DX11-B

RESPONDER

MD-11-DZDXI-A

EP-DZDXI-A-DL-A

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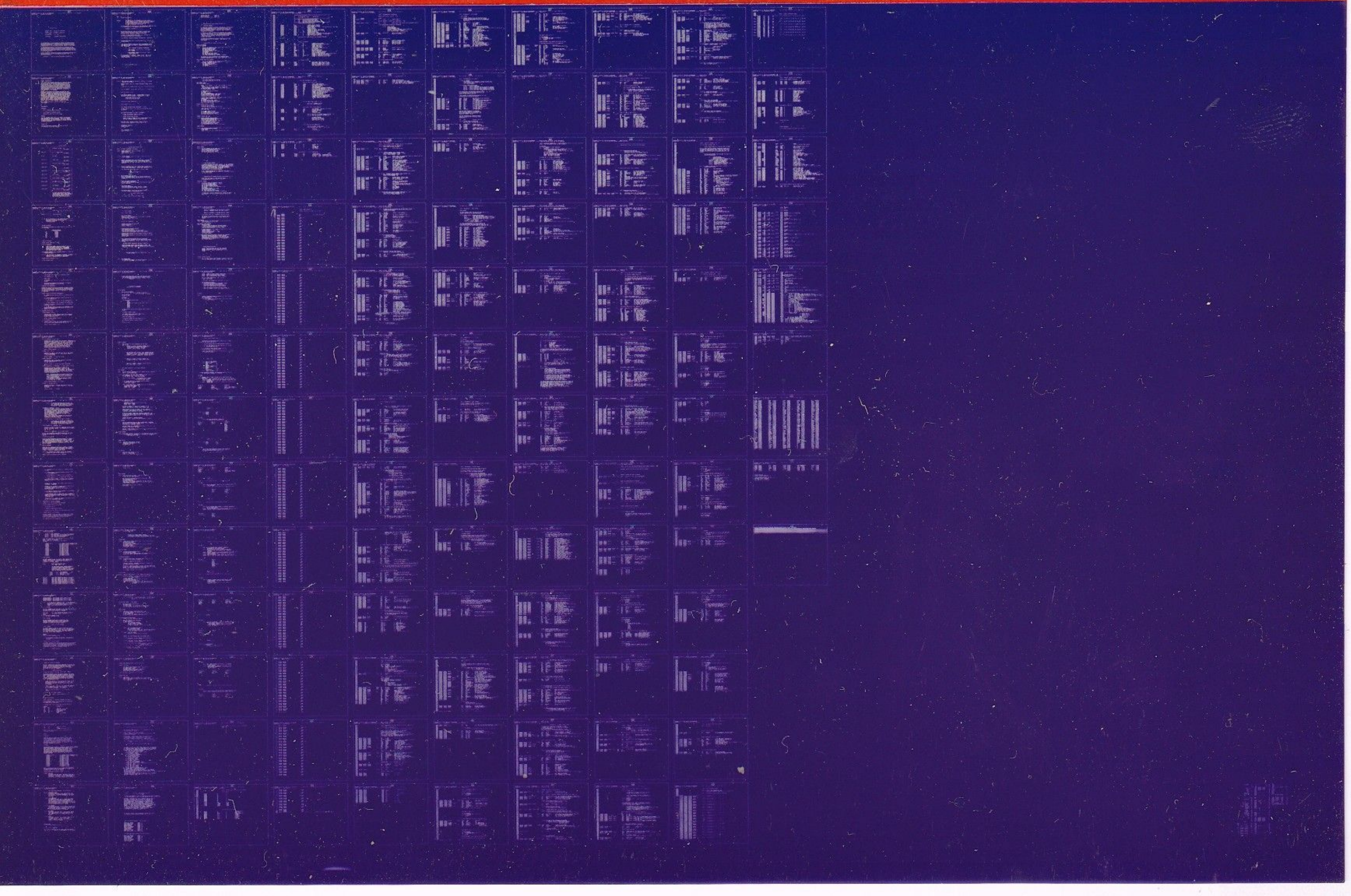
MADE IN U.S.A



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IDENTIFICATION

PRODUCT NAME: NEW DX11-B RESPONDER

PRODUCT CODE: MAINDEC-11-DZDXI-A-D

RELEASE DATE: JULY 1976

MAINTAINER: DIAGNOSTIC ENGINEERING

1.0 GENERAL DESCRIPTION

THIS SYSTEM TEST PROGRAM EXERCISES THE INTERFACE BETWEEN THE PDP-11 AND AN IBM 360/370 COMMUNICATING VIA THE DX11-B CONTROL UNIT. THE PROGRAM EMULATES AN IBM CRT (2260) AND ITS CONTROL UNIT (2848) COMMUNICATING OVER EITHER A MULTIPLEXER OR SELECTOR CHANNEL. THE 360/370 EXERCISES THE INTERFACE BY RUNNING STANDARD IBM DIAGNOSTICS DESIGNED TO TEST THE 2260/2848; FRIEND OR THE 2848 RESPONDER. UP TO EIGHT 2260'S MAY BE EMULATED SIMULTANEOUSLY BY THE PROGRAM.

BASICALLY THE SYSTEM TEST PROGRAM COLLECTS THE TEST PARAMETERS NEEDED VIA A QUESTION AND RESPONSE TUTORIAL METHOD; VALIDATES THE PARAMETERS AND THEN INITIALIZES THE SYSTEM. AFTER THE SYSTEM HAS BEEN INITIALIZED THE OPERATOR IS THEN REQUIRED TO START THE TEST BY TYPING "R" AND THEN THE 360/370 BEGINS TO TEST A 2260/2848. THE SYSTEM TEST PROGRAM ONLY RECOGNIZES BASIC ERRORS; SUCH AS, PARITY ERROR, ILLEGAL DEVICE ADDRESS, ETC., WITH THE 360 DIAGNOSTIC TESTING FOR MORE DETAILED ERRORS; SUCH AS, TIMING PROBLEMS, SEQUENCING ERRORS, ETC.

THIS PROGRAM COMPLETELY REPLACES AND OBSOLETES MD-11-DZDXC.

2.0 REQUIREMENTS

2.1 EQUIPMENT

A. PDP-11 COMPUTER WITH A MINIMUM OF 8K OF MEMORY.

B. DX11-B 360/370 INTERFACE OPTION.

C. ONE CONSOLE TELETYPE OR EQUIVALENT.

2.2 STORAGE

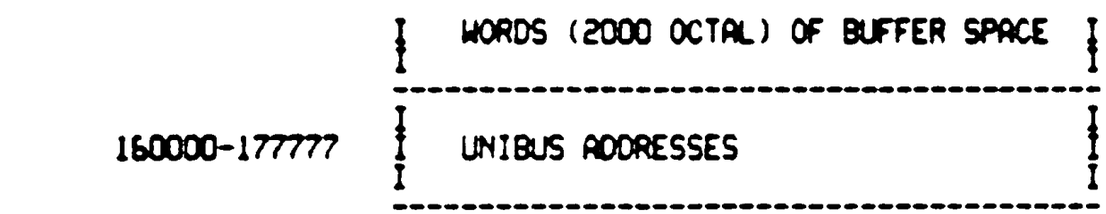
THE TEST PROGRAM LOADS INTO 4K OF MEMORY AND REQUIRES AT LEAST ANOTHER 4K FOR DATA BUFFERS. WITH 4K OF MEMORY, FOR DATA BUFFERS, UP TO SIX DEVICES (6) MAY BE EMULATED. TO EMULATE EIGHT 2260/2848 DEVICES 8K OF MEMORY FOR DATA BUFFERS IS REQUIRED.

2.3 STORAGE MAP

THE FOLLOWING MAP ILLUSTRATES THE USAGE OF MEMORY BY THE DX11-B SYSTEM TEST PROGRAM.

C O R E M A P

0-777	INTERRUPT VECTORS (500 WORDS)
1000-17777	DX11-B TEST PROGRAM (4K WORDS)
X0-X777	SPW TABLE (256 WORDS)
X1000-X1777	TUMBLE TABLE (256 WORDS)
X2000-X2777	DUPLICATE TUMBLE TABLE (256 WORDS)
X3000-X3377	DST TABLE (128 WORDS)
X3400-X3475	SOFTWARE DEVICE STATUS TABLE (DEV 0) (31 WORDS)
X3476-X4437	INPUT BUFFER (DEV 0) (241 WORDS)
X4440-X5377	OUTPUT/DISPLAY BUFFER (DEV 0) (240 WORDS)
X5400-X5475	SOFTWARE DEVICE STATUS TABLE (DEV 1) (31 WORDS)
X5476-X6437	INPUT BUFFER (DEV 1) (241 WORDS)
X6440-X7377	OUTPUT/DISPLAY BUFFER (DEV 1) (240 WORDS)
	THE ABOVE SOFTWARE BUFFER LAYOUT (DEVICE STATUS TABLE, INPUT BUFFER + OUTPUT BUFFER) WILL BE REPEATED FOR EACH DEVICE SPECIFIED (UP TO 8). EACH DEVICE EMULATED REQUIRES 512



NOTE -- "X" IS DETERMINED BY THE BUFFER RELOCATION FACTOR
INPUTTED AT SYSTEM CONFIGURATION TIME.
THE DEFAULT VALUE OF "X" IS 20000. "X" IS ALWAYS A
PHYSICAL ADDRESS.

3.0 LOADING PROCEDURE

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

	STARTING ADDRESS FOR ABSOLUTE LOADER
4K	017500
8K	037500
12K	057500
16K	077500
20K	117500
24K	137500
28K	157500

4.0 START UP PROCEDURE

4.1 CONTROL SWITCH SETTINGS -- NONE

4.2 STARTING ADDRESSES

1000 OR 200 NORMAL STARTING ADDRESS. FOR THE
FIRST TIME AFTER LOADING ONLY, THE PROGRAM
REQUESTS OPERATOR TO ENTER TEST PARAMETERS.
EACH SUCESSIVE RESTART USES THE PARAMETERS WHICH
HAVE BEEN PREVIOUSLY ENTERED.

1002 RESTART ADDRESS WHICH REQUESTS OPERATOR TO ENTER TEST
PARAMETERS AGAIN.

NOTE: AT ANY TIME WHILE THE PROGRAM IS RUNNING, A CONTROL P (↑P)
TYPED ON THE TTY KEYBOARD WILL ALSO REQUEST THE
OPERATOR TO REENTER THE TEST PARAMETERS.

4.3 PROGRAM AND/OR OPERATOR ACTION

4.3.1 INITIAL PROGRAM START

1. LOAD PROGRAM INTO MEMORY USING ABSOLUTE LOADER.

2. LOAD ADDRESS 200.

3. PRESS START

4. THE PROGRAM WILL TYPE OUT "DX11-B 2848 SYSTEM TEST PROGRAM".

5. THE SYSTEM NOW REQUESTS THE OPERATOR TO ENTER THE PARAMETERS NECESSARY TO RUN THE TEST.

4.3.2 ENTERING TEST PARAMETERS

BEFORE ANY TESTS MAY BE RUN OR WHENEVER A CHANGE IN PARAMETERS IS DESIRED, THE OPERATOR WILL BE REQUIRED TO ENTER ALL THE TEST PARAMETERS. THE ENTERING OF THE PARAMETERS IS DONE VIA THE CONSOLE TELETYPE IN RESPONSE TO A SERIES OF QUESTIONS.

4.3.2.1 GENERAL RULES FOR ENTERING PARAMETERS

A. ALL PARAMETERS MUST BE DELIMITED BY A CARRIAGE RETURN "(C/R)"

B. IF A TYPING ERROR IS DETECTED BEFORE ENTERING THE C/R, IT MAY BE CORRECTED BY:

   1. USING RUBOUT(S) TO DELETE THE LAST CHARACTER(S)

   2. HITTING CONTROL-U (↑U) TO DELETE THE ENTIRE ENTRY

C. TO SELECT THE DEFAULT PARAMETER ENTRY, TYPE CARRIAGE RETURN (C/R) ONLY.

D. IF THE PROGRAM DETECTS AN ERROR IN A PARAMETER IT WILL REPEAT THE QUESTION AGAIN AND REQUIRE THE OPERATOR TO REENTER THE PARAMETER.

4.3.2.2 PARAMETER DEFINITION

"UNIBUS ADDRESS -OCTAL-"

REQUESTS USER TO ENTER ADDRESS WHERE THE DX RESIDES ON THE UNIBUS. THIS MUST BE A 6 DIGIT OCTAL NUMBER BETWEEN 176200 AND 177700.

DEFAULT UNIBUS ADDRESS =176200

"VECTOR ADDRESS -OCTAL-"

REQUESTS USER TO ENTER THE VECTOR ADDRESS FOR THE DX AS A 3 DIGIT OCTAL NUMBER BETWEEN 300 AND 770.

DEFAULT VECTOR ADDRESS = 300

"DEVICE ADDRESSES (XX,XX) -HEX-"

REQUESTS THE USER TO ENTER THE 360 CHANNEL ADDRESS(ES) OF THE 2260(S) TO BE EMULATED BY THE TEST. IF MORE THAN ONE DEVICE IS TO EMULATED, THEN THE USER ENTERS IN THE RANGE OF ADDRESSES TO BE EMULATED: SUCH AS, "A0,A3" --THIS INDICATES THAT UNITS A0, A1, A2, AND A3 CAN BE USED IN THE TEST. THE UNIT ADDRESSES ARE TO BE ENTERED IN HEX BETWEEN 00 AND FF. IF A RANGE OF DEVICES IS GIVEN, THERE CAN NOT BE MORE THAN 8 TOTAL.

DEFAULT DEVICE ADDRESS = 10,10

"CHANNEL TYPE (M OR S)"

REQUESTS THE USER TO INDICATE WHAT TYPE OF 360 CHANNEL THE DX IS INTERFACED TO: M = MULTIPLEXER CHANNEL, S = SELECTOR CHANNEL.

DEFAULT CHANNEL = S, SELECTOR CHANNEL

"MEMORY MANAGEMENT (Y OR N)"

REQUESTS THE USER TO INDICATE WHETHER THE PROGRAM IS TO USE THE MEMORY MANAGEMENT OPTION.
Y = YES, N = NO

DEFAULT OPTION = N, DO NOT USE MEMORY MANAGEMENT

"BUFFER RELOCATION, IF SPECIFIED - IN EVEN ,000'S -OCTAL-"

REQUESTS THE PHYSICAL ADDRESS OF WHERE THE DX FIRMWARE BUFFERS (TUMBLE TABLE, SPW + DST) AND SOFTWARE DEVICE BUFFERS ARE TO RESIDE. THE RELOCATION ADDRESS IS ENTERED IN OCTAL THOUSANDS, AND MUST BE ON A 2000 BYTE ADDRESS BOUNDRY. EG: PHYSICAL ADDRESS 100000 IS ENTERED AS 100.

NOTE: THE BUFFER CANNOT BE CLOSER THAN 24000(8) TO ANY 200000 BOUNDARY OR TO THE I/O PAGE. THE THE DX IS NOT CAPABLE OF HAVING THESE BUFFERS CROSS A 200000 BOUNDARY.
IT IS POSSIBLE TO OVERLAY THE ABSOLUTE LOADER WHICH RESIDES IN THE HIGHEST AVAILABLE 4K(10) OF THE FIRST 28K OF MEMORY.

DEFAULT BUFFER ADDRESS = 20 (20000)

"FRIEND (F) OR 2848 DIAG (D)"

REQUESTS THE USER TO INDICATE WHAT TYPE OF TEST WILL BE RUN ON THE 360; F = IBM'S FRIEND OR D = THE 2848 RESPONDER.

DEFAULT OPTION = F -- FRIEND

NOTE -- IF THE 2848 RESPONDER WAS SELECTED, NO MORE PARAMETERS ARE NEEDED, SO THE SYSTEM WILL BE INITIALIZED AND CONTROL PASSED TO THE MONITOR. SEE MONITOR COMMANDS 4.4.

"SEPARATE I-O BUFFERS (Y OR N)"

REQUESTS THE USER TO INDICATE WHETHER SEPARATE INPUT AND OUTPUT BUFFER SHOULD BE MAINTAINED FOR EACH CRT UNIT EMULATED. SEPARATE INPUT/OUTPUT BUFFERS ALLOW THE TRANSMISSION OF THE SAME DATA PATTERN TO THE 360/370 INDEPENDENT OF WHAT DATA IS RECEIVED. THIS IS USEFULL IN DETERMINING THE CAUSE TO BAD DATA BEING TRANSMITTED.
NOTE -- MOST TESTS USING 'FRIEND' WILL NOT UTILIZE SEPARATE I/O BUFFERS. THESE ARE ONLY FOR SPECIAL SITUATIONS AS MENTIONED ABOVE.

DEFAULT OPTION = N, NO USE THE SAME I-O BUFFER

NOTE -- IF THE SAME I-O BUFFER WAS SPECIFIED, NO MORE PARAMETERS ARE NEEDED, SO THE SYSTEM WILL BE INITIALIZED AND CONTROL PASSED TO THE MONITOR. SEE MONITOR COMMANDS 4.4.

"OUTPUT BUFFER FILL CHARACTER -HEX-"

REQUESTS THE USER TO ENTER THE CHARACTER WHICH IS USED TO FILL THE OUTPUT BUFFER. THIS CHARACTER IS ENTERED IN HEX (00 - FF).

DEFAULT FILL CHARACTER = 40, AN EBCDIC BLANK

NOW ALL TEST PARAMETERS HAVE BEEN ENTERED AND THE SYSTEM WILL BE INITIALIZED AND CONTROL WILL BE PASSED TO THE MONITOR.

4.3.3 SYSTEM INITIALIZATION

AFTER THE TEST PARAMETERS HAVE BEEN ENTERED THE SYSTEM IS INITIALIZED AND CONTROL PASSED TO THE MONITOR. BEFORE ANY COMMUNICATIONS MAY BE CONDUCTED TO THE 360 THE DX WILL NEED TO BE ENABLED VIA THE RUN "R" COMMAND. SEE SECTION 4.4 FOR MORE INFORMATION CONCERNING THIS AND OTHER MONITOR COMMANDS.

4.4 MONITOR COMMANDS

AFTER THE TEST PARAMETERS HAVE BEEN SUCESSFULLY ENTERED, THE SYSTEM IS CONFIGURED AND INITIALIZED, THEN CONTROL IS PASSED TO THE MONITOR. ONCE IN THE MONITOR THE OPERATOR IS FREE TO ISSUE ANY COMMAND LISTED BELOW.

NOTE -- THE OPERATOR MUST ENABLE THE DX (RUN COMMAND) BEFORE ANY TESTS MAY BE PERFORMED WITH THE 360/370.

4.4.1 GENERAL RULES FOR ENTERING MONITOR COMMANDS

A. ALL COMMANDS MUST BE DELIMITED BY A CARRIAGE RETURN "(C/R)"

B. IF A TYPING ERROR IS DETECTED BEFORE ENTERING THE C/R, IT MAY BE CORRECTED BY:

   1. USING RUBOUT(S) TO DELETE THE LAST CHARACTER(S).

   2. TYPING CONTROL-U (↑U) TO DELETE THE ENTIRE LINE.

C. IF A USER WISHES TO ABORT A COMMAND, SUCH AS DUMPING DATA TO THE TELETYPE CONSOLE, HE DOES SO BY TYPING CONTROL-C (↑C).

D. CONTROL-S (↑S) SIGNALS THAT CONSOLE OUTPUT SHOULD BE TEMPORARILY SUSPENDED.

E. CONTROL-Q (↑Q) IS USED TO RESUME CONSOLE OUTPUT AFTER IT HAS BEEN STOPPED VIA A CONTROL-S.

F. THE MONITOR MODE IS DENOTED BY THE ASTERICK (*) IN PRINT POSITION 1.

G. IF AN ERROR IS DETECTED IN THE COMMAND BY THE PROGRAM, IT WILL PRINT A QUESTION MARK (?).

H. IF THE OPERATOR TRIES TO ENTER DATA WHILE A COMMAND IS CURRENTLY ACTIVE OR HE OVERFLOWS THE INPUT BUFFER (64 CHARS) THE SYSTEM WILL PRINT A BACKSLASH (\) AND DELETE THE ENTIRE LINE.

I. TYPING CTL-P (↑P) CAUSES THE SYSTEM TO BE REINITIALIZED AND NEW TEST PARAMETERS REQUESTED.

4.4.2 DESCRIPTION OF MONITOR COMMANDS

R -- ENABLE THE DX FOR TESTING - RUN COMMAND

THE RUN COMMAND DOES THE FOLLOWING:

1. INITIALIZES THE DX

2. CLEARS ALL TUMBLE TABLE ENTRIES.

3. ENABLES THE DX BY SETTING THE APPROPRIATE BITS IN DXCS.

S -- DISABLE THE DX - STOP COMMAND

THE STOP COMMAND ALLOWS THE USER TO DISABLE THE DX AFTER A SPECIFIC EVENT. THIS MAY EITHER BE IMMEDIATELY, AFTER AN INITIAL SELECTION SEQUENCE, AFTER A DATA TRANSFER, AFTER AN ENDING SEQUENCE, OR ON A PARITY ERROR.

THE FORMS OF THE STOP COMMAND ARE:

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          S(C/R) -- STOP IMMEDIATELY
          SI(C/R) -- STOP AFTER NEXT INITIAL SELECTION SEQUENCE
          SD(C/R) -- STOP AFTER NEXT DATA TRANSFER COMPLETION
          SE(C/R) -- STOP AFTER NEXT ENDING SEQUENCE
          SP(C/R) -- STOP ON NEXT PARITY ERROR

     AFTER THE CONDITIONS OF STOP ARE MET, THE DX WILL BE DIS-
     ABLED.  TYPE "R" TO CONTINUE.
     THE FOLLOWING WILL BE PRINTED ON THE CONSOLE
     TELETYPE:

          "CURRENT DEVICE -- XX"    THE CURRENT DEVICE ADDRESS IN HEX
          "XXXXXX"                  THE DXDS IN OCTAL - PROBABLY ZERO
          "XXXXXX"                  THE DXCA IN OCTAL
          "XXXXXX"                  THE DXCS IN OCTAL
          "XXXXXX"                  THE DXOS IS OCTAL
          "XXXXXX"                  THE DXBA IN OCTAL
          "XXXXXX"                  THE DXBC IN OCTAL
          "XXXXXX"                  THE DXMO IN OCTAL
          "XXXXXX"                  THE DXMI IN OCTAL
          "XXXXXX"                  THE DXCB IN OCTAL
          "XXXXXX"                  THE DXND IN OCTAL
          "XXXXXX"                  THE DXES1 IN OCTAL
          "XXXXXX"                  THE DXMOB IN OCTAL
          "XXXXXX"                  THE DXES2 IN OCTAL

D -- DUMP COMMAND

     THE DUMP COMMAND ALLOWS THE USER TO DUMP VARIOUS DATA
     BUFFERS, TABLES OR CORE LOCATIONS ON THE CONSOLE TELETYPE
     A VARIETY OF FORMATS.  THE FOLLOWING DESCRIBES THE
     SYNTAXES OF THE DUMP COMMAND:

     DTT,O          DUMP TUMBLE TABLE IN OCTAL
     DTT,H          DUMP TUMBLE TABLE IN HEX

                    THE DUMP TUMBLE TABLE COMMAND REFERENCES
                    A DUPLICATE TUMELE TABLE MAINTAINED
                    EXCLUSIVELY FOR THIS FUNCTION. THE TUMBLE
                    TABLE IS DUMPED IN REVERSE CHRONOLOGICAL
                    ORDER AND PRODUCES THE FOLLOWING REPORT:

               XXXXXX      TT2 -- LAST OPERATION
               XXXXXX      TT1 -- LAST OPERATION
               XXXXXX      TT2 -- PREVIOUS T/T ENTRY
               XXXXXX      TT1 -- PREVIOUS T/T ENTRY
               ETC

     DIN,O,XX       DUMP INPUT BUFFER FOR DEVICE XX IN OCTAL
     DIN,H,XX       DUMP INPUT BUFFER FOR DEVICE XX IN HEX
     DIN,E,XX       DUMP INPUT BUFFER FOR DEVICE XX IN EBCDIC
     DIN,A,XX       DUMP INPUT BUFFER FOR DEVICE XX IN ASCII
     DOT,O,XX       DUMP OUTPUT BUFFER FOR DEVICE XX IN OCTAL
     DOT,H,XX       DUMP OUTPUT BUFFER FOR DEVICE XX IN HEX
     DOT,E,XX       DUMP OUTPUT BUFFER FOR DEVICE XX IN EBCDIC
     DOT,A,XX       DUMP OUTPUT BUFFER FOR DEVICE XX IN ASCII
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            DSSSSSS,EEEEEE,O  DUMP BETWEEN GIVEN LIMITS IN OCTAL
            DSSSSSS,EEEEEE,H  DUMP BETWEEN GIVEN LIMITS IN HEX
            DSSSSSS,EEEEEE,E  DUMP BETWEEN GIVEN LIMITS IN EBCDIC
            DSSSSSS,EEEEEE,A  DUMP BETWEEN GIVEN LIMITS IN ASCII

            NOTE -- XX IS THE DEVICE ADDRESS IN HEX ; IF NOT SPECIFIED,
                    WILL DEFAULT TO 1ST DEVICE (CRT) # IN THE DEVICE TABLE.
                    SSSSSS IS THE STARTING MEMORY ADDRESS IN OCTAL
                    EEEEEE IS THE ENDING MEMORY ADDRESS IN OCTAL

        F -- FILL COMMAND

            THE FILL COMMAND ALLOWS THE USER TO FILL THE INPUT OR OUT-
            PUT FOR A DEVICE WITH A SPECIFIC DATA PATTERN.  THE FOLLOWING
            DESCRIBES THE SYNTAX FOR THE FILL COMMAND.

            FIN,YY,XX       FILL INPUT BUFFER FOR DEVICE XX WITH YY
            FOT,YY,XX       FILL OUTPUT BUFFER FOR DEVICE XX WITH YY
            WHERE:
            XX = THE DEVICE ADDRESS IN HEX
            YY = THE FILL CHARACTER IN HEX

        H -- HELP COMMAND

            THE HELP COMMAND PRINTS OUT A SYNOPSIS OF THE
            MONITOR COMMANDS AND CONSOLE CONTROL CHARACTERS
            AVAILABLE FOR OPERATING THE DX11-B SYSTEM TEST
            PROGRAM. THE SYNTAX OF THE HELP COMMAD IS:

            H               PRINT OUT HELP MESSAGE

        I -- INPUT COMMAND

            THE INPUT COMMAND ALLOWS THE USER TO INPUT DATA FOR A
            PARTICULAR CRT AND SEND IT TO THE 360, IN THE SAME MANNER
            AS IF HE WERE ACTUALLY ON A 2260.  THE INPUT COMMAND IS
            ONLY VALID WHEN THE IBM 2848 DIAGNOSTICS ARE BEING RUN.
            THE SYNTAX OF THE INPUT COMMAND IS:

            IXX,D---D
            WHERE:
            XX IS THE DEVICE ADDRESS IN HEX

            D---D IS THE DATA TO BE SENT TO THE 360.  THE DATA WILL
                  BE CONVERTED TO EBCDIC BEFORE BEING TRANSMITTED TO
                  THE 360.

        E -- ENABLE A DX-11 DEVICE ADDRESS

            THE ENABLE COMMAND TURNS THE DEVICE INDICATED IN THE OPERAND
            TO AN ON-LINE STATUS.  A DEVICE ADDRESS ONLY BECOMES OFF-
            LINE VIA THE "K" COMMAND.  THE DEVICE ADDRESS MUST BE ENTERED
            IN HEX AND BE WITHIN THE LIMITS SPECIFIED BY THE TEST
            PARAMETERS. THE SYNTAX OF THE ENABLE COMMAND IS:

            EXX             ENABLE DEVICE XX
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K -- DISABLE DX11-B DEVICE ADDRESS

THE KILL COMMAND SETS THE DEVICE INDICATED TO AN OFF-LINE STATUS. THE DEVICE ADDRESS ENTERED MUST BE IN HEX AND BE WITHIN THE LIMITS SPECIFIED BY THE TEST PARAMETERS. A DEVICE MAY ONLY BE ENABLED AGAIN VIA THE "E" COMMAND. THE SYNTAX OF THE KILL COMMAND IS:

KXX DISABLE DEVICE XX

A -- ACCESS AND DISPLAY LOCATIONS (QUICK LOOK + CHANGE)

THE ACCESS COMMAND ALLOWS THE USER TO DISPLAY AND ALTER MEMORY LOCATIONS WHILE THE PROGRAM IS RUNNING, AN ON-LINE ODT. THE ACCESS COMMAND SHOULD BE USED WITH EXTREME CAUTION. WHEN THE USER ENTERS THE ADDRESS TO BE ACCESSED, IN OCTAL, THE PROGRAM RESPONDS BY PRINTING THE CONTENTS OF THE REFERENCED LOCATION IN OCTAL ON THE CONSOLE TELETYPE. THE OPERATOR MAY THEN:

A. CHANGE THE CONTENTS OF THE LOCATION BY TYPING IN THE NEW CONTENTS IN OCTAL, DELIMITED BY A (C/R). THE SYSTEM WILL THEN OPEN THE NEXT LOCATION AND DISPLAY ITS CONTENTS.

B. TYPE A (C/R) ONLY. THIS WILL NOT AFFECT THE CONTENTS OF THE CURRENT LOCATION. THE SYSTEM WILL OPEN THE NEXT LOCATION AND DISPLAY ITS CONTENTS.

C. TYPE (/) SLASH FOLLOWED BY A (C/R) TO ESCAPE TO THE MONITOR.

THE SYNTAX OF THE ACCESS COMMAND IS:

AYYYYY ACCESS + DISPLAY LOCATION YYYYY

5.0 OPERATING PROCEDURE

REFER TO SECTION 4.4 "MONITOR COMMANDS" FOR DETAILS.

SEE MAINTENANCE MANUAL EK-DX11B-MM-002 FOR PROCEDURES FOR OPERATING THE IBM SYSTEM.

IN FRIEND MODE, THE FOLLOWING IBM COMMANDS ARE VALID;

COMMAND OCTAL	HEX	DESCRIPTION
00	00	TEST I/O
01	01	WRITE FULL BUFFER
02	02	*READ MANUAL INPUT
03	03	NO OPERATION
04	04	SENSE
05	05	WRITE LINE ADDRESS

06	06	READ FULL BUFFER
07	07	ERASE
12	0A	*READ SHORT MANUAL INPUT

*DATA IN THE OUTPUT BUFFER IS ONLY TRANSMITTED ONCE FOR THESE COMMANDS.

6.0 ERRORS

6.1 ERROR HALTS

THERE ARE ONLY TWO CONDITIONS (MEMORY TIME-OUT AND MEMORY MANAGEMENT ERROR) WHICH WILL CAUSE THE PROGRAM TO HALT OUTSIDE OF THE TRAP CATCHER. BOTH ERRORS ARE ACCOMPANIED WITH A DESCRIPTIVE MESSAGE RELATING THE CAUSE OF THE ERROR. RECOVERY FROM ANY SYSTEM HALT REQUIRES THE OPERATOR TO RESTART THE PROGRAM AT LOCATION 200. SEE ERROR MESSAGES FOR DETAILS.

6.2 DX ERRORS

UPON RECEIPT OF AN ILLEGAL DX CONDITION (INVALID DEVICE ADDRESS, INVALID DX COMMAND, NON EXISTENT MEMORY ERROR) THE SYSTEM WILL PRINT A DESCRIPTIVE ERROR MESSAGE AND DISABLE THE DX. THE USER MAY THEN EXAMINE THE STATE OF THE DX. NOTE THAT THE DX MUST BE ENABLED BEFORE MORE TESTS CAN BE PERFORMED ON THE 360/370 (RUN COMMAND). AFTER THE DX HAS BEEN DISABLED THE FOLLOWING WILL BE PRINTED ON THE CONSOLE TELETYPE:

"CURRENT DEVICE -- XX"	THE CURRENT DEVICE ADDRESS IN HEX
"XXXXXX"	THE DXDS IN OCTAL -- PROBABLY ZERO
"XXXXXX"	THE DXCS IN OCTAL
"XXXXXX"	THE DXOS IN OCTAL
"XXXXXX"	THE DXBA IN OCTAL
"XXXXXX"	THE DXBC IN OCTAL
"XXXXXX"	THE DXMO IN OCTAL
"XXXXXX"	THE DXMI IN OCTAL
"XXXXXX"	THE DXCB IN OCTAL
"XXXXXX"	THE DXNO IN OCTAL
"XXXXXX"	THE DXES1 IN OCTAL
"XXXXXX"	THE DXMOB IN OCTAL
"XXXXXX"	THE DXES2 IN OCTAL

NOTE -- THE DX WILL NOW BE IN A DISABLE STATE REQUIRING THE USER TO ENABLE THE DX VIA THE RUN "R" COMMAND BEFORE COMMUNICATIONS TO THE 360 CAN RESUME.

6.3 ERROR MESSAGES AND SUGGESTED CORRECTIVE ACTIONS

"MEMORY TIME OUT"

THE MEMORY TIME OUT ERROR INDICATES A TRAP WAS EXECUTED THRU LOCATION 4. THE SYSTEM HALTS AFTER THIS ERROR. THE MEMORY TIME OUT ERROR NORMALLY DENOTES THAT AN ILLEGAL ADDRESS WAS REFERENCED AND

THE SYSTEM SHOULD PROBABLY BE RECONFIGURED.

"MEMORY MANAGEMENT ERROR"
THIS ERROR INDICATES A TRAP WAS EXECUTED THRU LOCATION 250, THE MEMORY MANAGEMENT TRAP VECTOR. THE SYSTEM WILL HALT AFTER REPORTING THE ERROR CONDITION.

"ILLEGAL DEVICE NUMBER"
THIS ERROR INDICATES THAT A TUMBLE TABLE ENTRY WAS MADE WHICH CONTAINED A DEVICE ADDRESS OUTSIDE THE VALID DEVICE ADDRESSES SPECIFIED BY THE TEST PARAMETERS. NOTE -- THIS CONDITION WILL NOT OCCUR ON A SYSTEM RESET FROM THE 360. SEE SECTION 6.3 FOR FURTHER DETAILS ON DX ERRORS.

"INVALID DX COMMAND"
THIS ERROR INDICATES THAT AN INVALID COMMAND WAS DETECTED FROM THE 360. THIS ERROR CAN ONLY OCCUR ON AN INITIAL SELECTION SEQUENCE. SEE SECTION 6.3 FOR FURTHER DETAILS ON DX ERRORS.

"NON EX-MEM ERROR"
THIS ERROR INDICATES THAT A NON-EXISTENT MEMORY ERROR WAS DETECTED IN A TUMBLE TABLE FROM THE DX. SEE SECTION 6.3 FOR FURTHER DETAILS ON DX ERRORS.

"PARITY ERROR"
THIS ERROR INDICATES THAT A PARITY ERROR WAS DETECTED BY THE DX. TO STOP THE DX WHEN A PARITY ERROR IS DETECTED, THE USER SHOULD CONSULT THE "STOP" COMMAND.

7.0 RESTRICTIONS

SEE MEMORY REQUIREMENTS (SECTION 2.2)

7.1 MULTIPLE DEVICE ADDRESSES

ONLY 8 DEVICE ADDRESSES MAY BE EXERCISED SIMULTANEOUSLY OVER THE DX. ALL THE DEVICE ADDRESSES MUST BE CONTIGUOUS.

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        %
        .REM    %
        8.0     PROGRAM DESCRIPTION

        PURPOSE         THE PURPOSE OF THIS PROGRAM IS TO GIVE INSIGHT
        -------         ON FUNCTIONALITY OF THE HARDWARE AND TO GIVE CREDENCE
                        TO THE FIRMWARE DESIGN. IT WILL, BY DEFAULT, PROVE
                        ON "WHICH SIDE OF THE FENCE" A PROBLEM LIES-
                        SOFTWARE OR HARDWARE ,DEC OR IBM.

                THE FOLLOWING IS A DESCRIPTION OF THE PROGRAMMING TECHNIQES USED-
                IT IS BROKEN DOWN BY THE NEAREST DISCRIPTIVE ROUTINE-

                --------KEYBOARD & PRINTER I/O --------


        MESG:   THIS ROUTINE PACKS THE TYPE OUT MESSAGE IN BUFFER AREA -
                LOOKS TO SEE IF PRINTER IS BUSY - IF NOT, PRINTS AND
                RESTORES BUFFER AREA UNTIL MESSAGE IS COMPLETE.

                IF BUSY, IT PACKS BUFFER AREA UNTIL FULL, WAITING FOR
                THE OTHER PRINTABLE TASK TO COMPLETE.

                THIS APPROACH PROHIBITS MESSAGE INTERWEAVING.  USES PROUT:


        PROUT:  THIS ROUTINE SENDS DATA TO PRINTER BASED UPON TTY FLAG
                IS BUSY OR NOT.


        TKIN:   THIS ROUTINE ACCEPTS CHARACTERS FROM KEYBOARD AND STUFFS
                THEM AWAY IN TBUF, BUT FIRST, IT CHECKS FOR CERTAIN CON-
                TROL CHARACTERS.

                        ↑P - JUMP TO RESTART TO RESELECT PARAMETERS.

                        ↑C - WHEN COMMAND (TCMACT) ACTIVE = SET ABORT
                             FLAG (TCMDAB)

                        ↑C - WHEN COMMAND (TCMACT) NOT ACTIVE = PRINT \
                             & RESET BUFFER PTR.

                A C/R DELIMITS TTY COMMAND - TCMACT IS SET - NOW IF YOU
                CONTINUE TYPING - TCMACT BEING SET WILL NOW THROW AWAY
                THOSE CHARACTERS.




                ------MONITOR PARAMETER SETUP ------
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SYSINT: THIS ROUTINE CLEARS THE THE WORLD, SETS UP TTY KEYBOARD & PRINTER VECTOR AREAS.

SETS UP MEMORY TIME OUT & MEMORY MANAGEMENT ERROR VECTOR AREAS.

CLEARS OUT SYSTEM BUFFER AREA & SETS UP TTY BUFFER POINTERS.

----GETS DX ADDRESS - CHECKS FOR LIMITS SAVES IT IN UNADDR:

----GETS DX VECTOR - DITTO

GETS DEVICE ADDRESS IN HEX - ACCEPTS RANGE OF DEVICE ADDRESSES MUST NOT EXCEED 8 - SEPARATED BY A COMMA

SAVES START DEV ADD IN SDEV
SAVES END DEV ADD IN EDEV

----CHECKS FOR LEGAL TERMINATOR IE. C/R

----GETS CHANNEL TYPE M OR S

----GETS ANSWER WHETHER MEMORY MANAGEMENT? Y OR N

IF YES, SET UP VECTOR 4 AND TEST FOR EXISTANCE OF MEMORY MANAGEMENT.

----GET BUFFER RELOCATION IN ,000'S (THOUSANDS)

* CHECKS FOR BOUNDARY 20000 OR GREATER
* CHECKS FOR MULTIPLE OF 2000
* CHECKS TO SEE IF NUMBER IS VALID WITHIN MEMORY MANAGEMENT AND COMPARES WHETHER M/M WAS SPECIFIED.

----GET TEST TYPE - FRIEND OR 2848 - STORE IN TSTTYP: - IF FRIEND ASK NEXT QUESTION, IF 2848 JUMP TO INIT:

----SEPARATE I/O BUFFERS? Y OR N
STORE IN IOBUF:
IF Y ASK

----FILL CHARACTER IN HEX
SAVE IN FILLCH

-----MONITOR SETUP SUBROUTINES-----

NOMM: NO MEMORY MANAGEMENT AVAILABLE.

MMERR: MEMORY MANAGEMENT TRAP OUT ROUTINE
CLEAR WORLD
TYPE OUT ERROR MESSAGE
HALT

INITRT: PRINTS MESSAGE - WAITS FOR INPUT - GETS IT OR IF IT IS
A C/R - DEFAULTS.

COTB: GOBBLES CHARACTERS FROM INPUT BUFFER AREA - CONVERTS TO
OCTAL AND SAVES RESULT IN R3 - THIS ROUTINE DOES NO
OTHER CHECKING THE CODE FOLLOWING UNIT EXAMINE R3 FOR
VALIDITY.

