IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZQCA-F
SUPERSEDES: MAINDEC-11-D9D-

PRODUCT NAME: COMMUNICATION TEST PROGRAM (CTP)

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MAINTAINER: DIAGNOSTIC GROUP

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1.0 ABSTRACT

The function of this test is to detect malfunctions caused by the interaction of multiple communication devices. The test is designed to run 32 DC11 asynchronous line interfaces, 16 KL11 user teletype interfaces, 32 DP11 synchronous line interfaces, 16 DM11 asynchronous multiplexers, 16 DN11 auto calling units (64 lines), one DX11 (IBM 360 or 370 interface), 31 DL11C,D or E asynchronous interfaces, 8 DJ11 asynchronous interfaces one LP11 line printer, one TC11 DECtape, one RF11 disk, one RK11 disk, one RP11 disk, and one KL11 console teletype interface. All devices are fully interrupt driven. This allows a background program to monitor the comm devices (DC's, KL's, DP's, DM's, DL's, DH's, DJ's, DN's) and continuously check NPR data (RF, RK, RP, TC). On the first pass of this program the user must generate the hardware configuration to be tested. This is accomplished by leaving the start address in the console switches when pressing START. A systems configuration of devices currently on the system will be output on the CTY. The program then halts, permitting the user to select the device to be tested. After the intial configuring has been accomplished the restart proceedure is to "LOAD ADDRESS", zero switches, "START".

1.1 NOTE:

This program is run on the original hardware configuration (for communication systems) specified by the customer keysheet.

2.0 REQUIREMENTS

2.1 Equipment

A. PDP-11/20 System (8K core)
B. High speed reader
C. Console typewriter

2.1.1 Options

A. LP11 line printer
B. RF11, RK11 and/or RP11 disks
C. TC11 DECtape
D. DC11 asynchronous line (32.MAX)
E. KL11 asynchronous interface (16.MAX)
F. DP11 synchronous line (32.MAX)
G. DM11 async mux (16.MAX)
H. DN11 auto calling unit (16.MAX)
I. DX11 IBM Front end

J. DM11BB modem control mux (16.MAX)
K. KG11A cycle redundancy check option (8.MAX)
L. DL11C,D,E asynchronous interface (31.MAX)
M. DH11 (to be added)
N. DJ11 asychronous interface (8.MAX)

NOTE:

PERIPHERAL OUTPUT, such as VT05 and VT06 display and LA30 hard copy is "not" meaningfull for other than the line printer or local console TTY.

NOTE:
32 DP11's at 3KHZ (maintenance mode) requires in excess of 100% of the processor time. To run 32 simultaneously the maintenance clocks must be slowed by adding a capacitor to the maint. clk. cap.

2.2 Storage

The core requirements of this program is a function of the hardware under test. It consists of a fixed core requirement (location 000000 thru LINKER and a variable core requirement linker and up. This variable segment is a linker area to point unique-vectored multiple devices to a common interrupt service routine (ISR). Therefore the size of the linker area is a function of the number of devices under test. The linker area requires 3 words per vector followed by 400 bytes per DM11. The 400 byte DM11 buffers must start on a modulo 400 boundry. The DX11 requires 2000(8) bytes of table storage. This storage area must begin on a modulo (2000) boundry. If the DX11 is run online an additional (10)(420) octal bytes are required for tumble table trace tables and control functions. After the DX11 buffers, the rest of unused memory is filled with a special memory exercising routine.

Storage requirements = location 000000 to LINKER plus 3 words per vector plus 400 bytes per DM, plus 2000 or more bytes per DX11. see 7.1 restrictions DX11 online testing.

3.0 LOADING PROCEDURE

This program is assembled in absolute format. The ABS loader is used to load the program.

4.0 USER PROCEDURE

4.1 Initialize Perpherial Devices

A. Line printer:

1) Power "ON"
2) Ready light on
3) "ON LINE" light on

B. DECtape:
1) Mount spare cerified DECtape
2) Place drive in REMOTE
3) Select desired unit number
(when in doubt use unit 0)
(ACT11 select unit 1)

4.2 Operator Interaction

A. Load address 000200

B. Leave start address in WSR, depress START
A systems configuration map will be ouput on the CTY. To suppress further systems configuration map output on restarts set switch register bit #13.

C. Program will HALT and display a "1" one in the data lights indicating switch register selection #1.

D. Set desired switch register option. Switch in up position is a "1" and will cause the corresponding device to be tested.

DATA LIGHTS = 1, GENERAL TEST CONFIGURATION **********

SW00 = 1, TEST NON-COMM DEVICES
SW01 = 1, TEST DC11 ASYNC LINE UNIT
SW02 = 1, TEST KL11 MULTI-USER TTY'S
SW03 = 1, TEST DP11 SYNC LINE UNITS
SW04 = 1, TEST DM11A ASYNC MUX
SW05 = 1, TEST DN11 AUTO CALLING UNITS
SW06 = 1, TEST DM11BB MODEM CONTROL MULTIPLEXERS
SW07 = 1, TEST KG11A CYLIC REDUNDANCY OPTION
SW08 = 1, TEST DX11
SW09 = 1, TEST DL11C,D,E
SW10 = 1, TEST DH11 (TO BE ADDED)
SW11 = 1, TEST DJ11

