DH11 DM11 MODEM CTRL MLTPLXR
CZDHKEO

AH-8485E-MC
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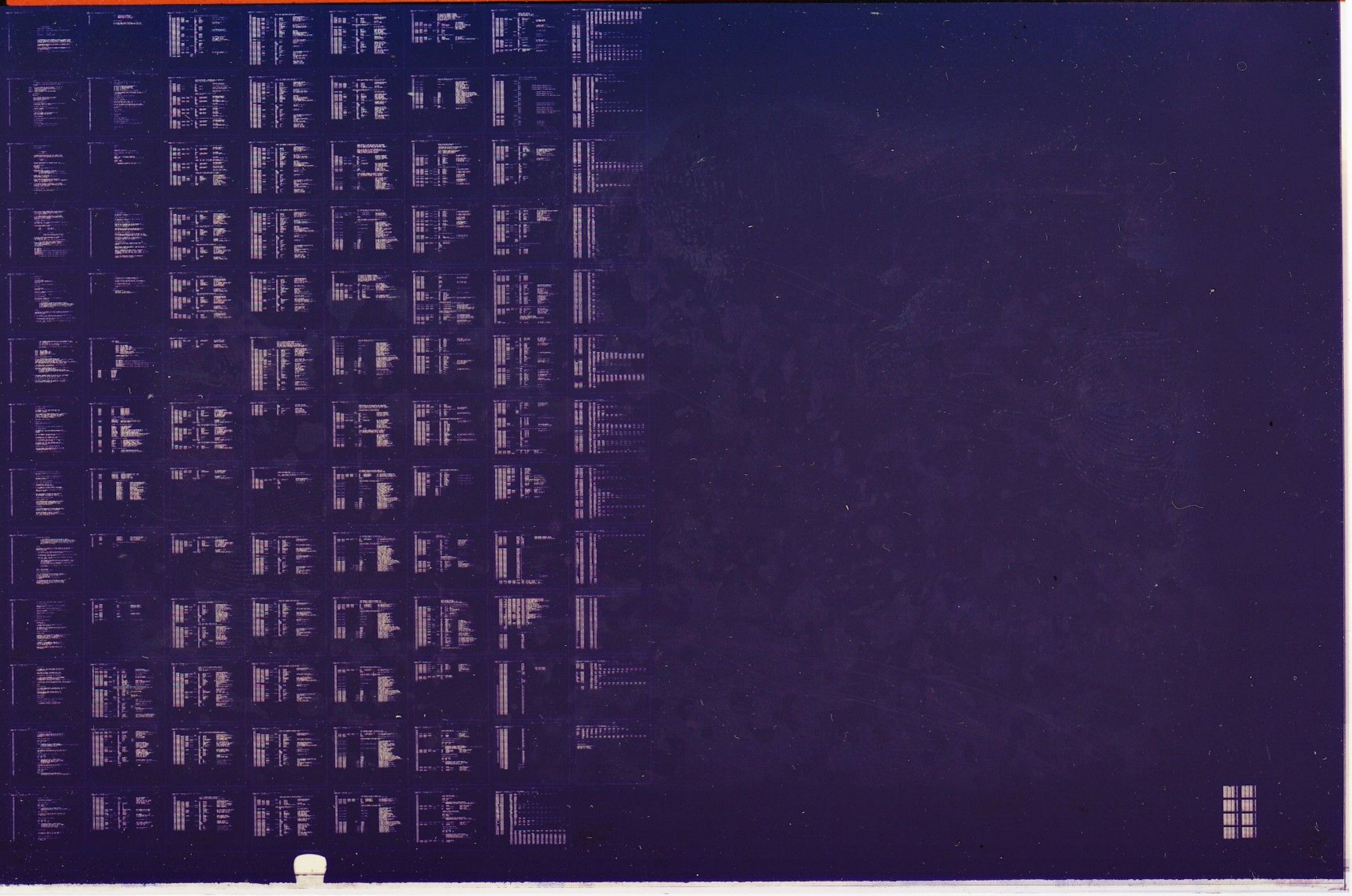

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                                                IDENTIFICATION

                                        PRODUCT CODE:   AC-8484E-MC

                                        PRODUCT NAME:   CZDMKEO MODEM CONTROL MULTIPLEXER DIAGNOSTIC

                                        DATE :          JULY 1984

                                        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 H861 TEST CONNECTOR.

                                2.1.2   FOR SINGLE LINE CABLE TEST

                                        4 CABLES TO CONNECT TO THE DISTRIBUTION PANEL
                                        H315 TEST CONNECTOR

                                2.1.3   FOR ON LINE TESTS

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

                                3.0     LOADING PROCEDURE

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

                                4.0     STARTING PROCEDURE

                                4.1     STARTING ADDRESS

                                        THE STARTING ADDRESS FOR ALL TESTS IS 000200.

                                        RESTART ADDRESS FOR ALL TESTS IS 000200
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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 <↑G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO
                                           LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

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

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

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

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

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

5.1.3 PROGRAM AND/OR OPERATOR ACTION

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

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

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

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

5.1.3.4 THIS PROGRAM WILL NO LONGER TRACE TRAP WITH THIS RELEASE

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

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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:

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

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

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

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

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

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


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

                                5.3.5   DATA SET MODE SWITCHING

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

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

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

                                        PROCEED AS DESCRIBED IN 4.2.1.8

                                5.5     ADDRESS CHANGE

                                        TO CHANGE THE VECTOR AND REGISTER ADDRESS OF THE MODEM CONTROL
                                        UNDER TEST, TYPE <CONTROL V>.  THE PROGRAM WILL
                                        STOP EXECUTION OF THE TEST IN PHOGRESS 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 RUSUME TEST EXECUTION.

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

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

                                6.0     ERRORS

                                6.1     NORMAL OPERATION

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

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

                              6.1.1     ERROR MESSAGES

                            6.1.1.1 UNIQUE ERROR

                                        ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER

                                        AN EXAMPLE OF THIS TYPE OF ERROR IS:

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

```
                                6.1.1.2 TRANSITION DETECTION ERROR

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

                                        FORMAT FOR ERROR TYPEOUT IS

                                        XXXXXX TRANSITION ERROR
                                        EXP    REC    LINE
                                        AA     BB     CC

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

                                6.1.1.3 SINGLE LINE STATUS ERROR

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

                                        FORMAT FOR SINGLE LINE STATUS ERROR IS

                                        XXXX LINE ERROR
                                        EXP    REC    LINE
                                        AAA    BBB    CC

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

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

                                        FORMAT FOR FATAL ERROR TYPEOUT IS

                                        XXXXXX FATAL ERROR
                                        CSTAT  LSTAT
                                        AAAAAA BBB

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

```
585
586                                 6.1.1.4 CONTROL STATUS ERROR
587
588                                         THIS ERROR WILL OCCUR IN A TEST THAT PRIMARILY
589                                         INVOLVES THE LINE SCANNER
590
591                                         FORMAT FOR CONTROL STATUS ERROR IS
592
593                                         XXXXXX STATUS FRROR
594                                         EXP    REC
595                                         AAAAAA BBBBBB
596
597                                         WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
598                                               AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
599                                               BBBBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR
600
601                                 6.1.1.5 LINE STATUS ERROR
602
603                                         THIS ERROR WILL OCCUR IN THOSE OFF LINE TESTS THAT
604                                         SET ONE LINE TO A PARTICULAR STATE, AND THEN CHECK
605                                         ALL OTHER LINES
606
607
608                                         FORMAT FOR LINE STATUS ERROR IS
609
610                                         XXXX LINE ERROR
611                                         EXP   REC   LINE  SEL
612                                         AAA   DDD   CC    DD
613
614                                         WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
615                                               AAA=EXPECTED LINE STATUS AT TIME OF ERROR
616                                               BBB=RECEIVED LINE STATUS AT TIME OF ERROR
617                                               CC=LINE ON WHICH ERROR OCCURED
618                                               DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING
619
620
621                               6.1.1.6 TIME OUT ERROR
622
623
624                                         THIS ERROR WILL OCCUR IF THE LINE UNDER TEST DOES
625                                         NOT INTERRUPT WITHIN A GIVEN TIME FRAME.
626
627
628                                         FORMAT FOR THIS ERROR IS
629
630                                         XXXXXX TIME OUT WAITING FOR INTERRUPT
631                                         LN  CSR    LSR
632                                         AAA BBBBBB CCCCCC
633
```

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


                                6 1.2   REPEATED ERRORS

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

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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 TYPEOUT
                                        SET SW10=0 (IF IT IS 1)
                                        SET SW09=1 TO LOOP ON SAME DATA (IF REQUIRED)

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

                                        THE PROGRAM WILL LOOP ON THE SAME TEST.

                                6.2.2   FROM PROGRAM START

                                6.2.2.1 PROCEED AS DESCRIBED IN 4.2.1.1 TO 4.2.1.4

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

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

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

                                6.2.3   AFTER <CONTROL>

                                        SAME AS 6.2.2.2 TO 6.2.2.4


                                7.0     RESTRICTIONS

                                7.1     STARTING

                                7.1.1   FOR 16 LINE SCANNER TEST

                                        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
```

```
                                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
                                        -------
                                        DMMVEC: 300  (AUTOMATICALLY GENERATED
                                        DMMLVL: 302       BY PROGRAM WHEN UNDER ACT-11 OR "XOR")
                                        ADDRESSES
                                        ---------
                                        DMMCSR: 170500
                                        DMMLSR: 170502

                                        NOTE: SW00(RESELECT ADDRESSES AND VECTORS BECOMES
                                              INOPERATIVE UNDER ACT-11 OR "XOR".
```

```
                                8.0     EXECUTION TIME

                                8.1     16 LINE SCANNER TEST

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

                                8.2     SINGLE LINE CABLE TEST

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

                                8.3     103A MODEM CONNECT-DISCONNECT TEST

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

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

                                8.4     202C MODEM CONNECT-DISCONNECT TEST

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

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

                        9.      PROGRAM DESCRIPTION

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

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

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

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

```
                                    9.      CONT'D

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

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

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

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

                                    10. LISTING

                                    11. MODIFICATION HISTORY:
                                            10-JULY-84      KEN RAUHALA
                                            ADDED DELAY FOR PDP-11/44 WITH CACHE ON.
                                            THE "MUXS2" MACRO WAS MODIFIED.
                                            ;
```

```
                                .TITLE  CZDHK-E
                                .ENABLE ABS,AMA
                                        ;SWITCH REGISTER OPTIONS


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

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

                                        ;TESTS AVAILABLE

                                        ;TEST GROUP 0-
                                        ;OFF LINE TESTS USING NO TEST CONNECTOR-FIRST TEST=0
                                        ;TEST GROUP 1-
                                        ;OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100
                                        ;TEST GROUP 2-
                                        ;CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200
                                        ;TEST GROUP 3-
                                        ;CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300

                                ;SYMBOL DEFINITIONS

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

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

```
                                ;REGISTER DEFINITIONS

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

                                ;LOCATION EQUIVALENCIES

177776                          PS=177776       ;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
014376                          RADIX=DIVIS     ;CONVERSION FACTOR FOR DECIMAL OUTPUT
014372                          BINWRD=DIVIDL   ;WORD TO BE CONVERTED TO OCTAL ASCII
014374                          DIGIT=DIVIDH    ;ASCII OCTAL DIGIT

                                ;CONTROL STATUS REGISTER BIT FUNCTIONS

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

                                ;LINE REGISTER BIT FUNCTIONS

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

                                ;SOFTWARE TRANSITION FLAGS

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

```
                                ;INSTRUCTION DEFINITIONS

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

                                        ;EMT DEFINITION TABLE

104000                                  ERRORC=EMT+X            ;CONTROL STATUS ERROR SERVICE
104001                                  ERRORL=EMT+X            ;LINE STATUS ERROR SERVICE
104002                                  SCOPE=EMT+X             ;SCOPE LOOP AND ITERATION SERVICE
104003                                  SCOPEF=EMT+X            ;DATA FREEZE SERVICE
104004                                  TYPE=EMT+X              ;TELETYPE OUTPUT
104005                                  SAV05P=EMT+X            ;SAVE R0-R5, PC+2 OF CALL
104006                                  OCTASC=EMT+X            ;CONVERT DATA TO ASCII AND TYPE
104007                                  RES05=EMT+X             ;RESTORE R0-R5
104010                                  CONVERT=EMT+X           ;ASCII CONVERSION ROUTINE
104011                                  EXTRACT=EMT+X           ;DIGIT EXTRACTION ROUTINE
104012                                  ERROR=EMT+X             ;TYPE PC OF FAILING TESTS ONLY
104013                                  INSTRG=EMT+X            ;INPUT OCTAL DATA STRING
104014                                  ERRORT=EMT+X            ;TRANSITION ERROR
104015                                  ERRORS=EMT+X            ;ON LINE STATUS ERROR
104016                                  ERRORN=EMT+X            ;FATAL TRANSITION
104017                                  GETLNS=EMT+X            ;INPUT LINE NUMBERS
104024                                  WAITS=EMT+X             ;DELAY FOR TRANSIENTS
104025                                  CNTLUU=EMT+X            ;CHANGE SWREG ROUTINE
104026                                  CKINTT=EMT+X            ;CHECK FOR INTERRUPTS-FLAG STYLE
104027                                  KBDIN=EMT+X             ;FAKE INTERRUPT ENTRY POINT
```

```
   919            104020                          SETUP=EMT+X             ;SET UP FOR ON LINE TEST
   920            104021                          CKRING=EMT+X            ;CHECK FOR RING ON CORRERT LINE
   921            104022                          WAITRN=EMT+X            ;WAIT FOR TRANSITIONS
   922            104023                          CKTRAN=EMT+X            ;CHECK TRANSITIONS
   927            104030                          ERRINT=EMT+X            ;TIME OUT ERROR FOR INTERRUPTS
   928
   929                                            ;TRAPCATCAER FOR ILLEGAL INTERRUPTS
   930            000000                  .=0
   931            000200                  .REPT 200
   932                                            .+2
   933                                            HALT
   934                                    .ENDR
```

```
                                        ;STANDARD INTERRUPT VECTORS

            000024              .=24
000024  015144                  PFAIL                   ;POWER FAIL HANDLER
000026  000340                  340                     ;SERVICE AT LEVEL 7
000030  013004                  EMTSRV                  ;EMT DISPATCH SERVICE
000032  000340                  340                     ;SERVICE AT LEVEL 7

            000046              .=46
000046  012766                  LOGICAL                 ;ACT11?