CHTB: GOBBLES CHARACTERS FROM INPUT BUFFER AREA CONVERTS HEX #
TO OCTAL AND SAVES RESULT. STORES AWAY TERMINATOR IN R4

THE TERMINATOR SHOULD BE EITHER A C/R OR A COMMA.

-----PROGRAM INITIALIZATION----

INIT: SET UP MEMORY TIME OUT TRAP
----SET UP DX ADDRESS TABLE. SET UP VECTOR ADDRESS WITH
DXISR. WAS BUFFER RELOCATION SPECIFIED - IF NOT START
AT 20000.

----TEST FOR MEMORY MANAGEMENT.
----IF YES - SET UP MEMORY MANAGEMENT REGISTERS AND ENABLE
MEMORY MANAGEMENT.

----SET UP SPW TABLE
LOAD DXOS WITH BUFFER OFFSET (DEFAULT = 20000)
CALCULATE ADDRESS OF DST TABLE - SAVE AT DSTOFF

----SET UP SPW TABLE - MOVE UCHK FOR INVALID DEVICE #'S
MOVE DST ADDRESS TO VALID DEVICE #'S

SPW TABLE = 400(8) WORDS.

----CLR TUMBLE TABLE & DUPLICATE TUMBLE TABLE.

TT = 400(8) WORDS

DTT = 400(8) WORDS

----SET UP DST TABLE
FIRST 11. BYTE LOCATIONS FILL IN WITH VALID COMMANDS.
REMAINDER DST = UCHK = 2
DST = 128. WORDS = 256. BYTES

----SET UP FILL CHARACTER

----COMPUTE MAX NUMBER OF DEVICES +1
SAVE AT MAXDEV:
DEVCON = FIRST DEVICE -1

----START SETTING UP DEVICE BUFFERS
SAVE ADDRESS AT SDEVTB
MAKE THE FIRST DEVICE = 0 IN THIS TABLE
CLEAR DEVICE STATUS BUFFER TABLE & INPUT BUFFER

----CREATE & SAVE ADDRESS OF INPUT/DISPLAY BUFFER IN DEVICE
BUFFER AREA.
CREATE & SAVE ADDRESS OF OUTPUT/DISPLAY BUFFER IN DEVICE
BUFFER AREA.

----FILL OUTPUT/DISPLAY BUFFER WITH FILL CHARACTER
NOW CHECK IF ALL DEVICES HAVE HAD THEIR DEV.CE STATUS
BUFFER TABLES GENERATED - IF NOT, REPEAT INI130: THRU
INT150:

- REMEMBER MEMORY MANAGEMENT HAS BEEN TURNED ON-

CREATE EXTENDED ADDRESS BITS AND SAVE AT XADDR: SET
FIRST TIME THRU FLAG - QUESTION/ANSWERS WILL ONLY BE
GENERATED IF LA 1002 & START. OR HITTING ↑S ON TTY KEYBOARD

--------THE EXEC: SYSTEM EXECUTIVE/BACKGROUND --------
(A WAIT ROUTINE)

EXEC: CLR SYSTEM FLAGS
----ANY COMMANDS TO EXECUTE? IF YES GO TO EXEC20. DID THE
DX ABORT AN OPERATION - IF NOT SPIN HERE

```
          ----ALWAYS COME HERE AFTER TELETYPE INPUT HAS SET TCMACT -
              THIS ROUTINE DISPATCHES YOU TO THE COMMAND TYPED IN - IF
              NOT AN ACCEPTABLE SYSTEM COMMAND = ? RETURN TO EXEC.
                        ( DISPATCH )




                           ---TYPICAL DX COMMANDS---
                        (ENTERED VIA TTY KEYBOARD)

      RUN DX COMMAND

      RUN:  CHECK IF DX IS ENABLED -
              IF YES, TYPE ? AND (BELL)--RETURN TO EXEC AND
                                         WAIT FOR ANOTHER TTY COMMAND.
              IF NO,CONTINUE
              RETURN TO EXEC.

              CLR DXCS
              INC DXCS - GO

              CLR DEVICE STATUS BUFFER TABLE
                    (SCMD
                     SLCMD
                     SSENSE  (NOT SCURS, SINTB, SOUBF, SONLF)
                     SSTAT
                     SBUFA
                     SRBYTC
                     SROAQ
                     SMINS)

              DO THIS FOR ALL DEVICE STATUS BUFFER TABLES (BASED ON
              MAXDEV:)

              CLR DXACT, CMDCHF, DXABFL

              CLR TUMBLE TABLE & DUPLICATE TUMBLE TABLE
              SET EXTENDED ADDRESS BITS IN DXCS

              CHECK FOR CHANNEL TYPE

              IF SELECTOR CHANNEL SET BUSY ENABLE IN DXCS

              SET INTERRUPT ENABLE & ONLINE IN DXCS

              RETURN TO EXEC
```

STOP DX COMMAND

STOP: PICK UP NEXT TTY INPUT CHARACTER FOR THE MODE.
WHAT IS IT?
C/R = CRUNCH DX, CONVERT AND PRINT CURRENT DEVICE #
IN HEX, PRINT 13 DX REGISTERS CONTENTS.
CLR ABORT FLAG (DXABFL), CLR DONE
RESET DX, SET GO, RETURN TO EXEC.

D = SET THE STOP FLAG (DXSTPF), TEST WHETHER STOP HAS
TAKEN PLACE, IF NOT , WAIT UNTIL DXSTPF HAS BEEN
CLEARED (TYPICALLY THE PCHEND: ROUTINE WILL CLEAR
DXSTPF (DXISR:)) , DISABLE DX , RETURN TO EXEC

E = SAME AS D EXCEPT (TYPICALLY PESEND: OR
PCHEND: ROUTINES WILL CLEAR DXSTPF (DXISR:))

I = SAME AS D EXCEPT (TYPICALLY PCHIS: ROUTINE
WILL CLEAR DXSTPF (DXISR:))

ANY OTHER CHARACTER = AN ILLEGAL CHARACTER

DUMP COMMAND

DUMP: PICK UP THE NEXT SEQUENCE OF OCTAL NUMBERS OR NEXT CHARACTER
FROM TTY INPUT BUFFER AREA.

(GLIMIT:) 1ST CHECK IF THEY ARE OCTAL NUMBERS. IF YES, (SAVE IT); IF
NOT, DETERMINE IF IT IS AN "I", "O", OR "T".
IF NOT ONE OF THESE - TYPE ERROR MESSAGE

(SAVE IT) OCTAL NUMBERS, 1ST ADDRESS GIVEN = SADDR
2ND ADDRESS GIVEN = EADDR.

IF "T" -CHECK FOR 2ND T - CREATE STARTING ADDRESS
OF DUPLICATE TT (TTPTR +1000)
(SAVE) DTT2 = SADDR

IF "I" - NOW CHECK FOR N - CREATE STARTING & ENDING ADDRESSES
OF DEVICE 0 INPUT BUFFER TABLE
SINBUF (DEV 0) = SADDR
SADDR + 481. = EADDR

IF "O" - NOW CHECK FOR T - CREATE STARTING AND ENDING

ADDRESSES OF DEVICE 0 OUTPUT BUFFER TABLE
SOUTB (DEV0) = SADDR
SADDR + 479. = EADDR

NOW SET UP DMPADR: TO CONTAIN THE ADDRESS OF THE
CORRECT DUMP ROUTINE (IE ASCII DUMP, EBCDIC, HEX, OCTAL)

CHECK TO SEE IF IT IS A TT DUMP - IF YES, DUMP DTT
IN REVERSE - USES ADDRESS IN DMPADR. CONTINUES DUMPING
(PRINTING) UNTIL BEGIN OF DTT IS SEEN.

IF NOT A TT DUMP - CHECK FOR A DEVICE # SPECIFIED - IF
NOT JUST DUMP DEFAULTED LIMITS GET THE DEVICE #, CRUNCH THE
CONTENTS OF SADDR & EADDR TO POINT TO THE PROPER DEVICE
SPECIFIED.

CONVERT AND DUMP IT, STOPPING @EADDR
RETURN TO EXEC.; LOOKING FOR MORE COMMANDS TO EXECUTE.

FILL COMMAND

FILL: PICK UP CHARACTERS FROM TTY INPUT BUFFER AREA - PERFORMS
VERY SIMILAR TO THE DUMP COMMAND EXCEPT IF FILLS AREA WITH THE
SPECIFIED FILL CHARACTER (FILLCH)

USE ONLY THOSE FILL COMMANDS AS SPECIFIED IN THE TEXT - ANY
OTHERS MAY OBLITERATE THE CORE.

BASICALLY THIS IS USED TO FILL THE OUTPUT OR INPUT BUFFER AREA
WITH FILL CHARACTER (FILLCH)

ACCESS COMMAND

ACCESS: OPENS CORE LOCATION, ALLOWING IT TO BE MODIFIED WITH NEW CONTENTS.
A "/" RETURNS YOU TO THE EXEC, A C/R OPENS NEXT LOCATION ETC.
-VERY SIMILAR TO "ODT" -

ENABLE DEVICE

ENABLE: GETS THE TYPED DEVICE # IN HEX
CLEARS THAT DEVICES STATUS TABLE
CLR SSENSE, CLR SONLF
RETURN TO EXEC

KILL DEVICE

KILL: GETS THE TYPED DEVICE # IN HEX
MOVES A "1" INTO SONLF
MOVES A UNIT CHECK INTO THE SPW TABLE

RETURN TO EXEC.

INPUT COMMAND

INPUT: CHECK FOR FRIEND OR 2848? - 2848 ONLY GET DEVICE #
IN HEX FROM TTY INPUT BUFFER.

PUT THE START CHARACTER IN DEVICE BUFFER AREA (SMI=112)
SAVE DATA LOCATION (SMINS)
INC CURSOR POSITION
CHECK FOR END OF SCREEN (SCURS=478.) IF YES, PUT EOM
(EOM=152) IN THE BUFFER AREA, INC CURSOR POSITION, QUEUE
A READ REQUEST (SRDRQ)

PUSH STACK (CREATE PHONEY INTERRUPT)
JUMP DXEXEC

-----TYPICAL TT1 (TUMBLE TABLE) ENTRIES----
(THESE SERVICE ROUTINES ARE SELECTED BY THE DXISR
ROUTINE WHEN THE TUMBLE TABLE ENTRY (TT1=DXDS) IS EXAMINED.)

SYSTEM RESET

PSYSRT: CLEAR DEVICE STATUS BUFFER TABLE. SETUP DISPLAY BUFFER
AREA WITH FILL CHAR.
DO THIS FOR ALL DEVICES
CLR ACTIVE FLAGS, CMD CHAINING FLAG (DXACT & CMDCHF)
CLR CUBUSY IN DXCS
PROCESS NEXT ENTRY IN TT
IF NO MORE TT ENTRIES - GO TO DXEXEC.

SELECTIVE RESET

PSELRT: CLR DEVICE STATUS BUFFER TABLE
FOR THAT DEVICE + SENSE
IT IS A SEL RESET ISSUED AGAINST THE CURRENT ACTIVE DEVICE.
PROCESS ANY MORE TT ENTRIES THEN GO TO DXEXEC.

INTERFACE DISCONNECT:

PINDSC: IF DEVICE WAS ACTIVE, ITS DEVICE STATUS TABLE WILL BE
CLEARED - IF NOT ACTIVE, IGNORE CMD.

IF ACTIVE - QUEUE CE! DE IN SCMD

(TYPICALLY IBM WILL INTERFACE DISCONNECT A DEVICE EVEN
THO THE DEVICE WAS NOT ACTIVE)

IF ACTIVE - CHECK FOR CMDCHF: & DXACT: FOR THAT PARTICULAR
DEVICE - IF YES, CLR BOTH FLAGS - ONLY ONE DEVICE AT A TIME
CAN HAVE CMD CHAINING AND/OR DX ACTIVE SET.

IF NO MORE TT ENTRIES - GO TO DXEXEC.

STATUS ACCEPT

PESENT: WAS LAST CMD A WRITE? IF SO, FORMAT THE DISPLAY (DISCTL)

WAS ATTN ACCEPTED? - IF YES, SET SRDRQ (READ MANUAL
INPUT REQUEST)
IF NO, CONTINUE
CLR OUT SLCMD (LAST CMD)(SET ONLY ON A WRITE)
CLR DXACT DXACTIVE FLAG
CLR DEVICE STATUS BUFFER TABLE
TEST FOR CMDCHN (TT1)(DXDS) - IF YES, SAVE DEVICE # IN
IN CMDCHF (ONLY ONE DEVICE AT A TIME CAN
CMD CHAIN)

```
                WAS A SE SPECIFIED?  (STOP ON ENDING SEQ) - IF YES, CRUNCH
                                     DX - IF NO, AND NO MORE TT ENTRIES GO TO
                                     DXEXEC


        NON-EXISTANT MEMORY - FATAL ERROR

        PNXM:  STOP THE DX FROM INTERRUPTING
               SET ABORT FLAG
               EXIT FROM DXISR - GO TO MONITOR WAIT STATE(EXEC).
               (DO NOT PASS THRU DXEXEC ROUTINE - JUST ABORT)


        PARITY ERROR

        PPARER:  WAS STOP ON PARITY ERROR SPECIFIED?
               THE PROGRAM (PARSTP: =0) HAS BEEN PRESET TO YES
               IF YES - CRUNCH DX
               IF NO (PARSTP: =>0) QUEUE A UNIT CHK TO SSTAT (STATUS WORD)
               RETURN TO DXISR AND CONTINUE CHECKING TTI


        EVERYTHING OK UP TO THIS POINT
               CHANNEL INITIATED SELECTION SEQUENCE

     PCHIS:  WAS A SI (STOP ON ISS) SPECIFIED?
               IF YES, CRUNCH DX
               CMDREJ?  YES, IS DEVICE ONLINE?
                        NO, SET INTREQ IN SSENSE
                        CMDCHF? IF YES, CLR CMDCHF.
                       ANY MORE TT ENTRIES? - IF NO, GO TO DXEXEC


               CMDREJ?  YES, IS DEVICE ON LINE?
                       YES, TEST PARITY ERROR
                       IF NOT, MUST BE ILLEGAL CMD - SET BUS OUT IN SSENSE
                       IF YES, SET SCMDRJ (COMMAND REJECT) IN SSENSE

               CMDCHF?  YES, CLR CMDCHF
                       ANYMORE TT ENTRIES, NO, GO TO DXEXEC


               CMDREJ?  NO, THEN PROCESS CMD (TT2 CONTAINS CMD)

               IS THIS A TIO CMD?  IF YES, IGNORE, CHECK CMDCHF ETC,
                       ANYMORE TT? NO? GO TO DXEXEC

               IS THIS A NOP CMD?  IF YES, IGNORE, CHECK CMDCHF ETC,
                       TT ENTRIES?, NO GO TO DXEXEC

               IS THIS A VALID CMD?  NO - ABORT DX(DXAB:)....EXIT FROM DXISR &
                                           RETURN TO EXEC:
                                     YES  - QUEUE CMD (TT2) TO SCMD

               IS CMDCHF SET?  YES, CLR CMDCHF
                       ANYMORE TT ENTRIES, NO? GO TO DXEXEC
```

```
        CHANNEL END, PREPARE ENDING SEQUENCE RESPONSE

        PCHEND:  CLR DXACT

                 WAS STOP ON DATA TRANSFER DONE?  YES, STOP DX
                 NO, QUEUE CEDE TO SCMD
                 SUBTRACT DXBYTE COUNT (DXBC) FROM SRBYTC
                 WAS THERE A PARITY ERROR?  IF YES,
                 QUEUE EQPCHK TO SSENSE (EQPCHK = 20 )

        (LOOP)   ANYMORE TT ENTRIES? NO, GO TO DXEXEC


        CONTROL UNIT END

        PCUEND:  CLR DXACT
                 USED TO KEEP TRACK OF REMAINING BYTE COUNT (SRBYTC)
                 AND TO KEEP TRACK OF CURRENT BUFFER POINTER (MULTIPLEXER CHANNEL)
                 JUMP TO PCHEND:
```

--- DXISR (DX11B INTERRUPT SERVICE ROUTINE) ---

THE DX SHOULD MAKE ENTRIES IN TT - INTERRUPTS VECTORING
THRU WHEN PSW IS < DX11B

DXISR: CHECK IF ZERO TT ENTRY UPON INTERRUPT
IF ZERO - ASSUME TT ENTRY HAS ALREADY BEEN PROCESSED -
RETURN FROM INTERRUPT

IF NON-ZERO, CLEAR "DONE" (DXCS) FOR EVERY TT ENTRY
- SAVE FIRST TT ENTRY IN DUPLICATE TT (DTT1) &TT1.
SAVE SECOND TT ENTRY IN DUPLICATE TT (DTT2) &TT2.
CLR BOTH TT ENTRIES TO SIGNIFY THAT THEY WERE PROCESSED.

NOTE: TT1 CONTAINS CONTENTS OF DXDS...TT2 CONTAINS CONTENTS
OF DXCA.

PICK UP DTT2 AND CHECK FOR VALID DEVICE # (TT2=DXCA)

THE ORDER IN WHICH THE FIRST TUMBLE TABLE ENTRY IS PROCESSED
IS IMPORTANT. CHECK FIRST FOR SYSTEM RESET , PARITY ERRORS,
ETC. THEN CHECK FOR CHANNEL INITIATED SEQUENCE, CHANNEL END,
CONTROL UNIT END. (PERFORM ACCORDING TO TT1 (DXDS))
* CHECK FOR A SYSRST IN TT1 (DXDS)
IF YES, GO TO SYSTEM RESET (PSYSRT:)
* SELECTIVE RESET? (DXDS)
IF YES, GO TO PSELRT:
* CHECK FOR INTERFACE DISCONNECT? (DXDS)
IF YES,GO TO PINDSC:
* NON-EXISTANT MEMORY? (DXDS)
IF YES, GO TO PNXM:
* STATUS ACCEPTED? (DXDS)
IF YES, GO TO PSESND:
* PARITY ERROR? (DXDS)
IF YES, GO TO PPARER:
* CHANNEL INITIATED SEQUENCE? (DXDS)
IF YES , GO TO TCHIS: (EVERYTHING OK UP TO THIS POINT).
* CHANNEL END? (DXDS)
IF YES, GO TO TCHEND:
* CONTROL UNIT END? (DXDS)
IF YES, GO TO TCUEND:
* INITIAL SELECTION SEQUENCE REJECT? (DXDS)
NO? IGNORE ENTRY...TREAT AS STACK STATUS
GET NEXT TT ENTRY AND DO REST OF ABOVE..... IF, HOWEVER,
INITIAL SELECTION SEQ WAS REJECTED ,ENTER A QUEUE CONTROL
UNIT END TO 360 (QUEUE A CONTROL UNIT END(QCUE=10) TO SCMD OF PROPER DEVICE
STATUS BUFFER TABLE)
-YOU WILL STAY IN THIS SECTION OF CODE UNTIL ALL TT ENTRIES
HAVE BEEN PROCESSED. WHEN THERE ARE NO MORE TT ENTRIES TO
PROCESS ....JUMP TO DXEXEC:.

---DXEXEC: OVERVIEW (CMD DISPATCH SECTION
OF THE DXISR) ---

DXISR HAS THE PRIORITY LEVEL AT 7 PREVENTING ANY MORE INTERRUPTS.
- IT HAS PROCESSED ALL THE TT ENTRIES BEFORE GETTING INTO THIS CODE

REMEMBER; THROUGHOUT THE DXISR INTERRUPT SERVICE ROUTINE,
AS A RESULT OF SERVICING TT ENTRIES, THE PROGRAM HAS
BEEN SETTING OR PUTTING SPECIFIC #'S IN THE DEVICE'S
STATUS BUFFER AREA. THESE COMMANDS OR WHATEVER WERE
BEING QUEUED FOR DXEXEC: PROCESSING. HOPEFULLY, AS THE TT
WAS SERVICED SOME OF THESE WERE CANCELLED OR CHANGED TO
REFLECT THE TRUE STATUS THAT MUST BE PRESENTED TO THE 360
CHANNEL. (I KNOW THAT MAY BE DIFFICULT TO REMEMBER). WELL,
NOW IS THE TIME TO PROCESS THESE QUEUED COMMANDS.
YOU CAN EXIT FROM THE DXISR: BY SEVERAL PATHS; EXECUTING
A COMMAND, SEND "ATTENTION", COMMAND CHAINING, OR A
SYSTEM RESET, INTERFACE DISCONNECT, ETC..

THE DXEXEC: ROUTINE FIRST DETERMINES WHETHER THE CHANNEL
WAS SELECTOR OR MULTIPLEXER (CHTYPE = "M" OR "S")

TYPICAL SELECTOR COMMANDS (FOR EACH DEVICE #)

WRITE FULL BUFFER	(SCMD = 1)
READ MANUAL INPUT	(SCMD = 2)
ENDING SEQUENCE	(SCMD = 3)
SENSR COMMAND	(SCMD = 4)
WRITE LINE ADDRESS	(SCMD = 5)
READ FULL BUFFER	(SCMD = 6)
ERASE COMMAND	(SCMD = 7)
CONTROL UNIT END	(SCMD =10)
SEND ATTN TO 360	(SCMD =11)
READ SHORT MANUAL INPUT	(SCMD =12)

TYPICAL MULTIPLEXER COMMANDS (FOR EACH DEVICE #)

WRITE FULL BUFFER	(SCMD = 1)
READ MANUAL INPUT	(SCMD = 2)
ENDING SEQUENCE	(SCMD = 3)
SENSE COMMAND	(SCMD = 4)
WRITE LINE ADDRESS	(SCMD = 5)
READ FULL BUFFER	(SCMD = 6)
ERASE COMMAND	(SCMD = 7)

```
        PROGRAM DESCRIPTION

                CONTROL UNIT END          (SCMD =10)
                SEND ATTENTION            (SCMD =11)
                READ SHORT MANUAL INPUT   (SCMD =12)




                ----SELECTOR/MULTIPLEXER COMMAND DESCRIPTION ----

                ---- SELECTOR CHANNEL ----

        SEX:    IS THERE ANY COMMANDS TO EXECUTE (PER DEVICE)?  IF NO, CHECK
                FOR COMMAND CHAINING; IF YES, EXIT FROM THE DXISR - WAIT
                FOR THE INTERRUPT (REMEMBER, YOU MUST EXIT IN ORDER TO
                DROP THE PROCESSOR LEVEL).  RESULTANT DXISR INTERRUPT WILL
                PROCESS NEW TT ENTRIES.

                IF CMDCHF = 0 CHECK TO SEE OF THE ATTENTION FLAG (SRDRQ)
                FOR THAT DEVICE IS SET.  IF YES, QUEUE A "SEND ATTENTION"
                (SCMD=11).  IF NO, RETURN TO DXEXEC AN REPEAT FOR NEXT DEVICE
                - REPEAT UNTIL ALL DEVICES HAVE BEEN SERVICED BEFORE
                EXITING FROM DXISR.

                IF THERE WAS A COMMAND TO EXECUTE (SCMD=XX); GO TO THAT
                ROUTINE SPECIFIED BY THE COMMAND.  WHEN COMPLETE...EXIT
                FROM DXISR


                ------DESCRIPTION OF COMMAND ROUTINES (SELECTOR)-----

        WRITE LINE ADDRESS
        WRITE FULL BUFFER

        SWRITE:     SET UP THE ADDRESS OF INPUT BUFFER AREA (SINBF) INTO DXBA
                    SUBTRACT PHYSICAL OFFSET
                .   SET BYTE COUNT IN DXBC
                    SET DEVICE ADDRESS IN DXCA
                .   SAVE COMMAND (SLCMD (----- SCMD)
                .   CLR SSENSE
                .   SET DEV ACTIVE FLAG (DXACT)
                .   SET INPUT FUNCTION & GO IN DXCS
                .   EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES

                THE SAVING OF SLCMD SIGNIFIES TO THE PRESENT ENDING
                SEQUENCE (PESEND) THAT IT MUST FORMAT THE DISPLAY (DISCTL)

        READ COMMAND (READ FULL BUFFER)

        SREAD:      SET UP THE ADDRESS OF THE OUTPUT BUFFER AREA (SOUTB)
                INTO DXBA.  SUBTRACT PHYSICAL OFFSET.
                .   SET BYTE COUNT IN DXBC
                .   SET DEVICE ADDRESS IN DXCA
                .   CLR SSENSE
                .   SET DEV ACTIVE FLAG (DXACT)
```

```
                . SET OUTPUT FUNCTION & GO IN DXCS
                . EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES.

        READ MANUAL INPUT
        READ SHORT MANUAL INPUT

                SSRMI:  IS IT FRIEND?  IF YES, TREAT AS READ FULL BUFFER
                (SREAD:)
                  DID YOU SPECIFY A READ REQUEST? NO? ASSUME THE
                360 GAVE AN 'UNSOLICITATED REQUEST (POLL) AND SEND BACK
                AN ENDING SEQUENCE (ESEQ:)

                IF READ REQUEST WAS SET-PROCEED -
                CLR SRDRQ
                SAVE LAST COMMAND
                SET UP STARTING ADDRESS - MOVE SMINS TO DXBA
                SUBTRACT PHYSICAL OFFSET FROM DXBA
                CALCULATE BYTE COUNT AND SET DXBC

                IF BYTE COUNT IS ERRONEOUS - JUST SEND AN ENDING SEQUENCE
                COMPUTE DEVICE ADDRESS AND SET DXCA
                CLR SSENSE
                SET DEVICE ACTIVE FLAG (DXACT)
                SET OUTPUT FUNCTION AND GO IN DXCS
                EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES.

        PRESENT ENDING STATUS TO CHANNEL

        ESEQ:   QUEUE CE & DE TO SSTAT
                 CALCULATE DEVICE ADDRESS AND SET DXCA

                CHECK FOR UNIT CHECK BIT SET.  IF YES, QUEUE SSTAT WITH
                UNIT CHECK ONLY

                IF NO, MOVE SSTAT TO DXOS
                SET STATUS FUNCTION & GO TO DXCS
                SET DEVICE ACTIVE FLAG (DXACT)
                EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES.

        PRESENT CONTROL UNIT END

        CONUNE: QUEUE A CONTROL UNIT TO SSTAT
                CALCULATE DEVICE ADDRESS AND SET DXCA
                CHECK FOR UNIT CHECK BIT SET
                IF YES, QUEUE SSTAT WITH UNIT CHECK ONLY
                IF NO, MOVE SSTAT TO DXOS
                SET STATUS FUNCTION & GO TO DXCS
                SET DEVICE ACTIVE FLAG (DXACT)
                EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES.

        ERASE COMMAND

        ERASCM: MOVE AN EBCDIC SPACE THROUGHOUT OUTPUT DATA BUFFER (SOUTB)
                CLEAR CURSOR POSITION (SCURS)
                CLEAR SSENSE
                QUEUE A CE & DE TO SCMD (CRUNCH WHATEVER WAS IN SCMD)
```

DO AN ENDING SEQUENCE - (ESEQ:)

SENSE COMMAND

SENSCM: MOVE THE ADDRESS OF THE SENSE BYTE (SSENSE) TO DXBA
COMPUTE DEVICE ADDRESS AND SET DXCA
SET UP TO SEND ONE BYTE TO DXBC
SET DEVICE ACTIVE FLAG (DXACT)
EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES

----- MULTIPLEXER CHANNEL ----

MEX: IS COMMAND CHAINING SPECIFIED? (CMDCHF) IF YES, EXIT FROM
DXISR TO ALLOW PSW = 0 IF NO, PICK UP LAST DEVICE ADDRESS
THAT HAS A COMMAND EXECUTED - HAS IT BEEN EXECUTED? (TYPICALLY
SYSTEM RESET, SELECTIVE RESET, INTERFACE DISCONNECT,
STATUS ACCEPTED, CHANNEL END, OR CONTROL UNIT END WILL
TERMINATE DXACT IN A COMMAND SEQUENCE)

GO TO DEVICE AND FIND OUT IF THERE IS A JOB TO DO
IF NOT, QUEUE "ATTENTION" IFF ATTENTION IS REQUESTED (SRDRQ=1)
-GO EXECUTE COMMAND.

-----DESCRIPTION OF COMMAND ROUTINES (MULTIPLEXER)-----

THOSE THAT ARE COMMON TO THE SELECTOR CHANNEL WILL NOT
BE EXPLAINED HERE - REFER BACK TO SELECTOR

WRITE FULL BUFFER

MWRITE: IS THERE A WRITE IN PROGRESS? (SRBYTC)
IF NO, SET UP DXBA (DXBA <----- SUBFA)
SET UP BYTE COUNTER (SRBYTC)
SET UP DEVICE ADDRESS IN DXCA
SET UP FOR 4 BYTES MAXIMUM TRANSFER IN DXBC
CLR SSENSE
SAVE COMMAND (SLCMD <----- SCMD)
SET DEVICE ACTIVE (DXACT)
SET INPUT FUNCTION & GO IN DXCS
EXIT FROM DXISR AND WAIT FOR NEW TT ENTRIES

IF THERE WAS A WRITE IN PROGRESS JUST CONTINUE AS ABOVE
UNTIL SRBYTC = 0, THEN SET UP TO MAXIMUM INPUT BUFFER
SIZE.

SRBYTC IS DECREASED BY THE FOLLOWING IT ENTERED
ROUTINE - (PREPARE CONTROL UNIT END (PCUEND))

SBUFA IS INCREASED BY THE SAME ROUTINE (PCUEND)

A 360 WRITE (MUX) WILL TRANSFER 4 BYTES AT A TIME

THE SAVING OF SLCMD SIGNIFIES TO THE PRESENT ENDING
SEQUENCE (PESEND) THAT IT MUST FORMAT THE DISPLAY
(DISCTL)

READ COMMAND
MREAD: SAME BASICALLY AS MWRITE EXCEPT IT USES SOUTB AND SETS
OUTPUT FUNCTION & GO IN DXCS

READ MANUAL INPUT COMMAND
MSRMI: FRIEND OR 2848
IF FRIEND--JUMP TO "READ FULL BUFFER" (MREAD:)
IF 2848, WAS READ REQUESTED ? NO- ASSUME NOP AND
QUEUE AN ENDING SEQUENCE TO CHANNEL (ESEQ:)

IF READ REQUESTED = YES (SRDRQ =1) SAVE CMD FOR DISPLAY
CONTROL (SLCMD)
COMPUTE ADDRESS OF OUTPUT BUFFER
COMPUTE THE BYTE COUNT
GO TO READ (MREAD:)

NOTE: AFTER TRANSFER OF THE 4 BYTES, THE DXBC WILL DECREMENT TO ZERO
CREATING A CONTROL UNIT END TT ENTRY (PCUEND:)
SRBYTC WILL BE DECREMENTED BY 4 AND SBUFA WILL BE
INCREMENTED BY 4-- THIS APPLIES TO ALL THE SELECTOR OR
MULTIPLEXER READ OR WRITES IF THE DX HARDWARE IS
FUNCTIONING CORRECTLY.

---MISCELLANEOUS ROUTINES ---

ASCDMP: THESE ROUTINES SPIT OUT THE CHARACTER
EBCDMP: EQUIVALENT OF THE ORIGINAL OCTAL BYTE
HEXDMP: IN ASCII, EBCDIC, HEXIDECIMAL , OR OCTAL..
OCTDMP:

DISPLAY CONTROL ROUTINE

DISCTL: WAS IT A READ MANUAL INPUT COMMAND (SLCMD=2) IF YES, PICK
UP SMINS. BACK UP. BLANK CHARACTER, SAVE SCURS & RETURN

```
                SMINS:  LOADED IN INPUT COMMAND (ENTER DATA ON A 7260 SCREEN)
                SMINS:  USED IN READ MANUAL INPUT COMMAND
                SMINS:  USED IN PERFORM READ MANUAL COMMANDS

                WAS IT A SHORT READ MANUAL INPUT (SLCMD=12)
                IF YES, JUST RETURN

                IF NEITHER, THE COMMAND MUST HAVE BEEN A 360 WRITE.

                WAS IT FRIEND OR 2848?
                IF FRIEND AND NOT SEPARATE I/O BUFFERS (IOBUF=0)
                   COPY INPUT BUFFER TO OUTPUT BUFFER
                IF FRIEND AND SEPARATE I/O BUFFERS (IOBUF=1)
                   DON'T COPY INPUT BUFFER TO OUTPUT BUFFER

                IF 2848, GET ADDRESS OF START OF INPUT (SINBF)
                   WAS THE LAST CMD A WRITE LINE ADDRESS? (SLCMD=5)



        DX ABORT

        DXAB:
                CLEAR DX INTERRUPT ENABLE TO PREVENT ANY MORE INTERRUPTS
                SET THE DXABLE FLAG TO ABORT
                EXIT FROM DXISR
                (TYPICALLY CAUSED BY A SYSTEM ERROR (NON EXISTANT MEMORY,
                        INVALID COMMAND)
```

----DEVICE STATUS TABLE FLAGS-----

DESCRIPTION OF THE DEVICE STATUS TABLE FLAGS. (THERE IS ONE FULL SET PER SPECIFIED DEVICE).

1) THEY ARE BROKEN DOWN TO THEIR POSSIBLE CONTENTS

2) HOW THEY ARE USED BY THE PERTINENT ROUTINE (CLOSEST SIGNIFICANT ROUTINE)

3) A LISTING OF WHAT ROUTINE CLEARS THE FLAG, OR SET THE FLAG, OR USES THE FLAG.

THESE FLAGS ARE USED ACTIVELY BY THE PROGRAM TO KEEP TRACK OF SIGNIFICANT EVENTS.

SCMD (0)

SCMD
<---- IDLE = 0 (NO COMMAND)
<---- SWRITE: & MWRITE: =1
<---- SRMI: & MRMI: = 2
<---- CEDE = 3 *
<---- SENSCM: = 4
<---- SWRITE: & MWRITE: = 5
<---- SREAD: & MREAD: = 6
<---- ERASCM: = 7
<---- QCUE = 10 *
<---- "ATTENTION" = 11 *
<---- SSRMI: & MSRMI: = 12

* PROGRAM GENERATED COMMANDS- THE REMAINING WERE AS A RESULT OF IBM 360/370 COMMANDS (TT2 ENTRIES)

HOW USED

PESEND: USED TO QUEUE INFORMATION IN SRDRQ & SLCMD FOR LATER PROCESSING
MEX: & SEX: USED TO PERFORM THE 360 CMD - SET UP DX AND DO IT
MWRITE: & SWRITE: USED TO SAVE LAST COMMAND IN SLCMD FOR LATER PROCESSING
MSRMI: & SSRMI: USED TO SAVE LAST COMMAND IN SLCMD FOR LATER PROCESSING.

