

DH11

CONTROL MULTIPLEXER
MD-11-DZDHK-D

EP-DZDHK-D-DL-B

JUN 1977

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digital

FICHE 1 OF 1

MADE IN USA

This microfiche card contains a grid of frames, each containing technical data. The frames are arranged in approximately 12 rows and 8 columns. Each frame contains a small table or list of data, likely representing a control multiplexer configuration. The data is printed in white on a dark background. The frames contain various alphanumeric strings, possibly representing control codes or data points. The overall layout is a dense grid of small tables.

A small microfiche frame located in the bottom right corner of the card. It contains a small table with several rows and columns of data, similar in format to the other frames on the card.

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IDENTIFICATION

PRODUCT CODE: KAINDEC-11-DZDK-D-D
PROD'CT NAME: MODEM CONTROL
MULTIPLEXER DIAGNOSTIC
DATE : APRIL 1977
MAINTAINER: DIAGNOSTIC GROUP

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1.0 ABSTRACT

THIS PROGRAM IS A TEST OF THE MODEM CONTROL MULTIPLEXER USED WITH THE DH11 OPTI
THE PROGRAM IS DIVIDED INTO FUNCTIONAL TEST GROUPS AS
FOLLOWS:

- GROUP 0: ALL LINE SCANNER AND LINE MULTIPLEXER FUNCTIONS ARE TESTED. NO TEST CONNECTOR IS NEEDED...
- 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

2.1.1 FOR 16 LINE SCANNER TEST

NO ADDITIONAL HARDWARE IS NEEDED. PROGRAM HAS BEEN MODIFIED
TO RUN WITHOUT H361 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

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

TO RECOVER, PERFORM 4.2.2.1.

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

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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 -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.

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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

5.0 OPERATING PROCEDURE

5.1 TEST GROUP 0 16 LINE SCANNER TEST

5.1.1 TEST INITIALIZATION

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

5.1.2 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

- 1) TYPE CONTROL G (<PG>): 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:

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- A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED) IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
- B) IF A CONTROL U <U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

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

5.1.3 PROGRAM AND/OR OPERATOR ACTION

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

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

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

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

5.1.3.4 THIS PROGRAM WILL NO LONGER TRACE TRAP WITH THIS RELEASE

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

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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

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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

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5.3.4 OPERATION SWITCH SETTINGS

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

CONTROL:

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- 1) TYPE CONTROL G (<G>); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE "NEW=" HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:
 - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED) IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
 - B) IF A CONTROL U (<U>) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

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

5.3.5 DATA SET MODE SWITCHING

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

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

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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).

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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

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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
AAAAA BBB
```

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

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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
AAAAA BBBBBB

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
AAAAA=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

6.1.1.6 TIME OUT ERROR

THIS ERROR WILL OCCUR IF THE LINE UNDER TEST DOES NOT INTERRUPT WITHIN A GIVEN TIME FRAME.

FORMAT FOR THIS ERROR IS

XXXXXX TIME OUT WAITING FOR INTERRUPT
LN CSR LSR
AAA BBBBBB CCCCC

WHERE XXXXXX=PC+2 OF ERROR CALL
AAA=FAILING LINE NUMBER
BBBBBB=CONTROL STATUS REGISTER
CCCCC=LINE STATUS REGISTER

6.1.2 REPEATED ERRORS

C02

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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

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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

NO TEST CONNECTOR IS NEEDED TO RUN THIS TEST....

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

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7.2 OPERATING

NONE.

7.3 WHEN ON ACT-11 OR "XOR"
PROGRAM WILL DEFAULT TO 16 LINE SCANNER TEST

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

VECTORS

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

DHMCSR: 170500
DHMLSR: 170502

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

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8.0 EXECUTION TIME

8.1 16 LINE SCANNER TEST

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

8.2 SINGLE LINE CABLE TEST

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

8.3 103A MODEM CONNECT-DISCONNECT TEST

APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE TIME THAT THE ANSWERING DATA SET FIRST DETECTS A RING SIGNAL TO THE TIME THAT THE PROGRAM TYPES "SET SWD1=1 TO DISCONNECT".

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

8.4 202C MODEM CONNECT-DISCONNECT TEST

APPROXIMATELY 1.5 MINUTES WILL ELAPSE BETWEEN THE TIME THAT THE ANSWERING DATA SET DETECTS THE FIRST RING SIGNAL TO THE TIME THAT THE PROGRAM TYPES "SET SWD1=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 ... SWD0 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.

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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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789      .TITLE  DZDMM-D
790      .ENABLE ABS,AMA
791          ;SWITCH REGISTER OPTIONS
792
793
794          ;SW15=1, HALT ON ERROR
795          ;SW14=1, LOOP ON CURRENT TEST
796          ;SW13=1, SUPPRESS ERROR TYPEOUT
797          ;SW12=1, SUPPRESS TRACE TRAPPING (THIS IS INOPERATIVE IN THIS RELEASE)
798          ;SW11=1, SUPPRESS ITERATIONS
799          ;SW10=1, ESCAPE TO NEXT TEST ON ERROR
800          ;SW09=1, FREEZE DATA
801          ;SW01=1, START DISCONNECT SEQUENCE
802          ;SW00=1, RESELECT VECTOR AND CONTROL REGISTER ADDRESS
803          ;AFTER PROGRAM RESTART
804
805          ;STARTING ADDRESS FOR ALL TESTS IS 000200
806          ;RESTART ADDRESS=000200
807
808          ;TESTS AVAILABLE
809
810          ;TEST GROUP 0-
811          ;OFF LINE TESTS USING NO TEST CONNECTOR-FIRST TEST=0
812          ;TEST GROUP 1-
813          ;OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100
814          ;TEST GROUP 2-
815          ;CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200
816          ;TEST GROUP 3-
817          ;CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300
818
819          ;SYMBOL DEFINITIONS
820
821          100000 SW15=100000
822          040000 SW14=40000
823          020000 SW13=20000
824          010000 SW12=10000
825          004000 SW11=4000
826          002000 SW10=2000
827          001000 SW09=1000
828          000400 SW08=400
829          000100 SW06=100
830
831          .NLIST MC,MD,CND
832          .LIST  ME
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;REGISTER DEFINITIONS
R0=%0      ;GENERAL REGISTER
R1=%1      ;GENERAL REGISTER
R2=%2      ;GENERAL REGISTER
R3=%3      ;GENERAL REGISTER
R4=%4      ;GENERAL REGISTER
R5=%5      ;GENERAL REGISTER
SP=%6      ;PROCESSOR STACK POINTER
PC=%7      ;PROGRAM COUNTER

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

;CONTROL STATUS REGISTER BIT FUNCTIONS
BUSY=20    ;LINE SCANNER RUNNING
SCNENA=40  ;LINE SCANNER ENABLE
INTENA=100 ;INTERRUPT ENABLE
DONE=200   ;SCANNER DONE
STEP=400   ;CAUSES LINE COUNTER TO BE INCREMENTED BY 1 COUNT
MAINT=1000 ;FORCES IS TO INPUT OF SCRATCH PAD MEMORY
CLMUX=2000 ;CLEAR MULTIPLEXER FUNCTION FLIPFLOPS
CLSCN=4000 ;CLEARS SCANNER SCRATCHPAD MEMORY
SECRXF=10000 ;SECONDARY RECEIVE TRANSITION WAS DETECTED BY SCANNER
CSF=20000  ;CLEAR TO SEND TRANSITION WAS DETECTED BY SCANNER
COF=40000  ;CARRIER TRANSITION WAS DETECTED BY SCANNER
RINGF=100000 ;RING SIGNAL WAS DETECTED BY SCANNER

;LINE REGISTER BIT FUNCTIONS
LINENA=1   ;=1, RECOGNIZE TRANSITIONS ON THIS LINE
TRMRDY=2   ;=1, SEND TERMINAL READY TO MODEM
RS=4       ;=1, SEND REQUEST TO SEND TO MODEM
SECTX=10   ;=1, SEND SECONDARY TRANSMIT TO MODEM
SECRX=20   ;=1, SECONDARY RECEIVE TURNED ON BY MODEM
CS=40      ;=1, CLEAR TO SEND TURNED ON BY MODEM
CO=100     ;=1, CARRIER TURNED ON BY MODEM
RING=200   ;=1, RING TURNED ON BY MODEM

;SOFTWARE TRANSITION FLAGS
XC0=4      ;CARRIER TRANSITION WAS DETECTED
XCS=2      ;CLEAR TO SEND TRANSITION WAS DETECTED
XSCRX=1    ;SECONDARY RECEIVE TRANSITION WAS DETECTED

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; INSTRUCTION DEFINITIONS

005746	PUSH1SP=5746	; DECREMENT PROCESSOR STACK 1 WORD
005726	POP1SP=5726	; INCR ENT PROCESSOR STACK 1 WORD
010046	PUSHRO=10046	; SAVE RO ON STACK
012600	POPPO=12600	; RESTORE RO FROM STACK
024646	PUSH2SP=24646	; DECRE ENT STACK TWICE
022626	POP2SP=22626	; INCREMENT STACK TWICE

; ENT DEFINITION TABLE

104000	ERRORC=ENT+X	; CONTROL STATUS ERROR SERVICE
104001	ERRORL=ENT+X	; LINE STATUS ERROR SERVICE
104002	SCOPE=ENT+X	; SCOPE LOOP AND ITERATION SERVICE
104003	SCOPEF=ENT+X	; DATA FREEZE SERVICE
104004	TYPE=ENT+X	; TELETYPE OUTPUT
104005	SAVOSP=ENT+X	; SAVE RO-R5, PC+2 OF CALL
104006	OCTASC=ENT+X	; CONVERT DATA TO ASCII AND TYPE
104007	RESOS=ENT+X	; RESTORE RO-R5
104010	CONVERT=ENT+X	; ASCII CONVERSION ROUTINE
104011	EXTRACT=ENT+X	; DIGIT EXTRACTION ROUTINE
104012	ERROR=ENT+X	; TYPE PC OF FAILING TESTS ONLY
104013	INSTRG=ENT+X	; INPUT OCTAL DATA STRING
104014	ERRORT=ENT+X	; TRANSITION ERROR
104015	ERRORS=ENT+X	; ON LINE STATUS ERROR
104016	ERRORN=ENT+X	; FATAL TRANSITION
104017	GETLNS=ENT+X	; INPUT LINE NUMBERS
104020	SETUP=ENT+X	; SET UP FOR ON LINE TEST
104021	CKRING=ENT+X	; CHECK FOR RING ON CORPERT LINE
104022	WAITRN=ENT+X	; WAIT FOR TRANSITIONS
104023	CKTRAN=ENT+X	; CHECK TRANSITIONS
104024	WAITS=ENT+X	; DELAY FOR TRANSIENTS
104025	CNTLUU=ENT+X	; CHANGE SWREG ROUTINE
104026	CKINTT=ENT+X	; CHECK FOR INTERRUPTS-FLAG STYLE
104027	KBOIN=ENT+X	; FAKE INTERRUPT ENTRY POINT
104030	ERRINT=ENT+X	; TIME OUT ERROR FOR INTERRUPTS

K02

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```
923  
924  
925          000000          ;TRAPCATCAER FOR ILLEGAL INTERRUPTS  
926          000200          :=0  
927                                     .REPT 200  
928                                     .+2  
929                                     HALT  
                                     .ENDR
```


L02

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930  
931  
932  
933  
934 000024 015130  
935 000026 000340  
936 000030 012770  
937 000032 000340  
938  
939 000046 012752  
940  
941  
942 000060 000060  
943 000060 001760  
944 000062 000340  
945  
946 000174 000000  
947 000176 000000  
948  
949  
950 000200 000200 001100  
951  
952  
953
```

 ; STANDARD INTERRUPT VECTORS

 .=24
 PFAIL ; POWER FAIL HANDLER
 340 ; SERVICE AT LEVEL 7
 EMTSRV ; EMT DISPATCH SERVICE
 340 ; SERVICE AT LEVEL 7

 .=46
 LOGICAL ; ACT11?

 .=60
 KBDINT ; KEYBOARD MONITOR
 340 ; SERVICE AT LEVEL 7

 .=174
 DISPREG: 0
 SWREG: 0

 .=200
 JMP START ; GO TO START OF PROGRAM

M02

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955
956      001100      . =1100
957      001100      STACK:
958      001100      012737 015130 000024  START:  MOV      #PFail,24      ;SET UP POWER FAIL
959                                     ;INTERRUPT SERVICE VECTOR
960      001106      005037 001756      CLR      TIPFLG      ;CLEAR TEST IN PROGRESS FLAG
961      001112      005077 014424      CLR      @TKCSR
962      001116      012706 001100      MOV      @STACK,SP      ;SET UP STACK POINTER
963
964      001122      013746 000006      SUSWR:  MOV      @#6,-(SP)      ;SAVE VECTORS
965      001126      013746 000004      MOV      @#4,-(SP)
966      001132      012737 001152 000004      MOV      @#4,@#4      ;SET UP FOR TIMEOUT
967      001140      022777 177777 014404      CMP      @-1,@SWR      ;REFERENCE HARDWARE SWITCH REGISTER
968      001146      001402      BEQ      65$
969      001150      000407      BR
970      001152      022626      64$:  CMP      (SP)+,(SP)+      ;ADJUST STACK
971      001154      012737 000176 015552      65$:  MOV      @SWREG,SWR      ;POINT TO SOFTWARE SWITCH REG
972      001162      012737 000174 015554      MOV      @DISPREG,DISPLAY      ;POINT TO SOFT DISPLAY REG
973      001170      012637 000004      66$:  MOV      (SP)+,@#4      ;RESTORE VECTORS
974      001174      012637 000006      MOV      (SP)+,@#6
975      001200      012777 000100 014334      MOV      @INTENA,@TKCSR      ;ENABLE TELETYPE INTERRUPTS
976      001206      005037 001252      CLR      XFLAG      ;XOR = NO
977      ;*****
978      ;REPLACE THE FOLLOWING BRANCH WITH A "NOP" (240) TO ACTIVATE "XOR" CODE
979      ;*****
980      001212      000423      BR      STARTO      ;SKIP XOR STUFF
981      001214      013746 000004      MOV      4,-(SP)      ;SAVE 4
982      001220      012737 001254 000004      MOV      @XORSVC,4      ;SET UP SVC ROUTINE
983      001226      005737 177060      TST      177060      ;GOT AN XOR TESTER OUT THERE ?
984      001232      012637 000004      MOV      (SP)+,4      ;YES
985      001236      005137 001252      COM      XFLAG      ;XOR = YES
986      001242      004737 015252      JSR      PC,XOR      ;AUTO VECTOR
987      001246      000137 001262      JMP      STARTO      ;RESTORE TRAPCATCHER
988      001252      000000      XFLAG:  0      ;XOR FLAG
989      001254      022626      XORSVC: POP2SP
990      001256      012637 000004      MOV      (SP)+,4 ;RESTORE 4
991      001262      005737 015642      STARTO: TST      TIFLG      ;TYPED TITLE?
992      001266      001005      BNE      .+14      ;YES
993      001270      104004      TYPE      ;TYPE "MODEM CONTROL DIAGNOSTIC"
994      001272      016521      MTITLE
995      001274      012737 000001 015642      MOV      @1,TIFLG      ;SET TITLE TYPED FLAG
996      001302      005737 001252      TST      XFLAG      ;X OR ?
997      001306      100422      BMI      VECSTR      ;RESTORE TRAPCATCHER
998      001310      005737 000042      TST      42      ;ACT 11?
999      001314      001403      BEQ      START1      ;NO
1000      001316      004737 015252      JSR      PC,XOR      ;YES AUTO VECTOR
1001      001322      000414      BR      VECSTR      ;GET VECTOR AND REGISTER ADDRESS
1002      001324      005737 000042      START1: TST      @#42      ;UNDER MONITOR?
1003      001330      001005      BNE      1$
1004      001332      022737 000176 015552      CMP      @SWREG,SWR      ;USING SWREG?
1005      001340      001001      BNE      1$
1006      001342      104025      CNTLUU
1007      001344      032777 000001 014200      1$:  BIT      @1,@SWR      ;IF SW BIT 0=1, ON PROGRAM RESTART
1008      001352      001510      BEQ      STARTN      ;INPUT VECTOR AND REGISTER ADDRESSES
1009      001354      012706 001100      VECSTR: MOV      @STACK,SP      ;SET UP PROCESSOR STACK POINTER
1010      001360      012737 000300 012676      MOV      @300,DAT1      ;ADDRESS OF FIRST FLOATING VECTOR

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N02

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1011	001366	012737	000302	012700		MOV	#302, DATA2	; ADDRESS OF STATUS WORD
1012	001374	013777	012700	011274	VECSTA:	MOV	DATA2, #DATA1	; MOVE ADDRESS OF STATUS WORD TO VECTOR
1013	001402	005077	011272			CLR	DATA2	; CLEAR STATUS WORD
1014								; (FOR HALT ON ILLEGAL INTERRUPT)
1015	001406	062737	000004	012676		ADD	#4, DATA1	; NEXT VECTOR
1016	001414	062737	000004	012700		ADD	#4, DATA2	; NEXT STATUS WORD
1017	001422	023727	012676	001000		CMP	DATA1, #1000	; IS TABLE CLEARED
1018	001430	001361				BNE	VECSTA	; IF NOT, CONTINUE
1019	001432	005737	001252			TST	XFLAG	
1020	001436	100523				BMI	TSTGC	; XOR ?
1021	001440	005737	000042			TST	42	; YES
1022	001444	001120				BNE	TSTGO	; ACT 11 ?
1023	001446	104013				INSTRG		; GET VECTOR ADDRESS
1024	001450	016605				MVECTOR		; MESSAGE "VECTOR ADDRESS--"
1025	001452	000300				300		; LOWER LIMIT FOR ADDRESS
1026	001454	000774				774		; UPPER LIMIT FOR ADDRESS
1027	001456	015532				DHIVEC		; STORAGE FOR ADDRESS
1028	001460	032737	000003	015532	1\$:	BIT	#3, DHIVEC	; TEST 2 LSB OF ADDRESS
1029	001466	001404				BEQ	VECST1	; IF 0, CONTINUE
1030	001470	012716	001460			MOV	#1\$, (SP)	
1031	001474	000137	014760			JMP	INSTR	; INCORRECT ADDRESS, TRY AGAIN
1032	001500	013737	015532	015534	VECST1:	MOV	DHIVEC, DHMLVL	; GENERATE ADDRESS OF
1033	001506	062737	000002	015534		ADD	#2, DHMLVL	; INTERRUPT STATUS WORD
1034	001514	104013				INSTRG		; GET ADDRESS OF CONTROL REGISTER
1035	001516	016627				MREGAD		; MESSAGE "REGISTER ADDRESS--"
1036	001520	170500				170500		; LOWER LIMIT FOR ADDRESS
1037	001522	177777				177777		; UPPER LIMIT FOR ADDRESS
1038	001524	015536				DHMCSR		; STORAGE FOR ADDRESS
1039	001526	032737	000007	015536	1\$:	BIT	#7, DHMCSR	; IF 3 LSB ARE NOT 0
1040	001534	001404				BEQ	REGST1	
1041	001536	012716	001526			MOV	#1\$, (SP)	
1042	001542	000137	014760			JMP	INSTR	; INCORRECT ADDRESS, TRY AGAIN
1043	001546	013737	015536	015540	REGST1:	MOV	DHMCSR, DHMLSR	; SET UP ADDRESS OF LINE STATUS REGISTER
1044	001554	062737	000002	015540		ADD	#2, DHMLSR	
1045	001562	104013				INSTRG		; GET LINE SELECT PARAMETER
1046	001564	016663				MLINSL		
1047	001566	000000				0		
1048	001570	177777				177777		
1049	001572	015644				LINSEL		

1050											
1051	001574	012706	001100		STARTN:	MOV	#STACK, SP				; SET UP PROCESSOR STACK
1052	001600	104013				INSTRG					; GET TEST NUMBER
1053	001602	016715				MTEST					; MESSAGE "TEST-"
1054	001604	000300				0					; LOWER LIMIT FOR TEST NUMBER
1055	001606	000777				777					; UPPER LIMIT FOR TEST NUMBER
1056	001610	015564				TSTNO					; STORAGE FOR TEST NUMBER
1057	001612	013705	015564		X1A:	MOV	TSTNO, RS				; GET TEST NUMBER
1058	001616	042705	177077			BIC	#177077, RS				; EXTRACT TEST GROUP NUMBER
1059	001622	006205				ASR	RS				
1060	001624	006205				ASR	RS				
1061	001626	006205				ASR	RS				
1062	001630	006205				ASR	RS				
1063	001632	006205				ASR	RS				
1064	001634	016537	017456	015620		MOV	GR0(R5), TSTMAX				; GET HIGHEST TEST IN GROUP
1065	001642	016537	017436	015616		MOV	TSTLST(R5), TSTPNT				; GET POINTER TO TEST TABLE
1066	001650	005737	015616			TST	TSTPNT				; IF 0, INVALID TEST GROUP
1067	001654	001004				BNE	STRTOA				
1068	001656	012716	001612		X1B:	MOV	#X1A, (SP)				
1069	001662	000137	014760			JMP	INSTR				; TRY AGAIN
1070	001666	042737	177700	015564	STRTOA:	BIC	#177700, TSTNO				; GET NUMBER OF FIRST TEST
1071											; TO BE EXECUTED IN SELECTED GROUP
1072	001674	023737	015564	015620		CMP	TSTNO, TSTMAX				; IS NUMBER TOO LARGE
1073	001702	003401				BLE	TSTGO				
1074	001704	000764				BR	X1B				
1075	001706	012746	000340		TSTGO:	MOV	#340, -(SP)				; SET UP PRIORITY LEVEL
1076	001712	005746				PUSH	SP				
1077	001714	000005				RESET					
1078	001716	012737	002202	002204		MOV	#DMYRTI, KRET				; SET UP DUMMY KEYBOARD RETURN
1079	001724	005037	015622			CLR	LINFLG				; CLEAR LINE SELECTED FLAG
1080	001730	005037	015560			CLR	TRACON				; CLEAR TRACE TRAP FLAG
1081	001734	005037	015562			CLR	PASCNT				; CLEAR PASS COUNT
1082	001740	104004				TYPE					
1083	001742	016731				MCRLF					
1084	001744	012737	000001	001756	IS:	MOV	#1, TIPFLG				; SET TEST IN PROGRESS FLAG
1085	001752	000137	013212			JMP	TSTENT				; START TESTING
1086	001756	000000			TIPFLG:	0					