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

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

```
                        001100                  .=1100
001100                  STACK:
001100  012737  015144  000024  START:  MOV     #PFAIL,24               ;SET UP POWER FAIL
                                                                        ;INTERRUPT SERVICE VECTOR
001106  005037  001756          CLR     TIPFLG                          ;CLEAR TEST IN PROGRESS FLAG
001112  005077  014440          CLR     @TKCSR
001116  012706  001100          MOV     #STACK,SP                       ;SET UP STACK POINTER

001122  013746  000006  SUSWR:  MOV     @#6,-(SP)                       ;SAVE VECTORS
001126  013746  000004          MOV     @#4,-(SP)
001132  012737  001152  000004  MOV     #64$,@#4                        ;SET UP FOR TIMEOUT
001140  022777  177777  014420  CMP     #-1,@SWR                        ;REFERENCE HARDWARE SWITCH REGISTER
001146  001402                  BEQ     65$
001150  000407                  BR      66$
001152  022626          64$:    CMP     (SP)+,(SP)+                     ;ADJUST STACK
001154  012737  000176  015566  65$:    MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
001162  012737  000174  015570          MOV     #DISPREG,DISPLAY        ;POINT TO SOFT DISPLAY REG
001170  012637  000004  66$:    MOV     (SP)+,@#4                       ;RESTORE VECTORS
001174  012637  000006          MOV     (SP)+,@#6
001200  012777  000100  014350  MOV     #INTENA,@TKCSR                  ;ENABLE TELETYPE INTERRUPTS
001206  005037  001252          CLR     XFLAG   ;XOR = NO

                                ;*****************************************************************
                                ;REPLACE THE FOLLOWING BRANCH WITH A "NOP" (240) TO ACTIVATE "XOR" CODE
                                ;*****************************************************************
001212  000423                  BR      STARTO                          ;SKIP XOR STUFF
001214  013746  000004          MOV     4,-(SP) ;SAVE 4
001220  012737  001254  000004  MOV     #XORSVC,4       ;SET UP SVC ROUTINE
001226  005737  177060          TST     177060  ;GOT AN XOR TESTER OUT THERE ?
001232  012637  000004          MOV     (SP)+,4 ;YES
001236  005137  001252          COM     XFLAG   ;XOR = YES
001242  004737  015266          JSR     PC,XOR          ;AUTO VECTOR
001246  000137  001262          JMP     STARTO          ;RESTORE TRAPCATCHER
001252  000000          XFLAG:  0                       ;XOR FLAG
001254  022626          XORSVC: POP2SP
001256  012637  000004          MOV     (SP)+,4 ;RESTORE 4
001262  005737  015656  STARTO: TST     TIFLG                   ;TYPED TITLE?
001266  001005                  BNE     .+14                    ;YES
001270  104004                  TYPE                            ;TYPE "MODEM CONTROL DIAGNOSTIC"
001272  016535                  MTITLE
001274  012737  000001  015656  MOV     #1,TIFLG                ;SET TITLE TYPED FLAG
001302  005737  001252          TST     XFLAG                   ;X OR ?
001306  100422                  BMI     VECSTR                  ;RESTORE TRAPCATCHER
001310  005737  000042          TST     42              ;ACT 11?
001314  001403                  BEQ     START1          ;NO
001316  004737  015266          JSR     PC,XOR          ;YES  AUTO VECTOR
001322  000414                  BR      VECSTR                  ;GET VECTOR AND REGISTER ADDRESS
001324  005737  000042  START1: TST     @#42                    ;UNDER MONITOR?
001330  001005                  BNE     1$
001332  022737  000176  015566  CMP     #SWREG,SWR              ;USING SWREG?
001340  001001                  BNE     1$
001342  104025                  CNTLUU
001344  032777  000001  014214  1$:     BIT     #1,@SWR                 ;IF SW BIT 0=1, ON PROGRAM RESTART
001352  001510                  BEQ     STARTN                  ;INPUT VECTOR AND REGISTER ADDRESSES
001354  012706  001100  VECSTR: MOV     #STACK,SP               ;SET UP PROCESSOR STACK POINTER
001360  012737  000300  012712  MOV     #300,DATA1              ;ADDRESS OF FIRST FLOATING VECTOR
```

```
1016  001366  012737  000302  012714          MOV     #302,DATA2              ;ADDRESS OF STATUS WORD
1017  001374  013777  012714  011310  VECSTA: MOV     DATA2,@DATA1            ;MOVE ADDRESS OF STATUS WORD TO VECTOR
1018  001402  005077  011306                  CLR     @DATA2                  ;CLEAR STATUS WORD
1019                                                                          ;(FOR HALT ON ILLEGAL INTERRUPT)
1020  001406  062737  000004  012712          ADD     #4,DATA1                ;NEXT VECTOR
1021  001414  062737  000004  012714          ADD     #4,DATA2                ;NEXT STATUS WORD
1022  001422  023727  012712  001000          CMP     DATA1,#1000             ;IS TABLE CLEARED
1023  001430  001361                          BNE     VECSTA                  ;IF NOT, CONTINUE
1024  001432  005737  001252                  TST     XFLAG           ;XOR ?
1025  001436  100523                          BMI     TSTGO           ;YES
1026  001440  005737  000042                  TST     42              ;ACT 11 ?
1027  001444  001120                          BNE     TSTGO           ;YES
1028  001446  104013                          INSTRG                          ;GET VECTOR ADDRESS
1029  001450  016621                          MVECTOR                         ;MESSAGE "VECTOR ADDRESS-"
1030  001452  000300                          300                             ;LOWER LIMIT FOR ADDRESS
1031  001454  000774                          774                             ;UPPER LIMIT FOR ADDRESS
1032  001456  015546                          DMMVEC                          ;STORAGE FOR ADDRESS
1033  001460  032737  000003  015546  1$:     BIT     #3,DMMVEC               ;TEST 2 LSB OF ADDRESS
1034  001466  001404                          BEQ     VECST1                  ;IF 0, CONTINUE
1035  001470  012716  001460                  MOV     #1$,(SP)
1036  001474  000137  014774                  JMP     INSTER                  ;INCORRECT ADDRESS, TRY AGAIN
1037  001500  013737  015546  015550  VECST1: MOV     DMMVEC,DMMLVL           ;GENERATE ADDRESS OF
1038  001506  062737  000002  015550          ADD     #2,DMMLVL               ;INTERRUPT STATUS WORD
1039  001514  104013                          INSTRG                          ;GET ADDRESS OF CONTROL REGISTER
1040  001516  016643                          MREGAD                          ;MESSAGE "REGISTER ADDRESS "
1041  001520  170500                          170500                          ;LOWER LIMIT FOR ADDRESS
1042  001522  177777                          177777                          ;UPPER LIMIT FOR ADDRESS
1043  001524  015552                          DMMCSR                          ;STORAGE FOR ADDRESS
1044  001526  032737  000007  015552  1$:     BIT     #7,DMMCSR               ;IF 3 LSB ARE NOT 0
1045  001534  001404                          BEQ     REGST1
1046  001536  012716  001526                  MOV     #1$,(SP)
1047  001542  000137  014774                  JMP     INSTER                  ;INCORRECT ADDRESS, TRY AGAIN
1048  001546  013737  015552  015554  REGST1: MOV     DMMCSR,DMMLSR           ;SET UP ADDRESS OF LINE STATUS REGISTER
1049  001554  062737  000002  015554          ADD     #2,DMMLSR
1050  001562  104013                          INSTRG                          ;GET LINE SELECT PARAMETER
1051  001564  016677                          MLINSL
1052  001566  000000                          0
1053  001570  177777                          177777
1054  001572  015660                          LINSEL
```

```
1055
1056  001574  012706  001100          STARTN: MOV     #STACK,SP               ;SET UP PROCESSOR STACK
1057  001600  104013                          INSTRG                          ;GET TEST NUMBER
1058  001602  016731                          MTEST                           ;MESSAGE "TEST-"
1059  001604  000000                          0                               ;LOWER LIMIT FOR TEST NUMBER
1060  001606  000777                          777                             ;UPPER LIMIT FOR TEST NUMBER
1061  001610  015600                          TSTNO                           ;STORAGE FOR TEST NUMBER
1062  001612  013705  015600          X1A:    MOV     TSTNO,R5                ;GET TEST NUMBER
1063  001616  042705  177077                  BIC     #177077,R5              ;EXTRACT TEST GROUP NUMBER
1064  001622  006205                          ASR     R5
1065  001624  006205                          ASR     R5
1066  001626  006205                          ASR     R5
1067  001630  006205                          ASR     R5
1068  001632  006205                          ASR     R5
1069  001634  016537  017472  015634          MOV     GRO(R5),TSTMAX          ;GET HIGHEST TEST IN GROUP
1070  001642  016537  017452  015632          MOV     TSTLST(R5),TSTPNT       ;GET POINTER TO TEST TABLE
1071  001650  005737  015632                  TST     TSTPNT                  ;IF 0, INVALID TEST GROUP
1072  001654  001004                          BNE     STRTOA
1073  001656  012716  001612          X1B:    MOV     #X1A,(SP)
1074  001662  000137  014774                  JMP     INSTER                  ;TRY AGAIN
1075  001666  042737  177700  015600  STRTOA: BIC     #177700,TSTNO           ;GET NUMBER OF FIRST TEST
1076                                                                          ;TO BE EXECUTED IN SELECTED GROUP
1077  001674  023737  015600  015634          CMP     TSTNO,TSTMAX            ;IS NUMBER TOO LARGE
1078  001702  003401                          BLE     TSTGO
1079  001704  000764                          BR      X1B
1080  001706  012746  000340          TSTGO:  MOV     #340,-(SP)              ;SET UP PRIORITY LEVEL
1081  001712  005746                          PUSH1SP
1082  001714  000005                          RESET
1083  001716  012737  002202  002204          MOV     #DMYRTI,KRET            ;SET UP DUMMY KEYBOARD RETURN
1084  001724  005037  015636                  CLR     LINFLG                  ;CLEAR LINE SELECTED FLAG
1085  001730  005037  015574                  CLR     TRACON                  ;CLEAR TRACE TRAP FLAG
1086  001734  005037  015576                  CLR     PASCN1                  ;CLEAR PASS COUNT
1087  001740  104004                          TYPE
1088  001742  016745                          MCRLF
1089  001744  012737  000001  001756  1$:     MOV     #1,TIPFLG               ;SET TEST IN PROGRESS FLAG
1090  001752  000137  013226                  JMP     TSTENT                  ;START TESTING
1091  001756  000000          TIPFLG: 0
```

```
1092
1093                                            ;TELETYPE KEYBOARD INTERRUPT SERVICE ROUTINE
1094
1095  001760  005037  001756          KBDINT: CLR     TIPFLG                  ;CLEAR TEST IN PROGRESS FLAG
1096  001764  005037  014222                  CLR     TMP1
1097  001770  005037  002206                  CLR     SINTFL                  ;CLEAR SOFTWARE INTERRUPT FLAG
1098  001774  117737  013560  014222          MOVB    @TKDBR,TMP1
1099  002002  142737  000200  014222          BICB    #200,TMP1
1100  002010  122737  000003  014222          CMPB    #3,TMP1                 ;IF <CNTROL C> WAS TYPED
1101  002016  001011                          BNE     KBDIN1                  ;TYPE "^C" AND
1102  002020  104004                          TYPE                            ;SELECT NEW TEST
1103  002022  017175                          MCONTC
1104  002024  022626                          POP2SP
1105  002026  005077  013520                  CLR     @DHMCSR
1106  002032  005077  013520                  CLR     @TKCSR
1107  002036  000137  001574                  JMP     STARTN
1108  002042  122737  000026  014222  KBDIN1: CMPB    #26,TMP1                ;IF <CONTROL V> WAS TYPED
1109  002050  001011                          BNE     KBDIN2                  ;TYPE "^V" AND GET NEW
1110  002052  104004                          TYPE                            ;VECTOR AND REGISTER ADDRESS
1111  002054  017200                          MCONTV
1112  002056  022626                          POP2SP
1113  002060  005077  013466                  CLR     @DHMCSR
1114  002064  005077  013466                  CLR     @TKCSR
1115  002070  000137  001354                  JMP     VECSTR
1116  002074  122737  000014  014222  KBDIN2: CMPB    #14,TMP1                ;IF <CONTROL L> WAS TYPED
1117  002102  001015                          BNE     KBDIN3                  ;TYPE "^L" AND GET NEW
1118  002104  104004                          TYPE                            ;LINE NUMBERS, UNLESS
1119  002106  017203                          MCONTL                          ;TEST GROUP 0 WAS IN PROGRESS
1120  002110  022737  002202  002204          CMP     #DMYRTI,KRET            ;IF <CONTROL L> WAS TYPED IN TEST
1121  002116  001431                          BEQ     DMYRTI                  ;GROUP 0, IGNORE
1122  002120  022626                          POP2SP
1123  002122  005077  013424                  CLR     @DHMCSR
1124  002126  005077  013424                  CLR     @TKCSR
1125  002132  000177  000046                  JMP     @KRET
1126  002136  005737  000042          KBDIN3: TST     @#42
1127  002142  001011                          BNE     1$
1128  002144  022737  000176  015566          CMP     #SWREG,SWR
1129  002152  001005                          BNE     1$
1130  002154  122737  000007  014222          CMPB    #7,TMP1                 ;IS IT <^G>
1131  002162  001001                          BNE     1$
1132  002164  104025                          CNTLUU
1133  002166  012737  000001  002206  1$:     MOV     #1,SINTFL               ;SET SOFTWARE INTERRUPT FLAG
1134  002174  012737  000001  001756          MOV     #1,TIPFLG               ;SET TEST IN PROGRESS FLAG
1135  002202  000002                  DMYRTI: RTI
1136                                          .EVEN
1137  002204  000000                  KRET:   0
1138  002206  000000                  SINTFL: 0
```

```
1139                                                    ;INITIALIZATION CHECK - PERFORMED ONLY AT PROGRAM START
1140                                                    ;VERIFY THAT CONTROL STATUS REGISTER AND LINE STATUS
1141                                                    ;REGISTER WERE CLEARED BY INITIALIZE
1142
1143  002210                                T0:                                     ;REFERENCE DESIGNATION
1144  002210  104004                               TYPE                            ;TYPE "16 LINE SCANNER TEST"
1145  002212  016502                               M16
1146  002214  005777  013332               INIT1: TST     @DHMCSR                 ;TEST CONTROL STATUS REGISTER
1147  002220  001401                               BEQ     .+4
1148  002222  104012                               ERROR                           ;CONTROL STATUS NOT CLEARED, ERROR
1149  002224  005777  013324                       TST     @DHMLSR                 ;TEST LINE STATUS REGISTER
1150  002230  001401                               BEQ     .+4
1151  002232  104012                               ERROR                           ;LINE STATUS NOT CLEARED, ERROR
1152  002234  104002                               SCOPE                           ;CHECK FOR LOOP
1153
1154                                                    ;VERIFY THAT "INTERRUPT ENABLE" CAN BE
1155                                                    ;SET AND CLEARED.
1156
1157  002236                                T1:                                     ;REFERENCE DESIGNATION
1158  002236  012777  000100  013306 CSTR1: MOV     #INTENA,@DHMCSR                 ;SET INTERRUPT ENABLE
1159  002244  032777  000100  013300       BIT     #INTENA,@DHMCSR                 ;WAS INTERRUPT ENABLE SET
1160  002252  001001                       BNE     .+4
1161  002254  104012                       ERROR                                   ;NO, ERROR
1162  002256  042777  000100  013266       BIC     #INTENA,@DHMCSR                 ;CLEAR INTERRUPT ENABLE
1163  002264  032777  000100  013260       BIT     #INTENA,@DHMCSR                 ;WAS INTERRUPT ENABLE CLEARED
1164  002272  001401                       BEQ     .+4
1165  002274  104012                       ERROR                                   ;NO, ERROR
1166  002276  104002                       SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
1167
1168                                                    ;VERIFY THAT "DONE" CAN BE SET AND CLEARED
1169
1170  002300                                T2:                                     ;REFERENCE DESIGNATION
1171  002300  012777  000200  013244 CSTR2: MOV     #DONE,@DHMCSR                   ;SET DONE
1172  002306  032777  000200  013236       BIT     #DONE,@DHMCSR                   ;WAS DONE SET
1173  002314  001001                       BNE     .+4
1174  002316  104012                       ERROR                                   ;NO, ERROR
1175  002320  042777  000200  013224       BIC     #DONE,@DHMCSR                   ;CLEAR DONE
1176  002326  032777  000200  013216       BIT     #DONE,@DHMCSR                   ;WAS DONE CLEARED
1177  002334  001401                       BEQ     .+4
1178  002336  104012                       ERROR                                   ;NO, ERROR
1179  002340  104002                       SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
1180
1181                                                    ;VERIFY "MAINTENANCE MODE" CAN BE SET AND CLEARED
1182
1183  002342                                T3:                                     ;REFERENCE DESIGNATION
1184  002342  012777  001000  013202 CSTR3: MOV     #MAINT,@DHMCSR                  ;SET MAINTENANCE MODE
1185  002350  032777  001000  013174       BIT     #MAINT,@DHMCSR                  ;WAS MAINTENANCE MODE SET
1186  002356  001001                       BNE     .+4
1187  002360  104012                       ERROR                                   ;NO, ERROR
1188  002362  042777  001000  013162       BIC     #MAINT,@DHMCSR                  ;CLEAR MAINTENANCE MODE
1189  002370  032777  001000  013154       BIT     #MAINT,@DHMCSR                  ;WAS MAINTENANCE MODE CLEARED
1190  002376  001401                       BEQ     .+4
1191  002400  104012                       ERROR                                   ;NO, ERROR
1192  002402  104002                       SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
```

```
1193
1194                                                    ;VERIFY THAT "SCAN ENABLE" CAN BE SET AND CLEARED.
1195
1196  002404                                    T4:                                     ;REFERENCE DESIGNATION
1197  002404  012777  000040  013140  CSTR4:   MOV     @SCNENA,@DHMCSR                 ;SET SCAN ENABLE
1198  002412  032777  000040  013132           BIT     @SCNENA,@DHMCSR                 ;WAS SCAN ENABLE SET
1199  002420  001001                           BNE     .+4
1200
1201  002422  104012                           ERROR                                   ;NO, ERROR
1202  002424  042777  000040  013120           BIC     @SCNENA,@DHMCSR                 ;CLEAR SCAN ENABLE
1203  002432  032777  000040  013112           BIT     @SCNENA,@DHMCSR                 ;WAS SCAN ENABLE CLEARED
1204  002440  001401                           BEQ     .+4
1205
1206  002442  104012                           ERROR                                   ;NO, ERROR
1207  002444  104002                           SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
1208
1209                                                    ;VERIFY THAT "BUSY" IS SET WHEN "SCAN ENABLE" IS SET
1210                                                    ;VERIFY THAT "BUSY" IS CLEARED WHEN "SCAN ENABLE" IS CLEARED
1211
1212  002446                                    T5:                                     ;REFERENCE DESIGNATION
1213  002446  012777  000040  013076  CSTR5:   MOV     @SCNENA,@DHMCSR                 ;SET SCAN ENABLE
1214  002454  032777  000020  013070           BIT     @BUSY,@DHMCSR                   ;IS BUSY BIT SET
1215  002462  001001                           BNE     .+4
1216  002464  104012                           ERROR                                   ;BUSY NOT SET, ERROR
1217  002466  042777  000040  013056           BIC     @SCNENA,@DHMCSR                 ;CLEAR SCAN ENABLE
1218  002474  032777  000020  013050           BIT     @BUSY,@DHMCSR                   ;IS BUSY BIT CLEARED
1219  002502  001401                           BEQ     .+4
1220  002504  104012                           ERROR                                   ;BUSY NOT CLEARED, ERROR
1221  002506  104002                           SCOPE                                   ;CHECK FOR LOOP, ITERATIONS
1222
1223                                                    ;VERIFY THAT SETTING "DONE" DOES NOT CCAUSE AN
1224                                                    ;INTERRUPT IF "INTERRUPT ENABLE" IS CLEARED.
1225
1226  002510                                    T6:                                     ;REFERENCE DESIGNATION
1227  002510  052737  000340  177776  INT1:    BIS     #340,PS                         ;LOCK OUT INTERRUPTS
1228  002516  005077  013030                   CLR     @DHMCSR                         ;CLEAR CONTROL REGISTER
1229  002522  012777  002556  013016           MOV     #INT1A,@DHMVEC                  ;SET UP INTERRUPT SERVICE ADDRESS
1230  002530  013777  177776  013012           MOV     PS,@DHMLVL                      ;SET UP INTERRUPT PRIORITY
1231  002536  052777  000200  013006           BIS     #DONE,@DHMCSR                   ;SET DONE
1232  002544  042737  000340  177776           BIC     #340,PS                         ;ALLOW INTERRUPTS
1233  002552  000240                           NOP                                     ;DELAY FOR INTERRUPT
1234  002554  000402                           BR      INT1B                           ;NO INTERRUPT, CONTINUE
1235  002556  022626                 INT1A:    POP2SP                                  ;RESTORE STACK, INTERRUPT
1236  002560  104012                           ERROR                                   ;OCCURED, ERROR
1237  002562  104002                 INT1B:    SCOPE                                   ;CHECK FOR LOOP, ITERATIONS
```

```
1238
1239                                            ;VERIFY THAT NO INTERRUPT OCCURS WITH "INTERRUPT ENABLE"
1240                                            ;SET AND "DONE" CLEARED.
1241
1242  002564                            T7:                                     ;REFERENCE DESIGNATION
1243  002564  052737  000340  177776  INT2:   BIS     #340,PS                 ;LOCK OUT INTERRUPTS
1244  002572  005077  012754          CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
1245  002576  012777  002632  012742  MOV     #INT2A,@DMMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1246  002604  013777  177776  012736  MOV     PS,@DMMLVL              ;SET UP INTERRUPT SERVICE LEVEL
1247  002612  052777  000100  012732  BIS     #INTENA,@DMMCSR         ;SET INTERRUPT ENABLE
1248  002620  042737  000340  177776  BIC     #340,PS                 ;ALLOW INTERRUPTS
1249  002626  000240                  NOP                             ;DELAY FOR INTERRUPTS
1250  002630  000402                  BR      INT2B                   ;NO INTERRUPT, CONTINUE
1251  002632  022626          INT2A:  POP2SP                          ;RESTORE STACK
1252  002634  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
1253  002636  104002          INT2B:  SCOPE                           ;CHECK FOR ITERATIONS, LOOP
1254
1255                                            ;VERIFY THAT SETTING "DONE" CAUSES AN INTERRUPT
1256                                            ;WITH "INTERRUPT ENABLE" SET
1257
1258  002640                            T10:                                    ;REFERENCE DESIGNATION
1259  002640  052737  000340  177776  INT3:   BIS     #340,PS                 ;LOCK OUT INTERRUPTS
1260  002646  005077  012700          CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
1261  002652  012777  002724  012666  MOV     #INT3A,@DMMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1262  002660  012777  000100  012664  MOV     #INTENA,@DMMCSR         ;SET "INTERRUPT ENABLE"
1263  002666  013777  177776  012654  MOV     PS,@DMMLVL              ;SET "INTERRUPT LEVEL"
1264  002674  042737  000340  177776  BIC     #340,PS                 ;ALLOW INTERRUPTS
1265  002702  052777  000200  012642  BIS     #DONE,@DMMCSR           ;SET "DONE"
1266  002710  00024C                  NOP                             ;DELAY FOR INTERRUPT
1267  002712  000240                  NOP
1268  002714  005077  012632          CLR     @DMMCSR
1269  002720  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
1270  002722  000401                  BR      INT3B                   ;CONTINUE
1271  002724  022626          INT3A:  POP2SP                          ;INTERRUPT OCCURED, RESTOR STACK
1272  002726  104002          INT3B:  SCOPE                           ;CHECK FOR ITERATION, LOOP
1273
1274
1275                                            ;VERIFY THAT NO INTERRUPT OCCURS WITH
1276                                            ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 7.
1277
1278  002730                            T11:                                    ;REFERENCE DESIGNATION
1279  002730  005077  012616          INT4:   CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
1280  002734  042737  000340  177776  BIC     #340,PS                 ;SET PROCESSOR PRIORITY
1281  002742  052737  000340  177776  BIS     #340,PS                 ;TO LEVEL 7.
1282  002750  012777  003012  012570  MOV     #INT4A,@DMMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1283  002756  013777  177776  012564  MOV     PS,@DMMLVL              ;SET UP INTERRUPT SERVICE LEVEL
1284  002764  012777  000100  012560  MOV     #INTENA,@DMMCSR         ;SET INTERRUPT ENABLE
1285  002772  052777  000200  012552  BIS     #DONE,@DMMCSR           ;GENERATE INTERRUPT
1286  003000  000240                  NOP                             ;DELAY FOR INTERRUPT
1287  003002  000240                  NOP
1288  003004  005077  012542          CLR     @DMMCSR
1289  003010  000402                  BR      INT4B                   ;NO INTERRUPT, CONTINUE
1290  003012  022626          INT4A:  POP2SP                          ;RESTORE STACK
1291  003014  104012                  ERROR                           ;INTERRUPT OCCURED, ERROR
1292  003016  104002          INT4B:  SCOPE                           ;CHECK FOR ITERATION, LOOP
```

```
1293
1294                                            ;VERIFY THAT NO INTERRUPT OCCURS WITH
1295                                            ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 6.
1296
1297  003020                            T12:                                ;REFERENCE DESIGNATION
1298  003020  005077  012526            INT5:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1299  003024  042737  000340  177776            BIC     #340,PS             ;SET PROCESSOR PRIORITY
1300  003032  052737  000300  177776            BIS     #300,PS             ;TO LEVEL 6.
1301  003040  012777  003102  012500            MOV     #INT5A,@DHMVEC      ;SET UP INTERRUPT SERVICE ADDRESS
1302  003046  013777  177776  012474            MOV     PS,@DHMLVL          ;SET UP INTERRUPT SERVICE LEVEL
1303  003054  012777  000100  012470            MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
1304  003062  052777  000200  012462            BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
1305  003070  000240                            NOP                         ;DELAY FOR INTERRUPT
1306  003072  000240                            NOP
1307  003074  005077  012452                    CLR     @DHMCSR
1308  003100  000402                            BR      INT5B               ;NO INTERRUPT, CONTINUE
1309  003102  022626                    INT5A:  POP2SP                      ;RESTORE STACK
1310  003104  104012                            ERROR                       ;INTERRUPT OCCURED, ERROR
1311  003106  104002                    INT5B:  SCOPE                       ;CHECK FOR ITERATION, LOOP
1312
1313                                            ;VERIFY THAT NO INTERRUPT OCCURS WITH
1314                                            ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 5.
1315
1316  003110                            T13:                                ;REFERENCE DESIGNATION
1317  003110  005077  012436            INT6:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1318  003114  042737  000340  177776            BIC     #340,PS             ;SET PROCESSOR PRIORITY
1319  003122  052737  000240  177776            BIS     #240,PS             ;TO LEVEL 5.
1320  003130  012777  003172  012410            MOV     #INT6A,@DHMVEC      ;SET UP INTERRUPT SERVICE ADDRESS
1321  003136  013777  177776  012404            MOV     PS,@DHMLVL          ;SET UP INTERRUPT SERVICE LEVEL
1322  003144  012777  000100  012400            MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
1323  003152  052777  000200  012372            BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
1324  003160  000240                            NOP                         ;DELAY FOR INTERRUPT
1325  003162  000240                            NOP
1326  003164  005077  012362                    CLR     @DHMCSR
1327  003170  000402                            BR      INT6B               ;NO INTERRUPT, CONTINUE
1328  003172  022626                    INT6A:  POP2SP                      ;RESTORE STACK
1329  003174  104012                            ERROR                       ;INTERRUPT OCCURED, ERROR
1330  003176  104002                    INT6B:  SCOPE                       ;CHECK FOR ITERATION, LOOP
1331
1332                                            ;VERIFY THAT NO INTERRUPT OCCURS WITH
1333                                            ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 4.
1334
1335  003200                            T14:                                ;REFERENCE DESIGNATION
1336  003200  005077  012346            INT7:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1337  003204  042737  000340  177776            BIC     #340,PS             ;SET PROCESSOR PRIORITY
1338  003212  052737  000200  177776            BIS     #200,PS             ;TO LEVEL 4.
1339  003220  012777  003262  012320            MOV     #INT7A,@DHMVEC      ;SET UP INTERRUPT SERVICE ADDRESS
1340  003226  013777  177776  012314            MOV     PS,@DHMLVL          ;SET UP INTERRUPT SERVICE LEVEL
```

```
 1341  003234  012777  000100  012310          MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
 1342  003242  052777  000200  012302          BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
 1343  003250  000240                          NOP                             ;DELAY FOR INTERRUPT
 1344  003252  000240                          NOP
 1345  003254  005077  012272                  CLR     @DHMCSR
 1346  003260  000402                          BR      INT7B                   ;NO INTERRUPT, CONTINUE
 1347  003262  022626                  INT7A:  POP2SP                          ;RESTORE STACK
 1348  003264  104012                          ERROR                           ;INTERRUPT OCCURED, ERROR
 1349  003266  104002                  INT7B:  SCOPE                           ;CHECK FOR ITERATION, LOOP
```

```
1350
1351
1352                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1353                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 0.
1354
1355  003270                          T15:                                ;REFERENCE DESIGNATION
1356  003270  005077  012256        INT10:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1357  003274  042737  000340  177776      BIC     #340,PS             ;ALLOW INTERRUPTS
1358  003302  012777  003352  012236      MOV     #INT10A,@DHMVEC     ;SET UP INTERRUPT SERVICE ADDRESS
1359  003310  005077  012234              CLR     @DHMLVL             ;SET UP INTERRUPT SERVICE PRIORITY
1360  003314  052737  000000  177776      BIS     #0,PS               ;SET PROCESSOR PRIORITY TO LEVEL 0.
1361  003322  012777  000100  012222      MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
1362  003330  052777  000200  012214      BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
1363  003336  000240                      NOP                         ;WAIT FOR INTERRUPT
1364  003340  000240                      NOP
1365  003342  005077  012204              CLR     @DHMCSR
1366  003346  104012                      ERROR                       ;NO INTERRUPT, ERROR
1367  003350  000401                      BR      INT10B              ;CONTINUE
1368  003352  022626              INT10A: POP2SP                      ;INTERRUPT OCCURED, RESTORE STACK
1369  003354  104002              INT10B: SCOPE                       ;CHECK FOR INTERATIONS, LOOP.
1370
1371                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1372                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 1.
1373
1374  003356                          T16:                                ;REFERENCE DESIGNATION
1375  003356  005077  012170        INT11:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1376  003362  042737  000340  177776      BIC     #340,PS             ;ALLOW INTERRUPTS
1377  003370  012777  003440  012150      MOV     #INT11A,@DHMVEC     ;SET UP INTERRUPT SERVICE ADDRESS
1378  003376  005077  012146              CLR     @DHMLVL             ;SET UP INTERRUPT SERVICE PRIORITY
1379  003402  052737  000040  177776      BIS     #40,PS              ;SET PROCESSOR PRIORITY TO LEVEL 1.
1380  003410  012777  000100  012134      MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
1381  003416  052777  000200  012126      BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
1382  003424  000240                      NOP                         ;WAIT FOR INTERRUPT
1383  003426  000240                      NOP
1384  003430  005077  012116              CLR     @DHMCSR
1385  003434  104012                      ERROR                       ;NO INTERRUPT, ERROR
1386  003436  000401                      BR      INT11B              ;CONTINUE
1387  003440  022626              INT11A: POP2SP                      ;INTERRUPT OCCURED, RESTORE STACK
1388  003442  104002              INT11B: SCOPE                       ;CHECK FOR INTERATIONS, LOOP.
1389
1390                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1391                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 2.
1392
1393  003444                          T17:                                ;REFERENCE DESIGNATION
1394  003444  005077  012102        INT12:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1395  003450  042737  000340  177776      BIC     #340,PS             ;ALLOW INTERRUPTS
1396  003456  012777  003526  012062      MOV     #INT12A,@DHMVEC     ;SET UP INTERRUPT SERVICE ADDRESS
1397  003464  005077  012060              CLR     @DHMLVL             ;SET UP INTERRUPT SERVICE PRIORITY
```

```
  1398  003470  052737  000100  177776          BIS     #100,PS                 ;SET PROCESSOR PRIORITY TO LEVEL 2.
  1399  003476  012777  000100  012046          MOV     #INTENA,@DHMCSR         ;SET INTERRUPT ENABLE
  1400  003504  052777  000200  012040          BIS     #DONE,@DHMCSR           ;GENERATE INTERRUPT
  1401  003512  000240                          NOP                             ;WAIT FOR INTERRUPT
  1402  003514  000240                          NOP
  1403  003516  005077  012030                  CLR     @DHMCSR
  1404  003522  104012                          ERROR                           ;NO INTERRUPT, ERROR
  1405  003524  000401                          BR      INT12B                  ;CONTINUE
  1406  003526  022626                  INT12A: POP2SP                          ;INTERRUPT OCCURED, RESTORE STACK
  1407  003530  104002                  INT12B: SCOPE                           ;CHECK FOR INTERATIONS, LOOP.
```

```
1408
1409                                        ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1410                                        ;ENABLE" SET AND "DONE" SET AT PRIORITY 3.
1411
1412  003532                          T20:                                ;REFERENCE DESIGNATION
1413  003532  005077  012014        INT13:  CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1414  003536  042737  000340  177776      BIC     #340,PS             ;ALLOW INTERRUPTS
1415  003544  012777  003614  011774      MOV     #INT13A,@DHMVEC     ;SET UP INTERRUPT SERVICE ADDRESS
1416  003552  005077  011772              CLR     @DHMLVL             ;SET UP INTERRUPT SERVICE PRIORITY
1417  003556  052737  000140  177776      BIS     #140,PS             ;SET PROCESSOR PRIORITY TO LEVEL 3.
1418  003564  012777  000100  011760      MOV     #INTENA,@DHMCSR     ;SET INTERRUPT ENABLE
1419  003572  052777  000200  011752      BIS     #DONE,@DHMCSR       ;GENERATE INTERRUPT
1420  003600  000240                      NOP                         ;WAIT FOR INTERRUPT
1421  003602  000240                      NOP
1422  003604  005077  011742              CLR     @DHMCSR
1423  003610  104012                      ERROR                       ;NO INTERRUPT, ERROR
1424  003612  000401                      BR      INT13B              ;CONTINUE
1425  003614  022626              INT13A: POP2SP                      ;INTERRUPT OCCURED, RESTORE STACK
1426  003616  104002              INT13B: SCOPE                       ;CHECK FOR INTERATIONS, LOOP.
```

```
1427
1428                                            ;VERIFY THAT ALL LINE NUMBERS CAN BE WRITTEN INTO AND
1429                                            ;READ BACK FROM LINE COUNTER
1430
1431  003620                            T21:                                    ;REFERENCE DESIGNATION
1432  003620  005077  011726           LINT1:   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
1433  003624  042737  000340  177776           BIC     #340,PS                 ;ENABLE INTERRUPTS
1434  003632  012737  000001  015662           MOV     #1,SELMSK               ;INIT LINE SELECT MASK
1435  003640  005005                           CLR     R5                      ;CLEAR EXPECTED LINE NUMBER
1436  003642  012700  000020                   MOV     #16.,R0                 ;SET UP TO TEST 16 LINE NUMBERS
1437  003646  033737  015662  015660 LINT1A:  BIT     SELMSK,LINSEL           ;THIS LINE SELECTED ??
1438  003654  001407                           BEQ     LINT1B                  ;BR IF NOT
1439  003656  010577  011670                   MOV     R5,@DHMCSR              ;SET LINE NUMBER
1440  003662  017704  011664                   MOV     @DHMCSR,R4              ;READ BACK LINE NUMBER
1441  003666  020504                           CMP     R5,R4                   ;ARE EXPECTED AND RECEIVED
1442  003670  001401                           BEQ     LINT1B                  ;LINE NUMBERS THE SAME
1443  003672  104000                           ERRORC                          ;LINE NUMBERS DIFFERENT, ERROR
1444  003674  104003           LINT1B: SCOPEF                                  ;CHECK FOR DATA FREEZE
1445  003676  003646                           LINT1A                          ;RETURN FOR DATA FREEZE
1446  003700  005205                           INC     R5                      ;UPDATE LINE COUNT
1447  003702  006337  015662                   ASL     SELMSK                  ;SELECT NEXT LINE TO TEST
1448  003706  005300                           DEC     R0                      ;UPDATE LINE NUMBER
1449  003710  001356                           BNE     LINT1A                  ;CONTINUE
1450  003712  104002                           SCOPE                           ;CHECK FOR ITERATION, LOOP
1451
1452                                            ;USING "STEP" MODE, VERIFY THAT THE
1453                                            ;LINE COUNTER CAN BE STEPPED THRU ALL STATES.
1454
1455  003714                            T22:                                    ;REFERENCE DESIGNATION
1456  003714  042737  000340  177776 LINT2:   BIC     #340,PS                 ;ENABLE INTERRUPTS
1457  003722  005077  011624                   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
1458  003726  005005                           CLR     R5                      ;CLEAR EXPECTED LINE COUNT
1459  003730  012737  000001  015662           MOV     #1,SELMSK               ;SET UP SELECT MASK
1460  003736  012701  177777                   MOV     #-1,R1                  ;INIT LINE COUNTER
1461  003742  012700  000020                   MOV     #16.,R0                 ;SET UP TO TEST 16 VALUES
1462  003746  012777  000017  011576           MOV     #17,@DHMCSR             ;FIRST VALUE =0
1463  003754  033737  015662  015660 LINT2A:  BIT     SELMSK,LINSEL           ;THIS LINE SELECTED ??
1464  003762  001407                           BEQ     LINT2B                  ;BR IF NOT
1465  003764  004737  013344                   CALL    STEPER                  ;STEP LINE COUNTER
1466  003770  017704  011556                   MOV     @DHMCSR,R4              ;READ LINE COUNTER
1467  003774  020504                           CMP     R5,R4                   ;COMPARE EXPECTED AND
1468  003776  001401                           BEQ     LINT2B                  ;RECEIVED LINE NUMBERS
1469  004000  104000                           ERRORC                          ;LINE COUNTER ERROR
1470  004002  104003           LINT2B: SCOPEF                                  ;CHECK FOR DATA FREEZE
1471  004004  003714                           LINT2
1472  004006  005205                           INC     R5                      ;UPDATE EXPECTED LINE NUMBER
1473  004010  006337  015662                   ASL     SELMSK                  ;SHIFT SELECT MASK
1474  004014  005201                           INC     R1                      ;GEN NEW LINE NO.
1475  004016  010177  011530                   MOV     R1,@DHMCSR              ;SET NEW LINE NO. IN CSR
1476  004022  005300                           DEC     R0
1477  004024  001353                           BNE     LINT2A
1478  004026  104002                           SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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1479
1480                                        ;WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS.
1481                                        ;VERIFY THAT ALL LOCATIONS HAVE BEEN WRITTEN
1482                                        ;TO 1'S.
1483                                        ;VERIFY THAT "CLEAR SCAN" CLEARS ALL SCANNER
1484                                        ;MEMORY LOCATIONS.
1485
1486  004030                          T23:                                ;REFERENCE DESIGNATION
1487  004030  012777  002000  011514  MEMT1:  MOV     #CLRMUX,@DHMCSR     ;CLEAR CONTROL STATUS REGISTER
1488  004036  042737  000340  177776          BIC     #340,PS             ;ENABLE INTERRUPTS
1489  004044  012700  000020                  MOV     #16.,R0             ;SET UP TO TEST 16 LOCATIONS
1490  004050  052777  001017  011474          BIS     #MAINT+17,@DHMCSR   ;SET MAINTEANCE MODE
1491  004056  004737  013344          MEMT1A: CALL    STEPER              ;SET LINE COUNTER THRU ALL
1492  004062  005300                          DEC     R0                  ;STATES, WRITING 1'S INTO
1493  004064  001374                          BNE     MEMT1A              ;ALL MEMORY WORDS
1494  004066  012700  000020                  MOV     #16.,R0             ;SET UP TO TEST 16 WORDS
1495  004072  012705  070000                  MOV     #70000,R5           ;SET UP EXPECTED STATUS REGISTER
1496  004076  012777  000017  011446          MOV     #17,@DHMCSR         ;START WITH LINE 0
1497  004104  004737  013344          MEMT1B: CALL    STEPER              ;ACCESS SCANNER MEMORY
1498  004110  017704  011436                  MOV     @DHMCSR,R4          ;READ DATA
1499  004114  020504                          CMP     R5,R4               ;COMPARE EXPECTED AND RECEIVED
1500  004116  001403                          BEQ     MEMT1C              ;DATA
1501  004120  104000                          ERRORC                      ;CONTROL STATUS OR MEMORY ERROR
1502  004122  104003                          SCOPEF                      ;CHECK FOR DATA FREEZE
1503  004124  004030                          MEMT1
1504  004126  005205          MEMT1C: INC     R5                          ;UPDATE EEXPECTED STATUS
1505  004130  005300                  DEC     R0                          ;UPDATE LINE COUNT
1506  004132  001364                  BNE     MEMT1B                      ;CONTINUE
1507  004134  012777  004000  011410  MEMT1D: MOV     #CLRSCN,@DHMCSR     ;SET "CLEAR SCAN"
1508  004142  032777  000020  011402          BIT     #BUSY,@DHMCSR       ;WAIT FOR "CLEAR CYCLES"
1509  004150  001374                          BNE     .-6
1510  004152  012700  000020                  MOV     #16.,R0             ;SET UP TO TEST 16 MEMORY
1511  004156  005005                          CLR     R5                  ;LOCATIONS
1512  004160  012777  000017  011364          MOV     #17,@DHMCSR         ;FIRST TO BE TESTED=0
1513  004166  004737  013344          MEMT1E: CALL    STEPER              ;ACCESS SEANNER MEMORY
1514  004172  017704  011354                  MOV     @DHMCSR,R4          ;READ DATA
1515  004176  020504                          CMP     R5,R4               ;COMPARE EXPECTED AND RECEIVED
1516  004200  001403                          BEQ     MEMT1F              ;DATA
1517  004202  104000                          ERRORC                      ;CONTROL  STATUS OF MEMORY ERROR
1518  004204  104003                          SCOPEFF                     ;CHECK FOR DATA FREEZE
1519  004206  004134                          MEMT1D
1520  004210  005205          MEMT1F: INC     R5                          ;UPDATE EXPECTED DATA
1521  004212  005300                  DEC     R0                          ;UPDATE LINE COUNT
1522  004214  001364                  BNE     MEMT1E                      ;CONTTINUE
1523  004216  104002                  SCOPE                               ;CHECK FOR ITERATIONS, LOOP
```

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1524
1525                                        ;WRITE 1'S INTO SELECTED SCANNER MEMORY LOCATION.
1526                                        ;VERIFY THAT ONLY SELECTED LOCATION WAS WRITTEN INTO.
1527
1528  004220                        T24:                                ;REFERENCE DESIGNATION
1529  004220  005077  011326        MEMT2:  CLR     @DHMCSR             ;CLEAR CONTROL STATUS REGISTER
1530  004224  042737  000340  177776      BIC     #340,PS             ;ENABLE INTERRUPTS
1531  004232  012700  000020              MOV     #16.,R0             ;SET UP TO TEST 16 ADDRESSES
1532  004236  012702  000017              MOV     #17,R2              ;FIRST ADDRESS TO BE TESTED=0
1533  004242  012777  004000  011302  MEMT2A: MOV     #CLRSCN,@DHMCSR     ;CLEAR ACANNER MEMORY
1534  004250  032777  000020  011274      BIT     #BUSY,@DHMCSR       ;WAIT FOR CLEAR CYCLE
1535  004256  001374                      BNE     .-6
1536  004260  012777  001000  011264      MOV     #MAINT,@DHMCSR      ;SET "MAINTENANCE MODE"
1537  004266  050277  011260              BIS     R2,@DHMCSR          ;SET LINE COUNTER TO TEST ADDRESS-1
1538  004272  004737  013344              CALL    STEPER              ;WRITE 1'S INTO TEST ADDRESS
1539  004276  042777  001000  011246      BIC     #MAINT,@DHMCSR      ;CLEAR "MAINTENANCE MODE"
1540  004304  012703  000020              MOV     #16.,R3             ;SET UP TO TEST ALL 16
1541  004310  012777  000017  011234      MOV     #17,@DHMCSR         ;SCANNER MEMORY LOCATIONS
1542  004316  005202                      INC     R2
1543  004320  005001                      CLR     R1
1544  004322  004737  013344  MEMT2B:    CALL    STEPER              ;ACCESS SCANNER MEMORY
1545  004326  117704  011220              MOVB    @DHMCSR,R4          ;READ COMPENTS OF MEMORY
1546  004332  010105                      MOV     R1,R5               ;SET UP EXPECTED CONTENTS
1547  004334  120402                      CMPB    R4,R2               ;OF SCANNER MEMORY
1548  004336  001002                      BNE     MEMT2C
1549  004340  052705  070000              BIS     #70000,R5
1550  004344  020405  MEMT2C:    CMP     R4,R5               ;COMPARE EXPECTED AND RECEIVED
1551  004346  001403                      BEQ     MEMT2D              ;VALUES
1552  004350  104000                      ERRORC                      ;SCANNER MEMORY ERROR
1553  004352  104003                      SCOPEF                      ;CHECK FOR DATA FREEZE
1554  004354  004242                      MEMT2A
1555  004356  005201  MEMT2D:    INC     R1
1556  004360  005303                      DEC     R3                  ;TEST NEXT SCANNEB LOCATION
1557  004362  001357                      BNE     MEMT2B
1558  004364  005300                      DEC     R0                  ;UPDATE LINE COUNT
1559  004366  001325                      BNE     MEMT2A
1560  004370  104002                      SCOPE                       ;CHECK FOR ITERATION, LOOP
```

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

004372                          T25:                                    ;REFERENCE DESIGNATION
004372  005077  011154          MEMT3:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
004376  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
004404  012700  000020                  MOV     #16.,R0                 ;SET UP TO TEST 16 ADDRESSES
004410  012702  000017                  MOV     #17,R2                  ;FIRST ADDRESS TO BE TESTED=0
004414  012703  000020          MEMT3A: MOV     #16.,R3                 ;WRITE 1'S INTO ALL SCANNER
004420  012777  001017  011124          MOV     #MAINT+17,@DHMCSR       ;MEMORY LOCATIONS
004426  004737  013344          MEMT3B: CALL    STEPER                  ;ACCESS SCANNER MEM
004432  005303                          DEC     R3
004434  001374                          BNE     MEMT3B
004436  010277  011110                  MOV     R2,@DHMCSR              ;SET LINE COUNTER TO TEST ADDRESS-1
004442  004737  013344                  CALL    STEPER                  ;WRITE 0'S INTO TEST ADDRESS
004446  012703  000020                  MOV     #16.,R3                 ;SET UP TO TEST ALL 16
004452  012777  000017  011072          MOV     #17,@DHMCSR             ;SCANNER MEMORY LOCATIONS
004460  005202                          INC     R2
004462  005001                          CLR     R1
004464  004737  013344          MEMT3C: CALL    STEPER                  ;ACESS SCANNER MEMORY
004470  117704  011056                  MOVB    @DHMCSR,R4              ;READ CONTENTS OF MEMORY
004474  010105                          MOV     R1,R5                   ;SET UP EXPECTED CONTENTS
004476  120402                          CMPB    R4,R2                   ;OF SCANNER MEIORY
004500  001002                          BNE     MEMT3D
004502  052705  070000                  BIS     #70000,R5
004506  020405          MEMT3D: CMP     R4,R5                   ;COMPARE EXPECTED AND
004510  001403                          BEQ     MEMT3E                  ;RECEIVED VALUES
004512  104000                          ERRORC                          ;SCANNER MEMORY ERROR
004514  104003                          SCOPEF                          ;CHECK FOR DATA FREEZE
004516  004414                          MEMT3A
004520  005201          MEMT3E: INC     R1
004522  005303                          DEC     R3                      ;TEST NEXT SCANNER LOCATION
004524  001357                          BNE     MEMT3C
004526  005300                          DEC     R0                      ;UPDATE ADDRESS COUNT
004530  001331                          BNE     MEMT3A
004532  104002                          SCOPE                           ;CHECK FOR ITERATION, LOOP
```