SET UP IN	USED IN	CLEARED IN
TISSRJ:	PESEND:	CDEVST: (RUN:,ENABLE:,
PINOSC:	SEX: & MEX:	KILL:,PSYSRT:,PINOSC:,
PVISS:	SWRITE: & MWRITE:	PESEND:)

PCHEND: SSRMI: & MSRMI:
ERASCM:

SSENSE (2)

SSENSE <---- INTREQ =100
        <---- BUSOUT =40
        <---- SCMDRJ =200
        <---- EQPCHK =20

HOW USED

USED BY 360 WHEN REQUESTING A SENSE CMD
IE. SENSCM: MOV #SSENSE,@DXBA

SET UP IN	USED IN	CLEARED IN
PHIS:	SENSCM:	RUN:
PCHEND:		ENABLE:
		PSYSRT:
		PSELRT:
		SWRITE:
		SREAD:
		ERASCM:
		MWRITE:
		MREAD:

SSTAT (3)

SSTAT <---- UCHK = 2
       <---- CE!DE = 14
       <---- ATTN = 200
       <---- CUE =40

HOW USED

USED BY 360 WHEN REQUESTING STATUS ;WITH EXECEPTION
OF THE ASYNCRONOUS PRESENTING OF STATUS (ATTN) TO
THE 360.
IE. STOUT: MOV SSTAT,@DXOS

SET UP IN	USED IN	CLEARED IN
PPARER:	STOUT:	PSYSRT:
ESEQ:		CDEVST:(RUN:,ENABLE:,
CONLNE:		KILL:,PSYSRT:,PINDSC:,
SATTN:		PESEND:)

SCURS (4)

SCURS <---- ANY # FROM 0 TO 479. (CURSOR POSITION)

HOW USED

INPUT: USED TO CALCULATE CURSOR POSITION TO CREATE OUTPUT TABLE
(FOR IBM READ)
MSRMI: & SSRMI: USED TO CALCULATE BYTE COUNT FOR USE @DXBC

USED IN	CLEARED IN
INPUT:	PSYSRT:
SSRMI:	DISCTL:
	ERASCM:

SINBF (6)

SINBF <---- ADDRESS OF DEVICE INPUT/DISPLAY BUFFER

HOW USED

DUMP: USED BY PROGRAM DUMP COMMAND TO ASCERTAIN BOUNDARIES
OF THE INPUT BUFFER
DISCTL: USED BY PROGRAM TO CALCULATE BOUNDARIES FOR INPUT BUFFER
MWRITE: & SWRITE: USED BY PROGRAM FOR CALCULATION

SET UP IN	USED IN
INIT: (INT140:)	DUMP:
	DISCTL:
	MWRITE: & SWRITE:

SOUTB (10)

SOUTB <---- ADDRESS OF DEVICE OUTPUT/DISPLAY BUFFER

HOW USED

DUMP: USED BY PROGRAM DUMP COMMAND TO ASCERTAIN
BOUNDARIES OF THE OUTPUT BUFFER
INPUT: USED TO CALCULATE START OF DATA LOCATION FOR
LOADING OF THE OUTPUT BUFFER FOR A SUBSEQUENT
IBM READ
DISCTL: USED BY PROGRAM TO CALCULATE BOUNDARIES FOR OUTPU BUFFER
MREAD: & SSRMI: & MSRMI: USED TO CALCULATE BYTE COUNT FOR
DXBC (IBM READ)
PSYSRT: USED TO CLEAR OUT OUTPUT BUFFER AREA (WITH FILLCH)
ERASCM: USED TO CLEAR OUT BUFFER AREA (WITH EBCDIC SPACE = 100)

SET UP IN	USED IN
INIT: (INT140:)	DUMP: INPUT: DISCTL: SSRMI: & MSRMI: PSYSRT: ERASCM: MREAD:

SBUFA (12)

SBUFA <---- CURRENT BUFFER ADDRESS (FOR MUX CHANNEL ONLY)

HOW USED

MSRMI: & MWRITE: & MREAD: USED TO KEEP TRACK OF CURRENT
BUFFER ADDRESS ,INCLUDING MEMORY MANAGEMENT--
LOADED IN DXBA
ALSO USED TO CALCULATE BYTE COUNT (SRBYTC)--
LOADED IN DXBC

SET UP IN	USED IN	CLEARED IN
PCUEND:	MWRITE:	CDEVST:(RUN:,
MWRITE:	MREAD:	ENABLE:,KILL:,PSYSRT:,
MREAD:	MSRMI:	PINDSC:,PESEND:)
MSRMI:		

SONLF (16)

SONLF <---- ONLINE = 0
       <---- OFFLINE = 1

HOW USED

PHIS: IF DEVICE IS OFFLINE-- QUEUE AN INTERVENTION REQUEST
TO IBM CHANNEL (SSENSE)
- WHEN CHANNEL TIMES OUT WHEN DX DIDN'T RESPOND -
IT WILL PROBABLY SEND A SENSE CMD , THEREBY
READING THE SSENSE

SET UP IN	USED IN
ENABLE: = 0	PCHIS:
KILL: = 1	

SRDRQ (17)

SRDRQ <---- READ REQUEST = 1
       <---- CLEARED = 0
       <---- READ REQUEST ACCEPTED(360)= 2

HOW USED

MEX: & SEX: USED TO FORCE AN ATTENTION (11) RESPONSE TO IBM CHANNEL
MSRMI: &SSRMI: USED TO DETERMINE IF AN UNSOLICITATED IBM READ HAD TRANSPIRED-- IF YES, QUEUE AN ENDING SEQUENCE

SET UP IN	USED IN	CLEARED IN
INPUT: = 1	SEX: & MEX:	RUN:
PESEND: = 1	SSRMI:	PSYSRT:
		SSRMI:

SMINS (20)

SMINS <---- ADDRESS OF THE DATA POINTER (MANUAL INPUT READ)

HOW USED

DISCTL: USED TO CALCULATE THE RELATIVE CURSOR POSITION (SCURS)
MSRMI: & SSRMI: USED FOR STARTING DATA ADDRESS FOR DXBA

SET UP IN	USED IN	CLEARED IN
INPUT:	DISCTL:	RUN:
	SSRMI: & MSRMI:	PSYSRT:

%

```
                                .TITLE  MAINDEC-11-DZDXI-A  NEW DX11-B RESPONDER
                                .ENABL  ABS
                                .ENABL  AMA
```

```
                                        .SBTTL  PROGRAM EQUATES AND DEVICE ASSIGNMENTS
                                ;
                                ;       SYSTEM EQUATES
                                ;
000000                  R0      =       %0
000001                  R1      =       %1
000002                  R2      =       %2
000003                  R3      =       %3
000004                  R4      =       %4
000005                  R5      =       %5
000006                  R6      =       %6
000006                  SP      =       %6
000007                  PC      =       %7
177776                  PSW     =       177776
172340                  KISAR0  =       172340
172356                  KISAR7  =       172356
172300                  KISDR0  =       172300
177572                  MMSR0   =       177572


                                ;
                                ;       TELETYPE CHARACTER EQUATES
                                ;
000015                  CR      =       15              ;CARRIAGE RETURN
000012                  LF      =       12              ;LINE FEED
000040                  SPACE   =       40              ;SPACE CHARACTER
000003                  CTL.C   =       3               ;CONTROL C
000020                  CTL.P   =       20              ;CONTROL P
000021                  CTL.Q   =       21              ;CONTROL Q
000023                  CTL.S   =       23              ;CONTROL S
000025                  CTL.U   =       25              ;CONTROL U
000177                  RUBOUT  =       177             ;RUBOUT
```

```
                                ;*****************************************************************
                                ;*                                                               *
                                ;*      DEVICE BUFFER LAYOUT    (1 PER DEVICE)                   *
                                ;*                                                               *
                                ;*****************************************************************
                                ;*      LOC     0-61 = DEVICE STATUS TABLE                       *
                                ;*      LOC     62-543 = DEVICE INPUT BUFFER                     *
                                ;*      LOC     554-1023 = DEVICE OUTPUT/DISPLAY BUFFER          *
                                ;*****************************************************************
                                ;       LAYOUT OF DEVICE STATUS TABLE
                                ;
000000                          $CMD    =       0       ;CURRENT DEVICE COMMAND
000001                          $LCMD   =       1       ;LAST COMMAND, IF WRITE
000002                          $SENSE  =       2       ;DEVICE SENSE BYTE (NOTE -- MUST BE EVEN BYTE LOCATION)
000003                          $STAT   =       3       ;DEVICE STATUS
000004                          $CURS   =       4       ;CURSOR POSITION
000006                          $INBF   =       6       ;ADDRESS OF DEVICE INPUT BUFFER
000010                          $OUTB   =       10      ;ADDRESS OF DEVICE OUTPUT BUFFER
000012                          $BUFA   =       12      ;CURRENT BUFFER PTR
000014                          $RBYTC  =       14      ;REMAINING BYTE COUNT
000016                          $ONLF   =       16      ;DEVICE ONLINE - INDICATOR 0=ON-LINE 1=OFF-LINE
000017                          $RDRQ   =       17      ;READ MANUAL INPUT REQUEST -- IF NON-ZERO
000020                          $MINS   =       20      ;START OF MANUAL INPUT DATA
                                ;
                                ;       LOCATIONS 22-77 ARE AVAILABLE FOR EXPANSION PURPOSES
                                ;
                                ;
                                ;
                                ;       OTHER   DX EQUATES
                                ;
000000                          DEV     =       R0              ;CURRENT DEVICE NUMBER
000003                          DTAB    =       R3              ;ADDRESS OF CUR DEV STATUS TABLE
000004                          TT1     =       R4              ;TUMBLE TABLE ENTRY 1
000005                          TT2     =       R5              ;TUMBLE TABLE ENTRY 2
000003                          CEDE    =       3               ;CHAN END & DEV END
000010                          QCUE    =       10              ;CODE TO QUE CONTROL UNIT END
000003                          NOP     =       3               ;NOP COMMAND
000025                          NEWLNE  =       25              ;NEW LINE CHARACTER
000100                          EBCDSP  =       100             ;EBCDIC SPACE CODE
000112                          SMI     =       112             ;START OF MESSAGE INDICATOR
000152                          EOM     =       152             ;END OF MESSAGE INDICATOR
000050                          LINSZ   =       40.             ;NUMBER OF CHARACTERS PER LINE OF 2260 DISPLAY
000014                          NOLIN   =       12.             ;NUMBER OF LINES PER 2260 DISPLAY
000740                          DISPSZ  =       NOLIN*LINSZ     ;NUMBER OF CHARACTERS ON THE DISPLAY
001000                          TTSIZE  =       512.            ;NUMBER OF ENTRIES IN TUMBLE TABLE
                                ;
                                ;
                                ;       360 COMMAND EQUATES
                                ;
000001                          CMWRT   =       1               ;WRITE DATA (FROM 360 TO PDP-11)
000002                          CMRMI   =       2               ;READ MANUAL INPUT (PDP-11 TO 360)
000005                          CMWTLA  =       5               ;WRITE LINE ADDRESS (360 TO PDP-11)
000006                          CMREAD  =       6               ;READ FULL BUFFER (PDP-11 TO 360)
000012                          CMSRMI  =       12              ;SHORT READ MANUAL INPUT (PDP-11 TO 360)
```

```
                                ;
                                ;       DX REGISTER ASSIGNMENTS & LAYOUTS
                                ;
                                ;               DXDS OR TUMBLE TABLE ENTRY 1 (TT1)
                                ;
100000          PARER   =       100000          ;PARITY ERROR DETECTED
040000          NXM     =       40000           ;NON EXISTENT MEMORY CONDITION
020000          SELRST  =       20000           ;IBM SELECTIVE RE-SET
010000          SYSRST  =       10000           ;IBM SYSTEM RESET
004000          INFDSC  =       4000            ;IBM PROGRAMMED INTERFACE DISCONNECT
002000          UCHKS   =       2000            ;UNIT CHECK WAS PRESENTED TO THE CHANNEL
001000          CHENDS  =       1000            ;CHANNEL END WAS PRESENTED TO THE CHANNEL
000400          BYSS    =       400             ;BUSY WAS PRESENTED TO THE CHANNEL
000200          CHIS    =       200             ;CHANNEL INIT SELECTION SEQ WAS COMPLETED
000100          ESEND   =       100             ;CHANNEL ACCEPTED LAST STATUS
000040          CHEND   =       40              ;CHANNEL DATA TRANSFER END
000020          CUEND   =       20              ;DX DATA TRANSFER END
000010          ISSREJ  =       10              ;INIT SELECTION SEQ WAS REJECTED
000004          CMDCHN  =       4               ;CHANNEL SPECIFIED COMMAND CHAING
000002          STKSTB  =       2               ;CHANNEL COULD NOT ACCEPT LAST STATUS
000001          CMDREJ  =       1               ;CHANNEL COMMAND WAS REJECTED


                                ;               DXCA OR TUMBLE TABLE ENTRY 2 (TT2)
                                ;
                                ;                       BITS 15-8 = COMMAND (IF ANY)
                                ;                       BITS 7-0 = DEVICE ADDRESS
                                ;
                                ;               DXCS CONTROL UNIT STATUS REGISTER
                                ;
004000          BSYEN   =       4000            ;BUSY ENABLE - FOR SELECTOR CHANNELS
001000          DXONLN  =       1000            ;ON-LINE INDICATION
000400          CUBUSY  =       400             ;CONTROL UNIT BUSY
000200          DONE    =       200             ;DONE FLAG
000100          DXENB   =       100             ;INTERRUPT ENABLE
                                ;
                                ;                       BITS 4+3 ARE SET IF EXTENDED ADDRESS IS USED > 32K
                                ;                       BITS 2-0 ARE THE FUNCTION TO BE PERFORMED
                                ;
000001          DXRST   =       1               ;DX RESET COMMAND
000003          DXWR    =       3               ;WRITE DATA TO THE 360
000005          DXRD    =       5               ;READ DATA FROM THE 360
000007          DXST    =       7               ;SEND STATUS TO THE 360


                                ;
                                ;               DXOS OFFSET AND STATUS REGISTER
                                ;
                                ;                       BITS 15-10 OFFSET OF SPW TABLE
                                ;                       STATUS REGISTER DEF (SSTAT) - STATUS BYTE
                                ;
000200          ATTN    =       200             ;ATTENTION
000100          STAMOD  =       100             ;STATUS MODIFIER
```

```
7649            000040                  CUE     =       40              ;CONTROL UNIT END
7650            000020                  BSY     =       20              ;BUSY
7651            000010                  CE      =       10              ;CHANNEL END
7652            000004                  DE      =       4               ;DEVICE END
7653            000002                  UCHK    =       2               ;UNIT CHECK
7654            000001                  UEXP    =       1               ;UNIT EXCEPTION
7655                                    ;
7656                                    ;
7657                                    ;       2848 SENSE BYTE (SSENSE) DEFINITION
7658                                    ;
7659            000200                  SCMDRJ  =       200             ;COMMAND REJECT
7660            000100                  INTREQ  =       100             ;DEVICE OFF-LINE - INTERVENTION REQ
7661            000040                  BUSOUT  =       40              ;BUS OUT -- PARITY ERROR DURING CHIS
7662            000020                  EQPCHK  =       20              ;EQUIPMENT CHECK - PARITY ERROR DUR DATA TRANS
```

```
                                        .SBTTL  TRAP CATCHER
                                ;
                                ;       THE TRAP CATCHER IS LOADED INTO LOW CORE
                                ;
                                ;
                                ;
                                        .=0
000000  000000                          HALT                    ;FOR MEMORY MANAGEMENT
000002  000000                          HALT
                                ;
(1)  000004  000006                     .WORD   .+2
(1)  000006  000000                     HALT
(1)
(1)  000010  000012                     .WORD   .+2
(1)  000012  000000                     HALT
(1)
(1)  000014  000016                     .WORD   .+2
(1)  000016  000000                     HALT
(1)
(1)  000020  000022                     .WORD   .+2
(1)  000022  000000                     HALT
(1)
(1)  000024  000026                     .WORD   .+2
(1)  000026  000000                     HALT
(1)
(1)  000030  000032                     .WORD   .+2
(1)  000032  000000                     HALT
(1)
(1)  000034  000036                     .WORD   .+2
(1)  000036  000000                     HALT
(1)
(1)  000040  000042                     .WORD   .+2
(1)  000042  000000                     HALT
(1)
(1)  000044  000046                     .WORD   .+2
(1)  000046  000000                     HALT
(1)
(1)  000050  000052                     .WORD   .+2
(1)  000052  000000                     HALT
(1)
(1)  000054  000056                     .WORD   .+2
(1)  000056  000000                     HALT
(1)
(1)  000060  000062                     .WORD   .+2
(1)  000062  000000                     HALT
(1)
(1)  000064  000066                     .WORD   .+2
(1)  000066  000000                     HALT
(1)
(1)  000070  000072                     .WORD   .+2
(1)  000072  000000                     HALT
(1)
(1)  000074  000076                     .WORD   .+2
(1)  000076  000000                     HALT
(1)
(1)  000100  000102                     .WORD   .+2
(1)  000102  000000                     HALT
```

```
(1)
(1)  000104  000106                    .WORD   .+2
(1)  000106  000000                    HALT
(1)
(1)  000110  000112                    .WORD   .+2
(1)  000112  000000                    HALT
(1)
(1)  000114  000116                    .WORD   .+2
(1)  000116  000000                    HALT
(1)
(1)  000120  000122                    .WORD   .+2
(1)  000122  000000                    HALT
(1)
(1)  000124  000126                    .WORD   .+2
(1)  000126  000000                    HALT
(1)
(1)  000130  000132                    .WORD   .+2
(1)  000132  000000                    HALT
(1)
(1)  000134  000136                    .WORD   .+2
(1)  000136  000000                    HALT
(1)
(1)  000140  000142                    .WORD   .+2
(1)  000142  000000                    HALT
(1)
(1)  000144  000146                    .WORD   .+2
(1)  000146  000000                    HALT
(1)
(1)  000150  000152                    .WORD   .+2
(1)  000152  000000                    HALT
(1)
(1)  000154  000156                    .WORD   .+2
(1)  000156  000000                    HALT
(1)
(1)  000160  000162                    .WORD   .+2
(1)  000162  000000                    HALT
(1)
(1)  000164  000166                    .WORD   .+2
(1)  000166  000000                    HALT
(1)
(1)  000170  000172                    .WORD   .+2
(1)  000172  000000                    HALT
(1)
(1)  000174  000176                    .WORD   .+2
(1)  000176  000000                    HALT
(1)
(1)  000200  000202                    .WORD   .+2
(1)  000202  000000                    HALT
(1)
(1)  000204  000206                    .WORD   .+2
(1)  000206  000000                    HALT
(1)
(1)  000210  000212                    .WORD   .+2
(1)  000212  000000                    HALT
(1)
(1)  000214  000216                    .WORD   .+2
```

```
(1)  000216  000000                 HALT
(1)
(1)  000220  000222                 .WORD   .+2
(1)  000222  000000                 HALT
(1)
(1)  000224  000226                 .WORD   .+2
(1)  000226  000000                 HALT
(1)
(1)  000230  000232                 .WORD   .+2
(1)  000232  000000                 HALT
(1)
(1)  000234  000236                 .WORD   .+2
(1)  000236  000000                 HALT
(1)
(1)  000240  000242                 .WORD   .+2
(1)  000242  000000                 HALT
(1)
(1)  000244  000246                 .WORD   .+2
(1)  000246  000000                 HALT
(1)
(1)  000250  000252                 .WORD   .+2
(1)  000252  000000                 HALT
(1)
(1)  000254  000256                 .WORD   .+2
(1)  000256  000000                 HALT
(1)
(1)  000260  000262                 .WORD   .+2
(1)  000262  000000                 HALT
(1)
(1)  000264  000266                 .WORD   .+2
(1)  000266  000000                 HALT
(1)
(1)  000270  000272                 .WORD   .+2
(1)  000272  000000                 HALT
(1)
(1)  000274  000276                 .WORD   .+2
(1)  000276  000000                 HALT
(1)
(1)  000300  000302                 .WORD   .+2
(1)  000302  000000                 HALT
(1)
(1)  000304  000306                 .WORD   .+2
(1)  000306  000000                 HALT
(1)
(1)  000310  000312                 .WORD   .+2
(1)  000312  000000                 HALT
(1)
(1)  000314  000316                 .WORD   .+2
(1)  000316  000000                 HALT
(1)
(1)  000320  000322                 .WORD   .+2
(1)  000322  000000                 HALT
(1)
(1)  000324  000326                 .WORD   .+2
(1)  000326  000000                 HALT
(1)
```

```
(1)  000330  000332                .WORD   .+2
(1)  000332  000000                HALT
(1)
(1)  000334  000336                .WORD   .+2
(1)  000336  000000                HALT
(1)
(1)  000340  000342                .WORD   .+2
(1)  000342  000000                HALT
(1)
(1)  000344  000346                .WORD   .+2
(1)  000346  000000                HALT
(1)
(1)  000350  000352                .WORD   .+2
(1)  000352  000000                HALT
(1)
(1)  000354  000356                .WORD   .+2
(1)  000356  000000                HALT
(1)
(1)  000360  000362                .WORD   .+2
(1)  000362  000000                HALT
(1)
(1)  000364  000366                .WORD   .+2
(1)  000366  000000                HALT
(1)
(1)  000370  000372                .WORD   .+2
(1)  000372  000000                HALT
(1)
(1)  000374  000376                .WORD   .+2
(1)  000376  000000                HALT
(1)
(1)  000400  000402                .WORD   .+2
(1)  000402  000000                HALT
(1)
(1)  000404  000406                .WORD   .+2
(1)  000406  000000                HALT
(1)
(1)  000410  000412                .WORD   .+2
(1)  000412  000000                HALT
(1)
(1)  000414  000416                .WORD   .+2
(1)  000416  000000                HALT
(1)
(1)  000420  000422                .WORD   .+2
(1)  000422  000000                HALT
(1)
(1)  000424  000426                .WORD   .+2
(1)  000426  000000                HALT
(1)
(1)  000430  000432                .WORD   .+2
(1)  000432  000000                HALT
(1)
(1)  000434  000436                .WORD   .+2
(1)  000436  000000                HALT
(1)
(1)  000440  000442                .WORD   .+2
(1)  000442  000000                HALT
```

```
(1)
(1)  000444  000446                .WORD   .+2
(1)  000446  000000                HALT
(1)
(1)  000450  000452                .WORD   .+2
(1)  000452  000000                HALT
(1)
(1)  000454  000456                .WORD   .+2
(1)  000456  000000                HALT
(1)
(1)  000460  000462                .WORD   .+2
(1)  000462  000000                HALT
(1)
(1)  000464  000466                .WORD   .+2
(1)  000466  000000                HALT
(1)
(1)  000470  000472                .WORD   .+2
(1)  000472  000000                HALT
(1)
(1)  000474  000476                .WORD   .+2
(1)  000476  000000                HALT
(1)
(1)  000500  000502                .WORD   .+2
(1)  000502  000000                HALT
(1)
(1)  000504  000506                .WORD   .+2
(1)  000506  000000                HALT
(1)
(1)  000510  000512                .WORD   .+2
(1)  000512  000000                HALT
(1)
(1)  000514  000516                .WORD   .+2
(1)  000516  000000                HALT
(1)
(1)  000520  000522                .WORD   .+2
(1)  000522  000000                HALT
(1)
(1)  000524  000526                .WORD   .+2
(1)  000526  000000                HALT
(1)
(1)  000530  000532                .WORD   .+2
(1)  000532  000000                HALT
(1)
(1)  000534  000536                .WORD   .+2
(1)  000536  000000                HALT
(1)
(1)  000540  000542                .WORD   .+2
(1)  000542  000000                HALT
(1)
(1)  000544  000546                .WORD   .+2
(1)  000546  000000                HALT
(1)
(1)  000550  000552                .WORD   .+2
(1)  000552  000000                HALT
(1)
(1)  000554  000556                .WORD   .+2
```

```
(1)  000556  000000                    HALT
(1)
(1)  000560  000562                    .WORD   .+2
(1)  000562  000000                    HALT
(1)
(1)  000564  000566                    .WORD   .+2
(1)  000566  000000                    HALT
(1)
(1)  000570  000572                    .WORD   .+2
(1)  000572  000000                    HALT
(1)
(1)  000574  000576                    .WORD   .+2
(1)  000576  000000                    HALT
(1)
(1)  000600  000602                    .WORD   .+2
(1)  000602  000000                    HALT
(1)
(1)  000604  000606                    .WORD   .+2
(1)  000606  000000                    HALT
(1)
(1)  000610  000612                    .WORD   .+2
(1)  000612  000000                    HALT
(1)
(1)  000614  000616                    .WORD   .+2
(1)  000616  000000                    HALT
(1)
(1)  000620  000622                    .WORD   .+2
(1)  000622  000000                    HALT
(1)
(1)  000624  000626                    .WORD   .+2
(1)  000626  000000                    HALT
(1)
(1)  000630  000632                    .WORD   .+2
(1)  000632  000000                    HALT
(1)
(1)  000634  000636                    .WORD   .+2
(1)  000636  000000                    HALT
(1)
(1)  000640  000642                    .WORD   .+2
(1)  000642  000000                    HALT
(1)
(1)  000644  000646                    .WORD   .+2
(1)  000646  000000                    HALT
(1)
(1)  000650  000652                    .WORD   .+2
(1)  000652  000000                    HALT
(1)
(1)  000654  000656                    .WORD   .+2
(1)  000656  000000                    HALT
(1)
(1)  000660  000662                    .WORD   .+2
(1)  000662  000000                    HALT
(1)
(1)  000664  000666                    .WORD   .+2
(1)  000666  000000                    HALT
(1)
```

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(1)  000670  000672                .WORD   .+2
(1)  000672  000000                HALT
(1)
(1)  000674  000676                .WORD   .+2
(1)  000676  000000                HALT
(1)
(1)  000700  000702                .WORD   .+2
(1)  000702  000000                HALT
(1)
(1)  000704  000706                .WORD   .+2
(1)  000706  000000                HALT
(1)
(1)  000710  000712                .WORD   .+2
(1)  000712  000000                HALT
(1)
(1)  000714  000716                .WORD   .+2
(1)  000716  000000                HALT
(1)
(1)  000720  000722                .WORD   .+2
(1)  000722  000000                HALT
(1)
(1)  000724  000726                .WORD   .+2
(1)  000726  000000                HALT
(1)
(1)  000730  000732                .WORD   .+2
(1)  000732  000000                HALT
(1)
(1)  000734  000736                .WORD   .+2
(1)  000736  000000                HALT
(1)
(1)  000740  000742                .WORD   .+2
(1)  000742  000000                HALT
(1)
(1)  000744  000746                .WORD   .+2
(1)  000746  000000                HALT
(1)
(1)  000750  000752                .WORD   .+2
(1)  000752  000000                HALT
(1)
(1)  000754  000756                .WORD   .+2
(1)  000756  000000                HALT
(1)
(1)  000760  000762                .WORD   .+2
(1)  000762  000000                HALT
(1)
(1)  000764  000766                .WORD   .+2
(1)  000766  000000                HALT
(1)
(1)  000770  000772                .WORD   .+2
(1)  000772  000000                HALT
(1)
(1)  000774  000776                .WORD   .+2
(1)  000776  000000                HALT
(1)
(1)  001000  001002                .WORD   .+2
(1)  001002  000000                HALT
```

```
(1)
(1)  001004  001006                  .WORD   .+2
(1)  001006  000000                  HALT
(1)
(1)  001010  001012                  .WORD   .+2
(1)  001012  000000                  HALT
(1)
(1)  001014  001016                  .WORD   .+2
(1)  001016  000000                  HALT
(1)
(1)  001020  001022                   WORD   .+2
(1)  001022  000000                  HALT
(1)
(1)  001024  001026                  .WORD   .+2
(1)  001026  000000                  HALT
(1)
(1)  001030  001032                  .WORD   .+2
(1)  001032  000000                  HALT
(1)
(1)  001034  001036                  .WORD   .+2
(1)  001036  000000                  HALT
(1)
(1)  001040  001042                  .WORD   .+2
(1)  001042  000000                  HALT
(1)
(1)  001044  001046                  .WORD   .+2
(1)  001046  000000                  HALT
(1)
(1)  001050  001052                  .WORD   .+2
(1)  001052  000000                  HALT
(1)
(1)  001054  001056                  .WORD   .+2
(1)  001056  000000                  HALT
(1)
(1)  001060  001062                  .WORD   .+2
(1)  001062  000000                  HALT
(1)
(1)  001064  001066                  .WORD   .+2
(1)  001066  000000                  HALT
(1)
(1)  001070  001072                  .WORD   .+2
(1)  001072  000000                  HALT
(1)
(1)  001074  001076                  .WORD   .+2
(1)  001076  000000                  HALT
(1)
(1)  001100  001102                  .WORD   .+2
(1)  001102  000000                  HALT
(1)
(1)  001104  001106                  .WORD   .+2
(1)  001106  000000                  HALT
(1)
(1)  001110  001112                  .WORD   .+2
(1)  001112  000000                  HALT
(1)
(1)  001114  001116                  .WORD   .+2
```

```
(1)  001116  000000                    HALT
(1)
(1)  001120  001122                    .WORD   .+2
(1)  001122  000000                    HALT
(1)
(1)  001124  001126                    .WORD   .+2
(1)  001126  000000                    HALT
(1)
(1)  001130  001132                    .WORD   .+2
(1)  001132  000000                    HALT
(1)
(1)  001134  001136                    .WORD   .+2
(1)  001136  000000                    HALT
(1)
(1)  001140  001142                    .WORD   .+2
(1)  001142  000000                    HALT
(1)
(1)  001144  001146                    .WORD   .+2
(1)  001146  000000                    HALT
(1)
(1)  001150  001152                    .WORD   .+2
(1)  001152  000000                    HALT
(1)
(1)  001154  001156                    .WORD   .+2
(1)  001156  000000                    HALT
(1)
(1)  001160  001162                    .WORD   .+2
(1)  001162  000000                    HALT
(1)
(1)  001164  001166                    .WORD   .+2
(1)  001166  000000                    HALT
(1)
(1)  001170  001172                    .WORD   .+2
(1)  001172  000000                    HALT
(1)
(1)  001174  001176                    .WORD   .+2
(1)  001176  000000                    HALT
(1)
(1)  001200  001202                    .WORD   .+2
(1)  001202  000000                    HALT
(1)
(1)  001204  001206                    .WORD   .+2
(1)  001206  000000                    HALT
(1)
(1)  001210  001212                    .WORD   .+2
(1)  001212  000000                    HALT
(1)
(1)  001214  001216                    .WORD   .+2
(1)  001216  000000                    HALT
(1)
(1)  001220  001222                    .WORD   .+2
(1)  001222  000000                    HALT
(1)
(1)  001224  001226                    .WORD   .+2
(1)  001226  000000                    HALT
(1)
```

```
   (1)  001230  001232                    .WORD   .+2
   (1)  001232  000000                    HALT
   (1)
   (1)  001234  001236                    .WORD   .+2
   (1)  001236  000000                    HALT
   (1)
   (1)  001240  001242                    .WORD   .+2
   (1)  001242  000000                    HALT
   (1)
   (1)  001244  001246                    .WORD   .+2
   (1)  001246  000000                    HALT
   (1)
   (1)  001250  001252                    .WORD   .+2
   (1)  001252  000000                    HALT
   (1)
   (1)  001254  001256                    .WORD   .+2
   (1)  001256  000000                    HALT
   (1)
   (1)  001260  001262                    .WORD   .+2
   (1)  001262  000000                    HALT
   (1)
   (1)  001264  001266                    .WORD   .+2
   (1)  001266  000000                    HALT
 7677           000200                    .=200
 7678  000200  000137  001000              JMP     START           ;ESTABLISH LOC 200 STARTING ADDRESS
 7679
```

```
                                                .SBTTL  PROGRAM START-UP SEQUENCES
                                        ;
                                        ;       NORMAL SYSTEM START LOCATION  --1000
                                        ;
                                                .=1000
001000  000402                 START:  BR      SYSINT          ;NORMAL START UP
                                        ;
                                        ;       RESTART ADDRESS -- REENTER ALL PARAMETERS -- 1002
                                        ;
001002  005037  013122          RSTART: CLR     FTIMFL          ;RESET FIRST TIME FLAG TO FORCE PARAMETER REENTRY
                                        ;
                                        ;       SYSTEM GENERALIZED INITIZATION PROCEEDURE
                                        ;
                                        ;               SET-UP  STACK POINTER
                                        ;                       TRAP/VECTOR AREA
                                        ;                       SYSTEM GENERATED TRAPS
                                        ;                       TELETYPE (CONSOLE) VECTORS + STATUS REGISTERS
                                        ;                       CLEAR ALL LIVE SYSTEM VARIABLES
                                        ;                       SET UP TELETYPE INPUT / OUTPUT BUFFERS
                                        ;
001006  012706  012626          SYSINT: MOV     #SSTACK,SP      ;SET UP THE STACK POINTER
001012  000005                          RESET                   ;RESET ALL DEVICES
                                        ;
                                        ;       SET UP CONSOLE VECTORS
                                        ;
001014  012700  000060                  MOV     #60,R0          ;START OF CONSOLE VECTORS
001020  012720  010732                  MOV     #TKIN,(R0)+     ;BEG OF TELE INPUT ISR
001024  012720  000340                  MOV     #340,(R0)+      ;NEW PROC STATUS
001030  012720  011220                  MOV     #PISR,(R0)+     ;BEG OF TELE PRINT ISR
001034  012710  000340                  MOV     #340,(R0)       ;NEW PROC STATUS
                                        ;
                                        ;       SET UP MISC TRAPS
                                        ;
001040  012737  011666  000004          MOV     #MTO,4          ;MEMORY  IME OUT TRAP
001046  012737  000340  000006          MOV     #340,6
001054  012737  011674  000250          MOV     #MMERR,250      ;MEMORY .ANAGEMENT ERROR
001062  012737  000340  000252          MOV     #340,252
                                        ;
                                        ;       CLEAR ALL VARIABLES
                                        ;
001070  012700  013626                  MOV     #VSTRT,R0       ;START OF VARAIBLES
001074  012701  000273                  MOV     #VEND-VSTRT+2,R1  ;# OF VARAIBLES TO CLEAR
001100  105020                  10$:     CLRB    (R0)+           ;CLEAR A BYTE
001102  005301                          DEC     R1              ;DONE?
001104  001375                          BNE     10$             ;NO, CONTINUE CLEARING
                                        ;
                                        ;       SET UP TELE BUFFER POINTERS
                                        ;
001106  012737  012630  012732          MOV     #TBUF,TPTR      ;TELE INPUT POINTER
001114  012737  012734  013036          MOV     #PBFS,PFPTR     ;TELE OUT FETCH PTR
001122  012737  012734  013040          MOV     #PBFS,PPPTR     ;TELE OUT PUT PTR
                                        ;
                                        ;       ENABLE TTY
```

```
 7737                                                    ;
 7738  001130  052777  000100  011306                    BIS     #100,@TKS       ;ENABLE TELETYPE INPUT
 7739  001136  005037  177776                            CLR     PSW             ;CLEAR THE PROCESSOR STATUS WORD
 7740  001142  005737  013122                            TST     FTIMFL          ;FIRST TIME THROUGH? (MUST PARAMETERS BE REENTERED?)
 7741  001146  001402                                    BEQ     GETPRM          ;YES, FORCE USER TO ENTER ALL PARAMETERS
 7742  001150  000137  002014                            JMP     INIT            ;NO, RESTART TEST USING SAME PARAMETERS
```

```
                                                .SBTTL  TOTAL SYSTEM RESTART (REQUEST NEW RUN TIME PARAMETERS)
                                        ;
                                        ;       HERE WE START GATHERING THE TEST INFORMATION
                                        ;               PRINT START-UP HERALD MESSAGE
                                        ;
001154  004137  011466          GETPRM: JSR     R1,MESG         ;PRINT START-UP MESG
001160  013124                          .WORD   STMSG
                                        ;
                                        ;       GET DX11 UNIBUSS ADDRESS (OCTAL ADDRESS INPUT)
                                        ;               VALID UNIBUS ADDRESSESS (176200 - 177000)
                                        ;               DEFAULT UNIBUS ADDRESS  176200
                                        ;
001162  005037  013122          NEWPRM: CLR     FTIMFL          ;RESET FIRST TIME PARAMETERS (FORCE ALL PARMS TO BE ENTE
001166  012737  176200  012506          MOV     #176200,UNADDR  ;SET UP DEFAULT ADDRESS
001174  004137  002620                  JSR     R1,INOCT        ;GET UNIBUS ADDRESS
001200  013165                          .WORD   UNMSG
001202  001246                          .WORD   5$              ;ADDRESS OF DEFAULT ROUTINE
001204  120427  000015                  CMPB    R4,#CR          ;WAS LINE DELIMITED PROPERLY?
001210  001364                          BNE     NEWPRM          ;NO, TELL HIM TO REENTER
001212  020327  176200                  CMP     R3,#176200      ;VALID UNIBUS ADDRESS? BETWEEN 176200 AND 177000
001216  002761                          BLT     NEWPRM          ;NO, GET AGAIN
001220  020327  177000                  CMP     R3,#177000      ;UNIBUS ADDRESS GT 177000?
001224  003356                          BGT     NEWPRM          ;YES, ERROR -- REENTER
001226  032703  000037                  BIT     #37,R3          ;MAKE SURE 40 OCTAL WORD BOUNDRY
001232  001353                          BNE     NEWPRM          ;ILLEGAL, REENTER
001234  012737  001162  000004          MOV     #NEWPRM,4       ;SET UP TRAP OUT TO VALIDATE ADDRESS
001242  010337  012506                  MOV     R3,UNADDR       ;SAVE UNIBUS ADDRESS
001246  005077  011234          5$:     CLR     @UNADDR         ;VALIDATE THE UNIBUS ADDRESS
                                                                ;TRAP WILL OCCUR IF INVALID UNIBUS ADDRESS
                                        ;
                                        ;       GET THE DX11 INTERRUPT VECTOR ADDRESS (OCTAL ADDRESS INPUT)
                                        ;               VALID VECTOR ADDRESSES (300 - 770)
                                        ;               DEFAULT VECTOR ADDRESS  300
                                        ;
001252  012737  011732  000004  10$:    MOV     #UNTRP,4        ;RESTORE MEMORY TIME-OUT TRAP
001260  012737  000300  012510          MOV     #300,VECTAD     ;SET UP DEFAULT VECTOR ADDRESS
001266  004137  002620                  JSR     R1,INOCT        ;GET VECTOR ADDRESS
001272  013222                          .WORD   VECTMS
001274  001332                          .WORD   20$             ;ADDRESS OF THE DEFAULT ENTRY
001276  120427  000015                  CMPB    R4,#CR          ;WAS LINE DELIMITED PROPERLY?
001302  001363                          BNE     10$             ;NO, REENTER
001304  020327  000300                  CMP     R3,#300         ;CHECK VECTOR ADDRESS BETWEEN 300 AND 770
001310  002760                          BLT     10$             ;TOO LOW GIVE AN ERROR AND REENTER
001312  020327  000770                  CMP     R3,#770         ;LT 770?
001316  003355                          BGT     10$             ;YES, REENTER
001320  032703  000001                  BIT     #1,R3           ;WORD ADDRESS?
001324  001352                          BNE     10$             ;NO, REENTER
001326  010337  012510                  MOV     R3,VECTAD       ;SAVE IT
                                        ;
                                        ;       GET STARTING AND ENDING DEVICE CHANNEL ADDRESSES (HEX INPUT)
                                        ;               VALID DEVICE CHANNEL ADDRESSES (00 - FF)
                                        ;               DEFAULT DEVICE CHANNEL ADDRESS  10,10
                                        ;
```

```
                                        ;       NOTE:   EITHER ONE OR TWO ADDRESSES MAY BE SPECIFIED. IF ONLY ONE
                                        ;               ADDRESS IS SPECIFIED IT IS USED AS THE STARTING AND
                                        ;               ENDING DEVICE ADDRESS.
                                        ;
001332  012737  000020  012512  20$:    MOV     #20,SDEV        ;DEFAULT TO HEX ADDRESS 10
001340  012737  000020  012514          MOV     #20,EDEV        ;
001346  004137  002612                  JSR     R1,INHEX        ;GET DEVICE ADDRESSES IN HEX
001352  013270                          .WORD   DEVMES
001354  001446                          .WORD   NEWP10          ;ADDRESS OF THE DEFAULT ROUTINE
001356  010337  012512                  MOV     R3,SDEV         ;SAVE START DEV ADDR
001362  010337  012514                  MOV     R3,EDEV
001366  005703                          TST     R3              ;BE SURE POSITIVE
001370  100760                          BMI     20$
001372  020327  000377                  CMP     R3,#377         ;AND NOT GREATER THAN 377 -- HEX FF
001376  003355                          BGT     20$             ;ILLEGAL ENTRY
001400  120427  000054                  CMPB    R4,#',          ;MORE THAN ONE DEV? (COMMA, PARAMETER DELIMETER)
001404  001015                          BNE     30$
001406  004737  011600                  JSR     PC,CHTB         ;GET ENDING DEVICE
001412  010337  012514                  MOV     R3,EDEV         ;SAVE ENDING ADDRESS
001416  023737  012512  012514          CMP     SDEV,EDEV       ;IS START LT END?
001424  003342                          BGT     20$             ;YES, ERROR
001426  163703  012512                  SUB     SDEV,R3         ;MORE THAN 8 DEVICES?
001432  020327  000007                  CMP     R3,#7
001436  003335                          BGT     20$             ;YES, ERROR
001440  120427  000015          30$:    CMPB    R4,#CR          ;WAS DEVICE ADDRESSES DELIMITED PROPERLY?
001444  001332                          BNE     20$             ;NO, REENTER
                                        ;
                                        ;       GET TYPE OF 360/370 CHANNEL
                                        ;               M = MULTIPLEXER CHANNEL
                                        ;               S = SELECTOR CHANNEL
                                        ;               DEFAULT IS 'S', SELECTOR CHANNEL
                                        ;
001446  105037  012516          NEWP10: CLRB    CHTYPE          ;0 = M, 1 = S
001452  004137  002620                  JSR     R1,INOCT        ;GET CHANNEL TYPE
001456  013334                          .WORD   CHTYMS
001460  001476                          .WORD   50$             ;DEFAULT TO SELECTOR CHANNEL
001462  120427  000115                  CMPB    R4,#'M          ;M? -- MULIPLEXER CHANNEL --
001466  001414                          BEQ     60$             ;YES, MULTIPLEXER CHANNEL
001470  120427  000123                  CMPB    R4,#'S          ;S? -- SELECTOR CHANNEL --
001474  001364                          BNE     NEWP10          ;NOT S OR M -- ERROR
001476  105237  012516          50$:    INCB    CHTYPE          ;SELECTOR CHANNEL
001502  000406                          BR      60$             ;GET MEMORY MANAGEMENT FACILITIES
                                        ;
                                        ;       MEMORY MANAGEMENT TIME-OUT TRAP HANDLER
                                        ;               USED ONLY FOR PARAMETER ENTRY PROCESS
                                        ;
001504  022626                  55$:    CMP     (SP)+,(SP)+            ;DUMP PC AND PSW SAVED BY INTERRUPT
001506  005037  177776                  CLR     PSW             ;TURN DOWN PROCESSOR STATUS
001512  004137  011466                  JSR     R1,MESG         ;PRINT "NO MEM MANAGEMENT AVAIL"
001516  014072                          .WORD   PNOMM
                                                                ;ASK TO HAVE QUESTION REENTERED
                                        ;
```

```
                                        ;       DETERMINE IF MEMORY MANAGEMENT IS TO BE USED
                                        ;               Y = YES, MEMORY MANAGEMENT TO BE USED
                                        ;               N = NO, DO NOT USE MEMORY MANAGEMENT
                                        ;               DEFAULT IS 'N', DO NOT USE MEMORY MANAGEMENT
                                        ;
001520  105037  012517          60$:    CLRB    MMRESP          ;DEFAULT TO NO MEMORY MANAGEMENT
001524  004137  002620                  JSR     R1,INOCT        ;GET MEM MANAGEMENT
001530  013366                          .WORD   MMMES
001532  001566                          .WORD   70$             ;DEFAULT ROUTINE ADDRESS
001534  120427  000116                  CMPB    R4,#'N          ;N? --DO NOT USE MEMORY MANAGEMENT
001540  001412                          BEQ     70$             ;IF EQ, NO MEMORY MANAGEMENT
001542  120427  000131                  CMPB    R4,#'Y          ;Y? --MEMORY MANAGEMENT TO BE USED
001546  001364                          BNE     60$             ;ERROR
001550  105237  012517                  INCB    MMRESP          ;MEMORY MANAGEMENT SPEC
001554  012737  001504  000004          MOV     #55$,4          ;SET UP TRAP TO TEST MEMORY MANAGEMENT
001562  005037  177572                  CLR     MMSR0           ;CHECK FOR MEMORY MANAGEMENT

