022626  
621 003530 104002

INT12A: POP2SP  
INT12B: SCOPE

: INTERRUPT OCCURED, RESTORE STACK  
: CHECK FOR INTERATIONS, LOOP.

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626 003532
627 003532 005077 013046
628 003536 042737 000340 177776
629 003544 012777 003614 013026
630 003552 005077 013024
631 003556 052737 000140 177776
632 003564 012777 000100 013012
633 003572 052777 000200 013004
634 003600 000240
635 003602 000240
636 003604 005077 012774
637 003610 104012
638 003612 000401
639 003614 022626
640 003616 104002

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

T20:
INT13: CLR @DHMCSR ;REFERENCE DESIGNATION
        BIC #340,PS ;CLEAR CONTROL REGISTER
        MOV #INT13A,@DHMVEC ;ALLOW INTERRUPTS
        CLR @DHMLVL ;SET UP INTERRUPT SERVICE ADDRESS
        BIS #140,PS ;SET UP INTERRUPT SERVICE PRIORITY
        MOV #INTENA,@DHMCSR ;SET PROCESSOR PRIORITY TO LEVEL 3.
        BIS #DONE,@DHMCSR ;SET INTERRUPT ENABLE
        NOP ;GENERATE INTERRUPT
        NOP ;WAIT FOR INTERRUPT
        CLR @DHMCSR
        ERROR ;NO INTERRUPT, ERROR
        BR INT13B ;CONTINUE
INT13A: POP2SP ;INTERRUPT OCCURED, RESTORE STACK
INT13B: SCOPE ;CHECK FOR INTERATIONS, LOOP.
    
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641
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645 003620
646 003620 005077 012760
647 003624 042737 000340 177776
648 003632 012737 000001 016714
649 003640 005005
650 003642 012700 000020
651 003646 033737 016714 016712
652 003654 001407
653 003656 010577 012722
654 003662 017704 012716
655 003666 020504
656 003670 001401
657 003672 104000
658 003674 104003
659 003676 003646
660 003700 005205
661 003702 006337 016714
662 003706 005300
663 003710 001356
664 003712 104002
665
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669 003714
670 003714 042737 000340 177776
671 003722 005077 012656
672 003726 005005
673 003730 012737 000001 016714
674 003736 012701 177777
675 003742 012700 000020
676 003746 012777 000017 012630
677 003754 033737 016714 016712
678 003762 001410
679 003764 052777 000400 012612
680 003772 017704 012606
681 003776 020504
682 004000 001401
683 004002 104000
684 004004 104003
685 004006 003714
686 004010 005205
687 004012 006337 016714
688 004016 005201
689 004020 010177 012560
690 004024 005300
691 004026 001352
692 004030 104002

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

T21:
LINT1: CLR 3DHCSR
      BIC #340,PS
      MOV #1,SELMSK
      CLR R5
      MOV #16,R0
LINT1A: BIT SELMSK,LINSEL
      BEQ LINT1B
      MOV R5,3DHCSR
      MOV 3DHCSR,R4
      CMP R5,R4
      BEQ LINT1B
LINT1B: ERRORC
      SCOPEF
LINT1A INC R5
      ASL SELMSK
      DEC R0
      BNE LINT1A
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL STATUS REGISTER
;ENABLE INTERRUPTS
;INIT LINE SELECT MASK
;CLEAR EXPECTED LINE NUMBER
;SET UP TO TEST 16 LINE NUMBERS
;THIS LINE SELECTED ??
;BR IF NOT
;SET LINE NUMBER
;READ BACK LINE NUMBER
;ARE EXPECTED AND RECEIVED
;LINE NUMBERS THE SAME
;LINE NUMBERS DIFFERENT, ERROR
;CHECK FOR DATA FREEZE
;RETURN FOR DATA FREEZE
;UPDATE LINE COUNT
;SELECT NEXT LINE TO TEST
;UPDATE LINE NUMBER
;CONTINUE
;CHECK FOR ITERATION, LOOP

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

T22:
LINT2: BIC #340,PS
      CLR 3DHCSR
      CLR R5
      MOV #1,SELMSK
      MOV #-1,R1
      MOV #16,R0
      MOV #17,3DHCSR
LINT2A: BIT SELMSK,LINSEL
      BEQ LINT2B
      BIS #STEP,3DHCSR
      MOV 3DHCSR,R4
      CMP R5,R4
      BEQ LINT2B
LINT2B: ERRORC
      SCOPEF
LINT2 INC R5
      ASL SELMSK
      INC R1
      MOV R1,3DHCSR
      DEC R0
      BNE LINT2A
      SCOPE

;REFERENCE DESIGNATION
;ENABLE INTERRUPTS
;CLEAR CONTROL STATUS REGISTER
;CLEAR EXPECTED LINE COUNT
;SET UP SELECT MASK
;INIT LINE COUNTER
;SET UP TO TEST 16 VALUES
;FIRST VALUE =0
;THIS LINE SELECTED ??
;BR IF NOT
;STEP LINE COUNTER
;READ LINE COUNTER
;COMPARE EXPECTED AND
;RECEIVED LINE NUMBERS
;LINE COUNTER ERROR
;CHECK FOR DATA FREEZE
;UPDATE EXPECTED LINE NUMBER
;SHIFT SELECT MASK
;GEN NEW LINE NO.
;SET NEW LINE NO. IN CSR

;CHECK FOR ITERATIONS, LOOP

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700 004032          T23:
701 004032 012777 002000 012544 MENT1: MOV #CLRMUX, @DHMCSR ;REFERENCE DESIGNATION
702 004040 042737 000340 177776 BIC #340, PS ;CLEAR CONTROL STATUS REGISTER
703 004046 012700 000020 MOV #16., R0 ;ENABLE INTERRUPTS
704 004052 052777 001017 012524 BIS #MAINT+17, @DHMCSR ;SET UP TO TEST 16 LOCATIONS
705 004060 052777 000400 012516 MENT1A: BIS #STEP, @DHMCSR ;SET MAINTENANCE MODE
706 004066 005300 DEC R0 ;SET LINE COUNTER THRU ALL
707 004070 001373 BNE MENT1A ;STATES, WRITING 1'S INTO
708 004072 012700 000020 MOV #16., R0 ;ALL MEMORY WORDS
709 004076 012705 070000 MOV #70000, R5 ;SET UP TO TEST 16 WORDS
710 004102 012777 000017 012474 MOV #17, @DHMCSR ;SET UP EXPECTED STATUS REGISTER
711 004110 052777 000400 012466 MENT1B: BIS #STEP, @DHMCSR ;START WITH LINE 0
712 004116 017704 012462 MOV @DHMCSR, R4 ;ACCESS SCANNER MEMORY
713 004122 020504 CMP R5, R4 ;READ DATA
714 004124 001403 BEQ MENT1C ;COMPARE EXPECTED AND RECEIVED
715 004126 104000 ERRORC ;DATA
716 004130 104003 SCOPEFF ;CONTROL STATUS OR MEMORY ERROR
717 004132 004032 MENT1 ;CHECK FOR DATA FREEZE
718 004134 005205 MENT1C: INC R5 ;UPDATE EEXPECTED STATUS
719 004136 005300 DEC R0 ;UPDATE LINE COUNT
720 004140 001363 BNE MENT1B ;CONTINUE
721 004142 012777 004000 012434 MENT1D: MOV #CLRSCN, @DHMCSR ;SET "CLEAR SCAN"
722 004150 032777 000020 012426 BIT #BUSY, @DHMCSR ;WAIT FOR "CLEAR CYCLES"
723 004156 001374 BNE .-6
724 004160 012700 000020 MOV #16., R0 ;SET UP TO TEST 16 MEMORY
725 004164 005005 CLR R5 ;LOCATIONS
726 004166 012777 000017 012410 MOV #17, @DHMCSR ;FIRST TO BE TESTED=0
727 004174 052777 000400 012402 MENT1E: BIS #STEP, @DHMCSR ;ACCESS SEANNER MEMORY
728 004202 017704 012376 MOV @DHMCSR, R4 ;READ DATA
729 004206 020504 CMP R5, R4 ;COMPARE EXPECTED AND RECEIVED
730 004210 001403 BEQ MENT1F ;DATA
731 004212 104000 ERRORC ;CONTROL STATUS OF MEMORY ERROR
732 004214 104003 SCOPEFF ;CHECK FOR DATA FREEZE
733 004216 004142 MENT1D
734 004220 005205 MENT1F: INC R5 ;UPDATE EXPECTED DATA
735 004222 005300 DEC R0 ;UPDATE LINE COUNT
736 004224 001363 BNE MENT1E ;CONTINUE
737 004226 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP

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742 004230
743 004230 005077 012350
744 004234 042737 000340 177776
745 004242 012700 000020
746 004246 012702 000017
747 004252 012777 004000 012324
748 004260 032777 000020 012316
749 004266 001374
750 004270 012777 001000 012306
751 004276 050277 012302
752 004302 052777 000400 012274
753 004310 042777 001000 012266
754 004316 012703 000020
755 004322 012777 000017 012254
756 004330 005202
757 004332 005001
758 004334 052777 000400 012242
759 004342 117704 012236
760 004346 010105
761 004350 120402
762 004352 001002
763 004354 052705 070000
764 004360 020405
765 004362 001403
766 004364 104000
767 004366 104003
768 004370 004252
769 004372 005201
770 004374 005303
771 004376 001356
772 004400 005300
773 004402 001323
774 004404 104002

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

T24:
MENT2: CLR @DHMCSR
      BIC #340,PS
      MOV #16,R0
      MOV #17,R2
MENT2A: MOV #CLASCN,@DHMCSR
      BIT #BUSY,@DHMCSR
      BNE -.6
      MOV #MAINT,@DHMCSR
      BIS R2,@DHMCSR
      BIS #STEP,@DHMCSR
      BIC #MAINT,@DHMCSR
      MOV #16,R3
      MOV #17,@DHMCSR
      INC R2
      CLR R1
MENT2B: BIS #STEP,@DHMCSR
      MOV @DHMCSR,R4
      MOV R1,R5
      CMPB R4,R2
      BNE MENT2C
      BIS #70000,R5
MENT2C: CMP R4,R5
      BEQ MENT2D
      ERRORC
      SCOPEF
MENT2A: MENT2A
MENT2D: INC R1
      DEC R3
      BNE MENT2B
      DEC R0
      BNE MENT2A
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL STATUS REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 ADDRESSES
;FIRST ADDRESS TO BE TESTED=0
;CLEAR SCANNER MEMORY
;WAIT FOR CLEAR CYCLE

;SET "MAINTENANCE MODE"
;SET LINE COUNTER TO TEST ADDRESS-1
;WRITE 1'S INTO TEST ADDRESS
;CLEAR "MAINTENANCE MODE"
;SET UP TO TEST ALL 16
;SCANNER MEMORY LOCATIONS

;ACCESS SCANNER MEMORY
;READ CONTENTS OF MEMORY
;SET UP EXPECTED CONTENTS
;OF SCANNER MEMORY

;COMPARE EXPECTED AND RECEIVED
;VALUES
;SCANNER MEMORY ERROR
;CHECK FOR DATA FREEZE

;TEST NEXT SCANNED LOCATION
;UPDATE LINE COUNT
;CHECK FOR ITERATION, LOOP

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775
776
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780 004406
781 004406 005077 012172
782 004412 042737 000340 177776
783 004420 012700 000020
784 004424 012702 000017
785 004430 012703 000020
786 004434 012777 001017 012142
787 004442 052777 000400 012134
788 004450 005303
789 004452 001373
790 004454 010277 012124
791 004460 052777 000400 012116
792 004466 012703 000020
793 004472 012777 000017 012104
794 004500 005202
795 004502 005001
796 004504 052777 000400 012072
797 004512 117704 012066
798 004516 010105
799 004520 120402
800 004522 001002
801 004524 052705 070000
802 004530 020405
803 004532 001403
804 004534 104000
805 004536 104003
806 004540 004430
807 004542 005201
808 004544 005303
809 004546 001356
810 004550 005300
811 004552 001326
812 004554 104002

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

T25:
MENT3: CLR @DHMCSR
      BIC #340,PS
      MOV #16,R0
      MOV #17,R2
MENT3A: MOV #16,R3
      MOV #MAINT+17,@DHMCSR
MENT3B: BIS #STEP,@DHMCSR
      DEC R3
      BNE MENT3B
      MOV R2,@DHMCSR
      BIS #STEP,@DHMCSR
      MOV #16,R3
      MOV #17,@DHMCSR
      INC R2
      CLR R1
MENT3C: BIS #STEP,@DHMCSR
      MOV @DHMCSR,R4
      MOV R1,R5
      CMPB R4,R2
      BNE MENT3D
      BIS #70000,R5
MENT3D: CMP R4,R5
      BEQ MENT3E
      ERRORC
      SCOPEF
MENT3E: INC R1
      DEC R3
      BNE MENT3C
      DEC R0
      BNE MENT3A
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL STATUS REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 ADDRESSES
;FIRST ADDRESS TO BE TESTED=0
;WRITE 1'S INTO ALL SCANNER
;MEMORY LOCATIONS