```

1087
1088                                     ;TELETYPE KEYBOARD INTERRUPT SERVICE ROUTINE
1089
1090 001760 005037 001756          KBDINT: CLR      TIPFLG          ;CLEAR TEST IN PROGRESS FLAG
1091 001764 005037 014206          CLR      TMP1
1092 001770 005037 002206          CLR      SINTFL          ;CLEAR SOFTWARE INTERRUPT FLAG
1093 001774 117737 013544          MOV     @TKDBR, TMP1
1094 002002 142737 000200 014206  BIC     #200, TMP1
1095 010110 122737 000003 014206  CMP     #3, TMP1          ;IF <CONTROL C> WAS TYPED
1096 010116 001011          BNE     KBDIN1          ;TYPE "C" AND
1097 010120 104004          TYPE
1098 010122 017161          MCONTC
1099 010124 022626          POP2SP
1100 010126 005077 013504          CLR     @DMCSR
1101 010132 005077 013504          CLR     @TKCSR
1102 010136 000137 001574          JMP     STARTN
1103 002042 122737 000026 014206  KBDIN1: CMP     #26, TMP1          ;IF <CONTROL V> WAS TYPED
1104 002050 001011          BNE     KBDIN2          ;TYPE "V" AND GET NEW
1105 002052 104004          TYPE
1106 002054 017164          MCONTV
1107 002056 022626          POP2SP
1108 002060 005077 013452          CLR     @DMCSR
1109 002064 005077 013452          CLR     @TKCSR
1110 002070 000137 001354          JMP     VECSTR
1111 002074 122737 000014 014206  KBDIN2: CMP     #14, TMP1          ;IF <CONTROL L> WAS TYPED
1112 002102 001015          BNE     KBDIN3          ;TYPE "L" AND GET NEW
1113 002104 104004          TYPE
1114 002106 017167          MCONTL
1115 002110 022737 002202 002204  CMP     @DMYRTI, KRET
1116 002116 001431          BEQ     DMYRTI
1117 002120 022626          POP2SP
1118 002122 005077 013410          CLR     @DMCSR
1119 002126 005077 013410          CLR     @TKCSR
1120 002132 000177 000046          JMP     @KRET
1121 002136 005737 000042          KBDIN3: TST     @42
1122 002142 001011          BNE     IS
1123 002144 022737 000176 015552  CMP     @SWREG, SWR
1124 002152 001005          BNE     IS
1125 002154 122737 000007 014206  CMP     #7, TMP1          ;IS IT <G>
1126 002162 001001          BNE     IS
1127 002164 104025          CNTLW
1128 002166 012737 000001 002206  IS:    MOV     #1, SINTFL          ;SET SOFTWARE INTERRUPT FLAG
1129 002174 012737 000001 001756  MOV     #1, TIPFLG          ;SET TEST IN PROGRESS FLAG
1130 002202 000002          DMYRTI: RTI
1131          .EVEN
1132 002204 000000          KRET:   0
1133 002206 000000          SINTFL: 0

```


E03

```

1188
1189 ;VERIFY THAT "SCAN ENABLE" CAN BE SET AND CLEARED.
1190
1191 002404 012777 000040 013124 T4: ;REFERENCE DESIGNATION
1192 002404 032777 000040 013116 CSTR4: MOV #SCNENA,20HMCSR ;SET SCAN ENABLE
1193 002412 032777 000040 013116 BIT #SCNENA,20HMCSR ;WAS SCAN ENABLE SET
1194 002420 001001 BNE .+4
1195
1196 002422 104012 ERROR ;NO ERROR
1197 002424 042777 000040 013104 BIC #SCNENA,20HMCSR ;CLEAR SCAN ENABLE
1198 002432 032777 000040 013076 BIT #SCNENA,20HMCSR ;WAS SCAN ENABLE CLEARED
1199 002440 001401 BEQ .+4
1200
1201 002442 104012 ERROR ;NO ERROR
1202 002444 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP
1203
1204 ;VERIFY THAT "BUSY" IS SET WHEN "SCAN ENABLE" IS SET
1205 ;VERIFY THAT "BUSY" IS CLEARED WHEN "SCAN ENABLE" IS CLEARED
1206
1207 002446 012777 000040 013062 T5: ;REFERENCE DESIGNATION
1208 002446 032777 000020 013054 CSTR5: MOV #SCNENA,20HMCSR ;SET SCAN ENABLE
1209 002454 032777 000020 013054 BIT #BUSY,20HMCSR ;IS BUSY BIT SET
1210 002462 001001 BNE .+4
1211 002464 104012 ERROR ;BUSY NOT SET, ERROR
1212 002466 042777 000040 013042 BIC #SCNENA,20HMCSR ;CLEAR SCAN ENABLE
1213 002474 032777 000020 013034 BIT #BUSY,20HMCSR ;IS BUSY BIT CLEARED
1214 002502 001401 BEQ .+4
1215 002504 104012 ERROR ;BUSY NOT CLEARED, ERROR
1216 002506 104002 SCOPE ;CHECK FOR LOOP, ITERATIONS
1217
1218 ;VERIFY THAT SETTING "DONE" DOES NOT CAUSE AN
1219 ;INTERRUPT IF "INTERRUPT ENABLE" IS CLEARED.
1220
1221 002510 052737 000340 177776 T6: ;REFERENCE DESIGNATION
1222 002510 005077 013014 INT1: BIS #340,PS ;LOCK OUT INTERRUPTS
1223 002516 012777 002556 013002 CLR 20HMCSR ;CLEAR CONTROL REGISTER
1224 002522 013777 177776 012776 MOV #INT1A,20HMVEC ;SET UP INTERRUPT SERVICE ADDRESS
1225 002530 013777 177776 012776 MOV PS,20HMLVL ;SET UP INTERRUPT PRIORITY
1226 002536 052777 000200 012772 BIS #DONE,20HMCSR ;SET DONE
1227 002544 042737 000340 177776 BIC #340,PS ;ALLOW INTERRUPTS
1228 002552 000240 NOP ;DELAY FOR INTERRUPT
1229 002554 000402 BR INT1B ;NO INTERRUPT, CONTINUE
1230 002556 022626 INT1A: POP2SP ;RESTORE STACK, INTERRUPT
1231 002560 104012 ERROR ;OCCURED, ERROR
1232 002562 104002 INT1B: SCOPE ;CHECK FOR LOOP, ITERATIONS

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F03

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1233
1234
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1236
1237 002564
1238 002564 052737 000340 177776 T7:
1239 002572 005077 012740 INT2: BIS #340,PS
1240 002576 012777 002632 012726 CLR #340,PS
1241 002604 013777 177776 012722 MOV #INT2A,#340,PS
1242 002612 052777 000100 012716 MOV #INT2A,#340,PS
1243 002620 042737 000340 177776 BIS #INTENA,#340,PS
1244 002626 000240 NOP
1245 002630 000402 BR INT2B
1246 002632 022626 INT2A: POP2SP
1247 002634 104012 ERROR
1248 002636 104002 INT2B: SCOPE
1249
1250
1251
1252
1253 002640
1254 002640 052737 000340 177776 T10:
1255 002646 005077 012664 INT3: BIS #340,PS
1256 002652 012777 002724 012652 CLR #340,PS
1257 002660 012777 000100 012650 MOV #INT3A,#340,PS
1258 002666 013777 177776 012640 MOV #INTENA,#340,PS
1259 002674 042737 000340 177776 MOV #PS,#340,PS
1260 002702 052777 000200 012626 BIC #340,PS
1261 002710 000240 NOP
1262 002712 000240 NOP
1263 002714 005077 012616 CLR #340,PS
1264 002720 104012 ERROR
1265 002722 000401 BR INT3B
1266 002724 022626 INT3A: POP2SP
1267 002726 104002 INT3B: SCOPE
1268
1269
1270
1271
1272
1273 002730
1274 002730 005077 012602 T11:
1275 002734 042737 000340 177776 INT4: CLR #340,PS
1276 002742 052737 000340 177776 BIC #340,PS
1277 002750 012777 003012 012554 BIS #340,PS
1278 002756 013777 177776 012550 MOV #INT4A,#340,PS
1279 002764 012777 000100 012544 MOV #INTENA,#340,PS
1280 002772 052777 000200 012536 BIS #DONE,#340,PS
1281 003000 000240 NOP
1282 003002 000240 NOP
1283 003004 005077 012526 CLR #340,PS
1284 003010 000402 BR INT4B
1285 003012 022626 INT4A: POP2SP
1286 003014 104012 ERROR
1287 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

```



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1288
1289
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1293 003020 005077 012512
1294 003024 042737 000340 177776
1295 003032 052737 000300 177776
1296 003040 012777 003102 012464
1297 003046 013777 177776 012460
1298 003054 012777 000100 012454
1299 003062 052777 000200 012446
1300 003070 000240
1301 003072 000240
1302 003074 005077 012436
1303 003100 000402
1304 003102 022626
1305 003104 104012
1306 003106 104002
1307
1308
1309
1310
1311 003110
1312 003110 005077 012422
1313 003114 042737 000340 177776
1314 003122 052737 000240 177776
1315 003130 012777 003172 012374
1316 003136 013777 177776 012370
1317 003144 012777 000100 012364
1318 003152 052777 000200 012356
1319 003160 000240
1320 003162 000240
1321 003164 005077 012346
1322 003170 000402
1323 003172 022626
1324 003174 104012
1325 003176 104002
1326
1327
1328
1329
1330 003200
1331 003200 005077 012332
1332 003204 042737 000340 177776
1333 003212 052737 000200 177776
1334 003220 012777 003262 012304
1335 003226 013777 177776 012300
1336 003234 012777 000100 012274
1337 003242 052777 000200 012266
1338 003250 000240
1339 003252 000240
1340 003254 005077 012256
1341 003260 000402
1342 003262 022626
1343 003264 104012
  
```

```

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

T12:
INT5: CLR 20HMCSR ;REFERENCE DESIGNATION
      BIC #340,PS ;CLEAR CONTROL REGISTER
      BIS #300,PS ;SET PROCESSOR PRIORITY
      ;TO LEVEL 6.
      MOV #INT5A,20HMVEC ;SET UP INTERRUPT SERVICE ADDRESS
      MOV PS,20HMLVL ;SET UP INTERRUPT SERVICE LEVEL
      MOV #INT5A,20HMCSR ;SET INTERRUPT ENABLE
      BIS #DONE,20HMCSR ;GENERATE INTERRUPT
      NOP ;DELAY FOR INTERRUPT
      NOP
      CLR 20HMCSR
      BR INT5B ;NO INTERRUPT, CONTINUE

INT5A: POP2SP ;RESTORE STACK
      ERROR ;INTERRUPT OCCURED, ERROR
INT5B: SCOPE ;CHECK FOR ITERATION, LOOP

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

T13:
INT6: CLR 20HMCSR ;REFERENCE DESIGNATION
      BIC #340,PS ;CLEAR CONTROL REGISTER
      BIS #240,PS ;SET PROCESSOR PRIORITY
      ;TO LEVEL 5.
      MOV #INT6A,20HMVEC ;SET UP INTERRUPT SERVICE ADDRESS
      MOV PS,20HMLVL ;SET UP INTERRUPT SERVICE LEVEL
      MOV #INT6A,20HMCSR ;SET INTERRUPT ENABLE
      BIS #DONE,20HMCSR ;GENERATE INTERRUPT
      NOP ;DELAY FOR INTERRUPT
      NOP
      CLR 20HMCSR
      BR INT6B ;NO INTERRUPT, CONTINUE

INT6A: POP2SP ;RESTORE STACK
      ERROR ;INTERRUPT OCCURED, ERROR
INT6B: SCOPE ;CHECK FOR ITERATION, LOOP

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

T14:
INT7: CLR 20HMCSR ;REFERENCE DESIGNATION
      BIC #340,PS ;CLEAR CONTROL REGISTER
      BIS #200,PS ;SET PROCESSOR PRIORITY
      ;TO LEVEL 4.
      MOV #INT7A,20HMVEC ;SET UP INTERRUPT SERVICE ADDRESS
      MOV PS,20HMLVL ;SET UP INTERRUPT SERVICE LEVEL
      MOV #INT7A,20HMCSR ;SET INTERRUPT ENABLE
      BIS #DONE,20HMCSR ;GENERATE INTERRUPT
      NOP ;DELAY FOR INTERRUPT
      NOP
      CLR 20HMCSR
      BR INT7B ;NO INTERRUPT, CONTINUE

INT7A: POP2SP ;RESTORE STACK
      ERROR ;INTERRUPT OCCURED, ERROR
  
```

H03

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1344 003266 104002

INT7B: SCOPE

;CHECK FOR ITERATION, LOOP

```

1345
1346
1347
1348
1349
1350 003270
1351 003270 005077 012242
1352 003274 042737 000340 177776
1353 003302 012777 003352 012222
1354 003310 005077 012220
1355 003314 052737 000000 177776
1356 003322 012777 000100 012206
1357 003330 052777 000200 012200
1358 003336 000240
1359 003340 000240
1360 003342 005077 012170
1361 003346 104012
1362 003350 000401
1363 003352 022626
1364 003354 104002
1365
1366
1367
1368
1369 003356
1370 003356 005077 012154
1371 003362 042737 000340 177776
1372 003370 012777 003440 012134
1373 003376 005077 012132
1374 003402 052737 000040 177776
1375 003410 012777 000100 012120
1376 003416 052777 000200 012112
1377 003424 000240
1378 003426 000240
1379 003430 005077 012102
1380 003434 104012
1381 003436 000401
1382 003440 022626
1383 003442 104002
1384
1385
1386
1387
1388 003444
1389 003444 005077 012066
1390 003450 042737 000340 177776
1391 003456 012777 003526 012046
1392 003464 005077 012044
1393 003470 052737 000100 177776
1394 003476 012777 000100 012032
1395 003504 052777 000200 012024
1396 003512 000240
1397 003514 000240
1398 003516 005077 012014
1399 003522 104012
1400 003524 000401

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

T15:
INT10: CLR 20HMCSR ;REFERENCE DESIGNATION
        BIC 8340,PS ;CLEAR CONTROL REGISTER
        MOV #INT10A,20HMVEC ;ALLOW INTERRUPTS
        CLR 20HMLVL ;SET UP INTERRUPT SERVICE ADDRESS
        BIS #0,PS ;SET UP INTERRUPT SERVICE PRIORITY
        MOV #INTENA,20HMCSR ;SET PROCESSOR PRIORITY TO LEVEL 0.
        BIS #DONE,20HMCSR ;SET INTERRUPT ENABLE
        NOP ;GENERATE INTERRUPT
        NOP ;WAIT FOR INTERRUPT

        CLR 20HMCSR
        ERROR ;NO INTERRUPT, ERROR
        BR INT10B ;CONTINUE
INT10A: POP2SP ;INTERRUPT OCCURED, RESTORE STACK
INT10B: SCOPE ;CHECK FOR INTERACTIONS, LOOP.

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

T16:
INT11: CLR 20HMCSR ;REFERENCE DESIGNATION
        BIC 8340,PS ;CLEAR CONTROL REGISTER
        MOV #INT11A,20HMVEC ;ALLOW INTERRUPTS
        CLR 20HMLVL ;SET UP INTERRUPT SERVICE ADDRESS
        BIS #40,PS ;SET UP INTERRUPT SERVICE PRIORITY
        MOV #INTENA,20HMCSR ;SET PROCESSOR PRIORITY TO LEVEL 1.
        BIS #DONE,20HMCSR ;SET INTERRUPT ENABLE
        NOP ;GENERATE INTERRUPT
        NOP ;WAIT FOR INTERRUPT

        CLR 20HMCSR
        ERROR ;NO INTERRUPT, ERROR
        BR INT11B ;CONTINUE
INT11A: POP2SP ;INTERRUPT OCCURED, RESTORE STACK
INT11B: SCOPE ;CHECK FOR INTERACTIONS, LOOP.

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

T17:
INT12: CLR 20HMCSR ;REFERENCE DESIGNATION
        BIC 8340,PS ;CLEAR CONTROL REGISTER
        MOV #INT12A,20HMVEC ;ALLOW INTERRUPTS
        CLR 20HMLVL ;SET UP INTERRUPT SERVICE ADDRESS
        BIS #100,PS ;SET UP INTERRUPT SERVICE PRIORITY
        MOV #INTENA,20HMCSR ;SET PROCESSOR PRIORITY TO LEVEL 2.
        BIS #DONE,20HMCSR ;SET INTERRUPT ENABLE
        NOP ;GENERATE INTERRUPT
        NOP ;WAIT FOR INTERRUPT

        CLR 20HMCSR
        ERROR ;NO INTERRUPT, ERROR
        BR INT12B ;CONTINUE
    
```

J03

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DZDHRD.P11 02-MAY-77 11:56

1401 003526 022626
1402 003530 104002

INT12A: POP2SP
INT12B: SCOPE

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

K03

DZDMK-D MACY11 27(1006) 02-MAY-77 11:58 PAGE 35
 DZDMK0.P11 02-MAY-77 11:56

1403									
1404									
1405									
1406									
1407	003532					T20:			
1408	003532	005077	012000			INT13:	CLR	@DMCSR	:REFERENCE DESIGNATION
1409	003536	042737	000340	177776			BIC	#340,PS	:CLEAR CONTROL REGISTER
1410	003544	012777	003614	011760			MOV	#INT13A,@DMVEC	:ALLOW INTERRUPTS
1411	003552	005077	011756				CLR	@DMPLVL	:SET UP INTERRUPT SERVICE ADDRESS
1412	003556	052737	000140	177776			BIS	#140,PS	:SET UP INTERRUPT SERVICE PRIORITY
1413	003564	012777	000100	011744			MOV	#INTENA,@DMCSR	:SET PROCESSOR PRIORITY TO LEVEL 3.
1414	003572	052777	000200	011736			BIS	#DONE,@DMCSR	:SET INTERRUPT ENABLE
1415	003600	000240					NOP		:GENERATE INTERRUPT
1416	003602	000240					NOP		:WAIT FOR INTERRUPT
1417	003604	005077	011726				CLR	@DMCSR	
1418	003610	104012					ERROR		:NO INTERRUPT, ERROR
1419	003612	000401					BR	INT13B	:CONTINUE
1420	003614	022626				INT13A:	POP2SP		:INTERRUPT OCCURED, RESTORE STACK
1421	003616	104002				INT13B:	SCOPE		:CHECK FOR INTERATIONS, LOOP.