                                        ;       GET BUFFER RELOCATION IN OCTAL ,000'S
                                        ;               VALID RELOCATION ADDRESSES (20 - 700)
                                        ;                       (20000 THROUGH 734000)
                                        ;               DEFAULT RELOCATION ADDRESS  20 ---(20000)
                                        ;
001566  004137  002620          70$:    JSR     R1,INOCT        ;GET BUFFER RELOC. IN ,000'S
001572  013426                          .WORD   BFREMS
001574  001672                          .WORD   NEWP20          ;ADDRESS OF DEFAULT ROUTINE
001576  120427  000015                  CMPB    R4,#CR          ;WAS LINE DELIMITED PROPERLY?
001602  001371                          BNE     70$             ;NO, REENTER
001604  032703  000001                  BIT     #1,R3           ;MUST BE A MULTIPLE OF 2000
001610  001366                          BNE     70$
001612  020327  000020                  CMP     R3,#20
001616  002763                          BLT     70$             ;ILLG BUFFER CONST -- LT 20000
001620  005703                          TST     R3              ;IS NUMBER NEGATIVE?
001622  100761                          BMI     70$             ;YES, REENTER ADDRESS
001624  020327  000734                  CMP     R3,#734         ;IS ADDRESS TOO LARGE?
001630  002356                          BGE     70$             ;YES, REENETER ADDRESS
001632  105737  012517                  TSTB    MMRESP          ;WAS MEMORY MANAGEMENT SPECIFIED?
001636  001412                          BEQ     71$             ;NO, CHECK FOR 28K
001640  010304                          MOV     R3,R4           ;PUT VALUE IN WORK REG
001642  042704  000600                  BIC     #600,R4         ;IGNORE ADDRESS EXTENSION BITS
001646  020427  000154                  CMP     R4,#154         ;IS IT TOO CLOSE TO 200000 BOUNDARY?
001652  003407                          BLE     NEWP20          ;BRANCH IF OK
001654  004137  011466                  JSR     R1,MESG         ;PRINT ERROR.  CANNOT SET BUFFER SO
                                ;CLOSE TO A 200000 BOUNDARY THAT A CARRY WOULD BE NEEDED TO CHANGE
                                ;THE EXTENDED ADDRESS BITS.  THE DX CANNOT WORK ACROSS 200000
                                ;BOUNDARIES.
001660  017044                          .WORD   TOOC            ;ADDRESS OF TOO CLOSE MESSAGE
001662  000741                          BR      70$             ;ASK FOR INPUT AGAIN

001664  020327  000134          71$:    CMP     R3,#134         ;NO, IS IT TOO CLOSE TO I/O PAGE?
001670  002336                          BGE     70$             ;YES, REENTER THE ADDRESS
001672  010337  012520          NEWP20: MOV     R3,BUFREL       ;SAVE REL CONST

                                        ;
                                        ;       GET TYPE  OF TEST TO BE RUN
                                        ;               D = 2848 RESPONDER DIAGNOSTIC
                                        ;
```

```
                                        ;               F = FRIEND
                                        ;
                                        ;               DEFAULT = 'F', FRIEND
                                        ;
001676  105037  012522          90$:    CLRB    TSTTYP          ;RESET TEST TYPE
001702  004137  002620                  JSR     R1,INOCT        ;GET TEST TYPE
001706  013524                          .WORD   TESTMS
001710  001740                          .WORD   100$            ;DEFAULT TO FRIEND
001712  112737  000100  012524          MOVB    #EBCDSP,FILLCH  ;FOR 2848 SET FILL CHAR TO EBCDIC SPACE
001720  120427  000104                  CMPB    R4,#'D          ;D? --2848 RESPONDER DIAGNOSTIC --
001724  001433                          BEQ     INIT            ;YES, 2848 TEST
001726  120427  000106                  CMPB    R4,#'F          ;F? -- FRIEND TEST --
001732  001361                          BNE     90$             ;ILLEGAL ENTRY
001734  105037  012524                  CLRB    FILLCH          ;FRIEND MODE -- DEFAULT FILL CHAR TO NULL
001740  105237  012522          100$:   INCB    TSTTYP          ;SET TEST TO FRIEND
                                        ;
                                        ;       FRIEND TEST ONLY
                                        ;       DETERMINE IF SEPARATE INPUT / OUTPUT BUFFERS ARE TO BE USED
                                        ;               Y = YES, MAINTAIN SEPARATE INPUT / OUTPUT BUFFERS
                                        ;               N = NO, USE SAME BUFFER FOR INPUT AND OUTPUT
                                        ;               DEFAULT IS 'N', NO, USE SAME BUFFER FOR INPUT / OUTPUT
                                        ;
001744  105037  012523          110$:   CLRB    IOBUF           ;0 = NO, 1 = YES
001750  004137  002620                  JSR     R1,INOCT        ;SEPARATE I/O BUFFERS?
001754  013564                          .WORD   FIOMS
001756  002014                          .WORD   INIT            ;DEFAULT TO NO
001760  120427  000116                  CMPB    R4,#'N          ;N? -- NO, SAME I/O BUFFER --
001764  001413                          BEQ     INIT            ;IF EQ, USE SAME I/O BUFFER FOR INPUT AND OUTPUT
001766  120427  000131                  CMPB    R4,#'Y          ;Y? --YES, SEPARATE I/O BUFFERS--
001772  001364                          BNE     110$            ;ERROR, REQUEST INPUT AGAIN
001774  105237  012523                  INCB    IOBUF           ;SET SEPARATE I/O BUFFER INDICATOR
                                        ;
                                        ;       FRIEND TEST MODE ONLY
                                        ;       GET BUFFER FILL CHARACTER (HEX INPUT REQUIRED)
                                        ;               ANY VALUE WILL BE ACCEPTED
                                        ;
002000  004137  002612                  JSR     R1,INHEX        ;FILL CHARACTER
002004  013626                          .WORD   FILLMS
002006  002014                          .WORD   INIT
002010  110337  012524                  MOVB    R3,FILLCH
```

```
                                        .SBTTL  PROGRAM INITIALIZATION
                                ;
                                ;       I N I T I A L I Z A T I O N
                                ;
                                ;
                                ;               SET UP ALL DX BUFFERS, MEMORY MANAGEMENT REGISTERS
                                ;                       AND DX REGISTERS
                                ;
002014  012737  011666  000004  INIT:  MOV     #MTO,4          ;SET UP MEMORY TIME OUT TRAP
002022  013701  012506          MOV     UNADDR,R1       ;SET UP DX UNIBUS ADDRESSES
002026  012702  012454          MOV     #DXDS,R2
002032  012703  000015          MOV     #13.,R3         ;13 ADDRESSES (REGISTERS)
002036  010122          10$:    MOV     R1,(R2)+        ;SET UP UNIBUS ADDRESS
002040  005721          TST     (R1)+           ;INCR TO NEXT DX REGISTER
002042  005303          DEC     R3              ;DONE?
002044  001374          BNE     10$             ;NO, SET UP NEXT REGISTER
                                ;
                                ;       SET UP DX VECTOR ADDRESS
                                ;
002046  013701  012510          MOV     VECTAD,R1
002052  012721  005322          MOV     #DXISR,(R1)+    ;TRAP TO DX ISR
002056  012711  000340          MOV     #340,(R1)       ;SET UP PROC STATUS AT INTER.
                                ;
                                ;       COMPUTE ADDRESSES OF DX BUFFERS
                                ;               CURRENTLY THIS INCLUDES DATA AREA, TUMBLE TABLE, AND SPW TABLE
                                ;
002062  005737  012520          TST     BUFREL          ;WAS BUFFER RELOC SPECIFIED?
002066  001003          BNE     20$             ;YES
002070  012737  000020  012520  MOV     #20,BUFREL      ;NO, MAKE BUFFERS START AT 20000
002076  013737  012520  013070  20$:    MOV     BUFREL,PBUFA    ;SAVE PHYSICAL ADDRESS
002104  013737  012520  013072  MOV     BUFREL,VBUFA    ;SAVE VIRTUAL ADDRESS
002112  105737  012517          TSTB    MMRESP          ;WAS MEMORY MANAGEMENT SPECIFIED?
002116  001436          BEQ     40$             ;NO, SET UP BUFFERS
                                ;
                                ;       MEMORY MANAGEMENT WAS SPECIFIED
                                ;               SET UP KERNEL REGISTERS
                                ;                       0-17777 = PROGRAM
                                ;                       20000-157777 = BUFFERS (VIRTUAL ADDRESSES)
                                ;                       160000-177777 = UNIBUS ADDRESSES
                                ;               ONLY I SPACE REGISTERS WILL BE USED
                                ;
002120  012704  172340          MOV     #KISAR0,R4      ;I-SPACE PAR
002124  012705  172300          MOV     #KISDR0,R5      ;I-SPACE PDR
002130  005024          CLR     (R4)+           ;VA 0-17777 = PA 0-17777
002132  012725  077406          MOV     #77406,(R5)+    ;64 BLOCKS, UNLIMITED ACCESS
002136  013703  013070          MOV     PBUFA,R3        ;PHYSICAL ADDR * 2-6
002142  006303          ASL     R3
002144  006303          ASL     R3
002146  006303          ASL     R3
002150  010324          30$:    MOV     R3,(R4)+        ;SET UP PA FOR VA 20000-157777
002152  012725  077406          MOV     #77406,(R5)+    ;64 BLOCKS, UNLIMITED ACCESS
002156  062703  000200          ADD     #200,R3         ;INCREMENT TO NEXT 4K BANK
002162  020427  172356          CMP     R4,#KISAR7      ;ALL BUFFER ADDRESSES SET UP?
002166  001370          BNE     30$             ;NO, SET UP NEXT REGISTER
002170  012714  007600          MOV     #7600,(R4)      ;SET UP UNIBUS ADDRESS REGISTER
002174  012715  077406          MOV     #77406,(R5)     ;64 BLOCKS, UNLIMITED ACCESS
```

```
8011  002200  012737  000001  177572          MOV     #1,MMSR0        ;ENABLE MEMORY MANAGEMENT
8012  002206  012737  000020  013072          MOV     #20,VBUFA       ;TO 8K BANK OR 20000 AND UP
8013                                  ;
8014                                  ;       START SETTING UP SPW TABLE
8015                                  ;               1 ENTRY PER DEVICE (256 DEVICES)
8016                                  ;               ENTRY DESCRIPTION
8017                                  ;                   ----FOR VALID DEVICE NUMBERS
8018                                  ;                       BITS 15-8 = OFFSET TO DST TABLE (PHYSICAL ADDR)
8019                                  ;                             7-0 = 0
8020                                  ;                   ----FOR INVALID DEVICE NUMBERS
8021                                  ;                       BITS 15-8 = 0
8022                                  ;                             7-0 = 2 -- UNIT CHECK
8023                                  ;
8024                                  ;       THIS TABLE IS REFERENCED ON EACH 360 ACTION TO DETERMINE
8025                                  ;               IF DEVICE NUMBER IS VALID. THIS AUTOMATICALLY DONE
8026                                  ;               BY THE DX CONTROL UNIT
8027                                  ;
8028  002214  013705  013070          40$:    MOV     PBUFA,R5        ;COMPUTE OFFSET PHYSICALLY
8029  002220  000305                          SWAB    R5              ;*1000
8030  002222  105005                          CLRB    R5
8031  002224  006305                          ASL     R5
8032  002226  010577  010230                  MOV     R5,@DX0S        ;OFFSET TO SPW TABLE
8033  002232  013701  013072                  MOV     VBUFA,R1        ;COMPUTE VIRT ADDR OF SPW TABLE
8034  002236  000301                          SWAB    R1              ;*1000
8035  002240  105001                          CLRB    R1
8036  002242  006301                          ASL     R1
8037  002244  010137  013104                  MOV     R1,STSPW        ;SAVE START OF SPW TABLE
8038  002250  010137  013074                  MOV     R1,PHYOFF       ;COMPUTE THE OFFSET FOR PHYSICAL ADDRESSES
8039  002254  160537  013074                  SUB     R5,PHYOFF       ;VERSES VIRTUAL ADDRESS - FOR MEM MANAGEMENT
8040  002260  062705  003000                  ADD     #3000,R5        ;COMPUTE THE OFFSET TO THE DST TABLE
8041  002264  010537  013106                  MOV     R5,DSTOFF       ;SAVE OFFSET TO DST TABLE
8042  002270  005000                          CLR     DEV             ;START AT DEVICE 0
8043  002272  120037  012512          50$:    CMPB    DEV,SDEV        ;IS DEVICE NUMBER VALID
8044  002276  002405                          BLT     60$             ;NO
8045  002300  120037  012514                  CMPB    DEV,EDEV
8046  002304  003002                          BGT     60$             ;NO
8047  002306  010521                          MOV     R5,(R1)+        ;VALID DEVICE DST OFFSET TO ENTRY
8048  002310  000402                          BR      70$
8049  002312  012721  000002          60$:    MOV     #UCHK,(R1)+     ;INVALID DEV # UNIT CHECK TO ENTRY
8050  002316  005200                  70$:    INC     DEV             ;TO NEXT DEVICE
8051  002320  020027  000400                  CMP     DEV,#256.       ;ALL DEVICES DONE?
8052  002324  001362                          BNE     50$             ;NO, SET UP SPW FOR NEXT DEVICE
8053                                  ;
8054                                  ;       NEXT SET UP TUMBLE TABLE AND DUPLICATE TUMBLE TABLE
8055                                  ;
8056  002326  010137  013052                  MOV     R1,TTADDR       ;TUMBLE TABLE ADDRESS
8057  002332  010137  013050                  MOV     R1,TTPTR        ;TUMBLE TABLE FETCH POINTER
8058  002336  012702  001000                  MOV     #TTSIZE,R2      ;CLEAR T/T + DUPLICATE T/T (WORD POINTER)
8059  002342  005021                  80$:    CLR     (R1)+           ;CLEAR NEXT WORD
8060  002344  005302                          DEC     R2              ;DONE?
8061  002346  001375                          BNE     80$             ;NO, CLEAR NEXT WORD
8062                                  ;
8063                                  ;       SET UP DST TABLE
8064                                  ;               THE DST TABLE IS USED TO VERIFY COMMANDS FROM THE
8065                                  ;               360, THIS IS DONE BY THE HARDWARE
8066                                  ;               THE DST TABLE IS A BYTE TABLE, 1 BYTE PER POSSIBLE
```

```
                                        ;               COMMAND 0-255, THE ENTRY IN THE DST TABLE IS
                                        ;               SENT TO THE 360.
                                        ;       THE FOLLOWING ARE A LIST OF VALID COMMANDS AND RESPONSES
                                        ;               COMMAND         RESPONSE        DESCRIPTION
                                        ;               0               0               TEST I/O
                                        ;               1               0               WRITE BUFFER
                                        ;               2               0               READ MANUAL INPUT
                                        ;               3               CE!DE           NOP
                                        ;               4               0               SENSE COMMAND
                                        ;               5               0               WRITE LINE ADDRESS
                                        ;               6               0               READ FULL BUFFER
                                        ;               7               0               ERASE COMMAND
                                        ;               12              0               SHORT READ MANUAL INPUT
                                        ;
                                        ;       ALL OTHER COMMANDS ARE RESPONDED WITH UNIT CHECK
                                        ;
002350  012702  000013                          MOV     #13,R2          ;NUMBER OF VALID 360 COMMANDS
002354  012703  002576                          MOV     #VCMDTB,R3      ;VALID COMMAND TABLE
002360  112321                          INIT10: MOVB    (R3)+,(R1)+     ;TO DST TABLE
002362  005302                                  DEC     R2              ;DONE?
002364  001375                                  BNE     INIT10          ;NO, MOVE IN NEXT RESPONSE
002366  012702  000365                          MOV     #245.,R2        ;MOVE UNIT CHECK TO INVALID ENTRIES
002372  112721  000002                  100$:   MOVB    #UCHK,(R1)+
002376  005302                                  DEC     R2
002400  001374                                  BNE     100$
                                        ;
                                        ;       COMPUTE MAX NUMBER OF DEVICES
                                        ;
002402  013703  012514                          MOV     EDEV,R3
002406  163703  012512                          SUB     SDEV,R3
002412  005203                                  INC     R3              ;START AT DEVICE NUMERO UNO
002414  110337  013057                          MOVB    R3,MAXDEV
002420  013737  012512  013100                  MOV     SDEV,DEVCON     ;SET UP DEVICE NUMBER -1
002426  005337  013100                          DEC     DEVCON
002432  012737  000001  013066                  MOV     #1,SELDEV       ;INIT DEVICE NUMBER FOR MUX AND SEL EXECUTORS
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                        ;
                                        ;       NOTE -- THE DEVICE BUFFERS ARE USED BY THE SOFTWARE ONLY TO CONTAIN
                                        ;               POINTERS AND INPUT AND OUTPUT DATA FOR EACH DEVICE;
                                        ;
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                        ;
                                        ;       START SETTING UP DEVICE BUFFERS
                                        ;
002440  010137  013054                          MOV     R1,SDEVTB       ;SAVE START OF DEVICE BUFFERS
002444  005000                                  CLR     DEV             ;DEV # 0
002446  010103                          120$:   MOV     R1,DTAB         ;SAVE ADDR OF DEVICE STATUS TABLE
002450  012702  000420                          MOV     #272.,R2        ;CLEAR DEVICE STATUS TABLE + INPUT BUFFER
002454  005021                          122$:   CLR     (R1)+
002456  005302                                  DEC     R2              ;DONE?
002460  001375                                  BNE     122$            ;NO, CLEAR NEXT WORD
002462  010363  000006                          MOV     DTAB,SINBF(DTAB)
002466  062763  000076  000006                  ADD     #62.,SINBF(DTAB) ;COMPUTE ADDRESS OF INPUT BUFFER
002474  010363  000010                          MOV     DTAB,SOUTB(DTAB)
002500  062763  001040  000010                  ADD     #544.,SOUTB(DTAB) ;COMPUTE ADDRESS OF OUTPUT BUFFER
002506  012702  000740                          MOV     #DISPSZ,R2
```

```
 8123  002512  113721  012524          125$:   MOVB    FILLCH,(R1)+    ;FILL OUTPUT/DISPLAY BUFFER
 8124  002516  005302                          DEC     R2              ;DONE?
 8125  002520  001374                          BNE     125$            ;NO
 8126  002522  005200                          INC     DEV             ;HAVE ALL DEVICE BUFFERS BEEN SET UP?
 8127  002524  120037  013057                  CMPB    DEV,MAXDEV
 8128  002530  001346                          BNE     120$            ;NO, SET UP NEXT DEVICE BUFFERS
 8129  002532  013705  013070                  MOV     PBUFA,R5        ;SET UP EXTENDED ADDRESS BITS
 8130  002536  006205                          ASR     R5
 8131  002540  006205                          ASR     R5
 8132  002542  006205                          ASR     R5
 8133  002544  006205                          ASR     R5
 8134  002546  042705  177747                  BIC     #177747,R5      ;SAVE ONLY H.O. 2 BITS
 8135  002552  010537  013102                  MOV     R5,XADDR        ;SAVE EXTENDED ADDRESS BITS FOR DX CONTROL REG
 8136  002556  012737  000001  013122          MOV     #1,FTIMFL       ;SET FIRST TIME THROUGH FLAG
 8137                                  ;
 8138                                  ;       INITIALIZATION COMPLETE
 8139                                  ;               TELL OPERATOR WE ARE ALREADY TO GO
 8140                                  ;
 8141                                  ;       NOTE:   AT THIS POINT THE DX HAS NOT BEEN STARTED
 8142                                  ;               AND THE OPERATOR MUST TYPE R (RUN COMMAND)
 8143                                  ;               TO THE SHOW UNDER WAY
 8144                                  ;
 8145  002564  004137  011466                  JSR     R1,MESG         ;TELL OPERATOR WE ARE READY TO GO
 8146  002570  014214                          .WORD   RNMESG
 8147  002572  000137  002706                  JMP     EXEC            ;GET THE SHOW ON THE ROAD
 8148
 8149                                  ;       VALID COMMAND TABLE
 8150                                  ;
 8151  002576      000                 VCMDTB: .BYTE 0                 ;0 = TEST I/O
 8152  002577      000                         .BYTE 0                 ;1 = WRITE BUFFER
 8153  002600      000                         .BYTE 0                 ;2 = READ MANUAL INPUT
 8154  002601      014                         .BYTE CE!DE             ;3 = NOP
 8155  002602      000                         .BYTE 0                 ;4 = SENSE COMMAND
 8156  002603      000                         .BYTE 0                 ;5 = WRITE LINE ADDRESS
 8157  002604      000                         .BYTE 0                 ;6 = READ FULL BUFFER
 8158  002605      000                         .BYTE 0                 ;7 = ERASE COMMAND
 8159  002606      002                         .BYTE UCHK              ;10 = INVALID
 8160  002607      002                         .BYTE UCHK              ;11 = INVALID
 8161  002610      000                         .BYTE 0                 ;12 = SHORT READ MANUAL INPUT
 8162          002612                          .EVEN
```

```
                                        .SBTTL  INITIALIZATION PARAMETER INPUT AND CONVERSION ROUTINES

                                ;
                                ;       INHEX -- PRINT MESSAGE, WAIT FOR INPUT, GET IT AND CONVERT THE HEX TO BINARY
                                ;
                                ;       CALLING SEQUENCE
                                ;       JSR     R1,INHEX
                                ;       .WORD   ADDRESS OF MESSAGE TO BE PRINTED
                                ;       .WORD   ADDRESS OF DEFAULT ROUTINE
                                ;       ........RETURN
                                ;               R2 = NEXT CHAR POINTER
                                ;               R3 = BINARY RESULT
                                ;               R4 = (BITS 0-7) FIRST NON-OCTAL CHARACTER
                                ;               R5 = NUMBER OF CHARCTERS CONVERTED
                                ;
002612  012705  011600          INHEX:  MOV     #CHTB,R5        ;MOVE ADDRESS OF CONVERSION ROUTINE TO R5
002616  000402                  BR      INR5
                                ;
                                ;       INOCT -- PRINT MESSAGE, WAIT FOR INPUT, + GET IT AND CONVERT OCTALL TO BINARY
                                ;
                                ;       CALLING SEQUENCE
                                ;       JSR     R1,INOCT
                                ;       .WORD ADDRESS OF MESSAGE TO BE PRINTED
                                ;       .WORD ADDRESS OF THE DEFAULT ROUTINE
                                ;       ......RETURN
                                ;               R2 = NEXT CHAR PTR
                                ;               R3 = BINARY RESULT
                                ;               R4 = (BITS 0-7) FIRST NON-OCTAL CHARACTER
                                ;               R5 = NUMBER OF CHARS CONVERTED
                                ;
002620  012705  011534          INOCT:  MOV     #COTB,R5        ;SET UP ADDRESS OF THE CONVERSION ROUTINE
002624  012102                  INR5:   MOV     (R1)+,R2        ;GET ADDRESS OF THE MESSAGE
002626  004737  011400          10$:    JSR     PC,PRMESG               ;PRINT THE DESIRED MESSAGE
002632  105037  013043                  CLRB    TCMACT          ;RESET ACTIVE FLAG
002636  105037  013044                  CLRB    TCMDAB          ;RESET ABORT FLAG
002642  105737  013044          30$:    TSTB    TCMDAB          ;COMMAND ABORT?
002646  001367                  BNE     10$             ;YES, REASK QUESTION
002650  105737  013043                  TSTB    TCMACT          ;WAS ENTRY COMPLETED?
002654  001772                  BEQ     30$             ;NO, WAIT
002656  012702  012630                  MOV     #TBUF,R2        ;SET UP ADDRESS OF BEG OF INPUT BUFFER
002662  004715                  JSR     PC,2R5          ;CONVERT INPUT TO BINARY
002664  005705                  TST     R5              ;LOOK FOR DEFAULT RESP -- C/R
002666  001005                  BNE     40$             ;NOT DEFAULT TAKE NORMAL RETURN
002670  120427  000015          CMPB    R4,#CR          ;ILLEGAL CHAR MUST BE A C/R
002674  001002                  BNE     40$             ;ITS NOT A DEFAULT
002676  011101                  MOV     (R1),R1         ;---TAKE THE DEFAULT RETURN
002700  000201                  RTS     R1
002702  005721          40$:    TST     (R1)+           ;INCR FOR NORMAL RETURN
002704  000201                  RTS     R1
```

```
                                        .SBTTL  BACKGROUND TELETYPE COMMAND DISPATCHER (EXECUTIVE)

                                ;
                                ;       SYSTEM EXECUTIVE/BACKGROUND
                                ;
                                ;               THE SYS EXEC EXECUTES THE SYSTEM TELETYPE COMMANDS
                                ;
                                ;       ENTRY TO THE TELETYPE COMMAND EXEC IS PERFORMED
                                ;       BY EXECUTING A JUMP TO EXEC. THE CALLER
                                ;       SHOULD NOT EXPECT ANY REGISTERS TO BE SAVED OR CONTROL
                                ;       R"S     PCED TO HIS PROGRAM.
                                ;       ENTRY TO THE TELETYPE COMMAND EXEC CAUSES THE STACK POINTER
                                ;       TO BE RESET; THUS, MOST COMMAND HANDLERS WILL NOT
                                ;       WITH LEAVING UN"POPPED" DATA ON THE STACK.
                                ;
002706  004737  011324        EXEC:   JSR     PC,CRLF         ;PRINT CR/LF
002712  012702  000052                MOV     #'*,R2
002716  004737  011342                JSR     PC,PRINT2               ;PRINT * -- DENOTE COMMAND MODE
002722  012706  012626                MOV     #SSTACK,SP      ;RE-ESTABLISH PUSH STACK
002726  105037  013043                CLRB    TCMACT          ;CLEAR TELE CMD ACT
002732  105037  013044                CLRB    TCMDAB          ;CLEAR TELE CMD ABORT
002736  105037  013045                CLRB    LINECT          ;RESET LINE COUNTER
002742  105737  013062        10$:    TSTB    DXABFL          ;DID THE DX ABORT AN OPERATION ?
002746  001402                        BEQ     20$             ;NO, CONTINUE
002750  000137  003326                JMP     STOPDX          ;YES IT DID, PRINT THE DX REGISTERS
002754  105737  013043        20$:    TSTB    TCMACT          ;IS THERE A COMMAND TO EXECUTE
002760  001001                        BNE     30$             ;YES, EXECUTE IT
002762  000767                        BR      10$             ;NO, WAIT AGAIN IF NOTHING TO DO
                                ;
                                ;       THERE IS A TELETYPE COMMAND TO BE EXECUTED
                                ;
002764  012702  012630        30$:    MOV     #TBUF,R2        ;SET UP PTR TO START OF TELE BUFFER
002770  112203                        MOVB    (R2)+,R3        ;GET COMMAND IDENTIFIER
002772  042703  177400                BIC     #177400,R3      ;SAVE L.O. BYTE
002776  012704  003032                MOV     #TCMDTB,R4      ;SET UP PTR TO COMMAND TABLE
003002  020324                40$:    CMP     R3,(R4)+        ;DOES COMMAND MATCH TABLE ENTRY?
003004  001411                        BEQ     EXECMD          ;YES. WE GOT A MATCH - START EXECUTION
003006  022404                        CMP     (R4)+,R4        ;INC, TO NEXT COMMAND
003010  005714                        TST     (R4)            ;END OF TABLE?
003012  001373                        BNE     40$             ;NO, TEST NEXT ENTRY
                                ;
                                ;       COMMAND ERROR - NOTIFY OPERATOR WITH ? AND "BELL"
                                ;
003014  012702  137607        CERR:   MOV     #137607,R2      ;PRINT ? AND "BELL"
003020  004737  011342                JSR     PC,PRINT2
003024  000137  002706                JMP     EXEC            ;RETURN TO EXEC
                                ;
                                ;       EXECUTE COMMAND
                                ;
003030  000134                EXECMD: JMP     @(R4)+          ;EXECUTE COMMAND
                                ;
                                ;       TELETYPE COMMAND TABLE
                                ;
003032  000101                TCMDTB: .WORD   'A              ;A = ACCESS
003034  004036                        .WORD   ACCESS
003036  000104                        .WORD   'D              ;D = DUMP
003040  003420                        .WORD   DUMP
```

```
 8269  003042  000105                    .WORD   'E              ;E = ENABLE DEVICE
 8270  003044  004210                    .WORD   ENABLE
 8271  003046  000106                    .WORD   'F              ;F = FILL
 8272  003050  003704                    .WORD   FILL
 8273  003052  000110                    .WORD   'H              ;H = HELP COMMAND
 8274  003054  003772                    .WORD   HELP
 8275  003056  000111                    .WORD   'I              ;I = INPUT
 8276  003060  004316                    .WORD   INPUT
 8277  003062  000113                    .WORD   'K              ;K = KILL
 8278  003064  004254                    .WORD   KILL
 8279  003066  000122                    .WORD   'R              ;R = RUN
 8280  003070  003100                    .WORD   RUN
 8281  003072  000123                    .WORD   'S              ;S = STOP
 8282  003074  003252                    .WORD   STOP
 8283  003076  000000                    .WORD   0               ;END OF TABLE
```

```
                                        .SBTTL  BACKGROUND -- RUN COMMAND

                                ;
                                ;       R = RUN COMMAND
                                ;
                                ;       THE RUN COMMAND READIES THE DX AND SPECIFIED DEVICE
                                ;            BUFFERS TO BEGIN OPERATION. THE RUN COMMANC MUST
                                ;            BE EXECUTED BEFORE ANY ACTION WILL BE PERFORMED
                                ;            OVER THE DX.
                                ;

003100  032777  001000  007352  RUN:    BIT     #DXONLN,@DXCS   ;IS DX ENABLED?
003106  001342                          BNE     CERR            ;YES, ERROR
003110  005077  007344                  CLR     @DXCS           ;INITIALIZE THE DX
003114  005277  007340                  INC     @DXCS           ;SET GO
003120  012700  000001                  MOV     #1,DEV          ;START CLEARING DEVICE TABLES
003124  004737  010244          10$:    JSR     PC,CDEVST               ;CLEAR DEV STATUS TABLE
003130  004737  010276                  JSR     PC,CSPWST               ;RESET THE APPR SPW STATUS ENTRY FOR THE DEVICE
003134  105063  000002                  CLRB    SSENSE(DTAB)    ;CLEAR SENSE BYTE
003140  105363  000017                  CLRB    SRQRQ(DTAB)     ;CLEAR THE READ REQUEST
003144  005063  000020                  CLR     SMINS(DTAB)     ;CLEAR THE START OF MANUAL INPUT
003150  005200                          INC     DEV             ;INCR TO NEXT DEVICE
003152  120037  013057                  CMPB    DEV,MAXDEV      ;ARE WE DONE
003156  003762                          BLE     10$             ;NO, DO NEXT DEVICE
003160  105037  013060                  CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
003164  105037  013064                  CLRB    CMDCHF          ;CLEAR COMMAND CHAINING FLAG
003170  105037  013062                  CLRB    DXABFL          ;CLEAR DX ABORT FLAG
003174  013701  013052                  MOV     TTADDR,R1       ;GET THE TUMBLE TABLE ADDRESS
003200  010137  013050                  MOV     R1,TTPTR        ;RESET THE SOFTWARE T/T POINTER
003204  012702  001000                  MOV     #TTSIZE,R2      ;SET UP CLEAR CONSTANT (WORD COUNTER)
003210  005021                  20$:    CLR     (R1)+           ;CLEAR T/T AND DUP T/T
003212  005302                          DEC     R2              ;ARE WE DONE?
003214  001375                          BNE     20$             ;NO, KEEP ON CLEARING
003216  012737  000001  013066          MOV     #1,MDEV         ;INIT THE DEVICE NUMBER FOR MUX
                                                                ; AND SEL EXECUTOR ROUTINES
003224  053777  013102  007226          BIS     XADDR,@DXCS     ;SET UP THE EXTENDED ADDRESS BITS
003232  052777  004000  007220          BIS     #BSYEN,@DXCS    ;SEL CHANNEL - SET BUSY ENABLE
003240  052777  001100  007212  30$:    BIS     #DXENB!DXONLN,@DXCS ;ENABLE THE DX
003246  000137  002706                  JMP     EXEC
```

```
                                        .SBTTL  BACKGROUND -- STOP COMMAND

                                ;
                                ;       S = STOP DX COMMAND
                                ;               STOP DISBLES THE DX IMMEDIATELY, AFTER THE NEXT CHIS
                                ;               AFTER THE NEXT DATA TRANSFER COMPLETION, OR AFTER THE
                                ;               NEXT ENDING SEQUENCE
                                ;
                                ;       THE FOLLOWING FORMATS ARE ALLOWED
                                ;               S(C/R)  -- STOP DX IMMEDIATELY
                                ;               SI(C/R) -- STOP DX AFTER NEXT INITIAL SELECTION SEQUENCE
                                ;               SD(C/R) -- STOP DX AFTER NEXT DATA TRANSFER IS COMPLETED
                                ;               SE(C/R) -- STOP DX AFTER NEXT ENDING SEQUENCE IS RECEIVED
                                ;               SP(C/R) -- STOP ON NEXT PARITY EROR RECEIVED FROM CHANNEL
                                ;
                                ;       STOP WAITS UNTIL THE SPECIFIED CONDITION IS MET. THEN, THE
                                ;       DX IS DISABLED AND THE DX STATUS REGISTERS ARE
                                ;       DUMPED ON THE CONSOLE TELETYPE.
                                ;
                                ;       A RUN COMMAND (R) MUST BE EXECUTED BEFORE ANY MORE
                                ;       ACTIONS WILL BE PERFORMED ON THE DX.
                                ;
003252  111204          STOP:   MOVB    (R2),R4         ;GET THE TYPE OF STOP INDICATED
003254  120427  000015          CMPB    R4,#CR          ;IMMEDIATELY?
003260  001422                  BEQ     STOPDX          ;YES, DISABLE DX AND PRINT REGISTERS
003262  120427  000104          CMPB    R4,#'D          ;D = AFTER NEXT DATA TRANSFER?
003266  001413                  BEQ     10$             ;YES, SET STOP FLAG
003270  120427  000105          CMPB    R4,#'E          ;E = AFTER THE NEXT ENDING SEQUENCE
003274  001410                  BEQ     10$             ;YES, SET STOP FLAG
003276  120427  000111          CMPB    R4,#'I          ;I = AFTER THE CHIS SEQUENCE
003302  001405                  BEQ     10$             ;YES, SET STOP FLAG
003304  120427  000120          CMPB    R4,#'P          ;P = STOP ON PARITY ERROR??
003310  001402                  BEQ     10$             ;YES, SET STOP FLAG
003312  000137  003014          JMP     CERR            ; ILLEGAL FORMAT -- GIVE ERROR
003316  110437  013056  10$:    MOVB    R4,DXSTPF       ;SET THE STOP FLAG
                                ;
                                ;       WHEN THE STOP CONDITION IS SATISIFIED,
                                ;       THE DX ISR WILL ABORT ALL DX ACTIVITY AND
                                ;       SET A FLAG CAUSING ALL DX REGISTERS TO BE
                                ;       DUMPED BY "STOPDX", BELOW
                                ;
                                ;       THE STOP CONDITION WILL REMAIN IN EFFECT
                                ;       UNTIL IT IS SATISIFIED OR ANOTHER REQUEST
                                ;       SUPERCEDES IT.
                                ;
003322  000137  002706          JMP     EXEC            ;RETURN TO THE EXEC
                                ;
                                ;       STOP THE DX AND PRINT THE REGISTERS
                                ;               NOTE THE PRINT OUTS WILL BE IN OCTAL
                                ;
003326  042777  000100  007124  STOPDX: BIC     #DXENB,@DXCS    ;DISABLE THE DX
003334  004737  011324          JSR     PC,CRLF         ;START AT NEW LINE
003340  004137  011466          JSR     R1,MESG         ;PRINT "CURRENT DEVICE -- "
003344  014006                  .WORD   STPMES
003346  013702  013076          MOV     CDEV,R2         ;CONVERT AND PRINT THE CURRENT
003352  004737  004746          JSR     PC,HDMP         ;DEVICE NUMBER IN HEX
003356  012703  000015          MOV     #13.,R3         ;PRINT THE 13 DX REGISTERS IN OCTAL
```

```
 8379  003362  012701  012454                    MOV     #DXDS,R1        ;STARTING POINT
 838C  003366  013102                      10$:  MOV     @(R1)+,R2       ;GET THE REGISTER CONTENTS
 8381  003370  004737  004656                    JSR     PC,OCTOMP               ;PRINT IN OCTAL
 8382  003374  005303                            DEC     R3              ;ARE WE DONE
 8383  003376  001373                            BNE     10$             ;NO, DUMP NEXT WORD
 8384  003400  105037  013062                    CLRB    DXABFL          ;YES, RESET THE ABORT FLAG
 8395  003404  005077  007050                    CLR     @DXCS           ;RESET THE DX
 8386  003410  005277  007044                    INC     @DXCS
 8387  003414  000137  002706                    JMP     EXEC            ;AND RETURN TO THE EXEC
```

```
 8389                                           .SBTTL  BACKGROUND -- DUMP COMMAND
 8390                                   ;
 8391                                   ;       DUMP COMMAND
 8392                                   ;
 8393                                   ;       THE DUMP COMMAND DUMPS THE SPECIFIED DATA AREA ON THE
 8394                                   ;       CONSOLE TELETYPE IN THE SPECIFIED FORMAT.
 8395                                   ;
 8396                                   ;       THE FOLLOWING COMMAND SYNTAXES ARE AVAILABLE:
 8397                                   ;               DTT,X           DUMP DUPLICATE TUMBLE TABLE IN CODE X
 8398                                   ;               DIN,X,YY        DUMP INPUT BUFFER FOR DEVICE YY IN CODE X
 8399                                   ;               DOT,X,YY        DUMP OUTPUT BUFFER FOR DEVICE YY IN CODE X
 8400                                   ;               DSSSSSS,EEEEEE,X DUMP BETWEEN THE OCTAL LIMITS GIVEN
 8401                                   ;                               IN CODE X
 8402                                   ;               WHERE: X = A-ASCII, E-EBCDIC, H-HEX, O-OCTAL
 8403                                   ;                 YY = THE DEVICE ADDRESS IN HEX
 8404                                   ;
 8405                                   ;       THE DUMPS ARE PERFORMED IN A COLUMN FASHION FOR
 8406                                   ;       OCTAL AND HEX MODES (ONE WORD PER LINE) AND IN A LINE
 8407                                   ;       FASHION FOR ASCII AND EBCDIC MODES (60 CHARACTERS PER LINE)
 8408                                   ;
 8409  003420  004737  005036  DUMP:   JSR     PC,GLIMIT               ;GET BUFFER LIMITS
 8410  003424  112204                   MOVB    (R2)+,R4        ;GET DUMP MODE A/E/O/H
 8411  003426  012705  004624           MOV     #ASCDMP,R5      ;SET UP FOR ASCII DUMP
 8412  003432  120427  000101           CMPB    R4,#'A          ;IS IT ASCII?
 8413  003436  001421                   BEQ     10$             ;YES, START DUMP
 8414  003440  012705  004560           MOV     #EBCDMP,R5      ;SET UP FOR EBCDIC DUMP
 8415  003444  120427  000105           CMPB    R4,#'E          ;IS IT EBCDIC?
 8416  003450  001414                   BEQ     10$             ;YES, CONTINUE DUMP
 8417  003452  012705  004742           MOV     #HEXDMP,R5      ;SET UP FOR HEX DUMP
 8418  003456  120427  000110           CMPB    R4,#'H          ;IS IT HEX?
 8419  003462  001407                   BEQ     10$             ;YES, CONTINUE DUMP
 8420  003464  012705  004656           MOV     #OCTDMP,R5      ;SET UP FOR OCTAL DUMP
 8421  003470  120427  000117           CMPB    R4,#'O          ;IS IT OCTAL?
 8422  003474  001402                   BEQ     10$             ;YES, CONTINUE DUMP
 8423  003476  000137  003014           JMP     CERR            ;ILLEGAL ENTRY -- ERROR
 8424  003502  010537  013114  10$:     MOV     R5,DMPADR       ;SAVE ADDRESS OF DUMP ROUTINE
 8425  003506  005700                   TST     R0              ;WAS THIS A TUMBLE TABLE DUMP?
 8426  003510  001043                   BNE     DTUMTB          ;YES, DUMP THE TUMBLE TABLE
 8427  003512  112204                   MOVB    (R2)+,R4        ;WAS A DEV # SPECIFIED
 8428  003514  120427  000054           CMPB    R4,#',          ;IS NEXT POSITION A COMMA
 8429  003520  001014                   BNE     50$             ;NO, DUMP GIVEN LIMITS
 8430  003522  004737  005270           JSR     PC,GDEV         ;GET THE DEVICE NUMBER -- IN HEX
 8431                                   ;
 8432                                   ;       COMPUTE RELOCATION CONSTANT FOR DEVICE
 8433                                   ;
```