;SET LINE COUNTER TO TEST ADDRESS-1
;WRITE 0'S INTO TEST ADDRESS
;SET UP TO TEST ALL 16
;SCANNER MEMORY LOCATIONS

;ACCESS SCANNER MEMORY
;READ CONTENTS OF MEMORY
;SET UP EXPECTED CONTENTS
;OF SCANNER MEMORY

;COMPARE EXPECTED AND
;RECEIVED VALUES
;SCANNER MEMORY ERROR
;CHECK FOR DATA FREEZE

;TEST NEXT SCANNER LOCATION
;UPDATE ADDRESS COUNT
;CHECK FOR ITERATION, LOOP

```





```

919                                     ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
920                                     ;BE SET AND CLEARED FOR SELECTED LINE
921
922 005252                                T30:                                ;REFERENCE DESIGNATION
923 005252 005077 011326                 MUX3: CLR 2DHMCSR                    ;CLEAR CONTROL STATUS REGISTER
924 005256 042737 000340 177776         BIC 8340,PS                          ;ENABLE INTERRUPTS
925 005264 012700 000020                 MOV 816,R0                             ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
926 005270 012737 000001 016714         MOV 81,SELMSK                          ;INIT LINE SELECT MASK
927 005276 005001                         CLR R1                                  ;START AT LINE 0
928 005300 012777 002000 011276         MUX3A: MOV 8CLRMUX,2DHMCSR
929 005306 012702 000020                 MOV 816,R2
930 005312 033737 016714 016712         BIT SELMSK,LINSEL                       ;IS THIS LINE SELECTED FOR TEST ?
931 005320 001463                         BEQ MUX3F                               ;BR IF NOT
932 005322 010177 011256                 MOV R1,2DHMCSR                          ;SELECT LINE TO BE TESTED
933 005326 012777 000004 011252         MOV 8RS,2DHMLSR                          ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
934 005334 012737 000001 016716         MOV 81,SLMSK                             ;INIT ANOTHER SELECT MASK
935 005342 005077 011236                 CLR 2DHMCSR
936 005346 005005                         CLR R5
937 005350 033737 016716 016712         MUX3B: BIT SLMSK,LINSEL
938 005356 001417                         BEQ MUX3D                               ;SELECTED ??
939 005360 017704 011222                 MOV 2DHMLSR,R4                          ;BR IF NOT
940 005364 117703 011214                 MOV8 2DHMCSR,R3                          ;READ LINE STATUS REGISTER
941 005370 042703 177760                 BIC 8177760,R3                          ;READ CONTROL STATUS REGISTER
942 005374 020103                         CMP R1,R3                                ;CLEAR UNWANTED BITS
943 005376 001002                         BNE MUX3C                               ;IF LINE NUMBER=SELECTED LINE NUMBER,
944 005400 012705 000004                 MOV 8RS,R5                               ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
945
946                                     ;TO BE SET
947 005404 020504                         MUX3C: CMP R5,R4                       ;COMPARE EXPECTED AND RECEIVED
948 005406 001403                         BEQ MUX3D                               ;RESULTS
949 005410 104001                         ERRORL                                  ;LINE STATUS ERROR
950 005412 104003                         SCOPEF
951 005414 005416                         MUX3D
952 005416 052777 000400 011160         MUX3D: BIS 8STEP,2DHMCSR
953 005424 006337 016716                 ASL SLMSK
954 005430 005302                         DEC R2
955 005432 001345                         BNE MUX3B
956 005434 005005                         CLR R5
957 005436 010177 011142                 MUX3E: MOV R1,2DHMCSR
958 005442 010103                         MOV R1,R3
959 005444 005077 011136                 CLR 2DHMLSR
960 005450 105227 000000                 INCB 80
961 005456 017704 011124                 BNE -4
962 005462 005704                         MOV 2DHMLSR,R4
963 005464 001401                         TST R4
964 005466 104001                         BEQ MUX3F
965 005470 104003                         ERRORL
966 005472 005300                         MUX3F: SCOPEF
967 005474 006337 016714                 MUX3A: ASL SELMSK
968 005500 005201                         INC R1
969 005502 005300                         DEC R0
970 005504 001275                         BNE MUX3A
971 005506 104002                         SCOPE

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1025
1026
1027
1028
1029 005746
1030 005746 005077 010632
1031 005752 042737 000340 177776
1032 005760 012700 000020
1033 005764 005001
1034 005766 012737 000001 016714
1035 005774 012702 000020
1036 006000 033737 016714 016712
1037 006006 001454
1038 006010 010177 010570
1039 006014 012777 000003 010564
1040 006022 005077 010556
1041 006026 005005
1042 006030 017704 010552
1043 006034 117703 010544
1044 006040 042703 177760
1045 006044 020103
1046 006046 001002
1047 006050 012705 000143
1048
1049 006054 020405
1050 006056 001403
1051 006060 104001
1052 006062 104003
1053 006064 006066
1054 006066 052777 000400 010510
1055 006074 005302
1056 006076 001353
1057 006100 012705 000001
1058 006104 010103
1059 006106 010177 010472
1060 006112 042777 000002 010466
1061 006120 105227 000000
1062 006124 001375
1063 006126 017704 010454
1064 006132 020504
1065 006134 001401
1066 006136 104001
1067 006140 104003
1068 006142 005774
1069 006144 005201
1070 006146 005077 010434
1071 006152 006337 016714
1072 006156 005300
1073 006160 001305
1074 006162 104002

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

T32:
MUXS: CLR 2DHMCSR
      BIC #340,PS
      MOV #16.,R0
      CLR R1
      MOV #1,SELMSK
MUXSA: MOV #16.,R2
      BIT SELMSK,LINSEL
      BEQ MUXSF
      MOV R1,2DHMCSR
      MOV #LINENA+TRMRDY,2DHMLSR
      CLR 2DHMCSR
MUXSB: CLR R5
      MOV 2DHMLSR,R4
      MOVB 2DHMCSR,R3
      BIC #177760,R3
      CMP R1,R3
      BNE MUXSC
      MOV #LINENA+TRMRDY+CO+CS,R5
MUXSC: CMP R4,R5
      BEQ MUXSD
      ERRORL SCOPEF
      MUXSD
MUXSD: BIS #STEP,2DHMCSR
      DEC R2
      BNE MUXSB
      MOV #LINENA,R5
MUXSE: MOV R1,R3
      MOV R1,2DHMCSR
      BIC #TRMRDY,2DHMLSR
      INCB #0
      BNE #-4
      MOV 2DHMLSR,R4
      CMP R5,R4
      BEQ MUXSF
      ERRORL SCOPEF
MUXSF: MUXSA
      INC R1
      CLR 2DHMLSR
      ASL SELMSK
      DEC R0
      BNE MUXSA
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 LINES
;START AT LINE 0
;INIT LINE SELECT MASK
;16 LINES
;THIS LINE SELECTED FOR TEST ?
;BR IF NOT
;SELECT A LINE
;SET LINE ENABLE +TRMRDY
;CLEAR CONTROL REGISTER
;CLEAR EXPECTED RESULT
;READ LINE STATUS
;READ LINE NUMBER
;CLEAR UNWANTED BITS
;IF RECEIVED LINE=SELECTED LINE
;EXPECT LINE ENABLE AND
;CLEAR TO SEND AND CARRIER ARE SET
;COMPARE EXPECTED AND
;RECEIVED RESULTS
;LINE STATUS ERROR

;UPDATE LINE COUNTER
;CONTINUE IF ALL CHECKS
;ARE NOT DONE FOR THIS LINE
;EXPECT LINE ENABLE
;ON SELECTED LINE
;SELECT LINE
;CLEAR TERMINAL
;DELAY FOR CABLE
;DITTO
;READ LINE STATUS REGISTER
;ONLY LINE ENABLE SHOULD BE
;SET ON THIS LINE
;LINE STATUS ERROR
;CHECK FOR LOOP ON SAME DATA

;UPDATE LINE NUMBER
;CLEAR LINE STATUS REGISTER
;SHIFT MARK TO TEST NEXT LINE
;CONTINUE IF ALL LINES NOT
;TESTED
;CHECK FOR ITERATIONS, LOOP

```

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1075
1076
1077
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1079 006164
1080 006164 005077 010414
1081 006170 042737 000340 177776
1082 006176 012700 000020
1083 006202 005001
1084 006204 012737 000001 016714
1085 006212 012702 000020
1086 006216 033737 016714 016712
1087 006224 001454
1088 006226 010177 010352
1089 006232 012777 000005 010346
1090 006240 005077 010340
1091 006244 005005
1092 006246 017704 010334
1093 006252 117703 010326
1094 006256 042703 177760
1095 006262 020103
1096 006264 001002
1097 006266 012705 000205
1098
1099 006272 020405
1100 006274 001403
1101 006276 104001
1102 006300 104003
1103 006302 006304
1104 006304 052777 000400 010272
1105 006312 005302
1106 006314 001353
1107 006316 012705 000001
1108 006322 010103
1109 006324 010177 010254
1110 006330 042777 000004 010250
1111 006336 105227 000000
1112 006342 001375
1113 006344 017704 010236
1114 006350 020504
1115 006352 001401
1116 006354 104001
1117 006356 104003
1118 006360 006212
1119 006362 005201
1120 006364 005077 010216
1121 006370 006337 016714
1122 006374 005300
1123 006376 001305
1124 006400 104002

;VERIFY THAT RING IS SET IF "LINE ENABLE"
;AND REQUEST TO SEND ARE SET FOR SELECTED LINE.

T33:
MUX6: CLR 2DHCSR
      BIC #340,PS
      MOV #16.,R0
      CLR R1
      MOV #1,SELMSK
MUX6A: MOV #16.,R2
      BIT SELMSK,LINSEL
      BEQ MUX6F
      MOV R1,2DHCSR
      MOV #LINENA+RS,2DHMSR
MUX6B: CLR 2DHCSR
      CLR R5
      MOV 2DHMSR,R4
      MOVB 2DHCSR,R3
      BIC #177760,R3
      CMP R1,R3
      BNE MUX6C
      MOV #LINENA+RS+RING,R5
MUX6C: CMP R4,R5
      BEQ MUX6D
      ERRORL SCOPEF
      MUX6D
MUX6D: BIS #STEP,2DHCSR
      DEC R2
      BNE MUX6B
      MOV #LINENA,RS
MUX6E: MOV R1,R3
      MOV R1,2DHCSR
      BIC #RS,2DHMSR
      INCB #0
      BNE -4
      MOV 2DHMSR,R4
      CMP R5,R4
      BEQ MUX6F
      ERRORL SCOPEF
MUX6F: MUX6A
      INC R1
      CLR 2DHMSR
      ASL SELMSK
      DEC R0
      BNE MUX6A
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 LINES
;START AT LINE 0
;INIT LINE SELECT MASK
;16 LINES
;THIS LINE SELECTED FOR TEST ?
;BR IF NOT
;SELECT A LINE
;SET LINE ENABLE +RS
;CLEAR CONTROL REGISTER
;CLEAR EXPECTED RESULT
;READ LINE STATUS
;READ LINE NUMBER
;CLEAR UNWANTED BITS
;IF RECEIVED LINE=SELECTED LINE
;EXPECT LINE ENABLE AND
;RING IS SET
;COMPARE EXPECTED AND
;RECEIVED RESULTS
;LINE STATUS ERROR
;UPDATE LINE COUNTER
;CONTINUE IF ALL CHECKS
;ARE NOT DONE FOR THIS LINE
;EXPECT LINE ENABLE
;ON SELECTED LINE
;SELECT LINE
;CLEAR REQUEST TO SEND
;DELAY FOR CABLE
;DITTO
;READ LINE STATUS REGISTER
;ONLY LINE ENABLE SHOULD BE
;SET ON THIS LINE
;LINE STATUS ERROR
;CHECK FOR LOOP ON SAME DATA
;UPDATE LINE NUMBER
;CLEAR LINE STATUS REGISTER
;SHIFT MARK TO TEST NEXT LINE
;CONTINUE IF ALL LINES NOT
;TESTED
;CHECK FOR ITERATIONS, LOOP

```

```

1125
1126
1127
1128
1129 006402
1130 006402 005077 010176
1131 006406 042737 000340 177776
1132 006414 012700 000020
1133 006420 005001
1134 006422 012737 000001 016714
1135 006430 012702 000020
1136 006434 033737 016714 015712
1137 006442 001454
1138 006444 010177 010134
1139 006450 012777 000011 010130
1140 006456 005077 010122
1141 006462 005005
1142 006464 017704 010116
1143 006470 117703 010110
1144 006474 042703 177760
1145 006500 020103
1146 006502 001002
1147 006504 012705 000031
1148
1149 006510 020405
1150 006512 001403
1151 006514 104001
1152 006516 104003
1153 006520 006522
1154 006522 052777 000400 010054
1155 006530 005302
1156 006532 001353
1157 006534 012705 000001
1158 006540 010103
1159 006542 010177 010036
1160 006546 042777 000010 010032
1161 006554 105227 000000
1162 006560 001375
1163 006562 017704 010020
1164 006566 020504
1165 006570 001401
1166 006572 104001
1167 006574 104003
1168 006576 006430
1169 006600 005201
1170 006602 005077 010000
1171 006606 006337 016714
1172 006612 005300
1173 006614 001305
1174 006616 104002

```

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

```

T34:
MUX7: CLR 2DHMCSR
      BIC #340,PS
      MOV #16.,R0
      CLR R1
      MOV #1,SELMSK
MUX7A: MOV #16.,R2
      BIT SELMSK,LINSEL
      BEQ MUX7F
      MOV R1,2DHMCSR
      MOV #LINENA+SECTX,2DHMLSR
      CLR 2DHMCSR
MUX7B: CLR R5
      MOV 2DHMLSR,R4
      MOVB 2DHMCSR,R3
      BIC #177760,R3
      CMP R1,R3
      BNE MUX7C
      MOV #LINENA+SECTX+SECRX,R5
MUX7C: CMP R4,R5
      BEQ MUX7D
      ERROR1
      SCOPEF
MUX7D: BIS #STEP,2DHMCSR
      DEC R2
      BNE MUX7B
      MOV #LINENA,R5
MUX7E: MOV R1,R3
      MOV R1,2DHMCSR
      BIC #SECTX,2DHMLSR
      INCB #0
      BNE .-4
      MOV 2DHMLSR,R4
      CMP R5,R4
      BEQ MUX7F
      ERROR1
      SCOPEF
MUX7F: MUX7A
      INC R1
      CLR 2DHMLSR
      ASL SELMSK
      DEC R0
      BNE MUX7A
      SCOPE