L03

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1422
1423
1424
1425
1426 003620
1427 003620 005077 011712 T21:
1428 003624 042737 000340 177776 LINT1: CLR 20HMCSR
1429 003632 012737 000001 015646 BIC #340,PS
1430 003640 005005 CLR RS
1431 003642 012700 000020 MOV #1,SELMSK
1432 003646 033737 015646 015644 LINT1A: CLR RS
1433 003654 001407 BEQ #16,R0
1434 003656 010577 011654 MOV SELMSK,LINSEL
1435 003662 017704 011650 LINT1B: BIT LINT1B
1436 003666 020504 CMP RS,20HMCSR
1437 003670 001401 BEQ RS,R4
1438 003672 104000 ERRORC LINT1B
1439 003674 104003 LINT1B: SCOPEF
1440 003676 003646 LINT1A
1441 003700 005205 INC RS
1442 003702 006337 015646 ASL SELMSK
1443 003706 005300 DEC R0
1444 003710 001356 BNE LINT1A
1445 003712 104002 SCOPE
1446
1447
1448
1449
1450 003714 T22:
1451 003714 042737 000340 177776 LINT2: BIC #340,PS
1452 003722 005077 011610 CLR 20HMCSR
1453 003726 005005 CLR RS
1454 003730 012737 000001 015646 MOV #1,SELMSK
1455 003736 012701 177777 MOV #-1,R1
1456 003742 012700 000020 MOV #16,R0
1457 003746 012777 000017 011562 MOV #17,20HMCSR
1458 003754 033737 015646 015644 LINT2A: BIT SELMSK,LINSEL
1459 003762 001407 BEQ LINT2B
1460 003764 004737 013330 CALL STEPER
1461 003770 017704 011542 MOV 20HMCSR,R4
1462 003774 020504 CMP RS,R4
1463 003776 001401 BEQ LINT2B
1464 004000 104000 ERRORC LINT2B
1465 004002 104003 LINT2B: SCOPEF
1466 004004 003714 LINT2
1467 004006 005205 INC RS
1468 004010 006337 015646 ASL SELMSK
1469 004014 005201 INC R1
1470 004016 010177 011514 MOV R1,20HMCSR
1471 004022 005300 DEC R0
1472 004024 001353 BNE LINT2A
1473 004026 104002 SCOPE

```

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

;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.

;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

M03

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1481 004030
1482 004030 012777 002000 011500
1483 004036 042737 000340 177776
1484 004044 012700 000020
1485 004050 052777 001017 011460
1486 004056 004737 013330
1487 004062 005300
1488 004064 001374
1489 004066 012700 000020
1490 004072 012705 070000
1491 004076 012777 000017 011432
1492 004104 004737 013330
1493 004110 017704 011422
1494 004114 020504
1495 004116 001403
1496 004120 104000
1497 004122 104003
1498 004124 004030
1499 004126 005205
1500 004130 005300
1501 004132 001364
1502 004134 012777 004000 011374
1503 004142 032777 000020 011366
1504 004150 001374
1505 004152 012700 000020
1506 004156 005005
1507 004160 012777 000017 011350
1508 004166 004737 013330
1509 004172 017704 011340
1510 004176 020504
1511 004200 001403
1512 004202 104000
1513 004204 104003
1514 004206 004134
1515 004210 005205
1516 004212 005300
1517 004214 001364
1518 004216 104002

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

T23:
MENT1: MOV #CLRMUX,20HMCSR
      BIC #340,PS
      MOV #16,R0
      BIS #MAINT+17,20HMCSR
MENT1A: CALL STEPER
      DEC R0
      BNE MENT1A
      MOV #16,R0
      MOV #70000,RS
      MOV #17,20HMCSR
MENT1B: CALL STEPER
      MOV 20HMCSR,R4
      CMP R5,R4
      BEQ MENT1C
      ERRORC
      SCOPEFF
      MENT1
MENT1C: INC R5
      DEC R0
      BNE MENT1B
MENT1D: MOV #CLRSCN,20HMCSR
      BIT #BUSY,20HMCSR
      BNE .-6
      MOV #16,R0
      CLR R5
      MOV #17,20HMCSR
MENT1E: CALL STEPER
      MOV 20HMCSR,R4
      CMP R5,R4
      BEQ MENT1F
      ERRORC
      SCOPEFF
      MENT1D
MENT1F: INC R5
      DEC R0
      BNE MENT1E
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL STATUS REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 LOCATIONS
;SET MAINTENANCE MODE
;SET LINE COUNTER THRU ALL
;STATES, WRITING 1'S INTO
;ALL MEMORY WORDS
;SET UP TO TEST 16 WORDS
;SET UP EXPECTED STATUS REGISTER
;START WITH LINE 0
;ACCESS SCANNER MEMORY
;READ DATA
;COMPARE EXPECTED AND RECEIVED
;DATA
;CONTROL STATUS OR MEMORY ERROR
;CHECK FOR DATA FREEZE

;UPDATE EXPECTED STATUS
;UPDATE LINE COUNT
;CONTINUE
;SET "CLEAR SCAN"
;WAIT FOR "CLEAR CYCLES"

;SET UP TO TEST 16 MEMORY
;LOCATIONS
;FIRST TO BE TESTED=0
;ACCESS SCANNER MEMORY
;READ DATA
;COMPARE EXPECTED AND RECEIVED
;DATA
;CONTROL STATUS OF MEMORY ERROR
;CHECK FOR DATA FREEZE

;UPDATE EXPECTED DATA
;UPDATE LINE COUNT
;CONTINUE
;CHECK FOR ITERATIONS, LOOP

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1524 004220
1525 004220 005077 011312
1526 004221 042737 000340 177776
1527 004232 012700 000020
1528 004236 012702 000017
1529 004242 012777 004000 011266
1530 004250 032777 000020 011260
1531 004256 001374
1532 004260 012777 001000 011250
1533 004266 050277 011244
1534 004272 004737 013330
1535 004276 042777 001000 011232
1536 004304 012703 000020
1537 004310 012777 000017 011220
1538 004316 005202
1539 004320 005001
1540 004322 004737 013330
1541 004326 117704 011204
1542 004332 010105
1543 004334 120402
1544 004336 001002
1545 004340 052705 070000
1546 004344 020405
1547 004346 001403
1548 004350 104000
1549 004352 104003
1550 004354 004242
1551 004356 005201
1552 004360 005303
1553 004362 001357
1554 004364 005300
1555 004366 001325
1556 004370 104002

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

T24:
MENT2: CLR @OHMCSR ;REFERENCE DESIGNATION
        BIC #340,PS ;CLEAR CONTROL STATUS REGISTER
        MOV #16,R0 ;ENABLE INTERRUPTS
        MOV #17,R2 ;SET UP TO TEST 16 ADDRESSES
MENT2A: MOV @CLASCN,@OHMCSR ;FIRST ADDRESS TO BE TESTED=0
        BIT #BUSY,@OHMCSR ;CLEAR SCANLR MEMORY
        BNE #-6 ;WAIT FOR CLEAR CYCLE
        MOV #MAINT,@OHMCSR ;SET "MAINTENANCE MODE"
        BIS R2,@OHMCSR ;SET LINE COUNTER TO TEST ADDRESS-1
        CALL STEPER ;WRITE 1'S INTO TEST ADDRESS
        BIC #MAINT,@OHMCSR ;CLEAR "MAINTENANCE MODE"
        MOV #16,R3 ;SET UP TO TEST ALL 16
        MOV #17,@OHMCSR ;SCANNER MEMORY LOCATIONS
        INC R2
        CLR R1
MENT2B: CALL STEPER ;ACCESS SCANNER MEMORY
        MOV @OHMCSR,R4 ;READ CONTENTS OF MEMORY
        MOV R1,R5 ;SET UP EXPECTED CONTENTS
        CMPB R4,R2 ;OF SCANNER MEMORY
        BNE MENT2C
        BIS #70000,R5
MENT2C: CMP R4,R5 ;COMPARE EXPECTED AND RECEIVED
        BEQ MENT2D ;VALUES
        ERRORC ;SCANNER MEMORY ERROR
        SCOPEF ;CHECK FOR DATA FREEZE
MENT2A: MENT2A
MENT2D: INC R1
        DEC R3 ;TEST NEXT SCANNED LOCATION
        BNE MENT2B
        DEC R0 ;UPDATE LINE COUNT
        BNE MENT2A
        SCOPE ;CHECK FOR ITERATION, LOOP
    
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1561 004372
1562 004372 005077 011140
1563 004376 042737 000340 177776
1564 004404 012700 000020
1565 004410 012702 000017
1566 004414 012703 000020
1567 004420 012777 001017 011110
1568 004426 004737 013330
1569 004432 005303
1570 004434 001374
1571 004436 010277 011074
1572 004442 004737 013330
1573 004446 012703 000020
1574 004452 012777 000017 011056
1575 004460 005202
1576 004462 005001
1577 004464 004737 013330
1578 004470 117704 011042
1579 004474 010105
1580 004476 120402
1581 004500 001002
1582 004502 052705 070000
1583 004506 020405
1584 004510 001403
1585 004512 104000
1586 004514 104003
1587 004516 004414
1588 004520 005201
1589 004522 005303
1590 004524 001357
1591 004526 005300
1592 004530 001331
1593 004532 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 20HMCSR
      BIC 8340,PS
      MOV 816,R0
      MOV 817,R2
MENT3A: MOV 816,R3
      MOV MAINT+17,20HMCSR
MENT3B: CALL STEPER
      DEC R3
      BNE MENT3B
      MOV R2,20HMCSR
      CALL STEPER
      MOV 816,R3
      MOV 817,20HMCSR
      INC R2
MENT3C: CLR R1
      CALL STEPER
      MOVB 20HMCSR,R4
      MOV R1,R5
      CPB R4,R2
      BNE MENT3D
      BIS 870000,R5
MENT3D: CMP R4,R5
      BEQ MENT3E
      ERRORC
      SCOPEF
MENT3A: MENT3A
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
;ACCESS SCANNER MEM

;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

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1594                                     ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
1595                                     ;BE SET AND CLEARED FOR SELECTED LINE
1596
1597 004534                                T26:                                ;REFERENCE DESIGNATION
1598 004534 005077 010776                 MUX1: CLR 20HCSR                    ;CLEAR CONTROL STATUS REGISTER
1599 004540 042737 000340 177776         BIC 8340,PS                        ;ENABLE INTERRUPTS
1600 004546 012700 000020                 MOV 816,R0                          ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1601 004552 012737 000001 015646         MOV 81,SELMSK                       ;INIT LINE SELECT MASK
1602 004560 005001                         CLR R1                               ;START AT LINE 0
1603 004562 012777 002000 010746         MUX1A: MOV 8CLRMLX,20HCSR           ;
1604 004570 012702 000020                 MOV 816,R2                          ;
1605 004574 033737 015646 015644         BIT SELMSK,LINSEL                   ;IS THIS LINE SELECTED FOR TEST ?
1606 004602 001464                         BEQ MUX1F                            ;BR IF NOT
1607 004604 010177 010726                 MOV R1,20HCSR                       ;SELECT LINE TO BE TESTED
1608 004610 012777 000001 010722         MOV 8LINENA,20HMLSR                 ;SET LINE ENABLE FUNCTION FLIP-FLOP
1609 004616 012737 000001 015650         MOV 81,SLMSK                         ;INIT ANOTHER SELECT MASK
1610 004624 005077 010706                 CLR 20HCSR
1611 004630 005005                         MUX1B: CLR RS
1612 004632 033737 015650 015644         BIT 3LMSK,LINSEL                    ;SELECTED ??
1613 004640 001421                         BEQ MUX1D                            ;BR IF NOT
1614 004642 017704 010672                 MOV 20HMLSR,R4                       ;READ LINE STATUS REGISTER
1615 004646 117703 010664                 MOV 20HCSR,R3                        ;READ CONTROL STATUS REGISTER
1616 004652 042703 177760                 BIC 8177760,R3                      ;CLEAR UNWANTED BITS
1617 004656 020103                         CMP R1,R3                            ;IF LINE NUMBER=SELECTED LINE NUMBER,
1618 004660 001002                         BNE MUX1C                            ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1619 004662 012705 000001                 MOV 8LINENA,R5
1620                                     ;TO BE SET
1621 004666                                     MUX1C:
1622 004666 042704 000360                 BIC 8360,R4                          ;CLEAR RING,CO,CS,SECRV
1623                                     ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1624 004672 020504                         CMP R5,R4                            ;CMP EXPECTED AND RCVD
1625 004674 001403                         BEQ MUX1D                            ;RESULTS
1626 004676 104001                         ERRORL                               ;LINE STATUS ERROR
1627 004700 104003                         SCOPEF
1628 004702 004704                         MUX1D
1629 004704 004737 013330                 MUX1D: CALL STEPER                    ;EXAMINE NEXT LINE
1630 004710 006337 015650                 ASL SLMSK                            ;SHIFT MASK
1631 004714 005302                         DEC R2
1632 004716 001344                         BNE MUX1B
1633 004722 005005                         CLR RS
1634 004726 010177 010610                 MUX1E: MOV R1,20HCSR
1635 004730 010103                         MOV R1,R3
1636 004734 005077 010604                 CLR 20HMLSR                          ;SET LINE COUNTER TO SELECTED LINE
1637 004738 105227 000000                 INCB 80                               ;CLEAR LINE ENABLE FLIP FLOP
1638 004740 001375                         BNE -4                               ;DELAY FOR CABLE
1639 004742 017704 010572                 MOV 20HMLSR,R4                       ;DITTO
1640 004746 005704                         TST R4
1641 004750 001401                         BEQ MUX1F                            ;READ LINE STATUS REGISTER
1642 004752 104001                         ERRORL                               ;WAS LINE ENABLE FUNCTION FLIP FLOP
1643 004754 104003                         SCOPEF                               ;CLEARED
1644 004756 004562                         MUX1A: MUX1A                        ;NO LINE STATUS ERROR
1645 004760 006337 015646                 ASL SELMSK                           ;CHECK FOR LOOP ON SAME DATA
1646 004764 005201                         INC R1
1647 004766 005300                         DEC R0
1648 004770 001274                         BNE MUX1A
1649 004772 104002                         SCOPE

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1650                                     ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN
1651                                     ;BE SET AND CLEARED FOR SELECTED LINE
1652
1653                                     ;REFERENCE DESIGNATION
1654 004774 T27: CLR 20HCSR ;CLEAR CONTROL STATUS REGISTER
1655 005000 MUX2: BIC #340,PS ;ENABLE INTERRUPTS
1656 005006 042737 000340 177776 MOV #16,R0 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1657 005012 012700 000020 015646 MOV #1,SELMSK ;INIT LINE SELECT MASK
1658 005020 005001 CLR R1 ;START AT LINE 0
1659 005022 012777 002000 010506 MUX2A: MOV #CLRMUX,20HCSR
1660 005030 012702 000020 MOV #16,R2
1661 005034 033737 015646 015644 BIT SELMSK,LINSEL ;IS THIS LINE SELECTED FOR TEST ?
1662 005042 001462 BEQ MUX2F ;BR IF NOT
1663 005044 010177 010466 MOV R1,20HCSR ;SELECT LINE TO BE TESTED
1664 005050 012777 000002 010462 MOV #TRMRDY,20HMSR ;SET TERMINAL READY FUNCTION FLIP-FLOP
1665 005056 012737 000001 015650 MOV #1,SLMSK ;INIT ANOTHER SELECT MASK
1666 005064 005077 010446 CLR 20HCSR
1667 005070 005005 MUX2B: CLR R5
1668 005072 033737 015650 015644 BIT SLMSK,LINSEL ;SELECTED ??
1669 005100 001417 BEQ MUX2D ;BR IF NOT
1670 005102 017704 010432 MOV 20HMSR,R4 ;READ LINE STATUS REGISTER
1671 005106 117703 010424 MOVB 20HCSR,R3 ;READ CONTROL STATUS REGISTER
1672 005112 042703 177760 BIC #177760,R3 ;CLEAR UNWANTED BITS
1673 005116 020103 CMP R1,R3 ;IF LINE NUMBER=SELECTED LINE NUMBER,
1674 005120 001002 BNE MUX2C ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
1675 005122 012705 000002 MOV #TRMRDY,R5 ;TO BE SET
1676
1677 MUX2C: CMP R5,R4 ;CMP EXPECTED AND RECVD
1678 005126 020504 BEQ MUX2D ;RESULTS
1679 005130 001403 ERRORL ;LINE STATUS ERROR
1680 005132 104001 SCOPEF
1681 005134 104003 MUX2D
1682 005136 005140 MUX2D
1683 005140 004737 013330 MUX2D: CALL STEPFR ;EXAMINE NEXT LINE
1684 005144 006337 015650 ASL SLMSK ;SHIFT MASK
1685 005150 005302 DEC R2
1686 005152 001346 BNE MUX2B
1687 005154 005005 CLR R5
1688 005156 010177 010354 MUX2E: MOV R1,20HCSR
1689 005162 010103 MOV R1,R3 ;SET LINE COUNTER TO SELECTED LINE
1690 005164 005077 010350 CLR 20HMSR ;CLEAR TERMINAL READY FLIP FLOP
1691 005170 105227 000000 INCB #0 ;DELAY FOR CABLE
1692 005174 001375 BNE -4 ;DITTO
1693 005176 017704 010336 MOV 20HMSR,R4 ;READ LINE STATUS REGISTER
1694 005202 005704 TST R4 ;WAS TERMINAL READY FUNCTION FLIP FLOP
1695 005204 001401 BEQ MUX2F ;CLEARED
1696 005206 104001 ERRORL ;NO, LINE STATUS ERROR
1697 005210 104003 SCOPEF ;CHECK FOR LOOP ON SAME DATA
1698 005212 005022 MUX2A
1699 005214 006337 015646 MUX2A: ASL SELMSK ;SHIFT SELECT MASK
1700 005220 005201 INC R1 ;SELECT NEXT LINE
1701 005222 005300 DEC R0 ;DECREMENT LINE COUNT
1702 005224 001276 BNE MUX2A ;CONTINU IF NOT DONE
1703 005226 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP
    
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1704                                     ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
1705                                     ;BE SET AND CLEARED FOR SELECTED LINE
1706
1707 005230                                T30:                                ;REFERENCE DESIGNATION
1708 005230 005077 010302                MUX3:  CLR 20HMCSR                ;CLEAR CONTROL STATUS REGISTER
1709 005234 042737 000340 177776        BIC #340,PS                       ;ENABLE INTERRUPTS
1710 005242 012700 000020                MOV #16,R0                         ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1711 005246 012737 000001 015646        MOV #1,SELMSK                      ;INIT LINE SELECT MASK
1712 005254 005001                        CLR R1                              ;START AT LINE 0
1713 005256 012777 002000 010252        MUX3A: MOV #CLRMUX,20HMCSR
1714 005264 012702 000020                MOV #16,R2
1715 005270 033737 015646 015644        BIT SELMSK,LINSEL                 ;IS THIS LINE SELECTED FOR TEST ?
1716 005276 001462                        BEQ MUX3F                          ;BR IF NOT
1717 005300 010177 010232                MOV R1,20HMCSR                    ;SELECT LINE TO BE TESTED
1718 005304 012777 000004 010226        MOV #RS,20HMLSR                   ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
1719 005312 012737 000001 015650        MOV #1,SLMSK                      ;INIT ANOTHER SELECT MASK
1720 005320 005077 010212                CLR 20HMCSR
1721 005324 005005                        MUX3B: CLR RS
1722 005326 033737 015650 015644        BIT SLMSK,LINSEL                 ;SELECTED ??
1723 005334 001417                        BEQ MUX3D                          ;BR IF NOT
1724 005336 017704 010176                MOV 20HMLSR,R4                    ;READ LINE STATUS REGISTER
1725 005342 117703 010170                MOV#B 20HMCSR,R3                  ;READ CONTROL STATUS REGISTER
1726 005346 042703 177760                BIC #177760,R3                   ;CLEAR UNWANTED BITS
1727 005352 020103                        CMP R1,R3                         ;IF LINE NUMBER=SELECTED LINE NUMBER,
1728 005354 001002                        BNE MUX3C                          ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
1729 005356 012705 000004                MOV #RS,R5                         ;TO BE SET
1730
1731                                MUX3C:                                ;CMP EXPECTED AND RECVD
1732 005362 020504                        CMP RS,R4
1733 005364 001403                        BEQ MUX3D                          ;RESULTS
1734 005366 104001                        ERRORL                             ;LINE STATUS ERROR
1735 005370 104003                        SCOPEF
1736 005372 005374                        MUX3D
1737 005374 004737 013330                MUX3D: CALL STEPER                 ;EXAMINE NEXT LINE
1738 005400 006337 015650                ASL SLMSK                         ;SHIFT MASK
1739 005404 005302                        DEC R2
1740 005406 001346                        BNE MUX3B
1741 005410 005005                        CLR RS
1742 005412 010177 010120                MUX3E: MOV R1,20HMCSR
1743 005416 010103                        MOV R1,R3
1744 005420 005077 010114                CLR 20HMLSR                       ;SET LINE COUNTER TO SELECTED LINE
1745 005424 105227 000000                INCB #0                            ;CLEAR REQUEST TO SEND FLIP FLOP
1746 005430 001375                        BNE -4                             ;DELAY FOR CABLE
1747 005432 017704 010102                MOV 20HMLSR,R4                    ;DITTO
1748 005436 005704                        TST R4                             ;READ LINE STATUS REGISTER
1749 005440 001401                        BEQ MUX3F                          ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
1750 005442 104001                        ERRORL                             ;CLEARED
1751 005444 104003                        SCOPEF                             ;NO LINE STATUS ERROR
1752 005446 005256                        MUX3A:                             ;CHECK FOR LOOP ON SAME DATA
1753 005450 006337 015646                ASL SELMSK
1754 005454 005201                        INC R1
1755 005456 005300                        DEC R0
1756 005460 001276                        BNE MUX3A
1757 005462 104002                        SCOPE

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F04

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1758                                     ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
1759                                     ;BE SET AND CLEARED FOR SELECTED LINE
1760
1761 005464 T31:                                     ;REFERENCE DESIGNATION
1762 005464 005077 010046 MUX4: CLR 20HMCSR ;CLEAR CONTROL STATUS REGISTER
1763 005470 042737 000340 177776 BIC #340,PS ;ENABLE INTERRUPTS
1764 005476 012700 000020 MOV #16,R0 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1765 005502 012737 000001 015646 MOV #1,SELMSK ;INIT LINE SELECT MASK
1766 005510 005001 CLR R1 ;START AT LINE 0
1767 005512 012777 002000 010016 MUX4A: MOV #CLRMUX,20HMCSR
1768 005520 012702 000020 MOV #16,R2
1769 005524 033737 015646 015644 BIT SELMSK,LINSEL ;IS THIS LINE SELECTED FOR TEST ?
1770 005532 001462 BEQ MUX4F ;BR IF NOT
1771 005534 010177 007776 MOV R1,20HMCSR ;SELECT LINE TO BE TESTED
1772 005540 012777 000010 007772 MOV #SECTX,20HMLSR ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
1773 005546 012737 000001 015650 MOV #1,SLMSK ;INIT ANOTHER SELECT MASK
1774 005554 005077 007756 CLR 20HMCSR
1775 005560 005005 MUX4B: CLR R5
1776 005562 033737 015650 015644 BIT SLMSK,LINSEL ;SELECTED ??
1777 005570 001417 BEQ MUX4D ;BR IF NOT
1778 005572 017704 007742 MOV 20HMLSR,R4 ;READ LINE STATUS REGISTER
1779 005576 117703 007734 MOVB 20HMCSR,R3 ;READ CONTROL STATUS REGISTER
1780 005602 042703 177760 BIC #177760,R3 ;CLEAR UNWANTED BITS
1781 005606 020103 CMP R1,R3 ;IF LINE NUMBER=SELECTED LINE NUMBER,
1782 005610 001002 BNE MUX4C ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
1783 005612 012705 000010 MOV #SECTX,R5 ;TO BE SET
1784
1785 MUX4C:
1786 005616 020504 CMP R5,R4 ;CMP EXPECTED AND RECVD
1787 005620 001403 BEQ MUX4D ;RESULTS
1788 005622 104001 ERRORL ;LINE STATUS ERROR
1789 005624 104003 SCOPEF
1790 005626 005630 MUX4D
1791 005630 004737 013330 MUX4D: CALL STEPER ;EXAMINE NEXT LINE
1792 005634 006337 015650 ASL SLMSK ;SHIFT MASK
1793 005640 005302 DEC R2
1794 005642 001346 BNE MUX4B
1795 005644 005005 CLR R5
1796 005646 010177 007664 MUX4E: MOV R1,20HMCSR
1797 005652 010103 MOV R1,R3 ;SET LINE COUNTER TO SELECTED LINE
1798 005654 005077 007660 CLR 20HMLSR ;CLEAR SECONDARY TRANSMIT FLIP FLOP
1799 005660 105227 000000 INCB #0 ;DELAY FOR CABLE
1800 005664 001375 BNE #-4 ;DITTO
1801 005666 017704 007646 MOV 20HMLSR,R4 ;READ LINE STATUS REGISTER
1802 005672 005704 TST R4 ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
1803 005674 001401 BEQ MUX4F ;CLEARED
1804 005676 104001 ERRORL ;NO, LINE STATUS ERROR
1805 005700 104003 SCOPEF ;CHECK FOR LOOP ON SAME DATA
1806 005702 005512 MUX4A
1807 005704 006337 015646 ASL SELMSK ;SHIFT SELECT MASK
1808 005710 005201 INC R1 ;SELECT NEXT LINE
1809 005712 005300 DEC R0 ;DECREMENT LINE COUNT
1810 005714 001276 BNE MUX4A ;CONTINU IF NOT DONE
1811 005716 104002 SCOPE ;CHECK FOR ITERATIONS, LOOP

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1816 005720          T32:
1817 005720 005077 007612          MUXB: CLR 20HCSR
1818 005724 042737 000340 177776      BIC #340,PS
1819 005732 012700 000020          MOV #16,R0
1820 005736 012777 000017 007574      MUXBA: MOV #17,20HLSR
1821 005744 004737 013330          CALL STEPER
1822 005750 005300          DEC R0
1823 005752 001371          BNE MUXBA
1824 005754 012737 000001 015646      MOV #1,SELMSK
1825 005762 005003          CLR R3
1826 005764 012700 000020          MOV #16,R0
1827 005770 012777 002000 007540      MUXBB: MOV #CLRMUX,20HCSR
1828 005776 033737 015646 015644      MUXBC: BIT SELMSK,LINSEL
1829 006004 001427          BEQ MUXBE
1830 006006 010377 007524          MOV R3,20HCSR
1831 006012 017704 007522          MOV 20HLSR,R4
1832 006016 005005          CLR R5
1833 006020 005704          TST R4
1834 006022 001403          BEQ MUXB0
1835 006024 104001          ERRORL
1836 006026 104003          SCOPEF
1837 006030 005770          MUXBB
1838 006032 005205          MUXBD: INC R5
1839 006034 052777 000001 007476      BIS #LINA,20HLSR
1840 006042 017704 007472          MOV 20HLSR,R4
1841 006046 042704 000360          BIC #360,R4
1842 006052 020504          CMP R5,R4
1843 006054 001403          BEQ MUXBE
1844 006056 104001          ERRORL
1845 006060 104003          SCOPEF
1846 006062 005770          MUXBB
1847 006064 005203          MUXBE: INC R3
1848 006066 005077 007446          CLR 20HLSR
1849 006072 006337 015646          ASL SELMSK
1850 006076 005300          DEC R0
1851 006100 001336          BNE MUXBC
1852 006102 104002          SCOPE

;VERIFY THAT "CLEAR MULTIPLXER" CLEARS ALL MULTIPLEXER
;FUNCTION FLIP-FLOPS

;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
;ENABLE INTERRUPTS
;SET UP TO TEST 16 LINES
;WRITE 15 INTO ALL MULTIPLEXER
;FUNCTION FLIPFLOPS

;INIT SELECT MASK
;SET UP FOR 16 LINES

;CLEAR MULTIPLEXER
;SELECTED ??
;BR IF NOT
;SELECT LINE
;READ LINE STATUS REGISTER
;EXPECT 05
;HAS LINE STATUS REGISTER CLEARED

;LINE STATUS ERROR
;CHECK FOR LOOP ON SAME DATA

;EXPECT LINE ENABLE
;SET LINE ENABLE ON SELECTED LINE
;READ LINE STATUS REGISTER
;CLEAR RING,CO,CS SEACV-MAY FLOAT HIGH
;IS ANYTHING BUT LINE ENABLE SET

;LINE STATUS ERROR
;CHECK FOR LOOP ON SAME DATA

;UPDATE LINE NUMBER
;CLEAR CURRENT LINE
;SHIFT SELECT MASK
;CONTINUE IF ALL LINES NOT
;TESTED
;CHECK FOR ITERATIONS, LOOP

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H04

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006104 012777 002000 007424 T33:
006104 005077 007420 SCNT1:
006116 042737 000340 177776 BIC
006124 012700 000020 MOV
006130 012777 001017 007400 MOV
006136 012737 000001 015646 MOV
006144 004737 013330 SCNT1A:
006150 012777 000001 007362 CALL
006156 005300 DEC
006160 001371 BNE
006162 012701 177777 MOV
006166 012705 077300 MOV
006172 012777 006344 007332 MOV
006200 013777 177776 007326 MOV
006206 012700 000020 MOV
006212 012777 000117 007316 MOV
006220 033737 015646 015644 SCNT1B:
006226 001456 BEQ
006230 052737 000340 177776 BIS
006236 004737 013330 CALL
006242 005003 CLR
006244 042737 000340 177776 BIC
006252 005303 1$: DEC
006254 001404 BEQ
006256 105777 007254 TSTB
006262 100373 BPL
006264 100416 BMI
006266 052737 000340 177776 2$: BIS
006274 017704 007236 MOV