DATA LIGHTS = 2, NON-COMM TEST CONFIGURATION **********

SW00 = 1, TEST CTY CONSOL TELETYPE
NOTE: DYNAMIC SWITCH SETTING
SW13 MUST BE SELECTED IE = 1
TO TEST CTY (CONSOLE TTY) READER
SW01 = 1, TEST LP11 LINE PRINTER
SW02 = 1, TEST TC11 DECTAPE (SEE "NOTE:" AT 9.8.1)
SW03 = 1, TEST RF11 DISK
SW04 = 1, TEST RK11 DISK
SW05 = 1, TEST RP11 DISK

```
      DATA LIGHTS = 3, DC11 TEST CONFIGURATION **********

              SW00 = 1, TEST DC LINE 0
              SW01 = 1, TEST DC LINE 1
                .
                .

              SW15 = 1, TEST DC LINE 15

      DATA LIGHTS = 4, DC11 TEST CONFIGURATION (CONTINUED)

              SW00 = 1, TEST DC LINE 16
              SW01 = 1, TEST DC LINE 17
                .
                .

              SW15 = 1, TEST DC LINE 31

      DATA LIGHTS = 5, KL11 TEST CONFIGURATION **********

              SW00 = 1, TEST KL LINE 0
              SW01 = 1, TEST KL LINE 1
                .
                .

              SW15 = 1, TEST KL LINE 15

      DATA LIGHTS = 6, DP11 TEST CONFIGURATION **********

              SW00 = 1, TEST DP LINE 0
              SW01 = 1, TEST DP LINE 1
                .
                .

              SW15 = 1, TEST DP LINE 15

      DATA LIGHTS = 7, DP11 TEST CONFIGURATION (CONTINUED)

              SW00 = 1, TEST DP LINE 16
              SW01 = 1, TEST DP LINE 17
                .
                .

              SW15 = 1, TEST DP LINE 31

      DATA LIGHTS = 10, DM11A TEST CONFIGURATION **********

              SW00 = 1, TEST DM11A #0 (LINES  0-15)
              SW01 = 1, TEST DM11A #1 (LINES 16-31)
                .
                .

              SW15 = 1, TEST DM11A #15 (LINES 240-255)

      DATA LIGHTS = 11, DN11 TEST CONFIGURATION **********
```

```
        SW00 = 1, TEST DN11 #0 (LINES 0-3)
        SW01 = 1, TEST DN11 #1 (LINES 4-7)
          .
          .
        SW15 = 1, TEST DN11 #15 (LINES 60-63)

DATA LIGHTS = 12, DM11BB TEST CONFIGURATION **********

        SW00 = 1, TEST DM11BB #0
        SW01 = 1, TEST DM11BB #1
          .
          .
        SW15 = 1, TEST DM11B #15

DATA LIGHTS = 13, KG11A TEST CONFIGURATION **********

        SW00 = 1, TEST KG11 #0
        SW01 = 1, TEST KG11 #1
          .
          .
        SW07 = 1, TEST KG11 #7

DATA LIGHTS = 14, DX11 TEST CONFIGURATION **********

        SW00 = 1, TEST DX11 #0
          .
          .
        SW08 = 1, ONLINE TEST OF DX11 #0

DATA LIGHTS = 177400, DX11 #0 CU ADDRESS

DATA LIGHTS = 15, DL11C,D,E TEST CONFIGURATION ********

        SW00 = 1, TEST DL11 LINE #0
        SW01 = 1, TEST DL11 LINE #1
          .
          .
        SW15 = 1, TEST DL11 LINE #15

DATA LIGHTS = 16, DL11C,D,E TEST CONFIGURATION(CONTINUED)

        SW00 = 1, TEST DL11 LINE #16
        SW01 = 1, TEST DL11 LINE #17
          .
          .
        SW14 = 1, TEST DL11 LINE #30

DATA LIGHTS = 200, DJ11 TEST CONFIGURATION
```

```
            SW00 = 1, TEST DJ11 #0
              .
              .
            SW07 = 1, TEST DJ11 #7
      DATA LIGHTS = 20, DJ11 #0 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #0 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #0 LINE #15
      DATA LIGHTS = 21, DJ11 #1 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #1 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #1 LINE #15
      DATA LIGHTS = 22, DJ11 #2 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #2 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #2 LINE #15
      DATA LIGHTS = 23, DJ11 #3 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #3 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #3 LINE #15
      DATA LIGHTS = 24, DJ11 #4 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #4 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #4 LINE #15
      DATA LIGHTS = 25, DJ11 #5 TEST CONFIGURATION *********
            SW00 = 1, TEST DJ11 #5 LINE #0
              .
              .
            SW15 = 1, TEST DJ11 #5 LINE #15
      DATA LIGHTS = 26, DJ11 #6 TEST CONFIGURATION *********
```

SW00 = 1, TEST DJ11 #6 LINE #0
.
.
SW15 = 1, TEST DJ11 #6 LINE #15

DATA LIGHTS = 27, DJ11 #7 TEST CONFIGURATION *********

SW00 = 1, TEST DJ11 #7 LINE #0
.
.
SW15 = 1, TEST DJ11 #7 LINE #15

DATA LIGHTS = 177777, DYNAMIC SWITCH SETTING **********

NOTE: SW09 SELECTION MAY RESULT IN DEVICE NOT RUNNING REPORTS

SW08 = 1, INHIBIT MEMORY TEST WORST CASE NOISE

SW09 = 1, INHIBIT MEMORY TEST FAST READ/WRITE

SW10 = 1, BELL ON ERROR
0, BELL ON PASS COMPLETED

SW11 = 1, INHIBIT ITERATIONS

SW13 = 1, INHIBIT ERROR TYPEOUT

SW14 = 1, SCOPE LOOP

SW15 = 1, HALT ON ERROR !

5.0 PROGRAM AND/OR OPERATOR ACTION

5.1 Normal HALTS

See Section 4.2 operator interaction

6.0 ERRORS

6.1 Error Reporting

The error reporting format was developed specifically for communication devices. The format assumes that R1 contains the line number (e.g. DC11 #1, DM11 #3 etc.) and that R2 contains the device address. The printout is as follows:

PC	PS	SP
nnnnnn	mmm	111111

Where:

PC "nnnnnn" is the address (within the program) of the error.
PS "nnnnnn" is the contents of the processor status register.
SP "111111" is the contents of the stack pointer.

The numeric typeout is not (with exception of the error PC) necessarily significant for non-communication devices, the DX11 or the DN11.

For the DX11 offline exerciser R1 contains the address of the DX input data buffer and R2 contains the input byte count. Error reporting in the online mode is done at the 360 console using FRIEND.

In addition to hard errors (errors subject to the HALT-ON-ERROR switch) CTP also has a "soft error" reporting routine that indicates that a device has not been serviced within the 8 sec to infinity window of the background monitor. The printout does not inhibit interrupts and is in the following format:

DEVICE NOT RUNNING:
"DEVICE""(n-m)"

Where:

DEVICE will be any of the following:

"ANCILLARIES", "DC11", "KL11", "DP11", "DM11A", "DN11", "DM11B", "KG11", "DX11", "DL11", "DJ11".

And "(n-m)" will have a numeric value of from 0 thru 31 decimal.

This output is to the console terminal and will cause the terminal test routine to error. Therefore if system overload problems are anticipated the operator should not run the console terminal test routine.

When execution is under control of the ACT11 Monitor all devices reported by the test configuration processor are tested and DEVICES that do not respond due to systems overload are reported as DEVICE NOT RUNNING and those devices are shut down.

6.2 Error HALT

If console switch 15 is on the program will HALT at location HALTER following the error type out. If switch 15 is down the program will restart on error.

7.0 RESTRICTIONS

If the line printer was selected for test the restart address is 1000. If 1000 is left in the consol switches when start is pressed the program will assume a new test configuration is desired. In this way the line printer may be deselected and restart address is 200 on the next pass.

7.1 DX11 ONLINE TESTING requires a minimum of 12 Kwords of memory. For testing in 8K word memory systems, the number of devices on line prameter located at symbolic location "NONL" will be modified to equal 1, (by the program).

7.2 PDP-11 SYSTEMS using 8k words of memory and testing low speed doubble buffered communications devices under monitor control (i.e., ACT-11). Depending on the cpu (i.e., mainframe) or type of memory used, it is possible that background processing can be completed in less than a character transfer time of a device being tested. This is due to the fact that monitor mode execution incorporates a QUICK PASS (i.e., suppress iterations) on pass #1, for quick verification of systems. This can result in

"DEVICE NOT RUNNING REPORTS". Should this occur under test, reload CTP using dump mode on the ACT-11 daughter station. Then clear location 42 octal and initialize for test starting at 4.0 user procedure. On 8k word memory systems device not running reports can occur with the setting (i.e.,=1) of dynamic word switch register switches:

11=1 INHIBIT ITERATIONS

9=1 INHIBIT MEMORY TEST FAST READ/WRITE

8=1 INHIBIT MEMORY TEST WORST CASE NOISE

NOTE:

DEVICE NOT RUNNING REPORTS SHOULD NOT
BE IGNORED BUT RESOULVED AS STATED ABOVE.

8.0 MISCELLANIOUS

8.1 Program Run Time

The run time is dependent on the amount of memory on the system and the number of devices selected to run. The minimum run time, with 8K of memory and no devices selected, is about 8 seconds. Add approximately 8 seconds for every 4K of additional memory. Each additional device takes up to about 10% additional time, until 100% of the processor is

used servicing devices, i.e. some large systems will not be able to select all available devices at the same time. A quick Verification pass may be selected by setting switch register switches 08 and 09 inhibit memory tests and switch 11 inhibit iterations.