```

;REFERENCE DESIGNATION  
;CLEAR CONTROL REGISTER  
;ENABLE INTERRUPTS  
;SET UP TO TEST 16 LINES  
;START AT LINE 0  
;INIT LINE SELECT MASK  
;16 LINES  
;THIS LINE SELECTED FOR TEST ?  
;BR IF NOT  
;SELECT A LINE  
;SET LINE ENABLE +SECTX  
;CLEAR CONTROL REGISTER  
;CLEAR EXPECTED RESULT  
;READ LINE STATUS  
;READ LINE NUMBER  
;CLEAR UNWANTED BITS  
;IF RECEIVED LINE=SELECTED LINE  
;EXPECT LINE ENABLE AND  
;SECONDARY RECEIVE IS SET  
;COMPARE EXPECTED AND  
;RECEIVED RESULTS  
;LINE STATUS ERROR  
;UPDATE LINE COUNTER  
;CONTINUE IF ALL CHECKS  
;ARE NOT DONE FOR THIS LINE  
;EXPECT LINE ENABLE  
;ON SELECTED LINE  
;SELECT LINE  
;CLEAR SECONDARY TRANSMIT  
;DELAY FOR CABLE  
;DITTO  
;READ LINE STATUS REGISTER  
;ONLY LINE ENABLE SHOULD BE  
;SET ON THIS LINE  
;LINE STATUS ERROR  
;CHECK FOR LOOP ON SAME DATA  
;UPDATE LINE NUMBER  
;CLEAR LINE STATUS REGISTER  
;SHIFT MARK TO TEST NEXT LINE  
;CONTINUE IF ALL LINES NOT  
;TESTED  
;CHECK FOR ITERATIONS, LOOP

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1175
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1177
1178
1179 006620          T35:
1180 006620 005077 007760          MUXB: CLR      2DHMCSR          ;REFERENCE DESIGNATION
1181 006624 042737 000340 177776          BIC      #340,PS          ;CLEAR CONTROL REGISTER
1182 006632 012700 000020          MOV      #16,R0          ;ENABLE INTERRUPTS
1183 006636 012777 000017 007742          MUXBA: MOV      #17,2DHMLSR ;SET UP TO TEST 16 LINES
1184 006644 052777 000400 007732          BIS      #STEP,2DHMCSR  ;WRITE 15 INTO ALL MULTIPLEXER
1185 006652 005300          DEC      R0              ;FUNCTION FLIPFLOPS
1186 006654 001370          BNE      MUXBA
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          MUXBB: MOV      #CLRMUX,2DHMCSR ;CLEAR MULTIPLEXER
1191 006700 033737 016714 016712          MUXBC: BIT      SELMSK,LINSEL ;SELECTED ??
1192 006706 001425          BEQ      MUXBE           ;BR IF NOT
1193 006710 010377 007670          MOV      R3,2DHMCSR     ;SELECT LINE
1194 006714 017704 007666          MOV      2DHMLSR,R4     ;READ LINE STATUS REGISTER
1195 006720 005005          CLR      R5              ;EXPECT 05
1196 006722 005704          TST      R4              ;WAS LINE STATUS REGISTER CLEARED
1197 006724 001403          BEQ      MUXBD
1198 006726 104001          ERRORL          ;LINE STATUS ERROR
1199 006730 104003          SCOPEF          ;CHECK FOR LOOP ON SAME DATA
1200 006732 006672          MUXBB
1201 006734 005205          MUXBD: INC      R5              ;EXPECT LINE ENABLE
1202 006736 052777 000001 007642          BIS      #LINENA,2DHMLSR ;SET LINE ENABLE ON SELECTED LINE
1203 006744 017704 007636          MOV      2DHMLSR,R4     ;READ LINE STATUS REGISTER
1204 006750 020504          CMP      R5,R4          ;IS ANYTHING BUT LINE ENABLE SET
1205 006752 001403          BEQ      MUXBE
1206 006754 104001          ERRORL          ;LINE STATUS ERROR
1207 006756 104003          SCOPEF          ;CHECK FOR LOOP ON SAME DATA
1208 006760 006672          MUXBB
1209 006762 005203          MUXBE: INC      R3              ;UPDATE LINE NUMBER
1210 006764 005077 007616          CLR      2DHMLSR        ;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      MUXBC          ;TESTED
1214 007000 104002          SCOPE          ;CHECK FOR ITERATIONS, LOOP

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1215
1216
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1220
1221 007002 012777 002000 007574 T36:
1222 007002 005077 007570 SCNT1: MOV #CLRMUX, @DHMCSR ;REFERENCE DESIGNATION
1223 007010 042737 000340 177776 CLR @DHMCSR ;CLEAR ALL MULTIPLEXER FLIPFLOPS
1224 007014 012700 000020 BIC #340, PS ;CLEAR CONTROL REGISTER
1225 007022 012777 001017 007550 MOV #16, RO ;ENABLE INTERRUPTS
1226 007026 012737 000001 016714 MOV #MAINT+17, @DHMCSR ;SET UP TO WRITE 1'S INTO
1227 007034 052777 000001 007534 SCNT1A: MOV #1, SELMSK ;ALL SCANNER MEMORY LOCATION
1228 007042 012777 000001 007530 BIS #STEP, @DHMCSR ;INIT SELECT MASK
1229 007050 012777 000001 007530 MOV #LINEA, @DHMLSR ;WRITE A LOCATION
1230 007056 005300 DEC RO ;LET "LINE ENABLE"
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, RO
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 RO ;CONTINUE IF NOT DONE
1265 007246 001324 BNE SCNT1B
1266 007250 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP

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1272 007252
1273 007252 012700 000020
1274 007256 012777 002000 007320
1275 007264 005077 007314
1276 007270 042737 000340 177776
1277 007276 012737 000001 016714
1278 007304 012777 000017 007274
1279 007312 052777 000400 007264
1280 007320 005300
1281 007322 001370
1282 007324 012777 004000 007252
1283 007332 032777 000020 007244
1284 007340 001374
1285 007342 012700 000020
1286 007346 012701 177777
1287 007352 012705 170340
1288 007356 012777 007462 007214
1289 007364 013777 177776 007210
1290 007372 012777 000117 007204
1291 007400 033737 016714 016712
1292 007406 001435
1293 007410 052737 000340 177776
1294 007416 052777 000040 007160
1295 007424 042737 000340 177776
1296 007432 105777 007146
1297 007436 100375
1298
1299 007440 052737 000340 177776
1300 007446 017704 007132
1301 007452 104000
1302 007454 104003
1303 007456 007252
1304 007460 000410
1305 007462 022626
1306 007464 017704 007114
1307 007470 020504
1308 007472 001403
1309 007474 104000
1310 007476 104003
1311 007500 007252
1312 007502 042777 000257 007074
1313 007510 006337 016714
1314 007514 005201
1315 007516 150177 007062
1316 007522 005205
1317 007524 005300
1318 007526 001324
1319 007530 104002

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

T37:
SCNT2: MOV #16, R0 ;REFERENCE DESIGNATION
MOV #CLRMUX, @DHMCSR ;WRITE 1S INTO ALL
CLR @DHMCSR ;CLEAR MULTIPLEXER
BIC #340, PS ;MULTIPLEXER FUNCTION
MOV #1, SELMSK ;ENABLE TELETYPE INTERRUPTS
SCNT2A: MOV #17, @DHMLSR ;INIT LINE SELECT MASK
BIS #STEP, @DHMCSR ;FLIPFLOPS
DEC R0
BNE SCNT2A
MOV #CLRSCN, @DHMCSR ;CLEAR SCANNER MEMORY
BIT #BUSY, @DHMCSR ;WAIT FOR CLEAR CYCLE TO COMPLETE
BNE .-6
MOV #16, R0 ;SET UP TO TEST 16 LINES
MOV #-1, R1 ;INIT LINE NO. GENERATOR
MOV #170340, R5 ;FIRST EXPECTED RESULT
MOV #SCNT2C, @DHMVEC ;SET UP LOCAL INTERRUPT RETURN
PS, @DHMLVL
SCNT2B: MOV #INTENA+17, @DHMCSR ;SET INTERRUPT ENABLE
BIT SELMSK, LINSEL ;IS THIS LINE SELECTED ??
BEQ SCNT2D ;BR IF NOT
BIS #340, PS ;LOCK OUT INTERRUPTS
BIS #SCNENA, @DHMCSR ;START SCANNER
BIC #340, PS ;ENABLE INTERRUPTS
TSTB @DHMCSR ;WAIT FOR DONE
BPL .-4 ;PROGRAM WILL HANG HERE
;IF DONE NEVER SETS
BIS #340, PS ;LOCK OUT INTERRUPTS
MOV @DHMCSR, R4 ;READ CONTROL STATUS
ERRORC ;INTERRUPT DID NOT OCCUR
SCOPEF ;CHECK FOR LOOP ON CURRENT DATA
SCNT2
BR SCNT2D ;CONTINUE
SCNT2C: POP2SP ;INTERRUPT OCCURED, RESTORE STACK
MOV @DHMCSR, R4 ;READ CONTROL STATUS REGISTER
CMP R5, R4 ;COMPARE TO EXPECTED RESULT
BEQ SCNT2D
ERRORC ;CONTROL STATUS ERROR
SCOPEF ;CHECK FOR LOOP ON CURRENT DATA
SCNT2
SCNT2D: BIC #SCNENA+DONE+17, @DHMCSR ;CLEAR SCAN ENABLE AND DONE AND LINE NO.
ASL SELMSK ;SHIFT SELECT BIT
INC R1 ;GEN NEW LINE NO.
BISB R1, @DHMCSR ;SET IT IN CSR
INC R5 ;UPDATE EXPECTED RESULT
DEC R0 ;CONTINUE IF ALL
BNE SCNT2B ;LINES NOT TESTED
SCOPE ;CHECK FOR ITERATIONS, LOOP

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007532  
007532 012737 007552 002204  
007540 042737 000340 177776  
007546 104004  
007550 017723  
007552 104013  
007554 017756  
007556 000000  
007560 000017  
007562 016672  
007564 104004  
007566 017720

T100:  
STRLIN: MOV #STRLNA,KRET  
BIC #340,PS  
TYPE  
MLINE  
STRLNA: INSTRG  
MLINEI  
0  
17  
LINE  
TYPE  
MCRLF

:SINGLE LINE CABLE TEST  
:FOR USE WITH MODEM CABLE AND DC11 TEST CONNECTOR  
:NOTE: MODEM CONTROL MULTIPLEXER INPUTS SHOULD BE CONNECTED  
:TO DISTRIBUTION PANEL VIA DM11-DC

:REFERENCE DESIGNATION  
:SET UP FOR NEW LINE SELECTION  
:ENABLE INTERRUPTS  
:TYPE "SINGLE LINE CABLE TEST"  
:GET LINE NUMBER

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1341
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1345 007570
1346 007570 005077 007010
1347 007574 042737 000340 177776
1348 007602 013701 016672
1349 007606 012777 002000 006770
1350 007614 012702 000020
1351 007620 010177 006760
1352 007624 012777 000001 006754
1353 007632 005077 006746
1354 007636 005005
1355 007640 017704 006742
1356 007644 117703 006734
1357 007650 042703 177760
1358 007654 020103
1359 007656 001002
1360 007660 012705 000001
1361
1362 007664 020504
1363 007666 001403
1364 007670 104001
1365 007672 104003
1366 007674 007676
1367 007676 052777 000400 006700
1368 007704 005302
1369 007706 001353
1370 007710 005005
1371 007712 010177 006666
1372 007716 010103
1373 007720 005077 006662
1374 007724 105227 000000
1375 007730 001375
1376 007732 017704 006650
1377 007736 005704
1378 007740 001401
1379 007742 104001
1380 007744 104002

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

T101:
MUX11: CLR 3DHMCSR ;REFERENCE DESIGNATION
        BIC #340,PS ;CLEAR CONTROL STATUS REGISTER
        MOV LINE,R1 ;ENABLE INTERRUPTS
MUX11A: MOV #CLRMUX,3DHMCSR
        MOV #16,R2
        MOV R1,3DHMCSR ;SELECT LINE TO BE TESTED
        MOV #LINENA,3DHMLSR ;SET LINE ENABLE FUNCTION FLIP-FLOP
MUX11B: CLR 3DHMCSR
        R5
        MOV 3DHMLSR,R4 ;READ LINE STATUS REGISTER
        MOVB 3DHMCSR,R3 ;READ CONTROL STATUS REGISTER
        BIC #177760,R3 ;CLEAR UNWANTED BITS
        CMP R1,R3 ;IF LINE NUMBER=SELECTED LINE NUMBER,
        BNE MUX11C ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
        MOV #LINENA,R5
MUX11C: CMP R5,R4 ;TO BE SET
        BEQ MUX11D ;COMPARE EXPECTED AND RECEIVED
        ERRORL ;RESULTS
        SCOPEF ;LINE STATUS ERROR
        MUX11D
MUX11D: BIS #STEP,3DHMCSR ;EXAMINE NEXT LINE
        DEC R2
        BNE MUX11B
        CLR R5
MUX11E: MOV R1,3DHMCSR
        MOV R1,R3 ;SET LINE COUNTER TO SELECTED LINE
        CLR 3DHMLSR ;CLEAR LINE ENABLE FLIP FLOP
        INCB #0 ;DELAY FOR CABLE
        BNE #-4 ;DITTO
        MOV 3DHMLSR,R4 ;READ LINE STATUS REGISTER
        TST R4 ;WAS LINE ENABLE FUNCTION FLIP FLOP
        BEQ MUX11F ;CLEARED
        ERRORL ;NO, LINE STATUS ERROR
        SCOPE ;CHECK FOR ITERATIONS, LOOP
MUX11F:

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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
1430 010160 012777 000004 006420        MOV     #RS,@DHMLSR
1431 010166 005077 006412                CLR     @DHMCSR
1432 010172 005005                MUX13B: CLR     R5
1433 010174 017704 006406                MOV     @DHMLSR,R4
1434 010200 117703 006400                MOV     @DHMCSR,R3
1435 010204 042703 177760                BIC     #177760,R3
1436 010210 020103                CMP     R1,R3
1437 010212 001002                BNE    MUX13C
1438 010214 012705 000004                MOV     #RS,R5
1439
1440 010220 020504                MUX13C: CMP     R5,R4
1441 010222 001403                BEQ    MUX13D
1442 010224 104001                ERRORL
1443 010226 104003                SCOPEF
1444 010230 010232                MUX13D
1445 010232 052777 000400 006344        MUX13D: BIS     #STEP,@DHMCSR
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
1451 010254 005077 006326                CLR     @DHMLSR
1452 010260 105227 000000                INCB   #0
1453 010264 001375                BNE    -4
1454 010266 017704 006314                MOV     @DHMLSR,R4
1455 010272 005704                TST    R4
1456 010274 001401                BEQ    MUX13F
1457 010276 104001                ERRORL
1458 010300 104002                MUX13F: SCOPE

;SELECT LINE TO BE TESTED
;SET REQUEST TO SEND FUNCTION FLIP-FLOP

;READ LINE STATUS REGISTER
;READ CONTROL STATUS REGISTER
;CLEAR UNWANTED BITS
;IF LINE NUMBER=SELECTED LINE NUMBER,
;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP

;TO BE SET
;COMPARE EXPECTED AND RECEIVED
;RESULTS
;LINE STATUS ERROR

;EXAMINE NEXT LINE

;SET LINE COUNTER TO SELECTED LINE
;CLEAR REQUEST TO SEND FLIP FLOP
;DELAY FOR CABLE
;DITTO
;READ LINE STATUS REGISTER
;WAS REQUEST TO SEND FUNCTION FLIP FLOP
;CLEARED
;NO LINE STATUS ERROR
;CHECK FOR ITERATIONS, LOOP

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1498
1499
1500
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1502 010460          T105:
1503 010460 005077 006120 MUX15: CLR 2DHMCSR           ;REFERENCE DESIGNATION
1504 010464 042737 000340 177776 BIC 2340,PS           ;CLEAR CONTROL REGISTER
1505 010472 013701 016672          MOV LINE,R1           ;ENABLE INTERRUPTS
1506 010476 012702 000020 MUX15A: MOV 16,R2           ;16 LINES
1507 010502 010177 006076          MOV R1,2DHMCSR        ;SELECT A LINE
1508 010506 012777 000003 006072 MOV 2DHMCSR+TRMRDY,2DHMLSR ;SET LINE ENABLE +TRMRDY
1509 010514 005077 006064          CLR 2DHMCSR           ;CLEAR CONTROL REGISTER
1510 010520 005005 MUX15B: CLR R5           ;CLEAR EXPECTED RESULT
1511 010522 017704 006060          MOV 2DHMLSR,R4        ;READ LINE STATUS
1512 010526 117703 006052          MOV 2DHMCSR,R3        ;READ LINE NUMBER
1513 010532 042703 177760          BIC 177760,R3         ;CLEAR UNWANTED BITS
1514 010536 020103          CMP R1,R3             ;IF RECEIVED LINE =SELECTED LINE
1515 010540 001002 MUX15C: BNE MUX15C        ;EXPECT LINE ENABLE AND
1516 010542 012705 000143          MOV 2DHMCSR+TRMRDY+CO+CS,R5 ;CLEAR TO SEND AND CARRIER ARE SET
1517
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 2DHMCSR           ;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 2DHMCSR+TRMRDY,2DHMLSR ;EXPECT LINE ENABLE
1527 010576 010103 MUX15E: MOV R1,R3             ;ON SELECTED LINE
1528 010600 010177 006000          MOV R1,2DHMCSR        ;SELECT LINE
1529 010604 042777 000002 005774 BIC 2DHMCSR+TRMRDY,2DHMLSR ;CLEAR TERMINAL
1530 010612 105227 000000          INCB 20               ;DELAY FOR CABLE
1531 010616 001375          BNE -4                ;DITTO
1532 010620 017704 005762          MOV 2DHMLSR,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

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1541 010634      005077      005744      T106:
1542 010634      042737      000340      MUX16: CLR      2DHMCSR      ;REFERENCE DESIGNATION
1543 010640      013701      016672      177776      BIC      8340,PS      ;CLEAR CONTROL REGISTER
1544 010646      012702      000020      MOV      LINE,R1      ;ENABLE INTERUPTS
1545 010652      010177      005722      MUX16A: MOV      16,R2      ;16 LINES
1546 010656      012777      000005      MOV      R1,2DHMCSR      ;SELECT A LINE
1547 010662      005077      005710      MOV      #LINENA+RS,2DHMLSR      ;SET LINE ENABLE +RS
1548 010670      005005      005704      CLR      2DHMCSR      ;CLEAR CONTROL REGISTER
1549 010674      017704      005704      MUX16B: CLR      R5      ;CLEAR EXPECTED RESULT
1550 010676      117703      005676      MOV      2DHMLSR,R4      ;READ LINE STATUS
1551 010702      042703      177760      MOV      2DHMCSR,R3      ;READ LINE NUMBER
1552 010706      020103      000205      BIC      8177760,R3      ;CLEAR UNWANTED BITS
1553 010712      001002      CMP      R1,R3      ;IF RECEIVED LINE=SELECTED LINE
1554 010714      012705      MUX16C: BNE      MUX16C      ;EXPECT LINE ENABLE AND
1555 010716      020405      CMP      R4,R5      ;RING IS SET
1556 010722      001403      BEQ      MUX16D      ;COMPARE EXPECTED AND
1557 010724      104001      ERRORL      ;RECEIVED RESULTS
1558 010726      104003      SCOPEF      ;LINE STATUS ERROR
1559 010730      010734      MUX16D: MUX16D      ;UPDATE LINE COUNTER
1560 010732      052777      000400      005642      BIS      #STEP,2DHMCSR      ;CONTINUE IF ALL CHECKS
1561 010734      005302      DEC      R2      ;ARE NOT DONE FOR THIS LINE
1562 010742      001353      BNE      MUX16E      ;EXPECT LINE ENABLE
1563 010744      012705      000001      MUX16E: MOV      #LINENA,RS      ;ON SELECTED LINE
1564 010746      010103      005624      MOV      R1,R3      ;SELECT LINE
1565 010752      010177      000004      005620      MOV      R1,2DHMCSR      ;CLEAR REQUEST TO SEND
1566 010754      042777      000000      BIC      #RS,2DHMLSR      ;DELAY FOR CABLE
1567 010760      105227      INCB      #0      ;DITTO
1568 010766      001375      BNE      -4      ;DITTO
1569 010772      017704      005606      MOV      2DHMLSR,R4      ;READ LINE STATUS REGISTER
1570 010774      020504      CMP      R5,R4      ;ONLY LINE ENABLE SHOULD BE
1571 011000      001401      BEQ      MUX16F      ;SET ON THIS LINE
1572 011002      104001      ERRORL      ;LINE STATUS ERROR
1573 011004      104002      MUX16F: SCOPE      ;CHECK FOR ITERATIONS, LOOP
1574 011006
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1580 011010          T107:
1581 011010 005077 005570 MUX17: CLR      2DHMCSR      ;REFERENCE DESIGNATION
1582 011014 042737 000340 177776 BIC      8340,PS      ;CLEAR CONTROL REGISTER
1583 011022 013701 016672          MOV      LINE,R1      ;ENABLE INTERRUPTS
1584 011026 012702 000020 MUX17A: MOV      816,R2      ;16 LINES
1585 011032 010177 005546          MOV      R1,2DHMCSR   ;SELECT A LINE
1586 011036 012777 000011 005542 MOV      #LINENA+SECTX,2DHMLSR ;SET LINE ENABLE +SECTX
1587 011044 005077 005534          CLR      2DHMCSR      ;CLEAR CONTROL REGISTER
1588 011050 005005          MUX17B: CLR      R5      ;CLEAR EXPECTED RESULT
1589 011052 017704 005530          MOV      2DHMLSR,R4   ;READ LINE STATUS
1590 011056 117703 005522          MOV      2DHMCSR,R3   ;READ LINE NUMBER
1591 011062 042703 177760          BIC      8177760,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 ;SECONDARY RECEIVE IS SET
1595
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,2DHMCSR ;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 000201          MOV      #LINENA,R5   ;EXPECT LINE ENABLE
1605 011126 010103          MUX17E: MOV      R1,R3   ;ON SELECTED LINE
1606 011130 010177 005450          MOV      R1,2DHMCSR   ;SELECT LINE
1607 011134 042777 000010 005444 BIC      #SECTX,2DHMLSR ;CLEAR SECONDARY TRANSMIT
1608 011142 105227 000000          INCB    #0           ;DELAY FOR CABLE
1609 011146 001375          BNE      -4          ;DITTO
1610 011150 017704 005432          MOV      2DHMLSR,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

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1628 011164
1629 011164 000076
1630 011166 012737 000340 177776
1631 011174 104004
1632 011176 017142
1633 011200 022737 000176 016620
1634 011206 001001
1635 011210 104025
1636 011212 012737 011230 013020
1637 011220 012737 011226 002204
1638 011226 104017
1639
1640 011230 104020
1641
1642 011232 011242
1643 011234 011236
1644 011236 104012
1645 011240 000772
1646
1647
1648
1649
1650
1651
1652 011242 104021
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1655
1656 011244 011262
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1658 011246 011252
1659
1660 011250 011256
1661
1662 011252 104014
1663 011254 000207
1664 011256 104014
1665 011260 000762

;MODEM CONTROL ON LINE TEST USING 103A TYPE MODEMS
;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
;USING THE MODEM CONTROL TO CONTROL 103A TYPE MODEMS

;NOTE: IF THE DM11-AA IS NOT CONNECTED TO THE
;DISTRIBUTION PANEL, AN M974 DM11 MAINTENANCE JUMPER
;SHOULD BE INSTALLED IN SLOT B1 OR B3 OF THE DISTRIBUTION
;PANNEL TO PREVENT A POSSIBLE LONG SPACE
;DISCONNECT FROM HANGING UP THE MODEM

T200:
ST103A: RESET ;REFERENCE DESIGNATION
MOV #340,PS ;INITIALIZE INTERFACE
TYPE ;DISABLE ALL INTERRUPTS
MT103T ;TYPE "103A MODEM CONNECT-
;DISCONNECT TEST"
CMP #SWREG,SWR
BNE IS
CNTLUU
IS: MOV #T103A,FATRET ;SET UP FOR FATAL ERROR
MOV #ST103B,KRET ;SET UP FOR LINE CHANGE
ST103B: GETLNS ;INPUT ORIGINATE AND
;AND ANSWER LINE NUMBERS
T103A: SETUP ;SET UP TO RECEIVE INTERRUPTS
;WAIT FOR RING
T103B ;GO HERE IF RING OK
T103A1 ;GO HERE IF NO RING
T103A1: ERROR ;NO RING WITHIN 5 MINUTES
BR ST103B ;SELECT NEW LINES AND REDIAL

;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
;WILL BE REQUESTED TO RESELECT LINES AND REDIAL

T103B: CKRING ;CHECK FOR RING INTERRUPT
;ONLY ON ANSWER LINE
;AND NO TRANSITIONS ON
;ORIGINATE LINE
T103C ;GO HERE IF TRANSITIONS
;ARE CORRECT
T103B1 ;GO HERE IF INCORRECT
;TRANSITION ON ANSWER LINE
T103B2 ;GO HERE IF INCORRECT TRANSITION
;ON ORIGINATE LINE
T103B1: ERRORT ;TRANSITION ERROR ON ANSWER LINE
RTS PC ;CONTINUE CHECKING
T103B2: ERRORT ;TRANSITION ERROR ON ORIGINATE LINE
BR ST103B ;RESELECT LINES AND REDIAL

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1666									
1667									
1668									
1669									
1670	011262	013777	016676	005314	T103C:	MOV	LINANS,JDHMCSR		
1671									
1672	011270	052777	000002	005310		BIS	#TRMRDY,JDHMLSR		
1673									
1674	011276	104026				CKINTT			
1675	011300	104022				WAITRN			
1676									
1677									
1678									
1679									
1680	011302	104023				CKTRAN			
1681									
1682									
1683	011304	000143				CO+CS+LINENA+TRMRDY			
1684									
1685									
1686									
1687	011306	000143				CO+CS+LINENA+TRMRDY			
1688									
1689									
1690									
1691	011310	100006				RINGF+XCO+XCS			
1692									
1693									
1694	011312	000006				XCO+XCS			
1695									
1696									
1697	011314	011326				T103D1			
1698									
1699	011316	011332				T103D2			
1700	011320	011336				T103D3			
1701	011322	011342				T103D4			
1702	011324	011346				T103E			
1703	011326	104015				T103D1: ERRORS			
1704	011330	000207				RTS	PC		
1705	011332	104015				T103D2: ERRORS			
1706	011334	000207				RTS	PC		
1707	011336	104014				T103D3: ERROR			
1708	011340	000207				RTS	PC		
1709	011342	104014				T103D4: ERROR			
1710	011344	000207				RTS	PC		

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

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;SET LINE COUNTER TO
;ANSWER LINE NUMBER
;SET TERMINAL READY ON
;SELECTED ANSWER LINE

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;WAIT FOR TRANSITIONS TO OCCUR