006300 010402 MOV
006302 017703 007232 MOV
006306 042704 177760 BIC
006312 104030 ERRINT
006314 104003 SCOPEF
006316 006104 SCNT1
006320 000421 BR
006322 052737 000340 177776 3$: BIS
006330 017704 007202 MOV
006334 104000 ERRORC
006336 104003 SCOPEF
006340 006104 SCNT1
006342 000410 BR
006344 022626 SCNT1C:
006346 017704 007164 POP2SP
006352 020504 MOV
CMP

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:WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS
:SET "LINE ENABLE" FOR ALL LINES
:VERIFY THAT AN INTERRUPT OCCURS FOR EACH LINE
:THIS TEST WILL FAIL ON ANY LINE THAT DOES
:NOT HAVE A LEVEL CONVERTER--CO,CS,RING,SECRV WILL FLOAT
:HIGH,HENCE MAINT. MODE CANNOT TOGGLE THESE SIGNALS TO
:CAUSE A TRANSITION.A PROGRAM TIME OUT WILL OCCUR.....

:REFERENCE DESIGNATION
:CLEAR ALL MULTIPLEXER FLIPFLOPS
:CLEAR CONTROL REGISTER
:ENABLE INTERRUPTS
:SET UP TO WRITE 1'S INTO
:ALL SCANNER MEMORY LOCATION
:INIT SELECT MASK
:WRITE A LOCATION
:LET "LINE ENABLE"

:INIT LINE NO. GEN.
:EXPECT "DONE"+"COF"+"CSF"+"SECRXF"
:SET UP LOCAL INTERRUPT SERVICE
:SERVICE AT LEVEL 7

:SET INTERRUPT ENABLE
:SELECTED ??
:BR IF NOT
:LOCK OUT INTERRUPTS
:HIT THE SCANNER ONCE
:CLEAR DELAY
:ENABLE INTERRUPTS
:WAIT LONG ENOUGH?
:WE HAVE AN ERROR
:DID DONE SET
:NOT YET
:SET BUT NO INTERRUPT

:GET FAILING LINE
:GET CSR
:GET LSR

:REPORT ERROR HAS OCCURED

:CONTINUE THE TEST
:INTERRUPT DID NOT OCCUR
:ERROR
:CONTROL STATUS ERROR
:CHECK FOR LOOP ON SAME DATA

:INTERRUPT OCCURED, REPOSITION STACK
:READ CONTROL STATUS
:ARE EXPECTED AND RECEIVED

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1909	006354	001403		BEQ	SCNT1D		;REGISTERS THE SAME
1910	006356	104000		ERRORC			;NO. LINE STATUS ERROR
1911	006360	104003		SCOPEF			;CHECK FOR LOOP WITH CURRENT DATA
1912	006362	006104		SCNT1			
1913	006364	042777	000217	007144	SCNT1D:	BIC	#DONE+17,20HMCSR
1914	006372	005201		INC		R1	;CLEAR D DONE
1915	006374	150177	007136	BISB		R1,20HMCSR	;GEN NXT LINE NO.
1916	006400	006337	015646	ASL		SELMSK	;SET LINE NO. BITS
1917	006404	005205		INC		R5	;SHIFT SELECT MASK
1918	006406	005300		DEC		R0	;UPDATE EXPECTED RESULT
1919	006410	001303		BNE		SCNT1B	;CONTINUE IF NOT DONE
1920	006412	104002		SCOPE			;CHECK FOR ITERATIONS, LOOP

J04

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006414
006414 012737 006434 002204
006422 042737 000340 177776
006430 104004
006432 016734
006434 104013
006436 016767
006440 000000
006442 000017
006444 015624
006446 104004
006450 016731

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

K04

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1942
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1947 006452 005077 007060 T101: ;REFERENCE DESIGNATION
1948 006452 042737 000340 MUX11: CLR 20HMCSR ;CLEAR CONTROL STATUS REGISTER
1949 006456 013701 015624 177776 BIC #340,PS ;ENABLE INTERRUPTS
1950 006470 012777 002000 007040 MUX11A: MOV #CLRMUX,20HMCSR
1951 006476 212702 000020 MOV #16,R2
1952 006502 010177 007030 MOV R1,20HMCSR ;SELECT LINE TO BE TESTED
1953 006506 012777 000001 007024 MUX11A: #LINENA,20HMLSR ;SET LINE ENABLE FUNCTION FLIP-FLOP
1954 006514 005077 007016 CLR 20HMCSR
1955 006520 005005 MUX11B: CLR R5
1956 006522 017704 007012 MOV 20HMLSR,R4 ;READ LINE STATUS REGISTER
1957 006526 117703 007004 MOVB 20HMCSR,R3 ;READ CONTROL STATUS REGISTER
1958 006532 042703 177760 BIC #177760,R3 ;CLEAR UNWANTED BITS
1959 006536 020103 CMP R1,R3 ;IF LINE NUMBER=SELECTED LINE NUMBER,
1960 006540 001002 BNE MUX11C ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1961 006542 012705 000001 MOV #LINENA,R5 ;TO BE SET
1962
1963 006546 MUX11C:
1964 006546 042704 000360 BIC #360,R4 ;CLEAR RING,CO,CS,SECRV
1965 ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1966 006552 020504 CMP R5,R4 ;CMP EXPECTED AND RECVD
1967 006554 001403 BEQ MUX11D ;RESULTS
1968 006556 104001 ERRORL ;LINE STATUS ERROR
1969 006560 104003 SCOPEF
1970 006562 006564 MUX11D
1971 006564 004737 013330 MUX11D: CALL STEPER ;EXAMINE NEXT LINE
1972 006570 005302 DEC R2
1973 006572 001352 BNE MUX11B
1974 006574 005005 CLR R5
1975 006576 010177 006734 MUX11E: MOV R1,20HMCSR
1976 006602 010103 MOV R1,R3 ;SET LINE COUNTER TO SELECTED LINE
1977 006604 005077 006730 CLR 20HMLSR ;CLEAR LINE ENABLE FLIP FLOP
1978 006610 105227 000000 INCB #0 ;DELAY FOR CABLE
1979 006614 001375 BNE .-4 ;DITTO
1980 006616 017704 006716 MOV 20HMLSR,R4 ;READ LINE STATUS REGISTER
1981 006622 005704 TST R4 ;WAS LINE ENABLE FUNCTION FLIP FLOP
1982 006624 001401 BEQ MUX11F ;CLEARED
1983 006626 104001 ERRORL ;NO LINE STATUS ERROR
1984 006630 104002 MUX11F: SCOPE ;CHECK FOR ITERATIONS, LOOP

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L04

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1985                                     ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN
1986                                     ;BE SET AND CLEARED FOR SELECTED LINE
1987
1988                                     ;REFERENCE DESIGNATION
1989 006632 005077 006700 T102:                                     ;CLEAR CONTROL STATUS REGISTER
1990 006632 042737 000340 177776 MUX12: CLR @OHMCSR ;ENABLE INTERRUPTS
1991 006634 013701 015624 MOV #340,PS
1992 006650 012777 002000 006660 MUX12A: MOV @CLRMUX,@OHMCSR ;
1993 006656 012702 000020 MOV #16,R2 ;
1994 006662 010177 006650 MOV R1,@OHMCSR ;SELECT LINE TO BE TESTED
1995 006666 012777 000002 006644 MOV @TRMRDY,@OHMLSR ;SET TERMINAL READY FUNCTION FLIP-FLOP
1996 006674 005077 006636 CLR @OHMCSR ;
1997 006700 005005 MUX12B: CLR R5 ;
1998 006702 017704 006632 MOV @OHMLSR,R4 ;READ LINE STATUS REGISTER
1999 006706 117703 006624 MOVB @OHMCSR,R3 ;READ CONTROL STATUS REGISTER
2000 006712 042703 177760 BIC #177760,R3 ;CLEAR UNWANTED BITS
2001 006716 020103 CMP R1,R3 ;IF LINE NUMBER=SELECTED LINE NUMBER,
2002 006720 001002 BNE MUX12C ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
2003 006722 012705 000002 MOV @TRMRDY,R5 ;TO BE SET
2004
2005 MUX12C:                                     ;
2006 006726 020504 CMP R5,R4 ;CMP EXPECTED AND RECVD
2007 006730 001403 BEQ MUX12D ;RESULTS
2008 006732 104001 ERRORL ;LINE STATUS ERROR
2009 006734 104003 SCOPEF
2010 006736 006740 MUX12D
2011 006740 004737 013330 MUX12D: CALL STEPER ;EXAMINE NEXT LINE
2012 006744 005302 DEC R2
2013 006746 001354 BNE MUX12B
2014 006750 005005 CLR R5
2015 006752 010177 006560 MUX12E: MOV R1,@OHMCSR ;SET LINE COUNTER TO SELECTED LINE
2016 006756 010103 MOV R1,R3 ;CLEAR TERMINAL READY FLIP FLOP
2017 006760 005077 006554 CLR @OHMLSR ;DELAY FOR CABLE
2018 006764 105227 000000 INCB #0 ;DITTO
2019 006770 001375 BNE .-4
2020 006772 017704 006542 MOV @OHMLSR,R4 ;READ LINE STATUS REGISTER
2021 006776 005704 TST R4 ;WAS TERMINAL READY FUNCTION FLIP FLOP
2022 007000 001401 BEQ MUX12F ;CLEARED
2023 007002 104001 ERRORL ;NO, LINE STATUS ERROR
2024 007004 104002 MUX12F: SCOPE ;CHECK FOR ITERATIONS, LOOP

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2109 007336
2110 007336 005077 006174
2111 007342 042737 000340 177776
2112 007350 013701 015624
2113 007354 012702 000020
2114 007360 010177 006152
2115 007364 012777 000003 006146
2116 007372 005077 006140
2117 007376 005005
2118 007400 017704 006134
2119 007404 117703 006126
2120 007410 042703 177760
2121 007414 020103
2122 007416 001002
2123 007420 012705 000143
2124
2125 007424 020405
2126 007426 001403
2127 007430 104001
2128 007432 104003
2129 007434 007436
2130 007436 004737 013330
2131 007442 005302
2132 007444 001354
2133 007446 012705 000001
2134 007452 010103
2135 007454 010177 006056
2136 007460 042777 000002 006052
2137 007466 105227 000000
2138 007472 001375
2139 007474 017704 006040
2140 007500 020504
2141 007502 001401
2142 007504 104001
2143 007506 104002

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

T105:
MUX15: CLR 20HCSR
      BIC #340,PS
      MOV LINE,R1
MUX15A: MOV #16,R2
      MOV R1,20HCSR
      MOV #LINEA+TRMRDY,20HMLSR
MUX15B: CLR 20HCSR
      CLR R5
      MOV 20HMLSR,R4
      MOVB 20HCSR,R3
      BIC #177760,R3
      CMP R1,R3
      BNE MUX15C
      MOV #LINEA+TRMRDY+CO+CS,R5
MUX15C: CMP R4,R5
      BEQ MUX15D
      ERRORL SCOPEF
      MUX15D
MUX15D: CALL STEPER
      DEC R2
      BNE MUX15B
      MOV #LINEA,R5
MUX15E: MOV R1,R3
      MOV R1,20HCSR
      BIC #TRMRDY,20HMLSR
      INCB #0
      BNE .-4
      MOV 20HMLSR,R4
      CMP R5,R4
      BEQ MUX15F
      ERRORL SCOPE
MUX15F: SCOPE

:REFERENCE DESIGNATION
:CLEAR CONTROL REGISTER
:ENABLE INTERRUPTS
:16 LINES
: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 ITERATIONS, LOOP
    
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2144
2145
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2148 007510
2149 007510 005077 006022
2150 007514 042737 000340 177776
2151 007522 013701 015624
2152 007526 012702 000020
2153 007532 010177 006000
2154 007536 012777 000005 005774
2155 007544 005077 005766
2156 007550 005005
2157 007552 017704 005762
2158 007556 117703 005754
2159 007562 042703 177760
2160 007566 020103
2161 007570 001002
2162 007572 012705 000205
2163
2164 007576 020405
2165 007600 001403
2166 007602 104001
2167 007604 104003
2168 007606 007610
2169 007610 004737 013330
2170 007614 005302
2171 007616 001354
2172 007620 012705 000001
2173 007624 010103
2174 007626 010177 005704
2175 007632 042777 000004 005700
2176 007640 105227 000000
2177 007644 001375
2178 007646 017704 005666
2179 007652 020504
2180 007654 001401
2181 007656 104001
2182 007660 104002

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

T106:
MUX16: CLR 20HMC SR
        BIC #340, PS
        MOV LINE, R1
MUX16A: MOV #16, R2
        MOV R1, 20HMC SR
        MOV #LINEA+RS, 20HML SR
        CLR 20HMC SR
MUX16B: CLR RS
        MOV 20HML SR, R4
        MOVB 20HMC SR, R3
        BIC #177760, R3
        CMP R1, R3
        BNE MUX16C
        MOV #LINEA+RS+RING, RS
MUX16C: CMP R4, RS
        BEQ MUX16D
        ERRORL SCOPEF
        MUX16D
MUX16E: CALL STEPER
        DEC R2
        BNE MUX16B
        MOV #LINEA, RS
MUX16F: MOV R1, R3
        MOV R1, 20HMC SR
        BIC #RS, 20HML SR
        INCB #0
        BNE .-4
        MOV 20HML SR, R4
        CMP RS, R4
        BEQ MUX16F
        ERRORL SCOPE
MUX16G:

;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
;ENABLE INTERRUPTS

;16 LINES
;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 CAB E
;DITTO
;READ LINE STATUS REGISTER
;ONLY LINE ENABLE SHOULD BE
;SET ON THIS LINE
;LINE STATUS ERROR
;CHECK FOR ITERATIONS, LOOP
    
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2183
2184
2185
2186
2187 007662
2188 007662 005077 005650
2189 007666 042737 000340 177776
2190 007674 013701 015624
2191 007700 012702 000020
2192 007704 010177 005626
2193 007710 012777 000011 005622
2194 007716 005077 005614
2195 007722 005005
2196 007724 017704 005610
2197 007730 117703 005602
2198 007734 042703 177760
2199 007740 020103
2200 007742 001002
2201 007744 012705 000031
2202
2203 007750 020405
2204 007752 001403
2205 007754 104001
2206 007756 104003
2207 007760 007762
2208 007762 004737 013330
2209 007766 005302
2210 007770 001354
2211 007772 012705 000001
2212 007776 010103
2213 010000 010177 005532
2214 010004 042777 000010 005526
2215 010012 105227 000000
2216 010016 001375
2217 010020 017704 005514
2218 010024 020504
2219 010026 001401
2220 010030 104001
2221 010032 104002

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

T107:
MUX17: CLR 20HCSR
      BIC #340,PS
      MOV LINE,R1
MUX17A: MOV #16,R2
      MOV R1,20HCSR
      MOV #LINEA+SECTX,20HMLSR
      CLR 20HCSR
MUX17B: CLR RS
      MOV 20HMLSR,R4
      MOVB 20HCSR,R3
      BIC #177760,R3
      CMP R1,R3
      BNE MUX17C
      MOV #LINEA+SECTX+SECRX,RS
MUX17C: CMP R4,RS
      BEQ MUX17D
      ERRORL SCOPEF
MUX17D: CALL STEPER
      DEC R2
      BNE MUX17B
MUX17E: MOV #LINEA,RS
      MOV R1,R3
      MOV R1,20HCSR
      BIC #SECTX,20HMLSR
      INCB #0
      BNE -4
      MOV 20HMLSR,R4
      CMP RS,R4
      BEQ MUX17F
      ERRORL SCOPE
MUX17F:

;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
;ENABLE INTERRUPTS

;16 LINES
;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 ITERATIONS, LOOP

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E05

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2222
2223 ;MODEM CONTROL ON LINE TEST USING 103A TYPE MODEMS
2224 ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
2225 ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
2226 ;USING THE MODEM CONTROL TO CONTROL 103A TYPE MODEMS
2227
2228 ;NOTE: IF THE DM11-AA IS NOT CONNECTED TO THE
2229 ;DISTRIBUTION PANEL, AN M974 DM11 MAINTENANCE JUMPER
2230 ;SHOULD BE INSTALLED IN SLOT B1 OR B3 OF THE DISTRIBUTION
2231 ;PANEL TO PREVENT A POSSIBLE LONG SPACE
2232 ;DISCONNECT FROM HANGING UP THE MODEM
2233
2234
2235 010034 T200: ;REFERENCE DESIGNATION
2236 010034 000005 ST103A: RESET ;INITIALIZE INTERFACE
2237 010036 012737 000340 177776 MOV #340,PS ;DISABLE ALL INTERRUPTS
2238 010044 104004 TYPE ;TYPE "103A MODEM CONNECT-
2239 010046 016153 MT103T ;DISCONNECT TEST"
2240 010050 022737 000176 015552 CMP #SWREG,SWR
2241 010056 001001 BNE IS
2242 010060 104025 CNTRLW
2243 010062 012737 010100 011670 IS: MOV #T103A,FATRET ;SET UP FOR FATAL ERROR
2244 010070 012737 010076 002204 MOV #ST1038,KRET ;SET UP FOR LINE CHANGE
2245 010076 104017 ST1038: GETLNS ;INPUT ORIGINATE AND
2246 ;AND ANSWER LINE NUMBERS
2247 010100 104020 T103A: SETUP ;SET UP TO RECEIVE INTERRUPTS
2248 ;WAIT FOR RING
2249 010102 010112 T1038 ;GO HERE IF RING OK
2250 010104 010106 T103A1 ;GO HERE IF NO RING
2251 010106 104012 T103A1: ERROR ;NO RING WITHIN 5 MINUTES
2252 010110 000772 BR ST1038 ;SELECT NEW LINES AND REDIAL
2253
2254 ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2255 ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
2256 ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
2257 ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
2258
2259 010112 104021 T1038: CKRING ;CHECK FOR RING INTERRUPT
2260 ;ONLY ON ANSWER LINE
2261 ;AND NO TRANSITIONS ON
2262 ;ORIGINATE LINE
2263 010114 010132 T103C ;GO HERE IF TRANSITIONS
2264 ;ARE CORRECT
2265 010116 010122 T10381 ;GO HERE IF INCORRECT
2266 ;TRANSITION ON ANSWER LINE
2267 010120 010126 T10382 ;GO HERE IF INCORRECT TRANSITION
2268 ;ON ORIGINATE LINE
2269 010122 104014 T10381: ERRORT ;TRANSITION ERROR ON ANSWER LINE
2270 010124 000207 RTS PC ;CONTINUE CHECKING
2271 010126 104014 T10382: ERRORT ;TRANSITION ERROR ON ORIGINATE LINE
2272 010130 000762 BR ST1038 ;RESELECT LINES AND REDIAL

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2273									
2274									;SET TERMINAL READY ON SELECTED ANSWER LINE
2275									;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2276									
2277	010132	013777	015630	005376	T103C:	MOV	LINANS,20HMCSR		;SET LINE COUNTER TO
2278									;ANSWER LINE NUMBER
2279	010140	052777	000002	005372		BIS	8TRMRDY,20HMCSR		;SET TERMINAL READY ON
2280									;SELECTED ANSWER LINE
2281	010146	104026				CKINTT			
2282	010150	104022				WAITRN			;WAIT FOR TRANSITIONS TO OCCUR
2283									
2284									;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2285									;SELECTED ORIGINATE AND ANSWER LINES
2286									
2287	010152	104023				CKTRAN			;CHECK TRANSITIONS AND
2288									;STATUS ON SELECTED
2289									;ANSWER AND ORIGINATE LINES
2290	010154	000143				CO+CS+LINENA+TRMRDY			;EXPECT CARRIER, CLEAR TO SEND,
2291									;LINE ENABLE AND TERMINAL
2292									;READY STATUS BITS SET ON
2293									;ANSWER LINE
2294	010156	000143				CO+CS+LINENA+TRMRDY			;EXPECT CARRIER, CLEAR TO SEND,
2295									;LINE ENABLE AND TERMINAL
2296									;READY STATUS BITS ON
2297									;ORIGINATE LINE
2298	010160	100006				RINGF+XCO+XCS			;EXPECT CARRIER, CLEAR TO SEND
2299									;AND POSSIBLE RING TRANSITIONS
2300									;ON ANSWER LINE
2301	010162	000006				XCO+XCS			;EXPECT CARRIER AND CLEAR
2302									;TO SEND TRANSITIONS ON
2303									;ORIGINATE LINE
2304	010164	010176				T10301			;GO HERE ON ANSWER LINE STATUS ERROR
2305									
2306	010166	010202				T10302			;GO HERE ON ORIGINATE LINE STATUS ERROR
2307	010170	010206				T10303			;GO HERE ON ANSWER LINE TRANSITION ERROR
2308	010172	010212				T10304			;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2309	010174	010216				T103E			;GO TO NEXT TEST IF NO ERRORS
2310	010176	104015			T10301:	ERRORS			;ANSWER LINE STATUS ERROR
2311	010200	000207				RTS	PC		;CONTINUE CHECKING
2312	010202	104015			T10302:	ERRORS			;ORIGINATE LINE STATUS ERROR
2313	010204	000207				RTS	PC		;CONTINUE CHECKING
2314	010206	104014			T10303:	ERRORT			;ANSWER LINE TRANSITION ERROR
2315	010210	000207				RTS	PC		;CONTINUE CHECKING
2316	010212	104014			T10304:	ERRORT			;ORIGINATE LINE TRANSITION ERROR
2317	010214	000207				RTS	PC		;CONTINUE CHECKING

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2328 010216 104004          T103E: TYPE
2329 010220 016416          MDISC
2330 010222 012737 000340 177776  MOV #340,PS
2331 010230 012777 011712 005274  MOV #TRNTYP,@DHMVEC ;SET UP
2332
2333 010236 012737 010256 015656  MOV #T103ES,RNGRET
2334
2335 010244 012777 000140 005264  MOV #SCNENA+INTENA,@DHMCSR
2336 010252 005037 177776          CLR PS
2337 010256 005077 005262          T103ES: CLR @TKDBR
2338 010262 105777 005254          IS: TSTB @TKCSR
2339 010266 100375          BPL IS
2340 010270 005777 005250          TST @TKDBR
2341 010274 012737 000340 177776  MOV #340,PS
2342 010302 005077 005230          CLR @DHMCSR
2343 010306 013777 015626 005222  MOV LINORG,@DHMCSR
2344 010314 042777 000002 005216  BIC #TRMROD,@DHMLSR
2345 010322 104026          CKINTT
2346 010324 104022          WAITRN

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;SET UP TO TEST DISCONNECT SEQUENCE
;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
;TO INITIATE THE DISCONNECT SEQUENCE
;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
;DATA TO TALK MODE AS MANY TIMES AS DESIRED
;BEFORE THE SWITCH SEETIN IS MADE
;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
;REPORTED BY TYPEOUT

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;TYPE "STRIKE ANY TTY KEY
;TEST DISCONNECT"
;LOCK OUT INTERRUPTS
;TO DETECT TRANSITIONS
;BEFORE DISCONNECT SEQUENCE STARTS
;SET UP DUMMY RETURN FOR
;RING INTERRUPT
;SET SCAN ENABLE AND INTERRUPT ENABLE
;ALLOW INTERRUPTS
;WAIT FOR TTY TO HIT
;START DISCONNECT SEQUENCE
;CLEAR CONTROL REGISTER
;SET LINE COUNTER TO SELECTED ORIGINATE LINE
;SET TERMINAL READY ON SELECTED LINE
;WAIT FOR TRANSITIONS TO OCCUR

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2347						
2348				:CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED		
2349				:ORIGINATE AND ANSWER LINES		
2350						
2351	010326	104023		CKTRAN		:CHECK TRANSITIONS AND
2352						:STATUS ON SELECTED
2353						:ANSWER AND ORIGINATE LINES
2354	010330	000003		LINENA+TRMRDY		:EXPECT LINE ENABLE AND
2355						:TERMINAL READY STATUS BITS
2356						:SET ON ANSWER LINE
2357	010332	000001		LINENA		:EXPECT LINE ENABLE STATUS BIT
2358						:SET ON ORIGINATE LINE
2359	010334	000006		XCO+XCS		:EXPECT CARRIER AND CLEAR
2360						:TO SEND TRANSITIONS ON
2361						:ANSWER LINE
2362	010336	000006		XCO+XCS		:EXPECT CARRIER AND CLEAR
2363						:TO SEND TRANSITIONS ON
2364						:ORIGINATE LINE
2365	010340	010352		T103E1		:GO HERE ON ANSWER LINE STATUS ERROR
2366						
2367	010342	010356		T103E2		:GO HERE ON ORIGINATE LINE STATUS ERROR
2368	010344	010362		T103E3		:GO HERE ON ANSWER LINE TRANSITION ERROR
2369	010346	010366		T103E4		:GO HERE ON ORIGINATE LINE TRANSITION ERROR
2370	010350	010372		T103EN		:GO TO NEXT TEST IF NO ERRORS
2371	010352	104015		T103E1: ERRORS		:ANSWER LINE STATUS ERROR
2372	010354	000207		RTS	PC	:CONTINUE CHECKING
2373	010356	104015		T103E2: ERRORS		:ORIGINATE LINE STATUS ERROR
2374	010360	000207		RTS	PC	:CONTINUE CHECKING
2375	010362	104014		T103E3: ERROR		:ANSWER LINE TRANSITION ERROR
2376	010364	000207		RTS	PC	:CONTINUE CHECKING
2377	010366	104014		T103E4: ERROR		:ORIGINATE LINE TRANSITION ERROR
2378	010370	000207		RTS	PC	:CONTINUE CHECKING
2379						
2380	010372			T201:		:REFERENCE DESIGNATION
2381	010372	104004		T103EN: TYPE		:TYPE " 103A TEST COMPLETE"
2382	010374	016340		MT103A		
2383	010376	005037	015564	CLR	TSTNO	:CLEAR TEST NUMBER FOR LOOPING
2384	010402	104026		CKINTT		
2385	010404	000137	010076	JMP	ST103B	:SELECT NEW LINE NUMBERS AND
2386						:RESTART TEST

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2396 010410
2397 010410 000005
2398 010412 012737 000340 177776
2399 010420 104004
2400 010422 016224
2401 010424 022737 000176 015552
2402 010432 001001
2403 010434 104025
2404 010436 012737 010454 011670
2405 010444 012737 010452 002204
2406 010452 104017
2407
2408 010454 104020
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2410 010456 010466
2411 010460 010462
2412 010462 104012
2413 010464 000772
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2420 010466 104021
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2424 010470 010506
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2426 010472 010476
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2428 010474 010502
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2430 010476 104014
2431 010500 000207
2432 010502 104014
2433 010504 000762
    
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;MODEM CONTROL ON LINE TEST USING 202C 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 202C TYPE MODEMS

 ;ALSO TESTED ARE LINE TURN-AROUND AND
 ;SECONDARY TRANSMIT-SECONDARY RECEIVE

 T300: ;REFERENCE DESIGNATION
 ST202A: RESET ;INITIALIZE INTERFACE
 MOV #340,PS ;DISABLE ALL INTERRUPTS
 TYPE ;TYPE "202C MODEM CONNECT-
 MT202T ;DISCONNECT TEST"
 CMP #SWREG,SWR
 BNE IS
 CNTLUU
 IS: MOV #T202A,FATRET ;SET UP FOR FATAL ERROR
 MOV #ST202B,KRET ;SET UP FOR LINE CHANGE
 ST202B: GETLNS ;INPUT ORIGINATE AND
 ;ANSWER LINE NUMBERS
 T202A: SETUP ;SET UP TO RECEIVE INTERRUPTS
 ;WAIT FOR RING
 T202B T202B ;GO HERE IF RING OK
 T202A1 T202A1 ;GO HERE IF NO RING
 ERROR ;NO RING WITHIN 5 MINUTES
 BR ST202B ;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

 T202B: CKRING ;CHECK FOR RING INTERRUPT
 ;ONLY ON ANSWER LINE
 ;AND NO TRANSITIONS ON
 ;ORIGINATE LINE
 T202C ;GO HERE IF TRANSITIONS
 ;ARE CORRECT
 T202B1 ;GO HERE IF INCORRECT
 ;TRANSITION ON ANSWER LINE
 T202B2 ;GO HERE IF INCORRECT
 ;TRANSITION ON ORIGINATE LINE
 T202B1: ERRORT ;ANSWER LINE TRANSITION ERROR
 RTS PC ;CONTINUE CHECKING
 T202B2: ERRORT ;ORIGINATE LINE TRANSITION ERROR
 BR ST202B ;RESELECT LINES AND REDIAL

2434											
2435											
2436											
2437											
2438											
2439	010506	013777	015630	005022	T202C:	MOV	LINANS, 20HMSCR				;SET LINE COUNTER TO ANSWER LINE
2440	010514	052777	000002	005016		BIS	#TRMRDY, 20HMLSR				;SET TERMINAL READY ON ANSWER LINE
2441	010522	013777	015626	005006	T202D:	MOV	LINORG, 20HMSCR				;SET LINE COUNTER TO ORIGINATE LINE
2442	010530	052777	000004	005002		BIS	#RS, 20HMLSR				;SET REQUEST TO SEND ON ORIGINATE LINE
2443	010536	104026				CKINTT					
2444	010540	104022				WAITRM					;WAIT FOR TRANSITIONS TO OCCUR
2445											
2446											
2447											
2448											
2449	010542	104023				CKTRAN					;CHECK TRANSITIONS AND STATUS
2450											;ON SELECTED ANSWER AND
2451											;ORIGINATE LINES
2452	010544	000103				CO+LINENA+TRMRDY					;EXPECT CARRIER, LINE ENABLE
2453											;AND TERMINAL READY STATUS
2454											;BITS SET ON ANSWER LINE
2455	010546	000147				RS+CO+CS+LINENA+TRMRDY					;EXPECT REQUEST TO SEND, CLEAR
2456											;TO SEND, CARRIER, LINE ENABLE
2457											;AND TERMINAL READY STATUS BITS
2458											;SET ON ORIGINATE LINE
2459	010550	100004				RINGF+XCO					;EXPECT CARRIER AND POSSIBLE
2460											;RING TRANSITIONS ON
2461											;ANSWER LINE
2462	010552	000006				XCO+XCS					;EXPECT CARRIER AND CLEAR
2463											;TO SEND TRANSITIONS ON
2464											;ORIGINATE LINE
2465	010554	010566				T20201					;GO HERE ON ANSWER LINE STATUS ERROR
2466	010556	010572				T20202					;GO HERE ON ORIGINATE LINE STATUS ERROR
2467	010560	010576				T20203					;GO HERE ON ANSWER LINE STATUS ERROR
2468	010562	010602				T20204					;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2469	010564	010606				T202E					;GO TO NEXT TEST IF NO ERRORS
2470	010566	104015			T20201:	ERRORS					;ANSWER LINE STATUS ERROR
2471	010570	000207				RTS	PC				;CONTINUE CHECKING
2472	010572	104015			T20202:	ERRORS					;ORIGINATE LINE STATUS ERROR
2473	010574	000207				RTS	PC				;CONTINUE CHECKING
2474	010576	104014			T20203:	ERRORT					;ANSWER LINE TRANSITION ERROR
2475	010600	000207				RTS	PC				;CONTINUE CHECKING
2476	010602	104014			T20204:	ERRORT					;ORIGINATE LINE TRANSITION ERROR
2477	010604	000207				RTS	PC				;CONTINUE CHECKING

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

010606 013777 015630 004722 T202E: MOV LINANS,JOHMLSR ;SET LINE COUNTER TO ANSWER LINE
010614 052777 000010 004716 BIS #SECTX,JOHMLSR ;SET SECONDARY RECEIVE ON ANSWER LINE
010622 104026 CKINTT
010624 104022 WAITRN ;WAIT FOR TRANSITIONS TO OCCUR

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

010626 104023 CKTRAN ;CHECK TRANSITIONS AND STATUS
;ON SELECTED ANSWER AND
;ORIGINATE LINES
010630 000133 SECTX+CO+LINENA+TRMRDY+SECRX ;EXPECT SECONDARY TRANSMIT
;SECONDARY RECEIVE, CARRIER
;LINE ENABLE AND TERMINAL READY
;STATUS BITS SET ON ANSWER LINE
010632 000167 SECRX+RS+CO+CS+LINENA+TRMRDY ;EXPECT SECONDARY RECEIVE
;REQUEST TO SEND, CLEAR TO SEND
;CARRIER, LINE ENABLE AND
;TERMINAL READY STATUS BITS
010634 000001 XSCRX ;SET ON ORIGINATE LINE
;EXPECT SECONDARY RECEIVE
;TRANSITION ON ANSWER LINE
010636 000001 XSCRX ;EXPECT SECONDARY RECEIVE
;TRANSITION ON ORIGINATE LINE
010640 010652 T202E1 ;GO HERE ON ANSWER LINE STATUS ERROR
010642 010656 T202E2 ;GO HERE ON ORIGINATE LINE STATUS ERROR
010644 010662 T202E3 ;GO HERE ON ANSWER LINE TRANSITION ERROR
010646 010666 T202E4 ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
010650 010672 T202F ;GO TO NEXT TEST IF NO ERRORS
010652 104015 T202E1: ERRORS ;ANSWER LINE STATUS ERROR
010654 000207 RTS PC ;CONTINUE CHECKING
010656 104015 T202E2: ERRORS ;ORIGINATE LINE STATUS ERROR
010660 000207 RTS PC ;CONTINUE CHECKING
010662 104014 T202E3: ERRORT ;ANSWER LINE TRANSITION ERROR