8.2 For hardware specifications, refer to the PDP-11 Peripheral and interface handbook.

9.0 PROGRAM DESCRIPTION

Following the load address and start sequence the program examines the console switches to see if the start address bit is still up. If so the program assumes that this is the first pass or a new test configuration is desired. If the start address is not in the console switch the program assumes that "no" hardware has been added or removed from the system.

For mechanical devices, such as the TTY reader, there is no automatic re-synchronization if its tape becomes out of phase with the data. It will become necessary to stop the exerciser and manuallly resynchronize the tape and restart the exerciser.

There is a primer area that checks the switch register to see what devices are to be initiated. The primer area sets the interrupt enable bit in the device status register, initializes the data pattern and initiates an operation to raise data flags on devices that can not initiate themselves. Then the primer jumps to the processor test where the individual devices are serviced at the interrupt rate.

The function of this test is to drive the unibus to the highest possible level of throughput in order to detect malfunctions which might arise from device interaction. It was for this reason that the device selection options are so extensive. This program is "NOT" a PROCESSOR or DEVICE DIAGNOSTIC.

9.1 CLREVEC

This subroutine loads location 000300 through 776 with .+2 and HALT. This is a series of instruction starting at location 0, designed to detect, and isolate unexpected traps and interrupts to the trap and interrupt vector area of memory.

The principle of this routine is: The vector entrance address points to the next sequential word which contains a HALT (00000). (This location is also the status for that

vector entrance, but this has no effect on it also being the next instruction).

If a HALT occurs in the trap or interrupt vector area, register six should be examined to determine the location the program was at, when the interrupt or trap occurred. (Memory as specified by R6 contains the PC of the instruction following this instruction where the trap occurred).

Following the .+2 initialization the emulator vector and start address is initialized. Emulator vector and start address in initialized.

9.2 SYSMAP

The function of this routine is to create a map of all the devices of the system capable of being tested by this program. The program assumes that all devices have their standard address and that all communication devices follow the address and vector assignment scheme specifies by the communication memo "relative vector assignments for communication devices in PDP-11 production systems".

SYSMAP generates ten (10) maps, a one (1) indicates that that device or line exits, e.g. bit 0 up indicates line zero exits.

SY.DC Map of DC11's lines 0-15.
SY.DC Map of DC11's lines 16-31.
SY.KL Map of KL11 lines 0-15.
SY.DP Map of DP11 lines 0-15.
SY.DP Map of DP11 lines 16-31.
SY.DM Map of DM11 units 0-15.
SY.DN Map of DN11 units 0-15.
SY.DL Map of DL11 units 0-15.
SY.DL Map of DL11 units 16-30.
SY.DH Map of DH11 units 0-15.
SY.DJ Map of DJ11 units 0-7.
SY.ANCMAP Map of ancillary devices.
  BIT0=KL11 Console TTY
  BIT1=LP11 Line Printer
  BIT2=TC11 DECtape
  BIT3=RF11 Disk
  BIT4=RK11 Disk
  BIT5=RP11 Disk

9.3 SWITCH

This routine enables the operator to select the system test configuration as per 4.2

9.4 SYSGEN

This routine verifies that all devices selected for test exist. Following this validation, the routine initializes the device vectors to point to the linker area and genrates the linker code. This section of code connects multiple vectors to the device interrupt service routine (ISR). The linker area also contains the line number corresponding to the vector it handles.

9.5 REPRT

This routine was intended to report the hardware and test configuration on the console TTY.

9.6 DEVICE

This routine is the entry point of the program when the swith register is zero. The function of this routine is to initialzie the status registers and data files of those devices selected for test.

9.7 BCKGND

9.7.1 Monitor

When the test configuratin has been selected and as corresponding devices initialized the processor priority is lowered to zero and the devices are serviced. If the ISR's do not require 100% of the processor time (as is the case with 32.DPII) the spare time is used to run a background routine. This routine monitors NPR data files (RF11, TC11) for data errors and silent devices (DC11's, DP11's) to verify that they are in fact running. The switch register is scanned once per pass in background and if SW9=0 (i.e., is reset) CORTST per 9.7.4 is envoked.

In the case of NPR data check the disk and DECtape input files are compared with a master output file.

9.7.2 CORTST (Memory Expansion)

This memory expansion is accomplished by repeating a unique test in unused memory. In the straight line code a test is made to see if extra memory is to be used. If so the memory is filled with the unique test, then the processor test jumps to the start of the expanded code. This code is executed in these memories until the end of the code is reached, then it will return to the normal processor test.

The amount of memory is determind by doing a TST (0)+ until a time out trap occurs. The value in the register at this time is considered to be high memory. 1000(8) bytes are subtracted from this value to leave a buffer at the top of memory, for ACT11 use.

A copy of the rotate byte instruction test is used as the unique test to fill memory. This test is written in position independent code.

9.8 Interrupt Service Routines

9.8.1 FENDX (TC11 Forware End Zone)

FENDZ is the first address in the DEC tape interrupt vector (214). This routine will read, in reverse block numbers until the reverse end zone is found. At this point the interrupt vecotr and command register are modified to read all block number in the forward direction. Each block number read is compared with the expected block number count and miscomparisons reported. When each block is found (with the exception of block 0) a block two hundred fifty six word of test data is written onto tape. After all block numbers have been read the tape is driven into the forward end zone. Here the direction is reversed and ll block numbers are read in reversed. Starting with block 1100 through block 1 the data is read from tape and stored in a storage buffer for comparison. While the I/O routines are inactive a background program compares TC11 read data with TC11 write data and errors are reported. At this point the bell is rung and test restarted.

NOTE:
TC11 DECTAPE DEVICE ADDRESS:

ACT11 = UNIT #1 otherwise UNIT #0 is tested.

9.8.2 DSKVEC (RF11 Disk Service Routine)

This routine is entered from the RF11 interrupt vector, the first section of this routine determines which disk function (write, write check, or read) to perform. Each function is executed in blocks of two hundred and fifty six words. When function has been executed through out the entire disk area the next function is selected and executed in the same manner two data buffers are involved in the disk exerciser, The first (BUFF*) is a two hundred and fifty six word block and serves as output data for RF11 disk and TC11 DECtape. The data file is a symmetrical pattern of N,-N where N=1 through 128, followed by -n-1,N where n=128 through 1. The second buffer (INBERF:) is a storage buffer for the disk read function. While the I/O interrupt routines are

inactive a background program continously compares the input buffer with the output buffer.

9.8.3 RKSTART (RK-11 Disk)

This routine performs a write and a write check of the disk. The data that is written on the disk is part of test program code that is never modified. This segment of memory is written in contiguous block thru the disk memory. After the total disk(s) has been written, a write check is used to verify that the data has been written correctly on the disk. Note that no "DATO" are used in exercising the disk (data is not transferred into memory). Ther is a location in the program that if modified will allow exercising up to four disks.

9.8.4 LPVECT (Line Printer Service Routine)

The LP11 line printer service routine is entered through an interrupt vector at location 200. A wedge is formed by printing a continous set of sixty four characters (40 through 137). The first line prints a full row of eighty columns. Then each sucessive line prints one less column until zero is reached and the wedge restarts.

NOTE:
That on successive lines of printer output that the previous lines first character is discarded. This causes the printed text (output) to rotate to the left one character per line.

Because the wedge does not contain a multiple of sixty four characters, sixty four different wedges are printed. If the line printe has a capacity of ninety six characters, location LPSIZE should be changed accordingly.