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1599                                            ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
1600                                            ;BE SET AND CLEARED FOR SELECTED LINE
1601
1602  004534                            T26:                                ;REFERENCE DESIGNATION
1603  004534  005077  011012            MUX1:   CLR     @DHMCSR             ;CLEAR CONTROL STATUS REGISTER
1604  004540  042737  000340  177776            BIC     #340,PS             ;ENABLE INTERRUPTS
1605  004546  012700  000020                    MOV     #16.,R0             ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1606  004552  012737  000001  015662            MOV     #1,SELMSK           ;INIT LINE SELECT MASK
1607  004560  005001                            CLR     R1                  ;START AT LINE 0
1608  004562  012777  002000  010762    MUX1A:  MOV     #CLRMUX,@DHMCSR
1609  004570  012702  000020                    MOV     #16.,R2
1610  004574  033737  015662  015660            BIT     SELMSK,LINSEL       ;IS THIS LINE SELECTED FOR TEST ?
1611  004602  001464                            BEQ     MUX1F               ;BR IF NOT
1612  004604  010177  010742                    MOV     R1,@DHMCSR          ;SELECT LINE TO BE TESTED
1613  004610  012777  000001  010736            MOV     #LINENA,@DHMLSR     ;SET LINE ENABLE FUNCTION FLIP-FLOP
1614  004616  012737  000001  015664            MOV     #1,SLMSK            ;INIT ANOTHER SELECT MASK
1615  004624  005077  010722                    CLR     @DHMCSR
1616  004630  005005                    MUX1B:  CLR     R5
1617  004632  033737  015664  015660            BIT     SLMSK,LINSEL        ;SELECTED ??
1618  004640  001421                            BEQ     MUX1D               ;BR IF NOT
1619  004642  017704  010706                    MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1620  004646  117703  010700                    MOVB    @DHMCSR,R3          ;READ CONTROL STATUS REGISTER
1621  004652  042703  177760                    BIC     #177760,R3          ;CLEAR UNWANTED BITS
1622  004656  020103                            CMP     R1,R3               ;IF LINE NUMBER=SELECTED LINE NUMBER,
1623  004660  001002                            BNE     MUX1C               ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1624  004662  012705  000001                    MOV     #LINENA,R5
1625                                                                        ;TO BE SET
1626  004666                            MUX1C:
1627  004666  042704  000360                    BIC     #360,R4             ;CLEAR RING,CO,CS,SCORCV
1628                                                                        ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1629  004672  020504                            CMP     R5,R4               ;CMP EXPECTED AND RECVD
1630  004674  001403                            BEQ     MUX1D               ;RESULTS
1631  004676  104001                            ERRORL                      ;LINE STATUS ERROR
1632  004700  104003                            SCOPEF
1633  004702  004704                            MUX1D
1634  004704  004737  013344    MUX1D:  CALL    STEPER              ;EXAMINE NEXT LINE
1635  004710  006337  015664            ASL     SLMSK               ;SHIFT MASK
1636  004714  005302                            DEC     R2
1637  004716  001344                            BNE     MUX1B
1638  004720  005005                            CLR     R5
1639  004722  010177  010624    MUX1E:  MOV     R1,@DHMCSR
1640  004726  010103                            MOV     R1,R3               ;SET LINE COUNTER TO SELECTED LINE
1641  004730  005077  010620                    CLR     @DHMLSR             ;CLEAR LINE ENABLE FLIP FLOP
1642  004734  105227  000000                    INCB    #0                  ;DELAY FOR CABLE
1643  004740  001375                            BNE     .-4                 ;DITTO
1644  004742  017704  010606                    MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1645  004746  005704                            TST     R4                  ;WAS LINE ENABLE FUNCTION FLIP FLOP
1646  004750  001401                            BEQ     MUX1F               ;CLEARED
1647  004752  104001                            ERRORL                      ;NO, LINE STATUS ERROR
1648  004754  104003    MUX1F:  SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1649  004756  004562                            MUX1A
1650  004760  006337  015662            ASL     SELMSK              ;SHIFT SELECT MASK
1651  004764  005201                            INC     R1                  ;SELECT NEXT LINE
1652  004766  005300                            DEC     R0                  ;DECREMENT LINE COUNT
1653  004770  001274                            BNE     MUX1A               ;CONTINU IF NOT DONE
1654  004772  104002                            SCOPE                       ;CHECK FOR ITERATIONS, LOOP
```

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

                                        T27:                                    ;REFERENCE DESIGNATION
                                        MUX2:   CLR     @DMMCSR                 ;CLEAR CONTROL STATUS REGISTER
                                                BIC     #340,PS                 ;ENABLE INTERRUPTS
                                                MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
                                                MOV     #1,SELMSK               ;INIT LINE SELECT MASK
                                                CLR     R1                      ;START AT LINE 0
                                        MUX2A:  MOV     #CLRMUX,@DMMCSR
                                                MOV     #16.,R2
                                                BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
                                                BEQ     MUX2F                   ;BR IF NOT
                                                MOV     R1,@DMMCSR              ;SELECT LINE TO BE TESTED
                                                MOV     #TRMRDY,@DMMLSR         ;SET TERMINAL READY FUNCTION FLIP FLOP
                                                MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
                                                CLR     @DMMCSR
                                        MUX2B:  CLR     R5
                                                BIT     SLMSK,LINSEL            ;SELECTED ??
                                                BEQ     MUX2D                   ;BR IF NOT
                                                MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
                                                MOVB    @DMMCSR,R3              ;READ CONTROL STATUS REGISTER
                                                BIC     #177760,R3              ;CLEAR UNWANTED BITS
                                                CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
                                                BNE     MUX2C                   ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
                                                MOV     #TRMRDY,R5
                                                                                ;TO BE SET
                                        MUX2C:
                                                CMP     R5,R4                   ;CMP EXPECTED AND RECVD
                                                BEQ     MUX2D                   ;RESULTS
                                                ERRORL                          ;LINE STATUS ERROR
                                                SCOPEF
                                                MUX2D
                                        MUX2D:  CALL    STEPER                  ;EXAMINE NEXT LINE
                                                ASL     SLMSK                   ;SHIFT MASK
                                                DEC     R2
                                                BNE     MUX2B
                                                CLR     R5
                                        MUX2E:  MOV     R1,@DMMCSR
                                                MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
                                                CLR     @DMMLSR                 ;CLEAR TERMINAL READY FLIP FLOP
                                                INCB    #0                      ;DELAY FOR CABLE
                                                BNE     .-4                     ;DITTO
                                                MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
                                                TST     R4                      ;WAS TERMINAL READY FUNCTION FLIP FLOP
                                                BEQ     MUX2F                   ;CLEARED
                                                ERRORL                          ;NO, LINE STATUS ERROR
                                        MUX2F:  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
                                                MUX2A
                                                ASL     SELMSK                  ;SHIFT SELECT MASK
                                                INC     R1                      ;SELECT NEXT LINE
                                                DEC     R0                      ;DECREMENT LINE COUNT
                                                BNE     MUX2A                   ;CONTINU IF NOT DONE
                                                SCOPE                           ;CHECK FOR ITERATIONS, LOOP
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                                        ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
                                        ;BE SET AND CLEARED FOR SELECTED LINE

                                T30:                                    ;REFERENCE DESIGNATION
005230                          MUX3:   CLR     @DMMCSR                 ;CLEAR CONTROL STATUS REGISTER
005230  005077  010316                  BIC     #340,PS                 ;ENABLE INTERRUPTS
005234  042737  000340  177776          MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
005242  012700  000020                  MOV     #1,SELMSK               ;INIT LINE SELECT MASK
005246  012737  000001  015662          CLR     R1                      ;START AT LINE 0
005254  005001                  MUX3A:  MOV     #CLRMUX,@DMMCSR
005256  012777  002000  010266          MOV     #16.,R2
005264  012702  000020                  BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
005270  033737  015662  015660          BEQ     MUX3F                   ;BR IF NOT
005276  001462                          MOV     R1,@DMMCSR              ;SELECT LINE TO BE TESTED
005300  010177  010246                  MOV     #RS,@DMMLSR             ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
005304  012777  000004  010242          MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
005312  012737  000001  015664          CLR     @DMMCSR
005320  005077  010226                  CLR     R5
005324  005005                  MUX3B:  BIT     SLMSK,LINSEL            ;SELECTED ??
005326  033737  015664  015660          BEQ     MUX3D                   ;BR IF NOT
005334  001417                          MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
005336  017704  010212                  MOVB    @DMMCSR,R3              ;READ CONTROL STATUS REGISTER
005342  117703  010204                  BIC     #177760,R3              ;CLEAR UNWANTED BITS
005346  042703  177760                  CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
005352  020103                          BNE     MUX3C                   ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
005354  001002                          MOV     #RS,R5
005356  012705  000004                                                  ;TO BE SET

005362                          MUX3C:
005362  020504                          CMP     R5,R4                   ;CMP EXPECTED AND RECVD
005364  001403                          BEQ     MUX3D                   ;RESULTS
005366  104001                          ERRORL                          ;LINE STATUS ERROR
005370  104003                          SCOPEF
005372  005374                          MUX3D
005374  004737  013344          MUX3D:  CALL    STEPER                  ;EXAMINE NEXT LINE
005400  006337  015664                  ASL     SLMSK                   ;SHIFT MASK
005404  005302                          DEC     R2
005406  001346                          BNE     MUX3B
005410  005005                          CLR     R5
005412  010177  010134          MUX3E:  MOV     R1,@DMMCSR
005416  010103                          MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
005420  005077  010130                  CLR     @DMMLSR                 ;CLEAR REQUEST TO SEND FLIP FLOP
005424  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
005430  001375                          BNE     .-4                     ;DITTO
005432  017704  010116                  MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
005436  005704                          TST     R4                      ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
005440  001401                          BEQ     MUX3F                   ;CLEARED
005442  104001                          ERRORL                          ;NO, LINE STATUS ERROR
005444  104003                  MUX3F:  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
005446  005256                          MUX3A
005450  006337  015662                  ASL     SELMSK                  ;SHIFT SELECT MASK
005454  005201                          INC     R1                      ;SELECT NEXT LINE
005456  005300                          DEC     R0                      ;DECREMENT LINE COUNT
005460  001276                          BNE     MUX3A                   ;CONTINU IF NOT DONE
005462  104002                          SCOPE                           ;CHECK FOR ITERATIONS, LOOP
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                                                ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
                                                ;BE SET AND CLEARED FOR SELECTED LINE

005464                                  T31:                                    ;REFERENCE DESIGNATION
005464  005077  010062                  MUX4:   CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
005470  042737  000340  177776                  BIC     #340,PS                 ;ENABLE INTERRUPTS
005476  012700  000020                          MOV     #16.,R0                 ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
005502  012737  000001  015662                  MOV     #1,SELMSK               ;INIT LINE SELECT MASK
005510  005001                                  CLR     R1                      ;START AT LINE 0
005512  012777  002000  010032          MUX4A:  MOV     #CLRMUX,@DHMCSR
005520  012702  000020                          MOV     #16.,R2
005524  033737  015662  015660                  BIT     SELMSK,LINSEL           ;IS THIS LINE SELECTED FOR TEST ?
005532  001462                                  BEQ     MUX4F                   ;BR IF NOT
005534  010177  010012                          MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
005540  012777  000010  010006                  MOV     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
005546  012737  000001  015664                  MOV     #1,SLMSK                ;INIT ANOTHER SELECT MASK
005554  005077  007772                          CLR     @DHMCSR
005560  005005                          MUX4B:  CLR     R5
005562  033737  015664  015660                  BIT     SLMSK,LINSEL            ;SELECTED ??
005570  001417                                  BEQ     MUX4D                   ;BR IF NOT
005572  017704  007756                          MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005576  117703  007750                          MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
005602  042703  177760                          BIC     #177760,R3              ;CLEAR UNWANTED BITS
005606  020103                                  CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
005610  001002                                  BNE     MUX4C                   ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
005612  012705  000010                          MOV     #SECTX,R5
                                                                                ;TO BE SET
005616                                  MUX4C:
005616  020504                                  CMP     R5,R4                   ;CMP EXPECTED AND RECVD
005620  001403                                  BEQ     MUX4D                   ;RESULTS
005622  104001                                  ERRORL                          ;LINE STATUS ERROR
005624  104003                                  SCOPEF
005626  005630                                  MUX4D
005630  004737  013344          MUX4D:  CALL    STEPER                  ;EXAMINE NEXT LINE
005634  006337  015664                  ASL     SLMSK                   ;SHIFT MASK
00564C  005302                          DEC     R2
005642  001346                          BNE     MUX4B
005644  005005                          CLR     R5
005646  010177  007700          MUX4E:  MOV     R1,@DHMCSR
005652  010103                          MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
005654  005077  007674                  CLR     @DHMLSR                 ;CLEAR SECONDARY TRANSMIT FLIP FLOP
005660  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
005664  001375                          BNE     .-4                     ;DITTO
005666  017704  007662                  MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
005672  005704                          TST     R4                      ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
005674  001401                          BEQ     MUX4F                   ;CLEARED
005676  104001                          ERRORL                          ;NO, LINE STATUS ERROR
005700  104003                  MUX4F:  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
005702  005512                          MUX4A
005704  006337  015662                  ASL     SELMSK                  ;SHIFT SELECT MASK
005710  005201                          INC     R1                      ;SELECT NEXT LINE
005712  005300                          DEC     R0                      ;DECREMENT LINE COUNT
005714  001276                          BNE     MUX4A                   ;CONTINU IF NOT DONE
005716  104002                          SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
1817
1818                                        ;VERIFY THAT "CLEAR MULTIPLXER" CLEARS ALL MULTIPLEXER
1819                                        ;FUNCTION FLIP-FLOPS
1820
1821  005720                        T32:                                ;REFERENCE DESIGNATION
1822  005720  005077  007626       MUX8:   CLR     @DHMCSR             ;CLEAR CONTROL REGISTER
1823  005724  042737  000340  177776       BIC     #340,PS             ;ENABLE INTERRUPTS
1824  005732  012700  000020               MOV     #16.,R0             ;SET UP TO TEST 16 LINES
1825  005736  012777  000017  007610 MUX8A: MOV     #17,@DHMLSR         ;WRITE 1S INTO  ALL MULTIPLEXER
1826  005744  004737  013344               CALL    STEPER              ;FUNCTION FLIPFLOPS
1827  005750  005300                       DEC     R0
1828  005752  001371                       BNE     MUX8A
1829  005754  012737  000001  015662       MOV     #1,SELMSK           ;INIT SELECT MASK
1830  005762  005003                       CLR     R3                  ;SET UP FOR 16 LINES
1831  005764  012700  000020               MOV     #16.,R0
1832  005770  012777  002000  007554 MUX8B: MOV     #CLRMUX,@DHMCSR     ;CLEAR MULTIPLEXER
1833  005776  033737  015662  015660 MUX8C: BIT     SELMSK,LINSEL       ;SELECTED ??
1834  006004  001427                       BEQ     MUX8E               ;BR IF NOT
1835  006006  010377  007540               MOV     R3,@DHMCSR          ;SELECT LINE
1836  006012  017704  007536               MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1837  006016  005005                       CLR     R5                  ;EXPECT 0S
1838  006020  005704                       TST     R4                  ;WAS LINE STATUS REGISTER CLEARED
1839  006022  001403                       BEQ     MUX8D
1840  006024  104001                       ERRORL                      ;LINE STATUS ERROR
1841  006026  104003                       SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1842  006030  005770                       MUX8B
1843  006032  005205               MUX8D:  INC     R5                  ;EXPECT LINE ENABLE
1844  006034  052777  000001  007512       BIS     #LINENA,@DHMLSR     ;SET LINE ENABLE ON SELECTED LINE
1845  006042  017704  007506               MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
1846  006046  042704  000360               BIC     #360,R4             ;CLEAR RING,CO,CS SECRCV-MAY FLOAT HIGH
1847  006052  020504                       CMP     R5,R4               ;IS ANYTHING BUT LINE ENABLE SET
1848  006054  001403                       BEQ     MUX8E
1849  006056  104001                       ERRORL                      ;LINE STATUS ERROR
1850  006060  104003                       SCOPEF                      ;CHECK FOR LOOP ON SAME DATA
1851  006062  005770                       MUX8B
1852  006064  005203               MUX8E:  INC     R3                  ;UPDATE LINE NUMBER
1853  006066  005077  007462               CLR     @DHMLSR             ;CLEAR CURRENT LINE
1854  006072  006337  015662               ASL     SELMSK              ;SHIFT SELECT MASK
1855  006076  005300                       DEC     R0                  ;CONTINUE IF ALL LINES NOT
1856  006100  001336                       BNE     MUX8C               ;TESTED
1857  006102  104002                       SCOPE                       ;CHECK FOR ITERATIONS, LOOP
```

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

006104                          T33:                                    ;REFERENCE DESIGNATION
006104  012777  002000  007440  SCNT1:  MOV     #CLRMUX,@DHMCSR         ;CLEAR ALL MULTIPLEXER FLIPFLOPS
006112  005077  007434                  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
006116  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
006124  012700  000020                  MOV     #16.,R0                 ;SET UP TO WRITE 1'S INTO
006130  012777  001017  007414          MOV     #MAINT+17,@DHMCSR       ;ALL SCANNER MEMORY LOCATION
006136  012737  000001  015662          MOV     #1,SELMSK               ;INIT SELECT MASK
006144  004737  013344          SCNT1A: CALL    STEPER                  ;WRITE A LOCATION
006150  012777  000001  007376          MOV     #LINENA,@DHMLSR         ;LET "LINE ENABLE"
006156  005300                  DEC     R0
006160  001371                  BNE     SCNT1A
006162  012701  177777                  MOV     #-1,R1                  ;INIT LINE NO. GEN.
006166  012705  070300                  MOV     #70300,R5               ;EXPECT "DONE"+"COF"+"CSF"+"SECRXF"
006172  012777  006344  007346          MOV     #SCNT1C,@DHMVEC         ;SET UP LOCAL INTERRUPT SERVICE
006200  013777  177776  007342          MOV     PS,@DHMLVL              ;SERVICE AT LEVEL 7
006206  012700  000020                  MOV     #16.,R0
006212  012777  000117  007332          MOV     #INTENA+17,@DHMCSR      ;SET INTERRUPT ENABLE
006220  033737  015662  015660  SCNT1B: BIT     SELMSK,LINSEL           ;SELECTED ??
006226  001456                  BEQ     SCNT1D                  ;BR IF NOT
006230  052737  000340  177776          BIS     #340,PS                 ;LOCK OUT INTERRUPTS
006236  004737  013344                  CALL    STEPER                  ;HIT THE SCANER ONCE
006242  005003                  CLR     R3                      ;CLEAR DELAY
006244  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
006252  005303                  1$:     DEC     R3                      ;WAIT LONG ENOUGH?
006254  001404                  BEQ     2$                      ;WE HAVE AN ERROR
006256  105777  007270                  TSTB    @DHMCSR                 ;DID DONE SET
006262  100373                  BPL     1$                      ;NOT YET
006264  100416                  BMI     3$                      ;SET BUT NO INTERRUPT
006266  052737  000340  177776  2$:     BIS     #340,PS
006274  017704  007252                  MOV     @DHMCSR,R4              ;GET FAILING LINE
006300  010402                  MOV     R4,R2                   ;GET CSR
006302  017703  007246                  MOV     @DHMLSR,R3              ;GET LSR
006306  042704  177760                  BIC     #177760,R4
006312  104030                  ERRINT                          ;REPORT ERROR HAS OCCURED
006314  104003                  SCOPEF
006316  006104                  SCNT1
006320  000421                  BR      SCNT1D                  ;CONTINUE THE TEST
006322  052737  000340  177776  3$:     BIS     #340,PS                 ;INTERRUPT DID NOT OCCUR
006330  017704  007216                  MOV     @DHMCSR,R4              ;ERROR
006334  104000                  ERRORC                          ;CONTROL STATUS ERROR
006336  104003                  SCOPEF                          ;CHECK FOR LOOP ON SAME DATA
006340  006104                  SCNT1
006342  000410                  BR      SCNT1D
006344  022626          SCNT1C: POP2SP                          ;INTERRUPT OCCURED, REPOSITION STACK
006346  017704  007200                  MOV     @DHMCSR,R4              ;READ CONTROL STATUS
006352  020504                  CMP     R5,R4                   ;ARE EXPECTED AND RECEIVED
```

```
 1914  006354  001403                          BEQ     SCNT1D                  ;REGISTERS THE SAME
 1915  006356  104000                          ERRORC                          ;NO, LINE STATUS ERROR
 1916  006360  104003                          SCOPEF                          ;CHECK FOR LOOP WITH CURRENT DATA
 1917  006362  006104                          SCNT1
 1918  006364  042777  000217  007160  SCNT1D: BIC     #DONE+17,@DHMCSR        ;CLEAR D DONE
 1919  006372  005201                          INC     R1                      ;GEN NXT LINE NO.
 1920  006374  150177  007152                  BISB    R1,@DHMCSR              ;SET LINE NO. BITS
 1921  006400  006337  015662                  ASL     SELMSK                  ;SHIFT SELECT MASK
 1922  006404  005205                          INC     R5                      ;UPDATE EXPECTED RESULT
 1923  006406  005300                          DEC     R0                      ;CONTINUE IF NOT DONE
 1924  006410  001303                          BNE     SCNT1B
 1925  006412  104002                          SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
1926
1927
1928                                            ;SINGLE LINE CABLE TEST
1929                                            ;FOR USE WITH MODEM CABLE AND DC11 TEST CONNECTOR
1930
1931                                            ;NOTE:  MODEM CONTROL MULTIPLEXER INPUTS SHOULD BE CONNECTED
1932                                            ;TO DISTRIBUTION PANEL WIA DM11-DC
1933
1934
1935  006414                                T100:                                   ;REFERENCE DESIGNATION
1936  006414  012737  006434  002204  STRLIN: MOV     #STRLNA,KRET                   ;SET UP FOR NEW LINE SELECTION
1937  006422  042737  000340  177776          BIC     #340,PS                        ;ENABLE INTERRUPTS
1938  006430  104004                          TYPE                                   ;TYPE "SINGLE LINE CABLE TEST"
1939  006432  016750                          MLINE
1940  006434  104013                STRLNA: INSTRG                                  ;GET LINE NUMBER
1941  006436  017003                          MLINEI
1942  006440  000000                          0
1943  006442  000017                          17
1944  006444  015640                          LINE
1945  006446  104004                          TYPE
1946  006450  016745                          MCRLF
```

```
1947
1948                                                    ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
1949                                                    ;BE SET AND CLEARED FOR SELECTED LINE
1950
1951  006452                                T101:                                   ;REFERENCE DESIGNATION
1952  006452  005077  007074                MUX11:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
1953  006456  042737  000340  177776              BIC     #340,PS                 ;ENABLE INTERRUPTS
1954  006464  013701  015640                      MOV     LINE,R1
1955  006470  012777  002000  007054  MUX11A: MOV     #CLRMUX,@DHMCSR
1956  006476  012702  000020                      MOV     #16.,R2
1957  006502  010177  007044                      MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
1958  006506  012777  000001  007040              MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE FUNCTION FLIP-FLOP
1959  006514  005077  007032                      CLR     @DHMCSR
1960  006520  005005                MUX11B: CLR     R5
1961  006522  017704  007026                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1962  006526  117703  007020                      MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
1963  006532  042703  177760                      BIC     #177760,R3              ;CLEAR UNWANTED BITS
1964  006536  020103                              CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
1965  006540  001002                              BNE     MUX11C                  ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1966  006542  012705  000001                      MOV     #LINENA,R5
1967                                                                            ;TO BE SET
1968  006546                        MUX11C:
1969  006546  042704  000360                      BIC     #360,R4                 ;CLEAR RING,CO,CS,SECRCV
1970                                                                            ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1971  006552  020504                              CMP     R5,R4                   ;CMP EXPECTED AND RECVD
1972  006554  001403                              BEQ     MUX11D                  ;RESULTS
1973  006556  104001                              ERRORL                          ;LINE STATUS ERROR
1974  006560  104003                              SCOPEF
1975  006562  006564                              MUX11D
1976  006564  004737  013344          MUX11D: CALL    STEPER                  ;EXAMINE NEXT LINE
1977  006570  005302                              DEC     R2
1978  006572  001352                              BNE     MUX11B
1979  006574  005005                              CLR     R5
1980  006576  010177  006750          MUX11E: MOV     R1,@DHMCSR
1981  006602  010103                              MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
1982  006604  005077  006744                      CLR     @DHMLSR                 ;CLEAR LINE ENABLE FLIP FLOP
1983  006610  105227  000000                      INCB    #0                      ;DELAY FOR CABLE
1984  006614  001375                              BNE     .-4                     ;DITTO
1985  006616  017704  006732                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
1986  006622  005704                              TST     R4                      ;WAS LINE ENABLE FUNCTION FLIP FLOP
1987  006624  001401                              BEQ     MUX11F                  ;CLEARED
1988  006626  104001                              ERRORL                          ;NO, LINE STATUS ERROR
1989  006630  104002                MUX11F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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

                                        T102:                                   ;REFERENCE DESIGNATION
006632  005077  006714                MUX12:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
006636  042737  000340  177776              BIC     #340,PS                 ;ENABLE INTERRUPTS
006644  013701  015640                      MOV     LINE,R1
006650  012777  002000  006674        MUX12A: MOV     #CLRMUX,@DHMCSR
006656  012702  000020                      MOV     #16.,R2
006662  010177  006664                      MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
006666  012777  000002  006660              MOV     #TRMRDY,@DHMLSR         ;SET TERMINAL READY FUNCTION FLIP-FLOP
006674  005077  006652                      CLR     @DHMCSR
006700  005005                        MUX12B: CLR     R5
006702  017704  006646                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
006706  117703  006640                      MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
006712  042703  177760                      BIC     #177760,R3              ;CLEAR UNWANTED BITS
006716  020103                              CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
006720  001002                              BNE     MUX12C                  ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
006722  012705  000002                      MOV     #TRMRDY,R5
                                                                            ;TO BE SET
006726                                  MUX12C:
006726  020504                              CMP     R5,R4                   ;CMP EXPECTED AND RECVD
006730  001403                              BEQ     MUX12D                  ;RESULTS
006732  104001                              ERRORL                          ;LINE STATUS ERROR
006734  104003                              SCOPEF
006736  006740                              MUX12D
006740  004737  013344                MUX12D: CALL    STEPER                  ;EXAMINE NEXT LINE
006744  005302                              DEC     R2
006746  001354                              BNE     MUX12B
006750  005005                              CLR     R5
006752  010177  006574                MUX12E: MOV     R1,@DHMCSR
006756  010103                              MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
006760  005077  006570                      CLR     @DHMLSR                 ;CLEAR TERMINAL READY FLIP FLOP
006764  105227  000000                      INCB    #0                      ;DELAY FOR CABLE
006770  001375                              BNE     .-4                     ;DITTO
006772  017704  006556                      MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
006776  005704                              TST     R4                      ;WAS TERMINAL READY FUNCTION FLIP FLOP
007000  001401                              BEQ     MUX12F                  ;CLEARED
007002  104001                              ERRORL                          ;NO, LINE STATUS ERROR
007004  104002                  MUX12F:     SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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