```
 8435  003526  005004                          CLR     R4              ;RELOCATION CONSTANT
 8436  003530  005303                  30$:    DEC     R3              ;DONE?
 8437  003532  001403                          BEQ     40$             ;YES, ADD TO START + END ADDRESSES
 8438  003534  062704  002000                  ADD     #2000,R4        ;TO NEXT DEVICE TABLES
 8439  003540  000773                          BR      30$
 8440  003542  060437  013110          40$:    ADD     R4,SADDR        ;ADD RELOCAT TO START ADDRESS
 8441  003546  060437  013112                  ADD     R4,EADDR        ;ADD RELOCAT TO END ADDRESS
 8442  003552  017702  007332          50$:    MOV     @SADDR,R2       ;GET WORD
 8443  003556  004777  007332                  JSR     PC,@DMPADR              ;CONVERT AND DUMP IT
 8444  003562  105737  013061          60$:    TSTB    PCTR
 8445  003566  001375                          BNE     60$
 8446  003570  062737  000002  013110          ADD     #2,SADDR        ;INCR TO NEXT WORD
 8447  003576  023737  013110  013112          CMP     SADDR,EADDR     ;DUMP DONE
 8448  003604  003003                          BGT     70$             ;YES, EXIT
 8449  003606  105737  013044                  TSTB    TCMDAB          ;COMMAND ABORT?
 8450  003612  001757                          BEQ     50$             ;NO, PRINT NEXT WORD
 8451  003614  000137  002706          70$:    JMP     EXEC            ;YES, RETURN TO EXEC
 8452
 8453
 8454
 8455                                  ;
 8456                                  ;       DUMP THE DUPLICATE TUMBLE TABLE IN REVERSE SEQUENCE
 8457                                  ;
 8458  003620  012700  000400          DUMTB:  MOV     #TTSIZE/2,R0    ;SET UP COUNTER TO DUMP ENTIRE TUMBLE TABLE
 8459  003624  017702  007260          5$:     MOV     @SADDR,R2       ;GET STARTING ADDRESS
 8460  003630  004777  007260                  JSR     PC,@DMPADR              ;PRINT THE CONTENTS
 8461  003634  105737  013061          10$:    TSTB    PCTR            ;IS PRINT COMPLETE?
 8462  003640  001375                          BNE     10$             ;NO, WAIT TILL DONE
 8463  003642  032737  000777  013110          BIT     #TTSIZE-1,SADDR ;CHECK FOR WRAP AROUND
 8464  003650  001003                          BNE     20$
 8465  003652  062737  001000  013110          ADD     #TTSIZE,SADDR   ;WRAP AROUND TO TOP OF TABLE
 8466  003660  162737  000002  013110  20$:    SUB     #2,SADDR        ;DECREMENT TO NEXT ENTRY
 8467  003666  005300                          DEC     R0              ;HAS ENTIRE TUMBLE TABLE BEEN DUMPED?
 8468  003670  001403                          BEQ     30$             ;YES, EXIT TO THE EXEC
 8469  003672  105737  013044                  TSTB    TCMDAB          ;ARE WE TO ABORT?
 8470  003676  001752                          BEQ     5$              ;NO, KEEP ON DUMPING
 8471  003700  000137  002706          30$:    JMP     EXEC            ;YUP, BACK TO THE EXEC
```

```
                                                .SBTTL  BACKGROUND -- FILL COMMAND
                                        ;
                                        ;       FILL COMMAND
                                        ;
                                        ;       THE FILL COMMAND LOADS THE SPECIFIED BYTE
                                        ;       INTO THE GIVEN DATA AREA.
                                        ;
                                        ;       THE FOLLOWING SYNTAXES ARE AVAILABLE FOR THE FILL COMMAND:
                                        ;               FIN,XX,YY       FILL INPUT BUFFER FOR DEVICE YY WITH XX
                                        ;               FOT,XX,YY       FILL OUTPUT BUFFER FOR DEVICE YY WITH XX
                                        ;
                                        ;       WHERE:  XX IS THE FILL CHARACTER IN HEX
                                        ;               YY IS THE DEVICE ADDRESS IN HEX
                                        ;
003704  004737  005036          FILL:   JSR     PC,GLIMIT               ;GET BUFFER LIMITS
003710  004737  011600                  JSR     PC,CHTB         ;GET THE FILL CHARCTER
003714  110337  012524                  MOVB    R3,FILLCH       ;SAVE FILL CHAR
003720  004737  005270                  JSR     PC,GDEV         ;GET THE DEVICE ADDRESS
                                        ;
                                        ;       COMPUTE RELOCATION FOR DEVICE
                                        ;
003724  005004                  10$:    CLR     R4
003726  005303                          DEC     R3              ;DONE?
003730  001403                          BEQ     20$             ;YES, ADD TO START AND END ADDR
003732  062704  002000                  ADD     #2000,R4
003736  000773                          BR      10$
003740  060437  013110          20$:    ADD     R4,SADDR        ;ADD RELOC CONST TO START
003744  060437  013112                  ADD     R4,EADDR        ;ADD RELOC CONST TO END ADDR
003750  013701  013110                  MOV     SADDR,R1
                                        ;
                                        ;       FILL BUFFER WITH SPECIFIED CAHARCTER
                                        ;
003754  113721  012524          30$:    MOVB    FILLCH,(R1)+    ;FILL CHARACTER
003760  020137  013112                  CMP     R1,EADDR        ;DONE?
003764  101773                          BLOS    30$             ;NOPE, FILL NEXT CHAR
003766  000137  002706                  JMP     EXEC            ;DONE, RETURN TO EXEC
```

```
                                                        .SBTTL  BACKGROUND -- HELP COMMAND
                                                ;
                                                ;       THE HELP COMMAND PROVIDES THE OPERATOR WITH A SYNOPSIS OF
                                                ;       COMMANDS WHICH MAY BE USED FOR OPERATING THIS SYSTEM.
                                                ;
                                                ;       THE SYNTAX FOR THE HELP COMMAND IS:
                                                ;               H
                                                ;
003772  012701  014270          HELP:   MOV     #HELPMS,R1      ;SET UP ADDRESS OF HELP MESSAGE
003776  012702  002554                  MOV     #HELPLN,R2      ;LENGTH OF HELP MESSAGE
                                                ;
                                                ;       START OUTPUTTING THE HELP MESSAGE UNDER OUR CONTROL
                                                ;       SO THE COMMAND MAY BE ABORTED QUICKLY.
                                                ;
004002  112100                  10$:     MOVB    (R1)+,R0        ;GET BYTE TO OUTPUT
004004  123727  013061  000004   15$:     CMPB    PCTR,#4         ;MORE THEN FOUR CHARACTERS IN OUTPUT BUFFER??
004012  003374                          BGT     15$             ;  YES, WAIT TIL DOWN A LITTLE
004014  004737  011362                  JSR     PC,PCHAR                ;PRINT IT ON CONSOLE
004020  105737  013044                  TSTB    TCNDAB          ;HAS OPERATOR INDICATED A DESIRE TO STOP?
004024  001002                          BNE     20$             ;  YES, ABORT HELP MESSAGE
004026  005302                          DEC     R2              ;HAS ENTIRE MESSAGE BEEN OUTPUTTED??
004030  001364                          BNE     10$             ;  NO, OUTPUT ANOTHER BYTE
004032  000137  002706          20$:    JMP     EXEC            ;  YES, RETURN TO THE EXECUTIVE
```

```
                                                .SBTTL  BACKGROUND -- ACCESS COMMAND
                                        ;
                                        ;       ACCESS SPECIFIED LOCATIONS AND CHANGE IF DESIRED
                                        ;
                                        ;       THE ACCESS COMMAND IS A QUICK LOOK AND CHANGE
                                        ;       ROUTINE MAINLY USED FOR PROGRAM DEBUGGING.
                                        ;
                                        ;       BASICALLY THE FOLLOWING ACTIONS ARE PERMITTED:
                                        ;               AXXXXX  -- OPEN AND PRINT SPECIFIED OCTAL LOCATION
                                        ;                        [XXXXXX](C/R) -- CHANGE CURRENT LOCATION IF DATA
                                        ;                       SPECIFIED [XXXXXX] AND OPEN NEXT LOCATION
                                        ;               /       -- RETURN TO EXEC MODE
                                        ;
 004036  004737  011534         ACCESS: JSR     PC,COTB         ;GET THE START ADDRESS
 004042  005705                         TST     R5              ;WAS A VALID ADDRESS ENTERED?
 004044  001403                         BEQ     5$              ;NO, GIVE OPERATOR AN ERROR
 004046  032703  000001                 BIT     #1,R3           ;WAS ADDRESS SPECIFIED A WORD ADDRESS?
 004052  001402                         BEQ     7$              ;YES, OPEN SPECIFIED LOCATION
 004054  000137  003014         5$:     JMP     CERR            ;NO, GIVE OPERATOR AN ERROR INDICATION
 004060  010337  013110         7$:     MOV     R3,SADDR        ;SAVE STARTING ADDRESS
 004064  013702  013110         10$:    MOV     SADDR,R2        ;GET OBJECT WORD
 004070  105037  013043                 CLRB    TCMACT          ;CLEAR TELE ACTIVE FLAG
 004074  004737  004656                 JSR     PC,OCTDMP               ;PRINT ADDRESS IN OCTAL
 004100  012702  020040                 MOV     #" ,R2          ;PRINT 2 SPACES
 004104  004737  011342                 JSR     PC,PRINT2
 004110  017702  006774                 MOV     @SADDR,R2       ;GET CONTENTS OF OBJECT LOCATION
 004114  004737  004662                 JSR     PC,ODMP         ;PRINT CONTENTS IN OCTAL
 004120  012702  020040                 MOV     #" ,R2          ;PRINT 2 SPACES
 004124  004737  011342                 JSR     PC,PRINT2
 004130  105737  013043         20$:    TSTB    TCMACT          ;ACTIVE COMMAND?
 004134  001775                         BEQ     20$             ;NO
 004136  012702  012630                 MOV     #TBUF,R2        ;SET UP INPUT BUFFER ADDRESS
 004142  004737  011534                 JSR     PC,COTB         ;WAS LOCATION CHANGED?
 004146  005705                         TST     R5              ;ANY CHANGE?
 004150  001007                         BNE     30$             ;YES, STORE IT
 004152  120427  000057                 CMPB    R4,#'/          ;/, EXIT TO EXEC
 004156  001412                         BEQ     50$             ;YES, RETURN TO EXEC
 004160  120427  000015                 CMPB    R4,#CR          ;CR, GO TO NEXT LOCATION?
 004164  001403                         BEQ     40$             ;YES, OPEN AND PRINT NEXT LOC.
 004166  000736                         BR      10$             ;ERROR, PRINT CONTENTS OF CURRENT LOC.
 004170  010377  006714         30$:    MOV     R3,@SADDR       ;CHANGE OPEN LOCATION
 004174  062737  000002  013110 40$:    ADD     #2,SADDR        ;OPEN NEXT LOCATION
 004202  000730                         BR      10$
 004204  000137  002706         50$:    JMP     EXEC            ;RETURN TO THE EXEC
```

```
 8579                                                   .SBTTL  BACKGROUND -- ENABLE DEVICE COMMAND
 8580                                           ;
 8581                                           ;       E = ENABLE DEVICE
 8582                                           ;
 8583                                           ;       THE ENABLE COMMAND TURNS THE DEVICE SPECIFIED INTO AN
 8584                                           ;       ON-LINE MODE. THIS IS ONLY NECESSITATED BECAUSE A KILL
 8585                                           ;       COMMAND WAS PERFORMED ON THE DEVICE IN QUESTION.
 8586                                           ;
 8587                                           ;       THE ENABLE COMMAND HAS THE FOLLOWING SYNTAX:
 8588                                           ;               EXX     -- ENABLE DEVICE ADDRESS XX
 8589                                           ;                          THE DEVICE ADDRESS (XX) MUST BE ENTERED IN HEX
 8590                                           ;
 8591  004210  004737  005270          ENABLE: JSR     PC,GDEV         ;GET THE DEVICE NUMBER
 8592  004214  004737  010244                  JSR     PC,CDZVST               ;CLEAR THE DEVICE STATUS TABLE
 8593  004220  010005                          MOV     DEV,R5          ;COMPUTE THE ADDRESS OF THE SPW TABLE ENTRY
 8594  004222  063705  013100                  ADD     DEVCON,R5       ;COMPENSATE FOR OFFSET DEVICE ADDRESS
 8595  004226  060505                          ADD     R5,R5
 8596  004230  063705  013104                  ADD     STSPW,R5
 8597  004234  013715  013106                  MOV     DSTOFF(R5)      ;ENABLE THE DEVICE NUMBER
 8598  004240  105063  000002                  CLRB    SSENSE(DTAB)
 8599  004244  105063  000016                  CLRB    SONLF(DTAB)
 8600  004250  000137  002706                  JMP     EXEC            ;RETURN TO THE EXEC
```

```
 8602                                                   .SBTTL  BACKGROUND -- KILL DEVICE COMMAND
 8603                                           ;
 8604                                           ;       K = KILL A DEVICE
 8605                                           ;
 8606                                           ;       THE KILL COMMAND DISABLES THE SPECIFIED DEVICE ADDRESS FROM
 8607                                           ;       PERFORMING TRANSFERS OVER THE DX. IT PUTS THE SPECIFIED
 8608                                           ;       DEVICE ADDRESS INTO AN OFF-LINE STATE. AN ENABLE COMMAND
 8609                                           ;       MUST BE ISSUED BEFORE DATA TRANSFERS MAY BE PERFORMED WITH
 8610                                           ;       THE DX FOR THE SPECIFIED DEVICE ADDRESS.
 8611                                           ;
 8612                                           ;       THE KILL COMMAND HAS THE FOLLOWING SYNTAX:
 8613                                           ;               KXX     -- KILL DEVICE ADDRESS XX
 8614                                           ;                          THE DEVICE ADDRESS (XX) MUST BE ENTERED IN HEX
 8615                                           ;
 8616  004254  004737  005270          KILL:   JSR     PC,GDEV         ;GET THE DEVICE NUMBER
 8617  004260  004737  010244                  JSR     PC,CDEVST
 8618  004264  112763  000001  000016          MOVB    #1,SONLF(DTAB)
 8619  004272  010005                          MOV     DEV,R5          ;COMPUTE THE ADDRESS OF THE SPW TABLE
 8620  004274  063705  013100                  ADD     DEVCON,R5       ;COMPONSATE FOR OFFSET DEVICE ADDRESS
 8621  004300  060505                          ADD     R5,R5
 8622  004302  063705  013104                  ADD     STSPW,R5
 8623  004306  012715  000002                  MOV     #UCHK,(R5)      ;MAKE THE DEVICE OFF-LINE SEND UNIT CHECK
 8624  004312  000137  002706          KILLEX: JMP     EXEC            ;RETURN TO THE EXEC
```

```
                                        .SBTTL  BACKGROUND -- INPUT DISPLAY DATA COMMAND
                                ;
                                ;       I = INPUT
                                ;
                                ;       THE INPUT COMMAND IS USED TO ENTER DATA ONTO A 2260
                                ;       SCREEN AND THEN SEND IT TO THE 360 VIA THE READ MANUAL INPUT
                                ;       COMMANDS
                                ;
                                ;       THE INPUT COMMAND HAS THE FOLLOWING SYNTAX:
                                ;               IXX,DDD....DDD  -- SEND DATA DDD TO DEVICE XX
                                ;                       THE DEVICE ADDRESS (XX) MUST BE ENTERED IN HEX
                                ;
004316  105737  012522          INPUT:  TSTB    TSTTYP          ;ILLEGAL ON FRIEND TEST
004322  001005                          BNE     10$             ;FRIEND -- GIVE AN ERROR
004324  004737  005270                  JSR     PC,GDEV         ;GET THE DEVICE NUMBER
004330  120427  000054                  CMPB    R4,#',          ;THE NEXT CHAR MUST BE A COMMA
004334  001402                          BEQ     20$             ;IT IS, CONTINUE
004336  000137  003014          10$:    JMP     CERR            ;AN ERROR WAS FOUND GIVE INDICATION
004342  004737  010216          20$:    JSR     PC,SUDEV        ;SET UP THE DEVICE STATUS TABLE POINTERS
004346  026327  000004  000734          CMP     SCURS(DTAB),#DISPSZ-4 ;ARE WE AT THE END OF THE BUFFER?
004354  002370                          BGE     10$             ;YES, GIVE AN ERROR
004356  032763  000001  000004          BIT     #1,SCURS(DTAB)  ;START INPUT ON EVEN BYTE ADDRESS
004364  001002                          BNE     30$             ;START SOM ON ODD BYTE ADDRESS
004366  005263  000004                  INC     SCURS(DTAB)     ;INCR CURSOR TO ODD BYTE ADDRESS
004372  016305  000010          30$:    MOV     SOUTB(DTAB),R5  ;COMPUTE STARTING ADDRESS
004376  066305  000004                  ADD     SCURS(DTAB),R5  ;
004402  112725  000112                  MOVB    #SMI,(R5)+      ;START CHARACTER TO BUFFER
004406  010563  000020                  MOV     R5,SMINS(DTAB)  ;SAVE START OF DATA LOCATION
004412  005263  000004          40$:    INC     SCURS(DTAB)     ;INCREMENT CURSOR POSITION
004416  026327  000004  000735          CMP     SCURS(DTAB),#DISPSZ-3 ;ARE WE AT THE END OF BUFFER
004424  001423                          BEQ     70$             ;YES, TERMINATE INPUT
004426  112204                          MOVB    (R2)+,R4        ;GET NEXT INPUTTED CHARACTER
004430  042704  177600                  BIC     #177600,R4      ;SAVE L.O. 7 BITS
004434  020427  000015                  CMP     R4,#CR          ;END OF INPUT?
004440  001415                          BEQ     70$             ;YES, SET UP TO EXIT
004442  020427  000040                  CMP     R4,#SPACE       ;CAN CHARACTER BE CONVERTED?
004446  002410                          BLT     60$             ;NO, MUST BE BETWEEN 40 - 137
004450  020427  000137                  CMP     R4,#'~
004454  003005                          BGT     60$             ;NO, MUST BE BETWEEN 40 - 137
004456  162704  000040                  SUB     #SPACE,R4       ;SCALE DOWN FOR INDEXING
004462  116425  012344          50$:    MOVB    ATOETB(R4),(R5)+;CONVERT CHARACATER AND MOVE TO DISPLAY BUFFER
004466  000751                          BR      40$             ;GET AND CONVERT NEXT CHARACATER
004470  005004                  60$:    CLR     R4              ;ILLEGAL CHARACTER -- TREAT AS SPACE
004472  000773                          BR      50$
                                ;
                                ;       SET UP TO EXIT
                                ;               SET EOM INDICATOR
                                ;               QUEUE READ MANUAL INPUT REQUEST
                                ;
004474  112715  000152          70$:    MOVB    #EOM,(R5)       ;SET EOM INDICATOR
004500  005263  000004                  INC     SCURS(DTAB)     ;INCREMENT CURSOR POINTER
004504  105263  000017                  INCB    SRDRQ(DTAB)     ;QUEUE READ REQUEST
                                ;
                                ;       SEE IF THE DX IS CURRENTLY ACTIVE
                                ;
004510  105737  013060                  TSTB    DXACT           ;IS DX ACTIVE?
```

M06


```
8682  004514  001402                          BEQ     BOS             ;NO, START ASYNCHRONOUS PROCESSING TO SEND ATTENTION
8683  004516  000137  002706                  JMP     EXEC            ;YES, ATTENTION WILL BE TAKEN CARE OF BY DX
8684                                ;
8685                                ;       DX IS NOT ACTIVE
8686                                ;               CREATE PHONY INTERRUPT TO ALLOW DX TO ACT ON ATTENTION
8687                                ;
8688  004522  013746  177776       BOS:    MOV     PSW,-(SP)       ;PSW TO PUSH STACK
8689  004526  012746  002706               MOV     #EXEC,-(SP)     ;RETURN ADDRESS TO PUSH S n.
8690  004532  012737  000340  177776       MOV     #340,PSW        ;INHIBIT INTERUPTS
8691  004540  010046                       MOV     R0,-(SP)        ;SET UP PUSH STACK FOR FAKE INTERRUPT
8692  004542  010146                       MOV     R1,-(SP)
8693  004544  010246                       MOV     R2,-(SP)
8694  004546  010346                       MOV     R3,-(SP)
8695  004550  010446                       MOV     R4,-(SP)
8696  004552  010546                       MOV     R5,-(SP)
8697  004554  000137  006542               JMP     DXEXEC          ;START PROCESSING THE ATTENTION
```

```
                                        .SBTTL  BACKGROUND SUBROUTINES -- PRINT  FORMATTING
                                ;
                                ;       DUMP WORD IN EBCDIC ON TTY
                                ;
                                ;       CALLING SEQUENCE
                                ;       ......R2 CONTAINS WORD TO BE PRINTED
                                ;       JSR     PC,EBCDMP
                                ;       ......RETURN
                                ;
                                ;
                                ;       REGISTERS 2 + 3 ARE DESTROYED BY THIS SUBROUTINE
                                ;
004560  010237  013046        EBCDMP: MOV     R2,WK           ;SAVE WORD TO BE PRINTED
004564  113703  013046                MOVB    WK,R3           ;GET LO BYTE
004570  042703  177400                BIC     #177400,R3
004574  116337  011744  013046        MOVB    EBCDTB(R3),WK   ;CONVERT EBCDIC TO ASCII
004602  113703  013047                MOVB    WK1,R3          ;GET HI BYTE AND CONVERT
004606  042703  177400                BIC     #177400,R3
004612  116337  011744  013047        MOVB    EBCDTB(R3),WK1  ;CONVERT CHAR TO ASCII
004620  013702  013046                MOV     WK,R2
                                ;       FALL THROUGH TO ASCII PRINT ROUTINE
                                ;
                                ;
                                ;       DUMP WORD IN ASCII ON TTY
                                ;
                                ;       CALLING SEQUENCE
                                ;       ......R2 CONTAINS WORD TO BE PRINTED
                                ;       JSR     PC,ASCDMP
                                ;       ......RETURN
                                ;
                                ;
                                ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
                                ;
004624  105737  013045        ASCDMP: TSTB    LINECT          ;NEW LINE?
004630  001005                BNE     10$             ;NO
004632  004737  011324                JSR     PC,CRLF         ;YES, PRINT CR/LF
004636  112737  000036  013045        MOVB    #30.,LINECT     ;60 CHARACTERS PER LINE
004644  105337  013045        10$:    DECB    LINECT          ;DECR LINE COUNTER
004650  004737  011342                JSR     PC,PRINT2               ;PRINT 2 CHARS
004654  000207                        RTS     PC                      ;RETURN TO CALLER
                                ;
                                ;
                                ;       DUMP WORD IN OCTAL ON TTY
                                ;
                                ;       CALLING SEQUENCE
                                ;       ......R2 CONTAINS WORD TO BE PRINTED
                                ;       JSR     PC,OCTDMP OR ODMP
                                ;       ......RETURN
                                ;
                                ;       OCTDMP PERFORMS A CR/LF BEFORE PRINTING OCTAL DATA
                                ;
                                ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
                                ;
004656  004737  011324        OCTDMP: JSR     PC,CRLF         ;GIVE A CRLF
```

```
8755  004662  010046                ODMP:   MOV     R0,-(SP)        ;SAVE IMPORTANT REGISTERS
8756  004664  010246                        MOV     R2,-(SP)
8757  004666  010446                        MOV     R4,-(SP)
8758  004670  012704  000006                MOV     #6,R4           ;EXTRACT 6 OCTAL DIGITS
8759  004674  005000                        CLR     R0              ;CLEAR THE WORKING REGISTER
8760  004676  006102                        ROL     R2              ;MOVE HIGH ORDER BIT TO C-BIT
8761  004700  006100                10$:    ROL     R0              ;GET THE REMAINING BIT STILL IN LINK
8762  004702  042700  177770              BIC     #177770,R0      ;ONLY 3 LOW ORDER BITS
8763  004706  062700  000060              ADD     #'0,R0          ;MAKE ASCII
8764  004712  004737  011362              JSR     PC,PCHAR                ;PRINT IT ON THE TTY
8765  004716  006102                        ROL     R2              ;ROTATE THE NEXT OCTAL CHAR INTO POSITION
8766  004720  006102                        ROL     R2
8767  004722  006102                        ROL     R2
8768  004724  010200                        MOV     R2,R0           ;DATA TO WORKING REGISTER
8769  004726  005304                        DEC     R4              ;ARE WE DONE?
8770  004730  001363                        BNE     10$             ;NO, PRINT ANOTHER CHARACTER
8771  004732  012604                OCTEX:  MOV     (SP)+,R4        ;RESTORE USED REGISTERS
8772  004734  012602                        MOV     (SP)+,R2
8773  004736  012600                        MOV     (SP)+,R0
8774  004740  000207                        RTS     PC                      ;RETURN TO THE CALLER
8775
8776
8777
8778                                ;       DUMP WORD IN HEX ON THE TTY
8779                                ;
8780                                ;       CALLING SEQUENCE
8781                                ;       .....R2 CONTAINS THE WORD TO BE PRINTED
8782                                ;       JSR     PC,HEXDMP OR HDMP
8783                                ;       ........RETURN
8784                                ;
8785                                ;       HEXDMP PERFORMS A CRLF BEFORE OUTPUTTING THE DATA
8786                                ;
8787                                ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
8788                                ;
8789  004742  004737  011324        HEXDMP: JSR     PC,CRLF         ;DO A CR LF
8790  004746  010046                HDMP:   MOV     R0,-(SP)        ;SAVE THE WORKING REGISTERS
8791  004750  010246                        MOV     R2,-(SP)
8792  004752  010446                        MOV     R4,-(SP)
8793  004754  012704  000004                MOV     #4,R4           ;4 CHARACTERS PER WORD
8794  004760  006102                10$:    ROL     R2              ;ROTATE HIGH ORDER 4 BITS TO LOW ORDER 4 BITS
8795  004762  006102                        ROL     R2
8796  004764  006102                        ROL     R2
8797  004766  006102                        ROL     R2
8798  004770  010200                        MOV     R2,R0           ;TO WORKING REG
8799  004772  006100                        ROL     R0              ;GET THE LINK BIT TOO
8800  004774  042700  177760              BIC     #177760,R0      ;ONLY LOW ORDER 4 BITS
8801  005000  062700  000060              ADD     #'0,R0          ;MAKE ASCII IF NUMBER
8802  005004  020027  000071              CMP     R0,#'9          ;SHOULD IT BE A-F?
8803  005010  003402                        BLE     20$             ;NO,SHIP IT
8804  005012  062700  000007              ADD     #7,R0           ;YES, MAKE ALPHA
8805  005016  004737  011362        20$:    JSR     PC,PCHAR                ;PRINT THE HEX CHARACTER
8806  005022  005304                        DEC     R4              ;ARE WE DONE?
8807  005024  001355                        BNE     10$             ;NO, CONVERT AND PRINT NEXT CHARCATER
8808  005026  012604                        MOV     (SP)+,R4        ;YES, RESTORE REGISTERS AND EXIT
8809  005030  012602                        MOV     (SP)+,R2
8810  005032  012600                        MOV     (SP)+,R0
```

```
  8811  005034  000207                          RTS     PC              ;RETURN TC THE CALLER
```

```
                                        .SBTTL  BACKGROUND SUBROUTINES -- COMPUTE SPECIFIED BUFFER LIMITS AND DEVICE ADD
                                ;       GLIMIT -- SET UP BUFFER LIMITS FOR TELE COMMANDS
                                ;
                                ;       CALLING SEQ
                                ;       ......R2 = ADDRESS OF FIRST PARAMETER
                                ;       JSR     PC,GLIMIT
                                ;       ........RETURN IF NO ERRORS DETECTED IN BUFFER LIMIT SYNTAX
                                ;               IF AN ERROR IS DETECTED, CONTROL WILL BE
                                ;                       PASSED TO "CERR" TO ABORT THE TELETYPE COMMAND.
                                ;               UPON GOOD RETURN:
                                ;               R0 = 0 = NOT T/T, 1 = T/T
                                ;               R2 = NEXT CHAR POSITION IN COMMAND STRING
                                ;               SADDR = BEG ADDR TO BE DUMPED
                                ;               EADDR = END ADDR TO BE DUMPED
                                ;
                                ;       REGISTERS R5, R4, R3 WILL BE DESTROYED.
                                ;
                                ;       IF AN ERROR IS FOUND CONTROL IS PASSED TO CERR
                                ;
005036  005000          GLIMIT: CLR     R0              ;RESET BUFFER TYPE
005040  004737  011534          JSR     PC,COTB         ;GET FIRST PARAMETER
005044  005705                  TST     R5              ;WAS AN OCTAL NUMBER ENTERED?
005046  001014                  BNE     GLOCT           ;YES, OCTAL PARAMS
005050  120427  000124          CMPB    R4,#'T          ;T = TUMBLE TABLE
005054  001425                  BEQ     GLMTT           ;YES, SET UP T/T LIMITS
005056  120427  000111          CMPB    R4,#'I          ;I = INPUT BUFFER
005062  001436                  BEQ     GLMIN           ;YES, SET UP INPUT BUFFER LIMITS
005064  120427  000117          CMPB    R4,#'O          ;O = OUTPUT BUFFER
005070  001453                  BEQ     GLMOT           ;YES, SET UP OUTPUT BUFFER LIMITS
                                ;
                                ;       ERROR DETECTED - POP OFF RETURN ADDR AND GIVE ERROR
                                ;
005072  012601          GLERR:  MOV     (SP)+,R1
005074  000137  003014          JMP     CERR
                                ;
                                ;       OCTAL LIMITS SPECIFIED
                                ;
005100  010337  013110  GLOCT:  MOV     R3,SADDR        ;SAVE START ADDR
005104  120427  000054          CMPB    R4,#',          ;CHECK FOR COMMA (,)
005110  001370                  BNE     GLERR
005112  004737  011534          JSR     PC,COTB         ;GET END ADDR
005116  005705                  TST     R5              ;WAS SECOND PARAM GIVEN?
005120  001764                  BEQ     GLERR           ;NO, ERROR
005122  010337  013112          MOV     R3,EADDR        ;SAVE END ADDR
005126  000454                  BR      GLEX            ;PREPARE TO EXIT
                                ;
                                ;       SET UP LIMITS OF TUMBLE TABLE
                                ;
005130  112204          GLMTT:  MOVB    (R2)+,R4
005132  120427  000124          CMPB    R4,#'T          ;MUST BE TT
005136  001355                  BNE     GLERR           ;ILLEGAL ENTRY
005140  013737  013050  013110  MOV     TTPTR,SADDR
```

```
8869  005146  062737  000776  013110          ADD     #TTSIZE-2,SADDR ;COMPUTE ADDRESS OF APPR DUPLICATE TT ENTRY
8870  005154  005200                          INC     R0              ;INDICATE DUMP TUMBLE TABLE
8871  005156  000437                          BR      GLEX1           ;SET UP TO EXIT
8872
8873
8874                                  ;
8875                                  ;       SET UP LIMITS FOR INPUT BUFFER OF DEVICE 0
8876                                  ;
8877  005160  112304                  GLMIN:  MOVB    (R2)+,R4
8878  005162  120427  000116                  CMPB    R4,#'N          ;MUST BE IN
8879  005166  001341                          BNE     GLERR           ;ILLEGAL ENTRY
8880  005170  013704  013054                  MOV     SDEVTB,R4       ;GET ADDR OF DEV 0 STATUS TABLE
8881  005174  016437  000006  013110          MOV     SINBF(R4),SADDR
8882  005202  013737  013110  013112          MOV     SADDR,EADDR
8883  005210  062737  000741  013112          ADD     #DISPSZ+1,EADDR ;DISPLAY SIZE + ROOM FOR LINE ADDRESS
8884  005216  000417                          BR      GLEX1
8885
8886
8887                                  ;
8888                                  ;       SET UP LIMITS FOR OUTPUT BUFFER OF DEVICE 0
8889                                  ;
8890  005220  112204                  GLMOT:  MOVB    (R2)+,R4
8891  005222  120427  000124                  CMPB    R4,#'T          ;MUST BE OT
8892  005226  001321                          BNE     GLERR           ;ILLEGAL ENTRY
8893  005230  013704  013054                  MOV     SDEVTB,R4       ;GET ADDR OF DEV 0 STATUS TABLE
8894  005234  016437  000010  013110          MOV     SOUTB(R4),SADDR ;COMPUTE STARTING AND ENDING ADDRESSESS OF SPECIFIED BUF
8895  005242  013737  013110  013112          MOV     SADDR,EADDR
8896  005250  062737  000737  013112          ADD     #DISPSZ-1,EADDR ;DISPLAY CHAR BUFFER
8897  005256  112204                  GLEX1:  MOVB    (R2)+,R4        ;GET NEXT INPUT CHARACTER AND UPDATE POINTER
8898                                  ;
8899                                  ;       INSURE ENTRY PROPERLY DELIMITED AND RETURN TO CALLER
8900                                  ;
8901  005260  120427  000054          GLEX:   CMPB    R4,#',          ;CHECK FOR
8902  005264  001302                          BNE     GLERR           ;ENTRY NOT PROPERLY DELIMITED (ERROR)
8903  005266  000207                          RTS     PC
```

```
8905                                    ;
8906                                    ;       GDEV -- GET THE THE DEVICE NUMBER FROM THE HEX INPUT
8907                                    ;
8908                                    ;       CALLING SEQUENCE
8909                                    ;       .........R2 = ADDRESS OF DEVICE ADDRESS IN HEX
8910                                    ;       JSR     PC,GDEV
8911                                    ;       .........RETURN IF NO ERRORS DETECTED
8912                                    ;               IF ERROR DETECTED, COMMAND IS ABORTED BY GOING
8913                                    ;                       TO "CERR"
8914                                    ;       UPON VALID RETURN
8915                                    ;               R3 AND DEV (R0) WILL CONTAIN THE DEVICE ADDRESS
2916                                    ;                       SCALED TO 1 - 8, NOTATION USED BY SYSTEM.
8917                                    ;               R2 WILL POINT TO THE NEXT CHARACTER FOLLOWING DEVICE ADDRESS
8918                                    ;
8919  005270  004737  011600  GDEV:    JSR     PC,CHTB         ;CONVERT THE HEX TO BINARY
8920  005274  163703  012512           SUB     SDEV,R3         ;-STARTING ADDRESS
8921  005300  100406                   BMI     10$             ;ERROR ON INPUT
8922  005302  005203                   INC     R3              ;MAKE BETWEEN 1 AND 8
8923  005304  120337  013057           CMPB    R3,MAXDEV       ;IS DEVICE NUMBER TOO BIG?
8924  005310  101002                   BHI     10$             ;YES, GIVE ERROR
8925  005312  010300                   MOV     R3,DEV          ;SET UP THE DEVICE NUMBER
8926  005314  000207                   RTS     PC
8927  005316  000137  003014  10$:     JMP     CERR            ;INPUT -ARAM ERROR
```

```
                                        .SBTTL  DX11-B ISR (INTERRUPT REQUEST LOGIC AND TUMBLE TABLE DECODE LOGIC)
                                ;
                                ;       D X 1 1 - B   I S R
                                ;
                                ;       DX11 ISR AND RELATED SUBROUTINE REGISTER USAGE
                                ;
                                ;       R0      DEV     DEVICE NUMBER
                                ;       R1              UN ASSIGNED
                                ;       R2              UNASSIGNED
                                ;       R3      DTAB    ADDRESS OF CURRENT DEVICE TABLE
                                ;       R4      TT1     TUMBLE TABLE ENTRY 1
                                ;       R5      TT2     TUMBLE TABLE ENTRY 2
                                ;
                                ;       THE ABOVE REGISTER DESIGNATIONS REPRESENT WHAT USUALLY WILL
                                ;       BE CONTAINED IN A REGISTER DURING DX ISR PROCESSING. HOWEVER,
                                ;       AS SITUATIONS DICTATE REGISTERS MAY BE USED FOR DIFFERENT
                                ;       PURPOSES.
                                ;
005322  010046          DXISR: MOV     R0,-(SP)        ;SAVE HARDWARE REGISTERS
005324  010146                 MOV     R1,-(SP)
005326  010246                 MOV     R2,-(SP)
005330  010346                 MOV     R3,-(SP)
005332  010446                 MOV     R4,-(SP)
005334  010546                 MOV     R5,-(SP)
005336  013702  013050         MOV     TTPTR,R2        ;CHECK FOR ZERO T/T ENTRY UPON INTERRUPT
005342  005712                 TST     (R2)
005344  001002                 BNE     LOOP            ;NON-ZERO -- WERE OK
                                ;
                                ;       NOTE -- AN INTERRUPT OCCURRED WITHOUT A TUMBLE TABLE
                                ;               ENTRY, THE ASSUMPTION IS THEN MADE THAT THE TUMBLE TABLE
                                ;               ENTRY HAS ALREADY BEEN PROCESSED
                                ;
005346  000137  010200         JMP     DXEXIT
                                ;
                                ;       PROCESS TUMBLE TABLE ENTRIES
                                ;               FOR CONVIENCE THE PROCESSING IS BEING PERFORMED
                                ;               AT THE INTERRUPT LEVEL. IT IS SUGGESTED THAT IN
                                ;               NORMAL PROCESSING ENVIRONMENTS THIS PROCESSING
                                ;               BE DISTRIBUTED TO LESS PRIVILEDGED PRIORITY LEVELS
                                ;               SUCH AS THE FORK  LEVEL IN RSX11-M.
                                ;
                                ;               THE INTERRUPT SERVICE LEVEL PROCESSING REQUIRED
                                ;               BY THE DX11-B IS TO RELEIVE THE INTERRUPT (DONE BIT
                                ;               IN DXCS) AND SCHEDULE A REQUEST FOR PROCESSING
                                ;               AT ANOTHER LEVEL. THE LEVEL SCHEDULED TO PERFORM
                                ;               THE PROCESSING SHOULD BE HIGH ENOUGH
                                ;               TO PROTECT AGAINST TUMBLE TABLE OVERFLOW.
                                ;
                                ;       THE TUMBLE TABLE ENTRIES ARE PROCESSED SEQUENTIALLY FROM THE
                                ;       CIRCULAR BUFFER FILLED BY THE DX. AS EACH ENTRY IS RETRIEVED
                                ;       FROM THE TUMBLE TABLE IT IS ZEROED. IT IS THIS MECHANISM
                                ;       THAT ALLOWS THE PROGRAMMER TO DISCERN WHEN ALL ENTRIES HAVE
                                ;       BEEN PROCESSED. WHEN ALL ENTRIES HAVE BEEN
                                ;       RETRIEVED FROM THE TUMBLE TABLE THEN THE NEXT ACTION
                                ;       IS PERFORMED TO THE DX. THE DX11-B NEVER ENTERS A ZERO
                                ;       IN TUMBLE TABLE ENTRY 1.
```

```
8985                                    ;
8986  005352  013702  013050            LOOP:   MOV     TTPTR,R2        ;GET T/T PTR
8987  005356  005712                            TST     (R2)            ;ANY ENTRIES LEFT IN T/T?
8988  005360  001002                            BNE     10$
8989  005362  000137  006542                    JMP     DXEXEC          ;NO, EXECUTE NEXT DX COMMAND
8990                                    ;
8991                                    ;       TUMBLE TABLE ENTRY AVAILABLE FOR PROCESSING
8992                                    ;               RESET THE DONE BIT (RELIEVE INTERRUPT)
8993                                    ;               COPY TUMBLE TABLE ENTRY TO DUPLICATE TUMBLE TABLE (FOR SYSTEM TESTS PURP
8994                                    ;               RESET TUMBLE TABLE ENTRY (2 WORDS)
8995                                    ;
8996  005366  042777  000200  005064    10$:    BIC     #DONE,@DXCS     ;CLEAR DONE
8997  005374  010203                            MOV     R2,R3           ;SET UP PTR TO DUP T/T
8998  005376  062703  001000                    ADD     #TTSIZE,R3
8999  005402  011223                            MOV     (R2),(R3)+      ;SAVE T/T ENTRY #1
9000  005404  011204                            MOV     (R2),TT1
9001  005406  005022                            CLR     (R2)+           ;CLEAR T/T ENTRY #1
9002  005410  011223                            MOV     (R2),(R3)+      ;SAVE T/T ENTRY #2
9003  005412  011205                            MOV     (R2),TT2
9004  005414  005022                            CLR     (R2)+           ;CLEAR T/T ENTRY #2
9005                                    ;
9006                                    ;       CHECK FOR POINTER WRAP AROUND
9007                                    ;
9008  005416  032702  000777                    BIT     #TTSIZE-1,R2    ;AT END OF BUFFER?
9009                                                                    ;NOTE -- POWER OF 2 BOUNDRY
9010  005422  001002                            BNE     20$             ;NO
9011  005424  013702  013052                    MOV     TTADDR,R2       ;YES, RESET PTR
9012  005430  010237  013050            20$:    MOV     R2,TTPTR        ;SAVE T/T PTR
9013                                    ;
9014                                    ;       START PROCESSING TUMBLE ENTRY ENTRY
9015                                    ;               SAVE DEVICE ADDRESS
9016                                    ;               CHECK FOR SYSTEM RESET
9017                                    ;               VALIDATE DEVICE ADDRESS
9018                                    ;
9019                                    ;       NOTE -- IF SYSTEM RESET OCCURRED, THERE IS NO GUARANTEE
9020                                    ;               THAT THE DEVICE ADDRESS WILL BE VALID.
9021                                    ;
9022  005434  010500                            MOV     TT2,DEV         ;GET DEV #
9023  005436  042700  177400                    BIC     #177400,DEV
9024  005442  010037  013076                    MOV     DEV,CDEV        ;SAVE CURRENT DEVICE NUMBER
9025  005446  042777  000200  005004          BIC     #DONE,@DXCS     ;CLEAR DONE
9026  005454  032704  010000                    BIT     #SYSRST,TT1     ;SYSTEM RESET?
9027  005460  001066                            BNE     PSYSRT          ;YES, PERFORM SYSTEM RESET FUNCTION
9028  005462  163700  012512                    SUB     SDEV,DEV        ;GET IN 0-7 RANGE - IF VALID
9029  005466  100403                            BMI     30$             ;INVALID DEVICE NUMBER
9030  005470  120037  013057                    CMPB    DEV,MAXDEV      ;VALID DEVICE?
9031  005474  103405                            BLO     40$             ;YES, NOT TOO BIG
9032                                    ;
9033                                    ;       INVALID DEVICE ADDRESS - BITCH
9034                                    ;
9035                                    ;       AN INVALID DEVICE ADDRESS WILL GENERALLY INDICATE
9036                                    ;       A PROBLEM IN THE CONFIGURATION OF DX DEVICE
9037                                    ;       ADDRESSES. BASICALLY THE DX HAS BEEN STRAPPED
9038                                    ;       TO HANDLE DEVICE ADDRESSES WHICH OVERLAP WITH
9039                                    ;       OTHER DEVICES ON THE CHANNEL.
9040                                    ;
```