010664 000207 RTS PC ;CONTINUE CHECKING
010666 104014 T202E4: ERRORT ;ORIGINATE LINE TRANSITION ERROR
010670 000207 RTS PC ;CONTINUE CHECKING
  
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2562									
2563									
2564									;SET REQUEST TO SEND ON ANSWER LINE
2565									;WAIT FOR TRANSITIONS ON SELECTED LINES
2566									
2567	010772	013777	015630	004536	T202G:	MOV	LINANS,20HMCSR		;SET LINE COUNTER TO ANSWER LINE
2568	011000	052777	000004	004532		BIS	#RS,20HMLSR		;SET REQUEST TO SEND
2569	011006	104026				CKINTT			
2570	011010	104022				WAITRN			;WAIT FOR TRANSITIONS TO OCCUR
2571									
2572									;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2573									;SELECTED ORIGINATE AND ANSWER LINES
2574									
2575	011012	104023				CKTRAN			;CHECK TRANSITIONS AND STATUS
2576									;ON SELECTED ANSWER AND
2577									;ORIGINATE LINES
2578	011014	000147				RS+CO+CS+LINENA+TRMRDY			;EXPECT LINE ENABLE, TERMINAL
2579									;READY, REQUEST TO SEND, CLEAR
2580									;TO SEND, AND CARRIER
2581									;STATUS BITS SET ON ANSWER LINE
2582	011016	000103				CO+LINENA+TRMRDY			;EXPECT LINE ENABLE, TERMINAL
2583									;READY AND CARRIER STATUS
2584									;BITS SET ON ORIGINATE LINE
2585	011020	000006				XCO+XCS			;EXPECT CARRIER AND CLEAR
2586									;TO SEND TRANSITIONS ON
2587									;ANSWER LINE
2588	011022	000004				XCO			;EXPECT CARRIER TRANSITION
2589									;ON ORIGINATE LINE
2590	011024	011036				T202G1			;GO HERE ON ANSWER LINE STATUS ERROR
2591	011026	011042				T202G2			;GO HERE ON ORIGINATE LINE STATUS ERROR
2592	011030	011046				T202G3			;GO HERE ON ANSWER LINE TRANSITION ERROR
2593	011032	011052				T202G4			;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2594	011034	011056				T202H			;GO TO NEXT TEST IF NO ERRORS
2595	011036	104015				T202G1: ERRORS			;ANSWER LINE STATUS ERROR
2596	011040	000207				RTS	PC		;CONTINUE TESTING
2597	011042	104015				T202G2: ERRORS			;ORIGINATE LINE STATUS ERROR
2598	011044	000207				RTS	PC		;CONTINUE TESTING
2599	011046	104014				T202G3: ERROR			;ANSWER LINE TRANSITION ERROR
2600	011050	000207				RTS	PC		;CONTINUE TESTING
2601	011052	104014				T202G4: ERROR			;ORIGINATE LINE TRANSITION ERROR
2602	011054	000207				RTS	PC		;CONTINUE TESTING

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2603								
2604								;SET SECONDARY TRANSMIT ON ORIGINATE LINE
2605								;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2606								
2607	011056	013777	015626	004452	T202H:	MOV	LINORG, 20HMSCR	;SET LINE COUNTER TO ORIGINATE LINE
2608	011064	052777	000010	004446		BIS	#SECTX, 20HMLSR	;SET SECONDARY TRANSMIT
2609	011072	104026				CKINTT		
2610	011074	104022				WAITRN		;WAIT FOR TRANSITIONS TO OCCUR
2611								
2612								;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2613								;SELECTED ORIGINATE AND ANSWER LINES
2614								
2615	011076	104023				CKTRAN		;CHECK TRANSITIONS AND STATUS
2616								;ON SELECTED ANSWER AND
2617								;ORIGINATE LINES
2618	011100	000167				RS+CS+CO+LINENA+TRMRDY+SECRX		;EXPECT LINE ENABLE, TERMINAL
2619								;READY, REQUEST TO SEND, CLEAR
2620								;TO SEND, CARRIER AND SECONDARY
2621								;RECEIVE STATUS BITS SET
2622								;ON ANSWER LINE
2623	011102	000133				SECTX+CO+LINENA+TRMRDY+SECRX		;EXPECT LINE ENABLE, TERMINAL
2624								;READY, CARRIER, SECONDARY
2625								;TRANSMIT AND SECONDARY
2626								;RECEIVE STATUS BITS SET
2627								;ON ORIGINATE LINE
2628	011104	000001				XSCRX		;EXPECT SECONDARY RECEIVE
2629								;TRANSITION ON ANSWER LINE
2630	011106	000001				XSCRX		;EXPECT SECONDARY RECEIVE
2631								;TRANSITION ON ORIGINATE LINE
2632	011110	011122				T202H2		;GO HERE ON ANSWER LINE STATUS ERROR
2633	011112	011126				T202H3		;GO HERE ON ORIGINATE LINE STATUS ERROR
2634	011114	011132				T202H4		;GO HERE ON ANSWER LINE TRANSITION ERROR
2635	011116	011136				T202H5		;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2636	011120	011142				T202I		;GO TO NEXT TEST IF NO ERRORS
2637	011122	104015			T202H2:	ERRORS		;ANSWER LINE STATUS ERROR
2638	011124	000207				RTS	PC	;CONTINUE CHECKING
2639	011126	104015			T202H3:	ERRORS		;ORIGINATE LINE STATUS ERROR
2640	011130	000207				RTS	PC	;CONTINUE CHECKING
2641	011132	104014			T202H4:	ERRORT		;ANSWER LINE TRANSITION ERROR
2642	011134	000207				RTS	PC	;CONTINUE CHECKING
2643	011136	104014			T202H5:	ERRORT		;ORIGINATE LINE TRANSITION ERROR
2644	011140	000207				RTS	PC	;CONTINUE CHECKING

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2645
2646
2647 ; DROP REQUEST TO SEND ON ANSWER LINE
2648 ; WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2649 011142 013777 015630 004366 T2021: MOV LINANS, ZOHMCSR ; SET LINE COUNTER TO ANSWER LINE
2650 011150 042777 000004 004362 BIC BRS, ZOHMLSR ; CLEAR REQUEST TO SEND
2651 011156 013777 015626 004352 MOV LINORG, ZOHMCSR ; SET LINE COUNTER TO ORIGINATE LINE
2652 011164 042777 000010 004346 BIC #SECTX, ZOHMLSR ; CLEAR SECONDARY TRANSMIT
2653 011172 104026 CKINTT
2654 011174 104022 WAITRN ; WAIT FOR TRANSITIONS TO OCCUR
2655
2656 ; CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2657 ; SELECTED ORIGINATE AND ANSWER LINES
2658
2659 011176 104023 CKTRAN ; CHECK TRANSITIONS AND STATUS
2660 ; ON SELECTED ANSWER AND
2661 ; ORIGINATE LINES
2662 011200 000003 LINENA+TRMRDY ; EXPECT LINE ENABLE AND
2663 ; TERMINAL READY STATUS BITS SET
2664 ; ON ANSWER LINE
2665 011202 000003 LINENA+TRMRDY ; EXPECT LINE ENABLE AND
2666 ; TERMINAL READY STATUS BITS
2667 ; SET ON ORIGINATE LINE
2668 011204 000007 XCO+XCS+XSCRX ; EXPECT CARRIER CLEAR TO SEND
2669 ; AND SECONDARY RECEIVE TRANSITIONS
2670 ; ON ANSWER LINE
2671 011206 000005 XCO+XSCRX ; EXPECT CARRIER AND SECONDARY
2672 ; RECEIVE TRANSITIONS ON
2673 ; ORIGINATE LINE
2674 011210 011222 T20212 ; GO HERE ON ANSWER LINE STATUS ERROR
2675 011212 011226 T20213 ; GO HERE ON ORIGINATE LINE STATUS ERROR
2676 011214 011232 T20214 ; GO HERE ON ANSWER LINE TRANSITION ERROR
2677 011216 011236 T20215 ; GO HERE ON ORIGINATE LINE TRANSITION ERROR
2678 011220 011242 T202J ; GO TO NEXT TEST IF NO ERRORS
2679 011222 104015 T20212: ERRORS ; ANSWER LINE STATUS ERROR
2680 011224 000207 RTS PC ; CONTINUE CHECKING
2681 011226 104015 T20213: ERRORS ; ORIGINATE LINE STATUS ERROR
2682 011230 000207 RTS PC ; CONTINUE CHECKING
2683 011232 104014 T20214: ERRORT ; ANSWER LINE TRANSITION ERROR
2684 011234 000207 RTS PC ; CONTINUE CHECKING
2685 011236 104014 T20215: ERRORT ; ORIGINATE LINE TRANSITION ERROR
2686 011240 000207 RTS PC ; CONTINUE CHECKING
    
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2687
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2696
2697 011242 04004 T202J: TYPE ;TYPE "STRIKE ANY TTY KEY
2698 011244 016416 MOISC ;TEST DISCONNECT"
2699 011246 012737 000340 177776 MOV #340,PS ;LOCK OUT INTERRUPTS
2700 011254 012777 011712 004250 MOV #TRNTYP,@OHMVEC ;SET UP TO DETECT TRANSITIONS
2701 011262 012737 011302 015656 MOV #T202JS,RNGRET ;SET UP DUMMY RETURN FOR RING
2702 ;FROM RING INTERRUPT
2703 011270 012777 000140 004240 MOV #SCNENA+INTENA,@OHMCSR ;ENABLE LINE SCANNER
2704 ;START SCANNER
2705 011276 005037 177776 CLR PS ;ENABLE INTERRUPTS
2706 011302 005077 004236 T202JS: CLR @TKDBR
2707 011306 105777 004230 IS: TSTB @TKCSR
2708 011312 100375 BPL IS
2709 011314 005777 004224 TST @TKDBR
2710
2711 ;DISCONNECT SEQUENCE REQUESTED
2712
2713 011320 012737 000340 177776 MOV #340,PS ;LOCK OUT INTERRUPTS
2714 011326 005077 004204 CLR @OHMCSR ;STOP SCANNER
2715 011332 013777 015626 004176 MOV LINORG,@OHMCSR ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
2716 011340 042777 000002 004172 BIC #TRMRDY,@OHMLSR ;SET TERMINAL READY ON SELECTED LINE
2717 011346 104024 WAITS ;DELAY
2718 011350 104026 CKINTT
2719 011352 104022 WAITRN ;WAIT FOR TRANSITIONS TO OCCUR
  
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E06

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2767
2768 011432 017704 004100      TRANS:  MOV      20HMSI ,R4      ;GET LINE NUMBER AND
2769
2770 011436 010405              MOV      R4,R5      ;INTERRUPT FLAGS
2771 011440 042705 177760      BIC      #177760,R5
2772 011444 023705 015626      CMP      LINORG,R5   ;EXTRACT LINE NUMBER
2773 011450 001411              BEQ      ORGTR       ;DID ORIGINATE LINE INTERRUPT
2774 011452 023705 015630      CMP      LINANS,R5   ;IF YES, SERVICE
2775 011456 001443              BEQ      ANSTR       ;DID ANSWER LINE INTERRUPT
2776 011460 010577 004052      MOV      R5,20HMSR
2777 011464 017703 004050      MOV      20HMSR,R3  ;IF YES, SERVICE
2778 011470 104016              ERRORN
2779 011472 000471              BR       FATEX      ;INTERRUPT ON INCORRECT LINE
2780
2781
2782
2783 011474 032704 100000      ORGTR:  BIT      #RINGF,R4   ;RECORD TRANSITIONS FOR ORIGINATE LINE
2784 011500 001403              BEQ      ORGTR1       ;IF RING CAUSED INTERRUPT,
2785 011502 052737 000010 015634      BIS      #10,ORGFLG   ;SET RING TRANSITION BIT
2786 011510 032704 040000      ORGTR1: BIT      #COF,R4   ;IF CARRIER CAUSED INTERRUPT
2787 011514 001403              BEQ      ORGTR2       ;SET CARRIER TRANSITION BIT
2788 011516 052737 000004 015634      BIS      #4,ORGFLG
2789 011524 032704 020000      ORGTR2: BIT      #CSF,R4   ;IF CLEAR TO SEND
2790
2791 011530 001403              BEQ      ORGTR3       ;CAUSED INTERRUPT
2792
2793 011532 052737 000002 015634      BIS      #2,ORGFLG   ;SET CLEAR TO SEND
2794 011540 032704 010000      ORGTR3: BIT      #SECRXF,R4 ;TRANSITION BIT
2795
2796 011544 001403              BEQ      ORGTR4       ;IF SECONDARY RECEIVE
2797 011546 052737 000001 015634      BIS      #1,ORGFLG   ;CAUSED INTERRUPT
2798 011554 032704 170000      ORGTR4: BIT      #RINGF+COF+CSF+SECRXF,R4 ;SET SECONDARY RECEIVE
2799
2800 011560 001044              BNE      TRANEX      ;TRANSITION BIT
2801 011562 104016              ORGTRR: ERRORN       ;IF NO INTERRUPT FLAGS SET
2802 011564 000434              BR       FATEX      ;EXIT TRANSITION DETECTION
  
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2803
2804                                     ;RECORD TRANSITIONS FOR ANSWER LINE
2805
2806 011566 032704 100000 ANSTR: BIT #RINGF,R4 ;IF RING CAUSED INTERRUPT,
2807 011572 001403 BEQ ANSTR1 ;SET RING TRANSITION BIT
2808 011574 052737 000010 015632 ANSTR1: BIT #10,ANSFLG
2809 011602 032704 040000 ANSTR1: BIT #COF,R4 ;IF CARRIER CAUSED INTERRUPT
2810 011606 001403 BEQ ANSTR2 ;SET CARRIER TRANSITION BIT
2811 011610 052737 000004 015632 ANSTR2: BIT #4,ANSFLG
2812 011616 032704 020000 ANSTR2: BIT #CSF,R4 ;IF CLEAR TO SEND
2813 CAUSED INTERRUPT
2814 011622 001403 BEQ ANSTR3 ;SET CLEAR TO SEND
2815 TRANSITION BIT
2816 011624 052737 000002 015632 ANSTR3: BIS #2,ANSFLG
2817 011632 032704 010000 ANSTR3: BIT #SECRXF,R4 ;IF SECONDARY RECEIVE
2818 CAUSED INTERRUPT
2819 011636 001403 BEQ ANSTR4 ;SET SECONDARY RECEIVE
2820 011640 052737 000001 015632 ANSTR4: BIS #1,ANSFLG ;TRANSITION BIT
2821 011646 032704 170000 ANSTR4: BIT #RINGF+COF+CSF+SECRXF,R4
2822 ;IF NO INTERRUPT FLAGS SET
2823 011652 001007 BNE TRANEX ;EXIT TRANSITION DETECTION
2824 011654 104016 ANSTR4: ERRORN
2825 011656 005037 015564 FATEX: CLR TSTNO
2826 011662 022626 POP2SP
2827 011664 000177 000000 FATEX: JMP @FATRET
2828 011670 000000 FATRET: 0
2829
2830                                     ;EXIT TRANSITION DETECTION
2831
2832 011672 005704 TRANEX: TST R4 ;IF RING FLAG WAS SET
2833 011674 100002 BPL .+6 ;SET UP SPECIAL RETURN
2834 011676 013716 015656 TRANX1: MOV RINGRET,(SP)
2835 011702 012777 000140 003626 TRANX1: MOV #SCNENA+INTENA,@DHMCSR ;RESTART SCANNER
2836 011710 000002 RTI
2837
2838                                     ;TYPE TRANSITION DATA AND RETURN
2839
2840 011712 017737 003620 012676 TRNTYP: MOV @DHMCSR,DATA1
2841 011720 017737 003614 012700 TRNTYP: MOV @DHMLSR,DATA2
2842 011726 104004 TYPE
2843 011730 017040 MTRNDT
2844 011732 104006 OCTASC
2845 011734 011740 TRNTAB
2846 011736 000761 BR TRANX1
2847 011740 000002 TRNTAB: 2
2848 011742 000006 6
2849 011744 012676 DATA1
2850 011746 000003 3
2851 011750 012700 DATA2
  
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2852
2853 ;INPUT ORIGINATE AND ANSWER LINES FROM TELETYPE KEYBOARD
2854
2855 011752 000005 GETLIN: RESET
2856 011754 104013 INSTRG ;TYPE "ORIGINATE LINE-"
2857 011756 016275 MSELOR ;AND GET LINE NUMBER
2858 011760 000000 0
2859 011762 000017 17
2860 011764 015626 LINORG
2861 011766 104013 INSTRG ;TYPE "ANSWER LINE-"
2862 011770 016321 MSELANS ;AND GET LINE NUMBER
2863 011772 000000 0
2864 011774 000017 17
2865 011776 015630 LINANS
2866 012000 104004 TYPE
2867 012002 016731 MCRLF
2868 012004 000002 RTI ;RETURN TO CALLING ROUTINE
2869
2870 ;INITIALIZE INTERFACE
2871
2872 012006 000005 SETUPS: RESET
2873 012010 012737 000340 177776 MOV #340,PS ;LOCK OUT ALL INTERRUPTS
2874 012016 011605 MOV (SP),RS
2875 012020 012537 012706 MOV (RS)+,NXTTS
2876 012024 012537 012666 MOV (RS)+,ERR1
2877 012030 010516 MOV RS,(SP)
2878 012032 012777 006000 003476 MOV #CLRSCN+CLRMUX,JDHMCSR ;CLEAR LINE SCANNER AND MULTIPLEXER
2879 012040 032777 000020 003470 SETUP1: BIT #BUSY,JDHMCSR ;WAIT FOR SCANNER TO CLEAR
2880 012046 001374 BNE SETUP1
2881 012050 005037 015556 CLR ERRFLG
2882
2883 ;ENABLE SELECTED LINES
2884 ;SET TERMINAL READY ON SELECTED ORIGINATE LINE
2885
2886 012054 013777 015626 003454 SETUP2: MOV LINORG,JDHMCSR ;SET UP TO ENABLE ORIGINATE LINE
2887 ;ORIGINATE LINE NUMBER
2888 012062 012777 000003 003450 MOV #LINENA+TRMRDY,JDHMLSR ;SET LINE ENABLE AND
2889 ;TERMINAL READY ON ORIGINATE LINE
2890 012070 013777 015630 003440 MOV LINANS,JDHMCSR ;SET LINE COUNTER TO ANSWER LINE
2891 012076 012777 000001 003434 MOV #LINENA,JDHMLSR ;SET LINE ENABLE ON ANSWER LINE
2892
2893 ;REQUEST OPERATOR TO DIAL SELECTED ANSWER TERMINAL
2894 ;SET UP TO RECEIVE INTERRUPTS
2895 ;START LINE SCANNER
2896
2897 012104 012777 011432 003420 MOV #TRANS,JDHMVEC ;SET UP INTERRUPT VECTOR
2898 ;FOR TRANSITION DETECTION
2899 012112 012777 000340 003414 MOV #340,JDHMLVL ;SET UP INTERRUPT SERVICE LEVEL
2900 012120 012777 000140 003410 MOV #SCNENA+INTENA,JDHMCSR ;START SCANNER, ENABLE INTERRUPTS
2901 012126 005037 015632 CLR ANSFLG ;CLEAR TRANSITION DETECTED FLAGS
2902 012132 005037 015634 CLR ORGFLG
2903 012136 012737 012166 015656 MOV #SETUP4,RNGRET ;SET UP RETURN FROM
2904 ;DETECTION OF RING INTERRUPT
2905 012144 104004 TYPE ;REQUEST OPERATOR TO DIAL
2906 012146 016115 DIALM
2907 012150 005037 177776 CLR PS ;CLEAR PROCESSOR STATUS WORD

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2908 012154 005037 015636          CLR      TIME1          ;CLEAR TIMER
2909 012160 012737 001000 015640  MOV      #1000,TIME2   ;SET UP FOR 5 MINUTE DELAY
2910 012166 005737 015632          TST      ANSFLG        ;IF TRANSITION HAS OCCURED,
2911 012172 001014          BNE      SETUP4        ;EXIT WAIT LOOP
2912 012174 005737 015634          TST      ORGFLG        ;
2913 012200 001011          BNE      SETUP8        ;
2914 012202 005237 015636          INC      TIME1          ;ALLOW OPERATOR 5 MINUTES TO DIAL
2915 012206 001367          BNE      SETUP4        ;
2916 012210 005337 015640          DEC      TIME2          ;
2917 012214 001364          BNE      SETUP4        ;
2918 012216 022626          POP2SP
2919 012220 000177 000442          JMP      @ERR1
2920 012224 022626          SETUP8: POP2SP
2921 012226 000177 000454          JMP      @NXTTS
2922 012232 012766 000340 000002  MOV      #340,+2(SP)
2923 012240 000002          RTI
2924
2925          ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2926
2927 012242 011605          CKRNG: MOV      (SP),R5
2928 012244 012537 012706          MOV      (R5)+,NXTTS
2929 012250 012537 012666          MOV      (R5)+,ERR1
2930 012254 012537 012670          MOV      (R5)+,ERR2
2931 012260 010516          MOV      R5,(SP)
2932 012262 012705 000010          MOV      #10,R5          ;EXPECT RING ONLY ON ANSWER LINE
2933 012266 013704 015632          MOV      ANSFLG,R4        ;GET ACTUAL TRANSITION DATA
2934 012272 013703 015630          MOV      LINANS,R3        ;SET UP LINE NUMBER
2935 012276 020504          CMP      R5,R4          ;DID RING CAUSE INTERRUPT
2936 012300 001402          BEQ      CKRNG1          ;ON ANSWER LINE
2937 012302 004777 000360          JSR      PC,@ERR1
2938 012306 005005          CKRNG1: CLR      R5
2939 012310 013704 015634          MOV      ORGFLG,R4
2940 012314 013703 015626          MOV      LINORG,R3
2941 012320 005704          TST      R4          ;IF TRANSITION OCCURED
2942 012322 001403          BEQ      CKRNG2          ;ON ORIGINATE LINE, ERROR
2943 012324 022626          POP2SP
2944 012326 000177 000336          JMP      @ERR2
2945 012332 022626          CKRNG2: POP2SP
2946 012334 000177 000346          JMP      @NXTTS
  
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2947
2948 012340 005037 015632      WAITR: CLR      ANSFLG
2949 012344 005037 015634      CLR      ORGFLG
2950 012350 012777 011432      003154  MOV      #TRANS,JOHMVEC
2951 012356 012737 012376      015656  MOV      #WAITR,RNGRET      ;SET UP FOR RETURN
                                ;FROM RING DETECTION
2952
2953 012364 012777 000140      003144  MOV      #SCNENA+INTENA,JOHMCSR ;START SCANNER
2954 012372 005037 177776      CLR      PS
2955 012376 005037 015636      WAITRR: CLR      TIME1
2956 012402 012737 000025      015640  MOV      #25,TIME2
2957 012410 005237 015636      WAITR1: INC      TIME1      ;WAIT FOR TRANSITIONS OF
                                ;CARRIER AND CLEAR TO SEND
2958 012414 001375      BNE      WAITR1
2959 012416 005337 015640      DEC      TIME2
2960 012422 001372      BNE      WAITR1
2961 012424 000002      RTI
2962
2963      ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2964      ;SELECTED ORIGINATE AND ANSWER LINES
2965
2966 012426 012737 000340      177776  CKTRN: MOV      #340,PS      ;LOCK OUT FURTHER INTERRUPTS
2967 012434 005077 003076      CLR      JOHMCSR      ;STOP LINE SCANNER
2968 012440 011605      MOV      (SP),R5
2969 012442 012537 012676      MOV      (R5)+,DATA1
2970 012446 012537 012700      MOV      (R5)+,DATA2
2971 012452 012537 012702      MOV      (R5)+,DATA3
2972 012456 012537 012704      MOV      (R5)+,DATA4
2973 012462 012537 012666      MOV      (R5)+,ERR1
2974 012466 012537 012670      MOV      (R5)+,ERR2
2975 012472 012537 012672      MOV      (R5)+,ERR3
2976 012476 012537 012674      MOV      (R5)+,ERR4
2977 012502 012537 012706      MOV      (R5)+,NXTTS
2978 012506 010516      MOV      RS,(SP)
2979 012510 013705 012676      MOV      DATA1,RS
2980 012514 013777 015630      003014  MOV      LINANS,JOHMCSR      ;SET LINE COUNTER TO ANSWER LINE
2981 012522 017704 003012      MOV      JOHMLSR,R4      ;GET ACTUAL ANSWER LINE STATUS
2982 012526 013703 015630      MOV      LINANS,R3
2983 012532 020504      CMP      R5,R4      ;COMPARE
2984 012534 001402      BEQ      CKTRN1
2985 012536 004777 000124      JSR      PC,@ERR1
2986 012542 013777 015626      002766  CKTRN1: MOV      LINORG,JOHMCSR      ;SET LINE COUNTER TO ORIGINATE LINE
2987 012550 017704 002764      MOV      JOHMLSR,R4      ;GET ACTUAL ORIGINATE LINE STATUS
2988 012554 013705 012700      MOV      DATA2,RS
2989 012560 013703 015626      MOV      LINORG,R3
2990 012564 020504      CMP      R5,R4      ;COMPARE
2991 012566 001402      BEQ      CKTRN2
2992 012570 004777 000074      JSR      PC,@ERR2
  
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2993
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2997 012574 105737 012703
2998 012600 100003
2999 012602 042737 000010 015632
3000 012610 113704 015632
3001 012614 113705 012702
3002 012620 013703 015630
3003 012624 020504
3004 012626 001402
3005 012630 004777 000036
3006 012634 013704 015634
3007 012640 013705 012704
3008 012644 013703 015626
3009 012650 020504
3010 012652 001402
3011 012654 004777 000014
3012 012660 022626
3013 012662 000177 000020
3014 012666 000000
3015 012670 000000
3016 012672 000000
3017 012674 000000
3018 012676 000000
3019 012700 000000
3020 012702 000000
3021 012704 000000
3022 012706 000000

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

CKTRN2: TSTB DATA3+1
        BPL .+10
        BIC #10,ANSFLG
        MOVB ANSFLG,R4 ;GET TRANSITION DATA FOR
        MOVB DATA3,R5
        MOV LINANS,R3
        CMP R5,R4 ;DID CORRECT TRANSITIONS OCCUR
        BEQ CKTRN3
        JSR PC,@ERR3
CKTRN3: MOV ORGFLG,R4 ;GET TRANSITION DATA FOR
        MOV DATA4,R5
        MOV LINORG,R3
        CMP R5,R4 ;DID CORRECT TRANSITIONS OCCUR
        BEQ CKTRN4
        JSR PC,@ERR4
CKTRN4: POP2SP
        JMP @NXTTS

ERR1: 0
ERR2: 0
ERR3: 0
ERR4: 0
DATA1: 0
DATA2: 0
DATA3: 0
DATA4: 0
NXTTS: 0
  
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K06

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3023
3024
3025      ;END OF PASS
3026      ;UPDATE PASS COUNT
3027      ;TYPE END OF PASS MESSAGE
3028
3028 012710      EOP:      INC      PASCNT      ;UPDATE PASS COUNT
3029 012710      005237 015562      MOV      #1,TSTNO      ;START AT FIRST TEST OF GROUP
3030 012714      012737 000001 015564      RESET     ;CLEAR THE WORLD
3031 012722      000005      CLR      FILLA      ;INIT COUNTER
3032 012724      005037 015654      DEC      FILLA      ;COUNT THE CTR
3033 012730      005337 015654      BNE     $          ;BR TIL STALL TIMES OUT
3034 012734      001375      TYPE     ; RING BELL
3035 012736      104004      MEPASS
3036 012740      017215      MOV      42,R1      ;ARE YOU ON ACT11?
3037 012742      013701 000042      BEQ     TSTENT      ;NO
3038 012746      001521      LOGICAL: JCR      PC,(R1)
3039 012750      000005      NOP
3040 012752      004711      NOP
3041 012754      000240      NOP
3042 012756      000240      NOP
3043 012760      000240      NOP
3044 012762      000240      NOP
3045 012764      000137 013212      JMP     TSTENT      ;GET ADDRESS OF FIRST TEST
3046
3047      ;EMT DISPATCH SERVICE
3048      ;ARGUMENT OF EMT IS EXTRACTED
3049      ;AND USED AS OFFSET TO OBTAIN POINTER
3050      ;TO SELECTED SUBROUTINE
3051
3052 012770      011646      EMTSRV: MOV     (SP),-(SP)      ;GET PC OF RETURN
3053 012772      162716 000002      SUB     #2,(SP)      ;=PC OF EMT
3054 012776      017616 000000      MOV     2(SP),(SP)   ;GET EMT
3055 013002      006316      EMTOK:  ASL     (SP)      ;MULTIPLY EMT ARG BY 2
3056 013004      042716 177001      BIC     #177001,(SP) ;CLEAR UNWANTED BITS
3057 013010      062716 017352      ADD     #EMTTAB,(SP) ;POINTER TO SUBROUTINE ADDRESS
3058 013014      017616 000000      MOV     2(SP),(SP)   ;SUBROUTINE ADDRESS
3059 013020      000136      JMP     2(SP)+       ;GO TO SUBROUTINE
3060
3061 013022      105777 002514      CKINT:  TSTB   @TKCSR
3062 013026      100001      BPL     $
3063 013030      104027      KBDIN
3064 013032      000002      $:     RTI
3065

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L06

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3066
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3073
3074 013034 005737 001252      LOOP:  TST      XFLAG      ;IS THERE AN XOR TESTER OUT THERE ?
3075 013040 100022                BPL      4$           ;NO
3076 013042 013746 000004                MOV      4, -(SP)    ;SAVE 4
3077 013046 012737 013066 000004                MOV      #1$ 4      ;SET UP SVC ROUTINE
3078 013054 005737 177060                TST     177060      ;GOT SOMETHING LIKE SLAVE SYNC
3079 013060 012637 000004                MOV     (SP)+, 4    ;YOU BETCHUM
3080 013064 000404                BR      2$
3081 013066 022626                1$:  POP2SP          ;RESTORE STACK
3082 013070 012637 000004                MOV     (SP)+, 4    ;RESTORE 4
3083 013074 000402                BR      3$
3084 013076 000137 013206                2$:  JMP      LOOPX     ;GO TO NEXT TEST
3085 013102 000137 013212                3$:  JMP      TSTENT    ;GO
3086 013106
3087 013106 005037 177776                4$:
3088 013112 052777 000100 002422                CLR     PSW
3089 013120 005737 015562                BIS     #INTENA, @TKCSR
3090 013124 001430                TST     PASCNT
3091 013126 005737 015556                5$:  TST     LOOPX
3092 013132 001404                BEQ     ERRFLG      ;1ST PASS
3093 013134 032777 002000 002410                BEQ     LOOPX      ;NO ITERATIONS
3094 013142 001021                TST     ERRFLG     ;IF ERROR OCCURED FLAG=1
3095 013144 032777 040000 002400  LOOPS:  BIT     #SW10, @SWR ;CHECK FOR ESCAPE TO NEXT TEST
3096 013152 001041                BNE     LOOPX      ;IF SW10=1,
3097 013154 032777 004000 002370                BNE     LOOPPL     ;ESCAPE TO NEXT TEST
3098 013162 001011                BIT     #SW14, @SWR ;IF SW14=1,
3099 013164 005337 015570                BNE     LOOPX      ;LOOP ON CURRENT TEST
3100 013170 001406                DEC     ICOUNT     ;IF SW11=1,
3101 013172 013716 015566                BEQ     LOOPX      ;INHIBIT ITERATIONS
3102 013176 042777 000100 002336  LOOPER: MOV     RETURN, (SP) ;UPDATE ITERATION COUNT
3103 013204 000002                BIC     #INTENA, @TKCSR ;SET UP FOR RETURN TO CURRENT TEST
3104 013206 005237 015564                RTI
3105 013212 013705 015564                LOOPX: INC     TSTNO ;RETURN TO CURRENT TEST
3106 013216 006305                TSTENT: MOV    TSTNO, R5 ;UPDATE TEST NUMBER
3107 013220 006305                ASL     R5         ;GET TEST NUMBER
3108 013222 063705 015616                ASL     R5         ;MULTIPLY TEST NUMBER BY 4
3109 013226 011537 015566                ADD     TSTPNT, R5 ;GET POINTER FOR TEST ENTRY
3110 013232 001626                MOV     (R5), RETURN ;GET STARTING ADDRESS OF NEXT TEST
3111 013234 012516                BEQ     EOP        ;IF ADDRESS=0, GO TO END OF PASS
3112 013236 011537 015570                MOV     (R5)+, (SP) ;PUT STARTING ADDRESS ON STACK
3113 013242 005037 015556                MOV     (R5), ICOUNT ;GET ITERATION COUNT FOR TEST
3114 013246 042777 000100 002266                CLR     ERRFLG     ;CLEAR ERROR OCCURED FLAG
3115 013254 000002                BIC     #INTENA, @TKCSR
3116 013256 012737 000001 015570  LOOPPL: MOV    #1, ICOUNT ;GO TO TEST
3117 013264 000742                BR      LOOPER     ;SET UP TO EXIT TEST AFTER LOOP
3118
3119
3120
3121