007006                          T103:                                   ;REFERENCE DESIGNATION
007006  005077  006540        MUX13:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
007012  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
007020  013701  015640                MOV     LINE,R1
007024  012777  002000  006520 MUX13A: MOV     #CLRMUX,@DHMCSR
007032  012702  000020                MOV     #16.,R2
007036  010177  006510                MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
007042  012777  000004  006504        MOV     #RS,@DHMLSR             ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
007050  005077  006476                CLR     @DHMCSR
007054  005005                MUX13B: CLR     R5
007056  017704  006472                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
007062  117703  006464                MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
007066  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
007072  020103                        CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
007074  001002                        BNE     MUX13C                  ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
007076  012705  000004                MOV     #RS,R5
                                                                        ;TO BE SET
007102                          MUX13C:
007102  020504                        CMP     R5,R4                   ;CMP EXPECTED AND RECVD
007104  001403                        BEQ     MUX13D                  ;RESULTS
007106  104001                        ERRORL                          ;LINE STATUS ERROR
007110  104003                        SCOPEF
007112  007114                        MUX13D
007114  004737  013344        MUX13D: CALL    STEPER                  ;EXAMINE NEXT LINE
007120  005302                        DEC     R2
007122  001354                        BNE     MUX13B
007124  005005                        CLR     R5
007126  010177  006420        MUX13E: MOV     R1,@DHMCSR
007132  010103                        MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
007134  005077  006414                CLR     @DHMLSR                 ;CLEAR REQUEST TO SEND FLIP FLOP
007140  105227  000000                INCB    #0                      ;DELAY FOR CABLE
007144  001375                        BNE     .-4                     ;DITTO
007146  017704  006402                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
007152  005704                        TST     R4                      ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
007154  001401                        BEQ     MUX13F                  ;CLEARED
007156  104001                        ERRORL                          ;NO, LINE STATUS ERROR
007160  104002          MUX13F: SCOPE                                 ;CHECK FOR ITERATIONS, LOOP
```

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

                                T104:                                   ;REFERENCE DESIGNATION
007162  005077  006364        MUX14:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
007166  042737  000340 177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
007174  013701  015640                MOV     LINE,R1
007200  012777  002000 006344  MUX14A: MOV     #CLRMUX,@DHMCSR
007206  012702  000020                MOV     #16.,R2
007212  010177  006334                MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
007216  012777  000010 006330          MOV     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
007224  005077  006322                CLR     @DHMCSR
007230  005005                MUX14B: CLR     R5
007232  017704  006316                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
007236  117703  006310                MOVB    @DHMCSR,R3              ;READ CONTROL STATUS REGISTER
007242  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
007246  020103                      CMP     R1,R3                   ;IF LINE NUMBER=SELECTED LINE NUMBER,
007250  001002                      BNE     MUX14C                  ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
007252  012705  000010                MOV     #SECTX,R5
                                                                        ;TO BE SET
007256                          MUX14C:
007256  020504                      CMP     R5,R4                   ;CMP EXPECTED AND RECVD
007260  001403                      BEQ     MUX14D                  ;RESULTS
007262  104001                      ERRORL                          ;LINE STATUS ERROR
007264  104003                      SCOPEF
007266  007270                      MUX14D
007270  004737  013344        MUX14D: CALL    STEPER                  ;EXAMINE NEXT LINE
007274  005302                      DEC     R2
007276  001354                      BNE     MUX14B
007300  005005                      CLR     R5
007302  010177  006244        MUX14E: MOV     R1,@DHMCSR
007306  010103                      MOV     R1,R3                   ;SET LINE COUNTER TO SELECTED LINE
007310  005077  006240                CLR     @DHMLSR                 ;CLEAR SECONDARY TRANSMIT FLIP FLOP
007314  105227  000000                INCB    #0                      ;DELAY FOR CABLE
007320  001375                      BNE     .-4                     ;DITTO
007322  017704  006226                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
007326  005704                      TST     R4                      ;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
007330  001401                      BEQ     MUX14F                  ;CLEARED
007332  104001                      ERRORL                          ;NO, LINE STATUS ERROR
007334  104002          MUX14F:     SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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

007336                          T105:                                   ;REFERENCE DESIGNATION
007336  005077  006210        MUX15:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
007342  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
007350  013701  015640                MOV     LINE,R1
007354  012702  000020        MUX15A: MOV     #16.,R2                 ;16 LINES
007360  010177  006166                MOV     R1,@DHMCSR              ;SELECT A LINE
007364  012777  000003  006162        MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE +TRMRL

                                        ;THESE TWO NOP'S ADDED FOR SOME DELAY FOR PDP-11/44
                                        ;WITH CACHE MEMORY TURNED ON.
007372  000240                          NOP                             ;KR 10-JULY-84 REV E
007374  000240                          NOP                             ;KR 10-JULY-84 REV E

007376  005077  006150                CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
007402  005005                MUX15B: CLR     R5                      ;CLEAR EXPECTED RESULT
007404  017704  006144                MOV     @DHMLSR,R4              ;READ LINE STATUS
007410  117703  006136                MOVB    @DHMCSR,R3              ;READ LINE NUMBER
007414  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
007420  020103                        CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
007422  001002                        BNE     MUX15C                  ;EXPECT LINE ENABLE AND
007424  012705  000143                MOV     #LINENA+TRMRDY+CO+CS,R5
                                                                        ;CLEAR TO SEND AND CARRIER ARE SET
007430  020405                MUX15C: CMP     R4,R5                   ;COMPARE EXPECTED AND
007432  001403                        BEQ     MUX15D                  ;RECEIVED RESULTS
007434  104001                        ERRORL                          ;LINE STATUS ERROR
007436  104003                        SCOPE.F
007440  007442                        MUX15D
007442  004737  013344        MUX15D: CALL    STEPER                  ;UPDATE LINE COUNTER
007446  005302                        DEC     R2                      ;CONTINUE IF ALL CHECKS
007450  001354                        BNE     MUX15B                  ;ARE NOT DONE FOR THIS LINE
007452  012705  000001                MOV     #LINENA,R5              ;EXPECT LINE ENABLE
007456  010103                MUX15E: MOV     R1,R3                   ;ON SELECTED LINE
007460  010177  006066                MOV     R1,@DHMCSR              ;SELECT LINE
007464  042777  000002  006062        BIC     #TRMRDY,@DHMLSR         ;CLEAR TERMINAL
007472  105227  000000                INCB    #0                      ;DELAY FOR CABLE
007476  001375                        BNE     .-4                     ;DITTO
007500  017704  006050                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
007504  020504                        CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
007506  001401                        BEQ     MUX15F                  ;SET ON THIS LINE
007510  104001                        ERRORL                          ;LINE STATUS ERROR
007512  104002                MUX15F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

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

007514                          T106:                                   ;REFERENCE DESIGNATION
007514  005077  006032          MUX16:  CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
007520  042737  000340  177776          BIC     #340,PS                 ;ENABLE INTERRUPTS
007526  013701  015640                  MOV     LINE,R1
007532  012702  000020          MUX16A: MOV     #16.,R2                 ;16 LINES
007536  010177  006010                  MOV     R1,@DMMCSR              ;SELECT A LINE
007542  012777  000005  006004          MOV     #LINENA+RS,@DMMLSR      ;SET LINE ENABLE +RS

                                        ;THESE TWO NOP'S ADDED FOR SOME DELAY FOR PDP-11/44
                                        ;WITH CACHE MEMORY TURNED ON.
007550  000240                          NOP                             ;KR 10-JULY-84 REV E
007552  000240                          NOP                             ;KR 10-JULY-84 REV E

007554  005077  005772                  CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
007560  005005          MUX16B: CLR     R5                              ;CLEAR EXPECTED RESULT
007562  017704  005766                  MOV     @DMMLSR,R4              ;READ LINE STATUS
007566  117703  005760                  MOVB    @DMMCSR,R3              ;READ LINE NUMBER
007572  042703  177760                  BIC     #177760,R3              ;CLEAR UNWANTED BITS
007576  020103                          CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
007600  001002                          BNE     MUX16C                  ;EXPECT LINE ENABLE AND
007602  012705  000205                  MOV     #LINENA+RS+RING,R5
                                                                        ;RING IS SET
007606  020405          MUX16C: CMP     R4,R5                           ;COMPARE EXPECTED AND
007610  001403                          BEQ     MUX16D                  ;RECEIVED RESULTS
007612  104001                          ERRORL                          ;LINE STATUS ERROR
007614  104003                          SCOPEF
007616  007620                          MUX16D
007620  004737  013344          MUX16D: CALL    STEPER                  ;UPDATE LINE COUNTER
007624  005302                          DEC     R2                      ;CONTINUE IF ALL CHECKS
007626  001354                          BNE     MUX16B                  ;ARE NOT DONE FOR THIS LINE
007630  012705  000001                  MOV     #LINENA,R5              ;EXPECT LINE ENABLE
007634  010103          MUX16E: MOV     R1,R3                           ;ON SELECTED LINE
007636  010177  005710                  MOV     R1,@DMMCSR              ;SELECT LINE
007642  042777  000004  005704          BIC     #RS,@DMMLSR             ;CLEAR REQUEST TO SEND
007650  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
007654  001375                          BNE     .-4                     ;DITTO
007656  017704  005672                  MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
007662  020504                          CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
007664  001401                          BEQ     MUX16F                  ;SET ON THIS LINE
007666  104001                          ERRORL                          ;LINE STATUS ERROR
007670  104002          MUX16F: SCOPE                                   ;CHECK FOR ITERATIONS, LOOP
```

```
2200
2201                                        ;VERIFY THAT SECONDARY RECEIVE IS SET IF "LINE ENABLE"
2202                                        ;AND SECONDARY TRANSMIT ARE SET FOR SELECTED LINE.
2203
2204  007672                        T107:                                   ;REFERENCE DESIGNATION
2205  007672  005077  005654        MUX17:  CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
2206  007676  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
2207  007704  013701  015640              MOV     LINE,R1
2208  007710  012702  000020        MUX17A: MOV     #16.,R2                 ;16 LINES
2209  007714  010177  005632              MOV     R1,@DMMCSR              ;SELECT A LINE
2210  007720  012777  000011  005626      MOV     #LINENA+SECTX,@DMMLSR   ;SET LINE ENABLE +SeCTx
2211
2212                                        ;THESE TWO NOP'S ADDED FOR SOME DELAY FOR PDP-11/44
2213                                        ;WITH CACHE MEMORY TURNED ON.
2214  007726  000240                       NOP                             ;KR 10-JULY-84 REV E
2215  007730  000240                       NOP                             ;KR 10-JULY-84 REV E
2216
2217  007732  005077  005614              CLR     @DMMCSR                 ;CLEAR CONTROL REGISTER
2218  007736  005005        MUX17B: CLR     R5                      ;CLEAR EXPECTED RESULT
2219  007740  017704  005610              MOV     @DMMLSR,R4              ;READ LINE STATUS
2220  007744  117703  005602              MOVB    @DMMCSR,R3              ;READ LINE NUMBER
2221  007750  042703  177760              BIC     #177760,R3              ;CLEAR UNWANTED BITS
2222  007754  020103                       CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
2223  007756  001002                       BNE     MUX17C                  ;EXPECT LINE ENABLE AND
2224  007760  012705  000031              MOV     #LINENA+SECTX+SECRX,R5
2225                                                                        ;SECONDARY RECEIVE IS SET
2226  007764  020405        MUX17C: CMP     R4,R5                   ;COMPARE EXPECTED AND
2227  007766  001403                       BEQ     MUX17D                  ;RECEIVED RESULTS
2228  007770  104001                       ERRORL                          ;LINE STATUS ERROR
2229  007772  104003                       SCOPEF
2230  007774  007776                       MUX17D
2231  007776  004737  013344        MUX17D: CALL    STEPER                  ;UPDATE LINE COUNTER
2232  010002  005302                       DEC     R2                      ;CONTINUE IF ALL CHECKS
2233  010004  001354                       BNE     MUX17B                  ;ARE NOT DONE FOR THIS LINE
2234  010006  012705  000001              MOV     #LINENA,R5              ;EXPECT LINE ENABLE
2235  010012  010103        MUX17E: MOV     R1,R3                   ;ON SELECTED LINE
2236  010014  010177  005532              MOV     R1,@DMMCSR              ;SELECT LINE
2237  010020  042777  000010  005526      BIC     #SECTX,@DMMLSR          ;CLEAR SECONDARY TRANSMIT
2238  010026  105227  000000              INCB    #0                      ;DELAY FOR CABLE
2239  010032  001375                       BNE     .-4                     ;DITTO
2240  010034  017704  005514              MOV     @DMMLSR,R4              ;READ LINE STATUS REGISTER
2241  010040  020504                       CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
2242  010042  001401                       BEQ     MUX17F                  ;SET ON THIS LINE
2243  010044  104001                       ERRORL                          ;LINE STATUS ERROR
2244  010046  104002        MUX17F: SCOPE                           ;CHECK FOR ITERATIONS, LOOP
```

```
2245
2246                                        ;MODEM CONTROL ON LINE TEST USING 103A TYPE MODEMS
2247                                        ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
2248                                        ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
2249                                        ;USING THE MODEM CONTROL TO CONTROL 103A TYPE MODEMS
2250
2251                                        ;NOTE:  IF THE DM11-AA IS NOT CONNECTED TO THE
2252                                        ;DISTRIBUTION PANEL, AN M974 DM11 MAINTENANCE JUMPER
2253                                        ;SHOULD BE INSTALLED IN SLOT B1 OR B3 OF THE DISTRIBUTION
2254                                        ;PANNEL TO PREVENT A POSSIBLE LONG SPACE
2255                                        ;DISCONNECT FROM HANGING UP THE MODEM
2256
2257
2258  010050                        T200:                                   ;REFERENCE DESIGNATION
2259  010050  000005                ST103A: RESET                           ;INITIALIZE INTERFACE
2260  010052  012737  000340  177776        MOV     #340,PS                 ;DISABLE ALL INTERRUPTS
2261  010060  104004                        TYPE                            ;TYPE "103A MODEM CONNECT-
2262  010062  016167                        MT103T                          ;DISCONNECT TEST"
2263  010064  022737  000176  015566        CMP     #SWREG,SWR
2264  010072  001001                        BNE     1$
2265  010074  104025                        CNTLUU
2266  010076  012737  010114  011704  1$:   MOV     #T103A,FATRET           ;SET UP FOR FATAL ERROR
2267  010104  012737  010112  000204        MOV     #ST103B,KRET            ;SET UP FOR LINE CHANGE
2268  010112  104017                ST103B: GETLNS                          ;INPUT ORIGINATE AND
2269                                                                        ;AND ANSWER LINE NUMBERS
2270  010114  104020                T103A:  SETUP                           ;SET UP TO RECEIVE INTERRUPTS
2271                                                                        ;WAIT FOR RING
2272  010116  010126                        T103B                           ;GO HERE IF RING OK
2273  010120  010122                        T103A1                          ;GO HERE IF NO RING
2274  010122  104012                T103A1: ERROR                           ;NO RING WITHIN 5 MINUTES
2275  010124  000772                        BR      ST103B                  ;SELECT NEW LINES AND REDIAL
2276
2277                                        ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2278                                        ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
2279                                        ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
2280                                        ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
2281
2282  010126  104021                T103B:  CKRING                          ;CHECK FOR RING INTERRUPT
2283                                                                        ;ONLY ON ANSWER LINE
2284                                                                        ;AND NO TRANSITIONS ON
2285                                                                        ;ORIGINATE LINE
2286  010130  010146                        T103C                           ;GO HERE IF TRANSITIONS
2287                                                                        ;ARE CORRECT
2288  010132  010136                        T10381                          ;GO HERE IF INCORRECT
2289                                                                        ;TRANSITION ON ANSWER LINE
2290  010134  010142                        T10382                          ;GO HERE IF INCORRECT TRANSITION
2291                                                                        ;ON ORIGINATE LINE
2292  010136  104014                T10381: ERRORT                          ;TRANSITION ERROR ON ANSWER LINE
2293  010140  000207                        RTS     PC                      ;CONTINUE CHECKING
2294  010142  104014                T10382: ERRORT                          ;TRANSITION ERROR ON ORIGINATE LINE
2295  010144  000762                        BR      ST103B                  ;RESELECT LINES AND REDIAL
```

```
2296
2297                                        ;SET TERMINAL READY ON SELECTED ANSWER LINE
2298                                        ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2299
2300  010146  013777  015644  005376  T103C:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO
2301                                                                            ;ANSWER LINE NUMBER
2302  010154  052777  000002  005372           BIS     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON
2303                                                                            ;SELECTED ANSWER LINE
2304  010162  104026                           CKINTT
2305  010164  104022                           WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
2306
2307                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2308                                        ;SELECTED ORIGINATE AND ANSWER LINES
2309
2310  010166  104023                           CKTRAN                          ;CHECK TRANSITIONS AND
2311                                                                            ;STATUS ON SELECTED
2312                                                                            ;ANSWER AND ORIGINATE LINES
2313  010170  000143                           CU+CS+LINENA+TRMRDY              ;EXPECT CARRIER, CLEAR TO SEND,
2314                                                                            ;LINE ENABLE AND TERMINAL
2315                                                                            ;READY STATUS BITS SET ON
2316                                                                            ;ANSWER LINE
2317  010172  000143                           CO+CS+LINENA+TRMRDY              ;EXPECT CARRIER, CLEAR TO SEND,
2318                                                                            ;LINE ENABLE   , AND TERMINAL
2319                                                                            ;READY STATUS BITS ON
2320                                                                            ;ORIGINATE LINE
2321  010174  100006                           RINGF+XCO+XCS                   ;EXPECT CARRIER, CLEAR TO SEND
2322                                                                            ;AND POSSIBLE RING TRANSITIONS
2323                                                                            ;ON ANSWER LINE
2324  010176  000006                           XCO+XCS                         ;EXPECT CARRIER AND CLEAR
2325                                                                            ;TO SEND TRANSITIONS ON
2326                                                                            ;ORIGINATE LINE
2327  010200  010212                           T103D1                          ;GO HERE ON ANSWER LINE STATUS ERROR
2328
2329  010202  010216                           T103D2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
2330  010204  010222                           T103D3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
2331  010206  010226                           T103D4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2332  010210  010232                           T103E                           ;GO TO NEXT TEST IF NO ERRORS
2333  010212  104015           T103D1: ERRORS                                  ;ANSWER LINE STATUS ERROR
2334  010214  000207                   RTS     PC                              ;CONTINUE CHECKING
2335  010216  104015           T103D2: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
2336  010220  000207                   RTS     PC                              ;CONTINUE CHECKING
2337  010222  104014           T103D3: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
2338  010224  000207                   RTS     PC                              ;CONTINUE CHECKING
2339  010226  104014           T103D4: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
2340  010230  000207                   RTS     PC                              ;CONTINUE CHECKING
```

```
2341
2342                                    ;SET UP TO TEST DISCONNECT SEQUENCE
2343                                    ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
2344                                    ;TO INITIATE THE DISCONNECT SEQUENCE
2345                                    ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
2346                                    ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
2347                                    ;BEFORE THE SWITCH SEETIN IS MADE
2348                                    ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
2349                                    ;REPORTED BY TYPEOUT
2350
2351  010232  104004          T103E:  TYPE                            ;TYPE "STRIKE ANY TTY KEY
2352  010234  016432                  MDISC                           ;TEST DISCONNECT"
2353  010236  012737  000340  177776          MOV     #340,PS         ;LOCK OUT INTERRUPTS
2354  010244  012777  011726  005274          MOV     #TRNTYP,@DHMVEC ;SET UP TO DETECT TRANSITIONS
2355                                                                  ;BEFORE DISCONNECT SEQUENCE STARTS
2356  010252  012737  010272  015672          MOV     #T103ES,RNGRET  ;SET UP DUMMY RETURN FOR
2357                                                                  ;RING INTERRUPT
2358  010260  012777  000140  005264          MOV     #SCNENA+INTENA,@DHMCSR  ;SET SCAN ENABLE AND INTERRUPT ENABLE
2359  010266  005037  177776                  CLR     PS              ;ALLOW INTERRUPTS
2360  010272  005077  005262          T103ES: CLR     @TKDBR
2361  010276  105777  005254          1$:     TSTB    @TKCSR          ;WAIT FOR TTY TO HIT
2362  010302  100375                          BPL     1$
2363  010304  005777  005250                  TST     @TKDBR
2364  010310  012737  000340  177776          MOV     #340,PS         ;START DISCONNECT SEQUENCE
2365  010316  005077  005230                  CLR     @DHMCSR         ;CLEAR CONROL REGISTER
2366  010322  013777  015642  005222          MOV     LINORG,@DHMCSR  ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
2367  010330  042777  000002  005216          BIC     #TRMRDY,@DHMLSR ;SET TERMINAL READY ON SELECTED LINE
2368  010336  104026                          CKINTT
2369  010340  104022                          WAITRN                  ;WAIT FOR TRANSITIONS TO OCCUR
```

```
2370
2371                                    ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED
2372                                    ;ORIGINATE AND ANSWER LINES
2373
2374  010342  104023                    CKTRAN                  ;CHECK TRANSITIONS AND
2375                                                            ;STATUS ON SELECTED
2376                                                            ;ANSWER AND ORIGINATE LINES
2377  010344  000003                    LINENA+TRMRDY           ;EXPECT LINE ENABLE AND
2378                                                            ;TERMINAL READY STATUS BITS
2379                                                            ;SET ON ANSWER LINE
2380  010346  000001                    LINENA                  ;EXPECT LINE ENABLE STATUS BIT
2381                                                            ;SET ON ORIGINATE LINE
2382  010350  000006                    XCO+XCS                 ;EXPECT CARRIER AND CLEAR
2383                                                            ;TO SEND TRANSITIONS ON
2384                                                            ;ANSWER LINE
2385  010352  000006                    XCO+XCS                 ;EXPECT CARRIER AND CLEAR
2386                                                            ;TO SEND TRANSITIONS ON
2387                                                            ;ORIGINATE LINE
2388  010354  010366                    T103E1                  ;GO HERE ON ANSWER LINE STATUS ERROR
2389
2390  010356  010372                    T103E2                  ;GO HERE ON ORIGINATE LINE STATUS ERROR
2391  010360  010376                    T103E3                  ;GO HERE ON ANSWER LINE TRANSITION ERROR
2392  010362  010402                    T103E4                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2393  010364  010406                    T103EN                  ;GO TO NEXT TEST IF NO ERRORS
2394  010366  104015          T103E1:   ERRORS                  ;ANSWER LINE STATUS ERROR
2395  010370  000207                    RTS     PC              ;CONTINUE CHECKING
2396  010372  104015          T103E2:   ERRORS                  ;ORIGINATE LINE STATUS ERROR
2397  010374  000207                    RTS     PC              ;CONTINUE CHECKING
2398  010376  104014          T103E3:   ERRORT                  ;ANSWER LINE TRANSITION ERROR
2399  010400  000207                    RTS     PC              ;CONTINUE CHECKING
2400  010402  104014          T103E4:   ERRORT                  ;ORIGINATE LINE TRANSITION ERROR
2401  010404  000207                    RTS     PC              ;CONTINUE CHECKING
2402
2403  010406                    T201:                           ;REFERENCE DESIGNATION
2404  010406  104004            T103EN: TYPE                    ;TYPE " 103A TEST COMPLETE"
2405  010410  016354                    MT103A
2406  010412  005037  015600            CLR     TSTNO           ;CLEAR TEST NUMBER FOR LOOPING
2407  010416  104026                    CKINTT
2408  010420  000137  010112            JMP     ST103B          ;SELECT NEW LINE NUMBERS AND
2409                                                            ;RESTART TEST
```

```
2411
2412                                    ;MODEM CONTROL ON LINE TEST USING 202C TYPE MODEMS
2413                                    ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
2414                                    ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
2415                                    ;USING THE MODEM CONTROL TO CONTROL 202C TYPE MODEMS
2416
2417                                    ;ALSO TESTED ARE LINE TURN-AROUND AND
2418                                    ;SECONDARY TRANSMIT-SECONDARY RECEIVE
2419  010424                    T300:                                   ;REFERENCE DESIGNATION
2420  010424  000005            ST202A: RESET                           ;INITIALIZE INTERFACE
2421  010426  012737  000340  177776        MOV     #340,PS           ;DISABLE ALL INTERRUPTS
2422  010434  104004                        TYPE                      ;TYPE "202C MODEM CONNECT-
2423  010436  016240                        MT202T                    ;DISCONNECT TEST"
2424  010440  022737  000176  015566        CMP     #SWREG,SWR
2425  010446  001001                        BNE     1$
2426  010450  104025                        CNTLUU
2427  010452  012737  010470  011704 1$:    MOV     #T202A,FATRET     ;SET UP FOR FATAL ERROR
2428  010460  012737  010466  002204        MOV     #ST202B,KRET      ;SET UP FOR LINE CHANGE
2429  010466  104017            ST202B: GETLNS                          ;INPUT ORIGINATE AND
2430                                                                    ;ANSWER LINE NUMBERS
2431  010470  104020            T202A:  SETUP                           ;SET UP TO RECEIVE INTERRUPTS
2432                                                                    ;WAIT FOR RING
2433  010472  010502                    T202B                         ;GO HERE IF RING OK
2434  010474  010476                    T202A1                        ;GO HERE IF NO RING
2435  010476  104012            T202A1: ERROR                           ;NO RING WITHIN 5 MINUTES
2436  010500  000772                    BR      ST202B                ;SELECT NEW LINES AND REDIAL
2437
2438                                    ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2439                                    ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
2440                                    ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
2441                                    ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
2442
2443  010502  104021            T202B:  CKRING                          ;CHECK FOR RING INTERRUPT
2444                                                                    ;ONLY ON ANSWER LINE
2445                                                                    ;AND NO TRANSITIONS ON
2446                                                                    ;ORIGINATE LINE
2447  010504  010522                    T202C                         ;GO HERE IF TRANSITIONS
2448                                                                    ;ARE CORRECT
2449  010506  010512                    T202B1                        ;GO HERE IF INCORRECT
2450                                                                    ;TRANSITION ON ANSWER LINE
2451  010510  010516                    T202B2                        ;GO HERE IF INCORRECT
2452                                                                    ;TRANSITION ON ORIGINATE LINE
2453  010512  104014            T202B1: ERRORT                          ;ANSWER LINE TRANSITION ERROR
2454  010514  000207                    RTS     PC                    ;CONTINUE CHECKING
2455  010516  104014            T202B2: ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
2456  010520  000762                    BR      ST202B                ;RESELECT LINES AND REDIAL
```

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

010522  013777  015644  005022  T202C:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
010530  052777  000002  005016          BIS     #TRMRDY,@DHMLSR         ;SET TERMINAL READY ON ANSWER LINE
010536  013777  015642  005006  T202D:  MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
010544  052777  000004  005002          BIS     #RS,@DHMLSR             ;SET REQUEST TO SEND ON ORIGINATE LINE
010552  104026                          CKINTT
010554  104022                          WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR

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

010556  104023                          CKTRAN                          ;CHECK TRANSITIONS AND STATUS
                                                                        ;ON SELECTED ANSWER AND
                                                                        ;ORIGINATE LINES
010560  000103                          CO+LINENA+TRMRDY                ;EXPECT CARRIER, LINE ENABLE
                                                                        ;AND TERMINAL READY STATUS
                                                                        ;BITS SET ON ANSWER LINE
010562  000147                          RS+CO+CS+LINENA+TRMRDY          ;EXPECT REQUEST TO SEND, CLEAR
                                                                        ;TO SEND, CARRIER, LINE ENABLE
                                                                        ;AND TERMINAL READY STATUS BITS
                                                                        ;SET ON ORIGINATE LINE
010564  100004                          RINGF+XCO                       ;EXPECT CARRIER AND POSSIBLE
                                                                        ;RING TRANSITIONS ON
                                                                        ;ANSWER LINE
010566  000006                          XCO+XCS                         ;EXPECT CARRIER AND CLEAR
                                                                        ;TO SEND TRANSITIONS ON
                                                                        ;ORIGINATE LINE
010570  010602                          T202D1                          ;GO HERE ON ANSWER LINE STATUS ERROR
010572  010606                          T202D2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
010574  010612                          T202D3                          ;GO HERE ON ANSWER LINE STATUS ERROR
010576  010616                          T202D4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
010600  010622                          T202E                           ;GO TO NEXT TEST IF NO ERRORS
010602  104015          T202D1: ERRORS                                  ;ANSWER LINE SATAUS ERROR
010604  000207                  RTS     PC                              ;CONTINUE CHECKING
010606  104015          T202D2: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
010610  000207                  RTS     PC                              ;CONTINUE CHECKING
010612  104014          T202D3: ERRORT                                  ;ANSWER LINE TRANSITION ERROR
010614  000207                  RTS     PC                              ;CONTINUE CHECKING
010616  104014          T202D4: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
010620  000207                  RTS     PC                              ;CONTINUE CHECKING
```

```
2501
2502                                            ;SET SECONDARY TRANSMIT ON ANSWER LINE
2503                                            ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2504
2505  010622  013777  015644  004722  T202E:   MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2506  010630  052777  000010  004716           BIS     #SECTX,@DHMLSR          ;SET SECONDARY RECEIVE ON ANSWER LINE
2507  010636  104026                           CKINTT
2508  010640  104022                           WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
2509
2510                                            ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2511                                            ;SELECTED ORIGINATE AND ANSWER LINES
2512
2513  010642  104023                           CKTRAN                          ;CHECK TRANSITIONS AND STATUS
2514                                                                           ;ON SELECTED ANSWER AND
2515                                                                           ;ORIGINATE LINES
2516  010644  000133                           SECTX+CO+LINENA+TRMRDY+SECRX     ;EXPECT SECONDARY TRANSMIT
2517                                                                           ;SECONDARY RECEIVE, CARRIER
2518                                                                           ;LINE ENABLE AND TERMINAL READY
2519                                                                           ;STATUS BITS SET ON ANSWER LINE
2520  010646  000167                           SECRX+RS+CO+CS+LINENA+TRMRDY     ;EXPECT SECONDARY RECEIVE,
2521                                                                           ;REQUEST TO SEND, CLEAR TO SEND
2522                                                                           ;CARRIER, LINE ENABLE AND
2523                                                                           ;TERMINAL READY STATUS BITS
2524                                                                           ;SET ON ORIGINATE LINE
2525  010650  000001                           XSCRX                           ;EXPECT SECONDARY RECEIVE
2526                                                                           ;TRANSITION ON ANSWER LINE
2527  010652  000001                           XSCRX                           ;EXPECT SECONDARY RECEIVE
2528                                                                           ;TRANSITION ON ORIGINATE LINE
2529  010654  010666                           T202E1                          ;GO HERE ON ANSWER LINE STATUS ERROR
2530  010656  010672                           T202E2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
2531  010660  010676                           T202E3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
2532  010662  010702                           T202E4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2533  010664  010706                           T202F                           ;GO TO NEXT TEST IF NO ERRORS
2534  010666  104015           T202E1:         ERRORS                          ;ANSWER LINE STATUS ERROR
2535  010670  000207                           RTS     PC                      ;CONTINUE CHECKING
2536  010672  104015           T202E2:         ERRORS                          ;ORIGINATE LINE STATUS ERROR
2537  010674  000207                           RTS     PC                      ;CONTINUE CHECKING
2538  010676  104014           T202E3:         ERRORT                          ;ANSWER LINE TRANSITION ERROR
2539  010700  000207                           RTS     PC                      ;CONTINUE CHECKING
2540  010702  104014           T202E4:         ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
2541  010704  000207                           RTS     PC                      ;CONTINUE CHECKING
```