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

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;CHECK TRANSITIONS AND
;STATUS ON SELECTED
;ANSWER AND ORIGINATE LINES
;EXPECT CARRIER, CLEAR TO SEND,
;LINE ENABLE AND TERMINAL
;READY STATUS BITS SET ON
;ANSWER LINE

```

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;EXPECT CARRIER, CLEAR TO SEND,
;LINE ENABLE AND TERMINAL
;READY STATUS BITS ON
;ORIGINATE LINE

```

```

;EXPECT CARRIER, CLEAR TO SEND
;AND POSSIBLE RING TRANSITIONS
;ON ANSWER LINE
;EXPECT CARRIER AND CLEAR
;TO SEND TRANSITIONS ON
;ORIGINATE LINE

```

```

;GO HERE ON ANSWER LINE STATUS ERROR

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```

;GO HERE ON ORIGINATE LINE STATUS ERROR
;GO HERE ON ANSWER LINE TRANSITION ERROR
;GO HERE ON ORIGINATE LINE TRANSITION ERROR
;GO TO NEXT TEST IF NO ERRORS

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```

;ANSWER LINE STATUS ERROR

```

```

;CONTINUE CHECKING
;ORIGINATE LINE STATUS ERROR

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```

;CONTINUE CHECKING
;ANSWER LINE TRANSITION ERROR

```

```

;CONTINUE CHECKING
;ORIGINATE LINE TRANSITION ERROR

```

```

;CONTINUE CHECKING

```

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1711
1712
1713
1714
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1717
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1719
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
1726 011366 012737 011406 016724  MOV      @T103ES,RNGRET ;BEFORE DISCONNECT SEQUENCE STARTS
1727
1728 011374 012777 000140 005202  MOV      @SCNENA+INTENA,@DHMCSR ;SET UP DUMMY RETURN FOR
1729 011402 005037 177776          CLR      PS         ;RING INTERRUPT
1730 011406 005077 005200          CLR      @TKDBR     ;SET SCAN ENABLE AND INTERRUPT ENABLE
1731 011412 105777 005172          T103ES: CLR      @TKCSR ;ALLOW INTERRUPTS
1732 011416 100375          IS:  TSTB @TKCSR   ;WAIT FOR TTY TO HIT
1733 011420 005777 005166          BPL     IS
1734 011424 012737 000340 177776  TST     @TKDBR
1735 011432 005077 005146          MOV      #340,PS   ;START DISCONNECT SEQUENCE
1736 011436 013777 016674 005140  CLR     @DHMCSR    ;CLEAR CONROL REGISTER
1737 011444 042777 000002 005134  MOV     LINORG,@DHMCSR ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
1738 011452 104026          BIC     @TRMRDY,@DHMLSR ;SET TERMINAL READY ON SELECTED LINE
1739 011454 104022          CKINTT
          WAITRN      ;WAIT FOR TRANSITIONS TO OCCUR
    
```



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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 IS
1796 011564 104025 CNTLNU
1797 011566 012737 011604 013020 IS: MOV #T202A,FATRET ;SET UP FOR FATAL ERROR
1798 011574 012737 011602 002204 MOV #ST202B,KRET ;SET UP FOR LINE CHANGE
1799 011602 104017 ST202B: GETLNS ;INPUT ORIGINATE AND
1800 ;ANSWER LINE NUMBERS
1801 011604 104020 T202A: SETUP ;SET UP TO RECEIVE INTERRUPTS
1802 ;WAIT FOR RING
1803 011606 011616 T202B ;GO HERE IF RING OK
1804 011610 011612 T202A1 ;GO HERE IF NO RING
1805 011612 104012 T202A1: ERROR ;NO RING WITHIN 5 MINUTES
1806 011614 000772 BR ST202B ;SELECT NEW LINES AND REDIAL
1807
1808 ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
1809 ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
1810 ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
1811 ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
1812
1813 011616 104021 T202B: CKRING ;CHECK FOR RING INTERRUPT
1814 ;ONLY ON ANSWER LINE
1815 ;AND NO TRANSITIONS ON
1816 ;ORIGINATE LINE
1817 011620 011636 T202C ;GO HERE IF TRANSITIONS
1818 ;ARE CORRECT
1819 011622 011626 T202B1 ;GO HERE IF INCORRECT
1820 ;TRANSITION ON ANSWER LINE
1821 011624 011632 T202B2 ;GO HERE IF INCORRECT
1822 ;TRANSITION ON ORIGINATE LINE
1823 011626 104014 T202B1: ERRORT ;ANSWER LINE TRANSITION ERROR
1824 011630 000207 RTS PC ;CONTINUE CHECKING
1825 011632 104014 T202B2: ERRORT ;ORIGINATE LINE TRANSITION ERROR
1826 011634 000762 BR ST202B ;RESELECT LINES AND REDIAL
    
```

1827											
1828											
1829											
1830											
1831											
1832	011636	013777	016676	004740	T202C:	MOV	LINANS,JDHMCSR				
1833	011644	052777	000002	004734		BIS	#TRMRDY,JDHMLSR				
1834	011652	013777	016674	004724	T202D:	MOV	LINORG,JDHMCSR				
1835	011660	052777	000004	004720		BIS	#RS,JDHMLSR				
1836	011666	104026				CKINTT					
1837	011670	104022				WAITRN					
1838											
1839											
1840											
1841											
1842	011672	104023				CKTRAN					
1843											
1844											
1845	011674	000103				CO+LINENA+TRMRDY					
1846											
1847											
1848	011676	000147				RS+CO+CS+LINENA+TRMRDY					
1849											
1850											
1851											
1852	011700	100004				RINGF+XCO					
1853											
1854											
1855	011702	000006				XCO+XCS					
1856											
1857											
1858	011704	011716				T202D1					
1859	011706	011722				T202D2					
1860	011710	011726				T202D3					
1861	011712	011732				T202D4					
1862	011714	011736				T202E					
1863	011716	104015				T202D1: ERRORS					
1864	011720	000207				RTS	PC				
1865	011722	104015				T202D2: ERRORS					
1866	011724	000207				RTS	PC				
1867	011726	104014				T202D3: ERROR					
1868	011730	000207				RTS	PC				
1869	011732	104014				T202D4: ERROR					
1870	011734	000207				RTS	PC				

1871									
1872									:SET SECONDARY TRANSMIT ON ANSWER LINE
1873									:WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
1874									
1875	011736	013777	016676	004640	T202E:	MOV	LINANS,JDHMCSR		:SET LINE COUNTER TO ANSWER LINE
1876	011744	052777	000010	004634		BIS	#SECTX,JDHMLSR		:SET SECONDARY RECEIVE ON ANSWER LINE
1877	011752	104026				CKINTT			
1878	011754	104022				WAITRN			:WAIT FOR TRANSITIONS TO OCCUR
1879									
1880									:CHECK FOR CORRECT STATUS AND TRANSITIONS ON
1881									:SELECTED ORIGINATE AND ANSWER LINES
1882									
1883	011756	104023				CKTRAN			:CHECK TRANSITIONS AND STATUS
1884									:ON SELECTED ANSWER AND
1885									:ORIGINATE LINES
1886	011760	000133				SECTX+CO+LINENA+TRMRDY+SECRX			:EXPECT SECONDARY TRANSMIT
1887									:SECONDARY RECEIVE, CARRIER
1888									:LINE ENABLE AND TERMINAL READY
1889									:STATUS BITS SET ON ANSWER LINE
1890	011762	000167				SECRX+RS+CO+CS+LINENA+TRMRDY			:EXPECT SECONDARY RECEIVE,
1891									:REQUEST TO SEND, CLEAR TO SEND
1892									:CARRIER, LINE ENABLE AND
1893									:TERMINAL READY STATUS BITS
1894									:SET ON ORIGINATE LINE
1895	011764	000001				XSCRX			:EXPECT SECONDARY RECEIVE
1896									:TRANSITION ON ANSWER LINE
1897	011766	000001				XSCRX			:EXPECT SECONDARY RECEIVE
1898									:TRANSITION ON ORIGINATE LINE
1899	011770	012002				T202E1			:GO HERE ON ANSWER LINE STATUS ERROR
1900	011772	012006				T202E2			:GO HERE ON ORIGINATE LINE STATUS ERROR
1901	011774	012012				T202E3			:GO HERE ON ANSWER LINE TRANSITION ERROR
1902	011776	012016				T202E4			:GO HERE ON ORIGINATE LINE TRANSITION ERROR
1903	012000	012022				T202F			:GO TO NEXT TEST IF NO ERRORS
1904	012002	104015			T202E1:	ERRORS			:ANSWER LINE STATUS ERROR
1905	012004	000207				RTS	PC		:CONTINUE CHECKING
1906	012006	104015			T202E2:	ERRORS			:ORIGINATE LINE STATUS ERROR
1907	012010	000207				RTS	PC		:CONTINUE CHECKING
1908	012012	104014			T202E3:	ERRORT			:ANSWER LINE TRANSITION ERROR
1909	012014	000207				RTS	PC		:CONTINUE CHECKING
1910	012016	104014			T202E4:	ERRORT			:ORIGINATE LINE TRANSITION ERROR
1911	012020	000207				RTS	PC		:CONTINUE CHECKING

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1912
1913
1914
1915
1916
1917 012022 013777 016674 004554 T202F: MOV LINORG,JDHMCSR ;SET LINE COUNTER TO ORIGINATE LINE
1918 012030 042777 000004 004550 BIC #RS,JDHMLSR ;DROP REQUEST TO SEND
1919 012036 013777 016676 004540 MOV LINANS,JDHMCSR ;SET LINE COUNTER TO ANSWER LINE
1920 012044 042777 000010 004534 BIC #SECTX,JDHMLSR ;DROP SECONDARY RECEIVE
1921 012052 104026 CKINTT
1922 012054 104022 WAITRN ;WAIT FOR TRANSITIONS TO OCCUR
1923
1924
1925 ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
1926 ;SELECTED ORIGINATE AND ANSWER LINES
1927 012056 104023 CKTRAN ;CHECK TRANSITIONS AND STATUS
1928 ;ON SELECTED ANSWER AND
1929 ;ORIGINATE LINES
1930 012060 000003 LINENA+TRMRDY ;EXPECT LINE ENABLE AND
1931 ;TERMINAL READY STATUS BITS
1932 ;SET ON ANSWER LINE
1933 012062 000003 LINENA+TRMRDY ;EXPECT LINE ENABLE AND
1934 ;TERMINAL READY STATUS BITS
1935 ;SET ON ORIGINATE LINE
1936 012064 000005 XCO+XSCRX ;EXPECT CARRIER AND SECONDARY
1937 ;RECEIVE TRANSITIONS ON
1938 ;ANSWER LINE
1939 012066 000007 XCO+XCS+XSCRX ;EXPECT CARRIER, CLEAR TO SEND
1940 ;AND SECONDARY RECEIVE
1941 ;TRANSITIONS ON ORIGINATE LINE
1942 012070 012102 T202F2 ;GO HERE ON ANSWER LINE STATUS ERROR
1943 012072 012106 T202F3 ;GO HERE ON ORIGINATE LINE STATUS ERROR
1944 012074 012112 T202F4 ;GO HERE ON ANSWER LINE TRANSITION ERROR
1945 012076 012116 T202F5 ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
1946 012100 012122 T202G ;GO TO NEXT TEST IF NO ERRORS
1947 012102 104015 T202F2: ERRORS ;ANSWER LINE STATUS ERROR
1948 012104 000207 RTS PC ;CONTINUE CHECKING
1949 012106 104015 T202F3: ERRORS ;ORIGINATE LINE STATUS ERROR
1950 012110 000207 RTS PC ;CONTINUE CHECKING
1951 012112 104014 T202F4: ERRORT ;ANSWER LINE TRANSITION ERROR
1952 012114 000207 RTS PC ;CONTINUE CHECKING
1953 012116 104014 T202F5: ERRORT ;ORIGINATE LINE TRANSITION ERROR
1954 012120 000207 RTS PC ;CONTINUE CHECKING

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1955									
1956									
1957									
1958									
1959									
1960	012122	013777	016676	004454	T202G:	MOV	LINANS,JDHMCSR		;SET LINE COUNTER TO ANSWER LINE
1961	012130	052777	000004	004450		BIS	#RS,JDHMLSR		;SET REQUEST TO SEND
1962	012136	104026				CKINTT			
1963	012140	104022				WAITRN			;WAIT FOR TRANSITIONS TO OCCUR
1964									
1965									
1966									
1967									
1968	012142	104023				CKTRAN			;CHECK TRANSITIONS AND STATUS
1969									;ON SELECTED ANSWER AND
1970									;ORIGINATE LINES
1971	012144	000147				RS+CO+CS+LINENA+TRMRDY			;EXPECT LINE ENABLE, TERMINAL
1972									;READY, REQUEST TO SEND, CLEAR
1973									;TO SEND, AND CARRIER
1974									;STATUS BITS SET ON ANSWER LINE
1975	012146	000103				CO+LINENA+TRMRDY			;EXPECT LINE ENABLE, TERMINAL
1976									;READY AND CARRIER STATUS
1977									;BITS SET ON ORIGINATE LINE
1978	012150	000006				XCO+XCS			;EXPECT CARRIER AND CLEAR
1979									;TO SEND TRANSITIONS ON
1980									;ANSWER LINE
1981	012152	000004				XCO			;EXPECT CARRIER TRANSITION
1982									;ON ORIGINATE LINE
1983	012154	012166				T202G1			;GO HERE ON ANSWER LINE STATUS ERROR
1984	012156	012172				T202G2			;GO HERE ON ORIGINATE LINE STATUS ERROR
1985	012160	012176				T202G3			;GO HERE ON ANSWER LINE TRANSITION ERROR
1986	012162	012202				T202G4			;GO HERE ON ORIGINATE LINE TRANSITION ERROR
1987	012164	012206				T202H			;GO TO NEXT TEST IF NO ERRORS
1988	012166	104015				T202G1: ERRORS			;ANSWER LINE STATUS ERROR
1989	012170	000207				RTS	PC		;CONTINUE TESTING
1990	012172	104015				T202G2: ERRORS			;ORIGINATE LINE STATUS ERROR
1991	012174	000207				RTS	PC		;CONTINUE TESTING
1992	012176	104014				T202G3: ERROR			;ANSWER LINE TRANSITION ERROR
1993	012200	000207				RTS	PC		;CONTINUE TESTING
1994	012202	104014				T202G4: ERROR			;ORIGINATE LINE TRANSITION ERROR
1995	012204	000207				RTS	PC		;CONTINUE TESTING

