IDENTIFICATION

Product Code:	MAINDEC-11-DZDLC-B-D
Product Name:	DL11/C,/D, or /E Off Line Test
Date Created:	MAY 1977
Maintainer:	Diagnostic RELEASE ENGINEERING
Author:	E. Crowley/B. Burgess

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1.0 PROGRAM PURPOSE (ABSTRACT)

This program has the ability to test the DL11 (Asynchronous Modem Interface), off line. Models able to be tested are C, D, and E only. The use of a modem is not required for testing; however, a special cable connector BC05C and a special modem test connector H315A is required. This program is capable of the following:

a. Verification of maintenance bit
b. Verification that transmitter can cause an interrupt
c. Verification that receiver 'DONE' can cause an interrupt
d. Checks that 'REQ TO SEND' asserts 'RING'
e. Checks that 'SEC XMIT' asserts 'SEC REC' and 'DATA SET INT'
f. Checks that 'DTR' can assert 'CLR TO SEND' and 'CAR DET'
g. Verifies that 'DATA SET I.E.' can cause a RECVR INTR
h. Checks the 'BREAK' feature
i. Performs null-del-null pattern
j. Performs binary up count pattern
k. Performs binary down count pattern
l. Runs a worse case pattern

Included in the program are special user routines - PRG #2, PRG #3, PRG #4, and PRG #5 (which will be described further into this document).

Note well two(2) points:

1. This program is capable of testing sixteen(16) DL11's and assumes contiguous addressing from 1st device to last.

   a. If multiple devices are not being tested, thus not requiring a pass thru the program once per device, then the program will default to testing the 1st possible DL11-E device i.e., RCSR address = 775610, and test this device only.

   b. If multiple device testing is not being conducted, and the device existing is not the default DL11-E, then the user on starting the program will have to set SW<0>=1 to enter the question & answer mode.

2. This program has provision for character length i.e., it assumes data is 8 bits, but also has the ability to handle 5, 6, or 7 bits of data as well.

2.0 SYSTEM REQUIREMENTS

a. Hardware Requirements

   PDP-11 family processor with 8K of memory
   M7800 DL11 asynchronous line interface module

BC05C special cable connector
H315A special modem test connector

b. Software Requirements

This program was specifically designed for the 11/40 Front End of the 1080 Console Processor System. In this environment it would be loaded by the TCDP (Dectape) diagnostic monitor. However, any 11/40 user with 8K of memory can run this program to test one(1) or multiple DL11's.

The program has the proper interface code to allow running under the automated manufacturing test line system - ACT11.

3.0 RELATED DOCUMENTS AND STANDARDS

a. Programming Practices - Document No. 175-003-009-00
b. PDP11/40 Processor Handbook
c. DL11 Asynchronous Line Interface Manual
   Document No. DEC-11-HDLAA
d. PDP-11 Maindec 'SYSMAC' Utility Package
   MAINDEC-11-DZQAC-C3
e. Applicable Circuit Schematic
   M7800

4.0 DIAGNOSTIC HIERARCHY PREREQUISITES

Before running this program, the following two(2) diagnostic programs should be run for verification of functionality of the 11-instruction set and memory:

1. MAINDEC-11-DBQEA and,
2. MAINDEC-11-DZQMC

5.0 LOADING AND STARTING PROCEDURE

Load program in memory using ABS loader
Load address 200.

NOTE

In the case of a 1080 system environment load the program using the TCDP (dectape) Diagnostic Monitor.

Press start.

a. There are also three(3) optional start addresses for the program:

204 - selects program #2
210 - selects program #3
214 - selects program #4
220 - selects program #5

6.0 SPECIAL ENVIRONMENTS

If this program is run in Quick Verify Mode under ACT11 the program is done after the first pass.

7.0 PROGRAM OPTIONS

SWITCH	USE
15=1 or up	Halt on error
14=1 or up	Loop on test
13=1 or up	Inhibit error typeouts
12=1 or up	/C or /D model being tested
11=1 or up	Inhibit iterations
10=1 or up	Bell on error
9=1 or up	Loop on error
8=1 or up	Loop on test in SWR<7:0>
<7:0>	Holds test no. of test to be looped on. Used in conjunction with SW<8>.
0=1 or up	Used in device table creation (1 to 16 devices) i.e., default device not desired. Also used for character length setting.

!! NOTE WELL !!

If sw<08> is set the user can only 'loop on a test' of the default device i.e. - DL11/E RCSR = 775610. If the user desires to 'loop on a test' of other than the default device he must first patch the five (5) locations labeled

DLRCSR: DLRDBR: DLXCSR: DLXDBR: DLVECT:

that appear under 'DL11 Definitions' heading at the front of the listing. i.e. - with sw<08> set sw<00> is not functional.

8.0 EXECUTION TIMES

Execution time is dependent on type of memory and

number of DL11's being tested. A representative time for 1 error free pass is:

11/40 - core memory - 1 DL11/E - 20 seconds

9.0 ERROR INFORMATION

9.1 Error Reporting

There are a total of seven(7) types of error reports generated by the program. The key column headings will be described below for clarity -

DEVADR - This is the address of the receiver control status register for the failing DL11

REGADR - This is the address of the DL11 register on which testing is being conducted

WAS - This is what the contents of the register of the DL11 undergoing test was (address is under column '(R2)')

S/B - This is what the contents of the register of the DL11 undergoing test should be (address is under column '(R2)')

WASADR - This is what the memory address was (input data buffer address)

SHBADR - This is what the memory address should be (output data buffer address)

(REG) - This is the contents of the DL11 receiver data buffer in error (address is under column '(R2)')

9.2 Error Halts

With the 'Halt on Error' switch (SW15) not set there are four(4) programmed 'HALTS' in the program:

a. In the case of error reporting and there is no terminal to allow the information transfer.

b. In the power fail routine if the power up sequence was

started before the power down sequence had a chance to complete itslef.

c. In the end of pass routine if multiple device testing is being conducted but no devices are shown as active.

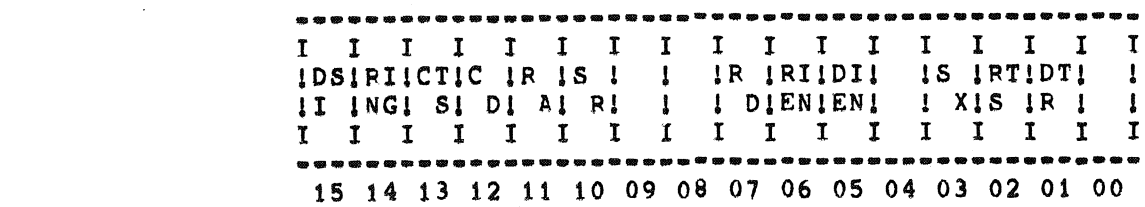
d. In the case of sw<08> being set.

10.0 PERFORMANCE AND PROGRESS REPORTS

Not applicable.

11.0 DEVICE INFORMATION TABLES

a. The following is a picture view of a DL11-E Receiver Control Status Register, which will show bit assignments and definitions, to provide a handy reference:



Bit assignments are defined as follows:

BIT15	Data Set Interrupt	1. Interrupt sequence initiated when BIT05 set. 2. Sets whenever bits 10, 11, 12 or 14 change state 3. Cleared by INIT or reading RCSR
BIT14	Ring	1. When set, indicates a control signal being received from dataset.
BIT13	Clear to send	1. When set indicates ON condition; when clear indicates OFF condition. 2. Dependent on state of 'CTS' signal from dataset
BIT12	Carrier Detect	1. Sets when data carrier received 2. When clear indicates end of current transmission or an error condition.

BIT11	Receiver Active	1. When set indicates receiver interface is active. 2. Cleared by INIT or RCVR DONE (BIT07).
BIT10	Secondary Receive or Supervisory Received Data	1. Provides receive capability, when set, for reverse channel of remote station. Sets when BIT03 is set. 2. Cleared by INIT
BIT07	Receiver Done	1. Sets when character has been received. Will initiate an interrupt providing BIT06 is also set 2. Cleared when RDBR is addressed or BIT00 is set. 3. Also, cleared by INIT
BIT06	Receiver Interrupt Enable	1. When set, allows interrupt providing BIT07 is set. 2. Cleared by INIT 3. ***READ/WRITE BIT***
BIT05	Dataset Interrupt Enable	1. When set, allows interrupt providing BIT15 is set. 2. Cleared by INIT 3. ***READ/WRITE BIT***
BIT03	Secondary Transmit or Supervisory Transmitted DATA	1. Provides transmit capability, when set, for reverse channel of remote station. Sets when BIT10 is set. 2. Cleared by INIT 3. ***READ/WRITE BIT***
BIT02	Request to Send	1. Jumper ties this bit to REQ TO SEND in dataset. 2. Required for transmission 3. Cleared by INIT 4. ***READ/WRITE BIT***
BIT01	Data Terminal Ready	1. When set, permits connection to channel. 2. When clear, disconnects interface from channel. 3. MUST be cleared by program 4. ***READ/WRITE BIT***

Special Notes on RCSR Register

1. Addresses should fall in the range of 175610 to

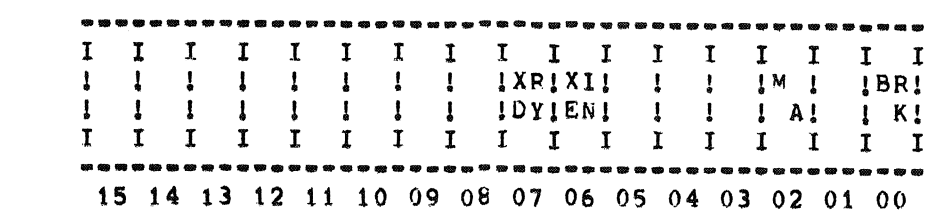
176170

2. BIT01 (Data terminal Ready) state is not defined after power-up.

3. On DL11-C or -D options bits 15, 14, 13, 12, 10, 5, 3, 2, and 1 are not used.

4. On DL11-C and -D options bit<00> is 'RDR ENB' . On a DL11-E option this bit is unused.

b. The following is a picture view of a DL11-E transmitter control status register, which will show bit assignments and definitions, to provide a handy reference:



Bit assignments are defined as follows:

BIT07	Transmitter Ready	1. Set when XDBR can accept another character. Will initiate an interrupt if BIT06 also set. 2. Also set by INIT 3. Cleared by loading XDBR
BIT06	Transmitter Interrupt Enable	1. When set, allows interrupt providing BIT07 is set. 2. Cleared by INIT 3. ***READ/WRITE BIT***
BIT02	Maintenance	1. When set, disables serial line input to receiver & connects XMIT output to receiver input which disconnects external device input. This forces receiver to run at xmitter speed. 2. Cleared by INIT 3. ***READ/WRITE BIT***
BIT00	Break	1. When set, transmits a continuous space to external device 2. Cleared by INIT 3. ***READ/WRITE BIT***

!! NOTE !!

DL11-C and -D options are the same.

c. The following is a picture view of the DL11-E receiver and transmitter data buffer registers, to provide a handy reference.

```
-------------------------------------------------
I  I  I  I  I  I  I  I  I  I  I  I  I  I  I  I  I
!ER!OR!FR!PE!  !  !  !  !  !  !D !A !T !A !  !  !
I  I  I  I  I  I  I  I  I  I  I  I  I  I  I  I  I
-------------------------------------------------
 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
```

Bit assignments are defined as follows:

BITS 07-00	Data	1. Character to be transferred to external device. 2. If character less than 8 bits it must be loaded right justified. 3. ***WRITE ONLY BITS***
BIT 15	Error	1. ***READ ONLY BIT*** 2. Cleared by error removal
BIT 14	Overrun	1. Same as BIT 15 2. RCVR DONE not cleared
BIT 13	Framing	1. Same as BIT 15 2. No valid STOP bit
BIT 12	parity	1. Same as BIT 15 2. Parity other than expected

NOTE: Bits<15:12> only appear in the rcvr data buffer DL11-C and -D options are the same.

12.0 SUBROUTINE SUMMARIES

12.1 DLADDR

This routine sets up the following:

RCSR - Receiver Status Register
RBUF - Receiver Buffer Register
XCSR - Transmitter Status Register
XBUF - Transmitter Buffer Register

The setup is done, initially, in response to user reply to 1st device he wants tested, and thereafter, at the end of a program pass to allow cycling thru all devices for multiple device testing (if required).

12.2 $EOP

This routine is supplied by MAINDEC-11-DZQACC3, the PDP-11 Maindec 'SYSMAC' utility package. This routine is responsible for the following:

a. Incrementing the pass number ($PASS)
b. Typing 'END PASS # XXX' (where 'XXX' is a decimal value)

NOTE

If multiple device testing is being conducted, then $PASS is only incremented after testing of all devices has transpired (multiple testing). Therefore, e.g., If 10 devices have been tested then 'END PASS #1' would be typed out; 'END PASS #2' would be typed out after the 10 devices have once again been tested by the program, etc.

c. Goes to a monitor, if there is one
d. If there is no monitor transfers control back to beginning of the program.

12.3 $SCOPE

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package.

This routine is entered before and after every subtest to ascertain the following conditions:

a. Loop on test just executed?
This condition is enabled when SW<14> is set to a '1'.

b. Loop on test if an error has occurred during the test?
This condition is enabled when SW<09> is set to a '1'.

c. Loop on test specified by test no. appearing in SWR<7:0>?
This condition is enabled when SW<08> is set to a '1'.

d. Inhibit subtest iterations?
This condition is enabled when SW<11> is set to a '1'.

12.4 $ERROR

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package.

This routine handles the following reactions to an error when an error is encountered:

a. 'HALT' on Error?
   This condition is enabled when SW<15> is set to a '1'.

b. Ring 'Bell' on Error?
   This condition is enabled when SW<10> is set to a '1'.

c. Loop on Error
   This condition is enabled when SW<09> is set to a '1'.

d. Inhibit Error Typeouts
   This condition is enabled when SW<13> is set to a '1'.

NOTE

On encountering an error while executing the program this routine will transfer control to '$ERRTYP' routine shown below (presumes 'HALT' on error SW<15> not set).

12.5 $ERRTYP

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package.

This routine handles the information for error message typeouts as follows:

This routine uses the 'Item Control Byte' ($ITEMB) to determine which error is to be reported. It then obtains, from the 'error Table' ($ERRTB) the addresses of where the information, for printout, is stored; and causes the appropriate information concerning the error to be printed out.

Note: 1. The variable '$ITEMB' is supplied by .$CMTAG, a 'SYSMAC' utility package routine.

2. The 1st address '$ERRTB' for location of 'error table' information is also supplied by .$CMTAG.

3. If the '$ITEMB' value is zero(0), then only a program counter (PC) is printed out. It has no label, it is a pure number.

12.6 $TYPOC

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. This routine is used for all octal typeouts (16 bit values) throughout the program.

12.7 $TYPDS

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. This routine is used to type a decimal value at the end of a pass of the program of the form 'END PASS # XXX' where 'XXX' is the decimal value.

12.8 $RDCHR, $RDLIN, $RDOCT

These routines are supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. Their uses are as follows:

a. $RDCHR - Handles a single character coming in from the TTY. The character is placed on top of the stack for future use.

b. $RDLIN - Handles a string of characters coming in from the TTY. The address of the 1st character is placed on top of the stack for future use.

c. $RDOCT - Handles an octal number coming in from the $RDDEC 104420 TTY decimal # input TTY. Low order bits are stored on top of the stack; high order bits are stored in location $HIOCT. $HIOCT is supplied by .$CMTAG, a 'SYSMAC' package utility routine.

12.9 $TYPE

This routine is supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. This routine is used to type ASCII messages (which must terminate with a 0 byte) as well as all other forms of typed information. The routine is also responsible for inserting a number of fill characters after a line feed.

Note: 1. $NULL contains the character to be used as fill.

2. $FILLS contains the number of filler characters req'd.

3. $FILLC contains the character to fill after.

4. The above three(3) variables are supplied by ,$CMTAG, a 'SYSMAC' package utility routine.

12.10 $TRAP, $TRPAD

These routines are supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. The '$TRAP' routine will strip off the lower byte of a trap instruction and use it to index thru the trap table ($TRPAD) for the starting address of the desired routine. Then using the address obtained it will then transfer program control to that routine.

The following table defines all routines in the program called by a 'TRAP' instruction by showing their 'TRAP' equivalences -

$TYPE	104400	TTY typeout routine
$TYPOC	104402	Type octal # (with leading zeros)
$TYPOS	104404	Type octal # (no leading zeros)
$TYPON	104406	Type octal # (per last character method)
$TYPDS	104410	Type decimal # (with sign)
$RDCHR	104412	TTY character input
$RDLIN	104414	TTY string input
$RDOCT	104416	TTY octal # input

12.11 $PWRDN, $PWRUP

These routines are supplied by MAINDEC-11-DZQAC-C3, the PDP-11 Maindec 'SYSMAC' utility package. These routines handle the 'Power Down and Up' sequence. The program may be power failed when running; however, use caution in turning power off/on while the power fail message is being typed - it may cause stack overflow.

NOTE

When power returns the program will automatically start itself over at the beginning.

12.12 XINT, RINT

XINT - This is the transmitter interrupt service routine for 256(10) byte block transfers.

RINT - This is the receiver interrupt service routine for 256(10) byte block transfers.

12.13 DELAY, STALL, DATCHK, TIMERX, TIMETX

These routines are all used by programs 2, 3, 4 and 5. Programs 2 through 5 are the 'Special' user interaction routines which will be defined later in this document. The above routine uses are as follows:

a. DELAY - This routine is used by all the utility programs to wait a no. of milliseconds between character transfers as specified by the user.

b. STALL - This routine is used by program #4 and will allow a random no. of milliseconds to transpire before a transmission of a character. This routine is activated based on user response.

c. DATCHK - This routine is used by program #4 and will check for correct expected and received data after character transmission as well as any error bit conditions.

d. TIMERX + TIMETX -
These two(2) routines are used by program #4 to verify the 'DONE' bit after both transmitter and receiver operations.

12.14 SUERR1, SUER2

These two(2) routines are used throughout the program to set up the error information for 'Error Reporting' before the 'Error Report' call is made. 'Error Report' calls appear throughout the program in the form "ERROR + XX" where 'XX' indicates the particular error table (ERRTB:) entry used by the Error Service Routine.

12.15 PRIME

This routine is used to set up the data buffers an the device under test for each 256(10) byte block transfer.

12.16 CLDLBF

This routine is used in conjunction with routine 'PRIME' to clear input and output buffers before data transfers.

12.17 LDOUT1, LDOUT2, LDOUT3, LDOUT4

The routines are all used for set up and loading purposes as follows:

a. LDOUT1 - is called to set up the 'null-del-null' pattern
b. LDOUT2 - is called to load an ascending binary count pattern
c. LDOUT3 - is called to load a descending binary count pattern
d. LDOUT4 - is called to load a complementing worse case pattern

12.18 CHKDAT

This routine is used to check for data compare errors in 256(10) byte block transfers.

12.19 BUSERR, RSVERR

These two(2) routines are used to service 'Unexpected' bus error and reserved instruction traps, respectively.

12.20 TRPCOM

This routine is used to set up and report the information concerning 'Unexpected' bus error and reserved instruction traps. This routine is used in conjunction with routines 'BUSERR' and 'RSVERR' described above.

13.0 MISCELLANEOUS

a. The stack pointer is initially set to 1100.

b. The parity bit is not covered.

14.0 USER SELECTION PROGRAMS

14.1 Program #2 Description

This utility program will allow the following:

a. Selection of transmitter data buffer

b. Selection of a character for continuous transfer

c. Selection of an expiration time in milliseconds between each transmitter data buffer character transfer

d. A tight scope loop lock on a specific character

The program relies on user response (via TTY) to specific questions as described below:

a. What is the transmitter data buffer address?

The user should respond by typing an address in the range 175616 to 176176 and follow it with a 'carriage return' at which time the program will validate what was typed to see if -

1. The value typed is within the correct range

2. The value typed is an 'even' address, so as not to cause a 'Bus timeout' when referenced, and

3. Then checks to see if the device associated with the value typed is indeed present

NOTE

If either of the three(3) above conditions are not met the program will type a question mark (?), reiterate the initial question, and wait for a 'new' user response.

b. What is the character to be transmitted (octal ASCII e.g., A=101)?

The user should respond by typing an octal ASCII value, for the character desired and follow it with a 'carriage return'.

c. What is the desired msec. delay (octal e.g., 10=8(10))?

The user should respond by typing an octal value for the desired no. of msec. delay and follow it with a 'carriage return'.

E.G. - If user desired 16 msec. delay between each character transfer he should type '20'.

d. At this point the program will loop continuously sending the character specified, with the desired msec. delay between each character transmission.

14.2 Program #3 Description

This utility program will allow the following:

a. Selection of TRANSMITTER data buffer

b. Selection of a character for continuous transfer IN MAINTENANCE MODE.

c. Selection of an expiration time in milliseconds between each TRANSMITTER data buffer character transfer

d. A tight scope loop lock on a specific character

The program relies on user response (via TTY) to specific questions as described below:

a. What is the TRANSMITTER data buffer address?

The user should respond by typing an address in the range 175616 to 176176 and follow it with a 'carriage return' at which time the program will validate what was typed to see if -

1. The value typed is within the correct range

2. The value typed is an 'even' address, so as not to cause a 'Bus timeout' when referenced, and

3. Then checks to see if the device associated with the value typed is indeed present

NOTE

If either of the three(3) above conditions are not met the program will type a question mark (?), reiterate the initial question, and wait for a 'new' user response.

b. What is the character to be transmitted (octal ASCII e.g., A=101)?

The user should respond by typing an octal ASCII value, for the character desired and follow it with a 'carriage return'.

c. What is the desired msec. delay (octal e.g., 10=8(10))?

The user should respond by typing an octal value for the desired no. of msec. delay and follow it with a 'carriage return'.

E.G. - If user desired 16 msec. delay between each character transfer he should type '20'.

d. At this point the program will loop continuously sending the character specified, with the desired msec. delay

between each character transmission.

14.3 Program #4 Description

This utility program will allow the following:

a. Selection of a transmitter data buffer

b. Selection of a single character to be sent, received and checked with maintenance bit set.

The program relies on user response (via TTY) to specific questions as described below:

a. What is the transmitter data buffer address?

The user should respond by typing an address in the range 175616 to 176176 and follow it with a 'carriage return' at which time the program will validate what was typed to see if -

1. The value typed is within the correct range

2. The value typed is an 'even' address, so as not to cause a 'Bus timeout' when referenced, and

3. Then checks to see if the device associated with the value typed is indeed present.

NOTE

If either of the three(3) above conditions are not met the program will type a question mark (?), reiterate the initial question, and wait for a 'new' user response.

b. Is a random wait time (msec.) desired 1/0=yes/no?

The user should respond as asked and follow it with a 'carriage return'.

c. What is the character to be transmitted (octal ASCII e.g. A=101)?

The user should respond by typing an octal ASCII value, for the character desired and follow it with a 'carriage return'.

d. At this point the program will loop continuously sending the character specified, with a random msec. delay between each character transmission. Between each transmission, 'RCVR' & 'XMITTER' done bits will be

verified, as well as checks for correct data and any error bit conditions.

NOTE

If user response to Item b. (directly above) was a '0' or a plain 'carriage return' then there is no delay between character transmissions.

14.4 Program #5 Description

This utility program will allow user parameters for running a binary count in maintenance mode.

The program relies on user response (via TTY) to specific questions as described below:

a. What is the transmitter data buffer address?

The user should respond by typing an address in the range 175616 to 176176 and follow it with a 'carriage return' at which time the program will validate what was typed to see if -

1. The value typed is within the correct range

2. The value typed is an 'even' address, so as not to cause a 'Bus timeout' when referenced, and

3. Then checks to see if the device associated with the value typed is indeed present.

NOTE

If either of the three(3) above conditions are not met the program will type a question mark (?), reiterate the initial question, and wait for a 'new' user response.

b. Is a random wait time (msec.) desired 1/0=yes/no?

The user should respond as asked and follow it with a 'carriage return'.

c. At this point the program will loop continuously sending binary characters, with a random msec. delay between each character transmission. Between each transmission, 'RCVR' & 'XMITTER' done bits will be verified, as well as checks for correct data and any error bit conditions.

NOTE

If user response to Item B. (directly above) was a '0' or a plain 'carriage return' then there is no delay between character transmissions.