```
2542
2543                                            ;DROP REQUEST TO SEND ON ORIGINATE LINE
2544                                            ;DROP SECONDARY TRANSMIT ON ANSWER LINE
2545                                            ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2546
2547  010706  013777  015642  004636  T202F:   MOV     LINORG,@DMMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
2548  010714  042777  000004  004632           BIC     #RS,@DMMLSR             ;DROP REQUEST TO SEND
2549  010722  013777  015644  004622           MOV     LINANS,@DMMCSR          ;SET LINE COUNTER TO ANSWER LINE
2550  010730  042777  000010  004616           BIC     #SECTX,@DMMLSR          ;DROP SECONDARY RECEIVE
2551  010736  104026                           CKINTT
2552  010740  104022                           WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
2553
2554                                            ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2555                                            ;SELECTED ORIGINATE AND ANSWER LINES
2556
2557  010742  104023                           CKTRAN                          ;CHECK TRANSITIONS AND STATUS
2558                                                                           ;ON SELECTED ANSWER AND
2559                                                                           ;ORIGINATE LINES
2560  010744  000003                           LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
2561                                                                           ;TERMINAL READY STATUS BITS
2562                                                                           ;SET ON ANSWER LINE
2563  010746  000003                           LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
2564                                                                           ;TERMINAL READY STATUS BITS
2565                                                                           ;SET ON ORIGINATE LINE
2566  010750  000005                           XCO+XSCRX                       ;EXPECT CARRIER AND SECONDARY
2567                                                                           ;RECEIVE TRANSITIONS ON
2568                                                                           ;ANSWER LINE
2569  010752  000007                           XCO+XCS+XSCRX                   ;EXPECT CARRIER, CLEAR TO SEND
2570                                                                           ;AND SECONDARY RECEIVE
2571                                                                           ;TRANSITIONS ON ORIGINATE LINE
2572  010754  010766                                   T202F2                  ;GO HERE ON ANSWER LINE STAATUS ERROR
2573  010756  010772                                   T202F3                  ;GO HERE ON ORIGINATE LINE STATUS ERRORO
2574  010760  010776                                   T202F4                  ;GO HERE ON ANSWER LINE TRANSITION ERROR
2575  010762  011002                                   T202F5                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2576  010764  011006                                   T202G                   ;GO TO NEXT TEST IF NO ERRORS
2577  010766  104015                   T202F2: ERRORS                          ;ANSWER LINE STATUS ERROR
2578  010770  000207                           RTS     PC                      ;CONTINUE CHECKING
2579  010772  104015                   T202F3: ERRORS                          ;ORIGINATE LINE STATUS ERROR
2580  010774  000207                           RTS     PC                      ;CONTINUE CHECKING
2581  010776  104014                   T202F4: ERRORT                          ;ANSWER LINE TRANSITION ERROR
2582  011000  000207                           RTS     PC                      ;CONTINTUE CHECKING
2583  011002  104014                   T202F5: ERRORT                          ;ORIGINATE LINE TRANSITION ERROR
2584  011004  000207                           RTS     PC                      ;CONTINUE CHECKING
```

```
2585
2586
2587                                        ;SET REQUEST TO SEND ON ANSWER LINE
2588                                        ;WAIT FOR TRANSITIONS ON SELECTED LINES
2589
2590  011006  013777  015644  004536  T202G:  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2591  011014  052777  000004  004532           BIS     #RS,@DHMLSR             ;SET REQUEST TO SEND
2592  011022  104026                           CKINTT
2593  011024  104022                           WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
2594
2595                                        ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2596                                        ;SELECTED ORIGINATE AND ANSWER LINES
2597
2598  011026  104023                           CKTRAN                          ;CHECK TRANSITIONS AND STATUS
2599                                                                           ;ON SELECTED ANSWER AND
2600                                                                           ;ORIGINATE LINES
2601  011030  000147                           RS+CO+CS+LINENA+TRMRDY          ;EXPECT LINE ENABLE, TERMINAL
2602                                                                           ;READY, REQUEST TO SEND, CLEAR
2603                                                                           ;TO SEND, AND CARRIER
2604                                                                           ;STATUS BITS SET ON  ANSWER LINE
2605  011032  000103                           CO+LINENA+TRMRDY                ;EXPECT LINE ENABLE, TERMINAL
2606                                                                           ;READY AND CARRIER STATUS
2607                                                                           ;BITS SET ON ORIGINATE LINE
2608  011034  000006                           XCO+XCS                         ;EXPECT CARRIER AND CLEAR
2609                                                                           ;TO SEND TRANSITIONS ON
2610                                                                           ;ANSWER LINE
2611  011036  000004                           XCO                             ;EXPECT CARRIER TRANSITION
2612                                                                           ;ON ORIGINATE LINE
2613  011040  011052                           T202G1                          ;GO HERE ON  ANSWER LINE STATUS ERROR
2614  011042  011056                           T202G2                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
2615  011044  011062                           T202G3                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
2616  011046  011066                           T202G4                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2617  011050  011072                           T202H                           ;GO TO NEXT TEST IF NO ERRORS
2618  011052  104015           T202G1:  ERRORS                                 ;ANSWER LINE STATUS ERROR
2619  011054  000207                    RTS     PC                              ;CONTINUE TESTING
2620  011056  104015           T202G2:  ERRORS                                 ;ORIGINATE LINE STATUS ERROR
2621  011060  000207                    RTS     PC                              ;CONTINUE TESTING
2622  011062  104014           T202G3:  ERRORT                                 ;ANSWER LINE TRANSITION ERROR
2623  011064  000207                    RTS     PC                              ;CONTINUE TESTING
2624  011066  104014           T202G4:  ERRORT                                 ;ORIGINATE LINE TRANSITION ERROR
2625  011070  000207                    RTS     PC                              ;CONTINUE TESTING
```

```
2626
2627                                            ;SET SECONDARY TRANSMIT ON ORIGINATE LINE
2628                                            ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2629
2630  011072  013777  015642  004452  T202H:   MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
2631  011100  052777  000010  004446            BIS     #SECTX,@DHMLSR          ;SET SECONDARY TRANSMIT
2632  011106  104026                           CKINTT
2633  011110  104022                           WAITRN                          ;WAIT FOR TRANSITIONS TO OCCUR
2634
2635                                            ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2636                                            ;SELECTED ORIGINATE AND ANSWER LINES
2637
2638  011112  104023                           CKTRAN                          ;CHECK TRANSITIONS AND STATUS
2639                                                                           ;ON SELECTED ANSWER AND
2640                                                                           ;ORIGINATE LINES
2641  011114  000167                           RS+CS+CO+LINENA+TRMRDY+SECRX     ;EXPECT LINE ENABLE, TERMINAL
2642                                                                           ;READY, REQUEST TO SEND, CLEAR
2643                                                                           ;TO SEND, CARRIER AND SECONDARY
2644                                                                           ;RECEIVE STATUS BITS SET
2645                                                                           ;ON ANSWER LINE
2646  011116  000133                           SECTX+CO+LINENA+TRMRDY+SECRX     ;EXPECT LINE ENABLE, TERMINAL
2647                                                                           ;READY, CARRIER, SECONDARY
2648                                                                           ;TRANSMIT AND SECONDARY
2649                                                                           ;RECEIVE STATUS BITS SET
2650                                                                           ;ON ORIGINATE LINE
2651  011120  000001                           XSCRX                           ;EXPECT SECONDARY RECEIVE
2652                                                                           ;TRANSITION ON ANSWER LINE
2653  011122  000001                           XSCRX                           ;EXPECT SECONDARY RECEIVE
2654                                                                           ;TRANSITION ON ORIGINATE LINE
2655  011124  011136                           T202H2                          ;GO HERE ON ANSWER LINE STATUS ERROR
2656  011126  011142                           T202H3                          ;GO HERE ON ORIGINATE LINE STATUS ERROR
2657  011130  011146                           T202H4                          ;GO HERE ON ANSWER LINE TRANSITION ERROR
2658  011132  011152                           T202H5                          ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2659  011134  011156                           T202I                           ;GO TO NEXT TEST IF NO ERRORS
2660  011136  104015            T202H2: ERRORS                                 ;ANSWER LIN STATUS ERROR
2661  011140  000207                    RTS     PC                              ;CONTINUE CHECKING
2662  011142  104015            T202H3: ERRORS                                 ;ORIGINATE LINE STATUS ERROR
2663  011144  000207                    RTS     PC                              ;CONTINUE CHECKING
2664  011146  104014            T202H4: ERRORT                                 ;ANSWER LINE TRANSITION ERROR
2665  011150  000207                    RTS     PC                              ;CONTINUE CHECKING
2666  011152  104014            T202H5: ERRORT                                 ;ORIGINATE LINE TRANSITION ERROR
2667  011154  000207                    RTS     PC                              ;CONTINUE CHECKING
```

```
2668
2669                                            ;DROP REQUEST TO SEND ON ANSWER LINE
2670                                            ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES
2671
2672  011156  013777  015644  004366  T202I:   MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2673  011164  042777  000004  004362           BIC     #RS,@DHMMLSR            ;CLEAR REQUEST TO SEND
2674  011172  013777  015642  004352           MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
2675  011200  042777  000010  004346           BIC     #SECTX,@DHMMLSR         ;CLEAR SECONDARY TRANSMIT
2676  011206  104026                           CKINTT
2677  011210  104022                           WAITRN                          ;WAIT FRO TRANSITIONS TO OCCUR
2678
2679                                            ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2680                                            ;SELECTED ORIGINATE AND ANSWER LINES
2681
2682  011212  104023                           CKTRAN                          ;CHECK TRANSITION S AND STATUS
2683                                                                            ;ON SELECTED ANSWE AND
2684                                                                            ;ORIGINATE LINES
2685  011214  000003                           LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
2686                                                                            ;TERMINAL READY STATUS BITS SET
2687                                                                            ;ON ANSWER LINE
2688  011216  000003                           LINENA+TRMRDY                   ;EXPECT LINE ENABLE AND
2689                                                                            ;TERMINAL READY STATUS BITS
2690                                                                            ;SET ON ORIGINATE LINE
2691  011220  000007                           XCO+XCS+XSCRX                   ;EXPECT CARRIER, CLEAR TO SEND
2692                                                                            ;AND SECONDARY RECEIVE TRANSITIONS
2693                                                                            ;ON ANSWER LINE
2694  011222  000005                           XCO+XSCRX                       ;EXPECT CARRIER AND SECONDARY
2695                                                                            ;RECEIVE TRANSITIONS ON
2696                                                                            ;ORIGINATE LINE
2697  011224  011236                   T202I2                                  ;GO HERE ON ANSWER LINE STATUS ERROR
2698  011226  011242                   T202I3                                  ;GO HERE ON ORIGINATE LINE STATUS ERROR
2699  011230  011246                   T202I4                                  ;GO HERE ON ANSWER LINE TRANSITIN ERROR
2700  011232  011252                   T202I5                                  ;GO HERE ON ORIGINATE LINE TRANSITION ERROR
2701  011234  011256                   T202J                                   ;GO TO NEXT TEST IF NO ERRORS
2702  011236  104015           T202I2: ERRORS                                  ;ANSWER LINE STATUS ERROR
2703  011240  000207                   RTS     PC                              ;CONTINUE CHECKING
2704  011242  104015           I202I3: ERRORS                                  ;ORIGINATE LINE STATUS ERROR
2705  011244  000207                   RTS     PC                              ;CONTINUE CHECKING
2706  011246  104014           T202I4: ERRORT                                  ;ANSWE LINE TRANSITION ERROR
2707  011250  000207                   RTS     PC                              ;CONTINUE CHECKING
2708  011252  104014           T202I5: ERRORT                                  ;ORIGINATE LINE TRANSITION ERROR
2709  011254  000207                   RTS     PC                              ;CONTINUE CHECKING
```

```
2710
2711                                        ;SET UP TO TEST DISCONNECT SEQUENCE
2712                                        ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
2713                                        ;TO INITIATE THE DISCONNECT SEQUENCE
2714                                        ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
2715                                        ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
2716                                        ;BEFORE THE SWITCH SEETIN IS MADE
2717                                        ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
2718                                        ;REPORTED BY TYPEOUT
2719
2720  011256  104004            T202J:    TYPE                              ;TYPE "STRIKE ANY TTY KEY
2721  011260  016432                      MDISC                             ;TEST DISCONNECT"
2722  011262  012737  000340  177776      MOV     #340,PS                   ;LOCK OUT INTERRUPTS
2723  011270  012777  011726  004250      MOV     #TRNTYP,@DMAVEC           ;SET UP TO DETECT TRANSITIONS
2724  011276  012737  011316  015672      MOV     #T202JS,RNGRET            ;SET UP DUMMY RETURN FOR RING
2725                                                                        ;FROM RING INTERRUPT
2726  011304  012777  000140  004240      MOV     #SCNENA+INTENA,@DMACSR    ;ENABLE LINE SCANNER
2727                                                                        ;START SCANNER
2728  011312  005037  177776              CLR     PS                        ;ENABLE INTERRUPTS
2729  011316  005077  004236    T202JS:   CLR     @TKDBR
2730  011322  105777  004230    1$:       TSTB    @TKCSR
2731  011326  100375                      BPL     1$
2732  011330  005777  004224              TST     @TKDBR
2733
2734                                        ;DISCONNECT SEQUENCE REQUESTED
2735
2736  011334  012737  000340  177776      MOV     #340,PS                   ;LOCK OUT INTERRUPTS
2737  011342  005077  004204              CLR     @DMACSR                   ;STOP SCANNER
2738  011346  013777  015642  004176      MOV     LINORG,@DMACSR            ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
2739  011354  042777  000002  004172      BIC     #TRMRDY,@DMALSR           ;SET TERMINAL READY ON SELECTED LINE
2740  011362  104024                      WAITS                             ;DELAY
2741  011364  104026                      CKINTT
2742  011366  104022                      WAITRN                            ;WAIT FOR TRANSITIONS TO OCCUR
```

```
2743
2744                                    ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED
2745                                    ;ORIGINATE AND ANSWER LINES
2746
2747  011370  104023                    CKTRAN                  ;CHECK TRANSITIONS AND STATUS
2748                                                            ;ON SELECTED ASNWER AND
2749                                                            ;ORIGINATE LINES
2750  011372  000003                    LINENA+TRMRDY           ;EXPECT LINE ENABLE AND
2751                                                            ;TERMINAL READY STATUS BITS
2752                                                            ;SET ON ANSWER LINE
2753  011374  000001                    LINENA                  ;EXPECT LINE ENABLE STATUS
2754                                                            ;BIT SET ON ORIGINATE LINE
2755  011376  000000                    0                       ;EXPECT NO TRANSITIONS ON
2756                                                            ;ANSWER LINE
2757  011400  000000                    0                       ;EXPECT NO TRANSITIONS ON
2758                                                            ;ORIGINATE LINE
2759  011402  011414                    T202J1                  ;GO HERE IF ANSWER LINE STATUS ERROR
2760  011404  011420                    T202J2                  ;GO HERE IF ORIGINATE LINE STATUS ERROR
2761  011406  011424                    T202J3                  ;GO HERE IF ANSWER LINE TRANSITION ERROR
2762  011410  011430                    T202J4                  ;GO HERE IF ORIGINATE LINE TRANSITIONS ERROR
2763  011412  011434                    T202JN                  ;GO TO END OF TEST IF NO ERRORS
2764  011414  104015          T202J1:   ERRORS                  ;ANSWER LINE STATUS ERRORO
2765  011416  000207                    RTS     PC              ;CONTINUE CHECKING
2766  011420  104015          T202J2:   ERRORS                  ;ORIGINATE LINE STATUS ERRROR
2767  011422  000207                    RTS     PC              ;CONTINUE CHECKING
2768  011424  104014          T202J3:   ERRORT                  ;ANSWER LINE TRANSITION ERROR
2769  011426  000207                    RTS     PC              ;CONTINUE CHECKING
2770  011430  104014          T202J4:   ERRORT                  ;ORIGINATE LINE TRANSITION ERROR
2771  011432  000207                    RTS     PC              ;CONTINUE CHECKING
2772
2773  011434  104004          T202JN:   TYPE                    ;TYPE "202C TEST COMPLETE"
2774  011436  016403                    MT202A
2775  011440  104026                    CKINTT
2776  011442  000137  010466            JMP     ST202B          ;GET NEW LINE NUMBERS
2777                                                            ;RESTART TEST
```