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1996
1997
1998
1999
2000 012206 013777 016674 004370 T202H: MOV LINORG,JDHMCRA ;SET LINE COUNTER TO ORIGINATE LINE
2001 012214 052777 000010 004364 BIS #SECTX,JDHMLSA ;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

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2038								
2039								
2040								: DROP REQUEST TO SEND ON ANSWER LINE
2041								: WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2042	012272	013777	016676	004304	T202I:	MOV	LINANS, 2DHMCSR	: SET LINE COUNTER TO ANSWER LINE
2043	012300	042777	000004	004300		BIC	%RS, 2DHMLSR	: CLEAR REQUEST TO SEND
2044	012306	013777	016674	004270		MOV	LINORG, 2DHMCSR	: SET LINE COUNTER TO ORIGINATE LINE
2045	012314	042777	000010	004264		BIC	%SECTX, 2DHMLSR	: CLEAR SECONDARY TRANSMIT
2046	012322	104026				CKINTT		
2047	012324	104022				WAITRN		: WAIT FRO TRANSITIONS TO OCCUR
2048								
2049								: CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2050								: SELECTED ORIGINATE AND ANSWER LINES
2051								
2052	012326	104023				CKTRAN		: CHECK TRANSITION S AND STATUS
2053								: ON SELECTED ANSME AND
2054								: ORIGINATE LINES
2055	012330	000003				LINENA+TRMRDY		: EXPECT LINE ENABLE AND
2056								: TERMINAL READY STATUS BITS SET
2057								: ON ANSWER LINE
2058	012332	000003				LINENA+TRMRDY		: EXPECT LINE ENABLE AND
2059								: TERMINAL READY STATUS BITS
2060								: SET ON ORIGINATE LINE
2061	012334	000007				XCO+XCS+XSCRX		: EXPECT CARRIER, CLEAR TO SEND
2062								: AND SECONDARY RECEIVE TRANSITIONS
2063								: ON ANSWER LINE
2064	012336	000005				XCO+XSCRX		: EXPECT CARRIER AND SECONDARY
2065								: RECEIVE TRANSITIONS ON
2066								: ORIGINATE LINE
2067	012340	012352				T202I2		: GO HERE ON ANSWER LINE STATUS ERROR
2068	012342	012356				T202I3		: GO HERE ON ORIGINATE LINE STATUS ERROR
2069	012344	012362				T202I4		: GO HERE ON ANSWER LINE TRANSITIN ERROR
2070	012346	012366				T202I5		: GO HERE ON ORIGINATE LINE TRANSITION ERROR
2071	012350	012372				T202J		: GO TO NEXT TEST IF NO ERRORS
2072	012352	104015				T202I2: ERRORS		: ANSWER LINE STATUS ERROR
2073	012354	000207				RTS	PC	: CONTINUE CHECKING
2074	012356	104015				T202I3: ERRORS		: ORIGINATE LINE STATUS ERROR
2075	012360	000207				RTS	PC	: CONTINUE CHECKING
2076	012362	104014				T202I4: ERRORT		: ANSME LINE TRANSITION ERROR
2077	012364	000207				RTS	PC	: CONTINUE CHECKING
2078	012366	104014				T202I5: ERRORT		: ORIGINATE LINE TRANSITION ERROR
2079	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      @TRNTYP,@DHMVEC      ;SET UP TO DETECT TRANSITIONS
2094      012412 012737 012432 016724      MOV      @T202JS,RNGRET      ;SET UP DUMMY RETURN FOR RING
2095      ;FROM RING INTERRUPT
2096      012420 012777 000140 004156      MOV      @SCNENA+INTENA,@DHMCSR      ;ENABLE LINE SCANNER
2097      ;START SCANNER
2098      012426 005037 177776      CLR      PS      ;ENABLE INTERRUPTS
2099      012432 005077 004154      T202JS: CLR      @TKDBR
2100      012436 105777 004146      IS:      TSTB      @TKCSR
2101      012442 100375      BPL      IS
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

```

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2113
2114
2115
2116
2117 012504 104023 CKTRAN
2118
2119
2120 012506 000003 LINENA+TRMRDY
2121
2122
2123 012510 000001 LINENA
2124
2125 012512 000000 0
2126
2127 012514 000000 0
2128
2129 012516 012530 T202J1
2130 012520 012534 T202J2
2131 012522 012540 T202J3
2132 012524 012544 T202J4
2133 012526 012550 T202JN
2134 012530 104015 T202J1: ERRORS
2135 012532 000207 RTS PC
2136 012534 104015 T202J2: ERRORS
2137 012536 000207 RTS PC
2138 012540 104014 T202J3: ERRORT
2139 012542 000207 RTS PC
2140 012544 104014 T202J4: ERRORT
2141 012546 000207 RTS PC
2142
2143 012550 104004 T202JN: TYPE
2144 012552 017356 MT202A
2145 012554 104026 CKINTT
2146 012556 000137 011602 JMP ST202B
2147

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```

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

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```

;CHECK TRANSITIONS AND STATUS
;ON SELECTED ANSWER AND
;ORIGINATE LINES
;EXPECT LINE ENABLE AND
;TERMINAL READY STATUS BITS
;SET ON ANSWER LINE
;EXPECT LINE ENABLE STATUS
;BIT SET ON ORIGINATE LINE
;EXPECT NO TRANSITIONS ON
;ANSWER LINE
;EXPECT NO TRANSITIONS ON
;ORIGINATE LINE
;GO HERE IF ANSWER LINE STATUS ERROR
;GO HERE IF ORIGINATE LINE STATUS ERROR
;GO HERE IF ANSWER LINE TRANSITION ERROR
;GO HERE IF ORIGINATE LINE TRANSITIONS ERROR
;GO TO END OF TEST IF NO ERRORS
;ANSWER LINE STATUS ERROR
;CONTINUE CHECKING
;ORIGINATE LINE STATUS ERROR
;CONTINUE CHECKING
;ANSWER LINE TRANSITION ERROR
;CONTINUE CHECKING
;ORIGINATE LINE TRANSITION ERROR
;CONTINUE CHECKING
;TYPE "202C TEST COMPLETE"
;GET NEW LINE NUMBERS
;RESTART TEST

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

```

```

2196
2197
2198
2199 012716 032704 100000 ANSTR: BIT #RINGF,R4 ;IF RING CAUSED INTERRUPT,
2200 012722 001403 BEQ ANSTR1 ;SET RING TRANSITION BIT
2201 012724 052737 000010 016700 BIS #10,ANSFLG
2202 012732 032704 040000 ANSTR1: BIT #COF,R4 ;IF CARRIER CAUSED INTERRUPT
2203 012736 001403 BEQ ANSTR2 ;SET CARRIER TRANSITION BIT
2204 012740 052737 000004 016700 BIS #4,ANSFLG
2205 012746 032704 020000 ANSTR2: BIT #CSF,R4 ;IF CLEAR TO SEND
2206 CAUSED INTERRUPT
2207 012752 001403 BEQ ANSTR3 ;SET CLEAR TO SEND
2208 ;TRANSITION BIT
2209 012754 052737 000002 016700 BIS #2,ANSFLG
2210 012762 032704 010000 ANSTR3: BIT #SECRXF,R4 ;IF SECONDARY RECEIVE
2211 CAUSED INTERRUPT
2212 012766 001403 BEQ ANSTR4 ;SET SECONDARY RECEIVE
2213 012770 052737 000001 016700 BIS #1,ANSFLG ;TRANSITION BIT
2214 012776 032704 170000 ANSTR4: BIT #RINGF+COF+CSF+SECRXF,R4
2215 ;IF NO INTERRUPT FLAGS SET
2216 013002 001007 BNE TRANEX ;EXIT TRANSITION DETECTION
2217 013004 104016 ANSTRR: ERRORN
2218 013006 005037 016632 FATEX: CLR TSTNO
2219 013012 022626 POP2SP
2220 013014 000177 000000 JMP @FATRET
2221 013020 000000 FATRET: 0
2222
2223 ;EXIT TRANSITION DETECTION
2224
2225 013022 005704 TRANEX: TST R4 ;IF RING FLAG WAS SET
2226 013024 100002 BPL +6 ;SET UP SPECIAL RETURN
2227 013026 013716 016724 MOV RINGRET,(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),RS
2268 013150 012537 014036 MOV (RS)+,NXTTS
2269 013154 012537 014016 MOV (RS)+,ERR1
2270 013160 010516 MOV RS,(SP)
2271 013162 012777 006000 003414 MOV #CLRSCH+CLRMUX,JDHMCSR ;CLEAR LINE SCANNER AND MULTIPLEXER
2272 013170 032777 000020 003406 SETUP1: BIT #BUSY,JDHMCSR ;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,JDHMCSR ;SET UP TO ENABLE ORIGINATE LINE
2280 ;ORIGINATE LINE NUMBER
2281 013212 012777 000003 003366 MOV #LINENA+TRMODY,JDHMLSR ;SET LINE ENABLE AND
2282 ;TERMINAL READY ON ORIGINATE LINE
2283 013220 013777 016676 003356 MOV LINANS,JDHMCSR ;SET LINE COUNTER TO ANSWER LINE
2284 013226 012777 000001 003352 MOV #LINENA,JDHMLSR ;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,JDHMVEC ;SET UP INTERRUPT VECTOR
2291 ;FOR TRANSITION DETECTION
2292 013242 012777 000340 003332 MOV #340,JDHMLVL ;SET UP INTERRUPT SERVICE LEVEL
2293 013250 012777 000140 003326 MOV #SCNENA+INTENA,JDHMCSR ;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      SETUP8       ;EXIT WAIT LOOP
2305 013324 005737 016702          TST      ORGFLG
2306 013330 001011          BNE      SETUP8
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          SETUP8: 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
2335 013452 001403          BEQ      CKRNG2         ;IF TRANSITION OCCURED
2336 013454 022626          POP2SP                 ;ON ORIGINATE LINE, ERROR
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      @WAITR,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
2388 ;CHECK FOR CORRECT TRANSITIONS ON
2389 ;SELECTED ORIGINATE AND ANSWER LINES
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

```

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```

014040
014040 005237 016630
014044 012737 000001 016632
014052 000005
014054 005037 016722
014060 005337 016722
014064 001375
014066 104004
014070 020306
014072 013701 000042
014076 001516
014100 000005
014102 004711
014104 000240
014106 000240
014110 000240
014112 000240
014114 000137 014334
014120 011646
014122 162716 000002
014126 017616 000000
014132 006316
014134 042716 177001
014140 062716 020324
014144 017616 000000
014150 000136
014152 105777 002432
014156 100001
014160 104027
014162 000002
    
```

```

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

```

EOP:
      INC      PASCNT
      MOV      #1, TSTNO
      RESET
      CLR      FILLA
      DEC      FILLA
1$:   BNE      1$
      TYPE
      MEPASS
      MOV      42, R1
      BEQ     TSTENT ;NO
      RESET
LOGICAL: JSR      PC, (R1)
      NOP
      NOP
      NOP
      NOP
      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
    
```

```

EMTSRV: MOV      (SP), -(SP) ;GET PC OF RETURN
        SUB      #2, (SP) ;=PC OF EMT
        MOV      @ (SP), (SP) ;GET EMT
EMTOK:  ASL      (SP) ;MULTIPLY EMT ARG BY 2
        BIC      #177001, (SP) ;CLEAR UNWANTED BITS
        ADD      #EMTTAB, (SP) ;POINTER TO SUBROUTINE ADDRESS
        MOV      @ (SP), (SP) ;SUBROUTINE ADDRESS
        JMP      @ (SP)+ ;GO TO SUBROUTINE

CKINT:  TSTB    @TKCSR
        BPL     1$
        KBDIN
1$:     RTI
    
```

```

2459
2460
2461
2462
2463
2464
2465
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
2511
2512
2513 014410 005737 016624 FREEZE: TST ERRFLG ;IF ERROR FLAG=0,
2514 014414 001413 BEQ FREEZX ;DO NOT TEST FOR ESCAPE
;END OF SUBTEST SERVICE
;CHECK FOR LOOP ON CURRENT TEST
;CHECK FOR ESCAPE TO NEXT TEST ON ERROR
;UPDATE ITERATION COUNT AND EXIT TO NEXT TEST IF 0
;TEST XOR FLAG (XFLAG) FOR EXISTANCE OF XOR TESTER.
;IF ERROR OCCURED FLAG=1,
;CHECK FOR ESCAPE TO NEXT TEST
;IF SW10=1,
;ESCAPE TO NEXT TEST
;IF SW14=1,
;LOOP ON CURRENT TEST
;IF SW11=1,
;INHIBIT ITERATIONS
;UPDATE ITERATION COUNT
;IF ICOUNT=0, GO TO NEXT TEST
;SET UP FOR RETURN TO CURRENT TEST
;RETURN TO CURRENT TEST
;UPDATE TEST NUMBER
;GET TEST NUMBER
;MULTIPLY TEST NUMBER BY 4
;GET POINTER FOR TEST ENTRY
;GET STARTING ADDRESS OF NEXT TEST
;IF ADDRESS=0, GO TO END OF PASS
;PUT STARTING ADDRSS ON STACK
;GET ITERATION COUNT FOR TEST
;CLEAR ERROR OCCURED FLAG
;GO TO TEST
;SET UP TO EXIT TEST AFTER LOOP
;GO TO LOOP SERVICE
;CHECK FOR LOOPING WITH SAME DATA
;CHECK FOR ESCAPE TO NEXT TEST ON ERROR