15.0 PROGRAM FUNCTIONAL FLOW CHARTS

16.0 PROGRAM LISTING

```
                                ;NLIST  CND,MD,MC
                                ;LIST   ME,SEQ,BIN
          167400                $SWR=167400
                                ;ENABLE ABS

                                ;TITLE  MAINDEC-11-DZDLC-B
                                ;*COPYRIGHT (C) 1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY E. CROWLEY/B. BURGESS
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
          000001                $TN=1


                                ;SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            /C OR /D MODEL
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                ;*
                                ;*         0            CREATION OF DEVICE/S TABLE
                                ;*                      OR CHANGE CHARACTER LENGTH

                                ;SBTTL  TRAP CATCHER

          000000                        .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
          000174                        .=174
000174  000000                 DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                 SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                ;SBTTL  STARTING ADDRESS(ES)
000200  000137  001446                  JMP     @#BEGIN ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  006344                  JMP     @#PRG2          ;JUMP TO USER PROGRAM NO. 2
000210  000137  006604                  JMP     @#PRG3          ;JUMP TO USER PROGRAM NO. 3
000214  000137  007054                  JMP     @#PRG4          ;JUMP TO USER PROGRAM NO. 4
000220  000137  007446                  JMP     @#PRG5          ;JUMP TO USER PROGRAM NO. 5

          000052                        .=52            ;INFORMATION LOCATION FOR ACT11
000052  000000                        .WORD   0       ;NO POWER FAIL REQUIRED <BIT15=0>
                                                        ;IS NOT MEMORY SIZE DEPENDENT <BIT14=0>
                                                        ;IS SUITABLE FOR AUTOMATIC OPERATION <BIT13=0>
```



```
                                ;SBTTL  BASIC DEFINITIONS

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
          001100                STACK=  1100
                                ;EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                                ;EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                                ;*MISCELLANEOUS DEFINITIONS
          000011                HT=     11              ;;CODE FOR HORIZONTAL TAB
          000012                LF=     12              ;;CODE FOR LINE FEED
          000015                CR=     15              ;;CODE FOR CARRIAGE RETURN
          000200                CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
          177776                PS=     177776          ;;PROCESSOR STATUS WORD
                                ;EQUIV  PS,PSW
          177774                STKLMT= 177774          ;;STACK LIMIT REGISTER
          177772                PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
          177570                DSWR=   177570          ;;HARDWARE SWITCH REGISTER
          177570                DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                                ;*GENERAL PURPOSE 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                R6=     %6              ;;GENERAL REGISTER
          000007                R7=     %7              ;;GENERAL REGISTER
          000006                SP=     %6              ;;STACK POINTER
          000007                PC=     %7              ;;PROGRAM COUNTER

                                ;*PRIORITY LEVEL DEFINITIONS
          000000                PR0=    0               ;;PRIORITY LEVEL 0
          000040                PR1=    40              ;;PRIORITY LEVEL 1
          000100                PR2=    100             ;;PRIORITY LEVEL 2
          000140                PR3=    140             ;;PRIORITY LEVEL 3
          000200                PR4=    200             ;;PRIORITY LEVEL 4
          000240                PR5=    240             ;;PRIORITY LEVEL 5
          000300                PR6=    300             ;;PRIORITY LEVEL 6
          000340                PR7=    340             ;;PRIORITY LEVEL 7

                                ;*"SWITCH REGISTER" SWITCH 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
          000200                SW07=   200
          000100                SW06=   100
          000040                SW05=   40
          000020                SW04=   20
          000010                SW03=   10
          000004                SW02=   4
```

```
                        000002          SW01=   2
                        000001          SW00=   1
                                        .EQUIV  SW09,SW9
                                        .EQUIV  SW08,SW8
                                        .EQUIV  SW07,SW7
                                        .EQUIV  SW06,SW6
                                        .EQUIV  SW05,SW5
                                        .EQUIV  SW04,SW4
                                        .EQUIV  SW03,SW3
                                        .EQUIV  SW02,SW2
                                        .EQUIV  SW01,SW1
                                        .EQUIV  SW00,SW0

                                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
                        100000          BIT15=  100000
                        040000          BIT14=  40000
                        020000          BIT13=  20000
                        010000          BIT12=  10000
                        004000          BIT11=  4000
                        002000          BIT10=  2000
                        001000          BIT09=  1000
                        000400          BIT08=  400
                        000200          BIT07=  200
                        000100          BIT06=  100
                        000040          BIT05=  40
                        000020          BIT04=  20
                        000010          BIT03=  10
                        000004          BIT02=  4
                        000002          BIT01=  2
                        000001          BIT00=  1
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                        000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        000014          TBITVEC=14              ;;"T" BIT
                        000014          TRTVEC= 14              ;;TRACE TRAP
                        000014          BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        000020          IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        000024          PWRVEC= 24              ;;POWER FAIL
                        000030          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        000034          TRAPVEC=34              ;;"TRAP" TRAP
                        000060          TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        000064          TPVEC=  64              ;;TTY PRINTER VECTOR
                        000240          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
```



```
                                        .SBTTL  COMMON TAGS

                                        ;;*************************************************************
                                        ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                        ;*USED IN THE PROGRAM.

                        001100                  .=1100
001100                                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102  000                             $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000                             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000                          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                             $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115  001                             $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000                          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                                  .WORD   0
001134  000                             $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135  000                             $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                                  .WORD   0
001140  177570                          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570                          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560                          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562                          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564                          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000                             $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002                             $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012                             $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000                             $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000                          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                                        ;;WHICH  ($REG0) WAS OBTAINED
001162  000000                          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000                          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000                          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000                          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000                          $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000                          $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001176  000000                          $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001200  000000                          $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001202  000000                          $TMP0:  .WORD   0               ;;USER DEFINED
001204  000000                          $TMP1:  .WORD   0               ;;USER DEFINED
001206  000000                          $TMP2:  .WORD   0               ;;USER DEFINED
001210  000000                          $TMP3:  .WORD   0               ;;USER DEFINED
001212  000000                          $TMP4:  .WORD   0               ;;USER DEFINED
001214  000000                          $TMP5:  .WORD   0               ;;USER DEFINED
001216  000000                          $TMP6:  .WORD   0               ;;USER DEFINED
001220  000000                          $TMP7:  .WORD   0               ;;USER DEFINED
001222  000000                          $TMP10: .WORD   0               ;;USER DEFINED
```

```
001224  000000                  $TMP11: .WORD   0               ;;USER DEFINED
001226  000000                  $TMP12: .WORD   0               ;;USER DEFINED
001230  000000                  $TMP13: .WORD   0               ;;USER DEFINED
001232  000000                  $TMP14: .WORD   0               ;;USER DEFINED
001234  000000                  $TMP15: .WORD   0               ;;USER DEFINED
001236  000000                  $TMP16: .WORD   0               ;;USER DEFINED
001240  000000                  $TMP17: .WORD   0               ;;USER DEFINED
001242  000000                  $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001244  000000                  $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001246  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001252     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
001253     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001254  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;**************************************************************

                                ;THE FOLLOWING TAG(S) ARE USER SUPPLIED BY CALLING THE MACRO
                                ;'MORETAGS' AS ONE OF THE ARGUMENTS TO THE SYSMAC ROUTINE .$CMTAG

001256  000000                  TABFLG: .WORD   0               ;AN INDICATOR TO SHOW THAT THE
                                                                ;INFORMATION FOR MULTIPLE DEVICE
                                                                ;TESTING HAS ALREADY TRANSPIRED
                                                                ;& 'MAINDEC' NAME HAS BEEN PRINTED
001260  000000                  DLBASE: .WORD   0               ;STORAGE & WORKING LOCATION FOR A DEVICE
                                                                ;RECEIVER STATUS REGISTER ADDRESS
001262  000000                  KEEPAD: .WORD   0               ;STORAGE LOCATION FOR THE 1ST
                                                                ;DEVICE RCSR FROM WHICH
                                                                ;'BASEADD' IS RESTORED AT THE
                                                                ;END OF A COMPLETE PROGRAM PASS.
001264  000000                  BASEADD:.WORD   0               ;STORAGE LOCATION WHICH HOLDS
                                                                ;THE RCSR ADDRESS OF THE 'NEXT'
                                                                ;DEVICE DURING MULTIPLE TESTING
001266  000000                  KEEPIV: .WORD   0               ;STORAGE LOCATION FOR THE 1ST
                                                                ;DEVICE RECEIVER VECTOR FROM
                                                                ;WHICH 'BASEIV' IS RESTORED AT THE
                                                                ;END OF A COMPLETE PROGRAM PASS
001270  000000                  BASEIV: .WORD   0               ;STORAGE LOCATION WHICH HOLDS
                                                                ;THE VECTOR ADDRESS OF THE 'NEXT'
                                                                ;DEVICE DURING MULTIPLE TESTING
001272  000000                  MULTD:  .WORD   0               ;FLAG TO INDICATE TO 'END OF PASS'
                                                                ;ROUTINE THAT MULTIPLE DEVICE
                                                                ;TESTING IS BEING CONDUCTED
                                                                ;0=NO, 1=YES
001274  000000                  ACTREG: .WORD   0               ;THIS IS THE DEVICE ACTIVE REGISTER
                                                                ;A BIT IS SET (STARTING AT
                                                                ;BIT0)FOR EACH CONTIGUOUS DEVICE
                                                                ;(A MAX. OF 16) THAT IS TO UNDERGO
                                                                ;TESTING.  THIS LOCATION IS
                                                                ;AUTOMATICALLY FILLED BASED ON
                                                                ;USER RESPONSE TO PROGRAM QUESTIONS
001276  000000                  ROTADD: .WORD   0               ;A ROTATING POINTER TO SIGNAL
                                                                ;THE LAST DEVICE TESTED (IF
                                                                ;MULTIPLE DEVICE TESTING WAS BEING
                                                                ;DONE) IF LESS THAN A FULL COMPLE-
                                                                ;MENT OF DEVICES (16)WAS SELECTED
001300  000000                  LASTADD:.WORD   0               ;STORAGE LOCATION FOR THE
                                                                ;RCSR ADDRESS OF THE LAST DEVICE
```



```
                                                                ;TESTED (IF MULTIPLE DEVICE
                                                                ;TESTING WAS SELECTED BY USER)
001302  000000                  DLPPI:  .WORD   0               ;STORAGE LOCATION FOR THE DEVICE
                                                                ;INTERRUPT PRIORITY LEVEL
001304  000000                  LESS1:  .WORD   0               ;THE PRIORITY LEVEL THE CPU
                                                                ;MUST BE AT TO ALLOW DEVICE INTERRUPTS.
                                                                ;THIS WILL BE 1 LEVEL LESS THAN
                                                                ;THE DEVICE LEVEL (BASED ON &
                                                                ;CALCULATED FROM USER RESPONSE TO
                                                                ;DEVICE PRIORITY LEVEL QUESTION)
001306  177740                  STLMSK: 177740                  ;THIS MASK IS USED BY THE 'STALL'
                                                                ;ROUTINE WHICH WAITS A RANDOM NO.
                                                                ;OF MILLISECONDS.  ITS' USE PREVENTS
                                                                ;A STALL > 37 MSEC.  THIS LOCATION
                                                                ;HOWEVER, CAN BE PATCHED BY THE
                                                                ;USER TO ALLOW LARGER 'STALLS'.

                                ;END OF USER SUPPLIED TAG(S)
```

```
                                        .SBTTL  ERROR POINTER TABLE

                                        ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                        ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                        ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                        ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                        ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                        ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                        ;*      DH              ;;POINTS TO THE DATA HEADER
                                        ;*      DT              ;;POINTS TO THE DATA
                                        ;*      DF              ;;POINTS TO THE DATA FORMAT


001310                                  $ERRTB:

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 1

001310  015146                                 EM1             ;"DL11 REGISTER REFERENCE CAUSED TIMEOUT"
001312  015215                                 DH1             ;"  (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  "
001314  015274                                 DT1             ; (R7)  (PSW)  (R6)  (R0)  (R1)  (R2)
001316  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 2

001320  015312                                 EM2             ;" DL11 REGISTER ERROR "
001322  015336                                 DH2             ;"  (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B  "
001324  015434                                 DT2             ;" (R7)  (PSW)  (R6)  (R0)  (R1)  (R2)  (R3)  (R4)  "
001326  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 3

001330  015456                                 EM3             ;" DL11 DATA COMPARE ERROR "
001332  015506                                 DH3             ;" (PC)  (PS)  (SP)  TEST  WASADR  SHBADR  WAS  S/B  "
001334  015604                                 DT3             ;"  (R7)  (PSW)  (R6)  (R0)  (R1)  (R2)  (R3)  (R4)  "
001336  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 4

001340  015626                                 EM4             ;" UNEXPECTED TRAP TO VECTOR AT LOCATION XXX "
001342  015700                                 DH4             ;"  (PC)  (PS)  (SP)  TEST  "
001344  015736                                 DT4             ;" (R7)  (PSW)  (R6)  (R0)  "
001346  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 5

001350  015750                                 EM5             ;" DL11 SOFT ERROR (PARITY,FRAMING, OR OVERRUN)  "
001352  016025                                 DH5             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  (REG)  "
001354  016114                                 DT5             ;"  (R7)  (PSW)  (R6)  (R0)  (R1)  (R2)  (R3)  "
001356  000000                                 0

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 6

001360  015146                                 EM1             ;"DL11 REGISTER REFERENCE CAUSED TIMEOUT"
001362  016134                                 DH6             ;"  (PC)    (PS)    (SP)    REGADR"
001364  016174                                 DT6             ;$ERRPC,$TMP0,$REG6,$REG2
```



```
001366  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 7

001370  015750                                 EM5             ;" DL11 SOFT ERROR (PARITY,FRAMING, OR OVERRUN) "
001372  016206                                 DH7             ;" (PC)  DEVADR  REGADR  (REG)"
001374  016246                                 DT7             ;$ERRPC,$REG1,$REG2,$REG3
001376  000000                                 0               ;PRINT ALL OCTAL

                                        ;ERROR TABLE ITEM FOR ERROR MESSAGE 10

001400  015456                                 EM3             ;" DL11 DATA COMPARE ERROR "
001402  016260                                 DH10            ;" (PC)  DEVADR  REGADR  (REG)  S/B"
001404  016326                                 DT10            ;$ERRPC,$REG1,$REG2,$REG3,$REG4
001406  000000                                 0               ;PRINT ALL OCTAL

                                        ;;*************************************************************
                                                ;DL11 DEFINITIONS
                                        ;;*************************************************************

001410  175610                                 DLRCSR: 175610          ;CONTAINS ADDRESS OF RCVR CSR
001412  175612                                 DLRDBR: 175612          ;CONTAINS ADDRESS OF RCVR DBR
001414  175614                                 DLXCSR: 175614          ;CONTAINS ADDRESS OF XMIT CSR
001416  175616                                 DLXDBR: 175616          ;CONTAINS ADDRESS OF XMIT DBR
001420  000300                                 DLVECT: 300             ;CONTAINS VECTOR ADDRESS OF CURRENT DL11
001422  000000                                 XFLG0:  0               ;FLAG FOR HARD XMIT ERRORS
001424  000000                                 RFLG0:  0               ;FLAG FOR HARD RCVR ERRORS
001426  000000                                 RFLG1:  0               ;FLAG FOR SOFT RCVR ERRORS
001430  000000                                 RTRY:   0               ;COUNTS NO. OF RETRIES ON SOFT ERRORS
001432  000000                                 OPTR:   0               ;CONTAINS POINTER TO OUTPUT BUFFER
001434  000000                                 IPTR:   0               ;CONTAINS POINTER TO INPUT BUFFER
001436  000000                                 LDOUT:  0               ;CONTAINS POINTER TO LOAD BUFFER ROUTINE
001440  000000                                 TIMR1:  0               ;TIMERS FOR 256. BYTE BLOCK TRANSFERS
001442  000000                                 TIMR2:  0
001444  000000                                 INTFLG: 0               ;SOFTWARE INTR. FLAG



001446  000240                                 BEGIN:  NOP                     ;PROGRAM WILL START HERE
                                                .SBTTL  INITIALIZE THE COMMON TAGS
                                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
001450  012706  001100                                 MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
001454  005026                                         CLR     (R6)+           ;;CLEAR MEMORY LOCATION
001456  022706  001140                                 CMP     #SWR,R6 ;;DONE?
001462  001374                                         BNE     .-6             ;;LOOP BACK IF NO
001464  012706  001100                                 MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                                ;;INITIALIZE A FEW VECTORS
001470  012737  010476  000020                         MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
001476  012737  000340  000022                         MOV     #340,@#IOTVEC+2 ;;LEVEL 7
001504  012737  010746  000030                         MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
001512  012737  000340  000032                         MOV     #340,@#EMTVEC+2 ;;LEVEL 7
001520  012737  013066  000034                         MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001526  012737  000340  000036                         MOV     #340,@#TRAPVEC+2;LEVEL 7
001534  012737  013146  000024                         MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001542  012737  000340  000026                         MOV     #340,@#PWRVEC+2 ;;LEVEL 7
```

```
  410  001550  005067  177466                CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
  411  001554  005067  177464                CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
  412  001560  112767  000001  177327        MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
  413  001566  012767  001566  177312        MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
  414  001574  012767  001574  177306        MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
  415                                    ;;SIZE FOR A HARDWARE SWITCH REGISTER, IF NOT FOUND OR IT IS
  416                                    ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
  417  001602  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
  418  001606  012737  001642  000004        MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
  419  001614  012767  177570  177316        MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
  420  001622  012767  177570  177312        MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
  421  001630  022777  177777  177302        CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
  422  001636  001012                        BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
  423                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
  424  001640  000403                        BR      65$             ;;BRANCH IF NO TIMEOUT
  425  001642  012716  001650        64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
  426  001646  000002                        RTI
  427  001650  012767  000176  177262 65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
  428  001656  012767  000174  177256        MOV     #DISPREG,DISPLAY
  429  001664  012637  000004        66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
  430
  431  001670  005067  177376                CLR     MULTD           ;CLEAR MULTIPLE DEVICE
  432                                                                ;TESTING FLAG
  433  001674  005067  177356                CLR     TABFLG          ;CLEAR TABLE CREATION FLAG
  434  001700  012767  000010  177326        MOV     #8.,$TMP15      ;SET CHARACTER LENGTH DESIGNATOR
  435                                                                ;FOR 8 BITS --- THIS IS THE DEFAULT
  436                                                                ;LENGTH ASSUMED BY THE PROGRAM
  437                                                                ;UNLESS THE USER CHANGES IT THRU
  438                                                                ;THE QUESTION AND ANSWER CYCLE
  439                                                                ;INITIATED BY SETTING SW<0> TO A 1
  440  001706  012767  000200  177366        MOV     #200,DLPRI      ;SET STANDARD PRIORITY LEVEL
  441                                                                ;FOR DEVICE
  442  001714  032777  000400  177216        BIT #SW8,@SWR           ;IS THE 'LOOP ON TEST' SWITCH SET?
  443  001722  001411                        BEQ     1$              ;BRANCH IF NOT
  444                                    ;
  445                                    ;IF THE 'LOOP ON TEST' SWITCH WAS SET WE WILL TAKE THE NEXT BRANCH
  446                                    ;INSTRUCTION THUS BYPASSING TABLE CREATION
  447                                    ;
  448                                    ;IF THE USER DESIRED TO LOOP ON A TEST OF OTHER THAN THE DEFAULT DEVICE
  449                                    ;THEN HE SHOULD HAVE PREVIOUSLY FILLED THE FOLLOWING PROGRAM LOCATIONS
  450                                    ;WITH THE DESIRED DEVICE REGISTER VALUES:
  451                                    ;
  452                                    ;                       ******************************
  453                                    ;               UNDER   ;DL11 DEFINITIONS              ABOVE
  454                                    ;                       ******************************
  455                                    ;
  456                                    ;       DLRCSR:         PATCH THE ADDRESS OF THE RCVR CSR
  457                                    ;       DLRDBR:         PATCH THE ADDRESS OF THE RCVR DBR
  458                                    ;       DLXCSR:         PATCH THE ADDRESS OF THE XMIT CSR
  459                                    ;       DLXDBR:         PATCH THE ADDRESS OF THE XMIT DBR
  460                                    ;       DLVECT:         PATCH THE VECTOR ADDRESS OF THIS DL11
  461                                    ;
  462  001724  104401  016651                TYPE,   STMES           ;PRINT OUT 'MAINDEC' NAME
  463  001730  104401  020673                TYPE,   FAILSA          ;TYPE FAILSAFE MESSAGE
  464  001734  104000                        ERROR   +0              ;TYPE OUT THE PC VALUE
  465  001736  104401  021251                TYPE,   PCMSG           ;FOLLOWED BY =PC
```



```
  466  001742  000000                        HALT                    ;WAIT FOR USER TO RESPOND
  467  001744  000443                        BR      ONCE            ;GO TO TEST DEVICE PATCHED IN BY USER
  468  001746                         1$:
  469                                    ;ENSURE THAT IF MULTIPLE DEVICE TESTING WAS BEING DONE
  470                                    ;AND THE USER 'HALTED' THE PROGRAM BEFORE ALL DEVICES
  471                                    ;WERE COMPLETED AND WENT BACK TO 'LOAD ADDRESS 200'
  472                                    ;TO RESTART THE PROGRAM THAT AS A BARE MINIMUM
  473                                    ;HE CAN RUN THE DEFAULT DEVICE (1ST RECEIVER
  474                                    ;STATUS REGISTER ADDRESS 175610)
  475                                    ;NOTE:  IF THIS IS NOT SUITABLE THE USER WILL
  476                                    ;       HAVE TO SET SW0=1 (OR UP) IN ORDER TO
  477                                    ;       RECREATE THE TABLE HE DESTROYED FROM
  478                                    ;       ABOVE
  479  001746  012767  175610  177304        MOV     #175610,DLBASE  ;1ST POSSIBLE RECEIVER CSR
  480  001754  004767  006110                JSR     PC,DLADDR       ;FORM DL ADDRESSES FOR
  481                                                                ;1ST POSSIBLE DEVICE
  482  001760  012767  000300  177432        MOV     #300,DLVECT     ;1ST POSSIBLE INTERPUPT VECTOR
  483  001766  005067  177264                CLR     TABFLG          ;CLEAR TABLE CREATION FLAG
  484
  485  001772  012706  001100        RESTRT: MOV     #STACK,SP               ;SET UP STACK POINTER
  486  001776  012737  015034  000004        MOV     #BUSERR,@#ERRVEC        ;SET UP BUS ERROR VECTOR
  487  002004  012737  000340  000006        MOV     #340,@#ERRVEC+2
  488  002012  012737  015060  000010        MOV     #RSVERR,@#RESVEC        ;SET UP RSVD INSTR. VECTOR
  489  002020  012737  000340  000012        MOV     #340,@#RESVEC+2
  490
  491                                    ;THIS  NEXT SECTION WILL CHECK TO SEE IF MULTIPLE DEVICE TESTING
  492                                    ;WILL TAKE PLACE I.E.-
  493                                    ;       A)  HAS FREE RUNNING DEVICE TABLE ALREADY BEEN CREATED, AND/OR
  494                                    ;       B)  IF IT HAS, DOES USER WISH TO CHANGE IT, OR DO WE TEST DEFAULT DEVICE?
  495  002026  105767  177224                TSTB    TABFLG          ;HAS TABLE CREATION BEEN PERFORMED?
  496  002032  001010                        BNE     ONCE            ;BRANCH IF YES TO SKIP 'MAINDEC
  497                                                                ;TITLE' MESSAGE
  498  002034  104401  016651                TYPE    ,STMES          ;OTHERWISE, PRINT OUT 'MAINDEC'
  499                                                                ;NAME
  500  002040  105167  177212                COMB    TABFLG          ;IF TABLE CREATION HAS NOT BEEN
  501                                                                ;PERFORMED, THEN SET FLAG, AND DO SO
  502  002044  032777  000001  177066        BIT     #SW0,@SWR       ;THE PROGRAM HAS OBVIOUSLY BEEN
  503                                                                ;RESTARTED - DOES USER WISH TO
  504                                                                ;RESELECT VECTOR AND CONTROL REGISTER
  505                                                                ;ADDRESSES I.E. - CREATE A NEW TABLE?
  506  002052  001012                        BNE     GO              ;BRANCH IF YES
  507  002054  005077  177334        ONCE:   CLR     @DLXCSR         ;CLEAR OUT BOTH CSR'S
  508  002060  005077  177324                CLR     @DLRCSR
  509  002064  005777  177322                TST     @DLRDBR         ;FLUSH RCVR "DONE" BIT
  510  002070  005777  177316                TST     @DLRDBR
  511  002074  000167  000670                JMP     TST1            ;OTHERWISE, GO WITH EXISTING
  512                                                                ;TABLE OR NOT USE ANY TABLE AT
  513                                                                ;ALL WHICHEVER THE CASE MAY BE
  514                                                                ;(DEFAULT CASE IS 1ST POSSIBLE
  515                                                                ;DEVICE)
  516                                    ;IF WE COME THIS PATH THE USER HAS DECIDED 1 OF 2 ALTERNATIVES:
  517                                    ;       A)  TO RUN MULTIPLE DEVICES
  518                                    ;       B)  TO CREATE A NEW TABLE TO RUN FROM, OR
  519                                    ;       C)  TO CHANGE THE CHARACTER LENGTH
  520  002100  104401  017233        GO:     TYPE,   LENGTH          ;ASK USER FOR THE CHARACTER LENGTH
  521                                                                ;FOR WHICH HIS DEVICE IS SET
```

```
                                        RDDEC                   ;ACCEPT THE ANSWER TYPED BY USER
                                ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
002106  012600                        MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002110  020027  000010                CMP     R0,#8.          ;IS THE NUMBER TOO HIGH?
002114  101114                        BHI     RETRY           ;IF YES - GO TO RETRY SITUATION
002116  020027  000005                CMP     R0,#5.          ;IS THE NUMBER TOO LOW?
002122  103511                        BLO     RETRY           ;IF YES - GO TO RETRY SITUATION
002124  010067  177104                MOV     R0,$TMP15       ;THE VALUE TYPED IS OK
                                                                ;STORE FOR FUTURE USE
002130  104401  017315                TYPE,   DEFAULT         ;ASK USER IF HE WISHES TO TEST OTHER
                                                                ;THAN THE DEFAULT DEVICE
002134  104410                        RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
002136  005726                        TST     (SP)+           ;LOOK AT THE ANSWER
002140  001002                        BNE     1$              ;BRANCH IF REPLY WAS YES
002142  000137  002724                JMP     @#FLUSH         ;OTHERWISE, SKIP REST OF INTERROGATION
002146  012700  000300        1$:     MOV     #300,R0         ;START RESTORATION OF TRAPCATCHER
002152  012701  000302                MOV     #302,R1         ;AREA FROM LOCATIONS 300 TO 776
002156  012702  000004                MOV     #4,R2           ;SO THAT WE CREATE THE MULTIPLE
002162  010110        2$:     MOV     R1,(R0)         ;DEVICES TABLE WITH A CLEAN SLATE
002164  005011                        CLR     (R1)            ;       .
002166  060200                        ADD     R2,R0           ;       .
002170  060201                        ADD     R2,R1           ;       .
002172  022701  001000                CMP     #1000,R1        ;       .
002176  002771                        BLT     2$              ;       .
                                ;THE TRAPCATCHER VECTOR AREA FROM 300 - 776 SHOULD NOW BE RESTORED.
                                ;PROCEED TO FIND OUT THE 1ST DEVICE RECEIVER CONTROL REGISTER
                                ;ADDRESS
002200  104401  017422        FIRSTD: TYPE    ,MFIRSTD        ;ASK USER FOR THE RECEIVER CONTROL
                                                                ;REGISTER ADDRESS OF HIS FIRST
                                                                ;DEVICE
002204  104410                        RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
                                                                ;AND STORE ON TOP OF STACK
                                ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
002206  012600                        MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002210  020027  176170                CMP     R0,#176170      ;IS THE NUMBER TOO HIGH?
002214  101060                        BHI     RETRY0          ;IF YES-GO TO RETRY SITUATION
002216  020027  175610                CMP     R0,#175610      ;IS THE NUMBER TOO LOW?
002222  103455                        BLO     RETRY0          ;IF YES - GO TO RETRY SITUATION
002224  132700  000001                BITB    #BIT0,R0        ;NUMBER IS IN RANGE BUT IS IT
                                                                ;ON AN EVEN BOUNDARY?
002230  001052                        BNE     RETRY0          ;IF NO - GO TO RETRY SITUATION
                                ;CHECK TO SEE IF USER RESPONSE WAS TRULY A RCVR STATUS REGISTER
002232  032700  000007                BIT #7,R0               ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
                                                                ;USER RESPONSE EQUAL TO A ZERO?
002236  001047                        BNE     RETRY0          ;BRANCH IF NOT
002240  010067  177014                MOV     R0,DLBASE       ;THE 1ST ADDRESS VALUE TYPED IS OK
                                                                ;STORE FOR FUTURE USE
                                ;NOW WE ARE READY TO FIND OUT THE DEVICE INTERRUPT VECTOR
002244  016767  177010  177010        MOV     DLBASE,KEEPADD  ;GET 1ST ADDRESS VALUE
002252  004767  005612                JSR     PC,DLADDR       ;GO FORM DL ADDRESSES FOR
                                                                ;1ST DEVICE SELECTED
002256  016767  177000  177000        MOV     KEEPADD,BASEADD ;RESTORE 1ST DEVICE ADDRESS
002264  104401  017510        VECT:   TYPE    ,MVECT          ;ASK USER FOR A VECTOR ADDRESS
002270  104410                        RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
                                                                ;AND STORE ON TOP OF STACK
                                ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
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002272  012600                        MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002274  020027  000776                CMP     R0,#776         ;IS THE NUMBER TOO HIGH?
002300  101032                        BHI     RETRY1          ;IF YES - GO TO RETRY SITUATION
002302  020027  000300                CMP     R0,#300         ;IS THE NUMBER TOO LOW?
002306  103427                        BLO     RETRY1          ;IF YES - GO TO RETRY SITUATION
002310  132700  000001                BITB    #BIT0,R0        ;NUMBER IS IN RANGE BUT IS IT
                                                                ;ON AN EVEN BOUNDARY?
002314  001024                        BNE     RETRY1          ;IF NO - GO TO RETRY SITUATION
                                ;CHECK TO SEE IF THE USER RESPONSE WAS TRULY A RCVR VECTOR ADDRESS
002316  032700  000007                BIT     #7,R0           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
                                                                ;USER RESPONSE EQUAL TO A ZERO?
002322  001021                        BNE     RETRY1          ;BRANCH IF NOT
002324  010067  177070                MOV     R0,DLVECT       ;THE VECTOR VALUE TYPED IS OK
                                                                ;STORE FOR FUTURE USE
002330  016767  177064  176730        MOV     DLVECT,KEEPIV   ;GET THE FIRST VECTOR VALUE
002336  016767  177056  176724        MOV     DLVECT,BASEIV   ;SAVE FIRST VECTOR VALUE
002344  000414                        BR      HOWMANY         ;GO TO SEE IF USER WANTS MORE
                                                                ;THAN 1 DEVICE
002346  104401  001252        RETRY:  TYPE,   $QUES           ;TYPE '?' INDICATING USER TYPED
                                                                ;SOMETHING WRONG FOR CHARACTER LENGTH
002352  000167  177522                JMP     GO              ;GO BACK TO REISSUE QUESTION
002356  104401  001252        RETRY0: TYPE    ,$QUES          ;TYPE '?' INDICATING USER TYPE
                                                                ;SOMETHING WRONG FOR 1ST ADDRESS
002362  000167  177612                JMP     FIRSTD          ;GO BACK TO REISSUE QUESTION
002366  104401  001252        RETRY1: TYPE    ,$QUES          ;TYPE '?' INDICATING USER TYPED
                                                                ;SOMETHING WRONG FOR VECTOR
002372  000167  177666                JMP     VECT            ;GO BACK TO REISSUE QUESTION
002376  104401  017566        HOWMANY:TYPE    ,MULDEV         ;ASK USER IF HE WISHES TO RUN
                                                                ;MULTIPLE DEVICES
002402  104410                        RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
                                                                ;AND STORE ON TOP OF STACK
002404  012600                        MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002406  005700                        TST     R0              ;WAS THE ANSWER YES?
002410  001003                        BNE     1$              ;BRANCH IF IT WAS
002412  005067  176654                CLR     MULTD           ;OTHERWISE, INITIALIZE FLAG TO
                                                                ;INDICATE NON-MULTIPLE DEVICES
002416  000402                        BR      2$              ;SKIP NEXT INSTRUCTION
002420  105167  176646        1$:     COMB    MULTD           ;INITIALIZE FLAG TO INDICATE
                                                                ;RUNNING OF MULTIPLE DEVICES
002424                          2$:
002424  105767  176642                TSTB    MULTD           ;ARE THERE MULTIPLE DEVICES ON
                                                                ;THE SYSTEM?
002430  100406                        BMI     LASTD   ;IF SO, GO TO ASK NEXT QUESTION
002432  005067  176636                CLR     ACTREG          ;CLEAR DEVICE ACTIVE FLAG TO
                                                                ;INDICATE NO RUNNING OF MULTIPLE
                                                                ;DEVICES
002436  005067  176634                CLR     ROTADD          ;CLEAR DEVICE ADDRESS POINTER IN
                                                                ;USE WHEN RUNNING MULTIPLE DEVICES
002442  000167  000160                JMP     CONQUES         ;SKIP ASKING NEXT QUESTION
002446                          LASTD:
                                ;WE WILL NOW BEGIN TO SET UP THE DEVICE ACTIVE REGISTER FOR RUNNING
                                ;MULTIPLE DL11 DEVICES
002446  104401  017653                TYPE    ,MLASTD         ;ASK USER FOR THE RECEIVER
                                                                ;CONTROL REGISTER ADDRESS OF
                                                                ;HIS LAST DEVICE
002452  104410                        RDOCT                   ;ACCEPT THE ANSWER TYPED BY
```

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                                                        ;USER AND STORE ON TOP OF STACK
                                ;CHECK TO SEE IF THE USER RESPONSE WAS WITHIN LIMITS
002454  012600                  1$:     MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002456  020027  176170                  CMP     R0,#176170      ;IS THE NUMBER TOO HIGH?
002462  101132                          BHI     RETRY2          ;IF YES - GO TO RETRY SITUATION
002464  020027  175610                  CMP     R0,#175610      ;IS THE NUMBER TOO LOW?
002470  103527                          BLO     RETRY2          ;IF YES - GO TO RETRY SITUATION
002472  132700  000001                  BITB    #BIT0,R0        ;NUMBER IS IN RANGE BUT IS IT
                                                                ;ON AN EVEN BOUNDARY?
002476  001124                          BNE     RETRY2          ;IF NOT - GO TO RETRY SITUATION
                                ;CHECK TO SEE IF USER RESPONSE WAS TRULY A RCVR STATUS REGISTER
002500  032700  000007                  BIT     #7,R0           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
                                                                ;USER RESPONSE EQUAL TO A ZERO?
002504  001121                          BNE     RETRY2          ;BRANCH IF NOT
002506  010067  176566                  MOV     R0,LASTADD      ;THE LAST ADDRESS VALUE TYPED IS OK
                                                                ;STORE FOR FUTURE USE
                                ;NOW WE BEGIN TO ACTUALLY INITIALIZE THE DEVICE ACTIVE REGISTER
                                ;FROM WHICH THE PROGRAM WILL CYCLE UNTIL ALL DEVICES HAVE BEEN TESTED
002512  012767  000001  176556          MOV     #1,ROTADD       ;SET UP POINTER FOR 'ACTREG'
002520  005067  176550                  CLR     ACTREG          ;CLEAR DEVICE ACTIVE REGISTER
002524  056767  176546  176542  2$:     BIS     ROTADD,ACTREG   ;MAKE 1ST DEVICE ACTIVE
002532  000241                          CLC                     ;CLEAR CARRY BIT FOR POINTER
                                                                ;ROTATION
002534  006167  176536                  ROL     ROTADD          ;ARE WE PAST 16 LINE RANGE?
002540  103422                          BCS     3$              ;BRANCH IF YES
002542  062767  000010  176514          ADD     #10,BASEADD     ;STEP UP BASE ADDRESS
002550  026767  176524  176506          CMP     LASTADD,BASEADD ;IS THIS THE LAST DEVICE?
002556  101362                          BHI     2$              ;BRANCH IF NOT
                                ;NOTE:  IF THIS PATH IS TAKEN IT IS ASSUMED THAT AT LEAST 2 DEVICES
                                ;       EXIST AND THAT ALL ADDRESSING IS CONTIGUOUS
002560  056767  176512  176506          BIS     ROTADD,ACTREG   ;INDICATE NEXT DEVICE ACTIVE
002566  012767  000001  176502          MOV     #1,ROTADD       ;RESET POINTER FOR 'ACTREG' FOR
                                                                ;LATER USE IN END OF PASS ROUTINE
002574  016767  176462  176462          MOV     KEEPAD,BASEADD  ;RESET 1ST DEVICE RECEIVER
                                                                ;CONTROLLER REGISTER ADDRESS FOR
                                                                ;LATER USE IN END OF PASS ROUTINE
002602  000167  000020                  JMP     CONQUES         ;GO TO CONTINUE QUESTIONING OF USER
002606                          3$:
                                ;IF WE TAKE THIS PATH IT APPEARS THAT THERE ARE NOT AT LEAST
                                ;TWO DEVICES PRESENT - IN RESPONSE TO USER TYPING 'YES' TO MULTIPLE
                                ;DEVICES QUESTION
002606  016767  176450  176450          MOV     KEEPADD,BASEADD ;RESET 1ST DEVICE RECEIVER
                                                                ;CONTROLLER REGISTER ADDRESS
002614  104401  017751                  TYPE    ,MRANGE         ;INFORM USER TO CHECK AND RETYPE
                                                                ;THE LAST DEVICE RCSR ADDRESS
002620  104410                          RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
                                                                ;AND STORE ON TOP OF STACK
002622  000167  177626                  JMP     1$
002626                          CONQUES:
                                ;IF WE HAVE REACHED THIS PORTION WE KNOW:
                                ;       A)  THE 'RXCSR' ADDRESS OF THE 1ST DEVICE
                                ;       B)  THE 'RXCSR' ADDRESS OF THE LAST DEVICE, SAND
                                ;       C)  THE INTERRUPT VECTOR OF THE 1ST DEVICE
                                ;NOW LET'S FIND THE PRIORITY LEVEL
002626  104401  020035                  TYPE    ,PLEVEL         ;ASK USER FOR PRIORITY LEVEL
002632  104410                          RDOCT                   ;ACCEPT ANSWER TYPED BY USER AND
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                                                        ;STORE ON TOP OF STACK
002634  012600                          MOV     (SP)+,R0        ;GET THE ANSWER TYPED
002636  020027  000007                  CMP     R0,#7           ;IS THE NUMBER TOO HIGH?
002642  101046                          BHI     RETRY3          ;IF YES - GO TO RETRY SITUATION
002644  020027  000004                  CMP     R0,#4           ;IS THE NUMBER TOO LOW?
002650  103443                          BLO     RETRY3          ;IF YES GO TO RETRY SITUATION
002652  010067  176424                  MOV     R0,DLPRI        ;THE PRIORITY TYPED IN IS OK
                                                                ;STORE FOR FUTURE USE

                                ;THIS SECTION WILL CALCULATE THE PRIORITY LEVEL FOR THE
                                ;PROCESSOR BASED ON THE USER RESPONSE FOR PRIORITY LEVEL OF THE
                                ;DEVICE
002656  006367  176420                  ASL     DLPRI           ;FORM BITS <7-5> OF PSW
002662  006367  176414                  ASL     DLPRI           ;       .
002666  006367  176410                  ASL     DLPRI           ;       .
002672  006367  176404                  ASL     DLPRI           ;       .
002676  006367  176400                  ASL     DLPRI           ;       .
002702  016767  176374  176374          MOV     DLPRI,LESS1     ;STAPT TO FORM LEVEL TO ALLOW
                                                                ;INTERRUPTS
002710  162767  000001  176366          SUB     #1,LESS1        ;DROP DEVICE LEVEL PRIORITY
                                                                ;BY 1 LEVEL FOR PSW
002716  042767  000037  176360          BIC     #37,LESS1       ;MAKE SURE THE T,N,Z,V & C
                                                                ;BITS FOR THE PROCESSOR ARE CLEAR
002724  005077  176464          FLUSH:  CLR     @DLXCSR         ;CLEAR OUT BOTH CSR'S
002730  005077  176454                  CLR     @DLRCSR
002734  005777  176452                  TST     @DLRDBR         ;FLUSH RCVR "DONE" BIT
002740  005777  176446                  TST     @DLRDBR
002744  000167  000020                  JMP     TST1            ;BEGIN TESTING
002750  104401  001252          RETRY2: TYPE    ,$QUES          ;TYPE '?' INDICATING USER TYPED
                                                                ;SOMETHING WRONG FOR LAST ADDRESS
002754  000167  177466                  JMP     LASTD   ;GO BACK TO REISSUE QUESTION
002760  104401  001252          RETRY3: TYPE    ,$QUES          ;TYPE'?' INDICATING USER TYPED
                                                                ;SOMETHING WRONG FOR PRIORITY
002764  000167  177636                  JMP     CONQUES         ;GO BACK TO REISSUE QUESTION


                                ;;*************************************************************
                                ;*TEST 1         TEST THAT REFERENCE TO RCSR DOES NOT CAUSE TIMEOUT
                                ;;*************************************************************
002770  000004          TST1:   SCOPE
002772  016746  175006                  MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
002776  012767  003014  175000          MOV     #1$,ERRVEC      ;GO TO 1$ IF TIMEOUT
003004  016702  176400                  MOV     DLRCSR,R2       ;REGADR = RCSR ADR
003010  005712                          TST     (R2)            ;USE REGADR ON BUS
003012  000407                          BR      3$              ;;<GO TO NEXT TEST IF NO TIMEOUT>
003014  004767  011112          1$:     JSR     PC,SUERT1       ;GO SET UP ERROR INFO
003020  012767  003030  176216          MOV     #2$,$ESCAPE     ;RETURN TO 2$ AFTER ERROR PRINT
003026  104001                          ERROR+1                 ;DL REFERENCE CAUSED BUS TIMEOUT
003030  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
003032  012667  174746          3$:     MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR


                                ;;*************************************************************
                                ;*TEST 2         TEST THAT REFERENCE TO XCSR DOES NOT CAUSE TIMEOUT
                                ;;*************************************************************
003036  000004          TST2:   SCOPE
003040  016746  174740                  MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
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                        T2      TEST THAT REFERENCE TO XCSR DOES NOT CAUSE TIMEOUT

003044  012767  003062  174732          MOV     #1$,ERRVEC      ;GO TO 1$ IF TIMEOUT
003052  016702  176336                  MOV     DLXCSR,R2       ;REGADR = XCSR ADR
003056  005712                          TST     (R2)            ;USE REGADR ON BUS
003060  000407                          BR      3$              ;;<GO TO NEXT TEST IF NO TIMEOUT>
003062  004767  011044          1$:     JSR     PC,SUERT1       ;GO SET UP ERROR INFO
003066  012767  003076  176150          MOV     #2$,$ESCAPE     ;RETURN TO 2$ AFTER ERROR PRINT
003074  104001                          ERROR+1                 ;DL REFERENCE CAUSED BUS TIMEOUT
003076  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
003100  012667  174700          3$:     MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR

                        ;;**************************************************************
                        ;*TEST 3         TEST THAT REFERENCE TO RDBR DOES NOT CAUSE TIMEOUT
                        ;;**************************************************************
003104  000004          TST3:   SCOPE
003106  016746  174672          MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
003112  012767  003130  174664          MOV     #1$,ERRVEC      ;GO TO 1$ IF TIMEOUT
003120  016702  176266                  MOV     DLRDBR,R2       ;REGADR = RDBR ADR
003124  005712                          TST     (R2)            ;USE REGADR ON BUS
003126  000407                          BR      3$              ;;<GO TO NEXT TEST IF NO TIMEOUT>
003130  004767  010776          1$:     JSR     PC,SUERT1       ;GO SET UP ERROR INFO
003134  012767  003144  176102          MOV     #2$,$ESCAPE     ;RETURN TO 2$ AFTER ERROR PRINT
003142  104001                          ERROR+1                 ;DL REFERENCE CAUSED BUS TIMEOUT
003144  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
003146  012667  174632          3$:     MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR

                        ;;**************************************************************
                        ;*TEST 4         TEST THAT REFERENCE TO XDBR DOES NOT CAUSE TIMEOUT
                        ;;**************************************************************
003152  000004          TST4:   SCOPE
003154  016746  174624          MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
003160  012767  003176  174616          MOV     #1$,ERRVEC      ;GO TO 1$ IF TIMEOUT
003166  016702  176224                  MOV     DLXDBR,P2       ;REGADR = XDBR ADR
003172  005712                          TST     (R2)            ;USE REGADR ON BUS
003174  000407                          BR      3$              ;;<GO TO NEXT TEST IF NO TIMEOUT>
003176  004767  010730          1$:     JSR     PC,SUERT1       ;GO SET UP ERROR INFO
003202  012767  003212  176034          MOV     #2$,$ESCAPE     ;RETURN TO 2$ AFTER ERROR PRINT
003210  104001                          ERROR+1                 ;DL REFERENCE CAUSED BUS TIMEOUT
003212  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
003214  012667  174564          3$:     MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR

                        ;;**************************************************************
                        ;*TEST 5         TEST THAT RCSR IS ALL ZEROES ON ENTRY
                        ;;**************************************************************
003220  000004          TST5:   SCOPE
003222  005004                  CLR     R4              ;RESULT IN RCSR S/B = 0
003224  016702  176160          MOV     DLRCSR,R2       ;REGADR = RCSR ADR
003230  020412                  CMP     R4,(R2)         ;[RCSR]=000000 ??
003232  001403                  BEQ     TST6            ;;<BR IF YES>
003234  004767  010612          JSR     PC,SUER2        ;GO SET UP ERROR INFO
003240  104002                  ERROR+2                 ;RCSR NOT CLEAR ON START UP
                        ;;**************************************************************
                        ;*TEST 6         TEST THAT "READY" BIT IS ONLY BIT SET IN XCSR
                        ;;**************************************************************
003242  000004          TST6:   SCOPE
003244  012704  000200          MOV     #200,R4         ;RESULT IN XCSR S/B = 000200
003250  016702  176140          MOV     DLXCSR,R2       ;REGADR = XCSR ADR
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                        T6      TEST THAT "READY" BIT IS ONLY BIT SET IN XCSR

003254  020412                  CMP     R4,(R2)         ;[XCSR]=000200 ??
003256  001403                  BEQ     TST7            ;;<BR IF YES>
003260  004767  010566          JSR     PC,SUER2        ;GO SETUP ERROR INFO
003264  104002                  ERROR+2                 ;[XCSR] INCORRECT ON START UP
                        ;;**************************************************************
                        ;*TEST 7         TEST THAT "MAINT" BIT CAN BE SET AND CLEARED
                        ;;**************************************************************
003266  000004          TST7:   SCOPE
003270  012704  000204          MOV     #204,R4         ;RESULT IN XCSR S/B = 000204
003274  016702  176114          MOV     DLXCSR,R2       ;REGADR = XCSR ADR
003300  052712  000004          BIS     #BIT2,(R2)      ;SET THE "MAINT" BIT
003304  020412                  CMP     R4,(R2) ;RESULT IN XCSR OK ??
003306  001403                  BEQ     1$              ;;<BR IF YES>
003310  004767  010536          JSR     PC,SUER2        ;GO SET UP ERROR INFO
003314  104002                  ERROR+2                 ;MAINT, BIT FAILED TO SET PROPERLY
003316  012704  000200  1$:     MOV     #200,R4         ;RESULT IN XCSR S/B = 000200
003322  042712  000004          BIC     #BIT2,(R2)      ;NOW CLEAR THE "MAINT" BIT
003326  020412                  CMP     R4,(R2)         ;RESULT IN XCSR OK ??
003330  001403                  BEQ     TST10           ;;<BR IF YES>
003332  004767  010514          JSR     PC,SUER2        ;GO SET UP ERROR INFO
003336  104002                  ERROR+2                 ;MAINT BIT FAILED TO CLEAR PROPERLY
                        ;;**************************************************************
                        ;*TEST 10        TEST THAT XMIT I,E, CAN CAUSE AN INTR
                        ;;**************************************************************
003340  000004          TST10:  SCOPE
003342  005067  176076          CLR     INTFLG          ;INIT SOFTWARE INTR FLAG
003346  016705  176046          MOV     DLVECT,R5       ;GET VECTOR ADDRESS
003352  012765  003440  000004          MOV     #2$,4(R5)       ;GO TO 4$ ON INTR
003360  016765  175716  000006          MOV     DLPRI,6(R5)     ;PRIORITY LEVEL 4
003366  005005                  CLR     R5              ;INIT INTR, TIMER
003370  012704  000200          MOV     #200,R4         ;RESULT IN XCSR S/B = 000200
003374  016702  176014          MOV     DLXCSR,R2       ;REGADR = XCSR ADR
003400  052712  000100          BIS     #100,(R2)       ;SET INTR, ENABLE BIT 06
003404  005767  176034  1$:     TST     INTFLG          ;DID INTR OCCUR YET ??
003410  001020                  BNE     3$              ;BR IF IT DID
003412  005305                  DEC     R5              ;COUNT THE TIMER
003414  001373                  BNE     1$              ;BR IF NO TIMEOUT
003416  012704  000300          MOV     #300,R4         ;RESULT IN XCSR S/B = 000300
003422  004767  010424          JSR     PC,SUER2        ;GO SETUP ERROR INFO
003426  012767  003436  175610          MOV     #4$,$ESCAPE     ;RETURN TO 4$ AFTER ERROR PRINT
003434  104002                  ERROR+2                 ;INTR,  FAILED
003436                  4$:
003436  000412                  BR      TST11           ;;<GO TO NEXT TEST>
003440  005167  176000  2$:     COM     INTFLG          ;SET THE SOFTWARE FLAG
003444  042712  000100          BIC     #100,(R2)       ;TURN OFF I,E, BIT
003450  000002                  RTI                     ;RETURN CONTROL TO INTR, ROUTINE
003452  020412          3$:     CMP     R4,(R2)         ;RESULT IN XCSR OK ??
003454  001403                  BEQ     TST11           ;;<BR IF YES>
003456  004767  010370          JSR     PC,SUER2        ;GO SET UP ERROR INFO,
003462  104002                  ERROR+2                 ;XMIT INTR, NOT SERVICED PROPERLY
                        ;;**************************************************************
                        ;*TEST 11        TEST THAT RCVR I,E, BIT CAN BE SET AND CLEARED
                        ;;**************************************************************
003464  000004          TST11:  SCOPE
003466  012704  000100          MOV     #100,R4         ;RESULT IN RCSR S/B = 000100
003472  016702  175712          MOV     DLRCSR,R2       ;REGADR = RCSR ADR
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003476  052712  000100                  BIS     #BIT6,(R2)      ;SET I.E. BIT
003502  020412                          CMP     R4,(R2)         ;DID IT SET PROPERLY ??
003504  001403                          BEQ     1$              ;;<BR IF YES>
003506  004767  010340                  JSR     PC,SUER2        ;GO SET UP ERROR INFO.
003512  104002                          ERROR+2                 ;RCVR I.E. BIT FAILED TO SET PROPERLY
003514  005004                  1$:     CLR     R4              ;RESULT IN RCSR S/B = 000000
003516  042712  000100                  BIC     #BIT6,(R2)      ;CLEAR THE I.E. BIT
003522  020412                          CMP     R4,(R2)         ;DID IT CLEAR PROPERLY ??
003524  001403                          BEQ     TST12           ;;<BR IF YES>
003526  004767  010320                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
003532  104002                          ERROR+2                 ;RCVR I.E. BIT FAILED TO CLEAR PROPERLY
                                ;;**************************************************************
                                ;*TEST 12        TEST THAT RCVR "DONE" CAN GENERATE AN INTR.
                                ;;**************************************************************
003534  000004                  TST12:  SCOPE
003536  016705  175656                  MOV     DLVECT,R5       ;GET THE VECTOR ADDRESS
003542  012725  003720                  MOV     #3$,(R5)+       ;GO TO 3$ ON RCVR INTR.
003546  016715  175530                  MOV     DLPRI,(R5)      ;AT LEVEL 4
003552  005067  175666                  CLR     INTFLG          ;INIT THE SOFTWARE FLAG
003556  005005                          CLR     R5              ;INIT INTR. TIMER
003560  105067  175420                  CLRB    $TMP1           ;INIT WHERE DATA WILL BE STORED
003564  016702  175620                  MOV     DLRCSR,R2       ;REGADR = RCSR ADR
003570  005012                          CLR     (R2)            ;INIT THE RCSR TO 000000
003572  052712  000100                  BIS     #BIT6,(R2)      ;ENABLE RCVR INTERRUPTS
003576  052762  000004  000004          BIS     #BIT2,4(R2)     ;NOW TURN ON MAINT MODE
003604  112767  000252  175372          MOVB    #252,$TMP1      ;GET DATA PATTERN AND
003612  004767  011126                  JSR     PC,UPMASK       ;GO MASK OFF BITS AS A FUNCTION OF
                                                                ;CHARACTER LENGTH ( 5, 6, 7, OR 8 BITS)
003616  116700  175410                  MOVB    $TMP14,R0       ;SAVE DATA PATTERN FOR FURTHER USE
003622  116762  175404  000006          MOVB    $TMP14,6(R2)    ;LOAD XMIT BUFFER REG.
003630  005767  175610          1$:     TST     INTFLG          ;DID RCVR INTR. YET ??
003634  001044                          BNE     4$              ;BR IF IT DID
003636  005305                          DEC     R5              ;COUNT THE TIMER
003640  001373                          BNE     1$              ;BR IF NO TIMEOUT
003642  013767  177776  175332          MOV     @#PSW,$TMP0     ;SAVE ERROR PSW
003650  042762  000004  000004          BIC     #BIT2,4(R2)     ;DISABLE MAINT MODE
003656  042712  000100                  BIC     #100,(R2)       ;DISABLE RCVR INTR.
003662  010667  175310                  MOV     SP,$REG6        ;SAVE THE ERROR SP
003666  010201                          MOV     R2,R1           ;DEVADR = RCSR ADR
003670  011203                          MOV     (R2),R3         ;GET THE WAS DATA
003672  012704  000200                  MOV     #200,R4         ;[RCSR] S/B = 000200
003676  004767  010176                  JSR     PC,SUERR1       ;GO SET UP ERROR INFO.
003702  012767  003712  175334          MOV     #2$,$ESCAPE     ;RETURN TO 2$ AFTER ERROR ALWAYS
003710  104002                          ERROR+2                 ;RCVR INTERRUPT FAILED
003712  005762  000002          2$:     TST     2(R2)           ;REFERENCE RCVR DATA BUFFER
                                                                ;TO CLEAR RCSR IN CASE RCVR
                                                                ;INTERRUPTS COULD NOT BE ENABLED
003716  000437                          BR      TST13           ;;<GO TO NEXT TEST>
003720  042762  000004  000004  3$:     BIC     #BIT2,4(R2)     ;DISABLE THE MAINT MODE
003726  116267  000002  175250          MOVB    2(R2),$TMP1     ;GET THE RECEIVED DATA
003734  042712  000100                  BIC     #BIT6,(R2)      ;TURN OFF RCVR INTR. ENAB
003740  005167  175500                  COM     INTFLG          ;SET THE SOFTWARE FLAG
003744  000002                          RTI                     ;RETURN TO MAINLINE
003746  005004                  4$:     CLR     R4              ;[RCSR] S/B=0
003750  005712                          TST     (R2)            ;IS IT ALL ZEROES ??
003752  001403                          BEQ     5$              ;;<BR IF YES>
```



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003754  004767  010072                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
003760  104002                          ERROR+2                 ;RCVR INTR NOT SERVICED PROPERLY
003762  016701  175424          5$:     MOV     DLRDBR,R1       ;SAVE WAS ADDRESS
003766  016702  175424                  MOV     DLXDBR,R2       ;SAVE THE S/B ADDRESS
003772  004767  010746                  JSR     PC,UPMASK       ;GET THE WAS DATA AND
                                                                ;GO MASK OFF BITS AS A FUNCTION OF
                                                                ;CHARACTER LENGTH ( 5, 6, 7, OR 8 BITS)
003776  116703  175230                  MOVB    $TMP14,R3       ;SET UP FOR ERROR CHECKING
004002  110004                          MOVB    R0,R4           ;GET THE S/B DATA
004004  020403                          CMP     R4,R3           ;WAS = S/B ??
004006  001403                          BEQ     TST13           ;;<BR IF YES>
004010  004767  010064                  JSR     PC,SUERR1       ;GO SET UP THE ERROR INFO
004014  104003                          ERROR+3                 ;DATA COMPARE ERROR
                                ;;**************************************************************
                                ;*TEST 13        TEST THAT "REQ TO SEND" ASSERTS "RING"
                                ;;**************************************************************
004016  000004                  TST13:  SCOPE
004020  032777  010000  175112          BIT     #SW12,@SWR      ;ARE WE TESTING /C OR /D MODEL?
004026  001047                          BNE     TST14           ;;<BRANCH IF YES>
004030  012704  140004                  MOV     #140004,R4      ;RESULT IN RCSR S/B = 140004
004034  016702  175350                  MOV     DLRCSR,R2       ;REGADR = RCSR ADR
004040  005012                          CLR     (R2)            ;INIT THE RCSR TO 000000
004042  052712  000004                  BIS     #BIT2,(R2)      ;SET "REQ TO SEND"
004046  032777  100000  175334          BIT     #BIT15,@DLRCSR  ;DID "RING" SET "DATA SET INT" ?
004054  001003                          BNE     1$              ;;<BR IF YES>
004056  004767  007770                  JSR     PC,SUER2        ;GO SET UP ERROR INFO.
004062  104002                          ERROR+2         ;"RING" TRANSITION FAILED TO SET "DATA SET INT"
                                                        ;NOTE: "BIT  #BIT15,(R2)" RESETS BIT15
004064  012704  040004          1$:     MOV     #40004,R4       ;RESULT IN RCSR S/B = 40004
004070  020412                          CMP     R4,(R2)         ;BOTH "RING" AND "REQ TO SEND" ASSERTED ?
004072  001403                          BEQ     2$              ;;<BR IF YES>
004074  004767  007752                  JSR     PC,SUER2        ;GO SET UP ERROR INFO.
004100  104002                          ERROR+2                 ;"RING" OR "REQ TO SEND" FAILED TO SET
004102  005004                  2$:     CLR     R4              ;RESULT IN RCSR S/B = 000000
004104  042712  000004                  BIC     #BIT2,(R2)      ;CLEAR "REQ TO SEND"
004110  032777  100000  175272          BIT     #BIT15,@DLRCSR  ;DID "DATA SET INT" GET SET ??
004116  001403                          BEQ     3$              ;;<BR IF NOT>
004120  004767  007726                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
004124  104002                          ERROR+2                 ;CLEARING "RING" SET "DATA SET INT"
004126  020412                  3$:     CMP     R4,(R2)         ;RCSR CONTAIN ALL ZEROES ??
004130  001406                          BEQ     TST14           ;;<BR IF YES>
004132  004767  007714                  JSR     PC,SUER2        ;GO SET UP ERROR INFO.
004136  016767  000002  175034          MOV     .+6,$REG7       ;SAVE THE ERROR PC
004144  104002                          ERROR+2                 ;CLEARING  "REQ TO SEND" FAILED TO CLEAR "RING"
                                ;;**************************************************************
                                ;*TEST 14        TEST THAT "SEC XMIT" ASSERTS "SEC REC" AND "DATA SET INT"
                                ;;**************************************************************
004146  000004                  TST14:  SCOPE
004150  032777  010000  174762          BIT     #SW12,@SWR      ;ARE WE TESTING /C OR /D MODEL?
004156  001046                          BNE     TST15           ;;<BRANCH IF YES>
004160  016702  175224                  MOV     DLRCSR,R2       ;REGADR = RCSR ADR
004164  005012                          CLR     (R2)            ;INIT RCSR TO 000000
004166  012704  102010                  MOV     #102010,R4      ;CONTENTS OF RCSR S/B = 102010
004172  052712  000010                  BIS     #BIT3,(R2)      ;SET "SEC XMIT" BIT
004176  032777  100000  175204          BIT     #BIT15,@DLRCSR  ;DID "DATA SET INT" SET ??
004204  001003                          BNE     1$              ;;<BR IF YES>
```

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                        T14     TEST THAT "SEC XMIT" ASSERTS "SEC REC" AND "DATA SET INT"