```

```

;CHECK FOR LOOPING WITH SAME DATA
;CHECK FOR ESCAPE TO NEXT TEST ON ERROR

```



```

3141
3142 ;GENERAL ERROR SERVICE
3143 ;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER
3144
3145 013350 005037 015556 ERR: CLR ERRFLG ;ALWAYS TYPE PC+2
3146 ;OF TEST THAT FAILED
3147 013354 005037 013570 CLR ERRMSG ;NO MESSAGE
3148 013360 005037 013602 CLR ERTAB ;NO TABLE OF DATA
3149 013364 000451 BR ERRGEN ;OUTPUT ERROR MESSAGE
3150
3151 ;TRANSITION DETECTION ERROR SERVICE
3152
3153 ;FORMAT FOR ERROR TYPEOUT IS
3154
3155 ;XXXXXX TRANSITION ERROR
3156 ;EXP REC LINE
3157 ;AA BB CC
3158
3159 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3160 ; AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER)
3161 ; BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
3162 ; CC=LINE ON WHICH ERROR OCCURED
3163 013366 005037 015556 ERRRT: CLR ERRFLG ;ALWAYS OUTPUT ALL DATA
3164 013372 012737 016056 013570 MOV #MTRANE,ERRMSG ;TYPE "TRANSITION ERROR"
3165 013400 012737 013674 013602 MOV #ERTAB1,ERTAB ;TABLE OF DATA
3166 013406 000440 BR ERRGEN ;OUTPUT ERROR MESSAGE
3167
3168 ;ON-LINE STATUS ERROR SERVICE
3169
3170 ;FORMAT FOR LINE STATUS ERROR IS
3171
3172 ;XXXX LINE ERROR
3173 ;EXP REC LINE
3174 ;AAA BBB CC
3175
3176 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3177 ; AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3178 ; BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3179 ; CC=LINE ON WHICH ERROR OCCURED
3180
3181
3182 013410 005037 015556 ERRS: CLR ERRFLG ;ALWAYS OUTPUT ALL DATA
3183 013414 012737 016025 013570 MOV #MLINE1,ERRMSG ;TYPE "LINE ERROR"
3184 ;EXP REC LINE"
3185 013422 012737 013712 013602 MOV #ERTAB2,ERTAB ;TABLE OF DATA
3186 013430 000427 BR ERRGEN ;OUTPUT ERROR MESSAGE
    
```

```

3187
3188 ;FATAL TRANSITION ERROR
3189 ;FORMAT FOR FATAL ERROR TYPEOUT IS
3190
3191 ;XXXXXX FATAL ERROR
3192 ;CSTAT LSTAT
3193 ;AAAAAA BBB
3194
3195 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3196 ;AAAAA=RECEIVED CONTROL STATUS ON LINE THAT INTERRUPTED
3197 ;BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED
3198
3199 013432 005037 015556 013570 ERRN: CLR ERRFLG ; ALWAYS OUTPUT ALL DATA
3200 013436 012737 017006 013570 MOV #MFATAL,ERRMSG ; TYPE "FATAL ERROR"
3201 ;CSTAT LSTAT"
3202 013444 012737 013730 013602 MOV #ERTAB3,ERTAB ; TABLE OF DATA
3203 013452 000416 BR ERGEN ; OUTPUT ERROR MESSAGE
3204
3205 ;"CONTROL STATUS" ERROR SERVICE
3206 ;FORMAT FOR CONTROL STATUS ERROR IS
3207
3208 ;XXXXXX STATUS ERROR
3209 ;EXP REC
3210 ;AAAAAA BBBB
3211
3212 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3213 ;AAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
3214 ;BBBBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR
3215
3216 013454 012737 015737 013570 ERRCS: MOV #MSTATE,ERRMSG ; TYPE "STATUS ERROR"
3217 ;"EXP REC"
3218 013462 012737 013742 013602 MOV #ERTAB4,ERTAB ; TABLE OF DATA
3219 013470 000407 BR ERGEN ; OUTPUT DATA
3220
3221 ;LINE STATUS ERROR SERVICE
3222
3223 ;FORMAT FOR LINE STATUS ERROR IS
3224
3225 ;XXXX LINE ERROR
3226 ;EXP REC LINE SEL
3227 ;AAA DDD CC DO
3228
3229 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3230 ;AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3231 ;BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3232 ;CC=LINE ON WHICH ERROR OCCURED
3233 ;DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING
3234
3235
3236 013472 012737 015770 013570 ERRLS: MOV #MLINER,ERRMSG
3237 013500 012737 013754 013602 MOV #ERTAB5,ERTAB
3238 013506 000400 BR ERGEN