```

00015	014416	032777	002000	002174		BIT	#SW10,@SWR		: IF SW10=1,
00016	014424	001341				BNE	LOOPX		: ESCAPE TO NEXT TEST
00017	014426	032777	001000	002164		BIT	#SW09,@SWR		: IF SW09=1,
00018	014434	001403				BEQ	FREEZX		: FREEZE CURRENT DATA
00019	014436	017616	000000			MOV	@(SP),(SP)		: GET LOOPING ADDRESS
00020	014442	000002				RTI			: LOOP
00021	014444	062716	000002		FREEZX:	ADD	#2,(SP)		: CONTINUE IN CURRENT TEST
00022	014450	000002				RTI			

014452  
014456  
014462  
014466  
014470  
014474  
014502  
014510  
014512  
014516  
014524  
014532

```

;GENERAL ERROR SERVICE
;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER
ERR: CLR ERRFLG ;ALWAYS TYPE PC+2
;OF TEST THAT FAILED
CLR ERRMSG ;NO MESSAGE
CLR ERTAB ;NO TABLE OF DATA
BR ERRGEN ;OUTPUT ERROR MESSAGE

```

;TRANSITION DETECTION ERROR SERVICE

;FORMAT FOR ERROR TYPEOUT IS

;XXXXXX TRANSITION ERROR

;EXP REC LINE  
;AA BB CC

```

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

```

```

ERRT: CLR ERRFLG ;ALWAYS OUTPUT ALL DATA
MOV @MTRANE,ERRMSG ;TYPE "TRANSITION ERROR"
MOV @ERTAB1,ERTAB ;TABLE OF DATA
BR ERRGEN ;OUTPUT ERROR MESSAGE

```

;ON-LINE STATUS ERROR SERVICE

;FORMAT FOR LINE STATUS ERROR IS

;XXXX LINE ERROR

;EXP REC LINE  
;AAA BBB CC

```

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

```

```

ERRS: CLR ERRFLG ;ALWAYS OUTPUT ALL DATA
MOV @MLINE1,ERRMSG ;TYPE "LINE ERROR"
MOV @ERTAB2,ERTAB ;EXP REC LINE"
BR ERRGEN ;TABLE OF DATA
;OUTPUT ERROR MESSAGE

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; 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=RECEIVED 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      PSM
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                SAVOSP
014650 005737 016624          TST     ERRFLG          ;IF ERROR OCCURED FLAG=1,
014654 001007                BNE     .1              ;TYPE DATA ONLY
014656 104006                OCTASC                ;TYPE PC+2 OF CALL TO ERROR ROUTINE
014660 014752
014662 005737 014672          TST     ERRMSG
014666 001407                BEQ     .2
014670 104004                TYPE                                ;TYPE ERROR MESSAGE
014672 000000          ERRMSG: 0
014674 005737 014704          .1:   TST     ERTAB
014700 001402                BEQ     .2
014702 104006                OCTASC                ;TYPE DATA
014704 000000          ERTAB: 0
014706 104007          .2:   RESOS          ;RESTORE R0-R5

;ERROR HALT SERVICE
014710 032777 100000 001702 .3:   BIT     #SW15,@SWR      ;IF SW15=0, DO NOT
014716 001406                BEQ     .4              ;HALT ON ERROR
014720 000000                HALT                                ;HALT AND DISPLAY ADDRESS OF FAILING TEST
014722 022737 000176 016620  CMP     #SWREG,SWR
014730 001001                BNE     .4
014732 104025                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

```

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2661 ;TABLE S OF DATA FOR ERROR TYPEOUT
2662
2663 ;TABLE FOR TRANSITION STATUS ERROR
2664
2665 014752 000001 ERTAB0: 1
2666 014754 000006 SAVPC
2667 014756 016656 ERTAB1: 3
2668 014760 000003 SAVRS ;CONTAINS EXPECTED TRANSITION STATUS
2669 014762 000002 SAVR4 ;CONTAINS RECEIVED TRANSITION STATUS
2670 014764 016652 ERTAB2: 3
2671 014766 000002 SAVR3 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2672 014770 016650 SAVRS ;CONTAINS EXPECTED LINE STATUS
2673 014772 000002 SAVR4 ;CONTAINS RECEIVED LINE STATUS
2674 014774 016646 ERTAB3: 3
2675 014776 000003 SAVR3 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2676 015000 000003 SAVRS ;CONTAINS EXPECTED LINE STATUS
2677 015002 016652 SAVR4 ;CONTAINS RECEIVED LINE STATUS
2678 015004 000003 ERTAB4: 3
2679 015006 016650 SAVR3 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2680 015010 000002 SAVRS ;CONTAINS EXPECTED CONTROL STATUS
2681 015012 016646 SAVR4 ;CONTAINS RECEIVED CONTROL STATUS
2682 015014 000002 ERTAB5: 4
2683 015016 000006 SAVRS ;CONTAINS EXPECTED LINE STATUS
2684 015020 016650 SAVR4 ;CONTAINS RECEIVED LINE STATUS
2685 015022 000003 ERTAB6: 4
2686 015024 016646 SAVR5 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2687 015026 000002 SAVR3 ;CONTAINS NUMBER OF LINE UNDER TEST
2688 015030 000006 SAVRS ;CONTAINS EXPECTED CONTROL STATUS
2689 015032 016652 SAVR4 ;CONTAINS RECEIVED CONTROL STATUS
2690 015034 000006 ERTAB7: 4
2691 015036 016650 SAVRS ;CONTAINS EXPECTED LINE STATUS
2692 015040 000004 SAVR4 ;CONTAINS RECEIVED LINE STATUS
2693 015042 000003 SAVR3 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2694 015044 016652 SAVR1 ;CONTAINS NUMBER OF LINE UNDER TEST
2695 015046 000003 SAVRS ;CONTAINS EXPECTED LINE STATUS
2696 015050 016650 SAVR4 ;CONTAINS RECEIVED LINE STATUS
2697 015052 000002 SAVR3 ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
2698 015054 016646 SAVR1 ;CONTAINS NUMBER OF LINE UNDER TEST
2699 015056 000002 SAVRS ;CONTAINS EXPECTED CONTROL STATUS
2700 015060 016642 SAVR4 ;CONTAINS RECEIVED CONTROL STATUS
2701
2702
2703 015062 000001 SWRTB: 1
2704 015064 000006 SAVR5
2705 015066 000176 SWREG

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2706
2707
2708 ;CONVERT OCTAL TO ASCII AND
2709 ;OUTPUT ON TELETYPE
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 MOV# #100, (R4) ;PUT TERMINATOR AT END OF MESSAGE
2721 015142 005737 015260 TST SMLN
2722 015146 001002 BNE IS
2723 015150 104004 TYPE ;OUTPUT CONVERTED DATA
2724 015152 020204 MBCD ;TO TELETYPE
2725 015154 000002 IS: 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 SSMREQ
2733 015174 052737 000001 015260 BIS #1, SMLN
2734 015202 104006 OCTASC
2735 015204 015062 SMRTB
2736 015206 104004 TYPE
2737 015210 020206 MBCD+2
2738 015212 104013 INSTRG
2739 015214 020172 SNEWS
2740 015216 000000 0
2741 015220 177777 177777
2742 015222 015254 TMP1
2743 015224 123727 016154 000015 CMPB INBUF, #15
2744 015232 001403 BEQ IS
2745 015234 013777 015254 001356 MOV TMP1, @SWR
2746 015242 005037 015256 IS: 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
  
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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 015264 012701 020310 MOV #TEMTAB,R1 ;SET UP POINTER FOR TEMPORARY STORAGE
2759 015272 104011 BINASA: EXTRACT ;EXTRACT ONE DIGIT
2760 015274 062737 000060 015426 ADD #60,DIGIT ;CONVERT FROM BCD TO ASCII
2761 015302 113721 015426 MOVB DIGIT,(R1)+ ;STORE DIGIT
2762 015306 005300 DEC R0 ;IF ALL DIGITS NOT DONE,
2763 015310 001370 BNE BINASA ;CONTINUE
2764 015312 114124 BINASB: MOVB -(R1),(R4)+ ;REVERSE ORDER OF DIGITS
2765 015314 005337 016662 DEC CHRCNT ;IF ALL CHARACTERS ARE NOT
2766 015320 001374 BNE BINASB ;IN ORDER, CONTINUE
2767 015322 112724 000040 MOVB #40,(R4)+ ;INSERT SPACE AFTER LAST DIGIT
2768 015326 000002 RTI ;RETURN TO CALLING ROUTINE
2769
2770 ;SINGLE PRECISION UNSIGNED DIVIDE LOOP
2771
2772 015330 005037 015426 DIVI: CLR DIVIDH
2773 015334 023737 015426 015430 DIVIU: CMP DIVIDH,DIVIS
2774 015342 103027 BHIS DIVIB
2775 015344 012737 000021 015404 MOV #17,DIVCNT
2776 015352 000407 BR DIVIC
2777 015354 023737 015426 015430 DIVIA: CMP DIVIDH,DIVIS
2778 015362 103403 BLO DIVIC
2779 015364 163737 015430 015426 SUB DIVIS,DIVIDH
2780 015372 006137 015424 DIVIC: ROL DIVIDL
2781 015376 006137 015426 ROL DIVIDH
2782 015402 005327 DEC (PC)+
2783 015404 000000 DIVCNT: 0
2784 015406 001362 BNE DIVIA
2785 015410 006037 015426 ROR DIVIDH
2786 015414 005137 015424 COM DIVIDL
2787 015420 000002 RTI
2788 015422 000000 DIVIB: HALT
2789 015424 000000 DIVIDL: 0
2790 015426 000000 DIVIDH: 0
2791 015430 000000 DIVIS: 0
2792
2793 ;SAVE PC OF TEST THAT FAILED AND R0-R5
2794
2795 015432 016637 000004 016656 SVOSP: MOV 4(SP),SAVPC
2796
2797 ;SAVE R0-R5
2798
2799 015440 010537 016652 SVOS: MOV R5,SAVR5
2800 015444 010437 016650 MOV R4,SAVR4
2801 015450 010337 016646 MOV R3,SAVR3
2802 015454 010237 016644 MOV R2,SAVR2
2803 015460 010137 016642 MOV R1,SAVR1
2804 015464 010037 016640 MOV R0,SAVR0
2805 015470 000002 RTI

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2806
2807
2808 ;RESTORE R0-R5
2809 015472 013700 016640 RS05: MOV SAVR0,R0
2810 015476 013701 016642 MOV SAVR1,R1
2811 015502 013702 016644 MOV SAVR2,R2
2812 015506 013703 016646 MOV SAVR3,R3
2813 015512 013704 016650 MOV SAVR4,R4
2814 015516 013705 016652 MOV SAVR5,R5
2815 015522 000002 RTI
2816
2817 ;TELETYPE OUTPUT ROUTINE
2818
2819 015524 017605 000000 TYPER: MOV @ (SP),R5 ;GET POINTER TO MESSAGE (ON STACK)
2820 015530 062716 000002 ADD #2,(SP) ;CORRECT STACK FOR RETURN
2821 015534 105777 001054 TYPERA: TSTB @TPCSR ;WAIT FOR TELEPRINTER READY
2822 015540 100375 BPL TYPERA
2823 015542 122765 000012 177777 CMPB #12,-1(R5) ;WAS LAST ONE A L.F. ??
2824 015550 001406 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 BICB #10,(R5) ;TO 12 OR 15
2840 015632 000770 BR TYPER2 ;TYPE IT
2841
2842
2843 ;OUTPUT FILLERS AFTER <CR> OR <LF> CHAR IS OUT PUTTED.
2844
2845 015634 113737 016720 016722 TYFILL: MOVB FILL,FILLA ;GET FILL COUNT
2846 015642 113777 016721 000746 1$: MOVB FILL+1,@TPDBR ;OUT PUT ONE FILLER
2847 015650 105777 000740 2$: TSTB @TPCSR ;WAIT FOR TTY TO FINISH OUTPUT
2848 015654 100375 BPL 2$ ;BR IF TTY NOT DONE
2849 015656 105337 016722 DECB FILLA ;COUNT ONE FILLER
2850 015662 001367 BNE 1$ ;BR TIL ALL DONE
2851 015664 000207 RTS PC ;RETURN TO CALLER ABOVE
2852
2853 ;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 INSTR:
2860 015666 011605 MOV (SP),R5 ;GET POINTER TO ARGUMENTS
2861 015670 012537 015714 MOV (R5)+,MSG ;GET MESSAGE TO BE TYPED

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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	RS,(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	INSTRB: CLR	SINTFL	
2873	015740	017737	000646	MOV	@TKDBR,TMP1	
2874	015746	142737	000200	BICB	#200,TMP1	
2875	015754	113714	015254	MOVB	TMP1,(R4)	
2876	015760	121427	000007	CMPB	(R4),#7	
2877	015764	001420		BEQ	INSTR	
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	IS	
2882	016002	005037	015254	CLR	TMP1	
2883	016006	000741		BR	INSTR1	
2884	016010	112477	000602	IS: 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		INSTR: TYPE		;TYPE "?" AND RE-REQUEST INPUT
2890	016030	017714		MGM		
2891	016032	000727		BR	INSTR1	
2892						
2893						
2894						
2895	016034	104004		INSTR2: TYPE		;CONVERT ASCII STRING TO OCTAL
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	CHK	
2902	016054	121427	000060	INSTRD: CMPB	(R4),#60	;IS CHARACTER OCTAL DIGIT
2903	016060	002762		BLT	INSTR	;IF 67>=CHAR>=60
2904	016062	121427	000067	CMPB	(R4),#67	;CHARACTER IS OCTAL DIGIT
2905	016066	003357		BGT	INSTR	
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