 970  004206  004767  007640                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
 971  004212  104002                         ERROR+2                 ;"DATA SET INT" FAILED TO SET-NOTE THAT
 972                                                                  ;"BIT  #BIT15,(R2)" RESETS BIT15
 973  004214  012704  002010          1$:    MOV     #2010,R4        ;RESULT IN RCSR S/B = 2010
 974  004220  020412                         CMP     R4,(R2)         ;ARE "SEC XMIT" AND "SEC REC" BOTH SET ?
 975  004222  001403                         BEQ     2$              ;;<BR IF YES>
 976  004224  004767  007622                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
 977  004230  104002                         ERROR+2                 ;"SEC XMIT" OR "SEC REC" FAILED TO SET
 978                                                                  ;OR "DATA SET INT" FAILED TO BE CLEARED
 979                                                                  ;WHEN REFERENCING RCSR
 980  004232  012704  100000          2$:    MOV     #BIT15,R4       ;RESULT IN RCSR S/B = 100000
 981  004236  042712  000010                 BIC     #BIT3,(R2)      ;CLEAR "SEC XMIT" BIT
 982  004242  032777  100000  175140         BIT     #BIT15,@DLRCSR  ;DID CLEARING IT SET "DATA SET INT"??
 983  004250  001003                         BNE     3$              ;;<BR IF YES>
 984  004252  004767  007574                 JSR     PC,SUER2        ;GO SET UP ERROR INFO,
 985  004256  104002                         ERROR+2                 ;CLEARING "SEC XMIT" FAILED TO SET "DATA
 986                                                                  ;SET INT, (NOTE THAT REFERENCING RCSR
 987                                                                  ; CLEARS "DATA SET INT"
 988  004260  005004                  3$:    CLR     R4              ;RESULT IN RCSR S/B = 000000
 989  004262  020412                         CMP     R4,(R2)         ;"SEC XMIT" AND "SEC REC" CLEAR ?
 990  004264  001403                         BEQ     TST15           ;;<BR IF YES>
 991  004266  004767  007560                 JSR     PC,SUER2        ;GO SETUP ERROR INFO
 992  004272  104002                         ERROR+2                 ;"SEC XMIT" OR "SEC REC" FAILED TO CLEAR
 993                                                                  ;OR REFERENCING RCSR  FAILED TO CLEAR "DATA SET INT"
 994                                ;;*************************************************************
 995                                ;*TEST 15        TEST THAT "DTR" CAN ASSERT "CLR TO SEND" AND "CAR DET"
 996                                ;;*************************************************************
 997  004274  000004                TST15:  SCOPE
 998  004276  032777  010000  174634         BIT     #SW12,@SWR      ;ARE WE TESTING /C OR /D MODEL?
 999  004304  001046                         BNE     TST16           ;;<BRANCH IF YES>
1000  004306  016702  175076                 MOV     DLRCSR,R2       ;REGADR = RCSR ADR
1001  004312  005012                         CLR     (R2)            ;INIT RCSR TO 000000
1002  004314  012704  130002                 MOV     #130002,R4      ;RESULT IN RCSR S/B = 130002
1003  004320  052712  000002                 BIS     #BIT1,(R2)      ;SET "DTR" BIT
1004  004324  032777  100000  175056         BIT     #BIT15,@DLRCSR  ;DID "DATA SET INT" SET ??
1005  004332  001003                         BNE     1$              ;;<BR IF YES>
1006  004334  004767  007512                 JSR     PC,SUER2        ;GO SET UP ERROR INFO,
1007  004340  104002                         ERROR+2                 ;"DATA SET INT" FAILED TO SET -
1008                                                                  ;NOTE: THE REFERENCE TO RCSR  ABOVE WILL
1009                                                                  ;WILL UNCONDITIONALLY CLEAR RCSR BIT 15.
1010  004342  012704  030002          1$:    MOV     #30002,R4       ;RESULT IN RCSR S/B = 30002
1011  004346  020412                         CMP     R4,(R2)         ;"DTR","CLR TO SEND", AND "CAR DET" ALLSET
1012  004350  001403                         BEQ     2$              ;;<BR IF ALL SET>
1013  004352  004767  007474                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
1014  004356  104002                         ERROR+2                 ;"DTR","CLR TO SEND" OR "CAR DET" FAILED
1015                                                                  ;TO SET OR "DATA SET INT" FAILED TO CLEAR
1016  004360  012704  100000          2$:    MOV     #BIT15,R4       ;RESULT IN RCSR S/B = 100000
1017  004364  042712  000002                 BIC     #BIT1,(R2)      ;NOW CLEAR "DTR"
1018  004370  032777  100000  175012         BIT     #BIT15,@DLRCSR  ;DID "DATA SET INT" SET ??
1019  004376  001003                         BNE     3$              ;;<BR IF YES>
1020  004400  004767  007446                 JSR     PC,SUER2        ;GO SETUP ERROR INFO
1021  004404  104002                         ERROR+2                 ;"DATA SET INT" FAILED TO SET WHEN "DTR"
1022                                                                  ;WENT TO A ZERO.
1023  004406  005004                  3$:    CLR     R4              ;RESULT IN RCSR S/B = 000000
1024  004410  020412                         CMP     R4,(R2)         ;DID ALL BITS CLEAR??
1025  004412  001403                         BEQ     TST16           ;;<BR IF YES>
```



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                        T15     TEST THAT "DTR" CAN ASSERT "CLR TO SEND" AND "CAR DET"

1026  004414  004767  007432                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
1027  004420  104002                         ERROR+2                 ;"DTR","CLR TO SEND" OR "CAR DET" FAILED
1028                                                                  ;TO CLEAR PROPERLY
1029                                ;;*************************************************************
1030                                ;*TEST 16        TEST THAT "DATA SET INT ENAB" CAN SET AND CLEAR
1031                                ;;*************************************************************
1032  004422  000004                TST16:  SCOPE
1033  004424  032777  010000  174506         BIT     #SW12,@SWR      ;ARE WE TESTING /C OR /D MODEL?
1034  004432  001023                         BNE     TST17           ;;<BRANCH IF YES>
1035  004434  016702  174750                 MOV     DLRCSR,R2       ;REGADR = RCSR ADR
1036  004440  012704  000040                 MOV     #40,R4          ;RESULT IN RCSR S/B = 000040
1037  004444  052712  000040                 BIS     #BIT5,(R2)      ;SET THE "DATA SET I.E." BIT
1038  004450  020412                         CMP     R4,(R2)         ;DID IT SET OK ??
1039  004452  001403                         BEQ     1$              ;;<BR IF YES>
1040  004454  004767  007372                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
1041  004460  104002                         ERROR+2                 ;"DAT SET I. E." FAILED TO SET
1042  004462  005004                  1$:    CLR     R4              ;MAKE S/B DATA = 000000
1043  004464  042712  000040                 BIC     #BIT5,(R2)      ;NOW CLEAR THE "DATA SET I.E." BIT
1044  004470  020412                         CMP     R4,(R2)         ;DID IT CLEAR OK ??
1045  004472  001403                         BEQ     TST17           ;;<BR IF YES>
1046  004474  004767  007352                 JSR     PC,SUER2        ;GO SET UP ERROR INFO,
1047  004500  104002                         ERROR+2                 ;"DATA SET I.E." FAILED TO CLEAR
1048                                ;;*************************************************************
1049                                ;*TEST 17        TEST THE "DATA SET I.E." CAN CAUSE A RCVR INTR
1050                                ;;*************************************************************
1051  004502  000004                TST17:  SCOPE
1052  004504  032777  010000  174426         BIT     #SW12,@SWR      ;ARE WE TESTING A /C OR /D MODEL?
1053  004512  001054                         BNE     TST20           ;;<BRANCH IF YES>
1054  004514  016705  174700                 MOV     DLVECT,R5       ;GET THE VECTOR ADDR
1055  004520  012725  004606                 MOV     #3$,(R5)+       ;GO TO 3$ ON RCVR INTR,
1056  004524  016715  174552                 MOV     DLPR1,(R5)      ;AT LEVEL 4
1057  004530  005005                         CLR     R5              ;INIT INTR, TIMER
1058  004532  005067  174706                 CLR     INTFLG          ;INIT SOFTWARE FLAG
1059  004536  005004                         CLR     R4              ;RESULT IN RCSR S/B = 0 AFTER INTR,
1060  004540  016702  174644                 MOV     DLRCSR,R2       ;REGADR = RCSR ADR
1061  004544  052712  000040                 BIS     #BIT5,(R2)      ;SET THE "DATA SET I.E." BIT
1062  004550  052712  000002                 BIS     #BIT1,(R2)      ;NOW SET "DTR" TO GEN INTR,
1063  004554  005767  174664          1$:    TST     INTFLG          ;DID INTR OCCUR YET ??
1064  004560  001016                         BNE     4$              ;BR IF YES
1065  004562  005305                         DEC     R5              ;COUNT THE TIMER
1066  004564  001373                         BNE     1$              ;BR IF NO TIMEOUT
1067  004566  004767  007260                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
1068  004572  005012                         CLR     (R2)            ;TURN IT ALL OFF
1069  004574  012767  004604  174442         MOV     #2$,$ESCAPE     ;COME BACK TO 2$ IN ALL CASES
1070  004602  104002                         ERROR+2                 ;"DATA SET" INTR FAILED TO OCCUR
1071  004604                           2$:
1072  004604  000417                         BR      TST20           ;;<GO TO NEXT TEST>
1073  004606  005012                  3$:    CLR     (R2)            ;ZERO THE RCSR
1074  004610  005167  174630                 COM     INTFLG          ;SET THE SOFTWARE FLAG
1075  004614  000002                         RTI                     ;RETURN TO SENDER
1076  004616  032712  100000          4$:    BIT     #BIT15,(R2)     ;DID "DATA SET INT" GET SET BY INTR, SERVICE ??
1077  004622  001003                         BNE     5$              ;;<BR IF YES>
1078  004624  004767  007222                 JSR     PC,SUER2        ;GO SET UP ERROR INFO
1079  004630  104002                         ERROR+2                 ;DATA SET INTR, NOT SERVICED PROPERLY
1080  004632  020412                  5$:    CMP     R4,(R2)         ;ALL BITS IN RCSR CLEAR ??
1081  004634  001403                         BEQ     TST20           ;;<BR IF YES>
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                                        T17     TEST THE "DATA SET I,E," CAN CAUSE A RCVR INTR

 1082  004636  004767  007210                   JSR     PC,SUER2        ;GO SET UP ERROR INFO
 1083  004642  104002                           ERROR+2                 ;INTR. SERVICE FAILED TO CLEAR RCSR
 1084                                  ;;*************************************************************
 1085                                  ;*TEST 20        TEST THAT THE "BREAK" BIT CAN BE SET AND CLEARED
 1086                                  ;;*************************************************************
 1087  004644  000004                 TST20:  SCOPE
 1088  004646  032777  010000  174264          BIT     #SW12,@SWR      ;ARE WE TESTING /C OR /D MODEL?
 1089  004654  001024                           BNE     TST21           ;;<BRANCH IF YES>
 1090  004656  012704  000201                   MOV     #201,R4         ;RESULT S/B = 201 IN XCSR
 1091  004662  016702  174526                   MOV     DLXCSR,R2       ;SET UP REGADR
 1092  004666  052712  000001                   BIS     #BIT0,(R2)      ;SET THE "BREAK" BIT
 1093  004672  020412                           CMP     R4,(R2)         ;DID IT SET PROPERLY ??
 1094  004674  001403                           BEQ     1$              ;;<BR IF YES>
 1095  004676  004767  007150                   JSR     PC,SUER2        ;GO SET UP ERROR INFO.
 1096  004702  104002                           ERROR+2                 ;"BREAK" BIT FAILED TO SET PROPERLY
 1097  004704  012704  000200           1$:     MOV     #200,R4         ;RESULT S/B = 200 IN XCSR
 1098  004710  042712  000001                   BIC     #BIT0,(R2)      ;CLEAR THE "BREAK" BIT
 1099  004714  020412                           CMP     R4,(R2)         ;DID IT CLEAR PROPERLY ??
 1100  004716  001403                           BEQ     TST21           ;;<BR IF YES>
 1101  004720  004767  007126                   JSR     PC,SUER2        ;GO SET UP ERROR INFO
 1102  004724  104002                           ERROR+2                 ;"BREAK" FAILED TO CLEAR PROPERLY
 1103
 1104
 1105                                  ;;*************************************************************
 1106                                  ;*TEST 21        TEST THAT A "RESET" CLEARS THE "BREAK" BIT
 1107                                  ;;*************************************************************
 1108  004726  000004                 TST21:  SCOPE
 1109  004730  012704  000200                   MOV     #200,R4         ;RESULT S/B = 200
 1110  004734  016702  174454                   MOV     DLXCSR,R2       ;SET UP REGADR
 1111  004740  052712  000001                   BIS     #BIT0,(R2)      ;SET THE "BREAK" BIT
 1112  004744  000005                           RESET                   ;CLEAR IT WITH A "RESET"
 1113  004746  020412                           CMP     R4,(R2)         ;DID IT CLEAR ??
 1114  004750  001403                           BEQ     TST22           ;;<BR IF YES>
 1115  004752  004767  007074                   JSR     PC,SUER2        ;GO SET UP ERROR INFO.
 1116  004756  104002                           ERROR+2                 ;RESET INSTR. FAILED TO CLEAR "BREAK"
 1117
```



```
                                        T22     TEST TO TURN AROUND NULL-DEL-NULL PATTERN

 1118                                  ;;*************************************************************
 1119                                  ;*TEST 22        TEST TO TURN AROUND NULL-DEL-NULL PATTERN
 1120                                  ;;*************************************************************
 1121  004760  000004                 TST22:  SCOPE
 1122  004762  012767  000001  174252          MOV     #1,$TIMES       ;;DO 1 ITERATION
 1123  004770  004767  007212                   JSR     PC,SUVEC        ;GO SET UP VECTORS
 1124  004774  005067  174430                   CLR     RTRY            ;INITIALIZE RETRY FLAG
 1125  005000  012767  014362  174430   1$:     MOV     #LDOUT1,LDOUT   ;SET POINTER TO LOAD ROUTINE
 1126  005006  004767  007222                   JSR     PC,PRIME        ;GO SET UP BUFFERS AND DEVICE
 1127  005012  005767  174404           2$:     TST     XFLG0           ;ANY HARD XMIT ERRORS ??
 1128  005016  001040                           BNE     5$              ;BR IF YES
 1129  005020  005767  174400                   TST     RFLG0           ;ANY HARD RECEIVER ERROR ??
 1130  005024  001053                           BNE     7$              ;BR IF YES
 1131  005026  005767  174374                   TST     RFLG1           ;ANY SOFT RECEIVER ERRORS ??
 1132  005032  001065                           BNE     9$              ;BR IF YES
 1133  005034  022767  022260  174372           CMP     #BUFEND,IPTR    ;RECEIVED 256. BYTES ??
 1134  005042  001003                           BNE     3$              ;BR IF NOT
 1135  005044  004767  007456                   JSR     PC,CHKDAT       ;GO CHECK THE DATA BUFFERS
 1136  005050  000500                           BR      TST23           ;;<GO TO NEXT TEST>
 1137  005052  005367  174362           3$:     DEC     TIMR1           ;DEC TIMEOUT COUNTER 1
 1138  005056  001355                           BNE     2$              ;BR IF NO TIMEOUT
 1139  005060  005367  174356                   DEC     TIMR2           ;DEC TIMEOUT COUNTER 2
 1140  005064  001352                           BNE     2$              ;BR IF NO TIMEOUT
 1141  005066  042777  000100  174314           BIC     #100,@DLRCSR    ;TURN OFF THE INTRS.
 1142  005074  042777  000104  174312           BIC     #104,@DLXCSR
 1143  005102  104401  016342                   TYPE    ,XMSG1          ;GO TYPE TIMEOUT MESSAGE
 1144  005106  012767  005116  174130           MOV     #4$,$ESCAPE     ;GO TO 4$ AFTER ERROR PRINT
 1145  005114  104000                           ERROR                   ;PRINT ERROR PC
 1146  005116                         4$:
 1147  005116  000455                           BR      TST23           ;;<GO TO NEXT TEST>
 1148  005120  016701  174264           5$:     MOV     DLRCSR,R1       ;PUT DEVADR IN R1
 1149  005124  016702  174264                   MOV     DLXCSR,R2       ;PUT REGADR IN R2
 1150  005130  011203                           MOV     (R2),R3         ;GET THE WAS DATA
 1151  005132  012704  000204                   MOV     #204,R4         ;PUT S/B DATA IN R4
 1152  005136  004767  006736                   JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1153  005142  012767  005152  174074           MOV     #6$,$ESCAPE     ;GO TO 6$ AFTER PRINTING ERROR
 1154  005150  104002                           ERROR+2                 ;TRANSMITTER FALSE INTERRUPT
 1155  005152                         6$:
 1156  005152  000437                           BR      TST23           ;;<GO TO NEXT TEST>
 1157  005154  016701  174230           7$:     MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1158  005160  010102                           MOV     R1,R2           ;SAVE THE REGADR
 1159  005162  011203                           MOV     (R2),R3         ;GET THE WAS DATA
 1160  005164  012704  000200                   MOV     #200,R4         ;RESULT S/B = 200
 1161  005170  004767  006704                   JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1162  005174  012767  005204  174042           MOV     #8$,$ESCAPE     ;GO TO 8$ AFTER ERROR PRINT
 1163  005202  104002                           ERROR+2                 ;RECEIVER FALSE INTERRUPT
 1164  005204                         8$:
 1165  005204  000422                           BR      TST23           ;;<GO TO NEXT TEST>
 1166  005206  016701  174176           9$:     MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1167  005212  016702  174174                   MOV     DLRDBR,R2       ;SAVE REGADR
 1168  005216  016703  173762                   MOV     $TMP1,R3        ;GET CONTENTS OF ERROR RDBR
 1169  005222  004767  006652                   JSR     PC,SUERR1       ;GO SETUP ERROR INFO
 1170  005226  012767  005236  174010           MOV     #10$,$ESCAPE    ;GO TO 10$ AFTER ERROR PRINT
 1171  005234  104005                           ERROR+5                 ;REPORT SOFT ERROR (PARITY,FRAMING, OR OVERRUN
 1172  005236  005267  174166           10$:    INC     RTRY            ;COUNT ONE TRY
 1173  005242  022767  000003  174160           CMP     #3,RTRY         ;TRIED THREE TIMES
```

```
 1174  005250  001253                          BNE     1$              ;BR IF NOT
```



```
 1175                                          ;;*****************************************************************
 1176                                          ;*TEST 23        TEST TO TURN AROUND BINARY UP COUNT PATTERN
 1177                                          ;;*****************************************************************
 1178  005252  000004                TST23:  SCOPE
 1179  005254  012767  000001  173760         MOV     #1,$TIMES       ;;DO 1 ITERATION
 1180  005262  004767  006720                 JSR     PC,SUVEC        ;GO SET UP VECTORS
 1181  005266  005067  174136                 CLR     RTRY            ;INITIALIZE RETRY FLAG
 1182  005272  012767  014404  174136  1$:    MOV     #LDOUT2,LDOUT   ;SET POINTER TO LOAD ROUTINE
 1183  005300  004767  006730                 JSR     PC,PRIME        ;GO SET UP BUFFERS AND DEVICE
 1184  005304  005767  174112          2$:    TST     XFLG0           ;ANY HARD XMIT ERRORS ??
 1185  005310  001040                         BNE     5$              ;BR IF YES
 1186  005312  005767  174106                 TST     RFLG0           ;ANY HARD RECEIVER ERROR ??
 1187  005316  001053                         BNE     7$              ;BR IF YES
 1188  005320  005767  174102                 TST     RFLG1           ;ANY SOFT RECEIVER ERRORS ??
 1189  005324  001065                         BNE     9$              ;BR IF YES
 1190  005326  022767  022260  174100         CMP     #BUFEND,IPTR    ;RECEIVED 256. BYTES ??
 1191  005334  001003                         BNE     3$              ;BR IF NOT
 1192  005336  004767  007164                 JSR     PC,CHKDAT       ;GO CHECK THE DATA BUFFERS
 1193  005342  000500                         BR      TST24           ;;<GO TO NEXT TEST>
 1194  005344  005367  174070          3$:    DEC     TIMR1           ;DEC TIMEOUT COUNTER 1
 1195  005350  001355                         BNE     2$              ;BR IF NO TIMEOUT
 1196  005352  005367  174064                 DEC     TIMR2           ;DEC TIMEOUT COUNTER 2
 1197  005356  001352                         BNE     2$              ;BR IF NO TIMEOUT
 1198  005360  042777  000100  174022         BIC     #100,@DLRCSR    ;TURN OFF THE INTRS.
 1199  005366  042777  000104  174020         BIC     #104,@DLXCSR
 1200  005374  104401  016421                 TYPE    ,XMSG2          ;GO TYPE TIMEOUT MESSAGE
 1201  005400  012767  005410  173636         MOV     #4$,$ESCAPE     ;GO TO 4$ AFTER ERROR PRINT
 1202  005406  104000                         ERROR                   ;PRINT ERROR PC
 1203  005410                          4$:
 1204  005410  000455                         BR      TST24           ;;<GO TO NEXT TEST>
 1205  005412  016701  173772          5$:    MOV     DLRCSR,R1       ;PUT DEVADR IN R1
 1206  005416  016702  173772                 MOV     DLXCSR,R2       ;PUT REGADR IN R2
 1207  005422  011203                         MOV     (R2),R3         ;GET THE WAS DATA
 1208  005424  012704  000204                 MOV     #204,R4         ;PUT S/B DATA IN R4
 1209  005430  004767  006444                 JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1210  005434  012767  005444  173602         MOV     #6$,$ESCAPE     ;GO TO 6$ AFTER PRINTING ERROR
 1211  005442  104002                         ERROR+2                 ;TRANSMITTER FALSE INTERRUPT
 1212  005444                          6$:
 1213  005444  000437                         BR      TST24           ;;<GO TO NEXT TEST>
 1214  005446  016701  173736          7$:    MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1215  005452  010102                         MOV     R1,R2           ;SAVE THE REGADR
 1216  005454  011203                         MOV     (R2),R3         ;GET THE WAS DATA
 1217  005456  012704  000200                 MOV     #200,R4         ;RESULT S/B = 200
 1218  005462  004767  006412                 JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1219  005466  012767  005476  173550         MOV     #8$,$ESCAPE     ;GO TO 8$ AFTER ERROR PRINT
 1220  005474  104002                         ERROR+2                 ;RECEIVER FALSE INTERRUPT
 1221  005476                          8$:
 1222  005476  000422                         BR      TST24           ;;<GO TO NEXT TEST>
 1223  005500  016701  173704          9$:    MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1224  005504  016702  173702                 MOV     DLRDBR,R2       ;SAVE REGADR
 1225  005510  016703  173470                 MOV     $TMP1,R3        ;GET CONTENTS OF ERROR RDBR
 1226  005514  004767  006360                 JSR     PC,SUERR1       ;GO SETUP ERROR INFO
 1227  005520  012767  005530  173516         MOV     #10$,$ESCAPE    ;GO TO 10$ AFTER ERROR PRINT
 1228  005526  104005                         ERROR+5                 ;REPORT SOFT ERROR (PARITY,FRAMING, OR OVERRUN
 1229  005530  005267  173674          10$:   INC     RTRY            ;COUNT ONE TRY
 1230  005534  022767  000003  173666         CMP     #3,RTRY         ;TRIED THREE TIMES
```

```
 1231  005542  001253                          BNE     1$              ;BR IF NOT
```



```
 1232                                       ;;************************************************************
 1233                                       ;*TEST 24       TEST TO TURN AROUND BINARY DOWN COUNT PATTERN
 1234                                       ;;************************************************************
 1235  005544  000004                      TST24:  SCOPE
 1236  005546  012767  000001  173466              MOV     #1,$TIMES       ;;DO 1 ITERATION
 1237  005554  004767  006426                      JSR     PC,SUVEC        ;GO SET UP VECTORS
 1238  005560  005067  173644                      CLR     RTRY            ;INITIALIZE RETRY FLAG
 1239  005564  012767  014424  173644  1$:         MOV     #LDOUT3,LDOUT   ;SET POINTER TO LOAD ROUTINE
 1240  005572  004767  006436                      JSR     PC,PRIME        ;GO SET UP BUFFERS AND DEVICE
 1241  005576  005767  173620          2$:         TST     XFLG0           ;ANY HARD XMIT ERRORS ??
 1242  005602  001040                              BNE     5$              ;BR IF YES
 1243  005604  005767  173614                      TST     RFLG0           ;ANY HARD RECEIVER ERROR ??
 1244  005610  001053                              BNE     7$              ;BR IF YES
 1245  005612  005767  173610                      TST     RFLG1           ;ANY SOFT RECEIVER ERRORS ??
 1246  005616  001065                              BNE     9$              ;BR IF YES
 1247  005620  022767  022260  173606              CMP     #BUFEND,IPTR    ;RECEIVED 256. BYTES ??
 1248  005626  001003                              BNE     3$              ;BR IF NOT
 1249  005630  004767  006672                      JSR     PC,CHKDAT       ;GO CHECK THE DATA BUFFERS
 1250  005634  000500                              BR      TST25           ;;<GO TO NEXT TEST>
 1251  005636  005367  173576          3$:         DEC     TIMR1           ;DEC TIMEOUT COUNTER 1
 1252  005642  001355                              BNE     2$              ;BR IF NO TIMEOUT
 1253  005644  005367  173572                      DEC     TIMR2           ;DEC TIMEOUT COUNTER 2
 1254  005650  001352                              BNE     2$              ;BR IF NO TIMEOUT
 1255  005652  042777  000100  173530              BIC     #100,@DLRCSR    ;TURN OFF THE INTRS.
 1256  005660  042777  000104  173526              BIC     #104,@DLXCSR
 1257  005666  104401  016502                      TYPE    ,XMSG3          ;GO TYPE TIMEOUT MESSAGE
 1258  005672  012767  005702  173344              MOV     #4$,$ESCAPE     ;GO TO 4$ AFTER ERROR PRINT
 1259  005700  104000                              ERROR                   ;PRINT ERROR PC
 1260  005702                               4$:
 1261  005702  000455                              BR      TST25           ;;<GO TO NEXT TEST>
 1262  005704  016701  173500          5$:         MOV     DLRCSR,R1       ;PUT DEVADR IN R1
 1263  005710  016702  173500                      MOV     DLXCSR,R2       ;PUT REGADR IN R2
 1264  005714  011203                              MOV     (R2),R3         ;GET THE WAS DATA
 1265  005716  012704  000204                      MOV     #204,R4         ;PUT S/B DATA IN R4
 1266  005722  004767  006152                      JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1267  005726  012767  005736  173310              MOV     #6$,$ESCAPE     ;GO TO 6$ AFTER PRINTING ERROR
 1268  005734  104002                              ERROR+2                 ;TRANSMITTER FALSE INTERRUPT
 1269  005736                               6$:
 1270  005736  000437                              BR      TST25           ;;<GO TO NEXT TEST>
 1271  005740  016701  173444          7$:         MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1272  005744  010102                              MOV     R1,R2           ;SAVE THE REGADR
 1273  005746  011203                              MOV     (R2),R3         ;GET THE WAS DATA
 1274  005750  012704  000200                      MOV     #200,R4         ;RESULT S/B = 200
 1275  005754  004767  006120                      JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1276  005760  012767  005770  173256              MOV     #8$,$ESCAPE     ;GO TO 8$ AFTER ERROR PRINT
 1277  005766  104002                              ERROR+2                 ;RECEIVER FALSE INTERRUPT
 1278  005770                               8$:
 1279  005770  000422                              BR      TST25           ;;<GO TO NEXT TEST>
 1280  005772  016701  173412          9$:         MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1281  005776  016702  173410                      MOV     DLRDBR,R2       ;SAVE REGADR
 1282  006002  016703  173176                      MOV     $TMP1,R3        ;GET CONTENTS OF ERROR RDBR
 1283  006006  004767  006066                      JSR     PC,SUERR1       ;GO SETUP ERROR INFO
 1284  006012  012767  006022  173224              MOV     #10$,$ESCAPE    ;GO TO 10$ AFTER ERROR PRINT
 1285  006020  104005                              ERROR+5                 ;REPORT SOFT ERROR (PARITY,FRAMING, OR OVERRUN
 1286  006022  005267  173402          10$:        INC     RTRY            ;COUNT ONE TRY
 1287  006026  022767  000003  173374              CMP     #3,RTRY         ;TRIED THREE TIMES
```

```
 1288  006034  001253                        BNE     1$              ;BR IF NOT
```



```
 1289                                   ;;*****************************************************************
 1290                                   ;*TEST 25       TEST TO TURN AROUND WORST CASE PATTERN
 1291                                   ;;*****************************************************************
 1292  006036  000004                   TST25:  SCOPE
 1293  006040  012767  000001  173174           MOV     #1,$TIMES       ;;DO 1 ITERATION
 1294  006046  004767  006134                   JSR     PC,SUVEC        ;GO SET UP VECTORS
 1295  006052  005067  173352                   CLR     RTRY            ;INITIALIZE RETRY FLAG
 1296  006056  012767  014460  173352  1$:      MOV     #LDOUT4,LDOUT   ;SET POINTER TO LOAD ROUTINE
 1297  006064  004767  006144                   JSR     PC,PRIME        ;GO SET UP BUFFERS AND DEVICE
 1298  006070  005767  173326           2$:     TST     XFLG0           ;ANY HARD XMIT ERRORS ??
 1299  006074  001042                           BNE     5$              ;BR IF YES
 1300  006076  005767  173322                   TST     RFLG0           ;ANY HARD RECEIVER ERROR ??
 1301  006102  001056                           BNE     7$              ;BR IF YES
 1302  006104  005767  173316                   TST     RFLG1           ;ANY SOFT RECEIVER ERRORS ??
 1303  006110  001071                           BNE     9$              ;BR IF YES
 1304  006112  022767  022260  173314           CMP     #BUFEND,IPTR    ;RECEIVED 256. BYTES ??
 1305  006120  001004                           BNE     3$              ;BR IF NOT
 1306  006122  004767  006400                   JSR     PC,CHKDAT       ;GO CHECK THE DATA BUFFERS
 1307  006126  000167  002012                   JMP             $EOP            ;GO TO NEXT TEST
 1308  006132  005367  173302           3$:     DEC     TIMR1           ;DEC TIMEOUT COUNTER 1
 1309  006136  001354                           BNE     2$              ;BR IF NO TIMEOUT
 1310  006140  005367  173276                   DEC     TIMR2           ;DEC TIMEOUT COUNTER 2
 1311  006144  001351                           BNE     2$              ;BR IF NO TIMEOUT
 1312  006146  042777  000100  173234           BIC     #100,@DLRCSR    ;TURN OFF THE INTRS.
 1313  006154  042777  000104  173232           BIC     #104,@DLXCSR
 1314  006162  104401  016565                   TYPE    ,XMSG4          ;GO TYPE TIMEOUT MESSAGE
 1315  006166  012767  006176  173050           MOV     #4$,$ESCAPE     ;GO TO 4$ AFTER ERROR PRINT
 1316  006174  104000                           ERROR                   ;PRINT ERROR PC
 1317  006176  000167  001742           4$:     JMP     $EOP            ;GO TO NEXT TEST
 1318  006202  016701  173202           5$:     MOV     DLRCSR,R1       ;PUT DEVADR IN R1
 1319  006206  016702  173202                   MOV     DLXCSR,R2       ;PUT REGADR IN R2
 1320  006212  011203                           MOV     (R2),R3         ;GET THE WAS DATA
 1321  006214  012704  000204                   MOV     #204,R4         ;PUT S/B DATA IN R4
 1322  006220  004767  005654                   JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1323  006224  012767  006234  173012           MOV     #6$,$ESCAPE     ;GO TO 6$ AFTER PRINTING ERROR
 1324  006232  104002                           ERROR+2                 ;TRANSMITTER FALSE INTERRUPT
 1325  006234  000167  001704           6$:     JMP     $EOP            ;GO TO NEXT TEST
 1326  006240  016701  173144           7$:     MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1327  006244  010102                           MOV     R1,R2           ;SAVE THE REGADR
 1328  006246  011203                           MOV     (R2),R3         ;GET THE WAS DATA
 1329  006250  012704  000200                   MOV     #200,R4         ;RESULT S/B = 200
 1330  006254  004767  005620                   JSR     PC,SUERR1       ;GO SET UP ERROR INFO
 1331  006260  012767  006270  172756           MOV     #8$,$ESCAPE     ;GO TO 8$ AFTER ERROR PRINT
 1332  006266  104002                           ERROR+2                 ;RECEIVER FALSE INTERRUPT
 1333  006270  000167  001650           8$:     JMP     $EOP            ;GO TO NEXT TEST
 1334  006274  016701  173110           9$:     MOV     DLRCSR,R1       ;SAVE THE DEVADR
 1335  006300  016702  173106                   MOV     DLRDBR,R2       ;SAVE REGADR
 1336  006304  016703  172674                   MOV     $TMP1,R3        ;GET CONTENTS OF ERROR RDBR
 1337  006310  004767  005564                   JSR     PC,SUERR1       ;GO SETUP ERROR INFO
 1338  006314  012767  006324  172722           MOV     #10$,$ESCAPE    ;GO TO 10$ AFTER ERROR PRINT
 1339  006322  104005                           ERROR+5                 ;REPORT SOFT ERROR (PARITY,FRAMING, OR OVERRUN
 1340  006324  005267  173100           10$:    INC     RTRY            ;COUNT ONE TRY
 1341  006330  022767  000003  173072           CMP     #3,RTRY         ;TRIED THREE TIMES
 1342  006336  001247                           BNE     1$              ;BR IF NOT
 1343  006340  000167  001600                   JMP     $EOP            ;GO TO END OF PASS ROUTINE
 1344
```

```
1345                                    ;THIS IS PROGRAM #2
1346                                    ;THE FOLLOWING USER UTILITY PROGRAM WILL ALLOW:
1347                                    ;       A)  SELECTION OF A TRANSMITTER DATA BUFFER
1348                                    ;       B)  SELECTION OF A CHARACTER FOR CONTINUOUS TRANSFER
1349                                    ;       C)  SELECTION OF AN EXPIRATION TIME IN MILLISECONDS
1350                                    ;           BETWEEN EACH TRANSMITTER DATA BUFFER CHARACTER TRANSFER
1351                                    ;       D)  A TIGHT SCOPE LOOP LOCK ON A SPECIFIC CHARACTER
1352                                    ;
1353
1354  006344  012706  001100            PRG2:   MOV     #STACK,SP       ;INITIALIZE THE STACK POINTER
1355  006350  012737  013066  000034            MOV     #$TRAP,@#TRAPVEC        ;TRAP VECTOR FOR TRAP CALLS
1356  006356  012737  000340  000036            MOV     #340,@#TRAPVEC+2        ;LEVEL 7
1357  006364  012737  010746  000030            MOV     #$ERROR,@#EMTVEC        ;EMT VECTOR FOR ERROR ROUTINE
1358  006372  012737  000340  000032            MOV     #340,@#EMTVEC+2         ;LEVEL 7
1359  006400  104401  016700                    TYPE    ,PROG2M         ;INDICATE THAT USER SELECTED
1360                                                                    ;PROGRAM #2
1361  006404  104401  020322            PRG2A:  TYPE    ,LINTAD         ;ASK USER FOR THE TRANSMITTER
1362                                                                    ;DATA BUFFER ADDRESS OF THE DEVICE
1363                                                                    ;HE WISHES TO TEST
1364  006410  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1365                                                                    ;AND STORE ON TOP OF STACK
1366                                    ;CHECK TO SEE IF THE USER RESPONSE WAS WITHIN LIMITS
1367  006412  012602                            MOV     (SP)+,R2        ;GET THE ANSWER TYPED
1368  006414  020227  176176                    CMP     R2,#176176      ;IS THE NUMBER TOO HIGH?
1369  006420  101065                            BHI     REDO1           ;IF YES - GO TO RETRY SITUATION
1370  006422  020227  175616                    CMP     R2,#175616      ;IS THE NUMBER TOO LOW?
1371  006426  103462                            BLO     REDO1           ;IF YES - GO TO RETRY SITUATION
1372  006430  132702  000001                    BITB    #BIT0,R2        ;NUMBER IS IN RANGE BUT IS IT
1373                                                                    ;ON AN EVEN BOUNDARY?
1374  006434  001057                            BNE     REDO1           ;IF NOT GO TO RETRY SITUATION
1375                                    ;CHECK TO SEE IF USER RESPONSE WAS TRULY A XMIT BUFFER REGISTER
1376  006436  010203                            MOV     R2,R3           ;GET THE USER RESPONSE
1377  006440  142703  000370                    BICB    #370,R3         ;MASK OFF LOWER BYTE EXCEPT FOR
1378                                                                    ;LEAST SIGNIFICANT DIGIT
1379  006444  122703  000006                    CMPB    #6,R3           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
1380                                                                    ;USER RESPONSE EQUAL TO A SIX?
1381  006450  001051                            BNE     REDO1           ;BRANCH IF NOT
1382  006452  010267  172524                    MOV     R2,$TMP0        ;THE TRANSMITTER ADDRESS
1383                                                                    ;TYPED IS OK - STORE FOR
1384                                                                    ;FUTURE USE
1385                                    ;NOW CHECK TO MAKE SURE THE DEVICE IS PRESENT
1386  006456  016746  171322                    MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
1387  006462  012767  006474  171314            MOV     #2$,ERRVEC      ;SET UP TIMEOUT SERVICE ADDRESS
1388  006470  005712                            TST     (R2)            ;IF PRESENT WE WILL EXECUTE THE
1389                                                                    ;NEXT INSTRUCTION - IF NOT
1390                                                                    ;WE GO TO 2$:
1391  006472  000412                            BR      4$              ;BRANCH IF PRESENT
1392  006474  004767  005460            2$:     JSR     PC,SUERT2       ;GO SET UP FOR ERROR INFORMATION
1393  006500  012767  006510  172536            MOV     #3$,$ESCAPE     ;POINT OF RETURN AFTER ERROR REPORT
1394  006506  104006                            ERROR   +6              ;XDBR REFERENCE CAUSED TIMEOUT
1395  006510  022626                    3$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
1396  006512  012667  171266                    MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR
1397  006516  000426                            BR      REDO1           ;GO TO RETRY SITUATION
1398  006520  012667  171260            4$:     MOV     (SP)+,ERRVEC    ;DEVICE REGISTER IS PRESENT!
1399                                                                    ;RESTORE TIMEOUT VECTOR
1400                                    ;WE ARE NOW READY FOR THE CHARACTER TO BE TRANSMITTED, AND THE
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1401                                    ;DELAY TIME (IN MILLISECONDS) THAT IS TO TRANSPIRE BETWEEN
1402                                    ;SUCCESSIVE CHARACTER TRANSFERS
1403  006524  104401  020403            PRG28:  TYPE    ,SELCAR         ;ASK USER FOR THE CHARACTER HE
1404                                                                    ;WISHES TO TRANSFER
1405  006530  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY
1406                                                                    ;USER AND STORE ON TOP OF STACK
1407  006532  012667  172446                    MOV     (SP)+,$TMP1     ;GET THE ANSWER TYPED
1408                                    ;NOTE:  THE USER RESPONSE FOR THE CHARACTER WAS TO BE THE
1409                                    ;       OCTAL ASCII EQUIVALENT OF THE CHARACTER E.G. A=101
1410  006536  104401  020511                    TYPE    ,SELDLY         ;ASK THE USER FOR THE DELAY
1411                                                                    ;IN MSEC (OCTAL NO.) BETWEEN
1412                                                                    ;CHARACTER TRANSFERS
1413  006542  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY
1414                                                                    ;USER AND STORE ON TOP OF STACK
1415  006544  012667  172436                    MOV     (SP)+,$TMP2     ;GET THE ANSWER TYPED
1416  006550  116767  172432  000012    1$:     MOVB    $TMP2,2$        ;SET THE DELAY COUNT ARGUMENT
1417                                                                    ;FOR TIMER ROUTINE
1418  006556  116777  172422  172416            MOVB    $TMP1,@$TMP0    ;LOAD THE TRANSMITTER DATA
1419                                                                    ;BUFFER WITH THE CHARACTER
1420  006564  004767  004750                    JSR     PC,DELAY        ;GO OFF TO WAIT THE SPECIFIED
```

```
1421                                                    ;NO. OF MSEC. BEFORE ISSUING
1422                                                    ;ANOTHER CHARACTER
1423  006570  000000                    2$:     .WORD   0               ;THIS IS WHERE THE DELAY COUNT RESIDES
1424  006572  000766                            BR      1$              ;GO BACK TO ISSUE ANOTHER CHARACTER
1425  006574  104401  001252            REDO1:  TYPE    ,#QUES          ;TYPE A QUESTION MARK(?)
1426  006600  000167  177600                    JMP     PRG2A           ;REITERATE THE XDBR QUESTION TO USER
1427                                    ;THIS IS PROGRAM #3
1428                                    ;THE FOLLOWING USER UTILITY PROGRAM WILL ALLOW:
1429                                    ;       A)  SELECTION OF A TRANSMITTER DATA BUFFER
1430                                    ;       B)  SELECTION OF A CHARACTER FOR CONTINUOUS TRANSFER
1431                                    ;           IN MAINTENANCE MODE
1432                                    ;       C)  SELECTION OF AN EXPIRATION TIME IN MILLISECONDS
1433                                    ;           BETWEEN EACH TRANSMITTER DATA BUFFER CHARACTER TRANSFER
1434                                    ;       D)  A TIGHT SCOPE LOOP LOCK ON A SPECIFIC CHARACTER
1435                                    ;
1436
1437  006604  012706  001100            PRG3:   MOV     #STACK,SP       ;INITIALIZE THE STACK POINTER
1438  006610  012737  013066  000034            MOV     #$TRAP,@#TRAPVEC        ;TRAP VECTOR FOR TRAP CALLS
1439  006616  012737  000340  000036            MOV     #340,@#TRAPVEC+2        ;LEVEL 7
1440  006624  012737  010746  000030            MOV     #$ERROR,@#EMTVEC        ;EMT VECTOR FOR ERROR ROUTINE
1441  006632  012737  000340  000032            MOV     #340,@#EMTVEC+2         ;LEVEL 7
1442  006640  104401  016744                    TYPE    ,PROG3M         ;INDICATE THAT USER SELECTED
1443                                                                    ;PROGRAM #3
1444  006644  104401  020322            PRG3A:  TYPE    ,LINTAD         ;ASK USER FOR THE TRANSMITTER DATA
1445                                                                    ;BUFFER ADDRESS OF THE DEVICE
1446                                                                    ;HE WISHES TO TEST
1447  006650  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY
1448                                                                    ;USER AND STORE ON TOP OF STACK
1449                                    ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
1450  006652  012602                            MOV     (SP)+,R2        ;GET THE ANSWER TYPED
1451  006654  020227  176176                    CMP     R2,#176176      ;IS THE NUMBER TOO HIGH?
1452  006660  101071                            BHI     REDO2           ;IF YES - GO TO RETRY SITUATION
1453  006662  020227  175616                    CMP     R2,#175616      ;IS THE NUMBER TOO LOW?
1454  006666  103466                            BLO     REDO2           ;IF YES - GO TO RETRY SITUATION
1455  006670  132702  000001                    BITB    #BIT0,R2        ;NUMBER IS IN RANGE BUT IS IT
1456                                                                    ;ON AN EVEN BOUNDARY?
1457  006674  001063                            BNE     REDO2           ;IF NOT - GO TO RETRY SITUATION
1458                                    ;CHECK TO SEE IF USER RESPONSE WAS TRULY A XDBR DBR ADDRESS
1459  006676  010203                            MOV     R2,R3           ;GET THE USER RESPONSE
1460  006700  142703  000370                    BICB    #370,R3         ;MASK OFF LOWER BYTE EXCEPT FOR
1461                                                                    ;LEAST SIGNIFICANT DIGIT
1462  006704  122703  000006                    CMPB    #6,R3           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
1463                                                                    ;USER RESPONSE EQUAL TO A TWO?
1464  006710  001055                            BNE     REDO2           ;BRANCH IF NOT
1465  006712  010267  172264                    MOV     R2,$TMP0        ;THE TRANSMITTER ADDRESS TYPED IS
1466                                                                    ;OK - STORE FOR FUTURE USE
1467                                    ;NOW CHECK TO MAKE SURE THE DEVICE IS PRESENT
1468  006716  016746  171062                    MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
1469  006722  012767  006734  171054            MOV     #2$,ERRVEC      ;SET UP TIMEOUT SERVICE ADDRESS
1470  006730  005712                            TST     (R2)            ;IF PRESENT WE WILL EXECUTE THE
1471                                                                    ;NEXT INSTRUCTION - IF NOT WE
1472                                                                    ;GO TO 2$:
1473  006732  000412                            BR      4$              ;BRANCH IF PRESENT
1474  006734  004767  005220            2$:     JSR     PC,SUERT2       ;GO SET UP FOR ERROR INFORMATION
1475  006740  012767  006750  172276            MOV     #3$,$ESCAPE     ;POINT OF RETURN AFTER ERROR REPORT
1476  006746  104006                            ERROR   +6              ;XDBR REFERENCE CAUSED TIMEOUT
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1477  006750  022626            3$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
1478  006752  012667  171026            MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR
1479  006756  000432                    BR      REDO2           ;GO TO RETRY SITUATION
1480  006760  012667  171020            4$:     MOV     (SP)+,ERRVEC    ;DEVICE REGISTER IS PRESENT!
1481                                                            ;RESTORE TIMEOUT VECTOR
1482                                    ;WE ARE NOW READY FOR THE CHARACTER TO BE TRANSMITTED, AND THE
1483                                    ;DELAY TIME (IN MILLISECONDS) THAT IS TO TRANSPIRE BETWEEN SUCCESSIVE
1484                                    ;CHARACTER TRANSFERS
1485  006764  104401  020403            PRG3B:  TYPE    ,SELCAR         ;ASK USER FOR THE CHARACTER
1486                                                                    ;HE WISHES TO TRANSFER
1487  006770  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1488                                                                    ;AND STORE ON TOP OF STACK
1489  006772  012667  172206                    MOV     (SP)+,$TMP1     ;GET THE ANSWER TYPED
1490                                    ;NOTE:  THE USER RESPONSE FOR THE CHARACTER WAS TO BE THE
1491                                    ;       OCTAL ASCII EQUIVALENT OF THE CHARACTER E.G. B=102
1492  006776  104401  020511                    TYPE    ,SELDLY         ;ASK THE USER FOR THE DELAY
1493                                                                    ;IN MSEC (OCTAL NO.) BETWEEN
1494                                                                    ;CHARACTER TRANSFERS
1495  007002  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY
1496                                                                    ;USER AND STORE ON TOP OF STACK
1497  007004  012667  172176                    MOV     (SP)+,$TMP2     ;GET THE ANSWER TYPED
1498  007010  162702  000002                    SUB     #2,R2           ;GET THE CORRESPONDING XCSR
1499                                                                    ;ADDRESS FOR TRANSMITTER UNDER-
1500                                                                    ;GOING TEST
1501  007014  052712  000004            1$:     BIS     #BIT2,(R2)      ;SET MAINTENANCE BIT IN XCSR
1502  007020  116767  172162  000012            MOVB    $TMP2,2$        ;SET THE DELAY COUNT ARGUMENT
1503                                                                    ;FOR TIMER ROUTINE
1504  007026  116777  172152  172146            MOVB    $TMP1,@$TMP0    ;LOAD THE TRANSMITTER DATA BUFFER
1505                                                                    ;WITH THE CHARACTER
1506  007034  004767  004500                    JSR     PC,DELAY        ;GO OFF TO WAIT THE SPECIFIED