9.8.5 DC.XMT DC11 Transmitter Service Routine

Each line of the DC11 has separate vecotr for the transmitter and receiver. These vectors point to a unique instruction in the linkr area. This instrcution in a JSR register 5 to the ISR and is followed by the line number. Upon entry to the ISR registers R1 and 2 are saved and the line number is fetched. The line number scaled to form and index to the data for that line and scaled again to form an index to the device status register. The data generated by the transmitter ISR is a binary count pattern 0-377. Since the transmitter is operating in the 5 bits/character mode this pattern appears to the receiver as four patterns of 0-37.

The 5 bit mode was selected to give the highest possible rate of interrupts. This scheme also verifies that the 3

MSB get stripped and that there is no cross talk between bits. The ISR transmits one character per entry and return to the mainline by incrementing R6 and executing an RTI.

9.8.6 DC.RCV DC11 Receiver Service Routine

The entry and exit scheme for the receiver ISR is indentical to that of the transmitter ISR. In this routine the done bit is tested to verify that is is a legitimate interrupt. Bit8 of the receiver status is set indicating to the background monitor that the line has been serviced and a comparison is made between the contents of the receiver data buffer and the expected data (0-37).

Because the DC11 is:
1. Operating in maintenance mode
2. Not double buffered
3. An asynchronous device

Data overrun should never occur as a result of processor time consumed by higher priority deviced.

9.8.7 KL.XMT KL11 Transmitter ISR

KL.XMT services all user KL11's up to sixteen. Because the device and vector addresses of the consol KL11 are not contiguous with the user KL11's a separate routine handles the CTY. KL.XMT is entered through the linker area in order to present a line number to the ISR if interrupt enable and done are set the ISR transmits a character in a binary count pattern (0-147), and exits.

NOTE:
The receiver routine is set up to run in the maintenance mode. This means that is an ASR33 is to be used there must not be any tape in the reader. If the reader is to be tested location KLXSET must be patched to 100.

9.8.8 KL.RCV KL11 Receiver ISR

The entry and exit scheme of the receiver ISR is identical to that of the transmitter. Receiver done and interrupt enable are tested prior to the data check to detect false interrupts. The data test first checks for leader. If the data is not leader it must eithr be a bell (207) or the correct data in the binary pattern (0-147)

9.8.9 Consol KL11 ISR's

The console IRS are entered directly from the console vectors (60-66), and the exit is by RTI data handling is identical to that of the KL11 users ISR.

9.8.10 DP11 Receiver ISR

The DP11 receiver ISR goes active on 4 syns's and receives and checks a binary count pattern 0-377 then kills active and waits to be resynced.

9.8.11 DP.XMT DP11 Transmitter ISR

The DP transmitter ISR transmits 4 sync characters and a binary count pattern 0-377. This process continues indefinately unless the system overhead gets too heavy. If this happens RCV O'RUN will set and the transmitter will stop and resync.

9.8.12 DM11 ISR

The DM11 routines first transmits an all ones character to each DM receiver to determine the character length of each DM. Then a binary count is transmitted in proportion to the character length.

9.8.13 DN11 ISR

The DN routine utilizes the maintainence mode to test the interface logic. After the interrupt has been serived, a software flag is set which signals the backgroung program to transmit the next data when it is ready. This routine only assumes one line per DN11. If an additional line is there, but doesn't work, it may never be detected.

9.8.14 DX11 Offline ISR

The function of the offline DX11 code is to create NPR's at a rate similar to that which would occur while operating online. To accomplish this and a fast Service-In/Service-Out sequence is enabled by setting the SOSIEN (SRVO-SRVI ENABLE) flop.

Following all the table initialization the 360 simulator out lines are loaded with a test data pattern (125) and the byte count and destination address are set. The DX function bits are set to do a 360 WRITE (from the 360 into PDP memory) and the SOSIEN is then set. This causes a fast SERVICE-IN/SERVICE-OUT sequence to take place until the byte count goes to zero. At that time the DONE light is set and the DX11 interrupts to the offline interrupt service routine DX.ISR. In this routine the received data buffer is checked for correct data and then is cleared and the sequence restarted.

Some errors that have been typical are Data Lates on the

RK03 disk and "holes" in either DX or RK data buffers. These "holes" were caused by noise on the M7821's which caused BUS BUSY to drop.

9.8.15 DX11 Online Responder

The online DX11 module of CTP is a responder to a 360 program that allows the PDP-11 system to be exercised in conjunction with the 360 system.

The 360 channel to the DX11 is usually driver by an IBM diagnostic program called FRIEND, which generates an arbitrary CCW string for a particular device (see DX11-B Maintenance Manual for FRIEND operator procedures). The DX11 CTP module recognizes eight 360 addresses, and all 256 commands, and responds to them as follows:

Addresses	X0 - X3:	Selections accepted (see command responses).
	X4 - X7:	Selections rejected with unit-check, except for sense, which receives Intervention Required.
Commands	Read :	Clears Sense byte and transfers 256 byte buffer to 360.
	Write :	Clears Sense byte and transfers 256 bytes from 360.
	Sense :	Returns one byte Sense byte to 360 (Sense byte not cleared).
	NOP :	No operation - Sense byte not altered.
	Others :	Rejected via Unit-Check. Sense byte set to Command-Reject.

The effect of these operations is that addresses X0 - X3 appear "online" to the 360, and X4 - X7 appear "offline". Also, for the online addresses, Read, Write, Sense, and NOP are legal commands.

FRIEND COMMAND STRING

In order to exercise the DX11 online to the 360, the following command string should be typed to FRIEND:

```
DEV = XXX
WRITE FROM $A
DATA = 256 X ff
READ INTO $B
DL = 256
COMPARE $A, $B
```

GO

ERROR DETECTION

No errors are detected by the CTP module. FRIEND detects data errors caused by the DX11 and also the failure of the DX11 to respond (which probably means that the DX11 failed to interrupt).

CTP SETUP

Several program constants may require alteration before CTP is started.

DX11 interrupt priority - default is 200 for BR4. In DX11 interrupts at BR5 or BR6, this constant must be changed.

DX11 control unit address - default is hexadecimal 10 (octal 20). This value should be changed to reflect the jumpered 360 address of the DX11 (see DX11-B Maintenance Manual).

9.8.16 DL11A,B C,D.E

Since each DL11 unit has four registers each requires four addresses. Address space assignments for the DL11A and B are the same as for the KL11; that is, unit 0 occupies addresses 777560-777566, and units 1-15 occupy from 776500 through 776676. For the DL11C,D, and E unit 0 will have address 775610 thru unit 31 at 776170.

The four registers and their addresses are listed for DL11 unit 0, where xx is 756 for DL11A and B, and 561 for DL11C,D,E.

1. RECEIVER STATUS REGISTER (RCSR) 77XXX0
2. RECEIVER DATA BUFFER REGISTER (RBUF) 77XXX2
3. TRANSMITTER STATUS REGISTER (XCSR) 77XXX4
4. TRANSMITTER DATA BUFFER REGISTER (XBUF) 77XXX6

DL11A,B

Are KL compatable devices with 8 bit character, no parity and two stop bit. If one is used for the console teletype it is assigned VECTOR ADDRESS 60 and 64.

9.8.17 DL.XMT DL11 Tranmitter ISR

DL.XMT services all user DL11's up to thirty one. Because

the device and vector addresses of the console DL11A and B are not contiguous with DL11C,D,E's the DL11A and B's are treated as KL11's and a separate routine handles them. DL.XMT is entered through the linker area. Transmitter ready is verified on each entry and a binary processed pattern of (0-37) is tranmitted.

9.8.18 DL.RCV DL11 Receiver ISR

The DL11 is tested in maintenance mode and entry in the receiver ISR is identical to that of the transmitter. The receiver done is tested prior to the data check to detect false interrupts. Each entry into the receiver ISR the DL DEVICE FLAG bit is set in the systems RUN MAP to indicate that the device has been serviced.