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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     RD,-(SP)      ;SAVE RD-R5 ON PROCESSOR STACK
2935 016200 010146          MOV     R1,-(SP)
2936 016202 010246          MOV     R2,-(SP)
2937 016204 010346          MOV     R3,-(SP)
2938 016206 010446          MOV     R4,-(SP)
2939 016210 010546          MOV     R5,-(SP)
2940 016212 013746 000024    MOV     24,-(SP)
2941 016216 010637 016654    MOV     SP,SAVSP      ;SAVE STACK POINTER
2942 016222 012737 016234 000024    MOV     #RESTART,24  ;SET UP FOR POWER UP TRAP
2943 016230 000000          HALT
2944 016232 000776          BR     .-2           ;HALT ON POWER DOWN NORMAL
2945
2946          ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
2947
2948 016234 013706 016654          RESTAR: MOV     SAVSP,SP      ;RESTORE STACK POINTER
2949 016240 012605          MOV     (SP)+,R5      ;RESTORE RD-R5
2950 016242 012604          MOV     (SP)+,R4
2951 016244 012603          MOV     (SP)+,R3
2952 016246 012602          MOV     (SP)+,R2
2953 016250 012601          MOV     (SP)+,R1
2954 016252 012600          MOV     (SP)+,R0
2955 016254 012737 016176 000024    MOV     #PFAIL,24    ;SET UP FOR POWER FAILURE
2956 016262 005726          POP1SP
2957 016264 104004          TYPE
2958 016266 020073          MPFAIL
2959 016270 005737 001756    TST     TIPFLG
2960 016274 001002          BNE     RESTA1
2961 016276 000137 001262    JMP     START0
2962 016302 104004          RESTA1: TYPE
2963 016304 020113          MPF1
2964 016306 012746 000340    MOV     #340,-(SP)
2965 016312 005746          PUSH1SP
2966 016314 000137 014334    JMP     TSTENT
2967
2968
2969          ;THE FOLLOWING AUTO VECTORS USING THE FIRST BASE ADDRESS
2970 016320 013746 000020    XOR:   MOV     20,-(SP)  ;SAVE 20
2971 016324 013746 000022    MOV     22,-(SP)  ;SAVE 22
2972 016330 012737 016522 000020    MOV     #25,20    ;IOT INTR VECTOR
2973 016336 012737 000340 000022    MOV     #340,22   ;IOT INTR LVL

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3009
3010                ;INDIRECT POINTERS
3011
3012 016600 000300    DHMVEC: 300                ;MODEM CONTROL INTERRUPT VECTOR
3013 016602 000302    DHMLVL: 302                ;MODEM CONTROL ONTERRUPT PRIORITY
3014 016604 170500    DHMCSR: 170500           ;MODEM CONTROL CONTROL STATUS REGISTER
3015 016606 170502    DHMLSR: 170502           ;MODEM CONTROL CONTROL STATUS REGISTER
3016 016610 177560    TKCSR: 177560
3017 016612 177562    TKDBR: 177562
3018 016614 177564    TPCSR: 177564
3019 016616 177566    TPDBR: 177566
3020 016620 177570    SWR: 177570
3021 016622 177570    DISPLAY:177570
3022
3023                ;PROGRAM VARIABLES
3024
3025 016624 000000    ERRFLG: 0
3026 016626 000000    TRACON: 0
3027 016630 000000    PASCNT: 0
3028 016632 000000    TSTNO: 0
3029 016634 000000    RETURN: 0
3030 016636 000000    ICOUNT: 0
3031 016640 000000    SAVRD: 0
3032 016642 000000    SAVR1: 0
3033 016644 000000    SAVR2: 0
3034 016646 000000    SAVR3: 0
3035 016650 000000    SAVR4: 0
3036 016652 000000    SAVR5: 0
3037 016654 000000    SAVSP: 0
3038 016656 000000    SAVPC: 0
3039 016660 000000    WRDCNT: 0
3040 016662 000000    CHRCNT: 0
3041 016664 020436    TSTPNT: TSTTBO
3042 016666 000000    TSTMAX: 0
3043 016670 000000    LINFLG: 0
3044 016672 000000    LINE: 0
3045 016674 000000    LINORG: 0
3046 016676 000000    LINANS: 0
3047 016700 000000    ANSFLG: 0
3048 016702 000000    ORGFLG: 0
3049 016704 000000    TIME1: 0
3050 016706 000000    TIME2: 0
3051 016710 000000    TIFLG: 0
3052 016712 177777    LINSEL: 177777
3053 016714 000000    SELMSK: 0
3054 016716 000000    SLMSK: 0
3055 016720 000002    FILL: 2                ;FILL CHAR/COUNT
3056 016722 000000    FILLA: 0                ;TEMP STORAGE FOR FILL COUNT
3057 016724 000000    RNGRET: 0
3058
3059 016726 052123 052101 051525 MSTATE: .ASCII ;STATUS ERROR%EXP REC;
3060 016734 042440 051122 051117
3061 016742 021045 054105 020120
3062 016750 020040 051040 041505
3063 016756 100
3064 016757 114 047111 020105 MLINER: .ASCII ;LINE ERROR%EXP REC LINE SEL;

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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	;%""DZDHC-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	MVECTOR:	.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		MGM:	.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	020054	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 ;+Ca;
3181	020153	136	040126		MCONTV: .ASCII ;+Va;
3182	020156	046136	100		MCONTL: .ASCII ;+La;
3183	020161	045	051442	051127	SSWREQ: .ASCII ;X=SWR= a;
3184	020166	020075	040040		
3185	020172	020040	047040	053505	SNEWIS: .ASCII ; NEW= a;
3186	020200	020075	040040		
3187	020204	021045			MBCD: .ASCII ;X=;
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			TYPFR
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			MAITR
3217	020372	013556			CKTRN
3218	020374	013526			MAITR
3219	020376	015156			CNTLU
3220	020400	014152			CKINT
3221	020402	001760			KBDINT
3222	020404	000000			EMTLIM: 0
3223	020406	020436			TSTLST: TSTTB0
3224	020410	020640			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			NI-100-1

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;CALL BY EMT CNTLUU
;CALL BY EMT CKINTT
;CALLBY EMT KBDIN

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

TSTT80:

3289 020612 006164  
 3290 020614 000200  
 3291 020616 006402  
 3292 020620 000200  
 3293 020622 006620  
 3294 020624 004000  
 3295 020626 007002  
 3296 020630 004000  
 3297 020632 007252  
 3298 020634 004000  
 3299 020636 000000  
 3300 020640 007532  
 3301 020642 000001  
 3302 020644 007570  
 3303 020646 004000  
 3304 020650 007746  
 3305 020652 004000  
 3306 020654 010124  
 3307 020656 004000  
 3308 020660 010302  
 3309 020662 004000  
 3310 020664 010460  
 3311 020666 004000  
 3312 020670 010634  
 3313 020672 004000  
 3314 020674 011010  
 3315 020676 004000  
 3316 020700 000000  
 3317 020702 011164  
 3318 020704 000001  
 3319 020706 000000  
 3320 020710 011540  
 3321 020712 000001  
 3322 000001

T33  
 TIMES  
 T34  
 TIMES  
 T35  
 TIMES  
 T36  
 TIMES  
 T37  
 TIMES  
 0  
 TSTTB1: T100  
 1  
 T101  
 TIMES  
 T102  
 TIMES  
 T103  
 TIMES  
 T104  
 TIMES  
 T105  
 TIMES  
 T106  
 TIMES  
 T107  
 TIMES  
 0  
 TSTTB2: T200  
 1  
 0  
 TSTTB3: T300  
 1  
 .END

ANSFLG	016700	DIVI	015330	ICOUNT	016636	LINANS	016676	MPF1	020113
ANSTR	012716	DIVIA	015354	INBUF	016154	LINE	016672	MGM	017714
ANSTRR	013004	DIVIB	015422	INIT1	002214	LINENA=	000001	MREGAO	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
BINARD=	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
CKRING=	104021	ERR	014452	INT1B	002562	LOOPL	014400	MUX1A	004604
CKRNG	013372	ERRCS	014556	INT10	003270	LOOPS	014266	MUX1B	004652
CKRNG1	013436	ERRFLG	016624	INT10A	003352	LOOPX	014330	MUX1C	004710
CKRNG2	013462	ERRGEN	014612	INT10B	003354	LVL =	000004	MUX1D	004722
CKTRAN=	104023	ERRLS	014574	INT11	003356	MAINT =	001000	MUX1E	004742
CKTRN	013556	ERRMSG	014672	INT11A	003440	MBCD	020204	MUX1F	004774
CKTRN1	013672	ERRN	014534	INT11B	003442	MCONTC	020150	MUX11	007570
CKTRN2	013724	ERROR =	104012	INT12	003444	MCONTL	020156	MUX11A	007606
CKTRN3	013764	ERRORC=	104000	INT12A	003526	MCONTV	020153	MUX11B	007636
CKTRN4	014010	ERRORL=	104001	INT12B	003530	MCRLF	017720	MUX11C	007664
CLMIX=	002000	ERRORN=	104016	INT13	003532	MDISC	017405	MUX11D	007676
CLRSCN=	004000	ERRORS=	104015	INT13A	003614	MENT1	004032	MUX11E	007712
CNTLU	015156	ERRORT=	104014	INT13B	003616	MENT1A	004060	MUX11F	007744
CNTLUU=	104025	ERRS	014512	INT2	002564	MENT1B	004110	MUX12	007746
CO =	000100	ERRT	014470	INT2A	002632	MENT1C	004134	MUX12A	007764
COF =	040000	ERR1	014016	INT2B	002636	MENT1D	004142	MUX12B	010014
CONVER=	104010	ERR2	014020	INT3	002640	MENT1E	004174	MUX12C	010042
CS =	000040	ERR3	014022	INT3A	002724	MENT1F	004220	MUX12D	010054
CSF =	020000	ERR4	014024	INT3B	002726	MENT2	004230	MUX12E	010070
CSTR1	002236	ERTAB	014704	INT4	002730	MENT2A	004252	MUX12F	010122
CSTR2	002300	ERTAB0	014752	INT4A	003012	MENT2B	004334	MUX13	010124
CSTR3	002342	ERTAB1	014760	INT4B	003016	MENT2C	004360	MUX13A	010142
CSTR4	002404	ERTAB2	014776	INT5	003020	MENT2D	004372	MUX13B	010172
CSTR5	002446	ERTAB3	015014	INT5A	003102	MENT3	004406	MUX13C	010220
DATA1	014026	ERTAB4	015026	INT5B	003106	MENT3A	004430	MUX13D	010232
DATA2	014030	ERTAB5	015040	INT6	003110	MENT3B	004442	MUX13E	010246
DATA3	014032	EXTRAC=	104011	INT6A	003172	MENT3C	004504	MUX13F	010300
DATA4	014034	FATEX	013006	INT6B	003176	MENT3D	004530	MUX14	010302
DHMCSR	016604	FATRET	013020	INT7	003200	MENT3E	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	MLINE1	017014	MUX15	010460
DISPRE	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	RS05	015472	STRLNA	007552	TYPECL	015622
MUX15E	010576	MUX7B	006462	RO	=%000000	STRTOA	001666	TYPERR	015524
MUX15F	010632	MUX7C	006510	R1	=%000001	ST103A	011164	TYPERA	015534
MUX16	010634	MUX7D	006522	R2	=%000002	ST103B	011226	TYPERR1	015600
MUX16A	010652	MUX7E	006540	R3	=%000003	ST202A	011540	TYPERR2	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	SV05	015440	T10	002640
MUX16E	010752	MUX8B	006672	SAVR0	016640	SV05P	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	MO	= 000040	SAVR5	016652	SW08	= 000400	T103A1	011236
MUX17D	011110	M1	= 000110	SAVSP	016654	SW09	= 001000	T103B	011242
MUX17E	011126	M16	017455	SAV05P=	104005	SW10	= 002000	T103B1	011252
MUX17F	011162	N	= 000300	SCNENA=	000040	SW11	= 004000	T103B2	011256
MUX2	005014	NXTTS	014036	SCNT1	007002	SW12	= 010000	T103C	011262
MUX2A	005042	NO	= 000040	SCNT1A	007042	SW13	= 020000	T103D1	011326
MUX2B	005110	N1	= 000110	SCNT1B	007120	SW14	= 040000	T103D2	011332
MUX2C	005146	N2	= 000202	SCNT1C	007202	SW15	= 100000	T103D3	011336
MUX2D	005160	N3	= 000301	SCNT1D	007222	T	= 000014	T103D4	011342
MUX2E	005200	OCTASC=	104006	SCNT2	007252	TEMTAB	020310	T103E	011346
MUX2F	005232	OCTASN	015070	SCNT2A	007304	TIFLG	016710	T103EN	011522
MUX3	005252	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	SELSK	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	POPRD	= 012600	SETUPS	013136	TRANEX	013022	T13	003110
MUX4E	005674	POP1SP=	005726	SETUP1	013170	TRANS	012562	T14	003200
MUX4F	005726	POP2SP=	022626	SETUP2	013204	TRANX1	013032	T15	003270
MUX5	005746	PS	= 177776	SETUP4	013316	TRMRDY=	000002	T16	003356
MUX5A	005774	PSW	= 177776	SINGLE=	000001	TRNTAB	013070	T17	003444
MUX5B	006026	PUSHRD=	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	RES05	= 104007	STARTN	001574	TSTTBO	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	RINGRET	016724	STORE	016152	TYFILL	015634	T202D1	011716

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	\$NEWS	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

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