1507                                                                    ;NO. OF MSEC. BEFORE ISSUING
1508                                                                    ;ANOTHER CHARACTER
1509  007040  000000            2$:     .WORD   0               ;THIS IS WHERE THE DELAY COUNT RESIDES
1510  007042  000764                    BR      1$              ;GO BACK TO ISSUE ANOTHER CHARACTER
1511  007044  104401  001252            REDO2:  TYPE    ,#QUES          ;TYPE A QUESTION MARK(?)
1512  007050  000167  177570                    JMP     PRG3A           ;REITERATE THE XDBR QUESTION TO
1513                                                                    ;USER
1514
1515                                    ;THIS IS PROGRAM #4
1516                                    ;THE FOLLOWING USER UTILITY PROGRAM WILL ALLOW:
1517                                    ;       A)  SELECTION OF A TRANSMITTER DATA BUFFER
1518                                    ;       B)  SELECTION OF A SINGLE CHARACTER TO BE SENT, RECEIVED
1519                                    ;           AND CHECKED WITH MAINTENANCE BIT SET
1520                                    ;
1521
1522  007054  012706  001100            PRG4:   MOV     #STACK,SP       ;INITIALIZE THE STACK POINTER
1523  007060  012737  013066  000034            MOV     #$TRAP,@#TRAPVEC        ;TRAP VECTOR FOR TRAP CALLS
1524  007066  012737  000340  000036            MOV     #340,@#TRAPVEC+2        ;LEVEL 7
1525  007074  012737  010746  000030            MOV     #$ERROR,@#EMTVEC        ;EMT VECTOR FOR ERROR ROUTINE
1526  007102  012737  000340  000032            MOV     #340,@#EMTVEC+2         ;LEVEL 7
1527  007110  104401  017010                    TYPE    ,PROG4M         ;INDICATE THAT USER SELECTED
1528                                                                    ;PROGRAM #4
1529  007114  104401  020322            PRG4A:  TYPE    ,LINTAD         ;ASK USER FOR THE TRANSMITTER
1530                                                                    ;DATA BUFFER ADDRESS OF THE
1531                                                                    ;DEVICE HE WISHES TO TEST
1532  007120  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY
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1533                                                    ;USER AND STORE ON TOP OF STACK
1534                                    ;CHECK TO SEE IF THE USER RESPONSE WAS WITHIN LIMITS
1535  007122  012602                            MOV     (SP)+,R2        ;GET THE ANSWER TYPED
1536  007124  020227  176176                    CMP     R2,#176176      ;IS THE NUMBER TOO HIGH?
1537  007130  101136                            BHI     REDO3           ;IF YES - GO TO RETRY SITUATION
1538  007132  020227  175616                    CMP     R2,#175616      ;IS THE NUMBER TOO LOW?
1539  007136  103533                            BLO     REDO3           ;IF YES - GO TO RETRY SITUATION
1540  007140  132702  000001                    BITB    #BIT0,R2        ;NUMBER IS IN RANGE BUT IS IT
1541                                                    ;ON AN EVEN BOUNDARY?
1542  007144  001130                            BNE     REDO3           ;IF NO - GO TO RETRY SITUATION
1543                                    ;CHECK TO SEE IF USER RESPONSE WAS TRULY A XMIT BUFFER REGISTER
1544  007146  010203                            MOV     R2,R3           ;GET THE USER RESPONSE
1545  007150  142703  000370                    BICB    #370,R3         ;MASK OFF LOWER BYTE EXCEPT FOR
1546                                                    ;LEAST SIGNIFICANT DIGIT
1547  007154  122703  000006                    CMPB    #6,R3           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
1548                                                    ;USER RESPONSE EQUAL TO A SIX?
1549  007160  001122                            BNE     REDO3           ;BRANCH IF NOT
1550  007162  010267  172014                    MOV     R2,$TMP0        ;THE TRANSMITTER ADDRESS TYPED
1551                                                    ;IS OK - STORE FOR FUTURE USE
1552                                    ;NOW CHECK TO MAKE SURE THE DEVICE IS PRESENT
1553  007166  016746  170612                    MOV     ERRVEC,-(SP)    ;SAVE THE TIMEOUT VECTOR
1554  007172  012767  007204  170604            MOV     #2$,ERRVEC      ;SET UP TIMEOUT SERVICE ADDRESS
1555  007200  005712                            TST     (R2)            ;IF PRESENT WE WILL EXECUTE THE
1556                                                    ;NEXT INSTRUCTION - IF NOT WE
1557                                                    ;GO TO 2$:
1558  007202  000412                            BR      4$              ;BRANCH IF PRESENT
1559  007204  004767  004750           2$:     JSR     PC,SUERT2       ;GO SET UP FOR ERROR INFORMATION
1560  007210  012767  007220  172026            MOV     #3$,$ESCAPE     ;POINT OF RETURN AFTER ERROR REPORT
1561  007216  104006                            ERROR   +6              ;XDBR REFERENCE CAUSED TIMEOUT
1562  007220  022626                    3$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
1563  007222  012667  170556                    MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR
1564  007226  000477                            BR      REDO3           ;GO TO RETRY SITUATION
1565  007230  012667  170550           4$:     MOV     (SP)+,ERRVEC    ;DEVICE REGISTER IS PRESENT!
1566                                                    ;RESTORE TIMEOUT VECTOR
1567  007234  104401  020604                    TYPE    ,PSTALL         ;ASK THE USER IF HE DESIRES SOME
1568                                                    ;RANDOM NO. OF MSEC. WAIT TIME
1569                                                    ;BEFORE CHECKING FOR XCSR DONE
1570                                                    ;FLAG
1571  007240  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1572                                                    ;AND STORE ON TOP OF STACK
1573  007242  012667  171740                    MOV     (SP)+,$TMP2     ;GET THE ANSWER TYPED
1574                                    ;WE ARE NOW READY FOR THE CHARACTER TO BE TRANSMITTED
1575  007246  104401  020403           PRG4B:  TYPE    ,SELCAR         ;ASK USER FOR THE CHARACTER HE
1576                                                    ;WISHES TO TRANSFER
1577  007252  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1578                                                    ;AND STORE ON TOP OF STACK
1579  007254  012667  171724                    MOV     (SP)+,$TMP1     ;GET THE ANSWER TYPED
1580                                    ;NOTE:  THE USER RESPONSE FOR THE CHARACTER WAS TO BE THE OCTAL
1581                                    ;       ASCII EQUIVALENT OF THE CHARACTER E.G. C=103
1582                                    ;
1583  007260  104401  017233           PRG4C:  TYPE,   LENGTH  ;ASK USER FOR THE CHARACTER LENGTH
1584                                                    ;FOR WHICH HIS DEVICE IS SET
1585  007264  104411                            RDDEC                   ;ACCEPT THE ANSWER TYPED BY USER
1586                                    ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
1587  007266  012600                            MOV     (SP)+,R0        ;GET THE ANSWER TYPED
1588  007270  020027  000010                    CMP     R0,#8.          ;IS THE NUMBER TOO HIGH?
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1589  007274  101060                            BHI     REDO3A          ;IF YES - GO TO RETRY SITUATION
1590  007276  020027  000005                    CMP     R0,#5.          ;IS THE NUMBER TOO LOW?
1591  007302  103455                            BLO     REDO3A          ;IF YES - GO TO RETRY SITUATION
1592  007304  010067  171724                    MOV     R0,$TMP15       ;THE VALUE TYPED IS OK
1593                                                    ;STORE FOR FUTURE USE
1594  007310  016767  171666  171672            MOV     $TMP0,$TMP3     ;GET THE XDBR ADDRESS
1595  007316  162767  000002  171664            SUB     #2,$TMP3        ;FORM THE XCSR ADDRESS
1596  007324  005767  171656           1$:     TST     $TMP2           ;DO WE RANDOM STALL?
1597  007330  001402                            BEQ     2$              ;BRANCH IF IT WASN'T DESIRED
1598  007332  004767  004246                    JSR     PC,STALL        ;GO STALL RANDOM VALUE OF MSEC.
1599  007336  004767  004352           2$:     JSR     PC,TIMETX       ;GO WAIT FOR TRANSMITTER DONE
1600                                                    ;BIT TO SET
1601  007342  104401  017120                    TYPE    ,XDB            ;TYPE TRANSMITTER DONE BIT MESSAGE
1602  007346  104000                            ERROR   +0              ;XCSR DONE BIT NEVER SET
1603  007350  052777  000004  171632            BIS     #BIT2,@$TMP3    ;SET THE MAINTENANCE BIT IN THE
1604                                                    ;TRANSMITTER CONTROL STATUS REGISTER
1605  007356  016777  171622  171616            MOV     $TMP1,@$TMP0    ;LOAD TRANSMITTER DATA BUFFER
1606                                                    ;WITH SELECTED CHARACTER
1607  007364  004767  004306                    JSR     PC,TIMERX       ;GO WAIT FOR RECEIVER DONE BIT
1608                                                    ;TO SET
1609  007370  104401  017167                    TYPE    ,RDB            ;TYPE RECEIVER DONE BIT MESSAGE
1610  007374  104000                            ERROR   +0              ;RCSR DONE BIT NEVER SET
1611  007376  016767  171606  171606            MOV     $TMP3,$TMP4     ;GET THE TRANSMITTER CONTROL
1612                                                    ;STATUS REGISTER ADDRESS
1613  007404  162767  000002  171600            SUB     #2,$TMP4        ;FORM THE RECEIVER DATA BUFFER
1614                                                    ;ADDRESS
1615  007412  017767  171574  171574            MOV     @$TMP4,$TMP5    ;STORE THE CHARACTER FROM THE
1616                                                    ;RECEIVER BUFFER + REST OF CONTENTS
1617  007420  004767  004326                    JSR     PC,DATCHK       ;GO TO COMPARE EXPECTED & RECEIVED
1618                                                    ;DATA
1619  007424  000737                            BR      1$              ;GO BACK TO ISSUE ANOTHER CHARACTER
1620  007426  104401  001252           REDO3:  TYPE    ,$QUES          ;TYPE A QUESTION MARK(?)
1621  007432  000167  177456                    JMP     PRG4A           ;REITERATE THE XDBR QUESTION TO USER
1622  007436  104401  001252           REDO3A: TYPE,   $QUES           ;TYPE '?' INDICATING USER TYPED
1623                                                    ;SOMETHING WRONG FOR CHARACTER LENGTH
1624  007442  000167  177612                    JMP     PRG4C           ;GO BACK TO REISSUE QUESTION
1625
1626                                    ;THIS IS PROGRAM #5
1627                                    ;THE FOLLOWING USER UTILITY PROGRAM WILL ALLOW USER PARAMETERS
1628                                    ;FOR RUNNING A BINARY COUNT IN MAINTENANCE MODE
1629                                    ;
1630
1631  007446  012706  001100           PRG5:   MOV     #STACK,SP       ;INITIALIZE THE STACK POINTER
1632  007452  012737  013066  000034            MOV     #$TRAP,@#TRAPVEC        ;TRAP VECTOR FOR TRAP CALLS
1633  007460  012737  000340  000036            MOV     #340,@#TRAPVEC+2        ;LEVEL 7
1634  007466  012737  010746  000030            MOV     #$ERROR,@#EMTVEC        ;EMT VECTOR FOR ERROR ROUTINE
1635  007474  012737  000340  000032            MOV     #340,@#EMTVEC+2         ;LEVEL 7
1636  007502  104401  017054                    TYPE    ,PROG5M         ;INDICATE THAT USER SELECTED
1637                                                    ;PROGRAM #5
1638  007506  104401  020322           PRG5A:  TYPE    ,LINTAD         ;ASK USER FOR THE TRANSMITTER DATA
1639                                                    ;BUFFER ADDRESS OF THE DEVICE
1640                                                    ;HE WISHES TO TEST
1641  007512  104410                            RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1642                                                    ;AND STORE ON TOP OF STACK
1643                                    ;CHECK TO SEE IF THE USER RESPONSE WAS WITHIN LIMITS
1644  007514  012602                            MOV     (SP)+,R2        ;GET THE ANSWER TYPED
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1645  007516  020227  176176          CMP     R2,#176176      ;IS THE NUMBER TOO HIGH?
1646  007522  101152                  BHI     REDO4           ;IF YES - GO TO RETRY SITUATION
1647  007524  020227  175616          CMP     R2,#175616      ;IS THE NUMBER TOO LOW?
1648  007530  103547                  BLO     REDO4           ;IF YES - GO TO RETRY SITUATION
1649  007532  132702  000001          BITB    #BIT0,R2        ;NUMBER IS IN RANGE BUT IS IT
1650                                                          ;ON AN EVEN BOUNDARY?
1651  007536  001144                  BNE     REDO4           ;IF NOT - GO TO RETRY SITUATION
1652                                ;CHECK TO SEE IF USER RESPONSE WAS TRULY A XMIT BUFFER REGISTER
1653  007540  010203                  MOV     R2,R3           ;GET THE USER RESPONSE
1654  007542  142703  000370          BICB    #370,R3 ;MASK OFF LOWER BYTE EXCEPT FOR
1655                                                          ;LEAST SIGNIFICANT DIGIT
1656  007546  122703  000006          CMPB    #6,R3           ;WAS THE LEAST SIGNIFICANT DIGIT OF THE
1657                                                          ;USER RESPONSE EQUAL TO A SIX?
1658  007552  001136                  BNE     REDO4           ;BRANCH IF NOT
1659  007554  010267  171422          MOV     R2,$TMP0        ;THE TRANMITTER ADDRESS TYPED
1660                                                          ;IS OK - STORE FOR FUTURE USE
1661                                ;NOW CHECK TO MAKE SURE THE DEVICE IS PRESENT
1662  007560  016746  170220          MOV     ERRVEC,-(SP)    ;SAVE THE TIMOUT VECTOR
1663  007564  012767  007576  170212  MOV     #2$,ERRVEC      ;SET UP TIMEOUT SERVICE ADDRESS
1664  007572  005712                  TST     (R2)            ;IF PRESENT WE WILL EXECUTE THE
1665                                                          ;NEXT INSTRUCTION - IF NOT WE
1666                                                          ;GO TO 2$:
1667  007574  000412                  BR      4$              ;BRANCH IF PRESENT
1668  007576  004767  004356  2$:     JSR     PC,SUERT2       ;GO SETUP FOR ERROR INFORMATION
1669  007602  012767  007612  171434  MOV     #3$,$ESCAPE     ;POINT OF RETURN AFTER ERROR REPORT
1670  007610  104006                  ERROR   +6              ;XDBR REFERENCE CAUSED TIMEOUT
1671  007612  022626          3$:     CMP     (SP)+,(SP)+     ;CLEAN STACK FROM TIMEOUT
1672  007614  012667  170164          MOV     (SP)+,ERRVEC    ;RESTORE TIMEOUT VECTOR
1673  007620  000513                  BR      REDO4           ;GO TO RETRY SITUATION
1674  007622  012667  170156          4$:     MOV     (SP)+,ERRVEC    ;DEVICE REGISTER IS PRESENT!
1675                                                          ;ASK THE USER IF HE DESIRES SOME
1676                                                          ;RANDOM NO. OF MSEC. WAIT TIME
1677                                                          ;BEFORE CHECKING XCSR DONE FLAG
1678  007626  104401  017233          PRG5C:  TYPE,   LENGTH  ;ASK USER FOR THE CHARACTER LENGTH
1679                                                          ;FOR WHICH HIS DEVICE IS SET
1680  007632  104411                  RDDEC                   ;ACCEPT THE ANSWER TYPED BY USER
1681                                ;CHECK TO SEE IF USER RESPONSE WAS WITHIN LIMITS
1682  007634  012600                  MOV     (SP)+,R0        ;GET THE ANSWER TYPED
1683  007636  020027  000010          CMP     R0,#8.          ;IS THE NUMBER TOO HIGH?
1684  007642  101106                  BHI     REDO4A          ;IF YES - GO TO RETRY SITUATION
1685  007644  020027  000005          CMP     R0,#5.          ;IS THE NUMBER TOO LOW?
1686  007650  103503                  BLO     REDO4A          ;IF YES - GO TO RETRY SITUATION
1687  007652  010067  171356          MOV     R0,$TMP15       ;THE VALUE TYPED IS OK
1688                                                          ;STORE FOR FUTURE USE
1689  007656  104401  020604          TYPE    ,RSTALL         ;RANDOM NO. OF MSEC. WAIT TIME
1690  007662  104410                  RDOCT                   ;ACCEPT THE ANSWER TYPED BY USER
1691                                                          ;AND STORE ON TOP OF STACK
1692  007664  012667  171316          MOV     (SP)+,$TMP2     ;GET THE ANSWER TYPED
1693                                ;WE ARE NOW READY TO INITIALIZE THE BINARY COUNT AND GET
1694                                ;THE BINARY CHARACTER
1695                                ;
1696  007670  012767  177777  171326  MOV     #-1,$TMP11      ;SET LEAD IN VARIABLE TO -1
1697  007676  016767  171322  171322  PRG5B:  MOV     $TMP11,$TMP12   ;STORE PREVIOUS BINARY CHARACTER
1698  007704  005267  171316          INC     $TMP12          ;FLIP BINARY CHARACTER AGAIN
1699  007710  042767  177400  171310  BIC     #177400,$TMP12  ;MASK TO 8 BITS
1700  007716  016767  171304  171300  MOV     $TMP12,$TMP11   ;STORE BINARY CHARACTER
```



```
1701  007724  016767  171276  171252  MOV     $TMP12,$TMP1    ;STORE BINARY CHARACTER
1702                                                          ;FOR FUTURE USE
1703  007732  016767  171244  171250  MOV     $TMP0,$TMP3     ;GET THE XDBR ADDRESS
1704  007740  162767  000002  171242  SUB     #2,$TMP3        ;FORM THE XCSR ADDRESS
1705  007746  005767  171234          1$:     TST     $TMP2   ;DO WE RANDOM STALL?
1706  007752  001402                  BEQ     2$              ;BRANCH IF IT WASN'T DESIRED
1707  007754  004767  003624          JSR     PC,STALL        ;GO STALL RANDOM VALUE OF MSEC.
1708  007760  004767  003730          2$:     JSR     PC,TIMETX       ;GO WAIT FOR TRANSMITTER DONE
1709                                                          ;BIT TO SET
1710  007764  104401  017120          TYPE    ,XDB            ;TYPE TRANSMITTER DONE BIT MESSAGE
1711  007770  104000                  ERROR   +0              ;XCSR DONE BIT NEVER SET
1712  007772  052777  000004  171210  BIS     #BIT2,@$TMP3    ;SET THE MAINTENANCE BIT IN THE
1713                                                          ;TRANSMITTER CONTROL STATUS REGISTER
1714  010000  016777  171200  171174  MOV     $TMP1,@$TMP0    ;LOAD TRANSMITTER DATA BUFFER
1715                                                          ;WITH SELECTED CHARACTER
1716  010006  004767  003664          JSR     PC,TIMERX       ;GO WAIT FOR RECEIVER DONE BIT TO SET
1717  010012  104401  017167          TYPE    ,RDB            ;TYPE RECEIVER DONE BIT MESSAGE
1718  010016  104000                  ERROR   +0              ;RCSR DONE BIT NEVER SET
1719  010020  016767  171164  171164  MOV     $TMP3,$TMP4     ;GET THE TRANSMITTER CONTROL
1720                                                          ;STATUS REGISTER ADDRESS
1721  010026  162767  000002  171156  SUB     #2,$TMP4        ;FORM THE RECEIVER DATA BUFFER
1722                                                          ;ADDRESS
1723  010034  017767  171152  171152  MOV     @$TMP4,$TMP5    ;STORE THE CHARACTER FROM THE
1724                                                          ;RECEIVER BUFFER + REST OF CONTENTS
1725  010042  004767  003704          JSR     PC,DATCHK       ;GO TO COMPARE EXPECTED &  RECEIVED
1726                                                          ;DATA
1727  010046  000713                  BR      PRG5B           ;GO BACK TO ISSUE ANOTHER BINARY
1728                                                          ;CHARACTER
1729  010050  104401  001252  REDO4:  TYPE    ,$QUES          ;TYPE A QUESTION MARK(?)
1730  010054  000167  177426          JMP     PRG5A           ;GO BACK TO REITERATE XDBR QUESTION
1731  010060  104401  001252  REDO4A: TYPE,   $QUES           ;TYPE '?' INDICATING USER TYPED
1732                                                          ;SOMETHING WRONG FOR CHARACTER LENGTH
1733  010064  000167  177536          JMP     PRG5C           ;GO BACK TO REISSUE QUESTION
1734
1735                                ;THIS ROUTINE WILL SET UP:
1736                                ;       RCSR - RECEVER STATUS REGISTER
1737                                ;       RBUF - RECEIVER BUFFER REGISTER
1738                                ;       XCSR - TRANSMITTER STATUS REGISTER
1739                                ;       XBUF - TRANSMITTER BUFFER REGISTER
1740                                ;INITIALLY, IN RESPONSE TO USER REPLY TO 1ST DEVICE HE WANTS
1741                                ;TESTED, AND THEREAFTER, AT THE END OF A PROGRAM TO CYCLE THRU
1742                                ;ALL DEVICES FOR MULTIPLE DEVICE TESTING (IF REQUIRED)
1743  010070  016767  171164  171312  DLADDR: MOV     DLBASE,DLRCSR   ;STORE RECEIVER STATUS REGISTER
1744                                                          ;OF CURRENT DEVICE
1745  010076  062767  000002  171154  ADD     #2,DLBASE       ;FORM RECEIVER BUFFER REGISTER
1746                                                          ;OF CURRENT DEVICE
1747  010104  016767  171150  171300  MOV     DLBASE,DLRDBR   ;STORE RECEIVER BUFFER REGISTER
1748                                                          ;OF CURRENT DEVICE
1749  010112  062767  000002  171140  ADD     #2,DLBASE       ;FORM TRANSMITTER STATUS REGISTER
1750                                                          ;OF OF CURRENT DEVICE
1751  010120  016767  171134  171266  MOV     DLBASE,DLXCSR   ;STORE TRANSMITTER STATUS REGISTER
1752                                                          ;OF CURRENT DEVICE
1753  010126  062767  000002  171124  ADD     #2,DLBASE       ;FOR TRANSMITTER BUFFER REGISTER
1754                                                          ;OF CURRENT DEVICE
1755  010134  016767  171120  171254  MOV     DLBASE,DLXDBR   ;STORE TRANSMITTER BUFFER REGISTER
1756                                                          ;OF CURRENT DEVICE
```

```
                                        RTS     PC              ;RETURN

                                .SBTTL  END OF PASS ROUTINE

                                ;;**************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO RESTRT

                                $EOP:
                                ;THIS NEXT SECTION UP TO THE NEXT LINE OF ASTERISKS WAS
                                ;SUPPLIED BY THE MACRO 'EOPBEG',  THE MACRO NAME APPEARS IN
                                ;THE SOURCE PROGRAM AS ONE OF THE ARGUMENTS TO THE .$EOP
                                ;SYSMAC UTILITY ROUTINE CALL.
010144  000004                            SCOPE
010146  105767  171120                    TSTB    MULTD           ;ARE WE RUNNING MULTIPLE DEVICES?
010152  001501                            BEQ     3$              ;BRANCH IF NOT FOR NORMAL
                                                                    ;'END PASS # XX' TYPEOUT
010154  005767  171114                    TST     ACTREG          ;ARE ANY DEVICES ACTIVE?
010160  001011                            BNE     1$              ;BRANCH IF YES
010162  104401  020110                    TYPE    ,FOULUP         ;INDICATE SOMETHING WRONG!
                                                                    ;MULTIPLE DEVICES ARE BEING
                                                                    ;RUN SUPPOSEDLY, BUT NONE ARE
                                                                    ;SHOWN ACTIVE
010166  000000                            HALT                    ;WAIT FOR A USER RESPONSE
010170  005067  171076                    CLR     MULTD           ;CLEAR MULTIPLE DEVICE FLAG
010174  005067  171056                    CLR     TABFLG          ;CLEAR TABLE CREATION FLAG
010200  000167  171566                    JMP     RESTRT          ;GET READY TO START ALL OVER
                                                                    ;AGAIN - ALL DEVICES WERE
                                                                    ;DESELECTED SOMEHOW!
010204  062767  000010  171052  1$:       ADD     #10,BASEADD     ;FORM A NEW BASE
                                                                    ;ADDRESS FOR START OF NEXT BLOCK
                                                                    ;OF REGISTERS FOR NEXT DEVICE
010212  062767  000010  171050            ADD     #10,BASEIV      ;FORM A NEW BASE ADDRESS FOR
                                                                    ;START OF NEXT BLOCK OF VECTORS
                                                                    ;FOR NEXT DEVICE
010220  000241                            CLC                     ;CLEAR LAST DEVICE INDICATOR
010222  006167  171050                    ROL     ROTADD          ;UPDATE NEXT POSSIBLE DEVICE ACTIVE
                                                                    ;POINTER
010226  103431                            BCS     2$              ;BRANCH IF THIS WAS THE
                                                                    ;LAST DEVICE TO BE TESTED ON
                                                                    ;THIS PASS
010230  036767  171042  171036            BIT     ROTADD,ACTREG   ;IS THIS DEVICE TRULY ACTIVE
                                                                    ;(AS PER USER)
010236  001762                            BEQ     1$              ;BRANCH IF NOT TO SEE IF NEXT
                                                                    ;ONE POSSIBLE IS
010240  016767  171020  171012            MOV     BASEADD,DLBASE  ;FORM THE RECEIVER STATUS REGISTER
                                                                    ;ADDRESS OF NEXT DEVICE
010246  016767  171016  171144            MOV     BASEIV,DLVECT   ;GET NEXT DEVICE RCVR VECTOR
010254  000240                            NOP
010256  004767  177606                    JSR     PC,DLADDR       ;GO FORM DL ADDRESSES FOR NEXT
                                                                    ;DEVICE SELECTED
010262  005067  170614                    CLR     $TSTNM          ;INITIALIZE TEST NO. FOR A PROGRAM
                                                                    ;PASS OVER THE NEXT DEVICE ACTIVE
010266  005077  171122                    CLR     @DLXCSR         ;CLEAR OUT BOTH CSR'S
```



```
010272  005077  171112                    CLR     @DLRCSR
010276  005777  171110                    TST     @DLRDBR         ;FLUSH RCVR "DONE" BIT
010302  005777  171104                    TST     @DLRDBR
010306  000167  172456                    JMP     TST1            ;START TESTING THIS DEVICE
010312                          2$:
                                ;IF WE TAKE THIS PATH WE HAVE MADE A CYCLE THRU THE PROGRAM ONCE
                                ;PER DEVICE I.E. - WE HAVE MADE A COMPLETE PASS
                                ;NOW WE NEED TO RESTORE EVERYTHING FOR THE NEXT COMPLETE PASS
010312  012767  000001  170756            MOV     #1,ROTADD       ;SET UP ROTATING POINTER FOR NEXT
                                                                    ;MULTIPLE PASS
010320  016767  170736  170736            MOV     KEEPADD,BASEADD ;RESTORE BASE ADDRESS
010326  016767  170734  170734            MOV     KEEPIV,BASEIV   ;RESTORE BASE INTERRUPT VECTOR
010334  016767  170724  170716            MOV     BASEADD,DLBASE  ;RESTORE 1ST DEVICE BASE ADDRESS
010342  016767  170722  171050            MOV     BASEIV,DLVECT   ;RESTORE 1ST DEVICE VECTOR ADDRESS
010350  000240                            NOP
010352  004767  177512                    JSR     PC,DLADDR       ;FORM ADDRESSES FOR 1ST DEVICE
010356                          3$:
                                ;;**************************************************************
010356  005067  170520                    CLR     $TSTNM          ;;ZERO THE TEST NUMBER
010362  005067  170654                    CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
010366  005267  170506                    INC     $PASS           ;;INCREMENT THE PASS NUMBER
010372  042767  100000  170500            BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
010400  005327                            DEC     (PC)+           ;;LOOP?
010402  000001          $EOPCT: ,WORD     1
010404  003022                            BGT     $DOAGN          ;;YES
010406  012737                            MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
010410  000001          $ENDCT: ,WORD     1
010412  010402                    $EOPCT
010414  104401  010461                    TYPE    ,$ENDMG         ;;TYPE "END PASS #"
010420  016746  170454                    MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
010424  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
010426  104401  010456                    TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
010432  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
010436  001405                            BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
010440  000005                            RESET                   ;;CLEAR THE WORLD
010442  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
010444  000240                            NOP                     ;;SAVE ROOM
010446  000240                            NOP                     ;;FOR
010450  000240                            NOP                     ;;ACT11
010452                          $DOAGN:
010452  000137                            JMP     @(PC)+          ;;RETURN
010454  001772                  $RTNAD: ,WORD   RESTRT
010456     377     377     000  $ENULL: ,BYTE   -1,-1,0          ;;NULL CHARACTER STRING
010461     015  042412  042116  $ENDMG: ,ASCIZ  <15><12>/END PASS #/
010466  050040  051501  020123
010474  000043

                                .SBTTL  SCOPE HANDLER ROUTINE

                                ;;**************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
```

```
                                        ;*SW08=1        LOOP ON TEST IN SWR<7:0>
                                        ;*CALL
                                        ;*      SCOPE           ;;SCOPE=IOT

010476                                  $SCOPE:
010476  032777  040000  170434          1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
010504  001111                                  BNE     $OVER           ;;YES IF SW14=1
                                        ;#####START OF CODE FOR THE XOR TESTER#####
010506  000416                          $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
010510  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
010514  012737  010534  000004                  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
010522  005737  177060                          TST     @#177060        ;;TIME OUT ON XOR?
010526  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
010532  000463                                  BR      $SVLAD          ;;GO TO THE NEXT TEST
010534  022626                          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
010536  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
010542  000423                                  BR      7$              ;;LOOP ON THE PRESENT TEST
010544                                  6$:;#####END OF CODE FOR THE XOR TESTER#####
010544  032777  000400  170366                  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
010552  001404                                  BEQ     2$              ;;BR IF NO
010554  127767  170360  170320                  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
010562  001462                                  BEQ     $OVER           ;;BR IF YES
010564  105767  170313          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
010570  001421                                  BEQ     3$              ;;BR IF NO
010572  126767  170317  170303                  CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
010600  101015                                  BHI     3$              ;;BR IF NO
010602  032777  001000  170330                  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
010610  001404                                  BEQ     4$              ;;BR IF NO
010612  016767  170272  170266          7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
010620  000443                                  BR      $OVER
010622  105067  170255          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
010626  005067  170410                          CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
010632  000415                                  BR      1$              ;;ESCAPE TO THE NEXT TEST
010634  032777  004000  170276          3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
010642  001011                                  BNE     1$              ;;BR IF YES
010644  005767  170230                          TST     $PASS           ;;IF FIRST PASS OF PROGRAM
010650  001406                                  BEQ     1$              ;;      INHIBIT ITERATIONS
010652  005267  170226                          INC     $ICNT           ;;INCREMENT ITERATION COUNT
010656  026767  170360  170220                  CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
010664  002021                                  BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
010666  012767  000001  170210          1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
010674  016767  000044  170340                  MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
010702  105267  170174          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
010706  011667  170174                          MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
010712  011667  170172                          MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
010716  005067  170322                          CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
010722  112767  000001  170165                  MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
010730  016777  170146  170204  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
010736  016716  170144                          MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
010742  000002                                  RTI                     ;;FIXES PS
010744  000100                          $MXCNT: 100                     ;;MAX. NUMBER OF ITERATIONS

                                        .SBTTL  ERROR HANDLER ROUTINE

                                        ;;**************************************************************
```



```
                                        ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                        ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                        ;*AND GO TO $ERRTYP ON ERROR
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW15=1        HALT ON ERROR
                                        ;*SW13=1        INHIBIT ERROR TYPEOUTS
                                        ;*SW10=1        BELL ON ERROR
                                        ;*SW09=1        LOOP ON ERROR
                                        ;*CALL
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

010746                                  $ERROR:
010746  105267  170131          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
010752  001775                                  BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
010754  016777  170122  170160                  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
010762  032777  002000  170150                  BIT     #BIT10,@SWR     ;;BELL ON ERROR?
010770  001402                                  BEQ     1$              ;;NO - SKIP
010772  104401  001246                          TYPE    ,$BELL          ;;RING BELL
010776  005267  170110          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
011002  011667  170110                          MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
011006  162767  000002  170102                  SUB     #2,$ERRPC
011014  117767  170076  170072                  MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
011022  032777  020000  170110                  BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
011030  001004                                  BNE     20$             ;;SKIP TYPEOUTS
011032  004767  000044                          JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
011036  104401  001253                          TYPE    ,$CRLF
011042                                  20$:
011042  005777  170072          2$:     TST     @SWR            ;;HALT ON ERROR
011046  100001                                  BPL     3$              ;;SKIP IF CONTINUE
011050  000000                                  HALT                    ;;HALT ON ERROR!
011052  032777  001000  170060          3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
011060  001402                                  BEQ     4$              ;;BR IF NO
011062  016716  170022                          MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
011066  005767  170152          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
011072  001402                                  BEQ     5$              ;;BR IF NONE
011074  016716  170144                          MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
011100                                  5$:
011100  000002                                  RTI                     ;;RETURN

                                        .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                        ;;**************************************************************
                                        ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                        ;*ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                        ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

011102                                  $ERRTYP:
011102  104401  001253                          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
011106  010046                                  MOV     R0,-(SP)        ;;SAVE R0
011110  005000                                  CLR     R0              ;;PICKUP THE ITEM INDEX
011112  153700  001114                          BISB    @#$ITEMB,R0
011116  001004                                  BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                        ;;TYPE THE PC OF THE ERROR
011120  016746  167772                          MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                        ;;ERROR ADDRESS
011124  104402                                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
```

```
011126  000426                          BR      6$              ;;GET OUT
011130  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
011132  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
011134  006300                          ASL     R0
011136  006300                          ASL     R0
011140  062700  001310                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
011144  012067  000004                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
011150  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
011152  104401                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
011154  000000                  2$:     ,WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
011156  104401  001253                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
011162  012067  000004          3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
011166  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
011170  104401                          TYPE                    ;;TYPE THE "DATA HEADER"
011172  000000                  4$:     ,WORD   0               ;;"DATA HEADER" POINTER GOES HERE
011174  104401  001253                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
011200  011000                  5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
011202  001004                          BNE     7$              ;;GO TYPE THE DATA
011204  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
011206  104401  001253                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
011212  000207                          RTS     PC              ;;RETURN
011214                          7$:
011214  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
011216  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
011220  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
011222  001770                          BEQ     6$              ;;BR IF NO
011224  104401  011232                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
011230  000771                          BR      7$              ;;LOOP
011232  020040     000          8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
        011236                          .EVEN

                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                                ;;**************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;*      .BYTE   M               ;;M=1 OR 0
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT
```



```
011236  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
011242  116667  000001  000211          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
011250  112667  000207                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
011254  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
011260  000406                          BR      $TYPON
011262  112767  000001  000171  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
011270  112767  000006  000165          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
011276  112767  000005  000154  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
011304  010346                          MOV     R3,-(SP)        ;;SAVE R3
011306  010446                          MOV     R4,-(SP)        ;;SAVE R4
011310  010546                          MOV     R5,-(SP)        ;;SAVE R5
011312  116704  000145                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
011316  005404                          NEG     R4
011320  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
011324  110467  000132                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
011330  116704  000125                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
011334  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
011340  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
011342  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
011344  000404                          BR      3$              ;;GO DO MSB
011346  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
011350  006105                          ROL     R5
011352  006105                          ROL     R5
011354  010503                          MOV     R5,R3
011356  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
011360  105367  000076                  DECB    $OMODE          ;;TYPE THIS DIGIT?
011364  100016                          BPL     7$              ;;BR IF NO
011366  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
011372  001002                          BNE     4$              ;;TEST FOR 0
011374  005704                          TST     R4              ;;SUPPRESS THIS 0?
011376  001403                          BEQ     5$              ;;BR IF YES
011400  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
011402  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
011406  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
011412  110367  000040                  MOVB    R3,8$           ;;SAVE FOR TYPING
011416  104401  011456                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
011422  105367  000032          7$:     DECB    $OCNT           ;;COUNT BY 1
011426  003347                          BGT     2$              ;;BR IF MORE TO DO
011430  002402                          BLT     6$              ;;BR IF DONE
011432  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
011434  000744                          BR      2$              ;;GO DO THE LAST DIGIT
011436  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
011440  012604                          MOV     (SP)+,R4        ;;RESTORE R4
011442  012603                          MOV     (SP)+,R3        ;;RESTORE R3
011444  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
011452  012616                          MOV     (SP)+,(SP)
011454  000002                          RTI                     ;;RETURN
011456     000          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
011457     000                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
011460     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
011461     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
011462  000000          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE

                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

                                ;;**************************************************************
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```
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT, DEPENDING ON WHETHER THE
                                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER, LEADING ZEROS WILL ALWAYS BE
                                        ;*REPLACED WITH SPACES.
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                        ;*      TYPDS                   ;;GO TO THE ROUTINE
                                        $TYPDS:
011464  010046                                 MOV     R0,-(SP)        ;;PUSH R0 ON STACK
011466  010146                                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
011470  010246                                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
011472  010346                                 MOV     R3,-(SP)        ;;PUSH R3 ON STACK
011474  010546                                 MOV     R5,-(SP)        ;;PUSH R5 ON STACK
011476  012746  020200                        MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
011502  016605  000020                        MOV     20(SP),R5       ;;GET THE INPUT NUMBER
011506  100004                                BPL     1$              ;;BR IF INPUT IS POS.
011510  005405                                NEG     R5              ;;MAKE THE BINARY NUMBER POS.
011512  112766  000055  000001                MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
011520  005000                        1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
011522  012703  011700                        MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
011526  112723  000040                        MOVB    #' ,(R3)+       ;;SET THE FIRST CHAPACTER TO A BLANK
011532  005002                        2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
011534  016001  011670                        MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
011540  160105                        3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
011542  002402                                BLT     4$              ;;BR IF DONE
011544  005202                                INC     R2              ;;INCREASE THE BCD DIGIT BY 1
011546  000774                                BR      3$
011550  060105                        4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
011552  005702                                TST     R2              ;;CHECK IF BCD DIGIT=0
011554  001002                                BNE     5$              ;;FALL THROUGH IF 0
011556  105716                                TSTB    (SP)            ;;STILL DOING LEADING 0'S?
011560  100407                                BMI     7$              ;;BR IF YES
011562  106316                        5$:     ASLB    (SP)            ;;MSD?
011564  103003                                BCC     6$              ;;BR IF NO
011566  116663  000001  177777                MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
011574  052702  000060                6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
011600  052702  000040                7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
011604  110223                                MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
011606  005720                                TST     (R0)+           ;;JUST INCREMENTING
011610  020027  000010                        CMP     R0,#10          ;;CHECK THE TABLE INDEX
011614  002746                                BLT     2$              ;;GO DO THE NEXT DIGIT
011616  003002                                BGT     8$              ;;GO TO EXIT
011620  010502                                MOV     R5,R2           ;;GET THE LSD
011622  000764                                BR      6$              ;;GO CHANGE TO ASCII
011624  105726                        8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
011626  100003                                BPL     9$              ;;BR IF NO
011630  116663  177777  177776                MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
011636  105013                        9$:     CLRB    (R3)            ;;SET THE TERMINATOR
011640  012605                                MOV     (SP)+,R5        ;;POP STACK INTO R5
011642  012603                                MOV     (SP)+,R3        ;;POP STACK INTO R3
011644  012602                                MOV     (SP)+,R2        ;;POP STACK INTO R2
011646  012601                                MOV     (SP)+,R1        ;;POP STACK INTO R1
011650  012600                                MOV     (SP)+,R0        ;;POP STACK INTO R0
011652  104401  011700                        TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
```