9.8.19 DJ.XMT/DJ.RCV Transmitter/Receiver Service Routines

Each DJ11 has a separate Vector for the transmitter and receiver. These vectors point to a UNIQUE instruction in the LINKER AREA. This instruction is a JSR register 5 to the associated ISR and is followed by the device number. On entry into the ISR the device number is fetched and scaled to form a device base address used by the ISR to service that device.

9.8.20 DJ.XMT DJ11 Transmitter ISR

On initial entry bit 15 XMIT READY is tested to detect false interrupts. The line number which requires service is extracted from the transmitter buffer register and used as an index to retrieve its associated character for transmission. The associated character entry is transmitted and then incremented to the next value. A 5 level binary processed data pattern of 0-37 is transmitted. Expanded character level and error report capability has been included, the method of implementation can be found in the form of annotation within the DEVICE ISR program listing. The device CSR register is tested and further line activity is processed as required. A running tally of transmitted characters is recorded in location DJ.XTLY.

9.8.21 DJ.RCV DJ11 Receiver ISR

The DJ11 is tested in maintenance mode and entry into the receiver ISR is identical to that of the transmitter. The RECEIVER DONE bit 7 is tested to detect false interrupts. The received character word is verified at a 16 bit level. i.e., OVERRUN, FRAMING and PARITY errors will result in error display processing. Each entry into the receiver ISR the DJ DEVICE FLAG bit is set in the system RUN MAP to

indicate that the device has been serviced.