```
2778
2779                                    ;DETECT AND RECORD TRANSITIONS ON SELECTED
2780                                    ;ORIGINATE AND ANSWER LINES
2781
2782                                    ;TRANSITION DATA IS STORED IN LOCATIONS ANSFLG AND ORGFLG
2783                                    ;FOR ANSWER AND ORIGINATE LINES RESPECTIVELY
2784                                    ;FORMAT OF DATA IS (FOR BOTH LINES)
2785
2786                                    ;BIT0=1,SECONDARY RECEIVE CAUSED INTERRUPT
2787                                    ;BIT1=1, CLEAR TO SEND CAUSED INTERRUPT
2788                                    ;BIT2=1, CARRIER CAUSED INTERRUPT
2789                                    ;BIT3=1, RING CAUSED INTERRUPT
2790
2791  011446  017704  004100   TRANS:  MOV     @DMMCSR,R4              ;GET LINE NUMBER AND
2792                                                                    ;INTERRUPT FLAGS
2793  011452  010405                  MOV     R4,R5
2794  011454  042705  177760          BIC     #177760,R5              ;EXTRACT LINE NUMBER
2795  011460  023705  015642          CMP     LINORG,R5               ;DID ORIGINATE LINE INTERRUPT
2796  011464  001411                  BEQ     ORGTR                   ;IF YES, SERVICE
2797  011466  023705  015644          CMP     LINANS,R5               ;DID ANSWER LINE INTERRUPT
2798  011472  001443                  BEQ     ANSTR                   ;IF YES, SERVICE
2799  011474  010577  004052          MOV     R5,@DMMCSR
2800  011500  017703  004050          MOV     @DMMLSR,R3
2801  011504  104016                  ERRORN                          ;INTERRUPT ON INCORRECT LINE
2802  011506  000471                  BR      FATEX
2803
2804                                    ;RECORD TRANSITIONS FOR ORIGINATE LINE
2805
2806  011510  032704  100000  ORGTR:  BIT     @RINGF,R4               ;IF RING CAUSED INTERRUPT,
2807  011514  001403                  BEQ     ORGTR1                  ;SET RING TRANSITION BIT
2808  011516  052737  000010  015650  BIS     #10,ORGFLG
2809  011524  032704  040000  ORGTR1: BIT     @COF,R4                 ;IF CARRIER CAUSED INTERRUPT
2810  011530  001403                  BEQ     ORGTR2                  ;SET CARRIER TRANSITION BIT
2811  011532  052737  000004  015650  BIS     #4,ORGFLG
2812  011540  032704  020000  ORGTR2: BIT     @CSF,R4                 ;IF CLEAR TO SEND
2813                                                                    ;CAUSED INTERRUPT
2814  011544  001403                  BEQ     ORGTR3                  ;SET CLEAR TO SEND
2815                                                                    ;TRANSITION BIT
2816  011546  052737  000002  015650  BIS     #2,ORGFLG
2817  011554  032704  010000  ORGTR3: BIT     @SECRXF,R4              ;IF SECONDARY RECEIVE
2818                                                                    ;CAUSED INTERRUPT
2819  011560  001403                  BEQ     ORGTR4                  ;SET SECONDARY RECEIVE
2820  011562  052737  000001  015650  BIS     #1,ORGFLG               ;TRANSITION BIT
2821  011570  032704  170000  ORGTR4: BIT     @RINGF+COF+CSF+SECRXF,R4
2822                                                                    ;IF NO INTERRUPT FLAGS SET
2823  011574  001044                  BNE     TRANEX                  ;EXIT TRANSITION DETECTION
2824  011576  104016          ORGTRR: ERRORN
2825  011600  000434                  BR      FATEX
```

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2826
2827                                            ;RECORD TRANSITIONS FOR ANSWER LINE
2828
2829  011602  032704  100000          ANSTR:  BIT     @RINGF,R4               ;IF RING CAUSED INTERRUPT,
2830  011606  001403                          BEQ     ANSTR1                  ;SET RING TRANSITION BIT
2831  011610  052737  000010  015646          BIS     #10,ANSFLG
2832  011616  032704  040000          ANSTR1: BIT     @COF,R4                 ;IF CARRIER CAUSED INTERRUPT
2833  011622  001403                          BEQ     ANSTR2                  ;SET CARRIER TRANSITION BIT
2834  011624  052737  000004  015646          BIS     #4,ANSFLG
2835  011632  032704  020000          ANSTR2: BIT     @CSF,R4                 ;IF CLEAR TO SEND
2836                                                                          ;CAUSED INTERRUPT
2837  011636  001403                          BEQ     ANSTR3                  ;SET CLEAR TO SEND
2838                                                                          ;TRANSITION BIT
2839  011640  052737  000002  015646          BIS     #2,ANSFLG
2840  011646  032704  010000          ANSTR3: BIT     @SECRXF,R4              ;IF SECONDARY RECEIVE
2841                                                                          ;CAUSED INTERRUPT
2842  011652  001403                          BEQ     ANSTR4                  ;SET SECONDARY RECEIVE
2843  011654  052737  000001  015646          BIS     #1,ANSFLG               ;TRANSITION BIT
2844  011662  032704  170000          ANSTR4: BIT     @RINGF+COF+CSF+SECRXF,R4
2845                                                                          ;IF NO INTERRUPT FLAGS SET
2846  011666  001007                          BNE     TRANEX                  ;EXIT TRANSITION DETECTION
2847  011670  104016                  ANSTRR: ERRORN
2848  011672  005037  015600          FATEX:  CLR     TSTNO
2849  011676  022626                          POP2SP
2850  011700  000177  000000                  JMP     @FATRET
2851  011704  000000                  FATRET: 0
2852
2853                                            ;EXIT TRANSITION DETECTION
2854
2855  011706  005704                  TRANEX: TST     R4                      ;IF RING FLAG WAS SET
2856  011710  100002                          BPL     .+6                     ;SET UP SPECIAL RETURN
2857  011712  013716  015672                  MOV     RNGRET,(SP)
2858  011716  012777  000140  003626  TRANX1: MOV     #SCNENA+INTENA,@DHMCSR  ;RESTART SCANNER
2859  011724  000002                          RTI
2860
2861                                            ;TYPE TRANSITION DATA AND RETURN
2862
2863  011726  017737  003620  012712  TRNTYP: MOV     @DHMCSR,DATA1
2864  011734  017737  003614  012714          MOV     @DHMLSR,DATA2
2865  011742  104004                          TYPE
2866  011744  017054                          MTRNDET
2867  011746  104006                          OCTASC
2868  011750  011754                          TRNTAB
2869  011752  000761                          BR      TRANX1
2870  011754  000002                  TRNTAB: 2
2871  011756  000006                          6
2872  011760  012712                          DATA1
2873  011762  000003                          3
2874  011764  012714                          DATA2
```

```
2875
2876                                                    ;INPUT ORIGINATE AND ANSWER LINES FROM TELETYPE KEYBOARD
2877
2878  011766  000005                          GETLIN: RESET
2879  011770  104013                                  INSTRG                          ;TYPE "ORIGINATE LINE-"
2880  011772  016311                                  MSELOR                          ;AND GET LINE NUMBER
2881  011774  000000                                  0
2882  011776  000017                                  17
2883  012000  015642                                  LINORG
2884  012002  104013                                  INSTRG                          ;TYPE "ANSWER LINE-"
2885  012004  016335                                  MSELANS                         ;AND GET LINE NUMBER
2886  012006  000000                                  0
2887  012010  000017                                  17
2888  012012  015644                                  LINANS
2889  012014  104004                                  TYPE
2890  012016  016745                                  MCRLF
2891  012020  000002                                  RTI                             ;RETURN TO CALLING ROUTINE
2892
2893                                                    ;INITIALIZE INTERFACE
2894
2895  012022  000005                          SETUPS: RESET
2896  012024  012737  000340  177776                  MOV     #340,PS                 ;LOCK OUT ALL INTERRUPTS
2897  012032  011605                                  MOV     (SP),R5
2898  012034  012537  012722                         MOV     (R5)+,NXTTS
2899  012040  012537  012702                         MOV     (R5)+,ERR1
2900  012044  010516                                  MOV     R5,(SP)
2901  012046  012777  006000  003476                  MOV     #CLRSCN+CLRMUX,@DHMCSR  ;CLEAR LINE SCANNER AND MULTIPLEXER
2902  012054  032777  000020  003470  SETUP1: BIT     #BUSY,@DHMCSR           ;WAIT FOR SCANNER TO CLEAR
2903  012062  001374                                  BNE     SETUP1
2904  012064  005037  015572                         CLR     ERRFLG
2905
2906                                                    ;ENABLE SELECTED LINES
2907                                                    ;SET TERMINAL READY ON SELECTED ORIGINATE LINE
2908
2909  012070  013777  015642  003454  SETUP2: MOV     LINORG,@DHMCSR          ;SET UP TO ENABLE ORIGINATE LINE
2910                                                                          ;ORIGINATE LINE NUMBER
2911  012076  012777  000003  003450                  MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE AND
2912                                                                          ;TERMINAL READY ON ORIGINATE LINE
2913  012104  013777  015644  003440                  MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
2914  012112  012777  000001  003434                  MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE ON ANSWER LINE
2915
2916                                                    ;REQUEST OPERATOR TO DIAL SELECTED ANSWER TERMINAL
2917                                                    ;SET UP TO RECEIVE INTERRUPTS
2918                                                    ;START LINE SCANNER
2919
2920  012120  012777  011446  003420                  MOV     #TRANS,@DHMVEC          ;SET UP INTERRUPT VECTOR
2921                                                                          ;FOR TRANSITION DETECTION
2922  012126  012777  000340  003414                  MOV     #340,@DHMLVL            ;SET UP INTERRUPT SERVICE LEVEL
2923  012134  012777  000140  003410                  MOV     #SCNENA+INTENA,@DHMCSR  ;START SCANNER, ENABLE INTERRUPTS
2924  012142  005037  015646                         CLR     ANSFLG                  ;CLEAR TRANSITION DETECTED FLAGS
2925  012146  005037  015650                         CLR     ORGFLG
2926  012152  012737  012202  015672                  MOV     #SETUP4,RNGRET          ;SET UP RETURN FROM
2927                                                                          ;DETECTION OF RING INTERRUPT
2928  012160  104004                                  TYPE                            ;REQUEST OPERATOR TC DIAL
2929  012162  016131                                  DIALM
2930  012164  005037  177776                         CLR     PS                      ;CLEAR PROCESSOR STATUS WORD
```

```
2931  012170  005037  015652                CLR     TIME1                   ;CLEAR TIMER
2932  012174  012737  001000  015654        MOV     #1000,TIME2             ;SET UP FOR 5 MINUTE DELAY
2933  012202  005737  015646  SETUP4: TST   ANSFLG                  ;IF TRANSITION HAS OCCURED,
2934  012206  001014                BNE     SETUP8                  ;EXIT WAIT LOOP
2935  012210  005737  015650        TST     ORGFLG
2936  012214  001011                BNE     SETUP8
2937  012216  005237  015652        INC     TIME1                   ;ALLOW OPERATOR 5 MINUTES TO DIAL
2938  012222  001367                BNE     SETUP4
2939  012224  005337  015654        DEC     TIME2
2940  012230  001364                BNE     SETUP4
2941  012232  022626                POP2SP
2942  012234  000177  000442        JMP     @ERR1
2943  012240  022626  SETUP8: POP2SP
2944  012242  000177  000454        JMP     @NXTTS
2945  012246  012766  000340  000002        MOV     #340,+2(SP)
2946  012254  000002                RTI
2947
2948                                ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2949
2950  012256  011605  CKRNG:  MOV     (SP),R5
2951  012260  012537  012722        MOV     (R5)+,NXTTS
2952  012264  012537  012702        MOV     (R5)+,ERR1
2953  012270  012537  012704        MOV     (R5)+,ERR2
2954  012274  010516                MOV     R5,(SP)
2955  012276  012705  000010        MOV     #10,R5                  ;EXPECT RING ONLY ON ANSWER LINE
2956  012302  013704  015646        MOV     ANSFLG,R4               ;GET ACTUAL TRANSITION DATA
2957  012306  013703  015644        MOV     LINANS,R3               ;SET UP LINE NUMBER
2958  012312  020504                CMP     R5,R4           ;DID RING CAUSE INTERRUPT
2959  012314  001402                BEQ     CKRNG1                  ;ON ANSWER LINE
2960  012316  004777  000360        JSR     PC,@ERR1
2961  012322  005005  CKRNG1: CLR     R5
2962  012324  013704  015650        MOV     ORGFLG,R4
2963  012330  013703  015642        MOV     LINORG,R3
2964  012334  005704                TST     R4                      ;IF TRANSITION OCCURED
2965  012336  001403                BEQ     CKRNG2                  ;ON ORIGINATE LINE, ERROR
2966  012340  022626                POP2SP
2967  012342  000177  000336        JMP     @ERR2
2968  012346  022626  CKRNG2: POP2SP
2969  012350  000177  000346        JMP     @NXTTS
```

```
2970
2971  012354  005037  015646          WAITR:  CLR     ANSFLG
2972  012360  005037  015650                  CLR     ORGFLG
2973  012364  012777  011446  003154          MOV     #TRANS,@DHMVEC
2974  012372  012737  012412  015672          MOV     #WAITRR,RNGRET          ;SET UP FOR RETURN
2975                                                                          ;FROM RING DETECTION
2976  012400  012777  000140  003144          MOV     #SCNENA+INTENA,@DHMCSR  ;START SCANNER
2977  012406  005037  177776                  CLR     PS
2978  012412  005037  015652          WAITRR: CLR     TIME1
2979  012416  012737  000025  015654          MOV     #25.,TIME2
2980  012424  005237  015652          WAITR1: INC     TIME1                   ;WAIT FOR TRANSITIONS OF
2981  012430  001375                          BNE     WAITR1                  ;CARRIER AND CLEAR TO SEND
2982  012432  005337  015654                  DEC     TIME2
2983  012436  001372                          BNE     WAITR1
2984  012440  000002                          RTI
2985
2986                                          ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON
2987                                          ;SELECTED ORIGINATE AND ANSWER LINES
2988
2989  012442  012737  000340  177776  CKTRN:  MOV     #340,PS                 ;LOCK OUT FURTHER INTERRUPTS
2990  012450  005077  003076                  CLR     @DHMCSR                 ;STOP LINE SCANNER
2991  012454  011605                          MOV     (SP),R5
2992  012456  012537  012712                  MOV     (R5)+,DATA1
2993  012462  012537  012714                  MOV     (R5)+,DATA2
2994  012466  012537  012716                  MOV     (R5)+,DATA3
2995  012472  012537  012720                  MOV     (R5)+,DATA4
2996  012476  012537  012702                  MOV     (R5)+,ERR1
2997  012502  012537  012704                  MOV     (R5)+,ERR2
2998  012506  012537  012706                  MOV     (R5)+,ERR3
2999  012512  012537  012710                  MOV     (R5)+,ERR4
3000  012516  012537  012722                  MOV     (R5)+,NXTTS
3001  012522  010516                          MOV     R5,(SP)
3002  012524  013705  012712                  MOV     DATA1,R5
3003  012530  013777  015644  003014          MOV     LINANS,@DHMCSR          ;SET LINE COUNTER TO ANSWER LINE
3004  012536  017704  003012                  MOV     @DHMLSR,R4              ;GET ACTUAL ANSWER LINE STATUS
3005  012542  013703  015644                  MOV     LINANS,R3
3006  012546  020504                          CMP     R5,R4                   ;COMPARE
3007  012550  001402                          BEQ     CKTRN1
3008  012552  004777  000124                  JSR     PC,@ERR1
3009  012556  013777  015642  002766  CKTRN1: MOV     LINORG,@DHMCSR          ;SET LINE COUNTER TO ORIGINATE LINE
3010  012564  017704  002764                  MOV     @DHMLSR,R4              ;GET ACTUAL ORIGINATE LINE STATUS
3011  012570  013705  012714                  MOV     DATA2,R5
3012  012574  013703  015642                  MOV     LINORG,R3
3013  012600  020504                          CMP     R5,R4                   ;COMPARE
3014  012602  001402                          BEQ     CKTRN2
3015  012604  004777  000074                  JSR     PC,@ERR2
```

```
3016
3017                                            ;CHECK FOR CORRECT TRANSITIONS ON
3018                                            ;SELECTED ORIGINATE AND ANSWER LINES
3019
3020  012610  105737  012717          CKTRN2: TSTB    DATA3+1
3021  012614  100003                          BPL     .+10
3022  012616  042737  000010  015646          BIC     #10,ANSFLG
3023  012624  113704  015646                  MOVB    ANSFLG,R4               ;GET TRANSITION DATA FOR
3024  012630  113705  012716                  MOVB    DATA3,R5
3025  012634  013703  015644                  MOV     LINANS,R3
3026  012640  020504                          CMP     R5,R4                   ;DID CORRECT TRANSITIONS OCCUR
3027  012642  001402                          BEQ     CKTRN3
3028  012644  004777  000036                  JSR     PC,@ERR3
3029  012650  013704  015650          CKTRN3: MOV     ORGFLG,R4               ;GET TRANSITION DATA FOR
3030  012654  013705  012720                  MOV     DATA4,R5
3031  012660  013703  015642                  MOV     LINORG,R3
3032  012664  020504                          CMP     R5,R4                   ;DID CORRECT TRANSITIONS OCCUR
3033  012666  001402                          BEQ     CKTRN4
3034  012670  004777  000014                  JSR     PC,@ERR4
3035  012674  022626                  CKTRN4: POP2SP
3036  012676  000177  000020                  JMP     @NXTTS
3037  012702  000000                  ERR1:   0
3038  012704  000000                  ERR2:   0
3039  012706  000000                  ERR3:   0
3040  012710  000000                  ERR4:   0
3041  012712  000000                  DATA1:  0
3042  012714  000000                  DATA2:  0
3043  012716  000000                  DATA3:  0
3044  012720  000000                  DATA4:  0
3045  012722  000000                  NXTTS:  0
```

```
3046
3047                                    ;END OF PASS
3048                                    ;UPDATE PASS COUNT
3049                                    ;TYPE END OF PASS MESSAGE
3050
3051  012724                            EOP:
3052  012724  005237  015576                   INC     PASCNT                  ;UPDATE PASS COUNT
3053  012730  012737  000001  015600           MOV     #1,TSTNO                ;START AT FIRST TEST OF GROUP
3054  012736  000005                           RESET                           ;CLEAR THE WORLD
3055  012740  005037  015670                   CLR     FILLA                   ;INIT COUNTER
3056  012744  005337  015670           1$:     DEC     FILLA                   ;COUNT THE CTR
3057  012750  001375                           BNE     1$                      ;BR TIL STALL TIMES OUT
3058  012752  104004                           TYPE                            ; RING BELL
3059  012754  017231                           MEPASS
3060  012756  013701  000042                   MOV     42,R1                   ;ARE YOU ON ACT11?
3061  012762  001521                           BEQ     TSTENT          ;NO
3062  012764  000005                           RESET
3063  012766  004711                   LOGICAL:        JSR     PC,(R1)
3064  012770  000240                           NOP
3065  012772  000240                           NOP
3066  012774  000240                           NOP
3067  012776  000240                           NOP
3068  013000  000137  013226                   JMP     TSTENT                  ;GET ADDRESS OF FIRST TEST
3069
3070                                    ;EMT DISPATCH SERVICE
3071                                    ;ARGUMENT OF EMT IS EXTRACTED
3072                                    ;AND USED AS OFFSET TO OBTAIN POINTER
3073                                    ;TO SELECTED SUBROUTINE
3074
3075  013004  011646                    EMTSRV: MOV     (SP),-(SP)              ;GET PC OF RETURN
3076  013006  162716  000002                   SUB     #2,(SP)                 ;=PC OF EMT
3077  013012  017616  000000                   MOV     @(SP),(SP)              ;GET EMT
3078  013016  006316                    EMTOK:  ASL     (SP)                    ;MULTIPLY EMT ARG BY 2
3079  013020  042716  177001                   BIC     #177001,(SP)            ;CLEAR UNWANTED BITS
3080  013024  062716  017366                   ADD     #EMTTAB,(SP)            ;POINTER TO SUBROUTINE ADDRESS
3081  013030  017616  000000                   MOV     @(SP),(SP)              ;SUBROUTINE ADDRESS
3082  013034  000136                           JMP     @(SP)+                  ;GO TO SUBROUTINE
3083
3084  013036  105777  002514            CKINT: TSTB    @TKCSR
3085  013042  100001                           BPL     1$
3086  013044  104027                           KBDIN
3087  013046  000002                    1$:    RTI
3088
```

```
3089
3090                                    ;END OF SUBTEST SERVICE
3091                                    ;CHECK FOR LOOP ON CURRENT TEST
3092                                    ;CHECK FOR ESCAPE TO NEXT TEST ON ERROR
3093                                    ;UPDATE ITERATION COUNT AND EXIT TO NEXT TEST IF 0
3094
3095                                    ;TEST XOR FLAG (XFLAG) FOR EXISTANCE OF XOR TESTER.
3096
3097  013050  005737  001252        LOOP:   TST     XFLAG   ;IS THERE AN XOR TESTER OUT THERE ?
3098  013054  100022                  BPL     4$      ;NO
3099  013056  013746  000004          MOV     4,-(SP) ;SAVE 4
3100  013062  012737  013102  000004  MOV     #1$,4   ;SET UP SVC ROUTINE
3101  013070  005737  177060          TST     177060  ;GOT SOMETHING LIKE SLAVE SYNC
3102  013074  012637  000004          MOV     (SP)+,4 ;YOU BETCHUM
3103  013100  000404                  BR      2$
3104  013102  022626                1$:     POP2SP          ;RESTORE STACK
3105  013104  012637  000004          MOV     (SP)+,4 ;RESTORE 4
3106  013110  000402                  BR      3$
3107  013112  000137  013222        2$:     JMP     LOOPX   ;GO TO NEXT TEST
3108  013116  000137  013226        3$:     JMP     TSTENT  ;GO
3109  013122                        4$:
3110  013122  005037  177776          CLR     PSW
3111  013126  052777  000100  002422  BIS     #INTENA,@TKCSR
3112  013134  005737  015576          TST     PASCNT                  ;1ST PASS
3113  013140  001430                  BEQ     LOOPX                   ;NO ITERATIONS
3114  013142  005737  015572        5$:     TST     ERRFLG                  ;IF ERROR OCCURED FLAG=1,
3115  013146  001404                  BEQ     LOOPS                   ;CHECK FOR ESCAPE TO NEXT TEST
3116  013150  032777  002000  002410  BIT     #SW10,@SWR              ;IF SW10=1,
3117  013156  001021                  BNE     LOOPX                   ;ESCAPE TO NEXT TEST
3118  013160  032777  040000  002400  LOOPS:  BIT     #SW14,@SWR              ;IF SW14=1,
3119  013166  001041                  BNE     LOOPL                   ;LOOP ON CURRENT TEST
3120  013170  032777  004000  002370          BIT     #SW11,@SWR              ;IF SW11=1,
3121  013176  001011                  BNE     LOOPX                   ;INHIBIT ITERATIONS
3122  013200  005337  015604          DEC     ICOUNT                  ;UPDATE ITERATION COUNT
3123  013204  001406                  BEQ     LOOPX                   ;IF ICOUNT=0, GO TO NEXT TEST
3124  013206  013716  015602        LOOPER: MOV     RETURN,(SP)             ;SET UP FOR RETURN TO CURRENT TEST
3125  013212  042777  000100  002336          BIC     #INTENA,@TKCSR
3126  013220  000002                  RTI                             ;RETURN TO CURRENT TEST
3127  013222  005237  015600        LOOPX:  INC     TSTNO                   ;UPDATE TEST NUMBER
3128  013226  013705  015600        TSTENT: MOV     TSTNO,R5                ;GET TEST NUMBER
3129  013232  006305                  ASL     R5                      ;MULTIPLY TEST NUMBER BY 4
3130  013234  006305                  ASL     R5
3131  013236  063705  015632          ADD     TSTPNT,R5               ;GET POINTER FOR TEST ENTRY
3132  013242  011537  015602          MOV     (R5),RETURN             ;GET STARTING ADDRESS OF NEXT TEST
3133  013246  001626                  BEQ     EOP                     ;IF ADDRESS=0, GO TO END OF PASS
3134  013250  012516                  MOV     (R5)+,(SP)              ;PUT STARTING ADDRSS ON STACK
3135  013252  011537  015604          MOV     (R5),ICOUNT             ;GET ITERATION COUNT FOR TEST
3136  013256  005037  015572          CLR     ERRFLG                  ;CLEAR ERROR OCCURED FLAG
3137  013262  042777  000100  002266          BIC     #INTENA,@TKCSR
3138  013270  000002                  RTI                             ;GO TO TEST
3139  013272  012737  000001  015604  LOOPL:  MOV     #1,ICOUNT               ;SET UP TO EXIT TEST AFTER LOOP
3140  013300  000742                  BR      LOOPER                  ;GO TO LOOP SERVICE
3141
3142                                    ;CHECK FOR LOOPING WITH SAME DATA
3143                                    ;CHECK FOR ESCAPE TO NEXT TEST ON ERROR
3144
```

```
3145  013302  005737  015572          FREEZE: TST     ERRFLG                  ;IF ERROR FLAG=0,
3146  013306  001413                          BEQ     FREEZX                  ;DO NOT TEST FOR ESCAPE
3147  013310  032777  002000  002250          BIT     #SW10,@SWR              ;IF SW10=1,
3148  013316  001341                          BNE     LOOPX                   ;ESCAPE TO NEXT TEST
3149  013320  032777  001000  002240          BIT     #SW09,@SWR              ;IF SW09=1,
3150  013326  001403                          BEQ     FREEZX                  ;FREEZE CURRENT DATA
3151  013330  017616  000000                  MOV     @(SP),(SP)              ;GET LOOPING ADDRESS
3152  013334  000002                          RTI                             ;LOOP
3153  013336  062716  000002          FREEZX: ADD     #2,(SP)                 ;CONTINUE IN CURRENT TEST
3154  013342  000002                          RTI
3155
3156
3157                                   ;ROUTINE TO STEP THRU LINES
3158  013344  052777  000400  002200  STEPER: BIS     #STEP,@DMMCSR
3159  013352  032777  000020  002172  1$:     BIT     #BUSY,@DMMCSR
3160  013360  001374                          BNE     1$
3161  013362  000207                          RETURN
3162
3163
```

```
3164
3165                                        ;GENERAL ERROR SERVICE
3166                                        ;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER
3167
3168  013364  005037  015572        ERR:    CLR     ERRFLG                  ;ALWAYS TYPE PC+2
3169                                                                        ;OF TEST THAT FAILED
3170  013370  005037  013604                CLR     ERRMSG                  ;NO MESSAGE
3171  013374  005037  013616                CLR     ERTAB                   ;NO TABLE OF DATA
3172  013400  000451                       BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
3173
3174                                        ;TRANSITION DETECTION ERROR SERVICE
3175
3176                                        ;FORMAT FOR ERROR TYPEOUT IS
3177
3178                                        ;XXXXXX TRANSITION ERROR
3179                                        ;EXP    REC    LINE
3180                                        ;AA     BB     CC
3181
3182                                        ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3183                                        ;       AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER
3184                                        ;       BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
3185                                        ;       CC=LINE ON WHICH ERROR OCCURED
3186  013402  005037  015572        ERRT:   CLR     ERRFLG                  ;ALWAYS OUTPUT  ALL DATA
3187  013406  012737  016072  013604      MOV     @#TRANE,ERRMSG          ;TYPE "TRANSITION ERROR
3188  013414  012737  013710  013616      MOV     @#ERTAB1,ERTAB          ;TABLE OF DATA
3189  013422  000440                       BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
3190
3191                                        ;ON-LINE STATUS ERROR SERVICE
3192
3193                                        ;FORMAT FOR LINE STATUS ERROR IS
3194
3195                                        ;XXXX LINE ERROR
3196                                        ;EXP    REC    LINE
3197                                        ;AAA    BBB    CC
3198
3199                                        ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3200                                        ;       AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3201                                        ;       BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3202                                        ;       CC=LINE ON WHICH ERROR OCCURED
3203
3204
3205  013424  005037  015572        ERRS:   CLR     ERRFLG                  ;ALWAYS OUTPUT ALL DATA
3206  013430  012737  016041  013604      MOV     @#LINE1,ERRMSG          ;TYPE "LINE ERROR
3207                                                                        ;EXP REC LINE"
3208  013436  012737  013726  013616      MOV     @#ERTAB2,ERTAB          ;TABLE OF DATA
3209  013444  000427                       BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
```

```
3210
3211                                    ;FATAL TRANSITION ERROR
3212                                    ;FORMAT FOR FATAL ERROR TYPEOUT IS
3213
3214                                    ;XXXXXX FATAL ERROR
3215                                    ;CSTAT  LSTAT
3216                                    ;AAAAAA BBB
3217
3218                                    ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3219                                    ;       AAAAAA=RECEVICED CONTROL STATUS ON LINE THAT INTERRUPTED
3220                                    ;       BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED
3221
3222  013446  005037  015572        ERRN:   CLR     ERRFLG                  ;ALWAYS OUTPUT ALL DATA
3223  013452  012737  017022  013604        MOV     #MFATAL,ERRMSG          ;TYPE "FATAL ERROR
3224                                                                        ;CSTAT   LSTAT"
3225  013460  012737  013744  013616        MOV     #ERTAB3,ERTAB           ;TABLE OF DATA
3226  013466  000416                        BR      ERRGEN                  ;OUTPUT ERROR MESSAGE
3227
3228                                    ;"CONTROL STATUS" ERROR SERVICE
3229                                    ;FORMAT FOR CONTROL STATUS ERROR IS
3230
3231                                    ;XXXXXX STATUS ERROR
3232                                    ;EXP    REC
3233                                    ;AAAAAA BBBBBB
3234
3235                                    ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3236                                    ;       AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
3237                                    ;       BBBBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR
3238
3239
3240  013470  012737  015753  013604  ERRCS:  MOV     #MSTATE,ERRMSG          ;TYPE "STATUS ERROR
3241                                                                        ;"EXP REC"
3242  013476  012737  013756  013616        MOV     #ERTAB4,ERTAB           ;TABLE OF DATA
3243  013504  000407                        BR      ERRGEN                  ;OUTPUT DATA
3244
3245                                    ;LINE STATUS ERROR SERVICE
3246
3247                                    ;FORMAT FOR LINE STATUS ERROR IS
3248
3249                                    ;XXXX LINE ERROR
3250                                    ;EXP    REC    LINE   SEL
3251                                    ;AAA    DDD    CC     DD
3252
3253                                    ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3254                                    ;       AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3255                                    ;       BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3256                                    ;       CC=LINE ON WHICH ERROR OCCURED
3257                                    ;       DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING
3258
3259
3260  013506  012737  016004  013604  ERRLS:  MOV     #MLINER,ERRMSG
3261  013514  012737  013770  013616        MOV     #ERTAB5,ERTAB
3262  013522  000400                        BR      ERRGEN
```

```
3263
3264                                    ;GENERAL ERROR HANDLER
3265                                    ;TYPE PC+2 OF TEST THAT FAILED
3266                                    ;TYPE ERROR MESSAGE (IF ANY)
3267                                    ;TYPE DATA RELATING TO FAILURE (IF ANY)
3268
3269  013524  005037  177776          ERRGEN: CLR     PSW
3270  013530  012777  000100  002020          MOV     #INTENA,@TKCSR
3271  013536  032777  020000  002022          BIT     #SW13,@SWR              ;IF SW13=1, DO NOT
3272  013544  001026                          BNE     .3                      ;TYPE ERROR MESSAGE
3273  013546  021637  015624                  CMP     (SP),SAVPC              ;SAME ERROR AGAIN
3274  013552  001402                          BEQ     .+6
3275  013554  005037  015572                  CLR     ERRFLG
3276  013560  104005                          SAVOSP
3277  013562  005737  015572                  TST     ERRFLG                  ;IF ERROR OCCURED FLAG=1,
3278  013566  001007                          BNE     .1                      ;TYPE DATA ONLY
3279  013570  104006                          OCTASC                          ;TYPE PC+2 OF CALL TO ERROR ROUTINE
3280  013572  013702                          ERTABO
3281  013574  005737  013604                  TST     ERRMSG
3282  013600  001407                          BEQ     .2
3283  013602  104004                          TYPE                            ;TYPE ERROR MESSAGE
3284  013604  000000          ERRMSG: 0
3285  013606  005737  013616  .1:     TST     ERTAB
3286  013612  001402                          BEQ     .2
3287  013614  104006                          OCTASC                          ;TYPE DATA
3288  013616  000000          ERTAB:  0
3289  013620  104007          .2:     RESOS                                   ;RESTORE R0-R5
3290
3291                                    ;ERROR HALT SERVICE
3292
3293  013622  032777  100000  001736  .3:     BIT     #SW15,@SWR              ;IF SW15=0. DO NOT
3294  013630  001406                          BEQ     .4                      ;HALT ON ERROR
3295  013632  000000                          HALT                            ;HALT AND DISPLAY ADDRESS OF FAILING TEST
3296  013634  022737  000176  015566          CMP     #SWREG,SWR
3297  013642  001001                          BNE     .4
3298  013644  104025                          CNTLUU
3299  013646  012737  000001  015572  .4:     MOV     #1,ERRFLG               ;SET ERROR OCCURED FLAG
3300  013654  042777  000100  001674          BIC     #INTENA,@TKCSR
3301  013662  000002                          RTI                             ;RETURN TO TEST
3302
3303                                    ;TIMEOUT ERROR WAITING FOR INTERRUPT ON TEST 33
3304  013664  012737  015674  013604  ERRQ:   MOV     #MNOINT,ERRMSG
3305  013672  012737  014020  013616          MOV     #ERTAB6,ERTAB           ;TYPE LN#,CSR,LSR+MSG
3306  013700  000711                          BR      ERRGEN                  ;OUTPUT DATA
3307
3308
```

```
3309                                            ;TABLE S OF DATA FOR ERROR TYPEOUT
3310
3311                                            ;TABLE FOR TRANSITION STATUS ERROR
3312
3313  013702  000001                    ERTAB0: 1
3314  013704  000006                            6
3315  013706  015624                            SAVPC
3316  013710  000003                    ERTAB1: 3
3317  013712  000002                            2
3318  013714  015620                            SAVR5                   ;CONTAINS EXPECTED TRANSITION STATUS
3319  013716  000002                            2
3320  013720  015616                            SAVR4                   ;CONTAINS RECEIVED TRANSITION STATUS
3321  013722  000002                            2
3322  013724  015614                            SAVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
3323  013726  000003                    ERTAB2: 3
3324  013730  000003                            3
3325  013732  015620                            SAVR5                           ;CONTAINS EXPECTED LINE STATUS
3326  013734  000003                            3
3327  013736  015616                            SAVR4                           ;CONTAINS RECEIVED LINE STATUS
3328  013740  000002                            2
3329  013742  015614                            SAVR3                           ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
3330  013744  000002                    ERTAB3: 2
3331  013746  000006                            6
3332  013750  015616                            SAVR4
3333  013752  000003                            3
3334  013754  015614                            SAVR3
3335  013756  000002                    ERTAB4: 2
3336  013760  000006                            6
3337  013762  015620                            SAVR5                   ;CONTAINS EXPECTED CONTROL STATUS
3338  013764  000006                            6
3339  013766  015616                            SAVR4                   ;CONTAINS RECEIVED CONTROL STATUS
3340  013770  000004                    ERTAB5: 4
3341  013772  000003                            3
3342  013774  015620                            SAVR5                   ;CONTAINS EXPECTED LINE STATUS
3343  013776  000003                            3
3344  014000  015616                            SAVR4                   ;CONTAINS RECEIVED LINE STATUS
3345  014002  000002                            2
3346  014004  015614                            SAVR3                   ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED
3347  014006  000002                            2
3348  014010  015610                            SAVR1                   ;CONTAINS NUMBER OF LINE UNDER TEST
3349
3350
3351  014012  000001                    SWRTB:  1
3352  014014  000006                            6
3353  014016  000176                            SWREG
3354
3355  014020  000003                    ERTAB6: 3
3356  014022  000003                            3
3357  014024  015616                            SAVR4                   ;FAILING LINE #
3358  014026  000006                            6
3359  014030  015612                            SAVR2                   ;CSR OF DEVICE
3360  014032  000006                            6
3361  014034  015614                            SAVR3                   ;LSR OF DEVICE
3362
```

```
3363
3364                                        ;CONVERT OCTAL TO ASCII AND
3365                                        ;OUTPUT ON TELETYPE
3366
3367  014036  017605  000000          OCTASC: MOV     @(SP),R5                ;GET POINTER TO TABLE OF DATA
3368  014042  062716  000002                  ADD     #2,(SP)
3369  014046  012737  000010  014376          MOV     #10,RADIX
3370  014054  012704  017251                  MOV     #MBCD+2,R4              ;SET UP POINTER FOR CONVERTED DATA
3371  014060  012537  015626                  MOV     (R5)+,WRDCNT            ;GET NUMBER OF WORDS TO BE CONVERTED
3372  014064  012537  015630          OCTAS1: MOV     (R5)+,CHRCNT            ;GET NUMBER OF DIGITS IN WORD
3373  014070  013537  014372                  MOV     @(R5)+,BINWRD           ;GET DATA TO BE CONVERTED
3374  014074  104010                          CONVERT                         ;CONVERT TO ASCII
3375  014076  005337  015626                  DEC     WRDCNT                  ;IF ALL DATA IS NOT CONVERTED
3376  014102  001370                          BNE     OCTAS1                  ;CONTINUE
3377  014104  112714  000100                  MOVB    #100,(R4)               ;PUT TERMINATOR AT END OF MESSAGE
3378  014110  005737  014226                  TST     SMLN
3379  014114  001002                          BNE     1$
3380  014116  104004                          TYPE                            ;OUTPUT CONVERTED DATA
3381  014120  017247                          MBCO                            ;TO TELETYPE
3382  014122  000002                  1$:     RTI                             ;RETURN TO CALLING ROUTINE
3383
3384
3385
3386  014124  005037  014222          CNTLU:  CLR     TMP1
3387  014130  012737  000001  014224          MOV     #1,TMP2
3388  014136  104004                          TYPE
3389  014140  017206                          $SWREQ
3390  014142  052737  000001  014226          BIS     #1,SMLN
3391  014150  104006                          OCTASC
3392  014152  014012                          SWRTB
3393  014154  104004                          TYPE
3394  014156  017251                          MBCD+2
3395  014160  104013                          INSTRG
3396  014162  017217                          $NEWIS
3397  014164  000000                          0
3398  014166  177777                          177777
3399  014170  014222                          TMP1
3400  014172  123727  015122  000015          CMPB    INBUF,#15
3401  014200  001403                          BEQ     1$
3402  014202  013777  014222  001356          MOV     TMP1,@SWR
3403  014210  005037  014224          1$:     CLR     TMP2
3404  014214  005037  014226                  CLR     SMLN
3405  014220  000002                          RTI
3406  014222  000000                  TMP1:   0
3407  014224  000000                  TMP2:   0
3408  014226  000000                  SMLN:   0
3409
3410
```

```
3411
3412                                        ;INTEGER BINARY TO ASCII CONVERSION COMMON ROUTINE
3413
3414  014230  013700  015630        BINASC: MOV     CHRCNT,R0               ;SET UP COUNT FOR DIGITS TO BE CONVERTED
3415  014234  012701  017352                MOV     #TEMTAB,R1              ;SET UP POINTER FOR TEMPORARY STORAGE
3416  014240  104011                BINASA: EXTRACT                         ;EXTRACT ONE DIGIT
3417  014242  062737  000060  014374        ADD     #60,DIGIT               ;CONVERT FROM BCD TO ASCII
3418  014250  113721  014374                MOVB    DIGIT,(R1)+             ;STORE DIGIT
3419  014254  005300                        DEC     R0                      ;IF ALL DIGITS NOT DONE,
3420  014256  001370                        BNE     BINASA                  ;CONTINUE
3421  014260  114124                RINASB: MOVB    -(R1),(R4)+             ;REVERSE ORDER OF DIGITS
3422  014262  005337  015630                DEC     CHRCNT                  ;IF ALL CHARACTERS ARE NOT
3423  014266  001374                        BNE     BINASB                  ;IN ORDER, CONTINUE
3424  014270  112724  000040                MOVB    #40,(R4)+               ;INSERT SPACE AFTER LAST DIGIT
3425  014274  000002                        RTI                             ;RETURN TO CALLING ROUTINE
3426
3427                                        ;SINGLE PRECISION UNSIGNED DIVIDE LOOP
3428
3429  014276  005037  014374        DIVI:   CLR     DIVIDH
3430  014302  023737  014374  014376  DIVIU:  CMP     DIVIDH,DIVIS
3431  014310  103027                        BHIS    DIVIB
3432  014312  012737  000021  014352        MOV     #17.,DIVCNT
3433  014320  000407                        BR      DIVIC
3434  014322  023737  014374  014376  DIVIA:  CMP     DIVIDH,DIVIS
3435  014330  103403                        BLO     DIVIC
3436  014332  163737  014376  014374        SUB     DIVIS,DIVIDH
3437  014340  006137  014372        DIVIC:  ROL     DIVIDL
3438  014344  006137  014374                ROL     DIVIDH
3439  014350  005327                        DEC     (PC)+
3440  014352  000000                DIVCNT: 0
3441  014354  001362                        BNE     DIVIA
3442  014356  006037  014374                ROR     DIVIDH
3443  014362  005137  014372                COM     DIVIDL
3444  014366  000002                        RTI
3445  014370  000000                DIVIB:  HALT
3446  014372  000000                DIVIDL: 0
3447  014374  000000                DIVIDH: 0
3448  014376  000000                DIVIS:  0
3449
3450                                        ;SAVE PC OF TEST THAT FAILED AND R0-R5
3451
3452  014400  016637  000004  015624  SV05P:  MOV     4(SP),SAVPC
3453
3454                                        ;SAVE R0-R5
3455
3456  014406  010537  015620        SV05:   MOV     R5,SAVR5
3457  014412  010437  015616                MOV     R4,SAVR4
3458  014416  010337  015614                MOV     R3,SAVR3
3459  014422  010237  015612                MOV     R2,SAVR2
3460  014426  010137  015610                MOV     R1,SAVR1
3461  014432  010037  015606                MOV     R0,SAVR0
3462  014436  000002                        RTI
```

```
3463
3464                                        ;RESTORE R0-R5
3465
3466  014440  013700  015606        RS05:   MOV     SAVR0,R0
3467  014444  013701  015610                MOV     SAVR1,R1
3468  014450  013702  015612                MOV     SAVR2,R2
3469  014454  013703  015614                MOV     SAVR3,R3
3470  014460  013704  015616                MOV     SAVR4,R4
3471  014464  013705  015620                MOV     SAVR5,R5
3472  014470  000002                        RTI
3473
3474                                        ;TELETYPE OUTPUT ROUTINE
3475
3476  014472  017605  000000        TYPER:  MOV     @(SP),R5        ;GET POINTER TO MESSAGE (ON STACK)
3477  014476  062716  000002                ADD     #2,(SP)         ;CORRECT STACK FOR RETURN
3478  014502  105777  001054        TYPERA: TSTB    @TPCSR          ;WAIT FOR TELEPRINTER READY
3479  014506  100375                        BPL     TYPERA
3480  014510  122765  000012  177777      CMPB    #12,-1(R5)      ;WAS LAST ONE A L.F. ??
3481  014516  001405                        BEQ     1$              ;BR IF YES
3482  014520  122765  000015  177777      CMPB    #15,-1(R5)      ;WAS LAST ONE A C.R. ??
3483  014526  001401                        BEQ     1$              ;BR IF YES
3484  014530  000402                        BR      2$              ;CONTINUE IF NEITHER
3485  014532  004737  014602        1$:     JSR     PC,TYFILL       ;GO OUT PUT FILLERS
3486  014536  122715  000100        2$:     CMPB    #100,(R5)       ;IF CHARACTER IS NOT TERMINATOR, TYPE IT
3487  014542  001001                        BNE     TYPER1
3488  014544  000002                        RTI                     ;CHARACTER IS TERMINATOR, EXIT
3489  014546  122715  000042        TYPER1: CMPB    #42,(R5)        ;IF CHARACTER=42,
3490  014552  001406                        BEQ     TYPECL          ;TYPE LINE FEED
3491  014554  122715  000045                CMPB    #45,(R5)        ;IF CHARACTER=45,
3492  014560  001403                        BEQ     TYPECL          ;TYPE CARRIAGE RETURN
3493  014562  112577  000776        TYPER2: MOVB    (R5)+,@TPDBR    ;GET CHARACTER
3494  014566  000745                        BR      TYPERA          ;TYPE IT
3495  014570  142715  000040        TYPECL: BICB    #40,(R5)        ;CONVERT CODE OF 42 OR 45
3496  014574  152715  000010                BISB    #10,(R5)        ;TO 12 OR 15
3497  014600  000770                        BR      TYPER2          ;TYPE IT
3498
3499
3500                                        ;OUTPUT FILLERS AFTER <CR> OR <LF> CHAR IS OUT PUTTED.
3501
3502  014602  113737  015666  015670  TYFILL: MOVB    FILL,FILLA      ;GET FILL COUNT
3503  014610  113777  015667  000746  1$:     MOVB    FILL+1,@TPDBR   ;OUT PUT ONE FILLER
3504  014616  105777  000740          2$:     TSTB    @TPCSR          ;WAIT FOR TTY TO FINISH OUTPUT
3505  014622  100375                        BPL     2$              ;BR IF TTY NOT DONE
3506  014624  105337  015670                DECB    FILLA           ;COUNT ONE FILLER
3507  014630  001367                        BNE     1$              ;BR TIL ALL DONE
3508  014632  000207                        RTS     PC              ;RETURN TO CALLER ABOVE
3509
3510                                        ;INPUT OCTAL CHARACTER STRING
3511                                        ;TERMINATOR IS CARRIAGE RETURN
3512                                        ;IF MORE THAN SEVEN (7) CHARACTERS INCLUDING
3513                                        ;CARRIAGE RETURN ARE TYPED, THE IN  PUT WILL
3514                                        ;BE RE-REQUESTED
3515
3516  014634                        INSTR:
3517  014634  011605                        MOV     (SP),R5         ;GET POINTER TO ARGUMENTS
3518  014636  012537  014662                MOV     (R5)+,MSG       ;GET MESAGE TO BE TYPED
```

```
3519  014642  012537  015114                MOV     (R5)+,LOLIM             ;GET LOWER LIMIT