```



```

3240
3241
3242
3243
3244
3245
3246 013510 005037 177776 ERRGEN: CLR PSH
3247 013514 012777 000100 002020 MOV #INTENA,@TKCSR
3248 013522 032777 020000 002022 BIT #SW13,@SWR ;IF SW13=1, DO NOT
3249 013530 001026 BNE .3 ;TYPE ERROR MESSAGE
3250 013532 021637 015610 CMP (SP),SAVPC ;SAME ERROR AGAIN
3251 013536 001402 BEQ .+6
3252 013540 005037 015556 CLR ERRFLG
3253 013544 104005 SAVOSP
3254 013546 005737 015556 TST ERRFLG ;IF ERROR OCCURED FLAG=1,
3255 013552 001007 BNE .1 ;TYPE DATA ONLY
3256 013554 104006 OCTASC ;TYPE PC+2 OF CALL TO ERROR ROUTINE
3257 013556 013666 ERTAB0
3258 013560 005737 013570 TST ERRMSG
3259 013564 001407 BEQ .2
3260 013566 104004 TYPE ;TYPE ERROR MESSAGE
3261 013570 000000 ERRMSG: 0
3262 013572 005737 013600 .1: TST ERTAB
3263 013576 001402 BEQ .2
3264 013600 104006 ;TYPE DATA
3265 013602 000000 ERTAB: 0
3266 013604 104007 .2: RESOS ;RESTORE R0-R5
3267
3268 ;ERROR HALT SERVICE
3269
3270 013606 032777 100000 001736 .3: BIT #SW15,@SWR ;IF SW15=0, DO NOT
3271 013614 001406 BEQ .4 ;HALT ON ERROR
3272 013616 000000 HALT ;HALT AND DISPLAY ADDRESS OF FAILING TEST
3273 013620 022737 000176 015552 CMP #CHREG,SWR
3274 013626 001001 BNE .4
3275 013630 104025 CNTLUU
3276 013632 012737 000001 015556 .4: MOV #1,ERRFLG ;SET ERROR OCCURED FLAG
3277 013640 042777 000100 001674 BIC #INTENA,@TKCSR ;RETURN TO TEST
3278 013646 000002 RTI
3279
3280 ;TIMEOUT ERROR WAITING FOR INTERRUPT ON TEST 33
3281 013650 012737 015660 013570 ERRQ: MOV #MNOINT,ERRMSG
3282 013656 012737 014004 013602 MOV #ERTAB6,ERTAB ;TYPE LN#,CSR,LSR+MSG
3283 013664 000711 BR ERRGEN ;OUTPUT DATA
3284
3285
    
```


E07

```

3340
3341 ; CONVERT OCTAL TO ASCII AND
3342 ; OUTPUT ON TELETYPE
3343
3344 014022 017605 000000 OCTASN: MOV @ (SP), R5 ; GET POINTER TO TABLE OF DATA
3345 014026 062716 000002 ADD #2, (SP)
3346 014032 012737 000010 014362 MOV #10, RADIX
3347 014040 012704 017235 MOV @MBCD+2, R4 ; SET UP POINTER FOR CONVERTED DATA
3348 014044 012537 015612 MOV (R5)+, WRODNT ; GET NUMBER OF WORDS TO BE CONVERTED
3349 014050 012537 015614 OCTAS1: MOV (R5)+, CHRCNT ; GET NUMBER OF DIGITS IN WORD
3350 014054 013537 014356 MOV @ (R5)+, BINWRD ; GET DATA TO BE CONVERTED
3351 014060 104010 CONVERT ; CONVERT TO ASCII
3352 014062 005337 015612 DEC WRODNT ; IF ALL DATA IS NOT CONVERTED
3353 014066 001370 BNE OCTAS1 ; CONTINUE
3354 014070 112714 000100 MOVB :100, (R4) ; PUT TERMINATOR AT END OF MESSAGE
3355 014074 005737 014212 TST SMLN
3356 014100 001002 BNE IS
3357 014102 104004 TYPE ; OUTPUT CONVERTED DATA
3358 014104 017233 MBCD ; TO TELETYPE
3359 014106 000002 IS: RTI ; RETURN TO CALLING ROUTINE
3360
3361
3362
3363 014110 005037 014206 CNTLU: CLR TMP1
3364 014114 012737 000001 014210 MOV #1, TMP2
3365 014122 104004 TYPE
3366 014124 017172 $$SWREQ
3367 014126 052737 000001 014212 BIS #1, SMLN
3368 014134 104006 OCTASC
3369 014136 013776 SWRTB
3370 014140 104004 TYPE
3371 014142 017235 MBCD+2
3372 014144 104013 INSTRG
3373 014146 017203 $NEWS
3374 014150 000000 0
3375 014152 177777 177777
3376 014154 014206 TMP1
3377 014156 123727 015106 000015 CMPB INBUF, #15
3378 014164 001403 BEQ IS
3379 014166 013777 014206 001356 MOV TMP1, @SWR
3380 014174 005037 014210 IS: CLR TMP2
3381 014200 005037 014212 CLR SMLN
3382 014204 000002 RTI
3383 014206 000000 TMP1: 0
3384 014210 000000 TMP2: 0
3385 014212 000000 SMLN: 0
3386
3387

```

```

3388
3389 ;INTEGER BINARY TO ASCII CONVERSION COMMON ROUTINE
3390
3391 014214 013700 015614 BINASC: MOV CHRCNT,RO ;SET UP COUNT FOR DIGITS TO BE CONVERTED
3392 014220 012701 017336 MOV #TEMPAB,R1 ;SET UP POINTER FOR TEMPORARY STORAGE
3393 014224 104011 BINASA: EXTRACT ;EXTRACT ONE DIGIT
3394 014226 062737 000060 014360 ADD #60,DIGIT ;CONVERT FROM BCD TO ASCII
3395 014234 113721 014360 MOVB DIGIT,(R1)+ ;STORE DIGIT
3396 014240 005300 DEC RO ;IF ALL DIGITS NOT DONE,
3397 014242 001370 BNE BINASA ;CONTINUE
3398 014244 114124 BINASB: MOVB -(R1),(R4)+ ;REVERSE ORDER OF DIGITS
3399 014246 005337 015614 DEC CHRCNT ;IF ALL CHARACTERS ARE NOT
3400 014252 001374 BNE BINASB ;IN ORDER, CONTINUE
3401 014254 112724 000040 MOVB #40,(R4)+ ;INSERT SPACE AFTER LAST DIGIT
3402 014260 000002 RTI ;RETURN TO CALLING ROUTINE
3403
3404 ;SINGLE PRECISION UNSIGNED DIVIDE LOOP
3405
3406 014262 005037 014360 DIVI: CLR DIVIDH
3407 014264 023737 014360 014362 DIVIU: CMP DIVIDH,DIVIS
3408 014274 103027 BHIS DIVIB
3409 014276 012737 000021 014336 MOV #17,DIVCNT
3410 014304 000407 BR DIVIC
3411 014306 023737 014360 014362 DIVIA: CMP DIVIDH,DIVIS
3412 014314 103403 BLO DIVIC
3413 014316 163737 014362 014360 SUB DIVIS,DIVIDH
3414 014324 006137 014356 DIVIC: ROL DIVIDL
3415 014330 006137 014360 ROL DIVIDH
3416 014334 005327 DEC (PC)+
3417 014336 000000 DIVCNT: 0
3418 014340 001362 BNE DIVIA
3419 014342 006037 014360 ROR DIVIDH
3420 014346 005137 014356 COM DIVIDL
3421 014352 000002 RTI
3422 014354 000000 DIVIB: HALT
3423 014356 000000 DIVIDL: 0
3424 014360 000000 DIVIDH: 0
3425 014362 000000 DIVIS: 0
3426
3427 ;SAVE PC OF TEST THAT FAILED AND RO-R5
3428
3429 014364 016637 000004 015610 SVOSP: MOV 4(SP),SAVPC
3430
3431 ;SAVE RO-R5
3432
3433 014372 010537 015604 SVOS: MOV R5,SAVR5
3434 014376 010437 015602 MOV R4,SAVR4
3435 014402 010337 015600 MOV R3,SAVR3
3436 014406 010237 015576 MOV R2,SAVR2
3437 014412 010137 015574 MOV R1,SAVR1
3438 014416 010037 015572 MOV R0,SAVR0
3439 014422 000002 RTI

```

```

3440
3441
3442
3443 014424 013700 015572
3444 014430 013701 015574
3445 014434 013702 015576
3446 014440 013703 015600
3447 014444 013704 015602
3448 014450 013705 015604
3449 014454 000002
3450
3451
3452
3453 014456 017605 000000
3454 014462 062716 000002
3455 014466 105777 001054
3456 014472 100375
3457 014474 122765 000012 177777
3458 014502 001405
3459 014504 122765 000015 177777
3460 014512 001401
3461 014514 000402
3462 014516 004737 014566
3463 014522 122715 000100
3464 014526 001001
3465 014530 000002
3466 014532 122715 000042
3467 014536 001406
3468 014540 122715 000045
3469 014544 001403
3470 014546 112577 000776
3471 014552 000745
3472 014554 142715 000040
3473 014560 152715 000010
3474 014564 000770
3475
3476
3477
3478
3479 014566 113737 015652 015654
3480 014574 113777 015653 000746
3481 014602 105777 000740
3482 014606 100375
3483 014610 105337 015654
3484 014614 001367
3485 014616 000207
3486
3487
3488
3489
3490
3491
3492
3493 014620
3494 014620 011605
3495 014622 012537 014646

```

; RESTORE R0-R5

```

RSOS:  MOV   SAVR0,R0
      MOV   SAVR1,R1
      MOV   SAVR2,R2
      MOV   SAVR3,R3
      MOV   SAVR4,R4
      MOV   SAVR5,R5
      RTI

```

; TELETYPE OUTPUT ROUTINE

```

TYPER:  MOV   @ (SP),R5
      ADD   #2,(SP)
TYPERA: TSTB  @TPCSR
      BPL   TYPERA
      CMPB  #12,-1(R5)
      BEQ   1$
      CMPB  #15,-1(R5)
      BEQ   1$
      BR    2$
1$:     JSR   PC,TYFILL
2$:     CMPB  #100,(R5)
      BNE   TYPER1
      RTI
TYPER1: CMPB  #42,(R5)
      BEQ   TYPECL
      CMPB  #45,(R5)
      BEQ   TYPECL
TYPER2: MOVB  (R5)+,@TPDBR
      BR    TYPERA
TYPECL: BICB  #40,(R5)
      BISB  #10,(R5)
      BR    TYPER2

```

```

; GET POINTER TO MESSAGE (ON STACK)
; CORRECT STACK FOR RETURN
; WAIT FOR TELEPRINTER READY
; WAS LAST ONE A L.F. ??
; BR IF YES
; WAS LAST ONE A C.R. ??
; BR IF YES
; CONTINUE IF NEITHER
; GO OUT PUT FILLERS
; IF CHARACTER IS NOT TERMINATOR, TYPE IT
; CHARACTER IS TERMINATOR, EXIT
; IF CHARACTER=42,
; TYPE LINE FEED
; IF CHARACTER=45,
; TYPE CARRIAGE RETURN
; GET CHARACTER
; TYPE IT
; CONVERT CODE OF 42 OR 45
; TO 12 OR 15
; TYPE IT

```

; OUTPUT FILLERS AFTER <CR> OR <LF> CHAR IS OUT PUTTED.

```

TYFILL: MOVB  FILL,FILLA
1$:     MOVB  FILL+1,@TPDBR
2$:     TSTB  @TPCSR
      BPL   2$
      DECB  FILLA
      BNE   1$
      RTS   PC

```

```

; GET FILL COUNT
; OUT PUT ONE FILLER
; WAIT FOR TTY TO FINISH OUTPUT
; BR IF TTY NOT DONE
; COUNT ONE FILLER
; BR TIL ALL DONE
; RETURN TO CALLER ABOVE

```

; INPUT OCTAL CHARACTER STRING
; TERMINATOR IS CARRIAGE RETURN
; IF MORE THAN SEVEN (7) CHARACTERS INCLUDING
; CARRIAGE RETURN ARE TYPED, THE IN PUT WILL
; BE RE-REQUESTED

```

INSTR: MOV   (SP),R5
      MOV   (R5)+,MSG

```

```

; GET POINTER TO ARGUMENTS
; GET MESSAGE TO BE TYPED

```

3496	014626	012537	015100		MOV	(R5)+,LOLIM	;GET LOWER LIMIT
3497	014632	012537	015102		MOV	(R5)+,HILIM	;GET UPPER LIMIT
3498	014636	012537	015104		MOV	(R5)+,STORE	;GET DATA STORAGE LOCATION
3499	014642	010516			MOV	RS,(SP)	;RESTORE STACK
3500	014644	104004			INSTR1: TYPE		;TYPE MESSAGE
3501	014646	000000			MSG: 0		
3502	014650	012704	015106		MOV	#INBUF,R4	;SET UP CHARACTER INPUT BUFFER
3503	014654	012703	000007		MOV	#7,R3	;SET UP INPUT COUNT
3504	014660	105777	000656		INSTR8: TSTB	@TKCSR	;WAIT FOR CHARACTER
3505	014664	100375			BPL	INSTR8	
3506	014666	005037	002206		INSTR8: CLR	SINTFL	
3507	014672	017737	000646	014206	MOV	@TKDBR,TMP1	
3508	014700	142737	000200	014206	BICB	#200,TMP1	
3509	014706	113714	014206		MOVB	TMP1,(R4)	
3510	014712	121427	000007		CMPB	(R4),#7	
3511	014716	001420			BEQ	INSTR	
3512	014720	121427	000015		CMPB	(R4),#15	;IS CHARACTER TERMINATOR
3513	014724	001420			BEQ	INSTR2	;IF IT IS, CONVERT INPUT STRING
3514	014726	121427	000025		CMPB	(R4),#25	
3515	014732	001003			BNE	IS	
3516	014734	005037	014206		C_R	TMP1	
3517	014740	000741			BR	INSTR1	
3518	014742	112477	000602		IS: MOVB	(R4)+,@TPDBR	
3519	014746	105777	000574		INSTRC: TSTB	@TPCSR	;WAIT TO FINISH TYPING
3520	014752	100375			BPL	INSTRC	
3521	014754	005303			DEC	R3	;UPDATE RECEIVED COUNT
3522	014756	001340			BNE	INSTRB	;AND CONTINUE
3523	014760	104004			INSTR: TYPE		;TYPE "?" AND RE-REQUEST INPUT
3524	014762	016725			MOH		
3525	014764	000727			BR	INSTR1	
3526							
3527							
3528							
3529	014766	104004			INSTR2: TYPE		;CONVERT ASCII STRING TO OCTAL
3530	014770	016731			MCRLF		
3531	014772	012704	015106		MOV	#INBUF,R4	;GET POINTER TO ASCII STRING
3532	014776	005003			CLR	R3	
3533	015000	122714	000015		CMPB	#15,(R4)	;IS TERMINATOR FIRST
3534							;CHARACTER IN STRING
3535	015004	001431			INSTRD: BEQ	CHCK	
3536	015006	121427	000060		CMPB	(R4),#60	;IS CHARACTER OCTAL DIGIT
3537	015012	002762			BLT	INSTR	;IF 67>=CHAR>=60
3538	015014	121427	000067		CMPB	(R4),#67	;CHARACTER IS OCTAL DIGIT
3539	015020	003357			BGT	INSTR	
3540	015022	142714	000060		BICB	#60,(R4)	;STRIP ASCII
3541	015026	152403			BISB	(R4)+,R3	;GENERATE OCTAL NUMBER
3542	015030	121427	000015		CMPB	(R4),#15	;IF END OF STRING, CHECK LIMITS
3543	015034	001404			BEQ	INSTR3	
3544	015036	006303			ASL	R3	;MULTIPLY DIGIT BY 10 (OCTAL
3545	015040	006303			ASL	R3	
3546	015042	006303			ASL	R3	
3547	015044	000760			BR	INSTRD	;GET NEXT DIGIT
3548							
3549							
3550							
3551	015046	020337	015102		INSTR3: CMP	R3,HILIM	;TEST HI LIMIT

```

3552 015052 101342          BHI     INSTER          ; IF R3>HILIM, ERROR
3553 015054 020337 015100    CMP     R3,LOLIM       ; TEST LOW LIMIT
3554 015060 103737          BLO     INSTER          ; IF R3<LOLIM, ERROR
3555 015062 010377 000016    MOV     R3,#STORE     ; STORE NUMBER
3556 015066 000002          RTI                    ; EXIT
3557 015070 005737 014210    CHCK:  TST     TMP2
3558 015074 001731          BEQ     INSTER
3559 015076 000002          RTI
3560 015100 000000          LOLIM: 0
3561 015102 000000          HILIM: 0
3562 015104 000000          STORE: 0
3563 015106 000000          INBUF: 0
3564          015130          .=.+20
3565          ;ENTER HERE ON POWER FAILURE
3566
3567
3568 015130 010046          PFAIL: MOV     R0,-(SP)      ;SAVE R0-R5 ON PROCESSOR STACK
3569 015132 010146          MOV     R1,-(SP)
3570 015134 010246          MOV     R2,-(SP)
3571 015136 010346          MOV     R3,-(SP)
3572 015140 010446          MOV     R4,-(SP)
3573 015142 010546          MOV     R5,-(SP)
3574 015144 013746 000024    MOV     #24,-(SP)
3575 015150 010637 015606    MOV     SP,SAVSP      ;SAVE STACK POINTER
3576 015154 012737 015166 000024    MOV     #RESTART,24  ;SET UP FOR POWER UP TRAP
3577 015162 000000          HALT                    ;HALT ON POWER DOWN NORMAL
3578 015164 000776          BR     .-2
3579
3580          ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
3581
3582 015166 013706 015606    RESTAR: MOV     SAVSP,SP  ;RESTORE STACK POINTER
3583 015172 012605          MOV     (SP)+,R5      ;RESTORE R0-R5
3584 015174 012604          MOV     (SP)+,R4
3585 015176 012603          MOV     (SP)+,R3
3586 015200 012602          MOV     (SP)+,R2
3587 015202 012601          MOV     (SP)+,R1
3588 015204 012600          MOV     (SP)+,R0
3589 015206 012737 015130 000024    MOV     #PFAIL,24    ;SET UP FOR POWER FAILURE
3590 015214 005726          POP1SP
3591 015216 104004          TYPE
3592 015220 017104          MPFAIL
3593 015222 005737 001756    TST     TIPFLG
3594 015226 001002          BNE     RESTAI
3595 015230 000137 001262    JMP     STARTO
3596 015234 104004          RESTAI: TYPE
3597 015236 017124          MPFI
3598 015240 012746 000340    MOV     #340,-(SP)
3599 015244 005746          PUSH1SP
3600 015246 000137 013212    JMP     TSTENT
3601
3602
3603          ;THE FOLLOWING AUTO VECTORS USING THE FIRST BASE ADDRESS
3604 015252 013746 000020    XOR:   MOV     20,-(SP)  ;SAVE 20
3605 015256 013746 000022          MOV     22,-(SP)      ;SAVE 22
3606 015262 012737 015454 000020    MOV     #25,20        ;IOT INTR VECTOR
3607 015270 012737 000340 000022    MOV     #340,22       ;IOT INTR LVL
    
```