10.0 FLOW CHART

11.0 LISTING


```
                                .TITLE  MAINDEC-11-DZQCA-G      COMMUNICATION TEST PROGRAM (CTP)
                                .ABS
                                .ENABLE TIM
                                ;COPYRIGHT 1972, 1973 BY DIGITAL EQUIPMENT CORPORATION
                                ;MAYNARD, MASSACHUSETTS 01754
                                ;PROGRAMMER:    WALT ARMSTRONG
                                ;
                                ;DATA LIGHTS = 1, GENERAL TEST CONFIGURATION ****************************
                                ;HALT ADDRESS 3114
                                ;       SW00 = 1, TEST NON-COMM DEVICES
                                ;       SW01 = 1, TEST DC11 ASYNC LINE UNIT
                                ;       SW02 = 1, TEST KL11 MULTI-USER TTY'S
                                ;       SW03 = 1, TEST DP11 SYNC LINE UNITS
                                ;       SW04 = 1, TEST DM11A ASYNC MUX
                                ;       SW05 = 1, TEST DN11 AUTO CALLING UNITS
                                ;       SW06 = 1, TEST DM11BB MODEM CONTROL MULTIPLEXERS
                                ;       SW07 = 1, TEST KG11A CYCLIC REDUNDANCY CHECK OPTIONS
                                ;       SW08 = 1, TEST DX11
                                ;       SW09 = 1, TEST DL11C,D,E
                                ;       SW10 = 1, TEST DH11 (TO BE ADDED)
                                ;       SW11 = 1, TEST DJ11
                                ;
                                ;DATA LIGHTS = 2, NON-COMM TEST CONFIGURATION ***************************
                                ;HALT ADDRESS 3140
                                ;       SW00 = 1, TEST CTY CONSOL TELETYPE
                                ;NOTE: DYNAMIC SWITCH SETTING
                                ;       SW13 MUST BE SELECTED IE = 1
                                ;       TO TEST CTY (CONSOLE TTY) READER
                                ;       SW01 = 1, TEST LP11 LINE PRINTER
                                ;       SW02 = 1, TEST TC11 DECTAPE
                                ;       SW03 = 1, TEST RF11 DISK
                                ;       SW04 = 1, TEST RK11 DISK
                                ;       SW05 = 1, TEST RP11 DISK
                                ;
                                ;DATA LIGHTS = 3, DC11 TEST CONFIGURATION ******************************
                                ;HALT ADDRESS 3164
                                ;       SW00 = 1, TEST DC LINE 0
                                ;       SW01 = 1, TEST DC LINE 1
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DC LINE 15
                                ;
                                ;DATA LIGHTS = 4, DC11 TEST CONFIGURATION (CONTINUED)
                                ;HALT ADDRESS 3206
                                ;       SW00 = 1, TEST DC LINE 16
                                ;       SW01 = 1, TEST DC LINE 17
                                ;         .
                                ;         .
```

```
51          ;
52          ;       SW15 = 1, TEST DC LINE 31
53          ;
54          ;DATA LIGHTS = 5, KL11 TEST CONFIGURATION ***********************************
55          ;HALT ADDRESS 3232
56          ;       SW00 = 1, TEST KL LINE 0
```

```
                                ;       SW01 = 1, TEST KL LINE 1
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST KL LINE 15
                                ;
                                ;DATA LIGHTS = 6, DP11 TEST CONFIGURATION ********************************
                                ;HALT ADDRESS 3256
                                ;       SW00 = 1, TEST DP LINE 0
                                ;       SW01 = 1, TEST DP LINE 1
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DP LINE 15
                                ;
                                ;DATA LIGHTS = 7, DP11 TEST CONFIGURATION (CONTINUED)
                                ;HALT ADDRESS 3300
                                ;       SW00 = 1, TEST DP LINE 16
                                ;       SW01 = 1, TEST DP LINE 17
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DP LINE 31
                                ;
                                ;DATA LIGHTS = 10, DM11A TEST CONFIGURATION ******************************
                                ;HALT ADDRESS 3324
                                ;       SW00 = 1, TEST DM11A #0 (LINES 0-15)
                                ;       SW01 = 1, TEST DM11A #1 (LINES 16-31)
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DM11A #15 (LINES 240-255)
                                ;
                                ;DATA LIGHTS = 11, DN11 TEST CONFIGURATION ********************************
                                ;HALT ADDRESS 3350
                                ;       SW00 = 1, TEST DN11 #0 (LINES 0-3)
                                ;       SW01 = 1, TEST DN11 #1 (LINES 4-7)
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DN11 #15 (LINES 60-63)
                                ;
                                ;DATA LIGHTS = 12 DM11BB TEST CONFIGURATION ******************************
                                ;HALT ADDRESS 3374
                                ;       SW00 = 1, TEST DM11BB #0
                                ;       SW01 = 1, TEST DM11BB #1
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1, TEST DM11BB #15
                                ;
                                ;DATA LIGHTS = 13, KG11A TEST CONFIGURATION ******************************
                                ;HALT ADDRESS 3420
                                ;       SW00 = 1, TEST KG11 #0
                                ;       SW01 = 1, TEST KG11 #1
                                ;         .
```

```
                        ;         .
                        ;         .
                        ;       SW07 = 1, TEST KG11 #7
                        ;
                        ;DATA LIGHTS = 14, DX11 TEST CONFIGURATION ******************************
                        ;HALT ADDRESS 3444
                        ;       SW00 = 1, TEST DX11 #0
                        ;
                        ;       SW08 = 1, ONLINE TEST OF DX11 #0
                        ;
                        ;NOTE:
                        ;       FOR DX11 ONLINE TEST SELECTION SEE RESTRICTIONS
                        ;       7.1 LISTING ANNOTATION AT BEGINING OF THIS MAINDEC
                        ;
                        ;
                        ;       DATA LIGHTS = 177400, DX11 #0 CU ADDRESS
                        ;HALT ADDRESS 3512
                        ;
                        ;DATA LIGHTS = 15, DL11C,D,E TEST CONFIGURATION **************************
                        ;HALT ADDRESS 3550
                        ;       SW00 = 1, TEST DL11 LINE #0
                        ;       SW01 = 1, TEST DL11 LINE #1
                        ;         .
                        ;         .
                        ;
                        ;       SW15 = 1, TEST DL11 LINE #15
                        ;
                        ;DATA LIGHTS = 16, DL11C,D,E TEST CONFIGURATION (CONTINUED)
                        ;HALT ADDRESS 3572
                        ;       SW00 = 1, TEST DL11 LINE #16
                        ;       SW01 = 1, TEST DL11 LINE #17
                        ;         .
                        ;         .
                        ;
                        ;       SW14 = 1, TEST DL11 LINE #30
                        ;
                        ;DATA LIGHTS = 200, DJ11 TEST CONFIGURATION
                        ;HALT ADDRESS 3620
                        ;       SW00 = 1, TEST DJ11 #0
                        ;         .
                        ;         .
                        ;
                        ;       SW07 = 1, TEST DJ11 #7
                        ;
                        ;DATA LIGHTS = 20, DJ11 #0 LINE TEST CONFIGURATION SELECTION *********
                        ;HALT ADDRESS 3644
                        ;
                        ;       SW00 = 1,TEST DJ11 #0 LINE #0
                        ;         .
                        ;         .
                        ;
                        ;       SW15 = 1,TEST DJ11 #0 LINE #15
                        ;
                        ;
                        ;
                        ;DATA LIGHTS = 21, DJ11 #1 LINE TEST CONFIGURATION SELECTION *********
```

```
                                ;HALT ADDRESS 3670
                                ;
                                ;       SW00 = 1,TEST DJ11 #1 LINE #0
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1,TEST DJ11 #1 LINE #15


                                ;DATA LIGHTS = 22, DJ11 #2 LINE TEST CONFIGURATION SELECTION *********
                                ;HALT ADDRESS 3714
                                ;
                                ;       SW00 = 1,TEST DJ11 #2 LINE #0
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1,TEST DJ11 #2 LINE #15


                                ;DATA LIGHTS = 23, DJ11 #3 LINE TEST CONFIGURATION SELECTION *********
                                ;HALT ADDRESS 3740
                                ;
                                ;       SW00 = 1,TEST DJ11 #3 LINE #0
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1,TEST DJ11 #3 LINE #15


                                ;DATA LIGHTS = 24, DJ11 #4 LINE TEST CONFIGURATION SELECTION *********
                                ;HALT ADDRESS 3764
                                ;
                                ;       SW00 = 1,TEST DJ11 #4 LINE #0
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1,TEST DJ11 #4 LINE #15


                                ;DATA LIGHTS = 25, DJ11 #5 LINE TEST CONFIGURATION SELECTION *********
                                ;HALT ADDRESS 4010
                                ;
                                ;       SW00 = 1,TEST DJ11 #5 LINE #0
                                ;         .
                                ;         .
                                ;         .
                                ;       SW15 = 1,TEST DJ11 #5 LINE #15
                                ;DATA LIGHTS = 26, DJ11 #6 LINE TEST CONFIGURATION SELECTION *********
                                ;HALT ADDRESS 4034
                                ;       SW00 = 1,TEST DJ11 #6 LINE #0
                                ;         .
                                ;         .
```

```
225                                     ;
226                                     ;       SWI5 = 1,TEST DJ11 #6 LINE #15
227
228
229
230                                     ;DATA LIGHTS = 27, DJ11 #7 LINE TEST CONFIGURATION SELECTION *********
231                                     ;HALT ADDRESS 4060
232
233                                     ;       SW00 = 1,TEST DJ11 #7 LINE #0
234                                     ;         .