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011656  016666  000002  000004                MOV     2(SP),4(SP)     ;;ADJUST THE STACK
011664  012616                                MOV     (SP)+,(SP)
011666  000002                                RTI                     ;;RETURN TO USER
011670  023420                        $DTBL:  10000.
011672  001750                                1000.
011674  000144                                100.
011676  000012                                10.
011700  000004                        $DBLK:  .BLKW   4

                                        .SBTTL  TTY INPUT ROUTINE

                                        ;;*************************************************************
                                        .ENABL  LSB

                                        .DSABL  LSB


                                        ;;*************************************************************
                                        ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*CALL:
                                        ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                        ;*                              ;;WITH PARITY BIT STRIPPED OFF
                                        ;

011710  011646                        $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
011712  016666  000004  000002                MOV     4(SP),2(SP)     ;;SAVE THE PS
011720  105777  167220                1$:     TSTB    @#TKS           ;;WAIT FOR
011724  100375                                BPL     1$              ;;A CHARACTER
011726  117766  167214  000004                MOVB    @#TKB,4(SP)     ;;READ THE TTY
011734  042766  177600  000004                BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
011742  026627  000004  000023                CMP     4(SP),#23       ;;IS IT A CONTROL-S?
011750  001013                                BNE     3$              ;;BRANCH IF NO
011752  105777  167166                2$:     TSTB    @#TKS           ;;WAIT FOR A CHARACTER
011756  100375                                BPL     2$              ;;LOOP UNTIL ITS THERE
011760  117746  167162                        MOVB    @#TKB,-(SP)     ;;GET CHARACTER
011764  042716  177600                        BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
011770  022627  000021                        CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
011774  001366                                BNE     2$              ;;IF NOT DISCARD IT
011776  000750                                BR      1$              ;;YES, RESUME
012000  026627  000004  000140        3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
012006  002407                                BLT     4$              ;;BRANCH IF YES
012010  026627  000004  000175                CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
012016  003003                                BGT     4$              ;;BRANCH IF YES
012020  042766  000040  000004                BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
012026  000002                        4$:     RTI                     ;;GO BACK TO USER
                                        ;;*************************************************************
                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                        ;*CALL:
                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S

012030  010346                        $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
012032  005046                                CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
012034  012703  012264                1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
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2205  012040  022703  012274          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
2206  012044  101456                          BLOS    4$              ;;BR IF YES
2207  012046  104406                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
2208  012050  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
2209  012052  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
2210  012056  001022                          BNE     5$              ;;BR IF NO
2211  012060  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
2212  012062  001007                          BNE     6$              ;;BR IF NO
2213  012064  112767  000134  000170        MOVB    #'\,9$          ;;TYPE A BACK SLASH
2214  012072  104401  012262                  TYPE    ,9$
2215  012076  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
2216  012102  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
2217  012104  020327  012264                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
2218  012110  103434                          BLO     4$              ;;BR IF YES
2219  012112  111367  000144                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
2220  012116  104401  012262                  TYPE    ,9$             ;;GO TYPE
2221  012122  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
2222  012124  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
2223  012126  001406                          BEQ     7$              ;;BR IF NO
2224  012130  112767  000134  000124        MOVB    #'\,9$          ;;TYPE A BACK SLASH
2225  012136  104401  012262                  TYPE    ,9$
2226  012142  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
2227  012144  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
2228  012150  001003                          BNE     8$              ;;BR IF NO
2229  012152  104401  012274                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
2230  012156  000726                          BR      1$              ;;GO START OVER
2231  012160  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A ""R"?
2232  012164  001011                          BNE     3$              ;;BRANCH IF NO
2233  012166  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
2234  012170  104401  001253                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
2235  012174  104401  012264                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
2236  012200  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
2237  012202  104401  001252          4$:     TYPE    ,$QUES          ;;TYPE A '?'
2238  012206  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
2239  012210  111367  000046          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
2240  012214  104401  012262                  TYPE    ,9$
2241  012220  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
2242  012224  001305                          BNE     2$              ;;LOOP IF NOT RETURN
2243  012226  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
2244  012232  104401  001254                  TYPE    ,$LF            ;;TYPE A LINE FEED
2245  012236  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
2246  012240  012603                          MOV     (SP)+,R3        ;;RESTORE R3
2247  012242  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
2248  012244  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
2249  012252  012766  012264  000004          MOV     #$TTYIN,4(SP)
2250  012260  000002                          RTI                     ;;RETURN
2251  012262     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR, TO TYPE
2252  012263     000                          .BYTE   0               ;;TERMINATOR
2253  012264  000010          $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
2254  012274  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
2255  012301     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
2256  012306  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
2257  012314  020075     000
2258  012317     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
2259  012324  036440  000040
2260
```



```
2261                                    .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
2262
2263                                    ;;*************************************************************
2264                                    ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
2265                                    ;*CHANGE IT TO BINARY.
2266                                    ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
2267                                    ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
2268                                    ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
2269                                    ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
2270                                    ;*CALL:
2271                                    ;*      RDOCT                   ;;READ AN OCTAL NUMBER
2272                                    ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
2273                                    ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
2274
2275  012330  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
2276  012332  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
2277  012340  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2278  012342  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2279  012344  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2280  012346  104407                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
2281  012350  012600                          MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
2282  012352  010067  000100                  MOV     R0,5$           ;;AND SAVE IT
2283  012356  005001                          CLR     R1              ;;CLEAR DATA WORD
2284  012360  005002                          CLR     R2
2285  012362  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
2286  012364  001420                          BEQ     3$              ;;IF ZERO GET OUT
2287  012366  122716  000060                  CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
2288  012372  003026                          BGT     4$              ;;IS AN OCTAL DIGIT
2289  012374  122716  000067                  CMPB    #'7,(SP)
2290  012400  002423                          BLT     4$
2291  012402  006301                          ASL     R1              ;;*2
2292  012404  006102                          ROL     R2
2293  012406  006301                          ASL     R1              ;;*4
2294  012410  006102                          ROL     R2
2295  012412  006301                          ASL     R1              ;;*8
2296  012414  006102                          ROL     R2
2297  012416  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
2298  012422  062601                          ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
2299  012424  000756                          BR      2$              ;;LOOP
2300  012426  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
2301  012430  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
2302  012434  010267  000026                  MOV     R2,$HIOCT
2303  012440  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
2304  012442  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
2305  012444  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
2306  012446  000002                          RTI                     ;;RETURN
2307  012450  005726                  4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
2308  012452  105010                          CLRB    (R0)            ;;SET A TERMINATOR
2309  012454  104401                          TYPE                    ;;TYPE UP THRU THE BAD CHAR.
2310  012456  000000                  5$:     .WORD   0
2311  012460  104401  001252                  TYPE    ,$QUES          ;;"?" "CR" & "LF"
2312  012464  000730                          BR      1$              ;;TRY AGAIN
2313  012466  000000                  $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
2314
2315                                    .SBTTL  TYPE ROUTINE
2316
```

```
                                        ;;*************************************************************
                                        ;*ROUTINE TO TYPE ASCIZ MESSAGE, MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                        ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                        ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                        ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                        ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                        ;*
                                        ;*CALL:
                                        ;*1) USING A TRAP INSTRUCTION
                                        ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                        ;*OR
                                        ;*      TYPE
                                        ;*      MESADR
                                        ;*

012470  105767  166463          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
012474  100002                          BPL     1$              ;;BR IF YES
012476  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
012500  000407                          BR      3$              ;;LEAVE
012502  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
012504  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
012510  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
012512  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
012514  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
012516  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
012520  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
012524  000002                          RTI                     ;;RETURN
012526  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
012532  001430                          BEQ     8$
012534  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
012540  001006                          BNE     5$
012542  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
012544  104401                          TYPE                    ;;TYPE A CR AND LF
012546  001253                          $CRLF
012550  105067  000130                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
012554  000755                          BR      2$              ;;GET NEXT CHARACTER
012556  004767  000056          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
012562  126726  166370          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
012566  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
012570  016746  166360                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
012574  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
012600  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
012602  004767  000032                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
012606  105367  000072                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
012612  000770                          BR      7$              ;;LOOP

                                        ;HORIZONTAL TAB PROCESSOR

012614  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
012620  004767  000014          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
012624  132767  000007  000052          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
012632  001372                          BNE     9$              ;;TAB STOP
012634  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
012636  000724                          BR      2$              ;;GET NEXT CHARACTER
012640  105777  166304          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
```



```
012644  100375                          BPL     $TYPEC
012646  116677  000002  166276          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
012654  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
012662  001003                          BNE     1$              ;;BRANCH IF NO
012664  105067  000014                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
012670  000406                          BR      $TYPEX          ;;EXIT
012672  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
012700  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
012702  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
012704  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
012706  000207          $TYPEX: RTS     PC


                                        .SBTTL  READ A DECIMAL NUMBER FROM THE TTY

                                        ;;*************************************************************
                                        ;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
                                        ;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
                                        ;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
                                        ;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
                                        ;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
                                        ;*POSITIVE 32767 TO NEGATIVE 32768.
                                        ;*CALL:
                                        ;*      RDDEC                   ;;READ A DECIMAL NUMBER
                                        ;*      RETURN HERE             ;;NUMBER IS ON TOP OF THE STACK
                                        ;

012710  011646          $RDDEC: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR
012712  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE INPUT NUMBER
012720  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
012722  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
012724  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
012726  104407                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
012730  012600                          MOV     (SP)+,R0        ;;ADDRESS OF 1ST CHAR.
012732  010067  000120                  MOV     R0,6$           ;;SAVE INCASE OF BAD INPUT
012736  005046                          CLR     -(SP)           ;;CLEAR DATA WORD
012740  005002                          CLR     R2              ;;SIGN SET POSITIVE
012742  122710  000055                  CMPB    #'-,(R0)        ;;SEE IF A MINUS SIGN WAS TYPED
012746  001001                          BNE     2$              ;;BR IF NO MINUS SIGN
012750  112002                          MOVB    (R0)+,R2        ;;SAVE FOR LATER USE
012752  112001                  2$:     MOVB    (R0)+,R1        ;;PICKUP THIS CHARACTER
012754  001424                          BEQ     3$              ;;GET OUT IF ZERO
012756  122701  000060                  CMPB    #'0,R1          ;;MAKE SURE THIS CHARACTER
012762  003032                          BGT     5$              ;;IS A DIGIT BETWEEN 0 & 9
012764  122701  000071                  CMPB    #'9,R1
012770  002427                          BLT     5$
012772  032716  170000                  BIT     #^C7777,(SP)    ;;DON'T LET NUMBER GET TO BIG
012776  001024                          BNE     5$              ;;BR IF NUMBER WOULD OVERFLOW
013000  006316                          ASL     (SP)            ;;*2
013002  011646                          MOV     (SP),-(SP)      ;;SAVE FOR LATER
013004  006316                          ASL     (SP)            ;;*4
013006  006316                          ASL     (SP)            ;;*8.
013010  062616                          ADD     (SP)+,(SP)      ;;*10.
013012  102416                          BVS     5$              ;;OVERFLOW ISN'T ALLOWED
013014  162701  000060                  SUB     #'0,R1          ;;STRIP AWAY THE ASCII JUNK
013020  060116                          ADD     R1,(SP)         ;;ADD IN THIS DIGIT
```

```
2429  013022  102412                        BVS     5$              ;;OVERFLOW ISN'T ALLOWED
2430  013024  000752                        BR      2$              ;;LOOP
2431  013026  005702                3$:     TST     R2              ;;CHECK IF NUMBER IS NEG
2432  013030  001401                        BEQ     4$              ;;BR IF NO
2433  013032  005416                        NEG     (SP)            ;;YES--NEGATE THE NUMBER
2434  013034  012666  000012        4$:     MOV     (SP)+,12(SP)    ;;SAVE THE RESULT
2435  013040  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
2436  013042  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
2437  013044  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
2438  013046  000002                        RTI                     ;;RETURN
2439
2440  013050  005726                5$:     TST     (SP)+           ;;CLEAN PARTIAL NUMBER FROM STACK
2441  013052  105010                        CLRB    (R0)            ;;SET A TERMINATOR
2442  013054  104401                        TYPE                    ;;TYPE THE INPUT UP TO BAD CHAR.
2443  013056  000000                6$:     .WORD   0               ;;POINTER GOES HERE
2444  013060  104401  001252              TYPE    ,$QUES          ;;"?" "CR" &"LF"
2445  013064  000720                        BR      1$              ;;TRY AGAIN
2446
2447                                .SBTTL  TRAP DECODER
2448
2449                                ;;**************************************************************
2450                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
2451                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
2452                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
2453                                ;*GO TO THAT ROUTINE.
2454
2455  013066  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
2456  013070  016600  000002              MOV     2(SP),R0        ;;GET TRAP ADDRESS
2457  013074  005740                      TST     -(R0)           ;;BACKUP BY 2
2458  013076  111000                      MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
2459  013100  006300                      ASL     R0              ;;POSITION FOR INDEXING
2460  013102  016000  013122              MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
2461  013106  000200                      RTS     R0              ;;GO TO ROUTINE
2462
2463
2464                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
2465
2466  013110  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
2467  013112  016666  000004  000002       MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
2468  013120  000002                       RTI                     ;;RESTORE THE PSW
2469
2470                                .SBTTL  TRAP TABLE
2471
2472                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
2473                                ;*BY THE "TRAP" INSTRUCTION.
2474
2475                                ;       ROUTINE
2476                                ;       -------
2477  013122  013110                $TRPAD: .WORD   $TRAP2
2478  013124  012470                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
2479  013126  011262                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
2480  013130  011236                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
2481  013132  011276                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
2482  013134  011464                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
2483
2484
```



```
2485  013136  011710                        $RDCHR  ;;CALL=RDCHR    TRAP+6(104406)  TTY TYPEIN CHARACTER ROUTINE
2486  013140  012030                        $RDLIN  ;;CALL=RDLIN    TRAP+7(104407)  TTY TYPEIN STRING ROUTINE
2487  013142  012330                        $RDOCT  ;;CALL=RDOCT    TRAP+10(104410) READ AN OCTAL NUMBER FROM TTY
2488  013144  012710                        $RDDEC  ;;CALL=RDDEC    TRAP+11(104411) READ A DECIMAL NUMBER FROM TTY
2489
2490                                .SBTTL  POWER DOWN AND UP ROUTINES
2491
2492                                ;;**************************************************************
2493                                ;POWER DOWN ROUTINE
2494  013146  012737  013312  000024 $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
2495  013154  012737  000340  000026       MOV     #340,@#PWRVEC+2 ;;PRIO:7
2496  013162  010046                       MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2497  013164  010146                       MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2498  013166  010246                       MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2499  013170  010346                       MOV     R3,-(SP)        ;;PUSH R3 ON STACK
2500  013172  010446                       MOV     R4,-(SP)        ;;PUSH R4 ON STACK
2501  013174  010546                       MOV     R5,-(SP)        ;;PUSH R5 ON STACK
2502  013176  017746  165736               MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
2503  013202  010667  000110               MOV     SP,$SAVR6       ;;SAVE SP
2504  013206  012737  013220  000024       MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
2505  013214  000000                       HALT
2506  013216  000776                       BR      .-2             ;;HANG UP
2507
2508                                ;;**************************************************************
2509                                ;POWER UP ROUTINE
2510  013220  012737  013312  000024 $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
2511  013226  016706  000064               MOV     $SAVR6,SP       ;;GET SP
2512  013232  005067  000060               CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
2513  013236  005267  000054        1$:    INC     $SAVR6          ;;WAIT FOR THE INC
2514  013242  001375                       BNE     1$              ;;OF  WORD
2515  013244  012677  165670               MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
2516  013250  012605                       MOV     (SP)+,R5        ;;POP STACK INTO R5
2517  013252  012604                       MOV     (SP)+,R4        ;;POP STACK INTO R4
2518  013254  012603                       MOV     (SP)+,R3        ;;POP STACK INTO R3
2519  013256  012602                       MOV     (SP)+,R2        ;;POP STACK INTO R2
2520  013260  012601                       MOV     (SP)+,R1        ;;POP STACK INTO R1
2521  013262  012600                       MOV     (SP)+,R0        ;;POP STACK INTO R0
2522  013264  012737  013146  000024       MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
2523  013272  012737  000340  000026       MOV     #340,@#PWPVEC+2 ;;PRIO:7
2524  013300  104401                       TYPE                    ;REPORT THE POWER FAILURE
2525  013302  013320                $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
2526  013304  012716                       MOV     (PC)+,(SP)      ;;RESTART AT RESTRT
2527  013306  001772                $PWRAD: .WORD   RESTRT          ;;RESTART ADDRESS
2528  013310  000002                       RTI
2529  013312  000000                $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
2530  013314  000776                       BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
2531  013316  000000                $SAVR6: 0                       ;;PUT THE SP HERE
2532  013320  005015  047520  042527 $POWER: .ASCIZ  <15><12>"POWER"
2533  013326  000122
2534                                       .EVEN
2535
2536                                ;;**************************************************************
2537                                ;TRANSMIT INTERRUPT SERVICE ROUTINE FOR 256. BYTE BLOCK TRANSFERS
2538                                ;;**************************************************************
2539
2540  013330  105777  166060        XINT:   TSTB    @DLXCSR         ;"READY" SET ??
```

```
2541  013334  100416                          BMI     1$              ;BR IF YES
2542  013336  013767  177776  165636          MOV     @#PSW,$TMP0     ;SAVE THE ERROR PSW
2543  013344  010667  165626                  MOV     SP,$REG6        ;SAVE THE ERROR STACK POINTER
2544  013350  005167  166046                  COM     XFLG0           ;SET XMII SOFTWARE ERROR FLAG
2545  013354  042777  000100  166026          BIC     #100,@DLRCSR    ;TURN OFF THE INTERRUPT ENABLES
2546  013362  042777  000100  166024          BIC     #100,@DLXCSR
2547  013370  000411                          BR      2$              ;GO TO EXIT
2548  013372  022767  021660  166032  1$:     CMP     #DLBUFI,OPTR    ;XMITTED 256, BYTES YET ??
2549  013400  001405                          BEQ     2$              ;BR IF YES
2550  013402  117777  166024  166006          MOVB    @OPTR,@DLXDBR   ;OUTPUT A BYTE
2551  013410  005267  166016                  INC     OPTR            ;UPDATE BUFFER POINTER
2552  013414  000002                  2$:     RTI                     ;RETURN TO MAINLINE TEST
2553
2554                                          ;;**************************************************************
2555                                          ;RECEIVER INTERRUPT SERVICE ROUTINE FOR 256. BYTE BLOCK TRANSFERS
2556                                          ;;**************************************************************
2557
2558  013416  105777  165766          RINT:   TSTB    @DLRCSR ;"DONE" SET ??
2559  013422  100410                          BMI     1$              ;BR IF YES
2560  013424  013767  177776  165550          MOV     @#PSW,$TMP0     ;SAVE THE ERROR PSW
2561  013432  010667  165540                  MOV     SP,$REG6        ;SAVR THE ERROR STACK POINTER
2562  013436  005167  165762                  COM     RFLG0           ;SET HARD RCVR ERROR FLAG
2563  013442  000415                          BR      2$              ;GO EXIT
2564  013444  005777  165742          1$:     TST     @DLRDBR         ;ANY SOFT ERRORS ??
2565  013450  100021                          BPL     3$              ;BR IF NOT
2566  013452  013767  177776  165522          MOV     @#PSW,$TMP0     ;SAVE THE ERROR PSW
2567  013460  010667  165512                  MOV     SP,$REG6        ;SAVE THE ERROR STACK POINTER
2568  013464  017767  165722  165512          MOV     @DLRDBR,$TMP1   ;SAVE THE ERROR REGISTER IN TMP1
2569  013472  005167  165730                  COM     RFLG1           ;SET THE SOFT ERROR FLAG
2570  013476  042777  000100  165710  2$:     BIC     #100,@DLXCSR    ;TURN OFF THE INTR. ENABLES
2571  013504  042777  000100  165676          BIC     #100,@DLRCSR
2572  013512  000411                          BR      4$              ;GO TO EXIT
2573  013514  022767  022260  165712  3$:     CMP     #BUFEND,IPTR    ;RECEIVED 256. BYTES YET ??
2574  013522  001405                          BEQ     4$              ;BR IF YES
2575  013524  117777  165662  165702          MOVB    @DLRDBR,@IPTR   ;INPUT A BYTE FROM THE DL11
2576  013532  005267  165676                  INC     IPTR            ;UPDATE BUFFER POINTER
2577  013536  000002                  4$:     RTI                     ;RETURN TO MAINLINE TEST
2578
2579                                          ;THE FOLLOWING ROUTINE IS USED BY THE USER UTILITY PROGRAMS TO WAIT
2580                                          ;A SPECIFIED NO. OF MILLISECONDS BETWEEN CHARACTER TRANSFERS
2581
2582  013540  017667  000000  000034  DELAY:  MOV     @(R6),DELCNT    ;GET THE NO. OF MSEC. DELAY COUNT
2583                                                                  ;TYPED IN BY USER
2584  013546  062716  000002                  ADD     #2,(R6)         ;SET UP THIS ROUTINE'S EXIT ADDRESS
2585  013552  005767  000024                  TST     DELCNT          ;IS THE DELAY COUNT ZERO?
2586  013556  001410                          BEQ     3$              ;BRANCH IF YES
2587  013560  012746  000226          1$:     MOV     #226,-(SP)      ;PUSH A 1 MSEC. COUNT TO STACK
2588  013564  005316                  2$:     DEC     (SP)            ;DECREMENT THE 1 MSEC. COUNT BY 1
2589  013566  001376                          BNE     2$              ;BRANCH IF 1 MSEC. NOT EATEN
2590                                                                  ;AWAY YET
2591  013570  005726                          TST     (SP)+           ;RESET STACK AFTER 1 MSEC. TIME UP
2592  013572  005367  000004                  DEC     DELCNT          ;DECREMENT THE TOTAL NO. OF
2593                                                                  ;MSECS. COUNT
2594  013576  001370                          BNE     1$              ;BRANCH IF WE HAVE MORE MSECS.
2595                                                                  ;TO WAIT
2596  013600  000207                  3$:     RTS     PC              ;GO BACK TO REISSUE A CHARACTER
```



```
2597  013602  000000          DELCNT: .WORD   0               ;THE NO. OF MSECS. NEEDED TO
2598                                                          ;TRANSPIRE RESIDES HERE
2599                                  ;THE FOLLOWING ROUTINE IS USED BY USER PROGRAM #4 AND WILL ALLOW
2600                                  ;A RANDOM NUMBER OF MILLISECONDS BEFORE TRANSMISSION OF CHARACTER
2601                                  ;
2602  013604  016700  000062  STALL:  MOV     NUMONE,R0       ;GET THE LOW LIMIT
2603  013610  006100                  ROL     R0              ;MULTIPLY BY 4
2604  013612  006100                  ROL     R0              ;   .
2605  013614  066700  000054          ADD     NUMTWO,R0       ;ADD IN THE HIGH LIMIT
2606  013620  010067  000046          MOV     R0,NUMONE       ;STORE THIS AS NEW LOW LIMIT
2607  013624  006100                  ROL     R0              ;MULTIPLY NEW LOW LIMIT BY 4
2608  013626  006100                  ROL     R0              ;   .
2609  013630  066700  000040          ADD     NUMTWO,R0       ;ADD IN THE HIGH LIMIT
2610  013634  006100                  ROL     R0              ;MULTIPLY BY 4 AGAIN
2611  013636  006100                  ROL     R0              ;   .
2612  013640  010067  000030          MOV     R0,NUMTWO       ;STORE THIS AS NEW HIGH LIMIT
2613  013644  016700  000022          MOV     NUMONE,R0       ;SAVE THE RANDOMLY GENERATED NO.
2614  013650  046700  165432          BIC     STLMSK,R0       ;STRIP ALL BUT 1ST 5 BITS SO AS
2615                                                          ;NOT TO ALLOW THE STALL TO BE TOO
2616                                                          ;LARGE
2617  013654  001405                  BEQ     2$              ;BRANCH IF RESULT WAS ZERO
2618  013656  010067  000004          MOV     R0,1$           ;SET STALL TIME FOR DELAY ROUTINE
2619  013662  004767  177652          JSR     PC,DELAY        ;GO OFF TO STALL
2620  013666  000000          1$:     .WORD   0               ;THIS IS WHERE STALL TIME RESIDES
2621  013670  000207          2$:     RTS     PC              ;RETURN TO ISSUE CHARACTER
2622  013672  001233          NUMONE: 1233                    ;LOW LIMIT FOR RANDOM NO.
2623  013674  007622          NUMTWO: 7622                    ;HIGH LIMIT FOR RANDOM NO.
2624                                  ;THE FOLLOWING ROUTINE CHECKS THE 'DONE' BIT FOR BOTH THE RECEIVER
2625                                  ;AND TRANSMITTER.  THIS ROUTINE IS USED BY PROGRAM #4
2626                                  ;
2627  013676  016767  165306  000044  TIMERX: MOV     $TMP3,DUT       ;GET THE TRANSMITTER CONTROL
2628                                                                  ;STATUS REGISTER ADDRESS
2629  013704  162767  000004  000036          SUB     #4,DUT          ;FORM THE RECEIVER CONTROL
2630                                                                  ;STATUS REGISTER ADDRESS
2631  013712  000403                          BR      TCONT           ;GO TO TIME OUT THE RECEIVERS'
2632                                                                  ;DONE BIT
2633  013714  016767  165270  000026  TIMETX: MOV     $TMP3,DUT       ;GET THE TRANSMITTER CONTROL
2634                                                                  ;STATUS REGISTER ADDRESS
2635  013722  005067  165270          TCONT:  CLR     $TMP6           ;INITIALIZE A TIME COUNT
2636  013726  005267  165264          1$:     INC     $TMP6           ;INCREMENT THE TIME COUNT
2637  013732  001405                          BEQ     2$              ;BRANCH IF TIME COUNTER OVERFLOWED
2638                                                                  ;INDICATING DONE BIT NEVER SET
2639                                                                  ;WITH PLENTY OF TIME ELAPSED
2640  013734  105777  000010                  TSTB    @DUT            ;SEE IF DONE BIT IS SET YET
2641  013740  100372                          BPL     1$              ;WAIT SOME MORE IF IT ISN'T
2642  013742  062716  000006                  ADD     #6,@R6          ;DONE BIT IS SET - SET UP EXIT
2643                                                                  ;RETURN TO SKIP ERROR REPORT
2644  013746  000207          2$:     RTS     PC              ;RETURN TO PROGRAM #4
2645  013750  000000          DUT:    .WORD   0               ;THIS IS WHERE THE RCSR OR XCSR
2646                                                          ;ADDRESS RESIDES
2647                                  ;THIS ROUTINE IS USED BY PROGRAMS #4 & 5, AND WILL CHECK FOR CORRECT
2648                                  ;EXPECTED AND RECEIVED DATA, IN ADDITION TO ANY ERROR BITS
2649                                  ;
2650  013752  016767  165236  165236  DATCHK: MOV     $TMP5,$TMP6     ;GET THE CONTENTS OF THE RECEIVER
2651                                                                  ;BUFFER
2652  013760  016767  165226  165200          MOV     $TMP4,$REG2     ;STORE THE ADDRESS OF THE RECEIVER
```