```
 9041  005476  004137  011502          30$:    JSR     R1,INMES        ;PRINT "INVALID DEVICE"
 9042  005502  013752                          .WORD   ILLMES
 9043  005504  000137  006524                  JMP     DXAB            ;ABORT DX11
 9044                                  ;
 9045                                  ;       COMPUTE ADDRESS OF SPECIFIED DEVICES STATUS TABLE
 9046                                  ;
 9047  005510  005200                  40$:    INC     DEV             ;MAKE DEVICE NUMBER 1 -8
 9048  005512  004737  010216                  JSR     PC,SUDEV        ;SET UP ADDR OF DEV STAT TABLE
```

```
9050
9051                                    ;       DECODE DX TUMBLE TABLE STATUS ENTRY
9052                                    ;
9053                                    ;               THE FOLLOWING PROCESS INDICATES THE ORDER IN WHICH
9054                                    ;               THE TUMBLE TABLE STATUS ENTRY SHOULD BE DECODED.
9055                                    ;               THIS ORDER IS IMPORTANT AND SHOULD BE ADHERED
9056                                    ;               TO FOR MOST EMULATIONS.
9057                                    ;
9058  005516  032704  020000           TSELRST:BIT     #SELRST,TT1     ;SELECTIVE RESET?
9059  005522  001402                           BEQ     TINDSC          ;NO, TEST INTERFACE DISC.
9060  005524  000137  005764                   JMP     PSELRT          ;YES, PERFORM SELECTIVE RESET
9061  005530  032704  004000           TINDSC: BIT     #INFDSC,TT1     ;INTERFACE DISCONNECT?
9062  005534  001402                           BEQ     TNXM            ;NO, CHECK NON-EXISTENT MEMORY
9063  005536  000137  006014                   JMP     PINDSC          ;YES, PERFORM INTER DISC
9064  005542  032704  040000           TNXM:   BIT     #NXM,TT1        ;NON-EXISTENT MEMORY ERROR?
9065  005546  001402                           BEQ     TESEND          ;NO, ES END
9066  005550  000137  006070                   JMP     PNXM            ;YES, PROCESS NON-EXISTENT MEMORY ERROR
9067  005554  032704  000100           TESEND: BIT     #ESEND,TT1      ;WAS STATUS ACCEPTED?
9068  005560  001402                           BEQ     TPARER          ;NO, CHECK FOR PARITY ERROR
9069  005562  000137  006102                   JMP     PESEND          ;YES, PERFORM STATUS ACCEPT
9070  005566  032704  100000           TPARER: BIT     #PARER,TT1      ;DID A PARITY ERROR OCCUR?
9071  005572  001402                           BEQ     TCHIS           ;NO, CHECK FOR CHIS
9072  005574  000137  006232                   JMP     PPARER          ;YES, PROCESS PARITY ERROR
9073  005600  032704  000200           TCHIS:  BIT     #CHIS,TT1       ;DID CHANNEL START A SELECTION SEQ?
9074  005604  001402                           BEQ     TCHEND          ;NO, CHECK FOR CHANNEL DATA END
9075  005606  000137  006262                   JMP     PCHIS           ;YES, PROCESS SELECTION SEQUENCE
9076  005612  032704  000040           TCHEND: BIT     #CHEND,TT1      ;DID CHANNEL END OCCUR?
9077  005616  001402                           BEQ     TCUEND          ;NO, CHECK FOR CONTROL UNIT END
9078  005620  000137  006444                   JMP     PCHEND          ;YES, PROCESS CHANNEL END
9079  005624  032704  000020           TCUEND: BIT     #CUEND,TT1      ;DID A CONTROL UNIT END OCCUR?
9080  005630  001650                           BEQ     LOOP            ;NO, IGNORE ENTRY -- ASSUME STACK STATUS
9081  005632  000137  006430                   JMP     PCUEND          ;YES, PROCESS CONTROL UNIT END
```

```
                                        .SBTTL  DX11-B ISR (TUMBLE TABLE ENTRY PROCESSING LOGIC)

                                ;
                                ;       SYSTEM RESET OCCURRED FROM 360
                                ;               CLEAR ALL DEVICE STATUS TABLES AND RESPECTIVE
                                ;                       SENSE BYTES
                                ;               RESET DX ACTIVE FLAGS AND COMMAND CHAIN FLAG
                                ;

005636  012700  000001      PSYSRT: MOV     #1,DEV          ;START AT FIRST DEVICE
005642  004737  010244      10$:    JSR     PC,CDEVST       ;CLEAR DEVICE STATUS TABLE
005646  004737  010276              JSR     PC,CSPWST       ;RESET SPW STATUS WORD UPON SYSTEM RESET
005652  105063  000002              CLRB    SSENSE(DTAB)    ;CLEAR SENSE BYTE
005656  105063  000017              CLRB    SRDRQ(DTAB)     ;CLEAR THE READ REQUEST
005662  005063  000020              CLR     SMINS(DTAB)     ;CLEAR THE BEG OF MANUAL INPUT  ADDRESS
005666  005063  000004              CLR     SCURS(DTAB)     ;RESET THE CURSOR
005672  105063  000003              CLRB    SSTAT(DTAB)     ;CLEAR THE STATUS REGISTER
005676  016301  000010              MOV     SOUTB(DTAB),R1  ;SET UP TO CLEAR THE DISPLAY BUFFER
005702  012702  000740              MOV     #DISPSZ,R2      ;SET UP NUMBER OF CHARACTERS IN DISPLAY
005706  112704  000100              MOVB    #EBCDSP,R4      ;ASSUME 2848 DIAGNOSTIC TEST MODE
005712  105737  012522              TSTB    TSTTYP          ;WHAT TYPE OF TEST?
005716  001402                      BEQ     20$             ;    IF 2848, USE EBCDIC SPACE
005720  113704  012524              MOVB    FILLCH,R4       ;    FRIEND TEST -- USE CURRENT FILL CHARACTER

005724  110421          20$:        MOVB    R4,(R1)+        ;USE THE FILL CHARACTER
005726  005302                      DEC     R2              ;ARE WE DONE?
005730  001375                      BNE     20$             ;NO, LOOP TILL DONE
005732  005200                      INC     DEV             ;TO NEXT DEVICE
005734  120037  013057              CMPB    DEV,MAXDEV      ;ARE WE DONE?
005740  003740                      BLE     10$             ;NO, CLEAR NEXT DEV STAT TABLE
005742  105037  013060              CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
005746  105037  013064              CLRB    CMDCHF          ;CLEAR COMMAND CHAINING FLAG
005752  042777  000400  004500      BIC     #CUBUSY,@DXCS   ;RESET CU BUSY FLAG
005760  000137  005352              JMP     LOOP            ;PROCESS NEXT T/T ENTRY


                                ;
                                ;       CHANNEL ISSUED A SELECTIVE RESET
                                ;               RESET THE DEVICE STATUS TABLE FOR THAT DEVICE + SENSE
                                ;       NOTE: THE SEL RESET IS ISSUED AGAINST THE CURRENT
                                ;               ACTIVE DEVICE
                                ;

005764  004737  010244      PSELRT: JSR     PC,CDEVST       ;CLEAR DEVICE STATUS TABLE
005770  004737  010276              JSR     PC,CSPWST       ;RESET SPW STATUS RESPONSE
005774  105063  000002              CLRB    SSENSE(DTAB)    ;CLEAR SENSE BYTE
006000  105037  013060              CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
006004  105037  013064              CLRB    CMDCHF          ;CLEAR COMMAND CHAIN FLAG
006010  000137  005352              JMP     LOOP


                                ;
                                ;       INTERFACE DISCONNECT WAS ISSUED FROM THE 360
                                ;               THIS IS DIRECTED TO A SPECIFIC DEVICE AND IS UNDER
                                ;               360 PROGRAM CONTROL
                                ;
                                ;               IF THE DEVICE WAS ACTIVE
                                ;                       ITS DEVICE STATUS TABLE WILL BE CLEARED
```

```
                                        ;                       AND CHAN END ! DEVICE END SET IN STATUS BYTE
                                        ;               IF THE DEVICE IS NOT ACTIVE THE COMMAND WILL BE IGNORED
                                        ;
006014  004737  010276          PINDSC: JSR     PC,CSPWST       ;CLEAR THE SPW STATUS RESPONSE
006020  105763  000000                  TSTB    SCMD(DTAB)      ;IS DEVICE ACTIVE?
006024  001417                          BEQ     20$             ;NO, IGNORE
006026  004737  010244                  JSR     PC,CDEVST       ;CLEAR THE DEVICE STATUS TABLE
006032  012763  000003  000000          MOV     #CEDE,SCMD(DTAB);QUE DEV END + CHAN END
006040  120037  013060                  CMPB    DEV,DXACT       ;IS DEVICE USING DX NOW?
006044  001002                          BNE     10$             ;NO
006046  105037  013060                  CLRB    DXACT           ;YES, RELEASE DX
006052  120037  013064          10$:    CMPB    DEV,CMDCHF      ;DOES DEVICE HAVE CMD CHAIN SPEC?
006056  001002                          BNE     20$             ;NO, GET NEXT T/T ENTRY
006060  105037  013064                  CLRB    CMDCHF          ;YES, CLEAR FLAG
006064  000137  005352          20$:    JMP     LOOP            ;GET NEXT T/T ENTRY


                                        ;
                                        ;       A NON-EXISTANT MEMORY CONDITION OCCURRED
                                        ;               THIS WILL USUALLY TRAP OUT FIRST
                                        ;
006070  004137  011502          PNXM:   JSR     R1,INMES        ;PRINT "NON EX MEM"
006074  013676                          .WORD   NXMMSG
006076  000137  006524                  JMP     DXAB            ;ABORT DX AND RETURN TO EXEC


                                        ;
                                        ;       THE LAST STATUS SENT TO THE 360 WAS ACCEPTED, CLEAR DX
                                        ;               ACTIVE FLAG
                                        ;       IF LAST OP WAS A WRITE PERFORM THE DISPLAY CONTROL ROUTINE
                                        ;
006102  004737  010276          PESEND: JSR     PC,CSPWST       ;RESET THE SPW STATUS BYTE
006106  105763  000001                  TSTB    SLCMD(DTAB)     ;DOES LAST COMMAND REQUIRE 2260 DISPLAY EMULATION?
006112  001402                          BEQ     10$             ;NO
006114  004737  010370                  JSR     PC,DISCTL       ;YES, FORMAT THE DISPLAY
006120  126327  000000  000011  10$:    CMPB    SCMD(DTAB),#11  ;WAS ATTN ACCEPTED?
006126  001003                          BNE     20$             ;NO, CONTINUE
006130  112763  000002  000017          MOVB    #2,SRQRQ(DTAB)  ;YES, INDICATE 360 ACCEPTANCE
006136  105063  000001          20$:    CLRB    SLCMD(DTAB)
006142  105037  013060                  CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
006146  004737  010244                  JSR     PC,CDEVST       ;CLEAR THE DEVICE STATUS TABLE
006152  032704  000004                  BIT     #CMDCHN,TT1     ;WAS COMMAND CHAINING SPECIFIED?
006156  001402                          BEQ     30$             ;NO,
006160  110037  013064                  MOVB    DEV,CMDCHF      ;YES, SAVE THE DEVICE NUMBER
006164  123727  013056  000105  30$:    CMPB    DXSTPF,#'E      ;WAS STOP ON END SEQ SPEC?(SE)
006172  001552                          BEQ     STPDX           ;YES, DISABLE THE DX

006174  032704  000010                  BIT     #ISSREJ,TT1     ;WAS AN ISS REJ DETECTED?
006200  001412                          BEQ     50$             ;NO, EXIT


                                        ;
                                        ;       INIT SELECTION SEQUENCE WAS REJECTED BY DX (FAST CU BUSY SEQUENCE)
                                        ;               IF FREIND TEST MODE -- QUEUE CONTROL UNIT END
                                        ;                       ON UNIT COMPLETING TRANSFER
                                        ;               IF 2848 DIAGNOSTIC TEST MODE -- QUEUE CONTROL UNIT END
```

```
                                        ;                       RESPONSE ON LOW ORDER CHANNEL ADDRESS
                                        ;
                                        ;       THE 2848 DEVICE EMULATION IS EXPECTED TO ISSUE
                                        ;       A CONTROL UNIT END ON THE LOW ORDER DEVICE ADDRESS
                                        ;       OF THE CONTROL UNIT.
                                        ;       MOST OTHER 360/370 DEVICES ARE EXPECTED TO ISSUE
                                        ;       CONTROL UNIT END ON THE DEVICE COMPLETING THE OPERATION.
                                        ;
006202  105737  012522                  TSTB    TSTTYP          ;PROCESS SEPARETLY IF FRIEND
006206  001004                          BNE     40$             ;FRIEND --QUEUE CU END ON BUSY UNIT
006210  012700  000001                  MOV     #1,DEV          ;SET UP TO SEND CUE ON LOW ORDER CONTROLLER ADDR
006214  004737  010216                  JSR     PC,SUDEV        ;  X
006220  112763  000010  000000  40$:    MOVB    #QCUE,SCMD(DTAB);QUEUE CONTROL UNIT END
006226  000137  005352          50$:    JMP     LOOP            ;LOOP BACK AND PROCESS NEXT TUMBLE TABLE ENTRY
                                        ;
                                        ;       PARITY ERROR WAS DETECTED
                                        ;
006232  004137  011502          PPARER: JSR     R1,INMES        ;PRINT "PARITY ERROR"
006236  013726                          .WORD   PARMES
006240  123727  013056  000120          CMPB    DXSTPF,#'P      ;STOP ON PARITY ERROR''
006246  001524                          BEQ     STPDX           ;YES, DISABLE THE DX
006250  152763  000002  000003          BISB    #UCHK,SSTAT(DTAB) ;SET UNIT CHECK IN STATUS WORD
006256  000137  005600                  JMP     TCHIS           ;CONTINUE WITH TUMBLE TABLE INTERROGATION
                                        ;
                                        ;       CHANNEL INITIATED SELECTION SEQUENCE
                                        ;               THUS FAR THE DEVICE NUMBER HAS BEEN VALIDATED
                                        ;               AND THE COMMAND CHECKED BY THE DX
                                        ;
                                        ;               TT2 CONTAINS THE COMMAND TO BE EXECUTED
                                        ;
006262  004737  010276          PCHIS:  JSR     PC,CSPWST       ;RESET THE SPW STATUS BYTE
                                                                ;ON NEXT CHANNEL INITIATED SELECTION SEQUENCE
006266  123727  013056  000111          CMPB    DXSTPF,#'I      ;WAS STOP ON ISS SPECIFIED(SI)
006274  001511                          BEQ     STPDX           ;YES, DISABLE DX
006276  032704  000001                  BIT     #CMDREJ,TT1     ;WAS COMMAND REJECTED BY DX?
006302  001022                          BNE     20$             ;YES, COMMAND REJECTED BY THE DX
                                        ;
                                        ;       VALID COMMAND, SET UP TO PROCESS IT
                                        ;
006304  105005                          CLRB    TT2             ;RESET DEVICE ADDRESS BITS
006306  000305                          SWAB    TT2             ;COMMAND TO L.O. BYTE
006310  105705                          TSTB    TT2             ;TEST I/O COMMAND?
006312  001437                          BEQ     50$             ;YES, IGNORE
006314  120527  000003                  CMPB    TT2,#NOP        ;WAS COMMAND A NOP?
006320  001434                          BEQ     50$             ;YES, IGNORE IT
006322  020527  000012                  CMP     TT2,#12         ;IS THIS A VALID COMMAND?
006326  003405                          BLE     10$             ;YES, QUEUE TO BE EXECUTED
006330  004137  011502                  JSR     R1,INMES        ;NO -- REPORT AN ILLEGAL COMMAND RECIEVED FROM THE DX
006334  014040                          .WORD   INVLDC
006336  000137  006524                  JMP     DXAB            ;AND  ABORT THE PROGRAM
006342  1[illegible]63  000000  10$:    MOVB    TT2,SCMD(DTAB)  ;QUEUE COMMAND TO BE PROCESSED
006346  [illegible]21                  BR      50$             ;EXIT + PROCESS NEXT T/T ENTRY
```

```
                                        ;
                                        ;       COMMAND WAS REJECTED, DETERMINE WHY
                                        ;
006350  105763  000016          20$:  TSTB    SONLF(DTAB)     ;IS DEVICE ON LINE?
006354  001404                        BEQ     30$             ;YES, TEST PARITY ERROR
                                        ;
                                        ;       DEVICE OFF-LINE -- RESPOND INTERVENTION REQUIRED SENSE CONDITION
                                        ;
006356  052763  000100  000002        BIS     #INTREQ,SSENSE(DTAB) ;SET INTERVENTION REQUIRED IN SENSE BYTE
006364  000412                        BR      50$             ;FINISH UP CHANNEL INITIATED SELECTION PROCESS
006366  032704  100000          30$:  BIT     #PARER,TTI      ;WAS A PARITY ERROR DETECTED?
006372  001404                        BEQ     40$             ;NO, MUST BE ILLEGAL COMMAND
                                        ;
                                        ;       COMMAND WAS REJECTED BECAUSE OF A PARITY ERROR
                                        ;               SET UP BUS OUT SENSE RESPONSE
                                        ;
006374  052763  000040  000002        BIS     #BUSOUT,SSENSE(DTAB) ;SET BUS OUT FLAG
006402  000403                        BR      50$             ;EXIT
                                        ;
                                        ;       INVALID COMMAND RECEIVED FROM 360
                                        ;               SET UP COMMAND REJECT SENSE RESPONSE
                                        ;
006404  052763  000200  000002  40$:  BIS     #SCMDRJ,SSENSE(DTAB) ;SET CMD REJ FLAG
                                        ;
                                        ;       CHANNEL INITIATED SELECTION SEQUENCE COMMON EXIT LOGIC
                                        ;               IF SELECTED DEVICE HAS COMMAND CHAINING IN AFFECT -- KILL IT
                                        ;
006412  120037  013064          50$:  CMPB    DEV,CMDCHF      ;DOES DEVICE HAVE COMMAND CHAINING SPECIFIED?
006416  001002                        BNE     60$             ;NO, GET NEXT TUMBLE TABLE ENTRY
006420  105037  013064                CLRB    CMDCHF          ;YES, CLEAR THE COMMAND CHAINING FLAG
006424  000137  005352          60$:  JMP     LOOP            ;AND GET THE NEXT T/T ENTRY
                                        ;
                                        ;       CONTROL UNIT END OF DATA TRANSFER WAS DETECTED
                                        ;               IF TRANSFER COMPLETE PREPARE ENDING SEQ RESP
                                        ;               IF TRANSFER INCOMPLETE INCR BUFFER ADDRESS
                                        ;                                       DECR BYTE COUNT
                                        ;
006430  105037  013060          PCUEND: CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
006434  004737  010330                  JSR     PC,MUXEND       ;HANDLE MUX DATA TRANSFER COMPLETION
006440  103017                        BCC     PCHEX           ;IF SEL CHAN OR MUX D/T NOT DONE, MERELY EXIT
                                        ;
                                        ;       MUX DATA TRANSFER COMPLETE
                                        ;               TREAT SAME AS SEL CHANNEL DONE
                                        ;
006442  000404                        BR      PCHEN1
                                        ;
                                        ;       CHANNEL END WAS DETECTED
                                        ;               PREPARE ENDING SEQUENCE RESPONSE
                                        ;
006444  105037  013060          PCHEND: CLRB    DXACT           ;CLEAR DX ACTIVE FLAG
006450  004737  010330                  JSR     PC,MUXEND       ;IF MUX CHANNEL HANDLE DATA TRANSFER
```

```
 9307  006454  123727  013056  000104  PCHEN1: CMPB    DXSTPF,#'D      ;STOP ON DATA TRANSFER DONE?(SD)
 9308  006462  001416                  BEQ     STPDX           ;YES, DISABLE DX
 9309  006464  112763  000003  000000          MOVB    #CEDE,SCMD(DTAB);QUE END SEQ RESPONSE
 9310  006472  167763  003770  000014          SUB     @DXBC,SRBYTC(DTAB) ;SAVE REMAINING BYTE COUNT
 9311  006500  032704  100000          PCHEX:  BIT     #PARER,TTI      ;WAS A PARITY ERROR SENSED?
 9312  006504  001403                  BEQ     1DS             ;NO, PROCESS NEXT TUMBLE TABLE ENTRY
 9313  006506  152763  000020  000002          BISB    #EQPCHK,SSENSE(DTAB) ;YES, SET EQUIP CHECK IN SENSE
 9314  006514  000137  005352          1DS:    JMP     LOOP            ;LOOP BACK + PROCESS NEXT TT ENTRY
 9315
 9316
 9317
 9318                                  ;
 9319                                  ;       STOP DX, SOMEONE WANTS TO INVESTIGATE
 9320                                  ;
 9321  006520  105037  013056          STPDX:  CLRB    DXSTPF          ;CLEAR STOP FLAG
 9322
 9323
 9324                                  ;
 9325                                  ;       ABORT   CURRENT DX OPERATION
 9326                                  ;               UNRECOVERABLE ERROR OCCURRED
 9327                                  ;
 9328  006524  042777  001100  003726  DXAB:   BIC     #DXONLN!DXENB,@DXCS ;DISABLE THE DX
 9329  006532  105237  013062          INCB    DXABFL          ;SET THE DX ABORT FLAG SO THE
 9330                                                          ;DX REGISTERS WILL BE PRINTED
 9331  006536  000137  010200          JMP     DXEXIT          ;EXIT FROM INTERRUPT
```

```
                                                .SBTTL  DX11-B ISR (SELECTOR CHANNEL COMMAND EXECUTION)
                                        ;
                                        ;       EXECUTE NEXT COMMAND FOR THE DX
                                        ;
006542  105737  012516          DXEXEC: TSTB    CHTYPE          ;CHANNEL TYPE 0=M, 1=S
006546  001002                          BNE     SEX             ;SELECTOR CHANNEL EXEC
006550  000137  007176                  JMP     MEX             ;MULTIPLEXER EXEC
                                        ;
                                        ;       SEX  -- SELECTOR CHANNEL EXECUTIVE
                                        ;
                                        ;       SEX EXECUTES COMMANDS FOR THE DX TO A SELECTOR CHANNEL
                                        ;
                                        ;       ON A SELECTOR CHANNEL A COMMAND WILL BE COMPLETED
                                        ;               BEFORE ATTEMPTING TO EXECUTE A COMMAND ON ANOTHER
                                        ;               DEVICE, ISS-DATA TRANSFER-ES.
                                        ;
                                        ;       DATA TRANSFERS ARE COMPLETED IN ONE BURST
                                        ;
006554  013700  013066          SEX:    MOV     SELDEV,DEV      ;GET SEL DEV #
006560  004737  010216          10$:    JSR     PC,SUDEV        ;SET UP DEV STATUS TABLE ADDR
006564  105763  000000                  TSTB    SCMD(DTAB)      ;ANY JOB TO DO?
006570  001030                          BNE     60$             ;YES, EXECUTE IT
006572  105737  013064                  TSTB    CMDCHF          ;WAS COMMAND CHAINING SPECIFIED
006576  001402                          BEQ     30$             ;NO
006600  000137  010200                  JMP     DXEXIT          ;YES, WAIT FOR COMMAND
006604  126327  000017  000001  30$:    CMPB    SRDRQ(DTAB),#1  ;IS ATTENTION TO BE SENT?
006612  001004                          BNE     40$             ;NO, CONTINUE
006614  112763  000011  000000          MOVB    #11,SCMD(DTAB)  ;YES, SET UP TO SEND THE ATTENTION
006622  000413                          BR      60$             ;FOR THE READ MANUAL INPUT
006624  005200                  40$:    INC     DEV             ;TO NEXT DEV
006626  120037  013057                  CMPB    DEV,MAXDEV      ;HAVE WE TRIED THE HIGHEST DEVICE?
006632  003402                          BLE     50$             ;NO
006634  012700  000001                  MOV     #1,DEV          ;YES, RESTART AT FIRST DEVICE
006640  020037  013066          50$:    CMP     DEV,SELDEV      ;IS THIS WHERE IT ALL STARTED?
006644  001345                          BNE     10$             ;NOPE, TEST THIS DEVICE
006646  000137  010200                  JMP     DXEXIT          ;EXIT -- NO TASKS PENDING
                                        ;
                                        ;       THERE IS A JOB TO DO, LETS DO IT
                                        ;
006652  116304  000000          60$:    MOVB    SCMD(DTAB),R4   ;COMMAND TO INDEX
006656  005304                          DEC     R4              ;SCALE TO 0 - 11
006660  006304                          ASL     R4              ;MAKE WORD ADDRESS
006662  010037  013066                  MOV     DEV,SELDEV      ;SAVE CURRENT DEVICE ADDR
006666  000174  006672                  JMP     @SCMDTB(R4)     ;EXECUTE THE COMMAND
006672  006716          SCMDTB: .WORD   SWRITE          ;1 = WRITE FULL BUFFER
006674  007006                  .WORD   SRMI            ;2 = READ MANUAL INPUT
006676  010030                  .WORD   ESEQ            ;3 = ENDING SEQUENCE
006700  010126                  .WORD   SENSCM          ;4 = SENSE COMMAND
006702  006716                  .WORD   SWRITE          ;5 = WRITE LINE ADDRESS
006704  007106                  .WORD   SREAD           ;6 = READ FULL BUFFER
006706  007756                  .WORD   ERASCM          ;7 = ERASE COMMAND
006710  007736                  .WORD   CONUNE          ;10 = CONTROL UNIT END
006712  007746                  .WORD   SATTN           ;11 = SEND ATTENTION TO 360
006714  007006                  .WORD   SSRMI           ;12 = READ SHORT MANUAL INPUT
```

```
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                        ;
                                        ;       COMMANDS SPECIFICALLY FOR THE SELECTOR CHANNEL
                                        ;
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


                                        ;
                                        ;       WRITE COMMAND RECEIVED FROM 360
                                        ;               PREPARE TO GET DATA FROM 360
                                        ;               BOTH WRITE AND WRITE LINE ADDRESS COME HERE
                                        ;
006716  016377  000006  003540  $WRITE: MOV     SINBF(DTAB),@DXBA ;SET UP BUFFER ADDRESS
006724  163777  013074  003532          SUB     PHYOFF,@DXBA    ;FOR VIRTUAL MEMORY -- OFFSET FOR PHYSICAL ADDRESS
006732  013702  013100                  MOV     DEVCON,R2       ;COMPUTE DEVICE ADDRESS
006736  060002                          ADD     DEV,R2
006740  110277  003512                  MOVB    R2,@DXCA
006744  012777  177037  003514          MOV     #-DISPSZ-1,@DXBC;SET UP BYTE COUNT FOR MAX, WRITE LINE ADDRESS
006752  116363  000000  000001          MOVB    SCMD(DTAB),SLCMD(DTAB)  ;SET WRITE FLAG
006760  105063  000002                  CLRB    SSENSE (DTAB)   ;CLEAR SENSE BYTE
006764  110037  013060                  MOVB    DEV,DXACT       ;SET DX ACTIVE FLAG
006770  005063  000014                  CLR     SRBYTC(DTAB)    ;RESET REMAINING BYTE COUNT
006774  052777  000003  003456          BIS     #DXWR,@DXCS     ;START TRANSFER
007002  000137  010200                  JMP     DXEXIT          ;RETURN FROM INTERRUPT



                                        ;
                                        ;       PERFORM READ MANUAL INPUT COMMANDS
                                        ;
        007006                          $RMI:
007006  105737  012522          $$RMI:  TSTB    TSTTYP          ;IS TEST FOR FRIEND?
007012  001036                          BNE     $READ           ;YES, TREAT ALL READS AS READ FULL BUFFER
007014  105063  000002                  CLRB    SSENSE(DTAB)    ;RESET THE SENSE BYTE
007020  105763  000017                  TSTB    SRDRQ(DTAB)     ;WAS A READ REQUESTED?
007024  001002                          BNE     10$             ;YES, CONTINUE
007026  000137  010030                  JMP     ESEQ            ;NO, TREAT AS A NOP -- END SEQ ONLY
007032  105063  000017          10$:    CLRB    SRDRQ(DTAB)
007036  016377  000020  003420          MOV     SMINS(DTAB),@DXBA ;SET UP STARTING ADDRESS
007044  016302  000010                  MOV     SOUTB(DTAB),R2  ;DETERMINE ENDING ADDRESS
007050  066302  000004                  ADD     SCURS(DTAB),R2
007054  005302                          DEC     R2
007056  167702  003402                  SUB     @DXBA,R2        ;COMPUTE BYTE COUNT
007062  100002                          BPL     20$             ;INSURE VALID BYTE COUNT
007064  000137  010030                  JMP     ESEQ            ;ILLEGAL
007070  005402                  20$:    NEG     R2
007072  010277  003370                  MOV     R2,@DXBC        ;SET UP DX'S BYTE COUNT
007076  163777  013074  003360          SUB     PHYOFF,@DXBA    ;FOR MEMORY MANAGEMENT - OFFSET FOR PHY ADDRESS
007104  000411                          BR      SRD10           ;START THE READ



                                        ;
                                        ;       READ COMMAND RECEIVED FROM 360
                                        ;               PREPARE TO SEND DISP BUFFER TO 360
                                        ;
007106  016377  000010  003350  $READ:  MOV     SOUTB(DTAB),@DXBA ;SET UP BUFFER ADDRESS
007114  163777  013074  003342          SUB     PHYOFF,@DXBA    ;FOR MEMORY MANAGEMENT - OFFSET FOR PHY ADDRESS
```

```
 9444  007122  012777  177040  003336          MOV     #-DISPSZ,@DXBC  ;SET UP BYTE COUNT
 9445  007130  116363  000000  000001  SRD10:  MOVB    SCMD(DTAB),SLCMD(DTAB) ;SAVE CODE OF LAST COMMAND
 9446  007136  013702  013100                  MOV     DEVCON,R2       ;COMPUTE DEVICE ADDRESS
 9447  007142  060002                          ADD     DEV,R2
 9448  007144  110277  003306                  MOVB    R2,@DXCA
 9449  007150  105063  000002                  CLRB    SSENSE(DTAB)    ;CLEAR SENSE BYTE
 9450  007154  110037  013060                  MOVB    DEV,DXACT       ;SET DX ACTIVE FLAG
 9451  007160  005063  000014                  CLR     SRBYTC(DTAB)    ;RESET REMAINING BYTE COUNT
 9452  007164  052777  000005  003266          BIS     #DXRQ,@DXCS     ;START TRANSFER
 9453  007172  000137  010200                  JMP     DXEXIT          ;RETURN FROM INTERRUPT
 9454
 9455
```

```
                                                .SBTTL  DX11-B ISR (MULTIPLEXER CHANNEL COMMANDS)
                                        ;
                                        ;       MEX--   MULTIPLEXER CHANNEL EXECUTIVE
                                        ;
                                        ;               MEX EXECUTES COMMANDS FROM THE DX ON A MULTIPLEXER CHANNEL
                                        ;
                                        ;               ON A MULTIPLEXER MULTIPLE DEVICE REQUESTS WILL BE
                                        ;               INTERLEAVED.  THIS WILL PROHIBIT A TIME OUT TO OCCUR
                                        ;               IF A DEVICE IS NOT SERVICED UNTIL ALL OTHER DEVICES
                                        ;               BEFORE IT.
                                        ;
                                        ;               DATA TRANSFERS ARE DONE IN 4 BYTE BLOCKS, SO AS TO NOT
                                        ;               HOG THE CHANNEL
                                        ;
007176  105737  013064          MEX:    TSTB    CMDCHF          ;IS COMMAND CHAINING SPECIFIED?
007202  001402                          BEQ     10$             ;NO, CONTINUE
007204  000137  010200                  JMP     DXEXIT          ;YES, LEAVE DX FREE
007210  013700  013066          10$:    MOV     MDEV,DEV        ;GET LAST DEVICE ADDR THAT HAD A COMMAND
007214  004737  010216          30$:    JSR     PC,SUDEV        ;COMPUTE ADDR OF DEV STAT TABLE
007220  105763  000000                  TSTB    SCMD(DTAB)      ;ANY JOB TO DO?
007224  001023                          BNE     50$             ;YES, EXECUTE IT
007226  126327  000017  000001          CMPB    SRDRQ(DTAB),#1  ;IS ATTENTION REQUESTED?
007234  001004                          BNE     40$             ;NO, CONTINUE
007236  112763  000011  000000          MOVB    #11,SCMD(DTAB)  ;YES, QUEUE ATTENTION
007244  000413                          BR      50$             ;FOR THE READ MANUAL INPUT
                                        ;
                                        ;       NO TASK PENDING FOR CURRENT DEVICE
                                        ;               BUMP TO INTERROGATE NEXT DEVICE ON CONTROL UNIT
                                        ;
007246  005200          40$:    INC     DEV             ;INCR TO NEXT DEVICE NUMBER
007250  120037  013057          CMPB    DEV,MAXDEV      ;WAS DEVICE NUMBER WRAPPED AROUND?
007254  003402                  BLE     45$             ;NO, SEE IF ALL DEVICES HAVE BEEN INTERROGATED
007256  012700  000001          MOV     #1,DEV          ;YES, RESET THE DEVICE NUMBER
007262  020037  013066  45$:    CMP     DEV,MDEV        ;NO JOB HERE, HAVE WE CHECKED ALL DEVICES?
007266  001352                  BNE     30$             ;NO, EXAMINE NEXT DEVICE
007270  000137  010200          JMP     DXEXIT          ;YES, EXIT FROM ISR
                                        ;
                                        ;       THIS DEVICE HAS A JOB TO DO, EXECUTE IT
                                        ;
007274  116304  000000  50$:    MOVB    SCMD(DTAB),R4   ;COMMAND TO INDEX
007300  005304                  DEC     R4              ;SCALE TO 0 - 11
007302  006304                  ASL     R4              ;MAKE INTO WORD ADDRESS
007304  010037  013066          MOV     DEV,MDEV        ;SAVE CURRENT DEVICE ADDRESS
007310  000174  007314          JMP     @MCMDTB(R4)     ;EXECUTE THE COMMAND
007314  007340  MCMDTB: .WORD   MWRITE          ;1 = WRITE FULL BUFFER
007316  007470          .WORD   MRMI            ;2 = READ MANUAL INPUT
007320  010030          .WORD   ESEQ            ;3 = ENDING SEQUENCE
007322  010126          .WORD   SENSCM          ;4 = SENSE COMMAND
007324  007340          .WORD   MWRITE          ;5 = WRITE LINE ADDRESS
007326  007566          .WORD   MREAD           ;6 = READ FULL BUFFER
007330  007756          .WORD   ERASCM          ;7 = ERASE COMMAND
007332  007736          .WORD   CONUNE          ;10 = CONTROL UNIT END
007334  007746          .WORD   SATTN           ;11 = SEND ATTENTION TO 360
007336  007470          .WORD   MSRMI           ;12 = READ SHORT MANUAL INPUT
```

```
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                        ;
                                        ;       COMMANDS SPECIFICALLY FOR THE MULTIPLEXER CHANNEL
                                        ;
                                        ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                        ;
                                        ;       WRITE COMMAND RECEIVED FROM 360
                                        ;               PREPARE TO GET 4 BYTES OF DATA FROM 360
                                        ;               NOTE--BOTH WRITE AND WRITE LINE ADDR COME HERE
                                        ;
007340  005763  000014                  MWRITE: TST     SRBYTC(DTAB)    ;WRITE IN PROGRESS?
007344  001011                                  BNE     10$             ;YES, SEND OUT MORE DATA
007346  016363  000006  000012                  MOV     SINBF(DTAB),SBUFA(DTAB) ;SET UP BUFFER ADDRESS
007354  163763  013074  000012                  SUB     PHYOFF,SBUFA(DTAB) ; FOR MEM MANG - OFFSET FOR PHY ADDRESS
007362  012763  000741  000014                  MOV     #DISPSZ+1,SRBYTC(DTAB) ;SET UP BUFFER FOR MAX SIZE
007370  016377  000012  003066  10$:            MOV     SBUFA(DTAB),@DXBA ;OUTPUT BUFFER ADDR TO DX
007376  013702  013100                          MOV     DEVCON,R2       ;COMPUTE DEVICE ADDRESS
007402  060002                                  ADD     DEV,R2
007404  110277  003046                          MOVB    R2,@DXCA
007410  012777  177774  003050                  MOV     #-4,@DXBC       ;START BYTE COUNT AT 4
007416  026327  000014  000004                  CMP     SRBYTC(DTAB),#4 ;IS LESS THEN 4 BYTES LEFT?
007424  002005                                  BGE     20$             ;NO, START TRANSFER
007426  016302  000014                          MOV     SRBYTC(DTAB),R2 ;YES, USE REMAINING BYTE COUNT
007432  005402                                  NEG     R2
007434  010277  003026                          MOV     R2,@DXBC
007440  105063  000002                  20$:    CLRB    SSENSE(DTAB)    ;CLEAR SENSE BYTE
007444  116363  000000  000001                  MOVB    SCMD(DTAB),SLCMD(DTAB) ;SET WRITE FLAG
007452  110037  013060                          MOVB    DEV,DXACT       ;SET ACTIVE FLAG
007456  152777  000003  002774                  BISB    #DXWR,@DXCS     ;START THE TRANSFER
007464  000137  010200                          JMP     DXEXIT          ;RETURN FROM INTERRUPT