235                                     ;         .
236                                     ;
237                                     ;       SWI5 = 1,TEST DJ11 #7 LINE #15
238
239
240                                     ;DATA LIGHTS = 177777, DYNAMIC SWITCH SETTING ****************************
241                                     ;HALT ADDRESS 4176
242
243                                     ;NOTE:
244                                     ;       SW08  = 1 INHIBIT MEMORY TEST WORST CASE NOISE
245
246                                     ;       SW09 = 1, INHIBIT MEMORY TEST FAST  READ WRITE
247                                     ;       SW10 = 1, BELL ON ERROR
248                                     ;              0, BELL ON PASS COMPLETED
249                                     ;NOTE: SW11 SELECTION MAY RESULT IN DEVICE NOT RUNNING REPORT
250
251                                     ;       SW11 = 1, INHIBIT ITERATIONS
252
253                                     ;       SW13 = 1, INHIBIT ERROR TYPEOUT
254                                     ;NOTE:  SW13 MUST BE SELECTED IE = 1
255                                     ;       TO TEST CTY (CONSOLE TTY)
256
257                                     ;ACT11: SW13 = 1 INHIBIT SHUTDOWN OF DEVICE(S) NOT RUNNING
258
259                                     ;       THE FOLLOWING CTY (CONSOLE TTY) REPORT WILL
260                                     ;       CONSTITUTE A PASS WHEN RUN UNDER THE ACT11
261                                     ;       MONITOR:
262
263                                     ;               DZQCA-G TESTED WITH
264                                     ;               SYSTEM CONFIGURATION
265                                     ;               ETC.
266
267
268                                     ;       SW14 = 1, SCOPE LOOP
269                                     ;       SW15 = 1, HALT ON ERROR !
270                                     ;
271                                     ;DEVICE FIRST   #VECTOR VECTOR
272                                     ;TYPE   ADDRESS WORDS   OFFSET
273
274                                     ;DC11   174000     4        10
275                                     ;KL11   176500     4        10
276                                     ;DP11   174770     4        10
277                                     ;DM11   175000     4        10
278                                     ;DN11   175200     2        10
279                                     ;DMB11  170500     2         4
280                                     ;KG11   170700     0         0
```

```
;DR11	167770	4	10
;PAR11	172600	2	4
;PAP11	172700	2	4
;DT11	177420	4	10
;DX11	176200	4	10
;DLC11	175610	4	10
;DJ11	160010	4	10


;NOTE:

;	IT IS ASSUMED THAT ALL DEVICE DIAGNOSTICS HAVE BEEN TESTED

;	ERROR FREE PRIOR TO EXECUTION OF DZQCA-G (CTP)
```

```
                        ;EQUALITIES
        000001          BIT0 =  000001
        000002          BIT1 =  000002
        000004          BIT2 =  000004
        000010          BIT3 =  000010
        000020          BIT4 =  000020
        000040          BIT5 =  000040
        000100          BIT6 =  000100
        000200          BIT7 =  000200
        000400          BIT8 =  000400
        001000          BIT9 =  001000
        002000          BIT10 = 002000
        004000          BIT11 = 004000
        010000          BIT12 = 010000
        020000          BIT13 = 020000
        040000          BIT14 = 040000
        100000          BIT15 = 100000
        000001          SW00 =  000001
        000002          SW01 =  000002
        000004          SW02 =  000004
        000010          SW03 =  000010
        000020          SW04 =  000020
        000040          SW05 =  000040
        000100          SW06 =  000100
        000200          SW07 =  000200
        000400          SW08 =  000400
        001000          SW09 =  001000
        002000          SW10 =  002000
        004000          SW11 =  004000
        010000          SW12 =  010000
        020000          SW13 =  020000
        040000          SW14 =  040000
        100000          SW15 =  100000
        000400          SW8 = SW08
        000200          LEVEL4= 200
        000240          LEVEL5= 240
        000300          LEVEL6= 300
        000340          LEVEL7= 340
        000000          R0 =    %0
        000001          R1 =    %1
        000002          R2 =    %2
        000003          R3 =    %3
        000004          R4 =    %4
        000005          R5 =    %5
        000006          R6 =    %6
        000007          R7 =    %7
        000005          TTY =   %5
        000006          SP =    %6
        000007          PC =    %7
        177774          SLR =   177774
        177776          PS =    177776
        177570          SWR =   177570
        177570          DISPLAY=SWR
        104400          SCOPE = TRAP
        000000          HERE =  0
```

```
000240                  NUP =   240
000000                  OPEN =  0
104000                  HLT =   EMT             ;ERROR REPORT ROUTINE
000004                  TYPE =  IOT
166000                  .BIT =  166000
000207                  BELL =  207
```

```
                                ;DEVICE CONTROL TABLE ENTRY DEFNS (DCT)

000000                          REQ=0                           ;CURRENT REQUEST
000002                          LREQ=2                          ;LAST REQUEST
000004                          DEVSTA=4                        ;DEVICE STATE
000006                          ONLF=6                          ;ONLINE FLAG
000010                          SNS=10                          ;SENSE BYTE
000012                          BUFA=12                         ;BUFFER ADDRESS
000014                          BUFC=14                         ;BUFFER BYTE COUNT
000016                          STS=16                          ;STATUS BYTE
000020                          DXBF=20                         ;DATA BUFFER AREA
000420                          DCTZ=20+256.

                                ;REGISTER DEFNS FOR DX11 CODE

000000                          DCT=%0                          ;CURRENT DCT BASE (BACKGROUND TASK)
000001                          TTP=%1                          ;CURRENT TUMBLE TABLE POINTER (INTERRUPT
000002                          T1=%2                           ;WORK REGISTER (BACKGROUND)
000003                          T2=%3                           ;WORK REGISTER (BACKGROUND)
000004                          T3=%4                           ;WORK REGISTER (BACKGROUND)
000005                          W=%5                            ;DCT BASE (INTERRUPT)
000016                          STS=16                          ;STATUS BYTE
                                ;DX DEFNS

000002                          CUART=2
000003                          CUCRT=3

000001                          GO=1
001000                          ONLINA=1000
020000                          ENDEN=20000
000100                          IE=100
000200                          DONE=200
000005                          FCTNW=5
000003                          FCTNR=3
000007                          FCTNS=7
004000                          BSYEN=4000
010000                          SMEN=10000
000400                          CUBSY=400
000010                          ISSREJ=10
000004                          CMDCHN=4

010000                          SYSRST=10000
000002                          STKSTB=2
000100                          ESEND=100
001000                          CHENDS=1000
002000                          UCHKS=2000
000200                          CHIS=200
004000                          INFDSC=4000
000020                          CUDEND=20
000040                          CHDEND=40

000002                          UC=2
000010                          CE=10
000004                          DE=4
```

```
                000100          SM=100

                000040          CUE=40
                000004          SENSE=4

                000200          CMDREJ=200
                000100          INTREQ=100

                                ;REQUEST CODES

                000000          RNULL=0         ;NO REQUEST
                000001          RINP=1          ;REQUEST INPUT
                000002          ROUTP=2         ;REQUEST OUTPUT
                000003          RSTS=3          ;REQUEST STATUS
                000004          RCUE=4          ;REQUEST CUE

                                ;DEVICE STATE CODES

                000000          IDLE=0          ;IDLE

                000001          DATA=1          ;DATA TRANSFER OR ES VALID

                000002          STA=2           ;ES REQUIRED

                000003          CHAIN=3         ;COMMAND CHAINING INDICATED

                                ;INTERRUPT VECTOR ADDRESS

                                ;INT ROUTINE
                                ;OPERATING STATUS
```

```
                                        ;TRAP INITIALIZATION

            000000                      . =     0                       ;TRAP CATCHER FROM 0-776
                                1.8
            000020                      . =     20
000020  023450  000000                  IOT$,   0       ;IOT TRAP VECTOR (20)
000024  024074  000340                  PDOWN$, 340     ;POWER FAIL INTERUPT VECTOR (24)
000030  023210  000340                  HLT$,   340     ;EMULATOR TRAP VECTOR (30)
000034  023750  000340                  TRAP$,  340     ;TRAP VECTOR (34)

                                        ;START ADDRESS INITIALIZATION
            000200                      . =     200
000200  000167  001476          4.9     START:  JMP     BEGIN

                                        ;RESTART ADDRESS IF LINE PRINTER IS TESTED
            001000                      . =     1000
001000  000167  000676          4.9     RSTART: JMP     BEGIN

                                        ;CTP OVERLAY LINKAGE ENTRIES

            001020                      .=      1020            ;FOREGROUND OVERLAY
001020  000000                          OVINIT: 0               ;INITIALIZATION LINKAGE POINTER

            001022                      .=      1022            ;FOREGROUND OVERLAY
001022  000000                          OVPRIM: 0               ;DEVICE PRIMER LINKAGE POINTER

                                        ;NOTE:

                                        ;       CTP WILL ACCOMADATE FOREGROUND OVERLAY'S FOR DEVICES
                                        ;       WHICH ARE NOT NORMALLY TESTED WITHIN CTP ITSELF.

            001024                      .=      1024
001024  000000                          CLINK:  0               ;MONITOR CONTROL ENTRY

            001026                      .=      1026            ;NEXT AVAILABLE FLOATING VECTOR ADDRESS GLOBAL
001026  000300                          FVECT:  300             ;DEFAULT = BASE
```