```
                                                        ;DATA BUFFER
013766  016767  165174  165170          MOV     $REG2,$REG1     ;GET THE ADDRESS OF THE RECEIVER
                                                        ;DATA BUFFER
013774  162767  000002  165162          SUB     #2,$REG1        ;FORM THE ADDRESS OF THE RECEIVER
                                                        ;STATUS REGISTER FROM IT
014002  016767  165206  165160          MOV     $TMP5,$REG3     ;STORE THE CONTENTS OF THE RECEIVER
                                                        ;DATA BUFFER
014010  032767  170000  165200          BIT     #170000,$TMP6   ;ARE ANY ERROR BITS SET?
014016  001013                          BNE     1$              ;BRANCH IF YES
014020  004767  000720                  JSR     PC,UPMASK       ;GO TO MASK OFF BITS AS A FUNCTION OF
                                                        ;CHARACTER LENGTH( 5, 6, 7, OR 8 BITS)
014024  026767  165164  165200          CMP     $TMP5,$TMP14    ;WAS RECEIVED CHARACTER THE
                                                        ;SAME AS THE ONE TRANSMITTED?
014032  001406                          BEQ     2$              ;BRANCH IF YES
014034  016767  165172  165130          MOV     $TMP14,$REG4    ;STORE WHAT THE CONTENTS OF THE
                                                        ;RECEIVER DATA BUFFER SHOULD BE
014042  104010                  ERROR   +10             ;DATA RECEIVED WRONG!
014044  000401                  BR      2$              ;GET SET TO RETURN AFTER ERROR REPORT
014046  104007          1$:     ERROR   +7              ;ERROR BIT/S SET FROM TRANSMISSION
014050  000207          2$:     RTS     PC              ;RETURN TO PROGRAM #4

                        ;;*************************************************************
                        ;SUBROUTINE TO SETUP ERROR INFORMATION FOR ERROR MESSAGES
                        ;;*************************************************************
```



```
014052  013767  177776  165122  SUER2:  MOV     @#PSW,$TMP0     ;SAVE THE [PSW]
014060  016701  165324                  MOV     DLRCSR,R1       ;PUT DEVADR IN R1
014064  011203                          MOV     (R2),R3         ;PUT WAS INFO IN R3
014066  010667  165104                  MOV     SP,$REG6        ;SAVE THE [SP]
014072  062767  000002  165076          ADD     #2,$REG6        ;CORRECT FOR CALLING JSR
014100  116700  164776  SUERR1: MOVB    $TSTNM,R0       ;PUT TEST NO. IN R0
014104  010067  165052                  MOV     R0,$REG0        ;SAVE [R0] THRU [R4]
014110  010167  165050                  MOV     R1,$REG1
014114  010267  165046                  MOV     R2,$REG2
014120  010367  165044                  MOV     R3,$REG3
014124  010467  165042                  MOV     R4,$REG4
014130  000207                          RTS     PC              ;RETURN TO CALLING TEST

014132  013767  177776  165042  SUERT1: MOV     @#PSW,$TMP0             ;SAVE THE [PSW]
014140  116700  164736                  MOVB    $TSTNM,R0               ;PUT TEST NO. IN R0
014144  016701  165240                  MOV     DLRCSR,R1               ;PUT DEVADR IN R1
014150  010067  165006                  MOV     R0,$REG0                ;SAVE [R0]
014154  010167  165004                  MOV     R1,$REG1                ;SAVE [R1]
014160  013767  177776  165016  SUERT2: MOV     @#PSW,$TMP1             ;SAVE THE [PSW]
014166  010667  165004                  MOV     SP,$REG6                ;SAVE THE [SP]
014172  062767  000002  164776          ADD     #2,$REG6                ;CORRECT FOR CALLING JSR
014200  010267  164762                  MOV     R2,$REG2                ;SAVE [R2]
014204  000207                          RTS     PC                      ;RETURN

                        ;SUBROUTINE TO SETUP VECTORS FOR 256. BYTE BLOCK TRANSFER TESTS

014206  016705  165206  SUVEC:  MOV     DLVECT,R5       ;GET FIRST VECTOR ADDRESS
014212  012725  013416                  MOV     #RINT,(R5)+     ;SET UP RCVR VECTOR
014216  016725  165060                  MOV     DLPRI,(R5)+
014222  012725  013330                  MOV     #XINT,(R5)+     ;SET UP XMIT VECTOR
014226  016715  165050                  MOV     DLPRI,(R5)
014232  000207                          RTS     PC              ;RETURN TO CALLER

                        ;SUBROUTINE TO PRIME DATA BUFFERS AND DEVICE FOR 256. BYTE TRANSFER

014234  005077  165154  PRIME:  CLR     @DLXCSR         ;CLEAR XMIT AND RCVR CSR'S
014240  005077  165144                  CLR     @DLRCSR
014244  005067  165152                  CLR     XFLG0           ;INITIALIZE ERROR FLAGS
014250  005067  165150                  CLR     RFLG0
014254  005067  165146                  CLR     RFLG1
014260  012767  021260  165144          MOV     #DLBUFO,OPTR    ;SET UP OUTPUT POINTER
014266  012767  021660  165140          MOV     #DLBUFI,IPTR    ;SET UP INPUT POINTER
014274  004767  000044                  JSR     PC,CLDLBF       ;GO CLEAR THE BUFFERS
014300  004777  165132                  JSR     PC,@LDOUT       ;GO SET UP THE PATTERN
014304  005067  165130                  CLR     TIMR1           ;INIT TIMEOUT COUNTERS
014310  012767  000036  165124          MOV     #30.,TIMR2
014316  005777  165070                  TST     @DLRDBR         ;FLUSH "DONE" BIT IN RCVR CSR
014322  005777  165064                  TST     @DLRDBR
014326  052777  000100  165054          BIS     #100,@DLRCSR    ;ENABLE RCVR INTR.
014334  052777  000104  165052          BIS     #104,@DLXCSR    ;ENABLE XMIT INTR. AND MAINT MODE
014342  000207                          RTS     PC


                        ;THIS ROUTINE IS CALLED TO CLEAR THE INPUT AND OUTPUT BUFFERS
```

```
2734
2735  014344  012705  021260          CLDLBF: MOV     #DLBUFO,R5      ;R5 POINTS TO BEGINNING OF BUFFER AREA
2736  014350  005025                  1$:     CLR     (R5)+           ;CLEAR A WORD
2737  014352  022705  022260                  CMP     #BUFEND,R5      ;DONE ALL WORDS ??
2738  014356  001374                          BNE     1$              ;BR IF NOT
2739  014360  000207                          RTS     PC              ;RETURN TO CALLER
2740
2741                                  ;THIS ROUTINE IS CALLED TO SET UP THE NULL-DEL-NULL PATTERN
2742
2743  014362  012705  021260          LDOUT1: MOV     #DLBUFO,R5      ;R5 POINTS TO OUTPUT BUFFER
2744  014366  105025                  1$:     CLRB    (R5)+           ;MOVE A NULL CHAR
2745  014370  112725  000377                  MOVB    #377,(R5)+      ;MOV A DEL CHAR
2746  014374  022705  021660                  CMP     #DLBUFI,R5      ;ALL DONE ??
2747  014400  001372                          BNE     1$              ;BR IF NOT
2748  014402  000207                          RTS     PC              ;RETURN TO CALLER
2749
2750                                  ;THIS ROUTINE IS USED TO LOAD AN ASCENDING BINARY COUNT PATTERN
2751
2752  014404  005005          LDOUT2: CLR     R5              ;START WITH 000
2753  014406  110565  021260  1$:     MOVB    R5,DLBUFO(R5)   ;LOAD ONE BYTE
2754  014412  005205                  INC     R5              ;INCREMENT BYTE
2755  014414  022705  000400          CMP     #400,R5         ;DONE 000 THRU 377 ??
2756  014420  001372                  BNE     1$              ;BR IF NOT
2757  014422  000207                  RTS     PC              ;RETURN TO CALLER
2758
2759                                  ;THIS ROUTINE IS USED TO LOAD A DESCENDING BINARY COUNT PATTERN
2760
2761  014424  112767  000377  164566 LDOUT3: MOVB    #377,$TMP7      ;START WITH A 377 BYTE
2762  014432  012705  021260          MOV     #DLBUFO,R5      ;R5 POINTS TO OUTPUT BUFFER
2763  014436  116725  164556  1$:     MOVB    $TMP7,(R5)+     ;LOAD ONE BYTE
2764  014442  022705  021660          CMP     #DLBUFI,R5      ;ALL DONE ??
2765  014446  001403                  BEQ     2$              ;BR IF YES
2766  014450  105367  164544          DECB    $TMP7           ;GENERATE NEXT BYTE
2767  014454  000770                  BR      1$              ;GO MOVE IT
2768  014456  000207          2$:     RTS     PC              ;RETURN TO CALLER
2769
2770
2771                                  ;THIS ROUTINE LOADS A COMPLEMENTING WORST CASE PATTERN
2772
2773  014460  012705  021260          LDOUT4: MOV     #DLBUFO,R5      ;R5 POINTS TO OUTPUT BUFFER
2774  014464  005067  164530          CLR     $TMP7           ;INIT. BYTE GENERATOR
2775  014470  116725  164524  1$:     MOVB    $TMP7,(R5)+     ;MOVE A BYTE
2776  014474  105167  164520          COMB    $TMP7           ;COMPLEMENT IT
2777  014500  116725  164514          MOVB    $TMP7,(R5)+     ;NOW LOAD THE 1'S COMPLEMENT
2778  014504  105267  164511          INCB    $TMP7+1         ;INCREMENT THE BYTE
2779  014510  116767  164505  164502 MOVB    $TMP7+1,$TMP7   ;SET UP TO LOAD NEXT TWO
2780  014516  022705  021660          CMP     #DLBUFI,R5      ;ALL DONE ??
2781  014522  001362                  BNE     1$              ;BR IF NOT
2782  014524  000207                  RTS     PC              ;RETURN TO CALLER
2783
2784                                  ;THIS ROUTINE CHECKS FOR DATA COMPARE ERRORS IN 256. BYTE BLOCK TRANSFERS
2785
2786  014526  042777  000104  164660 CHKDAT: BIC     #104,@DLXCSR    ;DISABLE BOTH XMIT AND RCVR INTR. ENAB.
2787  014534  042777  000100  164646         BIC     #100,@DLRCSR
2788  014542  012702  021260          MOV     #DLBUFO,R2      ;R2 POINTS TO S/B DATA IN OUTPUT BUFFER
2789  014546  004767  000070          JSR     PC,MASKING      ;GO TO MASK OFF BITS AS A FUNCTION OF
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2790                                                            ;CHARACTER LENGTH(5, 6, 7, OR 8 BITS)
2791  014552  012701  021660                  MOV     #DLBUFI,R1      ;R1 POINTS TO WAS DATA IN RCVR. BUFFER
2792  014556  122221          1$:     CMPB    (R2)+,(R1)+     ;DID S/B = WAS ??
2793  014560  001004                  BNE     3$              ;BR IF NOT
2794  014562  022701  022260  2$:     CMP     #BUFEND,R1      ;CHECKED ALL BYTES ??
2795  014566  001373                  BNE     1$              ;BR IF NOT
2796  014570  000207                  RTS     PC              ;RETURN TO CALLER
2797  014572  013767  177776  164402 3$:     MOV     @#PSW,$TMP0     ;SAVE THE [PSW]
2798  014600  010667  164372          MOV     SP,$REG6        ;SAVE THE [SP]
2799  014604  114204                  MOVB    -(R2),R4        ;GET THE S/B DATA
2800  014606  042704  177400          BIC     #177400,R4      ;CLEAR JUNK FROM HI BYTE
2801  014612  114103                  MOVB    -(R1),R3        ;GET THE WAS DATA
2802  014614  042703  177400          BIC     #177400,R3      ;CLEAR JUNK FROM HI BYTE
2803  014620  004767  177254          JSR     PC,SUERR1       ;GO SET UP ERROR INFO.
2804  014624  012767  014634  164412  MOV     #4$,$ESCAPE     ;RETURN TO 4$ AFTER ERROR PRINT
2805  014632  104003                  ERROR+3                 ;DATA COMPARE ERROR
2806  014634  005202          4$:     INC     R2              ;REPOSITION BUFFER POINTERS
2807  014636  005201                  INC     R1
2808  014640  000750                  BR      2$              ;GO CHECK NEXT BYTE
2809
2810                                  ;THIS ROUTINE IS USED BY THE PATTERN TESTS
2811                                  ;IT WILL MASK OFF THE CHARACTER SENT OUT BY THE XMITTER
2812                                  ;BEFORE THE COMPARISON OF DATA OF WHAT WAS RECEIVED AND WHAT WAS TRANSMITTED
2813                                  ;IS DONE.  THE MASKING IS DONE AS A FUNCTION OF CHARACTER LENGTH WHICH
2814                                  ;CAN BE EITHER 5, 6, 7, OR 8 BITS .
2815
2816  014642  005005          MASKING:        CLR     R5      ;INITIALIZE TABLE OFFSET
2817                                                          ;FOR PICKING UP MASK WORD
2818  014644  022767  000010  164362          CMP     #8.,$TMP15      ;IS THE CHARACTER LENGTH 8 BITS?
2819  014652  001427                          BEQ     3$              ;BRANCH IF IT IS
2820  014654  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
2821                                                          ;IT COULD BE THIS ONE
2822  014660  022767  000007  164346          CMP     #7.,$TMP15      ;IS THE CHARACTER LENGTH 7 BITS?
2823  014666  001410                          BEQ     1$              ;BRANCH IF IT IS
2824  014670  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
2825                                                          ;IT COULD BE THIS ONE
2826  014674  022767  000006  164332          CMP     #6.,$TMP15      ;IS THE CHARACTER LENGTH 6 BITS?
2827  014702  001402                          BEQ     1$              ;BRANCH IF IT IS
2828  014704  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
2829                                                          ;IT MUST BE THIS ONE!!!!
2830  014710  016505  014734          1$:     MOV     CHARL(R5),R5    ;PICK UP THE MASK WORD
2831  014714  005105                  COM     R5              ;FORM THE BITS THAT ARE TO BE MASKED
2832  014716  140522          2$:     BICB    R5,(R2)+        ;MASK A BYTE
2833  014720  022702  021660          CMP     #DLBUFI,R2      ;ARE WE AT THE END OF THE XMITTER
2834                                                          ;OUTPUT BUFFER
2835  014724  001374                  BNE     2$              ;BRANCH IF NO TO MASK NEXT BYTE
2836  014726  012702  021260          MOV     #DLBUFO,R2      ;RESTORE R2 BEFORE RETURNING
2837  014732  000207          3$:     RTS     PC              ;RETURN TO MAINLINE CODE
2838                                  ;TABLE OF MASK WORDS
2839  014734  000377          CHARL:  .WORD   377             ;8. BITS IN LENGTH
2840  014736  000177                  .WORD   177             ;7. BITS IN LENGTH
2841  014740  000077                  .WORD   77              ;6. BITS IN LENGTH
2842  014742  000037                  .WORD   37              ;5. BITS IN LENGTH
2843
2844                                  ;THIS ROUTINE IS USED BY PROGRAMS #4 & 5
2845                                  ;IT WILL MASK OFF THE CHARACTER SENT OUT BY THE TRANSMITTER
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                                        ;BEFORE THE COMPARISON OF DATA OF WHAT WAS RECEIVED AND WHAT WAS
                                        ;TRANSMITTED IS DONE,  THE MASKING IS DONE AS A FUNCTION OF CHARACTER
                                        ;LENGTH WHICH CAN BE EITHER 5, 6, 7, OR 8 BITS.
                                        ;
014744  016767  164234  164260  UPMASK: MOV     $TMP1,$TMP14    ;PICK UP THE CHARACTER THAT WAS
                                        ;SENT OUT FROM THE XMITTER
014752  005005                          CLR     R5              ;INITIIALIZE TABLE OFFSET
                                        ;FOR PICKING UP MASK WORD
014754  022767  000010  164252          CMP     #8.,$TMP15      ;IS THE CHARACTER LENGTH 8 BITS?
014762  001423                          BEQ     2$              ;BRANCH IF IT IS
014764  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
                                        ;IT COULD BE THIS ONE
014770  022767  000007  164236          CMP     #7.,$TMP15      ;IS THE CHARACTER LENGTH 7 BITS?
014776  001410                          BEQ     1$              ;BRANCH IF IT IS
015000  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
                                        ;IT COULD BE THIS ONE
015004  022767  000006  164222          CMP     #6.,$TMP15      ;IS THE CHARACTER LENGTH 6 BITS?
015012  001402                          BEQ     1$              ;BRANCH IF IT IS
015014  062705  000002                  ADD     #2,R5           ;SET UP FOR NEXT MASK WORD
                                        ;IT MUST BE THIS ONE!!!!
015020  016505  014734          1$:     MOV     CHARL(R5),R5    ;PICK UP THE MASK WORD
015024  005105                          COM     R5              ;FORM THE BITS THAT ARE TO BE MASKED
015026  140567  164200                  BICB    R5,$TMP14       ;MASK THE LOW BYTE
015032  000207                  2$:     RTS     PC              ;RETURN TO MAINLINE CODE

                                        ;ROUTINE TO SERVICE BUS ERROR TRAPS

015034  112767  000060  000632  BUSERR: MOVB    #60,EM4+46      ;SET UP ERROR MESSAGE
015042  112767  000060  000625          MOVB    #60,EM4+47
015050  112767  000064  000620          MOVB    #64,EM4+50
015056  000412                          BR      TRPCOM          ;GO SET UP AND REPORT BUS ERROR

                                        ;ROUTINE TO SERVICE RSVD INSTRUCTION TRAPS

015060  112767  000060  000606  RSVERR: MOVB    #60,EM4+46      ;SET UP ERROR MESSAGE
015066  112767  000061  000601          MOVB    #61,EM4+47
015074  112767  000060  000574          MOVB    #60,EM4+50
015102  000400                          BR      TRPCOM          ;GO SET UP AND REPORT RSVD INSTR. ERROR

                                        ;ROUTINE TO SET UP AND REPORT BUS ERROR AND RSVD INSTR ERRORS

015104  010667  164066          TRPCOM: MOV     SP,$REG6        ;SAVE THE TRAP SP
015110  116700  163766                  MOVB    $TSTNM,R0       ;PUT TEST NO. IN R0
015114  010067  164042                  MOV     R0,$REG0        ;SAVE TEST #
015120  016667  000002  164054          MOV     2(SP),$TMP0     ;SAVE THE ERROR PSW
015126  012767  015142  164110          MOV     #1$,$ESCAPE     ;GO TO 1$ AFTER ERROR PRINT
015134  011667  164040                  MOV     (SP),$REG7      ;SAVE THE ERROR PC
015140  104004                          ERROR+4                 ;REPORTED TRAP ERROR
015142  000137  001772          1$:     JMP     @#RESTRT        ;ATTEMPT TO RESTART THE PROGRAM
                                        ;AND TRY AGAIN


                                        ;;**************************************************************
                                        ;ERROR MESSAGE INFORMATION
                                        ;;**************************************************************
```



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                                        ;INFORMATION FOR ERROR MESSAGE 1

015146  046104  030461  051040  EM1:    .ASCIZ  'DL11 REGISTER REFERENCE CAUSED TIMEOUT'
015154  043505  051511  042524
015162  020122  042522  042506
015170  042522  041516  020105
015176  040503  051525  042105
015204  052040  046511  047505
015212  052125     000
015215     040  050050  024503  DH1:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  REGADR'
015222  020040  020040  050050
015230  024523  020040  020040
015236  051450  024520  020040
015244  020040  042524  052123
015252  020040  042040  053105
015260  042101  020122  051040
015266  043505  042101  000122
                                        .EVEN
015274  001116  001202  001176  DT1:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,0
015302  001162  001164  001166
015310  000000

                                        ;INFORMATION FOR ERROR MESSAGE 2

015312  046104  030461  051040  EM2:    .ASCIZ  'DL11 REGISTER ERROR'
015320  043505  051511  042524
015326  020122  051105  047522
015334  000122
015336  024040  041520  020051  DH2:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B'
015344  020040  024040  051520
015352  020051  020040  024040
015360  050123  020051  020040
015366  052040  051505  020124
015374  020040  042504  040526
015402  051104  020040  042522
015410  040507  051104  020040
015416  053440  051501  020040
015424  020040  051440  041057
015432     000
        015434                          .EVEN
015434  001116  001202  001176  DT2:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4,0
015442  001162  001164  001166
015450  001170  001172  000000

                                        ;INFORMATION FOR MESSAGE 3

015456  046104  030461  042040  EM3:    .ASCIZ  'DL11 DATA COMPARE ERROR'
015464  052101  020101  047503
015472  050115  051101  020105
015500  051105  047522  000122
015506  024040  041520  020051  DH3:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   WASADR  SHBADR    WAS     S/B'
015514  020040  024040  051520
015522  020051  020040  024040
015530  050123  020051  020040
015536  052040  051505  020124
015544  020040  040527  040523
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2958  015552  051104  020040  044123
2959  015560  040502  051104  020040
2960  015566  020040  040527  020123
2961  015574  020040  020040  027523
2962  015602  000102
2963                                  .EVEN
2964  015604  001116  001202  001176  DT3:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4,0
2965  015612  001162  001164  001166
2966  015620  001170  001172  000000
2967
2968                                  ;INFORMATION FOR MESSAGE 4
2969
2970  015626  047125  054105  042520  EM4:    .ASCIZ  'UNEXPECTED TRAP TO VECTOR AT LOCATION
2971  015634  052103  042105  052040
2972  015642  040522  020120  047524
2973  015650  053040  041505  047524
2974  015656  020122  052101  046040
2975  015664  041517  052101  047511
2976  015672  020116  020040  000040
2977  015700  024040  041520  020051  DH4:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST'
2978  015706  020040  024040  051520
2979  015714  020051  020040  024040
2980  015722  050123  020051  020040
2981  015730  052040  051505  000124
2982                                  .EVEN
2983  015736  001200  001202  001176  DT4:    .WORD   $REG7,$TMP0,$REG6,$REG0,0
2984  015744  001162  000000
2985
2986                                  ;ERROR INFORMATION FOR ERROR MESSAGE 5
2987
2988  015750  046104  030461  051440  EM5:    .ASCIZ  'DL11 SOFT ERROR (PARITY,FRAMING, OR OVERRUN)'
2989  015756  043117  020124  051105
2990  015764  047522  020122  050050
2991  015772  051101  052111  026131
2992  016000  051106  046501  047111
2993  016006  026107  047440  020122
2994  016014  053117  051105  052522
2995  016022  024516     000
2996  016025     040  050050  024503  DH5:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   (REG)'
2997  016032  020040  020040  050050
2998  016040  024523  020040  020040
2999  016046  051450  024520  020040
3000  016054  020040  042524  052123
3001  016062  020040  042040  053105
3002  016070  042101  020122  051040
3003  016076  043505  042101  020122
3004  016104  020040  051050  043505
3005  016112  000051
3006                                  .EVEN
3007  016114  001116  001202  001176  DT5:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,0
3008  016122  001162  001164  001166
3009  016130  001170  000000
3010
3011                                  ;INFORMATION FOR ERROR MESSAGE 6
3012
3013  016134  024040  041520  020051  DH6:    .ASCIZ  ' (PC)    (PS)    (SP)   REGADR'
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3014  016142  020040  024040  051520
3015  016150  020051  020040  024040
3016  016156  050123  020051  020040
3017  016164  042522  040507  051104
3018  016172     000
3019          016174                  .EVEN
3020  016174  001116  001204  001176  DT6:    .WORD   $ERRPC,$TMP1,$REG6,$REG2,0
3021  016202  001166  000000
3022
3023                                  ;INFORMATION FOR ERROR MESSAGE 7
3024
3025  016206  024040  041520  020051  DH7:    .ASCIZ  ' (PC)   DEVADR  REGADR   (REG)'
3026  016214  020040  042504  040526
3027  016222  051104  020040  042522
3028  016230  040507  051104  020040
3029  016236  024040  042522  024507
3030  016244     000
3031          016246                  .EVEN
3032  016246  001116  001164  001166  DT7:    .WORD   $ERRPC,$REG1,$REG2,$REG3,0
3033  016254  001170  000000
3034
3035                                  ;INFORMATION FOR ERROR MESSAGE 10
3036
3037  016260  024040  041520  020051  DH10:   .ASCIZ  ' (PC)   DEVADR  REGADR   (REG)    S/B'
3038  016266  020040  042504  040526
3039  016274  051104  020040  042522
3040  016302  040507  051104  020040
3041  016310  024040  042522  024507
3042  016316  020040  020040  027523
3043  016324  000102
3044                                  .EVEN
3045  016326  001116  001164  001166  DT10:   .WORD   $ERRPC,$REG1,$REG2,$REG3,$REG4,0
3046  016334  001170  001172  000000
3047                                  ;MISCELLANEOUS MESSAGES
3048
3049  016342  052516  046114  042055  XMSG1:  .ASCIZ  'NULL-DEL-NULL SEQUENCE TIMEOUT AT FOLLOWING PC'
3050  016350  046105  047055  046125
3051  016356  020114  042523  052521
3052  016364  047105  042503  052040
3053  016372  046511  047505  052125
3054  016400  040440  020124  047506
3055  016406  046114  053517  047111
3056  016414  020107  041520     000
3057  016421     102  047111  051101  XMSG2:  .ASCIZ  'BINARY UP COUNT SEQUENCE TIMEOUT AT FOLLOWING PC'
3058  016426  020131  050125  041440
3059  016434  052517  052116  051440
3060  016442  050505  042525  041516
3061  016450  020105  044524  042515
3062  016456  052517  020124  052101
3063  016464  043040  046117  047514
3064  016472  044527  043516  050040
3065  016500  000103
3066  016502  044502  040516  054522  XMSG3:  .ASCIZ  'BINARY DOWN COUNT SEQUENCE TIMEOUT AT FOLLOWING PC'
3067  016510  042040  053517  020116
3068  016516  047503  047125  020124
3069  016524  042523  052521  047105
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3070  016532  042503  052040  046511
3071  016540  047505  052125  040440
3072  016546  020124  047506  046114
3073  016554  053517  047111  020107
3074  016562  041520     000
3075  016565     127  051117  052123  XMSG4:  ,ASCIZ  'WORST CASE PATTERN SEQUENCE TIMEOUT AT FOLLOWING PC'
3076  016572  041440  051501  020105
3077  016600  040520  052124  051105
3078  016606  020116  042523  052521
3079  016614  047105  042503  052040
3080  016622  046511  047505  052125
3081  016630  040440  020124  047506
3082  016636  046114  053517  047111
3083  016644  020107  041520     000
3084
3085  016651     015  046412  044501  STMES:  ,ASCIZ  <15><12>'MAINDEC-11-DZDLC-B'<15><12>
3086  016656  042116  041505  030455
3087  016664  026461  055104  046104
3088  016672  026503  006502  000012
3089
3090  016700  005015  047531  020125  PROG2M: ,ASCIZ  <15><12>'YOU HAVE SELECTED PROGRAM NO. 2'<15><12>
3091  016706  040510  042526  051440
3092  016714  046105  041505  042524
3093  016722  020104  051120  043517
3094  016730  040522  020115  047516
3095  016736  020056  006462  000012
3096  016744  005015  047531  020125  PROG3M: ,ASCIZ  <15><12>'YOU HAVE SELECTED PROGRAM NO. 3'<15><12>
3097  016752  040510  042526  051440
3098  016760  046105  041505  042524
3099  016766  020104  051120  043517
3100  016774  040522  020115  047516
3101  017002  020056  006463  000012
3102  017010  005015  047531  020125  PROG4M: ,ASCIZ  <15><12>'YOU HAVE SELECTED PROGRAM NO. 4'<15><12>
3103  017016  040510  042526  051440
3104  017024  046105  041505  042524
3105  017032  020104  051120  043517
3106  017040  040522  020115  047516
3107  017046  020056  006464  000012
3108  017054  005015  047531  020125  PROG5M: ,ASCIZ  <15><12>'YOU HAVE SELECTED PROGRAM NO. 5'<15><12>
3109  017062  040510  042526  051440
3110  017070  046105  041505  042524
3111  017076  020104  051120  043517
3112  017104  040522  020115  047516
3113  017112  020056  006465  000012
3114  017120  005015  051124  047101  XDB:    ,ASCIZ  <15><12>'TRANSMITTER DONE BIT NEVER SET  PC= '
3115  017126  046523  052111  042524
3116  017134  020122  047504  042516
3117  017142  041040  052111  047040
3118  017150  053105  051105  051440
3119  017156  052105  020040  041520
3120  017164  020075     000
3121  017167     015  051012  041505  RDB:    ,ASCIZ  <15><12>'RECEIVER DONE BIT NEVER SET  PC='
3122  017174  044505  042526  020122
3123  017202  047504  042516  041040
3124  017210  052111  047040  053105
3125  017216  051105  051440  052105
```