                                        ;
                                        ;       READ MANUAL INPUT COMMAND
                                        ;
                                        ;       THIS WILL TRANSFER ONLY THE DATA ENTERED ON THE SCREEN TO THE 360
                                        ;
        007470                          MRMI    =       .
007470  105737  012522                  MSRMI:  TSTB    TSTTYP          ;FRIEND OR 2848 DIAG?
007474  001034                                  BNE     MREAD           ;FRIEND -- TREAT AS READ FULL BUFFER
007476  005763  000014                          TST     SRBYTC(DTAB)    ;ANY DATA LEFT TO TRANSFER?
007502  001031                                  BNE     MREAD           ;BRANCH IF YES TO CONTINUE
007504  105063  000002                          CLRB    SSENSE(DTAB)    ;RESET THE SENSE BYTE
007510  105763  000017                          TSTB    SRDRQ(DTAB)     ;WAS THE READ REQUESTED?
007514  001002                                  BNE     20$             ;YES, CONTINUE
007516  000137  010030                  10$:    JMP     ESEQ            ;NO, RETURN AN ENDING SEQ RESP DE!CE
007522  105063  000017                  20$:    CLRB    SRDRQ(DTAB)     ;CLEAR THE READ REQUEST
007526  016363  000020  000012                  MOV     SMINS(DTAB),SBUFA(DTAB) ;SET UP THE ADDRESS OF THE DATA
007534  016302  000010                          MOV     SOUTB(DTAB),R2  ;COMPUTE THE BYTE COUNT
007540  066302  000004                          ADD     SCURS(DTAB),R2  ;END - START
007544  005302                                  DEC     R2
007546  166302  000012                          SUB     SBUFA(DTAB),R2  ;COMPUTE THE BYTE COUNT
007552  100761                                  BMI     10$             ;NEGATIVE -- SOMETHING IS WRONG
007554  010263  000014                          MOV     R2,SRBYTC(DTAB) ;SAVE FOR READ DRIVER
007560  163763  013074  000012                  SUB     PHYOFF,SBUFA(DTAB) ;FOR MEM MANAG - OFFSET FOR PHY ADDRESS
                                        ;
```

```
                                        ;       FALL THROUGH TO NORMAL READ BUFFER ROUTINE
                                        ;
                                        ;
                                        ;
                                        ;       READ COMMAND RECEIVED FROM 360
                                        ;               PREPARE TO SEND 4 BYTES OF DATA TO THE 360
                                        ;
007566  116363  000000  000001  MREAD:  MOVB    SCMD(DTAB),SLCMD(DTAB) ;SAVE CODE OF LAST COMMAND FOR DISPLAY CONTROL
007574  005763  000014                  TST     SRBYTC(DTAB)    ;READ IN PROGRESS?
007600  001011                          BNE     10$             ;YES, SEND OUT MORE DATA
007602  016363  000010  000012          MOV     SOUTB(DTAB),SBUFA(DTAB) ;SET UP BUFFER ADDRESS
007610  163763  013074  000012          SUB     PHYOFF,SBUFA(DTAB) ;FOR MEM MANAG - OFFSET FOR PHY ADDRESS
007616  012763  000740  000014          MOV     #DISPSZ,SRBYTC(DTAB) ;SET UP TOTAL BYTE COUNT
007624  016377  000012  002632  10$:    MOV     SBUFA(DTAB),@DXBA ;SEND BUFFER ADDR TO DX
007632  013702  013100                  MOV     DEVCON,R2       ;COMPUTE DEVICE ADDR
007636  060002                          ADD     DEV,R2
007640  110277  002612                  MOVB    R2,@DXCA        ;OUTPUT THE DEVICE ADDRESS
007644  012777  177774  002614          MOV     #-4,@DXBC       ;OUTPUT THE BYTE COUNT -4-
007652  026327  000014  000004          CMP     SRBYTC(DTAB),#4 ;SEE IF REMAINING BYTE COUNT LESS THAN 4
007660  002005                          BGE     20$
007662  016302  000014                  MOV     SRBYTC(DTAB),R2 ;SET UP BYTE COUNT
007666  005402                          NEG     R2
007670  010277  002572                  MOV     R2,@DXBC        ;OUTPUT THE NEW BYTE COUNT -- LT 4
007674  105063  000002          20$:    CLRB    SSENSE(DTAB)    ;CLEAR SENSE AND SET DX ACTIVE FLAG
007700  110037  013060                  MOVB    DEV,DXACT       ;SET DEVICE ACTIVE FLAG FOR SOFTWARE
                                        ;
                                        ;       BEFORE TRANSMIT IS STARTED SET BUSY FLAG IN DX11 STATUS
                                        ;       TABLE FOR DEVICE
                                        ;
007704  010002                          MOV     DEV,R2          ;COMPUTE ADDRESS OF SPW ENTRY
007706  063702  013100                  ADD     DEVCON,R2       ; X
007712  060202                          ADD     R2,R2           ; X
007714  063702  013104                  ADD     STSPW,R2        ;ADD IN SPW BASE ADDRESS
007720  052712  000020                  BIS     #BSY,(R2)       ;SET UNIT BUSY FLAG
007724  152777  000005  002526          BISB    #DXRQ,@DXCS     ;START THE DX READING
007732  000137  010200                  JMP     DXEXIT
```

```
                                            .SBTTL  DX11-B ISR (MULTIPLEXER AND SELECTOR CHANNEL COMMANDS)
                                    ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                                    ;
                                    ;       COMMANDS FOR BOTH MULTIPLEXER AND SELECTOR CHANNELS
                                    ;
                                    ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


                                    ;
                                    ;       PRESENT CONTROL UNIT END TO CHANNEL
                                    ;
007736  152763  000040  000003  CONUNE: BISB    #CUE,SSTAT(DTAB) ;PUT IN STATUS BYTE
007744  000434                          BR      STOUT            ;OUTPUT TO CHANNEL


                                    ;
                                    ;       SEND THE ATTENTION BIT TO THE 360
                                    ;
007746  152763  000200  000003  SATTN:  BISB    #ATTN,SSTAT(DTAB) ;PUT IN STATUS BYTE
007754  000430                          BR      STOUT            ;OUTPUT TO THE 360


                                    ;
                                    ;       ERASE THE DISPLAY
                                    ;
007756  016304  000010          ERASCM: MOV     SOUTB(DTAB),R4   ;SET UP BEG OF DISPLAY BUFFER
007762  012705  000740                  MOV     #DISPSZ,R5       ;SET UP COUNTER
007766  112702  000100                  MOVB    #EBCDSP,R2       ;SET BUFFER FILL FOR 2848 DIAG
007772  105737  012522                  TSTB    TSTTYP           ;IS TEST BEING RUN FOR 2848 RESPONDER
007776  001402                          BEQ     10$              ;YES, FILL BUFFER WITH EBCDIC SPACE
010000  113702  012524                  MOVB    FILLCH,R2        ;NO, USE CURRENT FILL CHARACTER
010004  110224                  10$:    MOVB    R2,(R4)+         ;MOVE FILL CHARACTER TO BUFFER
010006  005305                          DEC     R5               ;DECR COUNTER
010010  001375                          BNE     10$              ;NOT DONE, DO NEXT CHAR
010012  005063  000004                  CLR     SCURS(DTAB)      ;RESET THE CURSOR
010016  105063  000002                  CLRB    SSENSE(DTAB)     ;CLEAR SENSE BYTE
010022  112763  000003  000000          MOVB    #CEDE,SCMD(DTAB);CHANGE COMMAND TO PRESENT END SEQ
                                    ;
                                    ;       FALL THROUGH TO PRESENT ENDING STATUS
                                    ;



                                    ;
                                    ;       PRESENT ENDING STATUS TO CHANNEL
                                    ;
010030  152763  000014  000003  ESEQ:   BISB    #CE!DE,SSTAT(DTAB) ;SET CH END + DEV END


                                    ;
                                    ;       PRESENT STATUS TO CHANNEL
                                    ;
                                    ;               THE STATUS IS BOTH PUT IN THE DX11-B SPW TABLE
                                    ;               AND SENT TO THE CHANNEL. CONDITIONS CAN OCCUR WHICH
                                    ;               CAUSE THE STATUS ENTRY TO THE CHANNEL TO BE
                                    ;               IGNORED.
                                    ;
```

```
 9662  010036  013702  013100          STOUT:  MOV     DEVCON,R2       ;OUTPUT DEVICE ADDRESS
 9663  010042  060002                          ADD     DEV,R2
 9664  010044  110277  002406                  MOVB    R2,@DXCA
 9665  010050  132763  000002  000003          BITB    #UCHK,SSTAT(DTAB) ;IS THE UNIT CHECK BIT SET?
 9666  010056  001403                          BEQ     10$             ;NO,TRANSMIT THE STATUS
 9667  010060  112763  000002  000003          MOVB    #UCHK,SSTAT(DTAB) ;YES, THEN SEND ONLY UNIT CHECK
 9668                                  ;
 9669                                  ;       IF MULTIPLEXER CHANNEL
 9670                                  ;               CLEAR ANY PENDING STATUS IN SPW STATUS ENTRY
 9671                                  ;                       (PROBABLY "BUSY")
 9672                                  ;
 9673  010066  105737  012516          10$:    TSTB    CHTYPE          ;SELECTOR CHANNEL?
 9674  010072  001004                          BNE     20$             ;YES, DON'T CLEAR STATUS IN SPW TABLE
 9675  010074  060202                          ADD     R2,R2           ;COMPUTE ADDRESS OF SPW STATUS ENTRY
 9676  010076  063702  013104                  ADD     ST$PW,R2        ;OFFSET BY BASE OF SPW TABLE
 9677  010102  105012                          CLRB    (R2)            ;CLEAR SPW STATUS ENTRY
 9678                                  ;
 9679                                  ;       OUTPUT THE STATUS TO THE CHANNEL
 9680                                  ;
 9681  010104  116377  000003  002350  20$:    MOVB    SSTAT(DTAB),@DXOS ;OUTPUT STATUS TO CHANNEL
 9682  010112  152777  000007  002340          BISB    #DXST,@DXCS     ;PRESENT TO CHANNEL
 9683  010120  110037  013060                  MOVB    DEV,DXACT       ;SET DX ACTIVE FLAG
 9684  010124  000425                          BR      DXEXIT          ;RETURN FROM INTERRUPT
 9685
 9686
 9687                                  ;
 9688                                  ;       SENSE COMMAND DESIRED BY 360
 9689                                  ;
 9690  010126  012777  000002  002330  SENSCM: MOV     #SSENSE,@DXBA   ;SET UP ADDRESS OF SENSE BYTE
 9691  010134  060377  002324                  ADD     DTAB,@DXBA
 9692  010140  163777  013074  002316          SUB     PHYOFF,@DXBA    ;FOR MEMORY MANAGEMENT - OFFSET FOR PHY ADDRESS
 9693  010146  013702  013100                  MOV     DEVCON,R2       ;COMPUTE DEVICE ADDRESS
 9694  010152  060002                          ADD     DEV,R2
 9695  010154  110277  002276                  MOVB    R2,@DXCA
 9696  010160  012777  177777  002300          MOV     #-1,@DXBC       ;TRANSFER 1 BYTE
 9697  010166  110037  013060                  MOVB    DEV,DXACT       ;SET DX ACTIVE FLAG
 9698  010172  052777  000005  002260          BIS     #DXRD,@DXCS     ;START TRANSFER
 9699
 9700
 9701                                  ;
 9702                                  ;       EXIT FROM THE DX ISR
 9703                                  ;
 9704  010200  012605                  DXEXIT: MOV     (SP)+,R5        ;RESTORE REGISTERS
 9705  010202  012604                          MOV     (SP)+,R4
 9706  010204  012603                          MOV     (SP)+,R3
 9707  010206  012602                          MOV     (SP)+,R2
 9708  010210  012601                          MOV     (SP)+,R1
 9709  010212  012600                          MOV     (SP)+,R0
 9710  010214  000002                          RTI
```

```
                                        .SBTTL  DX11-B ISR (UTILITY SUBROUTINES)
                                ;
                                ;       SET UP ADDR OF DEVICE STATUS TABLE
                                ;
                                ;       CALLING SEQUENCE
                                ;       ..... R0 = DEV #
                                ;       JSR     PC,SUDEV
                                ;       ..... RETURN
                                ;             R3 = ADDRESS OF DEVICE TABLE
                                ;
                                ;       ONLY REGISTER R3 IS MODIFIED BY THIS SUBROUTINE
                                ;
010216  013703  013054          SUDEV:  MOV     SDEVTB,DTAB     ;START AT DEV 1
010222  010146                          MOV     R1,-(SP)        ;SAVE R1
010224  010001                          MOV     DEV,R1
010226  005301                  SUD10:  DEC     R1              ;DEC DEVICE NUMBER
010230  001403                          BEQ     SUDEX           ;DONE, EXIT
010232  062703  002000                  ADD     #2000,DTAB      ;INCR TO NEXT DEV TABLE
010236  000773                          BR      SUD10           ;TRY AGAIN
010240  012601                  SUDEX:  MOV     (SP)+,R1        ;RETURN TO CALLER
010242  000207                          RTS     PC
                                ;
                                ;       CLEAR DEVICE STATUS TABLE
                                ;
                                ;       CALLING SEQUENCE
                                ;       ..... R0 = DEV #
                                ;       JSR     PC,CDEVST
                                ;       ..... RETURN
                                ;             R3 = ADDRESS OF DEVICE TABLE
                                ;                  THE FOLLOWING TABLE ENTRIES ARE CLEARED
                                ;                  SCMD
                                ;                  SSTAT
                                ;                  SBUFA
                                ;                  SRBYTC
                                ;                  SLCMD.
                                ;
                                ;       ONLY REGISTER R3 IS AFFECTED BY THIS SUBROUTINE
                                ;
010244  004737  010216          CDEVST: JSR     PC,SUDEV                ;SET UP ADDR OF DEVICE STAT TABLE
010250  105063  000000                  CLRB    SCMD(DTAB)      ;RESET CURRENT COMMAND ENTRY
010254  105063  000003                  CLRB    SSTAT(DTAB)     ;RESET DEVICE STATUS ENTRY
010260  005063  000012                  CLR     SBUFA(DTAB)     ;RESET CURRENT BUFFER ADDRESS POINTER
010264  005063  000014                  CLR     SRBYTC(DTAB)    ;RESET REMAINING BYTE COUNT
010270  105063  000001                  CLRB    SLCMD(DTAB)     ;RESET LAST COMMAND ENTRY
010274  000207                          RTS     PC                      ;RETURN TO THE CALLER
                                ;
                                ;       CSPWST -- CLEAR SPW STATUS BYTE
                                ;
                                ;       CALLING SEQUENCE
                                ;       .........DTAB (R3) POINTS TO CURRENT DEVICE STATUS TABLE
                                ;       .........DEV (R0) CONTAINS CURRENT DEVICE NUMBER
                                ;       JSR     PC,CSPWST
```

```
 9768                                   ;       .........RETURN TO CALLER WITH DEVICE STATUS BYTE RESET
 9769                                   ;
 9770                                   ;       ALL REGISTERS ARE PRESERVED ACCROSS THIS SUBROUTINE
 9771                                   ;
 9772  010276  010546                  CSPWST: MOV     R5,-(SP)        ;SAVE REGISTER FOR SUBROUTINE USAGE
 9773  010300  105763  000016                  TSTB    SONLF(DTAB)     ;IS DEVICE ON-LINE?
 9774  010304  001007                          BNE     10$             ;NO, JUST EXIT
 9775  010306  010005                          MOV     DEV,R5          ;GET DEVICE NUMBER AND COMPUTE
 9776  010310  063705  013100                  ADD     DEVCON,R5
 9777  010314  060505                          ADD     R5,R5           ;ADDRESS OF SPW STATUS BYTE
 9778  010316  063705  013104                  ADD     STSPW,R5
 9779  010322  105015                          CLRB    (R5)            ;RESET SPW STATUS BYTE
 9780  010324  012605                  10$:    MOV     (SP)+,R5        ;RESTORE REGISTER
 9781  010326  000207                          RTS     PC
```

```
                                        ;
                                        ;       MUXEND -- HANDLE DATA TRANSFER COMPLETIONS FOR MUX
                                        ;
                                        ;       CALLING SEQUENCE
                                        ;       .....R3 (DTAB) CONTAINS THE ADDRESS OF THE DEVICE STATUS TABLE
                                        ;       JSR     PC,MUXEND
                                        ;       .....RETURN  C-BIT SET   - MUX DATA TRANS DONE
                                        ;                    C-BIT RESET - SEL CHAN OR DATA TRANSFER NOT DONE
                                        ;
                                        ;       NO REGISTERS ARE AFFECTED BY THIS SUBROUTINE
                                        ;
010330  105737  012516          MUXEND: TSTB    CHTYPE          ;SELECTOR OR MULTIPLEXER CHANNEL??
010334  001006                          BNE     5$              ;SELECTOR CHANNEL -- EXIT
                                        ;
                                        ;       MULTIPLEXER CHANNEL
                                        ;
010336  162763  000004  000014          SUB     #4,SRBYTC(DTAB) ;DECR REAMINING BYTE COUNT
010344  003004                          BGT     10$             ;IF > 1, DATA TRANSFER NOT COMPLETE YET
                                        ;
                                        ;       DATA TRANSFER COMPLETE ON MUX CHANNEL
                                        ;
010346  005063  000014                  CLR     SRBYTC(DTAB)    ;INSURE REMAINING BYTE COUNT ZERO
010352  000261                  5$:     SEC                     ;SET MUX TRANSFER COMPLETE FLAG
010354  000404                          BR      30$             ;GOTO COMMON EXIT
                                        ;
                                        ;       DATA TRANSFER INCOMPLETE
                                        ;
010356  062763  000004  000012  10$:     ADD     #4,SBUFA(DTAB)  ;BUMP BUFFER ADDRESS
010364  000241                  20$:     CLC                     ;RESET FLAG TO INDICATE MUX CHAN NOT DONE
010366  000207                  30$:     RTS     PC              ;RETURN TO THE CALLER
```

```
                                        .SBTTL  DX11-B ISR (2260 DISPLAY CONTROL SUBROUTINE)
                                ;
                                ;       DISPLAY CONTROL ROUTINE
                                ;
                                ;               THIS ROUTINE IS ENTERED AFTER DATA HAS BEEN
                                ;               RECEIVED FROM OR WRITTEN TO THE 360.
                                ;
                                ;               DISCTL THEN FORMATS THE DATA TO CONFORM TO
                                ;               A 2260 DISPLAY SCREEN IF THE 2848 DIAG IS RUN
                                ;
                                ;       CALLING SEQUENCE
                                ;       ........DTAB(R3) POINTS TO CURRENT DEVICE STATUS TABLE
                                ;       JSR     PC,DISCTL
                                ;       ........RETURN
                                ;
                                ;       THIS SUBROUTINE IS ONLY USED TO COMPLETELY EMULATE
                                ;       A 2260'S DISPLAY. THIS ALLOWS THIS PROGRAM TO BE USED
                                ;       WITH THE 2848 RESPONDER DIAGNOSTIC.
                                ;
                                ;       NOTE -- THE REMAINING BYTE COUNT (SRBYTC) IS USED TO
                                ;               INDICATE THE NUMBER OF CHARACTERS RECEIVED FROM THE CHANNEL.
                                ;               IT IS SET UP AT THE COMPLETION OF AN I/O
                                ;               TRANSFER TO THE NUMBER OF CHARACTERS REMAINING IN
                                ;               THE DX BYTE COUNT REGISTER.
                                ;
                                ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
                                ;
010370  010046          DISCTL: MOV     R0,-(SP)        ;SAVE REGSITERS USED BY SUBROUTINE
010372  010146                  MOV     R1,-(SP)
010374  010246                  MOV     R2,-(SP)
010376  126327  000001  000002          CMPB    SLCMD(DTAB),#CMRMI ;WAS IT A READ MANUAL INPUT COMMAND?
010404  001535                  BEQ     DRMI            ;IF YES, PERFORM READ MANUAL INPUT PROCEEDURE
010406  126327  000001  000012          CMPB    SLCMD(DTAB),#CMSRMI ;WAS IT A SHORT READ MANAUL INPUT?
010414  001542                  BEQ     DSRMI           ;IF YES, EXIT
010416  126327  000001  000006          CMPB    SLCMD(DTAB),#CMREAD ;WAS IT A READ FULL BUFFER COMMAND?
010424  001522                  BEQ     DREAD           ;YES, RESET CURSOR ON READ FULL BUFFER
                                ;
                                ;       THE COMMAND MUST HAVE BEEN A 360 WRITE
                                ;               DETERMINE TYPE OF TEST BEING RUN
                                ;
010426  105737  012522          TSTB    TSTTYP          ;TYPE OF TEST 0 = 2848  1 = FRIEND
010432  001102                  BNE     DISFRN          ;FRIEND
                                ;
                                ;       FORMAT DISPLAY ALA 2260
                                ;
010434  016301  000006          MOV     SINBF(DTAB),R1  ;GET ADDR OF START OF INPUT
010440  126327  000001  000005          CMPB    SLCMD(DTAB),#CMWTLA ;WAS LAST CMD A WRITE LINE ADDRESS?
010446  001016                  BNE     20$             ;NO, NORMAL WRITE
                                ;
                                ;       WRITE LINE ADDRESS COMMAND
                                ;               FIRST BYTE OF DATA BLOCK IS CURSOR LINE ADDRESS
                                ;
010450  005263  000014          INC     SRBYTC(DTAB)    ;INCR BYTE COUNT
010454  112102                  MOVB    (R1)+,R2        ;GET LINE NUMBER
010456  042702  177760          BIC     #177760,R2      ;GET ONLY LINE NUMBER
```

```
9870  010462  005063  000004                    CLR     SCURS(DTAB)     ;
9871
9872                                    ;       COMPUTE CURSOR ADDRESS  CURS = LINE # * LINESIZE
9873                                    ;
9874  010466  005702                   10$:     TST     R2              ;DONE?
9875  010470  001405                            BEQ     20$             ;YES, MORE DATA INTO DISPLAY BUF
9876  010472  062763  000050  000004            ADD     #LINSZ,SCURS(DTAB) ;INCR TO NEXT LINE
9877  010500  005302                            DEC     R2              ;DECR LINE COUNT
9878  010502  000771                            BR      10$
9879
9880                                    ;       MOVE DATA RECEIVED INTO DISPLAY BUFFER
9881                                    ;               THE DATA RECEIVED MANY BE ANY CONFIGURATION
9882                                    ;               OF EIGHT BITS, 0 - 255. TO EMULATE A 2260 DISPLAY
9883                                    ;               THE RECEIVED CHARACTER IS "FOLDED" INTO ONE OF
9884                                    ;               THE 64 CHARACTERS USED BY THE 2260. THIS FOLDING
9885                                    ;               IS PERFORMED BY TRANSLATING THE CHARACTER TO ASCII
9886                                    ;               AND THEN BACK TO EBCDIC.
9887
9888  010504  016302  000010           20$:     MOV     SOUTB(DTAB),R2  ;COMPUTE DISPLAY ADDR
9889  010510  066302  000004                    ADD     SCURS(DTAB),R2
9890  010514  026327  000014  000741            CMP     SRBYTC(DTAB),#DISPSZ+1 ;ALL CHARS PROCESSED?
9891  010522  103077                            BHIS    DISCEX          ;YES, EXIT
9892  010524  005263  000014                    INC     SRBYTC(DTAB)    ;INCREMENT THE BYTE COUNT
9893  010530  112100                            MOVB    (R1)+,R0        ;GET THE NEXT BYTE RECEIVED AND BUMP POINTER
9894  010532  042700  177400                    BIC     #177400,R0      ;STRIP SIGN EXTENSION BITS (IF ANY)
9895  010536  116000  011744                    MOVB    EBCDTB(R0),R0   ;FOLD CHARACTER INTO ASCII CHARACTER SET
9896  010542  042700  177400                    BIC     #177400,R0      ;STRIP SIGN EXTENSION BITS, IF ANY
9897  010546  162700  000040                    SUB     #40,R0          ;SCALE INTO ASCII TABLE RANGE
9898  010552  116012  012344                    MOVB    ATOETB(R0),(R2) ;COMPLETE FOLDING BY RETRANSLATING TO EBCDIC
9899  010556  005263  000004                    INC     SCURS(DTAB)     ;INCR CURSOR PTR
9900  010562  121227  000025                    CMPB    (R2),#NEWLNE    ;WAS A NEW LINE SPECIFIED?
9901  010566  001015                            BNE     60$
9902
9903                                    ;       NEW LINE COMMAND - ADVANCE CURSOR TO BEG OF NEW LINE
9904                                    ;               CURSOR = (CURSOR/LINESIZE + 1) * LINESIZE.
9905
9906  010570  005002                            CLR     R2              ;CLEAR LINE CTR
9907  010572  005202                   40$:     INC     R2              ;INCR LINE CTR
9908  010574  162763  000050  000304            SUB     #LINSZ,SCURS(DTAB)
9909  010602  003373                            BGT     40$             ;KEEP DIVIDING
9910  010604  005063  000004                    CLR     SCURS(DTAB)     ;CLEAR CURSOR
9911  010610  062763  000050  000004  50$:     ADD     #LINSZ,SCURS(DTAB)
9912  010616  005302                            DEC     R2
9913  010620  001373                            BNE     50$
9914
9915                                    ;       CHECK FOR WRAP AROUND
9916
9917  010622  026327  000004  000740  60$:     CMP     SCURS(DTAB),#DISPSZ ;CURSOR OVERFLOW DISPLAY BUFFER?
9918  010630  002725                            BLT     20$             ;CURSOR OK, PROCESS NEXT CHAR
9919  010632  005063  000004                    CLR     SCURS(DTAB)     ;OVERFLOW, RESTART CURSOR AT POS 0
9920  010636  000722                            BR      20$
9921
9922
9923                                    ;       FRIEND TEST, IF SEPARATE I/O BUFFERS DON'T COPY
9924                                    ;               INPUT TO OUTPUT BUFFER
9925
```

```
 9926
 9927  010640  105737  012523          DISFRN: TSTB    IOBUF           ;SEPARATE I/O BUFFERS?
 9928  010644  001026                          BNE     DISCEX          ;YES, DON'T COPY INPUT TO OUTPUT
 9929  010646  016301  000006                  MOV     SINBF(DTAB),R1  ;SET UP INPUT BUFFER ADDRESS
 9930  010652  016302  000010                  MOV     SOUTB(DTAB),R2  ;SET UP OUTPUT BUFFER ADDRESS
 9931  010656  012700  000360                  MOV     #DISPSZ/2,R0    ;TRANSFER THE INPUT BUFFER TO THE OUTPUT BUFFER
 9932                                  ;
 9933                                  ;       PERFORM COPY
 9934                                  ;
 9935  010662  012122                  IOS:    MOV     (R1)+,(R2)+     ;INPUT TO OUTPUT
 9936  010664  005300                          DEC     R0              ;ARE WE DONE?
 9937  010666  001375                          BNE     IOS             ;NO, CONTINUE COPY
 9938  010670  000414                          BR      DISCEX          ;PREPARE TO RETURN TO CALLER
 9939
 9940                                  ;
 9941                                  ;       A READ FULL BUFFER WAS PERFORMED
 9942                                  ;               THE CURSOR MUST BE RESET TO THE BEGINNING OF THE SCREEN
 9943                                  ;
 9944  010672  005063  000004          DREAD:  CLR     SCURS(DTAB)     ;RESET THE CURSOR
 9945  010676  000411                          BR      DISCEX          ;AND PREPARE TO EXIT
 9946
 9947
 9948
 9949                                  ;
 9950                                  ;       A READ MANUAL INPUT WAS PERFORMED
 9951                                  ;               TO EMULATE THE 2260 SCREEN THE START OF MANUAL INPUT CHARCATER
 9952                                  ;               MUST BE DELETED FROM THE SCREEN
 9953                                  ;
 9954  010700  016301  000020          DRMI:   MOV     SMINS(DTAB),R1  ;GET THE STARTING ADDRESS
 9955  010704  005301                          DEC     R1              ;DECREMENT TO THE SMI CHAR
 9956  010706  112711  000100                  MOVB    #EBCDSP,(R1)    ;BLANK OUT THE CHARACTER
 9957  010712  166301  000010                  SUB     SOUTB(DTAB),R1  ;AND COMPUTE THE CURSOR POSITION
 9958  010716  010163  000004                  MOV     R1,SCURS(DTAB)
 9959
 9960
 9961                                  ;
 9962                                  ;       A SHORT READ MANUAL INPUT WAS PERFORMED
 9963                                  ;               NO ACTION REQUIRED BY DISPLAY CONTROL ROUTINE
 9964                                  ;
 9965  010722                          DSRMI:
 9966
 9967
 9968                                  ;
 9969                                  ;       RESTORE REGISTERS AND RETURN TO CALLER
 9970                                  ;
 9971  010722  012602                  DISCEX: MOV     (SP)+,R2        ;RESTORE SAVED REGISTERS
 9972  010724  012601                          MOV     (SP)+,R1
 9973  010726  012600                          MOV     (SP)+,R0
 9974  010730  000207                          RTS     PC              ;RETURN TO THE CALLER
```

```
                        .SBTTL  TELETYPE (CONSOLE) INPUT ISR

                        TELETYPE INPUT HANDLER (ISR)

                                CONTROL PASSES HERE ON A TELETYPE INPUT INTERRUPT

                        DATA IS INPUT FROM THE CONTROL CONSOLE AND STORED INTO
                        THE TELETYPE INPUT BUFFER (TBUF). WHEN ALL THE DATA IS
                        ENTERED, THE OPERATOR HITS A C/R TO END THE LINE, THEN
                        AN ACTIVE FLAG IS SET AND THE COMMAND EXECUTED BY THE
                        SYSTEM.

                                THE FOLLOWING CONTROL FUNCTIONS ARE AVAILABLE FOR
                                OPERATOR CONVENIENCE.

                                        C/R  =  LINE DELIMETER
                                        ←    =  DELETE LAST CHARACTER
                                        \    = (BACKSLASH SHIFT L) = DELETE LAST LINE
                                        (CONTROL-C) = ABORT CURRENT COMMAND -- FOR DUMPS
                                        (RUB OUT) = DELETE LAST CHARACTER
                                        (CTL-P) = REENTER ALL PARAMETERS
                                        (CTL-U) = DELETE CURRENT INPUT LINE
                                        (CTL-S) = TEMPORARILY STOP OUTPUT TO CONSOLE
                                        (CTL-Q) = RESUME OUTPUT TO CONSOLE

                        NOTE -- A CONTROL Q MUST BE ISSUED AFTER A CONTROL S TO
                                RESUME CONSOLE OUTPUT

010732 010046           TKIN:   MOV     R0,-(SP)        ;SAVE REGISTERS
010734 010146                   MOV     R1,-(SP)
010736 017700 001504            MOV     @TKB,R0         ;GET TELE CHARACTER
010742 042700 177600            BIC     #177600,R0      ;INSURE 7-BIT ASCII
010746 013701 012732            MOV     TPTR,R1         ;BUFFER PTR
010752 020027 000020            CMP     R0,#CTL.P       ;CONTROL -P ?
010756 001002                   BNE     3$              ;NO
010760 000137 001002            JMP     RSTART          ;YES, ALLOW OPERATOR TO REENTER ALL PARAMETERS
010764 020027 000023    3$:     CMP     R0,#CTL.S       ;CONTROL-S , TEMPORALILY STOP CONSOLE OUTPUT?
010770 001003                   BNE     6$              ;NO, CONTINUE
010772 105237 013063            INCB    TTYSTP          ;YES, SET FLAG TO STOP TTY OUTPUT
010776 000503                   BR      10$             ;    AND EXIT FROM INTERRUPT
011000 020027 000021    6$:     CMP     R0,#CTL.Q       ;CONTROL-Q, RESUME CONSOLE OUTPUT?
011004 001010                   BNE     10$             ;NO, CONTINUE
011006 105037 013063            CLRB    TTYSTP          ;YES, RESET CONSOLE STOP FLAG
011012 105737 013061            TSTB    PCTR            ;     CHECK TO INSURE OUTPUT TO RESUME
011016 001473                   BEQ     10$             ;     NO OUTPUT -- EXIT
011020 004737 011240            JSR     PC,PROUT        ;         RESTART CONSOLE OUTPUT
011024 000470                   BR      10$             ;    AND EXIT FROM THE INTERRUPT
011026 020027 000003    10$:    CMP     R0,#CTL.C       ;COMMAND ABORT -- CTL C?
011032 001011                   BNE     20$             ;NO
011034 105737 013043            TSTB    TCMACT          ;IS A COMMAND ACTIVE?
011040 001457                   BEQ     90$             ;NO, TREAT AS A DELETE LAST LINE
011042 105237 013044            INCB    TCMDAB          ;YES, SET ABORT FLAG
011046 012701 012630            MOV     #TBUF,R1        ;SET UP BUFFER POINTER
011052 000137 011206            JMP     10$             ;EXIT
011056 105737 013043    20$:    TSTB    TCMACT          ;TELE CMD CURRENTLY ACTIVE?
011062 001051                   BNE     100$            ;YES, IGNORE CHARACTER
```

E09


```
10032  011064  110021                        MOVB    R0,(R1)+        ;STORE CHAR INTO BUFFER - INC PTR
10033  011066  020027  000015                CMP     R0,#CR          ;LINE DELLIMETER -- C/R?
10034  011072  001005                        BNE     30$             ;NO
10035  011074  012701  012630                MOV     #TBUF,R1        ;RESET BUFFER PTR
10036  011100  105237  013043                INCB    TCMACT          ;YES, SET COMMAND ACTIVE FLAG
10037  011104  000440                        BR      100$            ;DONT PRINT THE LINE DELIMITER
10038  011106  020027  000177        30$:    CMP     R0,#RUBOUT      ;A RUBOUT?
10039  011112  001002                        BNE     40$             ;NOPE
10040  011114  012700  000137                MOV     #'←,R0          ;YES, TREAT AS A DELETE LAST CHARACTER
10041  011120  120027  000025        40$:    CMPB    R0,#CTL.U       ;CONTROL-U? (DELETE CURRENT INPUT LINE)
10042  011124  001002                        BNE     50$             ;NOPE, CONTINUE
10043  011126  112700  000134                MOVB    #'\,R0          ;YES, TREAT AS DELETE LAST LINE (BACKSLASH)
10044  011132  004737  011362        50$:    JSR     PC,PCHAR        ;ECHO THE CHARCTER BACK
10045  011136  020027  000137                CMP     R0,#'←          ;DELETE LAST CHAR -- BACK ARROW?
10046  011142  001004                        BNE     60$             ;NO
10047  011144  124141                        CMPB    -(R1),-(R1)     ;YES, DECR POINTER BY 2
10048  011146  020127  012630                CMP     R1,#TBUF        ;ARE WE  BEYOND BEG OF THE BUFFER?
10049  011152  003403                        BLE     70$             ;YES, RESET TO BEG OF BUFFER
10050  011154  020027  000134        60$:    CMP     R0,#'\          ;DELETE CUR LINE -- BACK SLASH?
10051  011160  001004                        BNE     80$             ;NO
10052  011162  012701  012630        70$:    MOV     #TBUF,R1        ;YES, RESET BUFFER PTR
10053  011166  004737  011324                JSR     PC,CRLF         ;NEW LINE FOR NEW COMMAND
10054  011172  020127  012730        80$:    CMP     R1,#TBUFE       ;WERE LIMITS EXCEEDED?
10055  011176  001003                        BNE     100$            ;NOPE, EXIT
10056  011200  012700  000134        90$:    MOV     #'\,R0          ;THEY WERE -- TREAT AS A LINE ABORT
10057  011204  000740                        BR      30$
10058  011206  010137  012732        100$:   MOV     R1,TPTR         ;SAVE BUFFER PTR
10059  011212  012601                        MOV     (SP)+,R1        ;RESTORE REGISTERS + EXIT
10060  011214  012600                        MOV     (SP)+,R0
10061  011216  000002                        RTI
```

```
10063                                           .SBTTL  TELETYPE (CONSOLE) OUTPUT ISR
10064                                   ;
10065                                   ;       TELETYPE OUTPUT DRIVER (ISR) -- PRINT
10066                                   ;
10067                                   ;               CONTROL PASSES HERE ON A TELE OUT INTERRUPT
10068                                   ;
10069  011220  105037  013042          PISR:   CLRB    PIUFL           ;CLEAR PRINTER BUSY FLAG
10070  011224  105737  013061                  TSTB    PCTR            ;ANY MORE DATA TO PRINT?
10071  011230  001402                          BEQ     10$             ;NO, EXIT
10072  011232  004737  011240                  JSR     PC,PROUT        ;OUTPUT ANOTHER CHAR
10073  011236  000002                  10$:    RTI
```

```
10075                                           .SBTTL  TELETYPE OUTPUT HANDLING SUBROUTINES
10076
10077                                   ;       SEND DATA TO PRINTER, IF NOT BUSY
10078                                   ;
10079                                   ;       CALLING SEQUENCE
10080                                   ;       JSR     PC,PROUT
10081                                   ;       ........RETURN
10082                                   ;
10083                                   ;       IF TELETYPE OUTPUT IS CURRENTLY IN PROGRESS OR HAS BEEN SUSPENDED BY A CONTROL -
10084                                   ;       CONTROL IS RETURNED IMMEDIATELY WITH NO ACTION
10085                                   ;       BEING INITIATED.
10086                                   ;       IF TELETYPE OUTPUT IS NOT CUPRENTLY IN PROGRESS
10087                                   ;       THE PRINTER BUSY FLAG IS SET AND A CHARACTER IS SENT TO THE TERMINAL
10088                                   ;
10089                                   ;       NO REGSISTERS ARE MODIFIED BY THIS SUBROUTINE
10090                                   ;
10091  011240  105737  013042          PROUT:  TSTB    PIUFL           ;IS IT BUSY?
10092  011244  001026                          BNE     20$             ;YES, EXIT
10093  011246  105737  013063                  TSTB    TTYSTP          ;HAS CONSOLE OUTPUT BEEN SUSPENDED?
10094  011252  001023                          BNE     20$             ;YES, RETURN IMMEDIATELY TO CALLER
10095  011254  105237  013042                  INCB    PIUFL           ;NO, SET BUSY FLAG
10096  011260  117777  001552  001164          MOVB    @PFPTR,@TPB     ;OUTPUT NEXT CHAR
10097  011266  012777  000100  001154          MOV     #100,@TPS       ;ENABLE INTERRUPTS
10098  011274  005237  013036                  INC     PFPTR           ;INCR PUNCH POINTER
10099  011300  023727  013036  013036          CMP     PFPTR,#PBFE     ;TIME TO WRAP AROUND?
10100  011306  001003                          BNE     10$             ;NO, EXIT
10101  011310  012737  012734  013036          MOV     #PBFS,PFPTR     ;YES, RESTORE TO START OF BUFFER
10102  011316  105337  013061          10$:    DECB    PCTR            ;DECR CHAR COUNTER
10103  011322  000207                  20$:    RTS     PC                      ;RETURN TO CALLER
10104
10105
10106                                   ;
10107                                   ;       PRINT A CR/LF
10108                                   ;
10109                                   ;       CALLING SEQUENCE
10110                                   ;       JSR     PC,CRLF
10111                                   ;       ........RETURN
10112                                   ;
10113                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
10114                                   ;
10115  011324  010246                  CRLF:   MOV     R2,-(SP)        ;SAVE THE R2 REGISTER
10116  011326  012702  105215                  MOV     #105215,R2      ;DO A CRLF
10117  011332  004737  011342                  JSR     PC,PRINT2       ;PRINT IT
10118  011336  012602                          MOV     (SP)+,R2        ;RESTORE THE R2 REGISTER
10119  011340  000207                          RTS     PC              ;RETURN TO THE CALLER
10120
10121
10122                                   ;
10123                                   ;       PRINT 2 CHARACTERS ON THE TTY
10124                                   ;
10125                                   ;       CALLING SEQUENCE
10126                                   ;       ......R2 CONTAINS DATA TO BE PRINTED (2 BYTES)
10127                                   ;       JSR   PC,PRINT2
10128                                   ;       ......RETURN
10129                                   ;
10130                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
```

```
10131                                   ;
10132  011342  010237  011356  PRINT2: MOV     R2,P2BF
10133  011346  004137  011466          JSR     R1,MESG
10134  011352  011356                  .WORD   P2BF
10135  011354  000207                  RTS     PC
10136  011356  000000  P2BF:   .WORD   0
10137  011360     377     377          .BYTE   377,377
10138
10139
10140                                   ;
10141                                   ;       PRINT 1 CHARACTER
10142                                   ;
10143                                   ;       CALLING SEQUENCE
10144                                   ;       ........R0 CONTAINS THE CHARACTER TO BE PRINTED
10145                                   ;       JSR     PC,PCHAR
10146                                   ;       ........RETURN WITH THE DATA IN THE PRINT BUFFER
10147                                   ;
10148                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
10149                                   ;
10150  011362  110037  011376  PCHAR:  MOVB    R0,P1BF
10151  011366  004137  011466          JSR     R1,MESG
10152  011372  011376                  .WORD   P1BF
10153  011374  000207                  RTS     PC              ;RETURN TO THE CALLER
10154  011376     000     377  P1BF:   .BYTE   0,377
```