3608	015276	012737	000300	012676		MOV	#300, DATA1	
3609	015304	012737	000302	012700		MOV	#302, DATA2	
3610	015312	013777	012700	175356	15:	MOV	DATA2, @DATA1	
3611	015320	012777	000004	175352		MOV	#IOT, @DATA2	; IOT TRAP
3612	015326	062737	000004	012676		ADD	#4, DATA1	
3613	015334	062737	000004	012700		ADD	#4, DATA2	
3614	015342	023727	012676	001000		CMF	DATA1, #1000	
3615	015350	001360				BNE	15	
3616	015352	012737	000000	015564		MOV	#0, TSTNO	; SET UP DEFAULT
3617	015360	012737	017466	015616		MOV	#TSTNO, TSTPNT	
3618	015366	052737	000340	177776		BIS	#340, PS	; PREVENT INTERRUPTS
3619	015374	005077	000136			CLR	@DMCSR	
3620	015400	012777	000100	000130		MOV	#INTENA, @DMCSR	; SET INTERRUPT ENABLE
3621	015406	042737	000340	177776		BIC	#340, PS	; ALLOW INTERRUPTS
3622	015414	052777	000200	000114		BIS	#DONE, @DMCSR	; SET DONE..AND INTERRUPT
3623	015422	000240				NOP		
3624	015424	012637	000022			MOV	(SP)+, 22	; YOU DIDN'T INTERRUPT ?
3625	015430	012637	000020			MOV	(SP)+, 20	; RESTORE 20 & 22
3626	015434	005077	000076			CLR	@DMCSR	; STOP ALL INTERRUPT
3627	015440	052737	000340	177776		BIS	#340, PS	
3628	015446	104012				ERROR		
3629	015450	000000				HALT		; YOU SHOULD HAVE INTERRUPTED
3630	015452	000426				BR	35	
3631	015454	011637	015532		25:	MOV	(SP), DMVEC	; EXTRACT VECTOR +4
3632	015460	162737	000002	015532		SUB	#2, DMVEC	; CREATE LVL
3633	015466	013737	015532	015534		MOV	DMVEC, DMMLVL	; SAVE
3634	015474	162737	000002	015532		SUB	#2, DMVEC	; CREATE AND SAVE VEC
3635	015502	012737	000340	177776		MOV	#340, PS	; PREVENT INTERRUPTS
3636	015510	005077	000022			CLR	@DMCSR	
3637	015514	022626				POP2SP		
3638	015516	022626				POP2SP		
3639	015520	012637	000022			MOV	(SP)+, 22	; RESTORE 22
3640	015524	012637	000020			MOV	(SP)+, 20	; RESTORE 20
3641	015530	000207			35:	RTS	PC	
3642								


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3643
3644 ;INDIRECT POINTERS
3645
3646 015532 000300 DHMVEC: 300 ;MODEM CONTROL INTERRUPT VECTOR
3647 015534 000302 DHMLVL: 302 ;MODEM CONTROL ONTERRUPT PRIORITY
3648 015536 170500 DHMCSR: 170500 ;MODEM CONTROL CONTROL STATUS REGISTER
3649 015540 170502 DHMLSR: 170502 ;MODEM CONTROL CONTROL STATUS REGISTER
3650 015542 177560 TKCSR: 177560
3651 015544 177562 TKDBR: 177562
3652 015546 177564 TPCSR: 177564
3653 015550 177566 TPDBR: 177566
3654 015552 177570 SWR: 177570
3655 015554 177570 DISPLAY: 177570
3656
3657 ;PROGRAM VARIABLES
3658
3659 015556 000000 ERRFLG: 0
3660 015560 000000 TRACON: 0
3661 015562 000000 PRSCNT: 0
3662 015564 000000 TSTNO: 0
3663 015566 000000 RETURN: 0
3664 015570 000000 ICOUNT: 0
3665 015572 000000 SAVRO: 0
3666 015574 000000 SAVR1: 0
3667 015576 000000 SAVR2: 0
3668 015600 000000 SAVR3: 0
3669 015602 000000 SAVR4: 0
3670 015604 000000 SAVR5: 0
3671 015606 000000 SAVSP: 0
3672 015610 000000 SAVPC: 0
3673 015612 000000 WRDCNT: 0
3674 015614 000000 CHRCNT: 0
3675 015616 017466 TSTPNT: TSTT80
3676 015620 000000 TSTMAX: 0
3677 015622 000000 LINFLG: 0
3678 015624 000000 LINE: 0
3679 015626 000000 LINORG: 0
3680 015630 000000 LINANS: 0
3681 015632 000000 ANSFLG: 0
3682 015634 000000 ORGFLG: 0
3683 015636 000000 TIME1: 0
3684 015640 000000 TIME2: 0
3685 015642 000000 TIFLG: 0
3686 015644 177777 LINSEL: 177777
3687 015646 000000 SELMSK: 0
3688 015650 000000 SLMSK: 0
3689 015652 000002 FILL: 2 ;FILL CHAR/COUNT
3690 015654 000000 FILLA: 0 ;TEMP STORAGE FOR FILL COUNT
3691 015656 000000 RNGRET: 0
3692
3693 .MLIST BEX
015660 044524 042515 047440 MNOINT: .ASCII ;TIME OUT WAITING FOR INTERRUPT%;
015720 047114 020040 051503 ;LN CSR LSR;
015737 123 040524 052524 MSTATE: .ASCII ;STATUS ERROR%EXP REC;
015770 044514 042516 042440 MLINER: .ASCII ;LINE ERROR%EXP REC LINE SEL;
016025 114 047111 020105 MLINE1: .ASCII ;LINE ERROR%EXP REC LINE;

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016056	051124	047101	044523	MTRANE:	.ASCII	:TRANSITION ERROR%EXP REC LINE@;
016115	045	022442	042042	DIALM:	.ASCII	:X%DIAL ANSWERING DATA SET%@;
016153	045	022442	030442	MT103T:	.ASCII	:X%103A MODEM CONNECT-DISCONNECT TEST%@;
016224	021045	021045	030062	MT202T:	.ASCII	:X%202C MODEM CONNECT-DISCONNECT TEST%@;
016275	045	022442	047442	MSELOR:	.ASCII	:X%ORIGINATE LINE-@;
016321	045	040442	051516	MSELAN:	.ASCII	:X%ANSWER LINE-@;
016340	021045	030061	040463	MT103A:	.ASCII	:X%103A TEST COMPLETEX%@;
016367	045	031042	031060	MT202A:	.ASCII	:X%202C TEST COMPLETEX%@;
016416	021045	052123	044522	MDISC:	.ASCII	:X%STRIKE ANY TTY KEY TO TEST DISCONNECT@;
016466	021045	021045	033061	M16:	.ASCII	:X%16 LINE SCANNER TEST%@;
016521	045	022442	042042	MTITLE:	.ASCII	:X%DZDHK-D -----MODEM CONTROL DIAGNOSTIC-----%@;
016605	045	053042	041505	MVECTO:	.ASCII	:X%VECTOR ADDRESS-@;
016627	045	041442	047117	MREGAD:	.ASCII	:X%CONTROL REGISTER ADDRESS-@;
016663	045	046042	047111	MLINSL:	.ASCII	:X%LINE SELECT PARAMETER -@;
016715	045	052042	051505	MTEST:	.ASCII	:X%TEST-@;
016725	040	037440	100	MGM:	.ASCII	:%@;
016731	045	040042		MCRLF:	.ASCII	:X%@;
016734	021045	044523	043516	MLINE:	.ASCII	:X%SINGLE LINE CABLE TEST%@;
016767	045	046042	047111	MLINEI:	.ASCII	:X%LINE NUMBER-@;
017006	040506	040524	020114	MFATAL:	.ASCII	:FATAL ERROR%STAT LSTAT@;
017040	021045	051124	047101	MTRNDE:	.ASCII	:X%TRANSITION DETECTED%STAT LSTAT@;
017104	021045	047520	042527	MPFAIL:	.ASCII	:X%POWER FAILURE@;
017124	041455	051125	042522	MPF1:	.ASCII	:CURRENT TEST WILL RESTART%@;
017161	136	040103		MCONTC:	.ASCII	:%@;
017164	053136	100		MCONTV:	.ASCII	:%@;
017167	136	040114		MCONTL:	.ASCII	:%@;
017172	021045	053523	036522	SSWREQ:	.ASCII	:X%SWR= @;
017203	040	020040	042516	SNEWIS:	.ASCII	:NEW= @;
017215	045	042442	042116	MEPASS:	.ASCII	:X%END PASS @;
017233	045	042		MBCD:	.ASCII	:%@;
	017335			.=.	+100	
	017336			.EVEN		
017336	000000			TEMTAB:	0	
	017350			.=.	+10	
017350	000000				0	
						;EMT DISPATCH TABLE
017352	013454			EMTTAB:	ERRCS	
017354	013472				ERRLS	
017356	013034				LOOP	
017360	013266				FREEZE	
017362	014456				TYPFR	
017364	014364				SVOSP	
017366	014022				OCTASN	
017370	014424				RSOS	
017372	014214				BINASC	
017374	014262				DIVI	
017376	013350				ERR	
017400	014620				INSTR	
017402	013366				ERRT	
017404	013410				ERRS	
017406	013432				ERRN	
017410	011752				GETLIN	
017412	012006				SETUPS	

M07

	017414	012242	CKRNG
	017416	012340	WAITR
	017420	012426	CKTRN
	017422	012376	WAITR
	017424	014110	CNTLU
	017426	013022	CKINT
	017430	001760	KBOINT
	017432	013650	ERRG
	017434	000000	ENTLIM: 0
	017436	017466	TSTLST: TSTTB0
	017440	017650	TSTTB1
	017442	017712	TSTTB2
	017444	017720	TSTTB3
	017446	000000	0
	017450	000000	0
	017452	000000	0
	017454	000000	0
	017456	000033	GRO: NO-1
	017460	000007	N1-100-1
	017462	000001	N2-200-1
	017454	000000	N3-300-1
	017466	002210	TSTTB0: T0
	017470	000001	1
(2)	017472	002236	T1
(2)	017474	004000	TIMES
(2)	017476	002300	T2
(2)	017500	004000	TIMES
(2)	017502	002342	T3
(2)	017504	004000	TIMES
(2)	017506	002404	T4
(2)	017510	004000	TIMES
(2)	017512	002446	T5
(2)	017514	004000	TIMES
(2)	017516	002510	T6
(2)	017520	004000	TIMES
(2)	017522	002564	T7
(2)	017524	004000	TIMES
(2)	017526	002640	T10
(2)	017530	004000	TIMES
(2)	017532	002730	T11
(2)	017534	004000	TIMES
(2)	017536	003020	T12
(2)	017540	004000	TIMES
(2)	017542	003110	T13
(2)	017544	004000	TIMES
(2)	017546	003200	T14
(2)	017550	004000	TIMES
(2)	017552	003270	T15
(2)	017554	004000	TIMES
(2)	017556	003356	T16
(2)	017560	004000	TIMES
(2)	017562	003444	T17
(2)	017564	004000	TIMES
(2)	017566	003532	T20
(2)	017570	004000	TIMES
(2)	017572	003620	T21

:CALL BY EMT CNTLUU
:CALL BY EMT CKINTT
:CALLBY EMT KBOIN
:CALLED BY EMT ERRINT

(2)	017574	004000	TIMES
(2)	017576	003714	T22
(2)	017600	000400	TIMES
(2)	017602	004030	T23
(2)	017604	000400	TIMES
(2)	017606	004220	T24
(2)	017610	000400	TIMES
(2)	017612	004372	T25
(2)	017614	000200	TIMES
(2)	017616	004534	T26
(2)	017620	000200	TIMES
(2)	017622	004774	T27
(2)	017624	000200	TIMES
(2)	017626	005230	T30
(2)	017630	000200	TIMES
(2)	017632	005464	T31
(2)	017634	000200	TIMES
(2)	017636	005720	T32
(2)	017640	000200	TIMES
(2)	017642	006104	T33
(2)	017644	000200	TIMES
	017646	000000	0
	017650	006414	TSTTB1: T100
	017652	000001	1
(2)	017654	006452	T101
(2)	017656	000200	TIMES
(2)	017660	006632	T102
(2)	017662	000200	TIMES
(2)	017664	007006	T103
(2)	017666	000200	TIMES
(2)	017670	007162	T104
(2)	017672	000200	TIMES
(2)	017674	007336	T105
(2)	017676	000200	TIMES
(2)	017700	007510	T106
(2)	017702	000200	TIMES
(2)	017704	007662	T107
(2)	017706	000200	TIMES
	017710	000000	0
	017712	010034	TSTTB2: T200
	017714	000001	1
	017716	000000	0
	017720	010410	TSTTB3: T300
	017722	000001	1
		000001	.END

ANSFLG	015632	2808*	2811*	2816*	2820*	2901*	2910	2933	2946*	2999*	3000	3681*		
ANSTR	011566	2775	2806*											
ANSTR	011654	2824*												
ANSTR1	011602	2807	2809*											
ANSTR2	011616	2810	2812*											
ANSTR3	011632	2814	2817*											
ANSTR4	011646	2819	2821*											
BIN*GA	014224	3393*	3397											
BIN*GB	014244	3398*	3400											
BIN*SC	014214	3391*	3693											
BIN*WD=	014356	852*	3350*											
BUSY =	000020	857*	1209	1213	1503	1529	2879	3136						
CHCK	015070	3535	3557*											
CHRCNT	015614	3349*	3391	3399*	3674*									
CKINT	013022	3061*	3693											
CKINTT=	104026	920*	2281	2345	2384	2443	2484	2528	2569	2609	2653	271A	2752	
CKRING=	104021	915*	2259	2420										
CKRNG	012242	2927*	3693											
CKRNG1	012306	2936	2938*											
CKRNG2	012332	2942	2945*											
CKTRIN=	104023	917*	2287	2351	2449	2490	2534	2575	2615	2659	2724			
CKTRN	012426	2966*	3693											
CKTRN1	012542	2984	2986*											
CKTRN2	012574	2991	2997*											
CKTRN3	012634	3004	3006*											
CKTRN4	012660	3010	3012*											
CLRMUX=	002000	863*	1482	1603	1659	1713	1767	1827	1864	1950	1992	2032	2072	2878
CLRSCN=	004000	864*	1502	1528	2878									
CNTLU	014110	3363*	3693											
CNTLUU=	104025	919*	1006	1127	2242	2403	3275							
CO =	000100	878*	2123	2290	2294	2452	2455	2493	2497	2578	2582	2618	2623	
COF =	040000	867*	2786	2798	2809	2821								
CONVER=	104010	906*	3351											
CS =	000040	877*	2123	2290	2294	2455	2497	2578	2618					
CSF =	020000	866*	2789	2798	2812	2821								
CSTR1	002236	1153*												
CSTR2	002300	1166*												
CSTR3	002342	1179*												
CSTR4	002404	1192*												
CSTR5	002446	1208*												
DATA1	012676	1010*	1012*	1015*	1017	2840*	2849	2969*	2979	3018*	3608*	3610*	3612*	3614
DATA2	012700	1011*	1012	1013*	1016*	2841*	2851	2970*	2988	3019*	3609*	3610	3611*	3613*
DATA3	012702	2971*	2997	3001	3020*									
DATA4	012704	2972*	3007	3021*										
DHMC SR	015536	1038	1039	1043	1100*	1108*	1118*	1141	1153*	1154	1157*	1158	1166*	1167
		1170*	1171	1179*	1180	1183*	1184	1192*	1193	1197*	1198	1208*	1209	1212*
		1213	1223*	1226*	1239*	1242*	1255*	1257*	1260*	1263*	1274*	1279*	1280*	1283*
		1293*	1298*	1299*	1302*	1312*	1317*	1318*	1321*	1331*	1336*	1337*	1340*	1351*
		1356*	1357*	1360*	1370*	1375*	1376*	1379*	1389*	1394*	1395*	1398*	1408*	1413*
		1414*	1417*	1427*	1434*	1435	1452*	1457*	1461	1470*	1482*	1485*	1491*	1493
		1502*	1503	1507*	1509	1524*	1528*	1529	1531*	1532*	1534*	1536*	1540	1562*
		1567*	1571*	1574*	1578	1598*	1603*	1607*	1610*	1615	1634*	1654*	1659*	1663*
		1666*	1671	1688*	1708*	1713*	1717*	1720*	1725	1742*	1762*	1767*	1771*	1774*
		1779	1796*	1817*	1827*	1830*	1864*	1865*	1868*	1879*	1888	1892	1901	1907
		1913*	1915*	1947*	1950*	1952*	1954*	1957	1975*	1989*	1992*	1994*	1996*	1999
		2015*	2029*	2032*	2034*	2036*	2039	2055*	2069*	2072*	2074*	2076*	2079	2095*

CROSS REFERENCE TABLE -- USER SYMBOLS

MENT1A	004056	1486#	1488		
MENT1B	004104	1492#	1501		
MENT1C	004126	1495#	1499#		
MENT1D	004134	1502#	1514		
MENT1E	004166	1508#	1517		
MENT1F	004210	1511#	1515#		
MENT2	004220	1524#			
MENT2A	004242	1528#	1549	1554	
MENT2B	004322	1539#	1552		
MENT2C	004344	1543#	1545#		
MENT2D	004356	1546#	1550#		
MENT3	004372	1562#			
MENT3A	004414	1566#	1587	1592	
MENT3B	004426	1568#	1570		
MENT3C	004464	1577#	1590		
MENT3D	004506	1581#	1583#		
MENT3E	004520	1584#	1588#		
MFATAL	017215	3036	3693#		
MLINE	017006	3200	3693#		
MLINEI	016734	1934	3693#		
MLINEI	016767	1936	3693#		
MLINER	015770	3237	3693#		
MLINEI	016025	3183	3693#		
MLIMSL	016663	1046	3693#		
MNOINT	015660	3281	3693#		
MPFAIL	017104	3592	3693#		
MPFI	017124	3597	3693#		
MPH	016725	3524	3693#		
MREGAD	016627	1035	3693#		
MSELAN	016321	2862	3693#		
MSELOR	016275	2857	3693#		
MSG	014646	3495#	3501#		
MSTATE	015737	3217	3693#		
MTEST	016715	1053	3693#		
MTITLE	016521	994	3693#		
MTRANE	016056	3164	3693#		
MTRNOE	017040	2843	3693#		
MT103A	016340	2382	3693#		
MT103T	016153	2239	3693#		
MT202A	016367	2751	3693#		
MT202T	016224	2400	3693#		
MUX1	004534	1598#			
MUX1A	004562	1603#	1644	1648	
MUX1B	004630	1611#	1632		
MUX1C	004666	1618	1621#		
MUX1D	004704	1613	1625	1628	1629#
MUX1E	004722	1634#			
MUX1F	004754	1606	1641	1643#	
MUX1I	006452	1947#			
MUX1IA	006470	1950#			
MUX1IB	006520	1955#	1973		
MUX1IC	006546	1960	1963#		
MUX1ID	006564	1967	1970	1971#	
MUX1IE	006576	1975#			
MUX1IF	006630	1982	1984#		
MUX1J	006632	1989#			

MUX12A	006650	1992#			
MUX12B	006700	1997#	2013		
MUX12C	006726	2002	2005#		
MUX12D	006740	2007	2010	2011#	
MUX12E	006752	2015#			
MUX12F	007004	2022	2024#		
MUX13	007006	2029#			
MUX13A	007024	2032#			
MUX13B	007054	2037#	2053		
MUX13C	007102	2042	2045#		
MUX13D	007114	2047	2050	2051#	
MUX13E	007126	2055#			
MUX13F	007160	2062	2064#		
MUX14	007162	2069#			
MUX14A	007200	2072#			
MUX14B	007230	2077#	2093		
MUX14C	007256	2082	2085#		
MUX14D	007270	2087	2090	2091#	
MUX14E	007302	2095#			
MUX14F	007334	2102	2104#		
MUX15	007336	2110#			
MUX15A	007354	2113#			
MUX15B	007376	2117#	2132		
MUX15C	007424	2122	2125#		
MUX15D	007436	2126	2129	2130#	
MUX15E	007452	2134#			
MUX15F	007506	2141	2143#		
MUX16	007510	2149#			
MUX16A	007526	2152#			
MUX16B	007550	2156#	2171		
MUX16C	007576	2161	2164#		
MUX16D	007610	2165	2168	2169#	
MUX16E	007624	2173#			
MUX16F	007660	2180	2182#		
MUX17	007662	2188#			
MUX17A	007700	2191#			
MUX17B	007722	2195#	2210		
MUX17C	007750	2200	2203#		
MUX17D	007762	2204	2207	2208#	
MUX17E	007776	2212#			
MUX17F	010032	2219	2221#		
MUX2	004774	1654#			
MUX2A	005022	1659#	1698	1702	
MUX2B	005070	1667#	1686		
MUX2C	005126	1674	1677#		
MUX2D	005140	1669	1679	1682	1683#
MUX2E	005156	1688#			
MUX2F	005210	1662	1695	1697#	
MUX3	005230	1708#			
MUX3A	005256	1713#	1752	1756	
MUX3B	005324	1721#	1740		
MUX3C	005362	1728	1731#		
MUX3D	005374	1723	1733	1736	1737#
MUX3E	005412	1742#			
MUX3F	005444	1716	1749	1751#	
MUX4	005464	1762#			

T20201	010566	2465	2470#
T20202	010572	2466	2472#
T20203	010576	2467	2474#
T20204	010602	2468	2476#
T202E	010606	2469	2482#
T202E1	010652	2506	2511#
T202E2	010656	2507	2513#
T202E3	010662	2508	2515#
T202E4	010666	2509	2517#
T202E5	010672	2510	2519#
T202E6	010752	2549	2554#
T202E7	010756	2550	2556#
T202E8	010762	2551	2558#
T202E9	010766	2552	2560#
T202E0	010772	2553	2562#
T202G1	011036	2580	2595#
T202G2	011042	2591	2597#
T202G3	011046	2592	2599#
T202G4	011052	2593	2601#
T202H1	011056	2594	2607#
T202H2	011122	2632	2637#
T202H3	011126	2633	2639#
T202H4	011132	2634	2641#
T202H5	011136	2635	2643#
T202I1	011142	2636	2649#
T202I2	011222	2674	2679#
T202I3	011226	2675	2681#
T202I4	011232	2676	2683#
T202I5	011236	2677	2685#
T202J	011242	2678	2697#
T202JN	011420	2740	2750#
T202JS	011302	2701	2706#
T202J1	011400	2736	2741#
T202J2	011404	2737	2743#
T202J3	011410	2738	2745#
T202J4	011414	2739	2747#
T21	003620	1426#	3693
T22	003714	1450#	3693
T23	004030	1481#	3693
T24	004220	1523#	3693
T25	004372	1561#	3693
T26	004534	1597#	3693
T27	004774	1653#	3693
T3	002342	1178#	3693
T30	005230	1707#	3693
T300	010410	2396#	3693
T31	005464	1761#	3693
T32	005720	1816#	3693
T33	006104	1863#	3693
T4	002404	1191#	3693
T5	002446	1207#	3693
T6	002510	1221#	3693
T7	002564	1237#	3693
VECSTA	001374	1012#	1018
VECSTR	001354	997	1001
VECST1	001500	1029	1032#

1009# 1110

N08

DZDHK-D MACY11 27(1006) 02-MAY-77 11:58 PAGE 105
 DZDHKD.P11 02-MAY-77 11:56 CROSS REFERENCE TABLE -- MACRO NAMES

COMMEN	834#	954#	1138#	1269#	1346#	1922#	1930#	2235#	2396#	3693#					
ENTDEF	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912
	913	914	915	916	917	918	919	920	921	922	954#				
INTS	1134#	1346	1365	1384	1403										
MUXS1	1134#	1594	1650	1704	1758	1943	1985	2025	2065						
MUXS2	1134#	2105	2144	2183											
NOINT	1134#	1269	1288	1307	1326										
TM	955#	3693													
TS	953#	1138	1152	1165	1178	1191	1207	1221	1237	1253	1273	1292	1311	1330	1350
	1369	1388	1407	1426	1450	1481	1523	1561	1597	1653	1707	1761	1816	1863	1930
	1946	1988	2028	2068	2109	2148	2187	2235	2380	2396					
TSS	953#														

. ABS. 017724 000

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

DZDHKD.SEQ/SOL/CRF/NL:TOC=DZDHKD.P11
 RUN-TIME: 4 8 1 SECONDS
 RUN-TIME RATIO: 44/14=3.0
 CORE USED: 10K (19 PAGES)