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3126  017224  020040  041520  020075
3127  017232     000
3128                          ;MESSAGES SEEKING USER RESPONSE
3129
3130  017233     015  053412  040510  LENGTH: ,ASCIZ  <15><12>'WHAT IS THE CHARACTER LENGTH (5,6,7 OR 8 BITS)?'
3131  017240  020124  051511  052040
3132  017246  042510  041440  040510
3133  017254  040522  052103  051105
3134  017262  046040  047105  052107
3135  017270  020110  032450  033054
3136  017276  033454  047440  020122
3137  017304  020070  044502  051524
3138  017312  037451     000
3139  017315     015  042012  020117  DEFAULT:        ,ASCII  <15><12>'DO YOU WISH TO TEST OTHER THAN THE'
3140  017322  047531  020125  044527
3141  017330  044123  052040  020117
3142  017336  042524  052123  047440
3143  017344  044124  051105  052040
3144  017352  040510  020116  044124
3145  017360     105
3146  017361     015  042012  043105          ,ASCIZ  <15><12>'DEFAULT DEVICE (1/0 = YES/NO)?'
3147  017366  052501  052114  042040
3148  017374  053105  041511  020105
3149  017402  030450  030057  036440
3150  017410  054440  051505  047057
3151  017416  024517  000077
3152  017422  005015  044127  052101  MFIRSTD:,ASCIZ  <15><12>'WHAT IS THE 1ST RECEIVER STATUS REGISTER ADDRESS?
3153  017430  044440  020123  044124
3154  017436  020105  051461  020124
3155  017444  042522  042503  053111
3156  017452  051105  051440  040524
3157  017460  052524  020123  042522
3158  017466  044507  052123  051105
3159  017474  040440  042104  042522
3160  017502  051523  020077  000040
3161  017510  005015  044127  052101  MVECT:  ,ASCIZ  <15><12>'WHAT IS THE 1ST RECEIVER''S VECTOR ADDRESS?
3162  017516  044440  020123  044124
3163  017524  020105  051461  020124
3164  017532  042522  042503  053111
3165  017540  051105  020123  042526
3166  017546  052103  051117  040440
3167  017554  042104  042522  051523
3168  017562  020077  000040
3169  017566  005015  047504  054440  MULDEV: ,ASCIZ  <15><12>'DO YOU WANT TO TEST MULTIPLE DEVICES 1/0=YES/NO?
3170  017574  052517  053440  047101
3171  017602  020124  047524  052040
3172  017610  051505  020124  052515
3173  017616  052114  050111  042514
3174  017624  042040  053105  041511
3175  017632  051505  030440  030057
3176  017640  054475  051505  047057
3177  017646  037517  020040     000
3178  017653     015  053412  040510  MLASTD: ,ASCIZ  <15><12>'WHAT IS THE STATUS REGISTER ADDRESS OF THE LAST RECEIVER?
3179  017660  020124  051511  052040
3180  017666  042510  051440  040524
3181  017674  052524  020123  042522
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3182  017702  044507  052123  051105
3183  017710  040440  042104  042522
3184  017716  051523  047440  020106
3185  017724  044124  020105  040514
3186  017732  052123  051040  041505
3187  017740  044505  042526  037522
3188  017746  020040     000
3189  017751     015  051412  046517  MRANGE: .ASCIZ  <15><12>'SOMETHING WRONG-ANSWER THE LAST QUESTION AGAIN!
3190  017756  052105  044510  043516
3191  017764  053440  047522  043516
3192  017772  040455  051516  042527
3193  020000  020122  044124  020105
3194  020006  040514  052123  050440
3195  020014  042525  052123  047511
3196  020022  020116  043501  044501
3197  020030  020516  020040     000
3198  020035     015  053412  040510  PLEVEL: .ASCIZ  <15><12>'WHAT IS YOUR INTERRUPT PRIORITY LEVEL?
3199  020042  020124  051511  054440
3200  020050  052517  020122  047111
3201  020056  042524  051122  050125
3202  020064  020124  051120  047511
3203  020072  044522  054524  046040
3204  020100  053105  046105  020077
3205  020106  000040
3206  020110  005015  051120  043517  FOULUP: .ASCII  <15><12>'PROGRAM DEVICE ACTIVE LOCATION SHOWS NO DEVICE ACTIVE'
3207  020116  040522  020115  042504
3208  020124  044526  042503  040440
3209  020132  052103  053111  020105
3210  020140  047514  040503  044524
3211  020146  047117  051440  047510
3212  020154  051527  047040  020117
3213  020162  042504  044526  042503
3214  020170  040440  052103  053111
3215  020176     105
3216  020177     015  051412  052105          .ASCII  <15><12>'SET SWITCH 0 TO A ONE (1) AND'
3217  020204  051440  044527  041524
3218  020212  020110  020060  047524
3219  020220  040440  047440  042516
3220  020226  024040  024461  040440
3221  020234  042116
3222  020236  005015  044510  020124          .ASCIZ  <15><12>'HIT CONTINUE TO GO BACK TO DEVICE SELECTION AGAIN'
3223  020244  047503  052116  047111
3224  020252  042525  052040  020117
3225  020260  047507  041040  041501
3226  020266  020113  047524  042040
3227  020274  053105  041511  020105
3228  020302  042523  042514  052103
3229  020310  047511  020116  043501
3230  020316  044501  000116
3231  020322  005015  044127  052101  LINTAD: .ASCIZ  <15><12>'WHAT IS THE TRANSMITTER DATA BUFFER ADDRESS?
3232  020330  044440  020123  044124
3233  020336  020105  051124  047101
3234  020344  046523  052111  042524
3235  020352  020122  040504  040524
3236  020360  041040  043125  042506
3237  020366  020122  042101  051104
```



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3238  020374  051505  037523  020040
3239  020402     000
3240  020403     015  053412  040510  SELCAR: .ASCIZ  <15><12>'WHAT IS THE CHARACTER TO BE TRANSMITTED (OCTAL ASCII E.G. A=101
3241  020410  020124  051511  052040
3242  020416  042510  041440  040510
3243  020424  040522  052103  051105
3244  020432  052040  020117  042502
3245  020440  052040  040522  051516
3246  020446  044515  052124  042105
3247  020454  024040  041517  040524
3248  020462  020114  051501  044503
3249  020470  020111  027105  027107
3250  020476  040440  030475  030460
3251  020504  037451  020040     000
3252  020511     015  053412  040510  SELDLY: .ASCIZ  <15><12>'WHAT IS THE DESIRED MSEC. DELAY (OCTAL E.G. 10=8(10))?
3253  020516  020124  051511  052040
3254  020524  042510  042040  051505
3255  020532  051111  042105  046440
3256  020540  042523  027103  042040
3257  020546  046105  054501  024040
3258  020554  041517  040524  020114
3259  020562  027105  027107  030440
3260  020570  036460  024070  030061
3261  020576  024451  020077  000040
3262  020604  005015  051511  040440  RSTALL: .ASCIZ  <15><12>'IS A RANDOM WAIT TIME (MSEC.) DESIRED  1/0=YES/NO?
3263  020612  051040  047101  047504
3264  020620  020115  040527  052111
3265  020626  052040  046511  020105
3266  020634  046450  042523  027103
3267  020642  020051  042504  044523
3268  020650  042522  020104  030440
3269  020656  030057  054475  051505
3270  020664  047057  037517  020040
3271  020672     000
3272  020673     015  054412  052517  FAILSA: .ASCII  <15><12>'YOU HAVE SWR8 SET INDICATING LOOP ON TEST'
3273  020700  044040  053101  020105
3274  020706  053523  034122  051440
3275  020714  052105  044440  042116
3276  020722  041511  052101  047111
3277  020730  020107  047514  050117
3278  020736  047440  020116  042524
3279  020744  052123
3280  020746  005015  040510  042526          .ASCII  <15><12>'HAVE YOU MODIFIED THE PROPER LOCATIONS FOR THE'
3281  020754  054440  052517  046440
3282  020762  042117  043111  042511
3283  020770  020104  044124  020105
3284  020776  051120  050117  051105
3285  021004  046040  041517  052101
3286  021012  047511  051516  043040
3287  021020  051117  052040  042510
3288  021026  005015  042504  044526          .ASCII  <15><12>'DEVICE THAT YOU WANT TO TEST?'
3289  021034  042503  052040  040510
3290  021042  020124  047531  020125
3291  021050  040527  052116  052040
3292  021056  020117  042524  052123
3293  021064     077
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3294  021065      015  044412  020106          .ASCII  <15><12>'IF SO - PRESS THE CONTINUE SWITCH'
3295  021072  047523  026440  050040
3296  021100  042522  051523  052040
3297  021106  042510  041440  047117
3298  021114  044524  052516  020105
3299  021122  053523  052111  044103
3300  021130  005015  043111  047040          .ASCII  <15><12>'IF NOT - MODIFY THE PROPER LOCATIONS, THEN'
3301  021136  052117  026440  046440
3302  021144  042117  043111  020131
3303  021152  044124  020105  051120
3304  021160  050117  051105  046040
3305  021166  041517  052101  047511
3306  021174  051516  020054  044124
3307  021202  047105
3308  021204  005015  042522  052123          .ASCIZ  <15><12>'RESTART THE PROGRAM AT ADDRESS 200'
3309  021212  051101  020124  044124
3310  021220  020105  051120  043517
3311  021226  040522  020115  052101
3312  021234  040440  042104  042522
3313  021242  051523  031040  030060
3314  021250      000
3315
3316  021251      040  020075  041520          PCMSG:  .ASCII  ' = PC'
3317  021256  000040                                  .ASCIZ  ' '
3318
3319                                      .EVEN
3320                                      ;512. WORDS RESERVED FOR TWO 256. BYTE INPUT/OUTPUT DATA BUFFERS
3321
3322  021260  000400                      DLBUFO: .BLKB   256.            ;RSVD FOR OUTPUT BUFFER
3323                                                                      ;THIS IS THE DATA BEING SENT OUT
3324                                                                      ;BY THE TRANSMITTER
3325  021660  000400                      DLBUFI: .BLKB   256.            ;RSVD FOR INPUT BUFFER
3326                                                                      ;THIS IS THE DATA THAT WAS PICKED
3327                                                                      ;UP BY THE RECEIVER (I.E. DATA
3328                                                                      ;SENT BY THE TRANSMITTER - HOPEFULLY)
3329  022260  000000                      BUFEND: 0                       ;TAG MARKS END OF BUFFERS
3330
3331          000001                      .END
```



```
ACTREG  001274          266#    621*    653*    654*    664*   1776   1800
BASEAD  001264          252#    573*    659*    660     667*    675*   1788*  1804   1823*  1825
BASEIV  001270          259#    593*   1791*   1806    1824*   1826
BEGIN   001446           46     393#
BIT0  = 000001          152#    560     583     641     1092    1098   1111   1372   1455   1540   1649
BIT00 = 000001          142#    152
BIT01 = 000002          141#    151
BIT02 = 000004          140#    150
BIT03 = 000010          139#    149
BIT04 = 000020          138#    148
BIT05 = 000040          137#    147
BIT06 = 000100          136#    146
BIT07 = 000200          135#    145
BIT08 = 000400          134#    144    1888
BIT09 = 001000          133#    143    1896    1955
BIT1  = 000002          151#   1003    1017    1062
BIT10 = 002000          132#   1940
BIT11 = 004000          131#   1903
BIT12 = 010000          130#
BIT13 = 020000          129#   1947
BIT14 = 040000          128#   1874
BIT15 = 100000          127#    937     949     968     980     982    1004   1016   1018   1076
BIT2  = 000004          150#    812     818     882     893     906     936    948   1501   1603   1712
BIT3  = 000010          149#    967     981
BIT4  = 000020          148#
BIT5  = 000040          147#   1037    1043    1061
BIT6  = 000100          146#    858     864     881     908
BIT7  = 000200          145#
BIT8  = 000400          144#
BIT9  = 001000          143#
BPTVEC= 000014          159#
BUFEND  022260         1133    1190    1247    1304    2573   2737   2794   3329#
BUSERR  015034          486    2873#
CHARL   014734         2830    2839#   2866
CHKDAT  014526         1135    1192    1249    1306    2786#
CLDLBF  014344         2720    2735#
CONQUE  002626          626     670     682#    723
CR    = 000015           67#   2375    2385
CRLF  = 000200           68#   2346    2385
DATCHK  013752         1617    1725    2650#
DDISP = 177570           74#    196     420
DEFAUL  017315          531    3139#
DELAY   013540         1420    1506    2582#   2619
DELCNT  013602         2582*   2585    2592*   2597#
DH1     015215          317    2911#
DH10    016260          366    3037#
DH2     015336          324    2930#
DH3     015506          331    2952#
DH4     015700          338    2977#
DH5     016025          345    2996#
DH6     016134          352    3013#
DH7     016206          359    3025#
DISPLA  001142          196#    420*    428*   1917*   1939*
DISPRE  000174           43#    428
DLADDR  010070          480     571    1743#   1808    1828
DLBASE  001260          246#    479*    567*    570    1743   1745*  1747   1749*  1751   1753*  1755   1804*  1825*
```

```
DLBUFI  021660          2548    2719    2746    2764    2780    2791    2833    3325#
DLBUFO  021260          2718    2735    2743    2753*   2762    2773    2788    2836    3322#
DLPRI   001302           282#    440*    696*    702*    703*    704*    705*    706*     707     830     875    1056    2706
                        2708
DLRCSR  001410           374#    508*    714#    732     791     857     879     934     937     949     964     968     982
                        1000    1004    1018    1035    1060    1141*   1148    1157    1166    1198*   1205    1214    1223
                        1255*   1262    1271    1280    1312*   1318    1326    1334    1743*   1813*   2545*   2558    2571*
                        2679    2693    2714*   2726*   2787*
DLRDBR  001412           375#    509     510     715     716     762     916    1167    1224    1281    1335    1747*   1814
                        1815    2564    2568    2575    2724    2725
DLVECT  001420           378#    482*    590*    592     593     828     873    1054    1806*   1826*   2704
DLXCSR  001414           376#    507*    713*    747     801     811     833    1091    1110    1142*   1149    1199*   1206
                        1256*   1263    1313*   1319    1751*   1812*   2540    2546*   2570*   2713*   2727*   2786*
DLXDBR  001416           377#    777     917    1755*   2550*
DSWR   = 177570           73#    195     419
DT1     015274           318    2920#
DT10    016326           367    3045#
DT2     015434           325    2942#
DT3     015604           332    2964#
DT4     015736           339    2983#
DT5     016114           346    3007#
DT6     016174           353    3020#
DT7     016246           360    3032#
DUT     013750          2627*   2629*   2633*   2640    2645#
EMTVEC= 000030           162#    404*    405*   1357*   1358*   1440*   1441*   1525*   1526*   1634*   1635*
EM1     015146           316     351    2904#
EM2     015312           323    2926#
EM3     015456           330     365    2948#
EM4     015626           337    2873*   2874*   2875*   2880*   2881*   2882*   2970#
EM5     015750           344     358    2988#
ERRVEC= 000004           155#    417     418*    429*    486*    487*    730     731*    739*    745     746*    754*    760
                         761*    769*    775     776*    784*   1386    1387*   1396*   1398*   1468    1469*   1478*   1480*
                        1553    1554*   1563*   1565*   1662    1663*   1672*   1674*   1879    1880*   1882*   1885*
FAILSA  020673           463    3272#
FIRSTD  002200           549#    601
FLUSH   002724           536     713#
FOULUP  020110          1778    3206#
GNS    = ******  U        42    2478    2479    2480    2481    2482    2485    2486    2487    2488
GO      002100           506     520#    598
HOWMAN  002376           594     605#
HT     = 000011           65#   2344    2385
INTFLG  001444           388#    827*    835     845*    876*    888     909*   1058*   1063    1074*
IOTVEC= 000020           160#    402*    403*
IPTR    001434           384#   1133    1190    1247    1304    2573    2575*   2576*   2719*
KEEPAD  001262           248#    570*    573     667     675    1823
KEEPIV  001266           255#    592*   1824
LASTAD  001300           278#    648*    660
LASTD   002446           620     627#    720
LDOUT   001436           385#   1125*   1182*   1239*   1296*   2721
LDOUT1  014362          1125    2743#
LDOUT2  014404          1182    2752#
LDOUT3  014424          1239    2761#
LDOUT4  014460          1296    2773#
LENGTH  017233           520    1583    1678    3130#
LESS1   001304           284#    707*    709*    711*
LF     = 000012            66#   2379    2385
```



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LINTAD  020322          1361    1444    1529    1638    3231#
MASKIN  014642          2789    2816#
MFIRST  017422           549    3152#
MLASTD  017653           630    3178#
MRANGE  017751           677    3189#
MULDEV  017566           605    3169#
MULTD   001272           262#    431*    612*    615*    618    1773    1783*
MVECT   017510           574    3161#
NUMONE  013672          2602    2606*   2613    2622#
NUMTWO  013674          2605    2609    2612*   2623#
ONCE    002054           467     496     507#
OPTR    001432           383#   2548    2550    2551*   2718*
PCMSG   021251           465    3316#
PIRQ   = 177772            72#
PIRQVE= 000240           166#
PLEVEL  020035           688    3198#
PRG2    006344            47    1354#
PRG2A   006404          1361#   1426
PRG2B   006524          1403#
PRG3    006604            48    1437#
PRG3A   006644          1444#   1512
PRG3B   006764          1485#
PRG4    007054            49    1522#
PRG4A   007114          1529#   1621
PRG4B   007246          1575#
PRG4C   007260          1583#   1624
PRG5    007446            50    1631#
PRG5A   007506          1638#   1730
PRG5B   007676          1697#   1727
PRG5C   007626          1678#   1733
PRIME   014234          1126    1183    1240    1297    2713#
PROG2M  016700          1359    3090#
PROG3M  016744          1442    3096#
PROG4M  017010          1527    3102#
PROG5M  017054          1636    3108#
PR0    = 000000            89#
PR1    = 000040            90#
PR2    = 000100            91#
PR3    = 000140            92#
PR4    = 000200            93#
PR5    = 000240            94#
PR6    = 000300            95#
PR7    = 000340            96#
PS     = 177776            69#     70
PSW    = 177776            70#    892    2542    2560    2566    2678    2691    2696    2797
PWRVEC= 000024           161#    408*    409*   2494*   2495*   2504*   2510*   2522*   2523*
RDB     017167          1609    1717    3121#
RDCHR  = 104406          2207    2485#
RDDEC  = 104411           522    1585    1680    2488#
RDLIN  = 104407          2280    2405    2486#
RDOCT  = 104410           533     552     575     607     633     679     689    1364    1405    1413    1447    1487    1495
                         1532    1571    1577    1641    1690    2487#
REDO1   006574          1369    1371    1374    1381    1397    1425#
REDO2   007044          1452    1454    1457    1464    1479    1511#
REDO3   007426          1537    1539    1542    1549    1564    1620#
REDO3A  007436          1589    1591    1622#
```

```
REDO4   010050          1646    1648    1651    1658    1673    1729#
REDO4A  010060          1684    1686    1731#
RESTRT  001772           485#   1785    1854    2527    2894
RESVEC= 000010           156#    488*    489*
RETRY   002346           526     528     596#
RETRY0  002356           557     559     562     566     599#
RETRY1  002366           580     582     585     589     602#
RETRY2  002750           638     640     643     647     718#
RETRY3  002760           693     695     721#
RFLG0   001424           380#   1129    1186    1243    1300    2562*   2716*
RFLG1   001426           381#   1131    1188    1245    1302    2569*   2717*
RINT    013416          2558#   2705
ROTADD  001276           273#    624*    652*    654     657*    664     665*    1795*   1800    1821*
RSTALL  020604          1567    1689    3262#
RSVERR  015060           488    2880#
RTRY    001430           382#   1124*   1172*   1173    1181*   1229*   1230    1238*   1286*   1287    1295*   1340*   1341
SELCAR  020403          1403    1485    1575    3240#
SELDLY  020511          1410    1492    3252#
STACK = 001100            60#    400     485    1354    1437    1522    1631
STALL   013604          1598    1707    2602#
STKLMT= 177774            71#
STLMSK  001306           290#   2614
STMES   016651           462     498    3085#
SUERR1  014100           899     925    1152    1161    1169    1209    1218    1226    1266    1275    1283    1322    1330
                        1337    2683#   2803
SUEPT1  014132           735     750     765     780    2691#
SUERT2  014160          1392    1474    1559    1668    2696#
SUER2   014052           794     804     815     821     840     850     861     867     914     939     945     951     955
                         970     976     984     991    1006    1013    1020    1026    1040    1046    1067    1078    1082
                        1095    1101    1115    2678#
SUVEC   014206          1123    1180    1237    1294    2704#
SWR     001140           195#    398     419*    421     427*    442     502     931     962     998    1033    1052    1088
                        1874    1888    1890    1896    1903    1940    1947    1952    1955    2502    2515*
SWREG   000176            44#    427
SW0   = 000001           124#    502
SW00  = 000001           114#    124
SW01  = 000002           113#    123
SW02  = 000004           112#    122
SW03  = 000010           111#    121
SW04  = 000020           110#    120
SW05  = 000040           109#    119
SW06  = 000100           108#    118
SW07  = 000200           107#    117
SW08  = 000400           106#    116
SW09  = 001000           105#    115
SW1   = 000002           123#
SW10  = 002000           104#
SW11  = 004000           103#
SW12  = 010000           102#    931     962     998    1033    1052    1088
SW13  = 020000           101#
SW14  = 040000           100#
SW15  = 100000            99#
SW2   = 000004           122#
SW3   = 000010           121#
SW4   = 000020           120#
SW5   = 000040           119#
```



```
SW6   = 000100           118#
SW7   = 000200           117#
SW8   = 000400           116#    442
SW9   = 001000           115#
TABFLG  001256           242#    433*    483*    495     500*    1784*
TBITVE= 000014           157#
TCONT   013722          2631    2635#
TIMERX  013676          1607    1716    2627#
TIMETX  013714          1599    1708    2633#
TIMR1   001440           386#   1137*   1194*   1251*   1308*   2722*
TIMR2   001442           387#   1139*   1196*   1253*   1310*   2723*
TKVEC = 000060           164#
TPVEC = 000064           165#
TRAPVE= 000034           163#    406*    407*   1355*   1356*   1438*   1439*   1523*   1524*   1632*   1633*
TRPCOM  015104          2876    2883    2887#
TRTVEC= 000014           158#
TST1    002770           511     717     729#   1816
TST10   003340           820     826#
TST11   003464           844     849     855#
TST12   003534           866     872#
TST13   004016           905     924     930#
TST14   004146           932     954     961#
TST15   004274           963     990     997#
TST16   004422           999    1025    1032#
TST17   004502          1034    1045    1051#
TST2    003036           744#
TST20   004644          1053    1072    1081    1087#
TST21   004726          1089    1100    1108#
TST22   004760          1114    1121#
TST23   005252          1136    1147    1156    1165    1178#
TST24   005544          1193    1204    1213    1222    1235#
TST25   006036          1250    1261    1270    1279    1292#
TST3    003104           759#
TST4    003152           774#
TST5    003220           789#
TST6    003242           793     799#
TST7    003266           803     809#
TYPDS = 104405          1843    2482#
TYPE  = 104401           462     463     465     498     520     531     549     574     596     599     602     605     630
                         677     688     718     721    1143    1200    1257    1314    1359    1361    1403    1410    1425
                        1442    1444    1485    1492    1511    1527    1529    1567    1575    1583    1601    1609    1620
                        1622    1636    1638    1678    1689    1710    1717    1729    1731    1778    1841    1844    1942
                        1950    1972    1989    1991    1994    1996    2000    2007    2072    2148    2214    2220    2225
                        2229    2234    2235    2237    2240    2244    2309    2311    2349    2442    2444    2478#   2524
TYPOC = 104402          1980    2004    2479#
TYPON = 104404          2481#
TYPOS = 104403          2480#
UPMASK  014744           884     918    2662    2850#
VECT    002264           574#    604
XDB     017120          1601    1710    3114#
XFLG0   001422           379#   1127    1184    1241    1298    2544*   2715*
XINT    013330          2540#   2707
XMSG1   016342          1143    3049#
XMSG2   016421          1200    3057#
XMSG3   016502          1257    3066#
XMSG4   016565          1314    3075#
```

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$AUTOB  001134          192#
$BDADR  001122          187#
$BDDAT  001126          189#
$BELL   001246          233#   1942   1963
$CHARC  012704         2351#  2361#  2368   2377#  2382#
$CKSWR= ****** U       2485
$CMTAG  001100          175#   395    396    404    410    411
$CM1  = 000010          207#   208#   209#   210#   211#   212#   213#   214#   215#
$CM2  = 000020          207#   208#   209#   210#   211#   212#   213#   214#   215#
$CM3  = 000010          205#   207
$CM4  = 000020          215#   216#   217#   218#   219#   220#   221#   222#   223#   224#   225#   226#   227#
                        228#   229#   230#   231#
$CNTLG  012301         2255#
$CNTLU  012274         2229   2254#
$CRLF   001253          235#  1950   1963   1972   1991   1996   2000   2234   2254   2314   2350   2385   2446
$DBLK   011700         2114   2148   2156#
$DOAGN  010452         1837   1846   1852#
$DTBL   011670         2117   2152#
$ENDAD  010442         1848#
$ENDCT  010410         1839#
$ENDMG  010461         1841   1856#
$ENULL  010456         1844   1855#
$EOP    010144         1307   1317   1325   1333   1343   1767#
$EOPCT  010402         1836#  1840
$ERFLG  001103          178#  1864   1892   1894   1900*  1921   1937*  1963
$ERMAX  001115          184#   412#  1894   1916*  1921
$ERROR  010746          404   1357   1440   1525   1634   1936#
$ERRPC  001116          185#  1944*  1945*  1946   1963   1978   2920   2942   2964   3007   3020   3032   3045
$ERRTB  001310          312#  1986
$ERRTY  011102         1949   1971#
$ERTTL  001112          182#  1943*  1963
$ESCAP  001244          232#   411*   736*   751*   766*   781*   841*   900*  1069*  1144*  1153*  1162*  1170*
                       1201*  1210*  1219*  1227*  1258*  1267*  1276*  1284*  1315*  1323*  1331*  1338*  1393*
                       1475*  1560*  1669*  1915*  1958   1960   1963   2804*  2891*
$FILLC  001156          203#  2354   2385
$FILLS  001155          202#  2385
$GDADR  001120          186#
$GDDAT  001124          188#
$GET42  010432         1845#
$GTSWR= ****** U       2484
$HD   = 000001           16     17
$HIOCT  012466         2302*  2313#
$ICNT   001104          179#  1907*  1908   1910*  1920
$ILLUP  013312         2494   2510   2529#
$INTAG  001135          193#
$ITEMB  001114          183#  1946*  1963   1975
$LF     001254          236#  1963   2244   2254   2314   2385   2446
$LPADR  001106          180#   413*  1898*  1913*  1918   1920
$LPERR  001110          181#   414*  1898   1914*  1920   1957
$MAIL = ****** U        431   1913   1952   2338
$MNEW   012317         2258#
$MSWR   012306         2256#
$MXCNT  010744         1911   1920#
$NULL   001154          201#  2356   2385
$NWTST= 000001          726#   741#   756#   771#   786#   796#   806#   823#   852#   869#   927#   958#   994#
                       1029#  1048#  1084#  1105#  1118#  1175#  1232#  1289#
```



```
$OCNT   011460         2044*  2073*  2086#
$OMODE  011462         2039*  2043*  2048   2051*  2062*  2088#
$OVER   010730         1875   1891   1899   1909   1917#
$PASS   001100          176#  1833*  1834*  1842   1855   1905   1921
$POWER  013320         2525   2532#
$PWRAD  013306         2527#
$PWRDN  013146          408   2494#  2522
$PWRMG  013302         2525#
$PWRUP  013220         2504   2510#
$QUES   001252          234#   596    599    602    718    721   1425   1511   1620   1622   1729   1731   1963
                       2237   2254   2311   2314   2385   2444   2446
$RDCHR  011710         2174#  2485
$RDDEC  012710         2400#  2488
$RDLIN  012030         2202#  2486
$RDOCT  012330         2275#  2487
$RDSZ = 000010         2195#
$REGAD  001160          205#
$REG0   001162          207#  2684*  2694*  2889*  2920   2942   2964   2983   3007
$REG1   001164          208#  2654*  2656*  2685*  2695*  2920   2942   2964   3007   3032   3045
$REG2   001166          209#  2652*  2654   2686*  2699*  2920   2942   2964   3007   3020   3032   3045
$REG3   001170          210#  2658*  2687*  2942   2964   3007   3032   3045
$REG4   001172          211#  2667*  2688*  2942   2964   3045
$REG5   001174          212#
$REG6   001176          213#   895*  2543*  2561*  2567*  2681*  2682*  2697*  2698*  2798*  2887*  2920   2942
                       2964   2983   3007   3020
$REG7   001200          214#   956*  2892*  2983
$RTNAD  010454         1854#
$R2A  = ****** U        2489
$SAVRE= ****** U        2489
$SAVR6  013316         2503*  2511   2512*  2513*  2531#
$SCOPE  010476          402   1873#
$SETUP= 000017          392#   401    402    404    406    408    410    411    413   1831   1874   1937   1955
                       1962   2163   2260
$STUP = 177777          392#
$SVLAD  010702         1883   1912#
$SWR  = 167400            3#     16     24     25     26     27     28     29     30     31    231    232    233
                        410    411    413    414    730    745    760    775    790    800    810    827    856
                        873    931    962    998   1033   1052   1088   1109   1122   1179   1236   1293   1764
                       1832   1847   1853   1855   1865   1866   1867   1868   1869   1874   1886   1888   1889
                       1892   1893   1894   1901   1902   1903   1914   1917   1920   1928   1929   1930   1931
                       1932   1940   1947   1952   1955   1963   2528
$SWRMK= 000000           31     32   1869   1870   1890
$TIMES  001242          231#   410*  1122*  1179*  1236*  1293*  1832*  1901*  1908   1911*  1920
$TKB    001146          198#  2161   2178   2184
$TKS    001144          197#  2161   2176   2182
$TMP0   001202          215#   892*  1382*  1418*  1465*  1504*  1550*  1594   1605*  1659*  1703   1714*  2542*
                       2560*  2566*  2678*  2691*  2797*  2890*  2920   2942   2964   2983   3007
$TMP1   001204          216#   878*   883*   907*  1168   1225   1282   1336   1407*  1418   1489*  1504   1579*
                       1605   1701*  1714   2568*  2696*  2850   3020
$TMP10  001222          223#
$TMP11  001224          224#  1696*  1697   1700*
$TMP12  001226          225#  1697*  1698*  1699*  1700   1701
$TMP13  001230          226#
$TMP14  001232          227#   886    887    921   2664   2667   2850*  2868*
$TMP15  001234          228#   434*   529*  1592*  1687*  2818   2822   2826   2854   2858   2862
$TMP16  001236          229#
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$TMP17  001240          230#
$TMP2   001206          217#  1415*  1416   1497*  1502   1573*  1596   1692*  1705
$TMP3   001210          218#  1594*  1595*  1603*  1611   1703*  1704*  1712*  1719   2627   2633
$TMP4   001212          219#  1611*  1613*  1615   1719*  1721*  1723   2652
$TMP5   001214          220#  1615*  1723*  2650   2658   2664
$TMP6   001216          221#  2635*  2636*  2650*  2660
$TMP7   001220          222#  2761*  2763   2766*  2774*  2775   2776*  2777   2778*  2779*
$TN     = 000026         16#   726   730#   741   745#   756   760#   771   775#   786   790#   793   796
                        800#   803   806   810#   820   823   827#   844   849   852   856#   866   869
                        873#   905   924   927   931#   932   954   958   962#   963   990   994   998#
                        999   1025  1029  1033#  1034   1045  1048  1052#  1053  1072  1081  1084  1088#
                       1089   1100  1105  1109#  1114   1118  1122#  1136  1147  1156  1165  1175  1179#
                       1193   1204  1213  1222   1232   1236#  1250  1261  1270  1279  1289  1293#
$TPB    001152          200#  2374*  2385
$TPFLG  001157          204#  2332   2385
$TPS    001150          199#  2372   2385
$TRAP   013066          406   1355   1438   1523   1632   2455#
$TRAP2  013110         2466#  2477
$TRP    = 000012       2470#  2479#  2480#  2481#  2482#  2483#  2485   2486#  2487#  2488#  2489#
$TRPAD  013122         2460   2477#
$TSTNM  001102          177#  1810*  1831*  1864   1890   1912*  1917   1921   1939   1963   2683   2692   2888
$TTYIN  012264         2204   2205   2217   2235   2249   2253#
$TYPBN= ******** U     2483
$TYPDS  011464         2102#  2482
$TYPE   012470         2332#  2470   2478
$TYPEC  012640         2353   2360   2367   2372#  2373
$TYPEX  012706         2378   2380   2383#
$TYPOC  011262         2042#  2479
$TYPON  011276         2041   2044#  2481
$TYPOS  011236         2037#  2480
$XTSTR  010506         1877#
$$GET4= 000000         1847#
$OFILL  011461         2038*  2042*  2052   2087#
$40CAT= ******** U     1874   1949
.       = 022262         38#    42#    52#   174#   237   399   413   414   956  1855  1859  1920  1921
                       1963   2010#  2156#  2161   2253#  2254  2260  2314  2385  2446  2506  2530  2941#
                       3019#  3031#  3322#  3325#
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COMMEN   167#
ENDCOM   167#
EOPBEG    19#  1768
ERROR     61#   464   737   752   767   782   795   805   816   822   842   851   862   868   901
           915   926   940   946   952   957   971   977   985   992  1007  1014  1021  1027  1041
          1047  1070  1079  1083  1096  1102  1116  1145  1154  1163  1171  1202  1211  1220  1228
          1259  1268  1277  1285  1316  1324  1332  1339  1394  1476  1561  1602  1610  1670  1711
          1718  2669  2671  2805  2893
ESCAPE   167#
GETPRI   167#
GETSWR   167#
MORETA    18#   238
MULT     167#
NEWTST   167#   726   741   756   771   786   796   806   823   852   869   927   958   994  1029
          1048  1084  1105  1118  1175  1232  1289
POP        4#   167#  2143  2303  2435  2515  2516
PUSH       4#   167#  2102  2277  2402  2496  2502
REPORT   167#
SCOPE     62#   729   744   759   774   789   799   809   826   855   872   930   961   997  1032
          1051  1087  1108  1121  1178  1235  1292  1772
SETPRI   167#
SETTRA  2470#  2479  2480  2481  2482  2485  2486  2487  2488
SETUP      4#   167#   394
SKIP     167#   734   749   764   779   793   803   814   820   843   849   860   866   905   913
           924   932   938   944   950   954   963   969   975   983   990   999  1005  1012  1019
          1025  1034  1039  1045  1053  1071  1077  1081  1089  1094  1100  1114  1136  1146  1155
          1164  1193  1203  1212  1221  1250  1260  1269  1278
SLASH    167#
SPACE    167#
STARS      4#   167#   170   237   370   372   726   728   741   743   756   758   771   773   786
           788   796   798   806   808   823   825   852   854   869   871   927   929   958   960
           994   996  1029  1031  1048  1050  1084  1086  1105  1107  1118  1120  1175  1177  1232
          1234  1289  1291  1761  1830  1861  1924  1966  2014  2092  2160  2166  2195  2263  2317
          2388  2449  2492  2508  2536  2538  2554  2556  2674  2676  2898  2900
SWRSU    167#   415#
TRMTRP  2470#
TYPBIN   167#
TYPDEC   167#  1842
TYPNAM   167#
TYPNUM   167#
TYPOCS   167#
TYPOCT   167#  1978  2002
TYPTXT   167#
$$CMRE   168#   207   208   209   210   211   212   213   214
$$CMTM   168#   215   216   217   218   219   220   221   222   223   224   225   226   227   228
          229   230
$$ESCA   167#
$$NEWT   167#   726   741   756   771   786   796   806   823   852   869   927   958   994  1029
          1048  1084  1105  1118  1175  1232  1289
$$SET   2470#  2479  2480  2481  2482  2485  2486  2487  2488
$$SKIP   167#   793   803   820   844   849   866   905   924   932   954   963   990   999  1025
          1034  1045  1053  1072  1081  1089  1100  1114  1136  1147  1156  1165  1193  1204  1213
          1222  1250  1261  1270  1279
.EQUAT     4#    57
.HEADE     4#     6
.SETUP     4#   392
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.SWRHI      4#     20
.SWRLO      4#     32#     33
.$CATC      4#     36
.$CMTA      4#    168
.$EOP       4#   1759
.$ERRO      4#   1922
.$ERRT      4#   1964
.$POWE      4#   2490
.$RDDE      4#   2386
.$RDOC      4#   2261
.$READ      4#   2158
.$SCOP      4#   1859
.$TRAP      4#   2447
.$TYPD      4#   2090
.$TYPE      4#   2315
.$TYPO      4#   2012

. ABS.  022262     000

 ERRORS DETECTED:  0

 DSKZ:DZDLCB.BIN,DSKZ:DZDLCB.LST/CRF/SOL/NL:TOC=DSKZ:DZDLCB.P11
 RUN-TIME:  21 10 1 SECONDS
 RUN-TIME RATIO: 314/33=9.4
 CORE USED:  25K  (49 PAGES)
```