```
10156
10157                                   ;       PRMESG PRINT A CHARACTER STRING
10158                                   ;
10159                                   ;       CALLING SEQ
10160                                   ;       .....R2 CONTAINS THE STARTING ADDRESS OF THE MESSAGE
10161                                   ;       JSR     PC,PRMESG
10162                                   ;       ......RETURN
10163                                   ;
10164                                   ;       NOTE -- MESSAGE MUST BE TERMINATED BY A 377
10165                                   ;
10166                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
10167  011400  010246                  PRMESG: MOV     R2,-(SP)        ;SAVE REGS
10168  011402  010346                          MOV     R3,-(SP)
10169  011404  013703  013040                  MOV     PPPTR,R3        ;GET PRINT OUTPUT POINTER
10170  011410  121227  000377          10$:    CMPB    (R2),#377       ;END OF MESSAGE?
10171  011414  001417                          BEQ     40$             ;YES, EXIT
10172  011416  112223                          MOVB    (R2)+,(R3)+     ;NO MOVE NEXT CHAR TO PRINT BUFFER
10173  011420  105237  013061                  INCB    PCTR            ;INCR CHAR COUNTER
10174  011424  020327  013036                  CMP     R3,#PBFE        ;AT END OF BUFFER?
10175  011430  001002                          BNE     20$             ;NO
10176  011432  012703  012734                  MOV     #PBFS,R3        ;YES, WRAP AROUND TO BEG OF BUFFER
10177  011436  004737  011240          20$:    JSR     PC,PROUT        ;CAN WE START PRINT?
10178  011442  123737  013061  013120  30$:    CMPB    PCTR,PMAX       ;IS PRINT BUFFER FULL?
10179  011450  001774                          BEQ     30$             ;YES, WAIT TILL ROOM AVAILABLE
10180  011452  000756                          BR      10$             ;GET NEXT CHAR
10181  011454  010337  013040          40$:    MOV     R3,PPPTR        ;EXIT, RESTORE PUT PTR
10182  011460  012603                          MOV     (SP)+,R3        ;RESTORE REGS
10183  011462  012602                          MOV     (SP)+,R2
10184  011464  000207                          RTS     PC              ;RETURN TO THE CALLER
10185
10186
10187                                   ;
10188                                   ;       MESG -- PRINT A CHARACTER STRING ON THE SYSTEM CONSOLE
10189                                   ;
10190                                   ;       CALLING SEQUENCE
10191                                   ;       JSR     R1,MESG
10192                                   ;       .WORD   ADDRESS OF START OF MESSAGE
10193                                   ;       .........RETURN
10194                                   ;
10195                                   ;       NOTE -- MESSAGE MUST BE TERMINATED BY A 377
10196                                   ;
10197                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
10198                                   ;
10199  011466  010246                  MESG:   MOV     R2,-(SP)        ;SAVE REGISTER
10200  011470  012102                          MOV     (R1)+,R2        ;GET ADDRESS OF MESSAGE AND BUMP FOR RETURN
10201  011472  004737  011400                  JSR     PC,PRMESG       ;MORE MESSAGE PROCESSING
10202  011476  012602                          MOV     (SP)+,R2        ;RESTORE SOILED REGISTER
10203  011500  000201                          RTS     R1              ;RETURN TO THE CALLER
10204
10205
10206                                   ;
10207                                   ;       INMES PRINT A CHARACTER STRING
10208                                   ;
10209                                   ;       CALLING SEQUENCE
10210                                   ;       JSR     R1,INMES
10211                                   ;       .WORD ADDRESS OF MESSAGE
```

```
10212                                   ;       .....RETURN
10213                                   ;
10214                                   ;       INMES IS USED FOR ROUTINES AT THE ISR LEVEL AND DOES
10215                                   ;               NOT CHECK TO SEE IF DATA WILL BE OVERLAYED IN
10216                                   ;               TELEBUFFER
10217                                   ;
10218                                   ;       NOTE -- THE MESSAGE MUST BE TERMINATED BY A 377
10219                                   ;
10220                                   ;       NO REGISTERS ARE MODIFIED BY THIS SUBROUTINE
10221                                   ;
10222  011502  010246                  INMES:  MOV     R2,-(SP)
10223  011504  113746  013120                  MOVB    PMAX,-(SP)      ;CHEAT, SAVE PMAX
10224  011510  112737  000377  013120          MOVB    #377,PMAX       ;AND MAKE VERY LARGE
10225  011516  012102                          MOV     (R1)+,R2
10226  011520  004737  011400                  JSR     PC,PRMESG       ;USE STANDARD MESSAGE PROCESSOR
10227  011524  112637  013120                  MOVB    (SP)+,PMAX      ;RESTORE PRINT MAX
10228  011530  012602                          MOV     (SP)+,R2
10229  011532  000201                          RTS     R1              ;RETURN TO CALLER
```

```
10231                                           .SBTTL  UTILITY SUBROUTINES (CONVERT OCTAL OR HEX TO BINARY)
10232                                   ;
10233                                   ;       COTB -- CONVERT ASCII OCTAL TO BINARY (COTB)
10234                                   ;
10235                                   ;       CALLING SEQUENCE
10236                                   ;       .....R2 = CHAR ADDRESS OF FIRST CHARCTER TO BE CONVERTED
10237                                   ;       JSR     PC,COTB
10238                                   ;       ......RETURN
10239                                   ;
10240                                   ;       UPON RETURN THE FOLLOWING REGISTERS WILL CONTAIN
10241                                   ;               R2 = NEXT CHAR POSITION AFTER LAST ILLG CHAR
10242                                   ;               R3 = BINARY RESULT OF CONVERSION
10243                                   ;               R4 = (BITS 0-7) FIRST NON-OCTAL CHARACTER
10244                                   ;               R5 = NUMBER OF CHARACTERS CONVERTED
10245                                   ;
10246  011534  005003                  COTB:   CLR     R3
10247  011536  005005                          CLR     R5
10248  011540  112204                  10$:    MOVB    (R2)+,R4        ;GET NEXT CHAR
10249  011542  120427  000067                 CMPB    R4,#'7          ;CHAR GT 7?
10250  011546  003013                          BGT     20$             ;YES EXIT
10251  011550  120427  000060                 CMPB    R4,#'0          ;CHAR LT 0?
10252  011554  002410                          BLT     20$             ;YES, EXIT
10253  011556  042704  177770                 BIC     #177770,R4      ;SAVE ONLY L.S. 3 BITS
10254  011562  006303                          ASL     R3              ;SHIFT OLD RESULT BY 8
10255  011564  006303                          ASL     R3
10256  011566  006303                          ASL     R3
10257  011570  060403                          ADD     R4,R3           ;ADD IN NEW NUMBER
10258  011572  005205                          INC     R5              ;INCR CHAR COUNT
10259  011574  000761                          BR      10$             ;GET NEXT CHAR
10260  011576  000207                  20$:    RTS     PC              ;RETURN TO CALLER
```

```
10262
10263                           ;       CHTB -- CONVERT ASCII HEX TO BINARY
10264                           ;
10265                           ;       CALLING SEQUENCE
10266                           ;       .....R2 = ADDRESS OF FIRST CHARCTER TO BE CONVERTED
10267                           ;       JSR     PC,CHTB
10268                           ;       .....   RETURN
10269                           ;       UPON RETURN
10270                           ;               R2 = NEXT CHAR POSITION NOT CONVERTED
10271                           ;               R3 = BINARY RESULT
10272                           ;               R4 = (BITS 0-7) FIRST NON HEX CHARACTER
10273                           ;               R5 = NUMBER OF CHARACTERS CONVERTED
10274                           ;
10275  011600  005003           CHTB:   CLR     R3
10276  011602  005005                   CLR     R5
10277  011604  112204           10$:    MOVB    (R2)+,R4        ;GET THE FIRST CHARACTER
10278  011606  162704  000060           SUB     #'0,R4          ;SCALE RELATIVE TO ASCII ZERO
10279  011612  100422                   BMI     30$             ;NOT A VALID HEX CHAR
10280  011614  020427  000012           CMP     R4,#10.         ;IS RESULT STILL GT 10?
10281  011620  002410                   BLT     20$             ;YES, WE HAVE A VALID HEX DIGIT
10282  011622  162704  000007           SUB     #7,R4
10283  011626  020427  000020           CMP     R4,#16.         ;IS IT A LETTER?
10284  011632  002012                   BGE     30$             ;NO, INVALID CHAR
10285  011634  020427  000012           CMP     R4,#10.         ;AND GT 10
10286  011640  002407                   BLT     30$             ;NO,ILLEGAL CHAR
10287  011642  006303           20$:    ASL     R3              ;MAKE ROOM FOR NEW ENTRY
10288  011644  006303                   ASL     R3
10289  011646  006303                   ASL     R3
10290  011650  006303                   ASL     R3
10291  011652  060403                   ADD     R4,R3           ;INSERT NEW ENTRY
10292  011654  005205                   INC     R5              ;INCR CHAR COUNT
10293  011656  000752                   BR      10$             ;AND CONVERT NEXT CHAR
10294  011660  005302           30$:    DEC     R2              ;GET THE ILLEGAL CHARCTER
10295  011662  112204                   MOVB    (R2)+,R4        ;AND PUT IT R4
10296  011664  000207                   RTS     PC              ;ITS TIME TO RETURN TO THE CALLER
```

```
10298                                           .SBTTL  PROCESSOR ERROR TRAP HANDLERS
10299                                   ;
10300                                   ;       TRAP OUT ROUTINES
10301                                   ;
10302
10303
10304                                   ;
10305                                   ;       MEMORY TIME OUT ROUTINE
10306                                   ;
10307  011666  012702  014133          MTO:    MOV     #PMTO,R2        ;SET UP ADDRESS OF THE PRINT ROUTINE
10308  011672  000404                          BR      TOUTRT          ;TO GENERALIZED TRAP OUT ROUTINE
10309
10310
10311                                   ;
10312                                   ;       MEMORY MANAGEMENT TRAP OUT ROUTINE
10313                                   ;
10314  011674  005037  177572          MMERR:  CLR     MMSR0           ;CLEAR THE MEMORY MANAGEMENT BIT
10315  011700  012701  014157                  MOV     #PMMERR,R1      ;SET UP ADDRES OF ERROR MESSAGE
10316  011704  000005                  TOUTRT: RESET                   ;CLEAR ALL DEVICES
10317  011706  105037  013042                  CLRB    PIUFL           ;CLEAR PRINT IN USE FLAG
10318  011712  005037  177776                  CLR     PSW             ;LOWER PROCESSOR STATUS TO ALLOW INTERRUPTS TO CUM
10319  011716  004737  011400                  JSR     PC,PRMESG       ;PRINT THE ERROR MESSAGE
10320  011722  105737  013061          10$:    TSTB    PCTR            ;IS PRINTING DONE?
10321  011726  001375                          BNE     10$
10322  011730  000000                          HALT                    ;YES, HALT
10323
10324
10325                                   ;
10326                                   ;       INVALID UNIBUS ADDRESS TRAP
10327                                   ;
10328  011732  022626                  UNTRP:  CMP     (SP)+,(SP)+     ;POP THE PUSH STACK
10329  011734  005037  177776                  CLR     PSW             ;CLEAR THE PROCESSOR STATUS WORD
10330  011740  000137  001162                  JMP     NEWPRM          ;ASK OPERATOR TO REENTER THE DATA
```

```
                                        .SBTTL  CODE CONVERSION TABLES

                                ;
                                ;       EBCDIC TO ASCII CODE CONVERSION TABLE
                                ;               THIS TABLE FOLDS ALL INPUT INTO A 64 CHARACTER SET
                                ;
                                ;       NOTE -- BACKARROW IS USED TO DENOTE A NEWLINE
                                ;
                                EBCDTB:
                                        .ASCII  / ABCDEFGHI↑.<(+!/      ;00 - 0F
                                        .ASCII  "&JKLM↓OPQR↓$*);]"      ;10 - 1F
                                        .ASCII  '-/STUVWXYZ",%(>?'      ;20 - 2F
                                        .ASCII  "0123456789:#@'=\"      ;30 - 3F
                                        .ASCII  / ABCDEFGHI↑.<(+!/      ;40 - 4F
                                        .ASCII  "&JKLMNOPQR↓$*);]"      ;50 - 5F
                                        .ASCII  '-/STUVWXYZ",%(>?'      ;60 - 6F
                                        .ASCII  "0123456789:#@'=\"      ;70 - 7F
                                        .ASCII  / ABCDEFGHI↑.<(+!/      ;80 - 8F
                                        .ASCII  "&JKLMNOPQR↓$*);]"      ;90 - 9F
                                        .ASCII  '-/STUVWXYZ",%(>?'      ;A0 - AF
                                        .ASCII  "0123456789:#@'=\"      ;B0 - BF
                                        .ASCII  / ABCDEFGHI↑.<(+!/      ;C0 - CF
                                        .ASCII  "&JKLMNOPQR↓$*);]"      ;D0 - DF
                                        .ASCII  '-/STUVWXYZ",%(>?'      ;E0 - EF
                                        .ASCII  "0123456789:#@'=\"      ;F0 - FF
```

```
10339  011744
10340  011744  040440  041502  042504
       011752  043506  044510  027136
       011760  024074  020453
1C341  011764  045046  046113  057515
       011772  050117  051121  022137
       012000  024452  056473
10342  012004  027455  052123  053125
       012012  054127  055131  026042
       012020  055445  037476
10343  012024  030460  031462  032464
       012032  033466  034470  021472
       012040  023500  056075
10344  012044  040440  041502  042504
       012052  043506  044510  027136
       012060  024074  020453
10345  012064  045046  046113  047115
       012072  050117  051121  022137
       012100  024452  056473
10346  012104  027455  052123  053125
       012112  054127  055131  026042
       012120  055445  037476
10347  012124  030460  031462  032464
       012132  033466  034470  021472
       012140  023500  056075
10348  012144  040440  041502  042504
       012152  043506  044510  027136
       012160  024074  020453
10349  012164  045046  046113  047115
       012172  050117  051121  022137
       012200  024452  056473
10350  012204  027455  052123  053125
       012212  054127  055131  026042
       012220  055445  037476
10351  012224  030460  031462  032464
       012232  033466  034470  021472
       012240  023500  056075
10352  012244  040440  041502  042504
       012252  043506  044510  027136
       012260  024074  020453
10353  012264  045046  046113  047115
       012272  050117  051121  022137
       012300  024452  056473
10354  012304  027455  052123  053125
       012312  054127  055131  026042
       012320  055445  037476
10355  012324  030460  031462  032464
       012332  033466  034470  021472
       012340  023500  056075
```

```
10357
10358
10359
10360  012344  100  117  152        ;
       012347  173  133  154        ;       ASCII TO EBCDIC CONVERSION TABLE
       012352  120  175              ;
10361  012354  115  135  134        ;
       012357  116  153  140        ;
       012362  113  141              ;
10362  012364  360  361  362        ;
       012367  363  364  365        ;
       012372  366  367              ;
10363  012374  370  371  172        ;
       012377  136  114  176        ;
       012402  156  157              ;
10364  012404  174  301  302        ;
       012407  303  304  305        ;
       012412  306  307              ;
10365  012414  310  311  321        ;
       012417  322  323  324        ;
       012422  325  326              ;
10366  012424  327  330  331        ;
       012427  342  343  344        ;
       012432  345  346              ;
10367  012434  347  350  351        ;
       012437  155  177  137        ;
       012442  112  025              ;
```

ATOETB: .BYTE 100,117,152,173,133,154,120,175 ;240-247

        .BYTE 115,135,134,116,153,140,113,141 ;250-257

        .BYTE 360,361,362,363,364,365,366,367 ;260-267

        .BYTE 370,371,172,136,114,176,156,157 ;270-277

        .BYTE 174,301,302,303,304,305,306,307 ;300-307

        .BYTE 310,311,321,322,323,324,325,326 ;310-317

        .BYTE 327,330,331,342,343,344,345,346 ;320,327

        .BYTE 347,350,351,155,177,137,112,025 ;330-337

```
10369                                           .SBTTL  PROGRAM CONSTANTS AND VARIABLES
10370
10371                                   ;       CONSOLE UNIBUS ADDRESS CONSTANTS
10372                                   ;
10373  012444  177560                  TKS:    .WORD   177560          ;KEYBOARD CONTROL STATUS REGISTER
10374  012446  177562                  TKB:    .WORD   177562          ;KEYBOARD DATA BUFFER
10375  012450  177564                  TPS:    .WORD   177564          ;PRINTER STATUS/CONTROL REGISTER
10376  012452  177566                  TPB:    .WORD   177566          ;PRINTER DATA BUFFER
10377
10378
10379
10380                                   ;
10381                                   ;       DX REGISTERS - ADDRESS GENERATED BY INITIALIZATION
10382                                   ;
10383  012454  000000                  DXDS:   .WORD   0               ;DEVICE STATUS -- TT1
10384  012456  000000                  DXCA:   .WORD   0               ;COMMAND AND ADDRESS -- TT2
10385  012460  000000                  DXCS:   .WORD   0               ;CONTROL UNIT STATUS
10386  012462  000000                  DXDS:   .WORD   0               ;OFFSET AND STATUS
10387  012464  000000                  DXBA:   .WORD   0               ;BUS ADDRESS
10388  012466  000000                  DXBC:   .WORD   0               ;BYTE COUNT
10389  012470  000000                  DXMO:   .WORD   0               ;MAINTANCE OUT
10390  012472  000000                  DXMI:   .WORD   0               ;MAINTANCE IN
10391  012474  000000                  DXCB:   .WORD   0               ;CONTROL BITS
10392  012476  000000                  DXMD:   .WORD   0               ;MPR DATA
10393  012500  000000                  DXES1:  .WORD   0               ;EXTRA SIGNALS
10394  012502  000000                  DXMOB:  .WORD   0               ;BUFFERED BUS OUT
10395  012504  000000                  DXES2:  .WORD   0               ;EXTRA SIGNALS
10396
10397
10398                                   ;
10399                                   ;       CONFIGURATION CONSTANTS
10400                                   ;
10401  012506  000000                  UNIADR: .WORD   0               ;UNIBUS ADDRESS
10402  012510  000000                  VECTAD: .WORD   0               ;DX VECTOR ADDRESS
10403  012512  000000                  SDEV:   .WORD   0               ;STARTING DEV NUMBER
10404  012514  000000                  EDEV:   .WORD   0               ;ENDING DEV NUMBER
10405  012516     000                  CHTYPE: .BYTE   0               ;CHANNEL TYPE 0 = MPX - 1 = SEL
10406  012517     000                  MMRESP: .BYTE   0               ;MEMORY MANAGEMENT 0 = NO - 1 = YES
10407  012520  000000                  BUFREL: .WORD   0               ;BUFFER RELOCATION ADDRESS
10408  012522     000                  TSTTYP: .BYTE   0               ;TEST TYPE 0 = 2848 - 1 = FRIEND
10409  012523     000                  IOBUF:  .BYTE   0               ;SEPERATE I/O BUFFER 0 = NO - 1 = YES
10410  012524     000                  FILLCH: .BYTE   0               ;FILL CHARACTER
10411  012525     000                  CONEND: .BYTE   0               ;EXTRA
10412
10413
10414                                   ;
10415                                   ;       SYSTEM PUSH STACK
10416                                   ;
10417         012626                            .=.+100
10418         012626                    SSTACK  =       .
10419
10420
10421                                   ;
10422                                   ;       SYSTEM VARIABLES
10423                                   ;
10424                                   ;       THE FOLLOWING VARIABLES ARE RESET UPON START-UP
```

```
10425                                   ;
10426  012626  000000                   VSTRT:  .WORD   0               ;DUMMY
10427          012630                   TBUF    =       .               ;START OF TELETYPE INPUT BUFFER
10428          012730                           .=.+100
10429  012730  000000                   TBUFE:  .WORD   0               ;END OF TELETYPE INPUT BUFFER
10430  012732  000000                   TPTR:   .WORD   0               ;TELE IN PTR
10431  012734  000000                   PBFS:   .WORD   0               ;START OF PRINT BUFFER
10432          013036                           .=.+100
10433          013036                   PBFE    =       .               ;END OF PRINT BUFFER
10434  013036  000000                   PFPTR:  .WORD   0               ;PRINT FETCH PTR
10435  013040  000000                   PPPTR:  .WORD   0               ;PRINT PUT PTR
10436  013042  000                      PIUFL:  .BYTE   0               ;PRINTER IN USE FLAG
10437  013043  000                      TCMACT: .BYTE   0               ;TELE COMMAND ACTIVE FLAG 0 = NON-ACT
10438  013044  000                      TCMDAB: .BYTE   0               ;TEL COMMAND ABORT 1 = ABORT
10439  013045  000                      LINECT: .BYTE   0               ;LINE CTR - CHARS / LINE
10440  013046  000                      WK:     .BYTE   0               ;WORK LOC
10441  013047  000                      WK1:    .BYTE   0               ;WORK LOC
10442  013050  000000                   TTPTR:  .WORD   0               ;TUMBLE TABLE PTR
10443  013052  000000                   TTADDR: .WORD   0               ;BEG OF TUMBLE TABLE
10444  013054  000000                   SDEVTB: .WORD   0               ;START OF DEVICE TABLES
10445  013056  000                      DXSTPF: .BYTE   0               ;DX STOP FLAG
10446  013057  000                      MAXDEV: .BYTE   0               ;HIGHEST DEV # 1 - 8
10447  013060  000                      DXACT:  .BYTE   0               ;DXACTIVE FLAG
10448  013061  000                      PCTR:   .BYTE   0               ;PRINT BUFFER COUNTER
10449  013062  000                      DXABFL: .BYTE   0               ;DX ABORT FLAG  0 = NO ABORT, 1 = ABORT
10450  013063  000                      TTYSTP: .BYTE   0               ;CONSOLE OUTPUT STOP FLAG 0 = OUTPUT; 1 = NO OUTPUT
10451                                           .EVEN
10452  013064  000000                   CMDCHF: .WORD   0               ;COMMAND CHAIN FLAG
10453  013066  000000                   MDEV:   .WORD   0               ;DEV # IN MPXR EXEC
10454          013066                   SELDEV  =       MDEV            ;DEV # IN SEL EXEC
10455  013070  000000                   PBUFA:  .WORD   0               ;PHYSICAL BUFF ADDR - IN 1000'S
10456  013072  000000                   VBUFA:  .WORD   0               ;VIRTUAL BUFF ADDR - IN 1000'S
10457  013074  000000                   PHYOFF: .WORD   0               ;PHY OFFSET FOR MEMORY MANAGEMENT
10458  013076  000000                   CDEV:   .WORD   0               ;CURRENT DX DEVICE -- INTER SERVICE ROUTINE
10459  013100  000000                   DEVCON: .WORD   0               ;DEVICE ADDED TO THE DEVICE NUMBER = STARTING DEV NUMB -
10460  013102  000000                   XADDR:  .WORD   0               ;EXTENDED ADDRESS BITS FOR THE DX CONTROL REGISTER -- IN
10461  013104  000000                   STSPW:  .WORD   0               ;START OF THE PSW TABLE
10462  013106  000000                   DSTOFF: .WORD   0               ;OFFSET TO THE DST TABLE
10463  013110  000000                   SADDR:  .WORD   0               ;TELETYPE COMMAND STARTING BUFFER ADDRESS
10464  013112  000000                   EADDR:  .WORD   0               ;TELETYPE COMMAND ENDING BUFFER ADDRESS
10465  013114  000000                   DMPADR: .WORD   0               ;POINTER TO DUMP ROUTINE CURRENTLY BEING UTILIZED BY TEL
10466  013116  000000                   VEND:   .WORD   0
10467
10468
10469                                   ;
10470                                   ;       THE FOLLOWING VARIABLES ARE NOT RESET ON START-UP
10471                                   ;
10472  013120  000102                   PMAX:   .WORD   PBFE-PBFS       ;SIZE OF PRINT BUFFER
10473  013122  000000                   FTIMFL: .WORD   0               ;FIRST TIME FLAG
```

```
                                                .SBTTL  MESSAGES
                                                .NLIST  BEX
                                        ;
                                        ;       SYSTEM MESSAGES
                                        ;
013124    215     212           STMSG:  .BYTE   215,212
013126 055104  054104  026511          .ASCII /DZDXI-A  NEW DX11-B RESPONDER/
013163    377     377                   .BYTE   377,377
013165    215     212           UNMSG:  .BYTE   215,212
013167    125  044516  052502          .ASCII /UNIBUS ADDRESS -OCTAL- : /
013220    377                           .BYTE   377
          013222                        .EVEN
013222    215     212           VECTMS: .BYTE   215,212
013224 047111  042524  051122          .ASCII /INTERRUPT VECTOR ADDRESS -OCTAL- : /
013267    377                           .BYTE   377
                                        .EVEN
013270    215     212           DEVMES: .BYTE   215,212
013272 042504  044526  042503          .ASCII /DEVICE ADDRESSES -HEX- (XX,XX): /
013332    377                           .BYTE   377
          013334                        .EVEN
013334    215     212           CHTYMS: .BYTE   215,212
013336 044103  047101  042516          .ASCII /CHANNEL TYPE (M OR S): /
013365    377                           .BYTE   377
                                        .EVEN
013366    215     212           MMMES:  .BYTE   215,212
013370 042515  047515  054522          .ASCII /MEMORY MANAGEMENT (Y OR N): /
013424    377                           .BYTE   377
          013426                        .EVEN
013426    215     212           BFREMS: .BYTE   215,212
013430 052502  043106  051105          .ASCII /BUFFER RELOCATION, IF SPECIFIED - IN EVEN ,000'S -OCTAL- : /
013523    377                           .BYTE   377
                                        .EVEN
013524    215     212           TESTMS: .BYTE   215,212
013526 051106  042511  042116          .ASCII /FRIEND (F) OR 2848 DIAG(D): /
013562    377                           .BYTE   377
          013564                        .EVEN
013564    215     212           FIOMS:  .BYTE   215,212
013566 042523  040520  040522          .ASCII /SEPARATE I-O BUFFERS (Y OR N): /
013625    377                           .BYTE   377
                                        .EVEN
013626    215     212           FILLMS: .BYTE   215,212
013630 052517  050124  052125          .ASCII /OUTPUT BUFFER FILL CHARACTER -HEX- : /
013675    377                           .BYTE   377
                                        .EVEN
013676    207     207     215   NXMMSG: .BYTE   207,207,215,212
013702 047516  020116  054105          .ASCII /NON EX-MEM ERROR/
013722    215     212     377           .BYTE   215,212,377
          013726                        .EVEN
013726    207     207     215   PARMES: .BYTE   207,207,215,212
013732 040520  044522  054524          .ASCII /PARITY ERROR/
013746    212     215     377           .BYTE   212,215,377
          013752                        .EVEN
013752    207     207     215   ILLMES: .BYTE   207,207,215,212
013756 046111  042514  040507          .ASCII  /ILLEGAL DEVICE NUMBER/
014003    212     215     377           .BYTE   212,215,377
                                        .EVEN
```

```
 10531  014006  052503  051122  047105  STPMES: .ASCII  /CURRENT DEVICE NUMBER -- /
 10532  014037     377                          .BYTE   377
 10533                                          .EVEN
 10534  014040     207     207     215  INVLDC: .BYTE   207,207,215,212
 10535  014044  047111  040526  044514          .ASCII /INVALID DX COMMAND/
 10536  014066     212     215     377          .BYTE   212,215,377
 10537          014072                          .EVEN
 10538  014072  020040  047516  046440  PNOMM:  .ASCII  /  NO MEMORY MANAGEMENT AVAILABLE/
 10539  014132     377                          .BYTE   377
 10540  014133     215     212     207  PMTO:   .BYTE   215,212,207,207
 10541  014137     115  046505  051117          .ASCII  /MEMORY TIME OUT/
 10542  014156     377                          .BYTE   377
 10543  014157     215     212     207  PMMERR: .BYTE   215,212,207,207
 10544  014163     115  046505  051117          .ASCII  /MEMORY MANAGEMENT ERROR/
 10545  014212     377                          .BYTE   377
 10546          014214                          .EVEN
 10547  014214     215     212          RNMESG: .BYTE   215,212
 10548  014216  054523  052123  046505          .ASCII  /SYSTEM INITIALIZED, TYPE "R" TO ENABLE DX/
 10549  014267     377                          .BYTE   377
 10550  014270     015     012          HELPMS: .BYTE   CR,LF
 10551  014272  054104  030461  041055          .ASCII  /DX11-B 2848 EMULATOR TEST PACKAGE - OPERATIONAL INFORMATION/
 10552  014365     015     012                  .BYTE   CR,LF
 10553  014367     015     012                  .BYTE   CR,LF
 10554  014371     104  026440  020055          .ASCII  /D -- DUMP COMMAND/<CR><LF>
 10555  014414  020040  020040  020040          .ASCII  /       DTT,C     DUMP TUMBLE TABLE IN CODE "C"/<CR><LF>
 10556  014434  020040  020040  020040          .ASCII  /       DIN,XX,C  DUMP INPUT BUFFER FOR DEVICE XX IN CODE "C"/<CR><LF>
 10557  014572  020040  020040  020040          .ASCII  /       DOT,XX,C  DUMP OUTPUT BUFFER FOR DEVICE XX IN CODE "C"/<CR><LF>
 10558  014671     105  026440  020055          .ASCII  /E -- ENABLE DEVICE ON DX/<CR><LF>
 10559  014723     040  020040  020040          .ASCII  /       EXX       ENABLE DEVICE XX/<CR><LF>
 10560  014766  020106  026455  043040          .ASCII  /F -- FILL BUFFER COMMAND/<CR><LF>
 10561  015020  020040  020040  020040          .ASCII  /       FIN,HH,XX FILL INPUT BUFFER ON DEV XX WITH HH/<CR><LF>
 10562  015106  020040  020040  020040          .ASCII  /       FOT,HH,XX FILL OUTPUT BUFFER ON DEV XX WITH HH/<CR><LF>
 10563  015175     110  026440  020055          .ASCII  /H -- HELP COMMAND/<CR><LF>
 10564  015220  020040  020040  020040          .ASCII  /       THIS TEXT/<CR><LF>
 10565  015242  020113  026455  045440          .ASCII  /K -- KILL A DEVICE ON THE DX/<CR><LF>
 10566  015300  020040  020040  020040          .ASCII  /       KXX       KILL DEVICE XX/<CR><LF>
 10567  015341     122  026440  020055          .ASCII  /R -- ENABLE DX (RUN)/<CR><LF>
 10568  015367     040  020040  020040          .ASCII  /       R         RUN TEST/<CR><LF>
 10569  015422  020123  026455  042040          .ASCII  /S -- DISABLE DX (STOP)/<CR><LF>
 10570  015452  020040  020040  020040          .ASCII  /       S         STOP IMMEDIATELY/<CR><LF>
 10571  015515     040  020040  020040          .ASCII  /       SD        STOP AFTER NEXT DATA TRANSFER/<CR><LF>
 10572  015575     040  020040  020040          .ASCII  /       SE        STOP AFTER NEXT ENDING SEQUENCE/<CR><LF>
 10573  015657     040  020040  020040          .ASCII  /       SI        STOP ON NEXT SEL SEQ (ISS)/<CR><LF>
 10574  015734  020040  020040  020040          .ASCII  /       SP        STOP ON NEXT PARITY ERROR/<CR><LF>
 10575  016010  005015  044127  051105          .ASCII  <CR><LF>/WHERE:/<CR><LF>
 10576  016022  020040  020040  041442          .ASCII  /    "C" IS CODE FORMAT     O = OCTAL/<CR><LF>
 10577  016070  020040  020040  020040          .ASCII  /                           A = ASCII/<CR><LF>
 10578  016136  020040  020040  020040          .ASCII  /                           E = EBCDIC/<CR><LF>
 10579  016205     040  020040  020040          .ASCII  /                           H = HEX/<CR><LF>
 10580  016251     040  020040  021040          .ASCII  /    "XX" IS DX-11 DEVICE NUMBER IN HEX/<CR><LF>
 10581  016321     040  020040  021040          .ASCII  /    "HH" IS A HEX CHARACTER/<CR><LF><LF>
 10582  016357     103  047117  047523          .ASCII  /CONSOLE CONTROL CHARACTERS/<CR><LF>
 10583  016413     103  046124  041455          .ASCII  /CTL-C (↑C) ABORT CURRENT COMMAND/<CR><LF>
 10584  016455     103  046124  050055          .ASCII  /CTL-P (↑P) REQUESTS THE REENTRY OF CONTROL PARAMETERS/<CR><LF>
 10585  016544  052103  026514  020121          .ASCII  /CTL-Q (↑Q) RESUME OUTPUT AFTER TEMPORARILY STOPPING BY (↑S)/<CR><LF>
 10586  016641     103  046124  051455          .ASCII  /CTL-S (↑S) TEMPORARILY STOP OUTPUT TO CONSOLE/<CR><LF>
```

```
 10597  016720  052103  026514  020125            .ASCII  /CTL-U (↑U) DELETE CURRENT INPUT LINE/<CR><LF>
 10598  016766  052522  047502  052125            .ASCII  /RUBOUT -- DELETE LAST CHARACTER INPUTTED/<CR><LF>
 10599  017040     015     012     012            .BYTE   CR,LF,LF,LF
 10600          002554                  HELPLN  =       .-HELPMS
 10601  017044     215     212             TOOC:  .BYTE   215,212
 10602  017046  047524  020117  046103            .ASCII  /TOO CLOSE TO 200000 BOUNDARY/
 10603  017102     377                            .BYTE   377
 10604                                             .LIST   BEX
 10605          017104                             .EVEN
 10606          000001                             .END
```

```
ACCESS  004036
ASCDMP  004624
ATOETB  012344
ATTN  = 000200
BFREMS  013426
BSY   = 000020
BSYEN = 004000
BUFREL  012520
BUSOUT= 000040
BYSS  = 000400
CDEV    013076
CDEVST  010244
CE    = 000010
CEDE  = 000003
CERR    003014
CHEND = 000040
CHENDS= 001000
CHIS  = 000200
CHTB    011600
CHTYMS  013334
CHTYPE  012516
CMDCHF  013064
CMDCHN= 000004
CMDREJ= 000001
CMREAD= 000006
CMRMI = 000002
CMSRMI= 000012
CMWRT = 000001
CMWTLA= 000005
CONEND  012525
CONUNE  007736
COTB    011534
CR    = 000015
CRLF    011324
CSPWST  010276
CTL.C = 000003
CTL.P = 000020
CTL.Q = 000021
CTL.S = 000023
CTL.U = 000025
CUBUSY= 000400
CUE   = 000040
CUEND = 000020
DE    = 000004
DEV   =%000000
DEVCON  013100
DEVMES  013270
DISCEX  010722
DISCTL  010370
DISFRN  010640
DISPSZ= 000740
DMPADR  013114
DONE  = 000200
DREAD   010672
DRMI    010700
DSRMI   010722
DSTOFF  013106
DTAB  =%000003
DTUMTB  003620
DUMP    003420
DXAB    006524
DXABFL  013062
DXACT   013060
DXBA    012464
DXBC    012466
DXCA    012456
DXCB    012474
DXCS    012460
DXDS    012454
DXENB = 000100
DXES1   012500
DXES2   012504
DXEXEC  006542
DXEXIT  010200
DXISR   005322
DXMI    012472
DXMO    012470
DXMOB   012502
DXND    012476
DXONLN= 001000
DXOS    012462
DXRD  = 000005
DXRST = 000001
DXST  = 000007
DXSTPF  013056
DXWR  = 000003
EADDR   013112
EBCDMP  004560
EBCDSP= 000100
EBCDTB  011744
EDEV    012514
ENABLE  004210
EOM   = 000152
EQPCHK= 000020
ERASCM  007756
ESEND = 000100
ESEQ    010030
EXEC    002706
EXECMD  003030
FILL    003704
FILLCH  012524
FILLMS  013626
FIOMS   013564
FTIMFL  013122
GDEV    005270
GETPRM  001154
GLERR   005072
GLEX    005260
GLEX1   005256
GLIMIT  005036
GLMIN   005160
GLMOT   005220
GLMTT   005130
GLOCT   005100
HDMP    004746
HELP    003772
HELPLN= 002554
HELPMS  014270
HEXDMP  004742
ILLMES  013752
INFDSC= 004000
INHEX   002612
INIT    002014
INIT10  002360
INMES   011502
INOCT   002620
INPUT   004316
INR5    002624
INTREQ= 000100
INVLDC  014040
IOBUF   012523
ISSREJ= 000010
KILL    004254
KILLEX  004312
KISAR0= 172340
KISAR7= 172356
KISDR0= 172300
LF    = 000012
LINECT  013045
LINSZ = 000050
LOOP    005352
MAXDEV  013057
MCMDTB  007314
MDEV    013066
MESG    011466
MEX     007176
MMERR   011674
MMMES   013366
MMRESP  012517
MMSR0 = 177572
MREAD   007566
MRMI  = 007470
MSRMI   007470
MTO     011666
MUXEND  010330
MWRITE  007340
NEWLNE= 000025
NEWPRM  001162
NEWP10  001446
NEWP20  001672
NOLIN = 000014
NOP   = 000003
NXM   = 040000
NXMMSG  013676
OCTDMP  004656
OCTEX   004732
ODMP    004662
PARER = 100000
PARMES  013726
PBFE  = 013036
PBFS    012734
PBUFA   013070
PC    =%000007
PCHAR   011362
PCHEND  006444
PCHEN1  006454
PCHEX   006500
PCHIS   006262
PCTR    013061
PCUEND  006430
PESEND  006102
PFPTR   013036
PHYOFF  013074
PINDSC  006014
PISR    011220
PIUFL   013042
PMAX    013120
PMMERR  014157
PMTO    014133
PNOMM   014072
PNXM    006070
PPARER  006232
PPPTR   013040
PRINT2  011342
PRMESG  011400
PROUT   011240
PSELRT  005764
PSW   = 177776
PSYSRT  005636
P1BF    011376
P2BF    011356
QCUE  = 000010
RNMESG  014214
RSTART  001002
RUBOUT= 000177
RUN     003100
R0    =%000000
R1    =%000001
R2    =%000002
R3    =%000003
R4    =%000004
R5    =%000005
R6    =%000006
SADDR   013110
SATTN   007746
SBUFA = 000012
SCMD  = 000000
SCMDRJ= 000200
SCMDTB  006672
SCURS = 000004
SDEV    012512
SDEVTB  013054
SELDEV= 013066
SELRST= 020000
SENSCM  010126
SEX     006554
SINBF = 000006
SLCMD = 000001
SMI   = 000112
SMINS = 000020
SONLF = 000016
SOUTB = 000010
SP    =%000006
SPACE = 000040
SRBYTC= 000014
SRDRQ = 000017
SRD10   007130
SREAD   007106
SRMI    007006
SSENSE= 000002
SSRMI   007006
SSTACK= 012626
SSTAT = 000003
STAMOD= 000100
START   001000
STKSTB= 000002
STMSG   013124
STOP    003252
STOPDX  003326
STOUT   010036
STPDX   006520
STPMES  014006
STSPW   013104
SUDEV   010216
SUDEX   010240
SUD10   010226
SWRITE  006716
SYSINT  001006
SYSRST= 010000
TBUF  = 012630
TBUFE   012730
TCHEND  005612
TCHIS   005600
TCMACT  013043
TCMDAB  013044
```

DZDXIA.CMB SYMBOL TABLE

```
TCMDTB  003032        TNXM    005542        TSTTYP  012522        UCHKS = 002000        VECTMS  013222
TCUEND  005624        TOOC    017044        TTADDR  013052        UEXP  = 000001        VEND    013116
TESEND  005554        TOUTRT  011704        TTPTR   013050        UNADDR  012506       VSTRT   012626
TESTMS  013524        TPARER  005566        TTSIZE= 001000        UNMSG   013165       WK      013046
TINDSC  005530        TPB     012452        TTYSTP  013063        UNTRP   011732       WK1     013047
TKB     012446        TPS     012450        TT1   =%000004        VBUFA   013072       XADDR   013102
TKIN    010732        TPTR    012732        TT2   =%000005        VCMDTB  002576       .     = 017104


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *,NOW.SEQ/PAGNUM=SYSMAC.CO,DZDXIA.CMB
 RUN-TIME: 31  46  1 SECONDS
 RUN-TIME RATIO: 321/79=4.0
 CORE USED:  32K  (63 PAGES)
```

J10

Spooler runtime 14 Seconds, 60 KCS, 388 disk reads, 3 disk writes, 125 pages