3520  014646  012537  015116                MOV     (R5)+,HILIM             ;GET UPPER LIMIT
3521  014652  012537  015120                MOV     (R5)+,STORE             ;GET DATA STORAGE LOCATION
3522  014656  010516                        MOV     R5,(SP)                 ;RESTORE STACK
3523  014660  104004            INSTR1:     TYPE                            ;TYPE MESSAGE
3524  014662  000000            MSG:        0
3525  014664  012704  015122                MOV     #INBUF,R4               ;SET UP CHARACTER INPUT BUFFER
3526  014670  012703  000007                MOV     #7,R3                   ;SET UP INPUT COUNT
3527  014674  105777  000656    INSTR8:     TSTB    @TKCSR                  ;WAIT FOR CHARACTER
3528  014700  100375                        BPL     INSTR8
3529  014702  005037  002206    INSTB8:     CLR     SINTFL
3530  014706  017737  000646  014222        MOV     @TKDBR,TMP1
3531  014714  142737  000200  014222        BICB    #200,TMP1
3532  014722  113714  014222                MOVB    TMP1,(R4)
3533  014726  121427  000007                CMPB    (R4),#7
3534  014732  001420                        BEQ     INSTER
3535  014734  121427  000015                CMPB    (R4),#15                ;IS CHARACTER TERMINATOR
3536  014740  001420                        BEQ     INSTR2                  ;IF IT IS, CONVERT INPUT STRING
3537  014742  121427  000025                CMPB    (R4),#25
3538  014746  001003                        BNE     1$
3539  014750  005037  014222                CLR     TMP1
3540  014754  000741                        BR      INSTR1
3541  014756  112477  000602        1$:     MOVB    (R4)+,@TPDBR
3542  014762  105777  000574    INSTRC:     TSTB    @TPCSR                  ;WAIT TO FINISH TYPING
3543  014766  100375                        BPL     INSTRC
3544  014770  005303                        DEC     R3                      ;UPDATE RECEIVED COUNT
3545  014772  001340                        BNE     INSTR8                  ;AND CONTINUE
3546  014774  104004            INSTER:     TYPE                            ;TYPE "?" AND RE-REQUEST INPUT
3547  014776  016741                        MOM
3548  015000  000727                        BR      INSTR1
3549
3550                                        ;CONVERT ASCII STRING TO OCTAL
3551
3552  015002  104004            INSTR2:     TYPE
3553  015004  016745                        MCRLF
3554  015006  012704  015122                MOV     #INBUF,R4               ;GET POINTER TO ASCII STRING
3555  015012  005003                        CLR     R3
3556  015014  122714  000015                CMPB    #15,(R4)                ;IS TERMINATOR FIRST
3557                                                                          ;CHARACTER IN STRING
3558  015020  001431                        BEQ     CHCK
3559  015022  121427  000060    INSTRD:     CMPB    (R4),#60                ;IS CHARACTER OCTAL DIGIT
3560  015026  002762                        BLT     INSTER                  ;IF 67>=CHAR>=60
3561  015030  121427  000067                CMPB    (R4),#67                ;CHARACTER IS OCTAL DIGIT
3562  015034  003357                        BGT     INSTER
3563  015036  142714  000060                BICB    #60,(R4)                ;STRIP ASCII
3564  015042  152403                        BISB    (R4)+,R3                ;GENERATE OCTAL NUMBER
3565  015044  121427  000015                CMPB    (R4),#15                ;IF END OF STRING, CHECK LIMITS
3566  015050  001404                        BEQ     INSTR3
3567  015052  006303                        ASL     R3                      ;MULTIPLY DIGIT BY 10 (OCTAL
3568  015054  006303                        ASL     R3
3569  015056  006303                        ASL     R3
3570  015060  000760                        BR      INSTRD                  ;GET NEXT DIGIT
3571
3572                                        ;TEST NUMBER TO SEE IF IT IS WITHIN LIMITS
3573
3574  015062  020337  015116    INSTR3:     CMP     R3,HILIM                ;TEST HI LIMIT
```

```
3575  015066  101342                          BMI     INSTER                  ;IF R3>HILIM, ERROR
3576  015070  020337  015114                  CMP     R3,LOLIM                ;TEST LOW LIMIT
3577  015074  103737                          BLO     INSTER                  ;IF R3<LOLIM, ERROR
3578  015076  010377  000016                  MOV     R3,@STORE               ;STORE NUMBER
3579  015102  000002                          RTI                             ;EXIT
3580  015104  005737  014224          CHCK:   TST     TMP2
3581  015110  001731                          BEQ     INSTER
3582  015112  000002                          RTI
3583  015114  000000                  LOLIM:  0
3584  015116  000000                  HILIM:  0
3585  015120  000000                  STORE:  0
3586  015122  000000                  INBUF:  0
3587          015144                  .=.+20
3588                                  ;ENTER HERE ON POWER FAILURE
3589
3590
3591  015144  010046                  PFAIL:  MOV     R0,-(SP)                ;SAVE R0-R5 ON PROCESSOR STACK
3592  015146  010146                          MOV     R1,-(SP)
3593  015150  010246                          MOV     R2,-(SP)
3594  015152  010346                          MOV     R3,-(SP)
3595  015154  010446                          MOV     R4,-(SP)
3596  015156  010546                          MOV     R5,-(SP)
3597  015160  013746  000024                  MOV     24,-(SP)
3598  015164  010637  015622                  MOV     SP,SAVSP                ;SAVE STACK POINTER
3599  015170  012737  015202  000024          MOV     @RESTART,24             ;SET UP FOR POWER UP TRAP
3600  015176  000000                          HALT                            ;HALT ON POWER DOWN NORMAL
3601  015200  000776                          BR      .-2
3602
3603                                  ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
3604
3605  015202  013706  015622          RESTAR: MOV     SAVSP,SP                ;RESTORE STACK POINTER
3606  015206  012605                          MOV     (SP)+,R5                ;RESTORE R0-R5
3607  015210  012604                          MOV     (SP)+,R4
3608  015212  012603                          MOV     (SP)+,R3
3609  015214  012602                          MOV     (SP)+,R2
3610  015216  012601                          MOV     (SP)+,R1
3611  015220  012600                          MOV     (SP)+,R0
3612  015222  012737  015144  000024          MOV     @PFAIL,24               ;SET UP FOR POWER FAILURE
3613  015230  005726                          POP1SP
3614  015232  104004                          TYPE
3615  015234  017120                          MPFAIL
3616  015236  005737  001756                  TST     TIPFLG
3617  015242  001002                          BNE     RESTA1
3618  015244  000137  001262                  JMP     START0
3619  015250  104004                  RESTA1: TYPE
3620  015252  017140                          MPF1
3621  015254  012746  000340                  MOV     @340,-(SP)
3622  015260  005746                          PUSH1SP
3623  015262  000137  013226                  JMP     TSTENT
3624
3625
3626                                  ;THE FOLLOWING AUTO VECTORS USING THE FIRST BASE ADDRESS
3627  015266  013746  000020          XOR:    MOV     20,-(SP)        ;SAVE 20
3628  015272  013746  000022                  MOV     22,-(SP)        ;SAVE 22
3629  015276  012737  015470  000020          MOV     @#,20           ;IOT INTR VECTOR
3630  015304  012737  000340  000022          MOV     @340,22         ;IOT INTR LVL
```

```
 3631  015312  012737  000300  012712          MOV     #300,DATA1
 3632  015320  012737  000302  012714          MOV     #302,DATA2
 3633  015326  013777  012714  175356  1$:     MOV     DATA2,@DATA1
 3634  015334  012777  000004  175352          MOV     #IOT,@DATA2     ;IOT TRAP
 3635  015342  062737  000004  012712          ADD     #4,DATA1
 3636  015350  062737  000004  012714          ADD     #4,DATA2
 3637  015356  023727  012712  001000          CMP     DATA1,#1000
 3638  015364  001360                          BNE     1$
 3639  015366  012737  000000  015600          MOV     #0,TSTNO        ;SET UP DEFAULT
 3640  015374  012737  017502  015632          MOV     #TSTTBO,TSTPNT  ;
 3641  015402  052737  000340  177776          BIS     #340,PS         ;PREVENT INTERRUPTS
 3642  015410  005077  000136                  CLR     @DHMCSR         ;
 3643  015414  012777  000100  000130          MOV     #INTENA,@DHMCSR ;SET INTERRUPT ENABLE
 3644  015422  042737  000340  177776          BIC     #340,PS ;ALLOW INTERRUPTS
 3645  015430  052777  000200  000114          BIS     #DONE,@DHMCSR   ;SET DONE..AND INTERRUPT
 3646  015436  000240                          NOP
 3647  015440  012637  000022                  MOV     (SP)+,22        ;YOU DIDN'T INTERRUPT ?
 3648  015444  012637  000020                  MOV     (SP)+,20        ;RESTORE 20 & 22
 3649  015450  005077  000076                  CLR     @DHMCSR         ;STOP ALL INTERRUPT
 3650  015454  052737  000340  177776          BIS     #340,PS         ;
 3651  015462  104012                          ERROR
 3652  015464  000000                          HALT                    ;YOU SHOULD HAVE INTERRUPTED
 3653  015466  000426                          BR      3$
 3654  015470  011637  015546          2$:     MOV     (SP),DHMVEC     ;EXTRACT VECTOR +4
 3655  015474  162737  000002  015546          SUB     #2,DHMVEC       ;CREATE LVL
 3656  015502  013737  015546  015550          MOV     DHMVEC,DHMLVL   ;SAVE
 3657  015510  162737  000002  015546          SUB     #2,DHMVEC       ;CREATE AND SAVE VEC
 3658  015516  012737  000340  177776          MOV     #340,PS         ;PREVENT INTERRUPTS
 3659  015524  005077  000022                  CLR     @DHMCSR         ;
 3660  015530  022626                          POP2SP
 3661  015532  022626                          POP2SP
 3662  015534  012637  000022                  MOV     (SP)+,22        ;RESTORE 22
 3663  015540  012637  000020                  MOV     (SP)+,20        ;RESTORE 20
 3664  015544  000207                  3$:     RTS     PC
 3665
```

```
3666
3667                                    ;INDIRECT POINTERS
3668
3669  015546  000300                    DHMVEC: 300                     ;MODEM CONTROL INTERRUPT VECTOR
3670  015550  000302                    DHMLVL: 302                     ;MODEM CONTROL ONTERRUPT PRIORITY
3671  015552  170500                    DHMCSR: 170500                  ;MODEM CONTROL CONTROL STATUS REGISTER
3672  015554  170502                    DHMLSR: 170502                  ;MODEM CONTROL CONTROL STATUS REGISTER
3673  015556  177560                    TKCSR:  177560
3674  015560  177562                    TKDBR:  177562
3675  015562  177564                    TPCSR:  177564
3676  015564  177566                    TPDBR:  177566
3677  015566  177570                    SWR:    177570
3678  015570  177570                    DISPLAY:177570
3679
3680                                    ;PROGRAM VARIABLES
3681
3682  015572  000000                    ERRFLG: 0
3683  015574  000000                    TRACON: 0
3684  015576  000000                    PASCNT: 0
3685  015600  000000                    TSTNO:  0
3686  015602  000000                    RETURN: 0
3687  015604  000000                    ICOUNT: 0
3688  015606  000000                    SAVR0:  0
3689  015610  000000                    SAVR1:  0
3690  015612  000000                    SAVR2:  0
3691  015614  000000                    SAVR3:  0
3692  015616  000000                    SAVR4:  0
3693  015620  000000                    SAVR5:  0
3694  015622  000000                    SAVSP:  0
3695  015624  000000                    SAVPC:  0
3696  015626  000000                    WRDCNT: 0
3697  015630  000000                    CHRCNT: 0
3698  015632  017502                    TSTPNT: TSTTBO
3699  015634  000000                    TSTMAX: 0
3700  015636  000000                    LINFLG: 0
3701  015640  000000                    LINE:   0
3702  015642  000000                    LINORG: 0
3703  015644  000000                    LINANG: 0
3704  015646  000000                    ANSFLG: 0
3705  015650  000000                    ORGFLG: 0
3706  015652  000000                    TIME1:  0
3707  015654  000000                    TIME2:  0
3708  015656  000000                    TIFLG:  0
3709  015660  177777                    LINSEL: 177777
3710  015662  000000                    SELMSK: 0
3711  015664  000000                    SLMSK:  0
3712  015666  000002                    FILL:   2                               ;FILL CHAR/COUNT
3713  015670  000000                    FILLA:  0                               ;TEMP STORAGE FOR FILL COUNT
3714  015672  000000                    RNGRET: 0
3715
3716                                    .NLIST  BEX
      015674  044524  042515  047440    MNOINT: .ASCII  ;TIME OUT WAITING FOR INTERRUPT#";
      015734  047114  020040  051503            .ASCII  ;LN  CSR    LSR@;
      015753     123  040524  052524    MSTATE: .ASCII  ;STATUS ERROR#"EXP    REC@;
      016004  044514  042516  042440    MLINER: .ASCII  ;LINE ERROR#"EXP REC LINE SEL@;
      016041     114  047111  020105    MLINE1: .ASCII  ;LINE ERROR#"EXP REC LINE@;
```

```
016072  051124  047101  044523  MTRANE: .ASCII  ;TRANSITION ERROR<15>"EXP REC LINE<0>;
016131     045  022442  042042  DIALM:  .ASCII  ;<15>"<15>"DIAL ANSWERING DATA SET<15>"<0>;
016167     045  022442  030442  MT103T: .ASCII  ;<15>"<15>"103A MODEM CONNECT-DISCONNECT TEST<15>"<0>;
016240  021045  021045  030062  MT202T: .ASCII  ;<15>"<15>"202C MODEM CONNECT-DISCONNECT TEST<15>"<0>;
016311     045  022442  047442  MSELOR: .ASCII  ;<15>"<15>"ORIGINATE LINE-<0>;
016335     045  040442  051516  MSELAN: .ASCII  ;<15>"ANSWER LINE-<0>;
016354  021045  030061  040463  MT103A: .ASCII  ;<15>"103A TEST COMPLETE<15>"<0>;
016403     045  031042  031060  MT202A: .ASCII  ;<15>"202C TEST COMPLETE<15>"<0>;
016432  021045  052123  044522  MDISC:  .ASCII  ;<15>"STRIKE ANY TTY KEY TO TEST DISCONNECT<0>;
016502  021045  021045  033061  M16:    .ASCII  ;<15>"<15>"16 LINE SCANNER TEST<15>"<0>;
016535     045  022442  042042  MTITLE: .ASCII  ;<15>"<15>"CZDHK-E     -----MODEM CONTROL DIAGNOSTIC-----<15>"<0>;
016621     045  053042  041505  MVECTO: .ASCII  ;<15>"VECTOR ADDRESS-<0>;
016643     045  041442  047117  MREGAD: .ASCII  ;<15>"CONTROL REGISTER ADDRESS-<0>;
016677     045  046042  047111  MLINSL: .ASCII  ;<15>"LINE SELECT PARAMETER -<0>;
016731     045  052042  051505  MTEST:  .ASCII  ;<15>"TEST-<0>;
016741     040  037440     100  MQM:    .ASCII  ;  ?<0>;
016745     045  040042          MCRLF:  .ASCII   ;<15>"<0>;
016750  021045  044523  043516  MLINE:  .ASCII  ;<15>"SINGLE LINE CABLE TEST<15>"<0>;
017003     045  046042  047111  MLINEI: .ASCII  ;<15>"LINE NUMBER-<0>;
017022  040506  040524  020114  MFATAL: .ASCII  ;FATAL ERROR<15>"CSTAT  LSTAT<0>;
017054  021045  051124  047101  MTRNDE: .ASCII  ;<15>"TRANSITION DETECTED<15>"CSTAT  LSTAT<0>;
017120  021045  047520  042527  MPFAIL: .ASCII  ;<15>"POWER FAILURE<0>;
017140  041455  051125  042522  MPF1:   .ASCII  ;-CURRENT TEST WILL RESTART<15>"<0>;
017175     136  040103          MCONTC: .ASCII  ;↑C<0>;
017200  053136     100          MCONTV: .ASCII  ;↑V<0>;
017203     136  040114          MCONTL: .ASCII  ;↑L<0>;
017206  021045  053523  036522  $SWREQ: .ASCII  ;<15>"SWR=  <0>;
017217     040  020040  042516  $NEWIS: .ASCII  ;  NEW=  <0>;
017231     045  042442  042116  MEPASS: .ASCII  ;<15>"END PASS   <0>;
017247     045     042          MBCD:   .ASCII  ;<15>";
         017351                 .=.+100
         017352                 .EVEN
017352   000000                 TEMTAB: 0
         017364                 .=.+10

017364   000000                         0

                                ;EMT DISPATCH TABLE

017366   013470                 EMTTAB: ERRCS
017370   013506                         ERRLS
017372   013050                         LOOP
017374   013302                         FREEZE
017376   014472                         TYPER
017400   014400                         SV05P
017402   014036                         OCTASN
017404   014440                         RS05
017406   014230                         BINASC
017410   014276                         DIVI
017412   013364                         ERR
017414   014634                         INSTR
017416   013402                         ERRT
017420   013424                         ERRS
017422   013446                         ERRN
017424   011766                         GETLIN
017426   012022                         SETUPS
```

```
        017430  012256                          CKRNG
        017432  012354                          WAITR
        017434  012442                          CKTRN
        017436  012412                          WAITRR
        017440  014124                          CNTLU           ;CALL BY EMT CNTLUU
        017442  013036                          CKINT           ;CALL  BY EMT CKINTT
        017444  001760                          KBDINT          ;CALLBY EMT  KBDIN
        017446  013664                          ERRG            ;CALLED BY EMT ERRINT
        017450  000000                  EMTLIM: 0
        017452  017502                  TSTLST: TSTTBO
        017454  017664                          TSTTB1
        017456  017726                          TSTTB2
        017460  017734                          TSTTB3
        017462  000000                          0
        017464  000000                          0
        017466  000000                          0
        017470  000000                          0
        017472  000033                  GRO:    NO-1
        017474  000007                          N1-100-1
        017476  000001                          N2-200-1
        017500  000000                          N3-300-1
        017502  002210                  TSTTBO: T0
        017504  000001                          1
  (2)   017506  002236                          T1
  (2)   017510  004000                          TIMES
  (2)   017512  002300                          T2
  (2)   017514  004000                          TIMES
  (2)   017516  002342                          T3
  (2)   017520  004000                          TIMES
  (2)   017522  002404                          T4
  (2)   017524  004000                          TIMES
  (2)   017526  002446                          T5
  (2)   017530  004000                          TIMES
  (2)   017532  002510                          T6
  (2)   017534  004000                          TIMES
  (2)   017536  002564                          T7
  (2)   017540  004000                          TIMES
  (2)   017542  002640                          T10
  (2)   017544  004000                          TIMES
  (2)   017546  002730                          T11
  (2)   017550  004000                          TIMES
  (2)   017552  003020                          T12
  (2)   017554  004000                          TIMES
  (2)   017556  003110                          T13
  (2)   017560  004000                          TIMES
  (2)   017562  003200                          T14
  (2)   017564  004000                          TIMES
  (2)   017566  003270                          T15
  (2)   017570  004000                          TIMES
  (2)   017572  003356                          T16
  (2)   017574  004000                          TIMES
  (2)   017576  003444                          T17
  (2)   017600  004000                          TIMES
  (2)   017602  003532                          T20
  (2)   017604  004000                          TIMES
  (2)   017606  003620                          T21
```

```
   (2)  017610  004000                          TIMES
   (2)  017612  003714                          T22
   (2)  017614  000400                          TIMES
   (2)  017616  004030                          T23
   (2)  017620  000400                          TIMES
   (2)  017622  004220                          T24
   (2)  017624  000400                          TIMES
   (2)  017626  004372                          T25
   (2)  017630  000200                          TIMES
   (2)  017632  004534                          T26
   (2)  017634  000200                          TIMES
   (2)  017636  004774                          T27
   (2)  017640  000200                          TIMES
   (2)  017642  005230                          T30
   (2)  017644  000200                          TIMES
   (2)  017646  005464                          T31
   (2)  017650  000200                          TIMES
   (2)  017652  005720                          T32
   (2)  017654  000200                          TIMES
   (2)  017656  006104                          T33
   (2)  017660  000200                          TIMES
        017662  000000                          0
        017664  006414                TSTTB1:   T100
        017666  000001                          1
   (2)  017670  006452                          T101
   (2)  017672  000200                          TIMES
   (2)  017674  006632                          T102
   (2)  017676  000200                          TIMES
   (2)  017700  007006                          T103
   (2)  017702  000200                          TIMES
   (2)  017704  007162                          T104
   (2)  017706  000200                          TIMES
   (2)  017710  007336                          T105
   (2)  017712  000200                          TIMES
   (2)  017714  007514                          T106
   (2)  017716  000200                          TIMES
   (2)  017720  007672                          T107
   (2)  017722  000200                          TIMES
        017724  000000                          0
        017726  010050                TSTTB2:   T200
        017730  000001                          1
        017732  000000                          0
        017734  010424                TSTTB3:   T300
        017736  000001                          1
                000001                .END
```

```
ANSFLG  015646          2831*  2834*  2839*  2843*  2924*  2933   2956   2971*  3022*  3023   3704#
ANSTR   011602          2798   2829#
ANSTRR  011670          2847#
ANSTR1  011616          2830   2832#
ANSTR2  011632          2833   2835#
ANSTR3  011646          2837   2840#
ANSTR4  011662          2842   2844#
BINASA  014240          3416#  3420
BINASB  014260          3421#  3423
BINASC  014230          3414#  3716
BINURD- 014372           857#  3373*
BUSY  - 000020           862#  1214   1218   1508   1534   2902   3159
CHCK    015104          3558   3580#
CHRCNT  015630          3372*  3414   3422*  3697#
CKINT   013036          3084#  3716
CKINTT- 104026           925#  2304   2368   2407   2466   2507   2551   2592   2632   2676   2741   2775
CKRING- 104021           920#  2282   2443
CKRNG   012256          2950#  3716
CKRNG1  012322          2959   2961#
CKRNG2  012346          2965   2968#
CKTRAN- 104023           922#  2310   2374   2472   2513   2557   2598   2638   2682   2747
CKTRN   012442          2989#  3716
CKTRN1  012556          3007   3009#
CKTRN2  012610          3014   3020#
CKTRN3  012650          3027   3029#
CKTRN4  012674          3033   3035#
CLRMUX- 002000           868#  1487   1608   1664   1718   1772   1832   1869   1955   1997   2037   2077   2901
CLRSCN- 004000           869#  1507   1533   2901
CNTLU   014124          3386#  3716
CNTLUU- 104025           924#  1011   1132   2265   2426   3298
CO    - 000100           883#  2134   2313   2317   2475   2478   2516   2520   2601   2605   2641   2646
COF   - 040000           872#  2809   2821   2832   2844
CONVER- 104010           911#  3374
CS    - 000040           882#  2134   2313   2317   2478   2520   2601   2641
CSF   - 020000           871#  2812   2821   2835   2844
CSTR1   002236          1158#
CSTR2   002300          1171#
CSTR3   002342          1184#
CSTR4   002404          1197#
CSTR5   002446          1213#
DATA1   012712          1015*  1017*  1020*  1022   2863*  2872   2992*  3002   3041#  3631*  3633*  3635*  3637
DATA2   012714          1016*  1017   1018*  1021*  2864*  2874   2993*  3011   3042#  3632*  3633   3634*  3636*
DATA3   012716          2994*  3020   3024   3043#
DATA4   012720          2995*  3030   3044#
DHMCSR  015552          1043   1044   1048   1105*  1113*  1123*  1146   1158*  1159   1162*  1163   1171*  1172
                        1175*  1176   1184*  1185   1188*  1189   1197*  1198   1202*  1203   1213*  1214   1217*
                        1218   1228*  1231*  1244*  1247*  1260*  1262*  1265*  1268*  1279*  1284*  1285*  1288*
                        1298*  1303*  1304*  1307*  1317*  1322*  1323*  1326*  1336*  1341*  1342*  1345*  1356*
                        1361*  1362*  1365*  1375*  1380*  1381*  1384*  1394*  1399*  1400*  1403*  1413*  1418*
                        1419*  1422*  1432*  1439*  1440   1457*  1462*  1466   1475*  1487*  1490*  1496*  1498
                        1507*  1509   1512*  1514   1529*  1533*  1534   1536*  1537*  1539*  1541*  1545   1567*
                        1572*  1576*  1579*  1583   1603*  1608*  1612*  1615*  1620   1639*  1659*  1664*  1668*
                        1671*  1676   1693*  1713*  1718*  1722*  1725*  1730   1747*  1767*  1772*  1776*  1779*
                        1784   1801*  1822*  1832*  1835*  1869*  1870*  1873*  1884*  1893   1897   1906   1912
                        1918*  1920*  1952*  1955*  1957*  1959*  1962   1980*  1994*  1997*  1999*  2001*  2004
                        2020*  2034*  2037*  2039*  2041*  2044   2060*  2074*  2077*  2079*  2081*  2084   2100*
```

```
                    2115#  2119#  2127#  2130   2146#  2160#  2164#  2172#  2175   2191#  2205#  2209#  2217#
                    2220   2236#  2300#  2358#  2365#  2366#  2462#  2464#  2505#  2547#  2549#  2590#  2630#
                    2672#  2674#  2726#  2737#  2738#  2791   2799#  2858#  2863   2901#  2902   2904#  2913#
                    2923#  2976#  2990#  3003#  3009#  3158#  3159   3642#  3643#  3645#  3649#  3659#  3671#
DMPLSR  015554      1048#  1049#  1149   1613#  1619   1641#  1644   1669#  1675   1695#  1698   1723#  1729
                    1749#  1752   1777#  1783   1803#  1806   1825#  1836   1844#  1845   1853#  1876#  1899
                    1958#  1961   1982#  1985   2000#  2003   2022#  2025   2040#  2043   2062#  2065   2080#
                    2083   2102#  2105   2120#  2129   2147#  2150   2165#  2174   2192#  2195   2210#  2219
                    2237#  2240   2302#  2367#  2463#  2465#  2506#  2548#  2550#  2591#  2631#  2673#  2675#
                    2739#  2800   2864   2911#  2914#  3004   3042   3672#
DMPLVL  015550      1037#  1038#  1230#  1246#  1263#  1283#  1302#  1321#  1340#  1359#  1378#  1397#  1416#
                    1882#  2922#  3656#  3670#
DMPVEC  015546      1032   1033   1037   1229#  1245#  1261#  1282#  1301#  1320#  1339#  1358#  1377#  1396#
                    1415#  1881#  2354#  2723#  2920#  2973#  3654#  3655#  3656   3657#  3669#
DIALM   016131      2929   3716#
DIGIT - 014374       858#  3417#  3418
DISPLA  015570       977#  3678#
DISPRE  000174      9518    977
DIVCNT  014352      3432#  3440#
DIVI    014276      3429#  3476
DIVIA   014322      3434#  3441
DIVIB   014370      3431   3445#
DIVIC   014340      3433   3435   3437#
DIVIDM  014374       858   3429#  3430   3434   3436#  3438#  3442#  3447#
DIVIDL  014372       857   3437#  3443#  3446#
DIVIS   014376       856   3430   3434   3436   3448#
DIVIU   014302      3430#
DMYRTI  002202      1083   1120   1121   1135#
DONE  - 000200       865#  1171   1172   1175   1176   1231   1265   1285   1304   1323   1342   1362   1381
                    1400   1419   1918   3645
EMTLIM  017450      3716#
EMTOK   013016      3078#
EMTSRV  013004       941   3075#
EMTTAB  017366      3080   3716#
EOP     012724      3051#  3133
ERR     013364      3168#  3716
ERRCS   013470      3240#  3716
ERRFLG  015572      2904#  3114   3136#  3145   3168#  3186#  3205#  3222#  3275#  3277   3299#  3682#
ERRGEN  013524      3172   3189   3209   3226   3243   3262   3269#  3306
ERRINT- 104030       927#  1901
ERRLS   013506      3260#  3716
ERRMSG  013604      3170#  3187#  3206#  3223#  3240#  3260#  3281   3284#  3304#
ERRN    013446      3222#  3716
ERROR - 104012       913#  1148   1151   1161   1165   1174   1178   1187   1191   1201   1206   1216   1220
                    1236   1252   1269   1291   1310   1329   1348   1366   1385   1404   1423   2274   2435
                    3651
ERRORC- 104000       903#  1443   1469   1501   1517   1552   1590   1907   1915
ERRORL- 104001       904#  1631   1647   1685   1701   1739   1755   1793   1809   1840   1849   1973   1988
                    2013   2028   2053   2068   2093   2108   2138   2153   2183   2198   2228   2243
ERRORN- 104016       917#  2801   2824   2847
ERRORS- 104015       916#  2333   2335   2394   2396   2493   2495   2534   2536   2577   2579   2611   2620
                    2660   2662   2702   2704   2764   2766
ERRORT- 104014       915#  2292   2294   2337   2339   2398   2400   2453   2455   2497   2499   2538   2540
                    2581   2583   2622   2624   2664   2666   2706   2708   2768   2770
ERRQ    013664      3304#  3716
ERRS    013424      3205#  3716
```

```
ERRT    013402          3186#   3716
ERR1    012702          2899*   2942    2952*   2960    2996*   3008    3037#
ERR2    012704          2953*   2967    2997*   3015    3038#
ERR3    012706          2998*   3028    3039#
ERR4    012710          2999*   3034    3040#
ERTAB   013616          3171*   3188*   3208*   3225*   3242*   3261*   3285    3288#   3305*
ERTAB0  013702          3208    3313#
ERTAB1  013710          3188    3316#
ERTAB2  013726          3208    3323#
ERTAB3  013744          3225    3330#
ERTAB4  013756          3242    3335#
ERTAB5  013770          3261    3340#
ERTAB6  014020          3305    3355#
EXTRAC* 104011           912#   3416
FATEX   011672          2802    2825    2848#
FATRET  011704          2266*   2427*   2850    2851#
FILL    015666          3502    3503    3712#
FILLA   015670          3055*   3056*   3502*   3506*   3713#
FREEZE  013302          3145#   3716
FREEZX  013336          3146    3150    3153#
GETLIN  011766          2878#   3716
GETLNS* 104017           918#   2268    2429
GRO     017472          1069    3716#
HILIM   015116          3520*   3574    3584#
ICOUNT  015604          3122*   3135*   3139*   3687#
INBUF   015122          3400    3525    3554    3586#
INIT1   002214          1146#
INSTBB  014702          3529#
INSTER  014774          1036    1047    1074    3534    3546#   3560    3562    3575    3577    3581
INSTR   014634          3516#   3716
INSTRB  014674          3527#   3528    3545
INSTRC  014762          3542#   3543
INSTRD  015022          3559#   3570
INSTRG* 104013           914#   1028    1039    1050    1057    1940    2879    2884    3395
INSTR1  014660          3523#   3540    3548
INSTR2  015002          3536    3552#
INSTR3  015062          3566    3574#
INTENA* 000100           864#    980    1158    1159    1162    1163    1247    1262    1284    1303    1322    1341    1361
                        1380    1399    1418    1884    2358    2726    2858    2923    2976    3111    3125    3137    3270
                        3300    3643
INT1    002510          1227#
INT1A   002556          1229    1235#
INT1B   002562          1234    1237#
INT10   003270          1356#
INT10A  003352          1358    1368#
INT10B  003354          1367    1369#
INT11   003356          1375#
INT11A  003440          1377    1387#
INT11B  003442          1386    1388#
INT12   003444          1394#
INT12A  003526          1396    1406#
INT12B  003530          1405    1407#
INT13   003532          1413#
INT13A  003614          1415    1425#
INT13B  003616          1424    1426#
INT2    002564          1243#
```

```
INT2A   002632          1245    12510
INT2B   002636          1250    12530
INT3    002640          12590
INT3A   002724          1261    12710
INT3B   002726          1270    12720
INT4    002730          12790
INT4A   003012          1282    12900
INT4B   003016          1289    12920
INT5    003020          12980
INT5A   003102          1301    13090
INT5B   003106          1308    13110
INT6    003110          13170
INT6A   003172          1320    13280
INT6B   003176          1327    13300
INT7    003200          13360
INT7A   003262          1339    13470
INT7B   003266          1346    13490
KBDIN - 104027           9260   3086
KBDINT  001760           948    10950   3716
KBDIN1  002042          1101    11080
KBDIN2  002074          1109    11160
KBDIN3  002136          1117    11260
KRET    002204          1083*   1120    1125    11370   1936*   2267*   2428*
LINANS  015644          2300    2462    2505    2549    2590    2672    2797    2888    2913    2957    3003    3005    3025
                        37030
LINE    015640          1944    1954    1996    2036    2076    2117    2162    2207    37010
LINENA- 000001           8770   1613    1624    1844    1876    1958    1966    2120    2134    2144    2165    2179    2189
                        2210    2224    2234    2313    2317    2377    2380    2475    2478    2516    2520    2560    2563
                        2601    2605    2641    2646    2685    2688    2750    2753    2911    2914
LINFLG  015636          1084*   37000
LINORG  015642          2366    2464    2547    2630    2674    2738    2795    2883    2909    2963    3009    3012    3031
                        37020
LINSEL  015660          1054    1437    1463    1610    1617    1666    1673    1720    1727    1774    1781    1833    1865
                        37090
LINT1   003620          14320
LINT1A  003646          1437*   1445    1449
LINT1B  003674          1438    1442    14440
LINT2   003714          14560   1471
LINT2A  003754          14630   1477
LINT2B  004002          1464    1468    14700
LOGICA  012766           945    30630
LOLIM   015114          3519*   3576    35830
LOOP    013050          3097*   3716
LOOPER  013206          3124*   3140
LOOPL   013272          3119    31390
LOOPS   013160          3115    31180
LOOPX   013222          3107    3113    3117    3121    3123    3127*   3148
LVL   - 000004          1274*   1293*   1312*   1331*   1350*   1351*   1370*   1389*   1408*   1427*
MAINT - 001000           867*   1184    1185    1188    1189    1490    1536    1539    1572    1873
MBCD    017247          3370    3381    3394    37160
MCONTC  017175          1103    37160
MCONTL  017203          1119    37160
MCONTV  017200          1111    37160
MCRLF   016745          1088    1946    2890    3553    37160
MDISC   016432          2352    2721    37160
MEMT1   004030          1487*   1503
```

```
MEMT1A  004056           1491#   1493
MEMT1B  004104           1497#   1506
MEMT1C  004126           1500    1504#
MEMT1D  004134           1507#   1519
MEMT1E  004166           1513#   1522
MEMT1F  004210           1516    1520#
MEMT2   004220           1529#
MEMT2A  004242           1533#   1554    1559
MEMT2B  004322           1544#   1557
MEMT2C  004344           1548    1550#
MEMT2D  004356           1551    1555#
MEMT3   004372           1567#
MEMT3A  004414           1571#   1592    1597
MEMT3B  004426           1573#   1575
MEMT3C  004464           1582#   1595
MEMT3D  004506           1586    1588#
MEMT3E  004520           1589    1593#
MEPASS  017231           3059    3716#
MFATAL  017022           3223    3716#
MLINE   016750           1939    3716#
MLINEI  017003           1941    3716#
MLINER  016004           3260    3716#
MLINE1  016041           3206    3716#
MLINSL  016677           1051    3716#
MNOINT  015674           3304    3716#
MPFAIL  017120           3615    3716#
MPF1    017140           3620    3716#
MQM     016741           3547    3716#
MREGAD  016643           1040    3716#
MSELAN  016335           2885    3716#
MSELOR  016311           2880    3716#
MSG     014662           3518*   3524#
MSTATE  015753           3240    3716#
MTEST   016731           1058    3716#
MTITLE  016535            999    3716#
MTRANE  016072           3187    3716#
MTRNDE  017054           2866    3716#
MT103A  016354           2405    3716#
MT103T  016167           2262    3716#
MT202A  016403           2774    3716#
MT202T  016240           2423    3716#
MUX1    004534           1603#
MUX1A   004562           1608#   1649    1653
MUX1B   004630           1616#   1637
MUX1C   004666           1623    1626#
MUX1D   004704           1618    1630    1633    1634#
MUX1E   004722           1639#
MUX1F   004754           1611    1646    1648#
MUX11   006452           1952#
MUX11A  006470           1955#
MUX11B  006520           1960#   1978
MUX11C  006546           1965    1968#
MUX11D  006564           1972    1975    1976#
MUX11E  006576           1980#
MUX11F  006630           1987    1989#
MUX12   006632           1994#
```

```
MUX12A  006650            1997#
MUX12B  006700            2002#   2018
MUX12C  006726            2007    2010#
MUX12D  006740            2012    2015    2016#
MUX12E  006752            2020#
MUX12F  007004            2027    2029#
MUX13   007006            2034#
MUX13A  007024            2037#
MUX13B  007054            2042#   2058
MUX13C  007102            2047    2050#
MUX13D  007114            2052    2055    2056#
MUX13E  007126            2060#
MUX13F  007160            2067    2069#
MUX14   007162            2074#
MUX14A  007200            2077#
MUX14B  007230            2082#   2098
MUX14C  007256            2087    2090#
MUX14D  007270            2092    2095    2096#
MUX14E  007302            2100#
MUX14F  007334            2107    2109#
MUX15   007336            2115#
MUX15A  007354            2118#
MUX15B  007402            2120#   2143
MUX15C  007430            2133    2136#
MUX15D  007442            2137    2140    2141#
MUX15E  007456            2145#
MUX15F  007512            2152    2154#
MUX16   007514            2160#
MUX16A  007532            2163#
MUX16B  007560            2173#   2188
MUX16C  007606            2178    2181#
MUX16D  007620            2182    2185    2186#
MUX16E  007634            2190#
MUX16F  007670            2197    2199#
MUX17   007672            2205#
MUX17A  007710            2208#
MUX17B  007736            2218#   2233
MUX17C  007764            2223    2226#
MUX17D  007776            2227    2230    2231#
MUX17E  010012            2235#
MUX17F  010046            2242    2244#
MUX2    004774            1659#
MUX2A   005022            1664#   1703    1707
MUX2B   005070            1672#   1691
MUX2C   005126            1679    1682#
MUX2D   005140            1674    1684    1687    1688#
MUX2E   005156            1693#
MUX2F   005210            1667    1700    1702#
MUX3    005230            1713#
MUX3A   005256            1718#   1757    1761
MUX3B   005324            1726#   1745
MUX3C   005362            1733    1736#
MUX3D   005374            1728    1738    1741    1742#
MUX3E   005412            1747#
MUX3F   005444            1721    1754    1756#
MUX4    005464            1767#
```

```
MUX4A   005512          1772#  1811   1815
MUX4B   005560          1780#  1799
MUX4C   005616          1787   1790#
MUX4D   005630          1782   1792   1795   1796#
MUX4E   005646          1801#
MUX4F   005700          1775   1808   1810#
MUX8    005720          1822#
MUX8A   005736          1825#  1828
MUX8B   005770          1832#  1842   1851
MUX8C   005776          1833#  1856
MUX8D   006032          1839   1843#
MUX8E   006064          1834   1848   1852#
MVECTO  016621          1029   3716#
M0    = 000034          3716#
M1    = 000110          3716#
M16     016502          1145   3716#
N     = 000300          1143#  1935#  2258#  2419#
NXTTS   012722          2898*  2944   2951*  2969   3000*  3036   3045#
N0    = 000034          1143#  1144#  1157   1158#  1170   1171#  1183   1184#  1196   1197#  1212   1213#  1226
                        1227#  1242   1243#  1258   1259#  1278   1279#  1293   1297   1298#  1312   1316   1317#
                        1331   1335   1336#  1350   1355   1356#  1370   1374   1375#  1389   1393   1394#  1408
                        1412   1413#  1427   1431   1432#  1455   1456#  1486   1487#  1528   1529#  1566   1567#
                        1602   1603#  1658   1659#  1712   1713#  1766   1767#  1821   1822#  1868   1869#  3716
N1    = 000110          1935#  1936#  1951   1952#  1993   1994#  2033   2034#  2073   2074#  2114   2115#  2159
                        2160#  2204   2205#  3716
N2    = 000202          2258#  2259#  2403   2404#  3716
N3    = 000301          2419#  2420#  3716
OCTASC= 104006           909#  2867   3279   3287   3391
OCTASN  014036          3367#  3716
OCTAS1  014064          3372#  3376
ORGFLG  015650          2808*  2811*  2816*  2820*  2925*  2935   2962   2972*  3029   3705#
ORGTR   011510          2796   2806#
ORGTRR  011576          2824#
ORGTR1  011524          2807   2809#
ORGTR2  011540          2810   2812#
ORGTR3  011554          2814   2817#
ORGTR4  011570          2819   2821#
PASCNT  015576          1086*  3052*  3112   3684#
PFAIL   015144           939    963   3591#  3612
POPR0 = 012600           897#
POP1SP= 005726           895#  3613
POP2SP= 022626           899#   994   1104   1112   1122   1235   1251   1271   1290   1309   1328   1347   1368
                        1387   1406   1425   1911   2849   2941   2943   2966   2968   3035   3104   3660   3661
PS    = 177776           854#   855   1227*  1230   1232*  1243*  1246   1248*  1259*  1263   1264*  1280*  1281*
                        1283   1279*  1300*  1302   1318*  1319*  1321   1337*  1338*  1340   1357*  1360*  1376*
                        1379*  1395*  1398*  1414*  1417*  1433*  1456*  1488*  1530*  1568*  1604*  1660*  1714*
                        1768*  1823*  1871*  1882   1887*  1890*  1896*  1905*  1937*  1953*  1995*  2035*  2075*
                        2116*  2161*  2206*  2260*  2353*  2359*  2364*  2421*  2722*  2728*  2736*  2896*  2930*
                        2977*  2989*  3641*  3644*  3650*  3658*
PSW   = 177776           855#  3110*  3269*
PUSHR0= 010046           896#
PUSH1S= 005746           894#  1081   3622
PUSH2S= 024646           898#
RADIX = 014376           856#  3369*
REGST1  001546          1045   1048#
RESTAR  015202          3599   3605#
```

```
RESTA1  015250          3617    3619#
RESO5 - 104007           910#    3289
RETURN  015602          3124    3132*   3686#
RING  - 000200           884#    2179
RINGF - 100000           873#    2321    2482    2806    2821    2829    2844
RNGRET  015672          2356*   2724*   2857    2926*   2974*   3714#
RS    - 000004           879#    1723    1734    2040    2048    2165    2179    2192    2465    2478    2520    2548    2591
                        2601    2641    2673
RSO5    014440          3466#   3716
SAVPC   015624          3273    3315    3452*   3695#
SAVRO   015606          3461*   3466    3688#
SAVR1   015610          3348    3460*   3467    3689#
SAVR2   015612          3359    3459*   3468    3690#
SAVR3   015614          3322    3329    3334    3346    3361    3458*   3469    3691#
SAVR4   015616          3320    3327    3332    3339    3344    3357    3457*   3470    3692#
SAVR5   015620          3318    3325    3337    3342    3456*   3471    3693#
SAVSP   015622          3598*   3605    3694#
SAVOSP- 104005           908#    3276
SCNENA- 000040           863#    1197    1198    1202    1203    1213    1217    2358    2726    2858    2923    2976
SCNT1   006104          1869#    1903    1909    1917
SCNT1A  006144          1875#    1878
SCNT1B  006220          1885#    1924
SCNT1C  006344          1881     1911#
SCNT1D  006364          1886     1904    1910    1914    1918#
SCOPE - 104002           905#    1152    1166    1179    1192    1207    1221    1237    1253    1272    1292    1311    1330
                        1349    1369    1388    1407    1426    1450    1478    1523    1560    1598    1654    1708    1762
                        1816    1857    1925    1989    2029    2069    2109    2154    2199    2244
SCOPEF- 104003           906#    1444    1470    1502    1518    1553    1591    1632    1648    1686    1702    1740    1756
                        1794    1810    1841    1850    1902    1908    1916    1974    2014    2054    2094    2139    2184
                        2229
SECRX - 000020           881#    2224    2516    2520    2641    2646
SECRXF- 010000           870#    2817    2821    2840    2844
SECTX - 000010           880#    1777    1788    2080    2088    2210    2224    2237    2506    2516    2550    2631    2646
                        2675
SELMSK  015662          1434*   1437    1447*   1459*   1463    1473*   1606*   1610    1650*   1662*   1666    1704*   1716*
                        1720    1758*   1770*   1774    1812*   1829*   1833    1854*   1874*   1885    1921*   3710#
SETUP - 104020           919#    2270    2431
SETUPB  012240          2934    2936    2943#
SETUPS  012022          2895#    3716
SETUP1  012054          2902#    2903
SETUP2  012070          2909#
SETUP4  012202          2926    2933#   2938    2940
SINGLE- 000001           840#    1602    1658    1712    1766    1927#   1951    1993    2033    2073    2114    2159    2204
SINTFL  002206          1097*   1133*   1138#   3529*
SLMSK   015664          1614*   1617    1635*   1670*   1673    1689*   1724*   1727    1743*   1778*   1781    1797*   3711#
SMLN    014226          3378    3390*   3404*   3408#
ST    - 000200          1274#    1293#   1312#   1331#   1350#   1351#   1370#   1389#   1408#   1427#
STACK   001100           962#     967    1014    1056
START   001100           955     963#
STARTN  001574          1013    1056#   1107
STARTO  001262           985     992     996#    3618
START1  001324          1004    1007#
STEP  - 000400           866#    3158
STEPER  013344          1465*   1491*   1497*   1513*   1538*   1544*   1573*   1577*   1582*   1634*   1688*   1742*   1796*
                        1826*   1875*   1888*   1976*   2016*   2056*   2096*   2141*   2186*   2231*   3158#
STORE   015120          3521*   3578*   3585#
```

```
STRLIN  006414           1936#
STRLNA  006434           1936    1940#
STRTCA  001666           1072    1075#
ST103A  010050           2259#
ST103B  010112           2267    2268#   2275    2295    2408
ST202A  010424           2420#
ST202B  010466           2428    2429#   2436    2456    2776
SUSWR   001122            969#
SVOS    014406           3456#
SVOSP   014400           3452#   3716
SWR     015566            972     976*   1009    1012    1128    2263    2424    3116    3118    3120    3147    3149    3271
                         3293    3296    3402*   3677#
SWREG   000176            952#    976    1009    1128    2263    2424    3296    3353
SWRTB   014012           3351#   3392
SW06  = 000100            834#
SW08  = 000400            833#
SW09  = 001000            832#   3149
SW10  = 002000            831#   3116    3147
SW11  = 004000            830#   3120
SW12  = 010000            829#
SW13  = 020000            828#   3271
SW14  = 040000            827#   3118
SW15  = 100000            826#   3293
T     = 000014           1274#   1293#   1312#   1331#   1350#   1351#   1370#   1389#   1408#   1427#
TEMTAB  017352           3415    3716#
TIFLG   015656            996    1000*   3708#
TIMES = 000200           3716#
TIME1   015652           2931*   2937*   2978*   2980*   3706#
TIME2   015654           2933*   2939*   2979*   2982*   3707#
TIPFLG  001756            965*   1089*   1091#   1095*   1134*   3616
TKCSR   015556            966*    980*   1106*   1114*   1124*   2361    2730    3084    3111*   3125*   3137*   3270*   3300*
                         3527    3673#
TKDBR   015560           1098    2360*   2363    2729*   2732    3530    3674#
TMP1    014222           1096*   1098*   1099*   1100    1108    1116    1130    3386*   3399    3402    3406#   3530*   3531*
                         3532    3539*
TMP2    014224           3387*   3403*   3407#   3580
TPCSR   015562           3478    3504    3542    3675#
TPDBR   015564           3493*   3503*   3541*   3676#
TRACON  015574           1085*   3683#
TRANEX  011706           2823    2846    2855#
TRANS   011446           2791#   2920    2973
TRANX1  011716           2858#   2869
TRMRDY= 000002            878#   1669    1680    2000    2008    2120    2134    2147    2302    2313    2317    2367    2377
                         2463    2475    2478    2516    2520    2560    2563    2601    2605    2641    2646    2685    2688
                         2739    2750    2911
TRNTAB  011754           2868    2870#
TRNTYP  011726           2354    2723    2863#
TSTENT  013226           1090    3061    3068    3108    3128#   3623
TSTGO   001706           1025    1027    1078    1080#
TSTLST  017452           1070    3716#
TSTMAX  015634           1069*   1077    3699#
TSTNO   015600           1061    1062    1075*   1077    2406*   2848*   3053*   3127*   3128    3639*   3685#
TSTPNT  015632           1070*   1071    3131    3640*   3698#
TSTTBO  017502           3640    3698    3716#
TSTTB1  017664           3716#
TSTTB2  017726           3716#
```

 CROSS REFERENCE TABLE -- USER SYMBOLS

```
TSTTB3  017734            3716#
TYFILL  014602            3485    3502#
TYPE  = 104004             907#    998    1087    1102    1110    1118    1144    1938    1945    2261    2351    2404    2422
                          2720    2773    2865    2889    2928    3058    3283    3380    3388    3393    3523    3546    3552
                          3614    3619
TYPECL  014570            3490    3492    3495#
TYPER   014472            3476#   3716
TYPERA  014502            3478#   3479    3494
TYPER1  014546            3487    3489#
TYPER2  014562            3493#   3497
T0      002210            1143#   3716
T1      002236            1157#   3716
T10     002640            1258#   3716
T100    006414            1935#   3716
T101    006452            1951#   3716
T102    006632            1993#   3716
T103    007006            2033#   3716
T103A   010114            2266    2270#
T103A1  010122            2273    2274#
T103B   010126            2272    2282#
T103B1  010136            2288    2292#
T103B2  010142            2290    2294#
T103C   010146            2286    2300#
T103D1  010212            2327    2333#
T103D2  010216            2329    2335#
T103D3  010222            2330    2337#
T103D4  010226            2331    2339#
T103E   010232            2332    2351#
T103EN  010406            2393    2404#
T103ES  010272            2356    2360#
T103E1  010366            2388    2394#
T103E2  010372            2390    2396#
T103E3  010376            2391    2398#
T103E4  010402            2392    2400#
T104    007162            2073#   3716
T105    007336            2114#   3716
T106    007514            2159#   3716
T107    007672            2204#   3716
T11     002730            1278#   3716
T12     003020            1297#   3716
T13     003110            1316#   3716
T14     003200            1335#   3716
T15     003270            1355#   3716
T16     003356            1374#   3716
T17     003444            1393#   3716
T2      002300            1170#   3716
T20     003532            1412#   3716
T200    010050            2258#   3716
T201    010406            2403#
T202A   010470            2427    2431#
T202A1  010476            2434    2435#
T202B   010502            2433    2443#
T202B1  010512            2449    2453#
T202B2  010516            2451    2455#
T202C   010522            2447    2462#
T202D   010536            2464#
```

```
T202D1  010602            2488    2493#
T202D2  010606            2489    2495#
T202D3  010612            2490    2497#
T202D4  010616            2491    2499#
T202E   010622            2492    2505#
T202E1  010666            2529    2534#
T202E2  010672            2530    2536#
T202E3  010676            2531    2538#
T202E4  010702            2532    2540#
T202F   010706            2533    2547#
T202F2  010766            2572    2577#
T202F3  010772            2573    2579#
T202F4  010776            2574    2581#
T202F5  011002            2575    2583#
T202G   011006            2576    2590#
T202G1  011052            2613    2618#
T202G2  011056            2614    2620#
T202G3  011062            2615    2622#
T202G4  011066            2616    2624#
T202H   011072            2617    2630#
T202H2  011136            2655    2660#
T202H3  011142            2656    2662#
T202H4  011146            2657    2664#
T202H5  011152            2658    2666#
T202I   011156            2659    2672#
T202I2  011236            2697    2702#
T202I3  011242            2698    2704#
T202I4  011246            2699    2706#
T202I5  011252            2700    2708#
T202J   011256            2701    2720#
T202JN  011434            2763    2773#
T202JS  011316            2724    2729#
T202J1  011414            2759    2764#
T202J2  011420            2760    2766#
T202J3  011424            2761    2768#
T202J4  011430            2762    2770#
T21     003620            1431#   3716
T22     003714            1455#   3716
T23     004030            1486#   3716
T24     004220            1528#   3716
T25     004372            1566#   3716
T26     004534            1602#   3716
T27     004774            1658#   3716
T3      002342            1183#   3716
T30     005230            1712#   3716
T300    010424            2419#   3716
T31     005464            1766#   3716
T32     005720            1821#   3716
T33     006104            1868#   3716
T4      002404            1196#   3716
T5      002446            1212#   3716
T6      002510            1226#   3716
T7      002564            1242#   3716
VECS1A  001374            1017#   1023
VECSTR  001354            1002    1006    1014#   1115
VECST1  001500            1034    1037#
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
WAITR   012354          2971#   3716
WAITRN- 104022           921#   2305    2369    2467    2508    2552    2593    2633    2677    2742
WAITRR  012412          2974    2978#   3716
WAITR1  012424          2980#   2981    2983
WAITS - 104024           923#   2740
WRDCNT  015626          3371*   3375*   3696#
X     - 000000           903     904#    905#    906#    907#    908#    909#    910#    911#    912#    913#    914#    915#
                         916#    917#    918#    919#    920#    921#    922#    923#    924#    925#    926#    927#    928#
                         959#
XCO   - 000004           888#   2321    2324    2382    2385    2482    2485    2566    2569    2608    2611    2691    2694
XCS   - 000002           889#   2321    2324    2382    2385    2485    2569    2608    2691
XFLAG   001252           981*    990*    993#    1001    1024    3097
XM    - 000101          3716#
XN    - 000300          1143#   1935#   2258#   2419#
XOR     015266           991    1005    3627#
XORSVC  001254           987     994#
XSCRX - 000001           890#   2525    2527    2566    2569    2651    2653    2691    2694
X1A     001612          1062#   1073
X1B     001656          1073#   1079
$NEWIS  017217          3396    3716#
$SWREQ  017206          3389    3716#
.     - 017740           930#    935     938#    944#    947#    950#    954#    961#    997    1147    1150    1160    1164
                        1173    1177    1186    1190    1199    1204    1215    1219    1509    1535    1643    1697    1751
                        1805    1984    2024    2064    2104    2149    2194    2239    2856    3021    3274    3587#   3601
                        3716#
.1      013606          3278    3285#
.2      013620          3282    3286    3289#
.3      013622          3272    3293#
.4      013646          3294    3297    3299#
```

```
CZDHK-E MACY11 30A(1052)  11-JUL-84  08:53  PAGE 105
CZDHKE.P11    11-JUL-84 08:45          CROSS REFERENCE TABLE -- MACRO NAMES

COMMEN    839#    959#   1143#   1274#   1351#   1927#   1935#   2258#   2419#   3716#
EMTDEF     903     904     905     906     907     908     909     910     911     912     913     914     915     916     917
           918     919     920     921     922     923     924     925     926     927    959#
INTS      1139#   1351    1370    1389    1408
MUXS1     1139#   1599    1655    1709    1763    1948    1990    2030    2070
MUXS2     1139#   2110    2155    2200
NOINT     1139#   1274    1293    1312    1331
TM         960#   3716
TS         958#   1143    1157    1170    1183    1196    1212    1226    1242    1258    1278    1297    1316    1335    1355
          1374    1393    1412    1431    1455    1486    1528    1566    1602    1658    1712    1766    1821    1868    1935
          1951    1993    2033    2073    2114    2159    2204    2258    2403    2419
TSS        958#

. ABS.  017740     000


 ERRORS DETECTED:  0

 CZDHKE,CZDHKE/SOL/CRF=CZDHKE.P11
 RUN-TIME: 4 8 1 SECONDS
 RUN-TIME RATIO: 30/14=2.0
 CORE USED:  11K  (21 PAGES)

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```