H03


```

                001200                          .=1200
        001200  000000                          ICNT:    0              ;ITERATION COUNT
        001202  000000                          ERRORS: 0               ;NUMBER OF ERRORS
        001204  000000  000000                  PASSES: 0,0             ;NUMBER OF PASSES

                000017                          MAPSIZ = 15.            ;CONSTANT TO KEEP TRACK OF MAP SIZE

                000001                          FL.ANC= 000001
                000002                          FL.DC  = 000002
                000004                          FL.KL  = 000004
                000010                          FL.DP  = 000010
                000020                          FL.DMA= 000020
                000040                          FL.DN  = 000040
                000100                          FL.DMB= 000100
                000200                          FL.KG  = 000200
                000400                          FL.DX  = 000400
                001000                          FL.DLC= 001000
                                                ;FL.DH= 002000
                004000                          FL.DJ  = 004000
                000001                          FL.CTY= 000001
                000002                          FL.LP  = 000002
                000004                          FL.TC  = 000004
                000010                          FL.RF  = 000010
                000020                          FL.RK  = 000020
                000040                          FL.RP  = 000040

        001210  000000                          SY.MAP: 0               ;SYSTEM CONFIGURATION MAP
        001212  000000                          SY.ANC: 0
        001214  000000                          SY.DC1: 0
        001216  000000                          SY.DC2: 0
        001220  000000                          SY.KL:  0
        001222  000000                          SY.DP1: 0
        001224  000000                          SY.DP2: 0
        001226  000000                          SY.DMA: 0
        001230  000000                          SY.DN:  0
        001232  000000                          SY.DMB: 0
        001234  000000                          SY.KG:  0
        001236  000000                          SY.DX:  0
        001240  000000                          SY.DL1: 0
        001242  000000                          SY.DL2: 0
        001244  000000                          SY.DJ:  0

        001246  000000                          SW.MAP: 0               ;DEVICES SELECTED FOR TEST MAP
        001250  000000                          SW.ANC: 0
        001252  000000                          SW.DC1: 0
        001254  000000                          SW.DC2: 0
        001256  000000                          SW.KL:  0
        001260  000000                          SW.DP1: 0
        001262  000000                          SW.DP2: 0
        001264  000000                          SW.DMA: 0
        001266  000000                          SW.DN:  0
        001270  000000                          SW.DMB: 0
        001272  000000                          SW.KG:  0
        001274  000000                          SW.DX:  0
        001276  000000                          SW.DL1: 0
```

```
  539  001300  000000                    SW.DL2: 0
  540  001302  000000                    SW.DJ:  0
  541
  542
  543  001304  000000                    RU.MAP: 0               ;DEVICES RUNNING MAP
  544  001306  000000                    RU.ANC: 0
  545  001310  000000                    RU.DC1: 0
  546  001312  000000                    RU.DC2: 0
  547  001314  000000                    RU.KL:  0
  548  001316  000000                    RU.DP1: 0
  549  001320  000000                    RU.DP2: 0
  550  001322  000000                    RU.DMA: 0
  551  001324  000000                    RU.DN:  0
  552  001326  000000                    RU.DMB: 0
  553  001330  000000                    RU.KG:  0
  554  001332  000000                    RU.DX:  0
  555  001334  000000                    RU.DL1: 0
  556  001336  000000                    RU.DL2: 0
  557  001340  000000                    RU.DJ:  0
  558
  559  001342                            MAP:
  560                                    ;BIT11  BIT10   BIT9   BIT8   BIT7   BIT6    BIT5   BIT4   BIT3   BIT2   BIT1
  561                                    ;DJ11   DH11    DL11C  DX11   KG11   DM11BB  DN11   DM11A  DP11   KL11   DC11
  562                                    ;                DL11D                                                    DL11A
  563                                    ;                DL11E                                                    DL11B
  564  001342  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #0
  565  001344  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #1
  566  001346  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #2
  567  001350  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #3
  568  001352  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #4
  569  001354  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #5
  570  001356  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #6
  571  001360  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #7
  572  001362  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #10
  573  001364  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #11
  574  001366  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #12
  575  001370  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #13
  576  001372  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #14
  577  001374  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #15
  578  001376  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #16
  579  001400  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #17
  580  001402  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #20
  581  001404  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #21
  582  001406  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #22
  583  001410  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #23
  584  001412  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #24
  585  001414  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #25
  586  001416  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #26
  587  001420  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #27
  588  001422  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #30
  589  001424  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #31
  590  001426  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #32
  591  001430  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #33
  592  001432  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #34
  593  001434  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #35
  594  001436  000000                            0               ;MONITOR MAP FOR DEVICE UNIT #36
```

```
  595  001440  000000                        0               ;MONITOR MAP FOR DEVICE UNIT #37
  596
  597                                 ;SYSTEM MAPS OF NON-COMM FLOATING VECTOR DEVICES
  598  001442  000000                 SY.DR1: 0               ;MAP OF DR11A AND DR11C
  599  001444  000000                 SY.DR2: 0
  600  001446  000000                 SY.PAR: 0               ;MAP OF PA611 READERS
  601  001450  000000                 SY.PAP: 0               ;MAP OF PA611 PUNCHES
  602  001452  000000                 SY.DT:  0               ;MAP OF DT11
  603  001454  000000                 SY.NXT: 0               ;MAP NEXT
  604
  605  001456  177777                 SW.DJ0: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #0
  606  001460  177777                 SW.DJ1: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #1
  607  001462  177777                 SW.DJ2: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #2
  608  001464  177777                 SW.DJ3: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #3
  609  001466  177777                 SW.DJ4: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #4
  610  001470  177777                 SW.DJ5: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #5
  611  001472  177777                 SW.DJ6: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #6
  612  001474  177777                 SW.DJ7: 177777          ;LINE ACTIVITY SWITCHES FOR DJ11 #7
  613
  614  001476  000000                 ENDVEC: 0               ;END OF VECTOR AREA
  615  001500  031424                 ENDLNK: LINKER          ;END OF LINKER AREA
  616  001502  000000                 ENDTAB: 0               ;END OF DM11 TABLES
  617  001504  000000                 ENDCOR: 0               ;END OF USEABLE CORE
  618
  619  001506  000000                 NO.DC:  0               ;NUMBER OF DC11'S
  620  001510  000000                 NO.KL:  0               ;NUMBER OF KL11'S
  621  001512  000000                 NO.DP:  0               ;NUMBER OF DP11'S
  622  001514  000000                 NO.DMA: 0               ;NUMBER OF DM11A'S
  623  001516  000000                 NO.DN:  0               ;NUMBER OF DN11'S
  624  001520  000000                 NO.DMB: 0               ;NUMBER OF DM11BB'S
  625  001522  000000                 NO.KG:  0               ;NUMBER OF KG11'S
  626  001524  000000                 NO.DR:  0               ;NUMBER OF DR11'S
  627  001526  000000                 NO.PAR: 0               ;NUMBER OF PA611 READERS
  628  001530  000000                 NO.PAP: 0               ;NUMBER OF PA611 PUNCHES
  629  001532  000000                 NO.DT:  0               ;NUMBER OF DT11'S
  630  001534  000000                 NO.DX:  0               ;NUMBER OF DX11'S
  631  001536  000000                 NO.DLC: 0               ;NUMBER OF DL11C'S
  632  001540  000000                 NO.DJ:  0               ;NUMBER OF DJ11'S
  633
  634  001542  000040                 MX.DC:  32.             ;MAXIMUM NUMBER OF DC11'S ALLOWABLE
  635  001544  000020                 MX.KL:  16.             ;MAXIMUM NUMBER OF KL11'S ALLOWABLE
  636  001546  000040                 MX.DP:  32.             ;MAXIMUM NUMBER OF DP11'S ALLOWABLE
  637  001550  000020                 MX.DMA: 16.             ;MAXIMUM NUMBER OF DM11A'S ALLOWABLE
  638  001552  000020                 MX.DN:  16.             ;MAXIMUM NUMBER OF DN11'S ALLOWABLE
  639  001554  000020                 MX.DMB: 16.             ;MAXIMUM NUMBER OF DM11BB'S ALLOWABLE
  640  001556  000020                 MX.KG:  16.             ;MAXIMUM NUMBER OF KG11'S ALLOWABLE
  641  001560  000040                 MX.DR:  32.             ;MAXIMUM NUMBER OF DR11'S ALLOWABLE
  642  001562  000020                 MX.PAR: 16.             ;MAXIMUM NUMBER OF PA611 READERS ALLOWABLE
  643  001564  000020                 MX.PAP: 16.             ;MAXIMUM NUMBER OF PA611 PUNCHES ALLOWABLE
  644  001566  000010                 MX.DT:  8.              ;MAXIMUM NUMBER OF DT11'S ALLOWABLE
  645  001570  000004                 MX.DX:  4.              ;MAXIMUM NUMBER OF DX11'S ALLOWABLE
  646  001572  000037                 MX.DLC: 31.             ;MAXIMUM NUMBER OF DL11'S ALLOWABLE
  647  001574  000010                 MX.DJ:  8.              ;MAXIMUM NUMBER OF DJ11'S ALLOWABLE
  648  001576  000000                 MX.NEXT: 0              ;ADDITIONAL ENTRIES
```

```
                                AD.DC:  174000          ;ADR OF FIRST DC11
001600  174000                  AD.KL:  176500          ;ADR OF FIRST KL11, DL11A, DL11B
001602  176500                  AD.DP:  174770          ;ADR OF FIRST DP11
001604  174770                  AD.DMA: 175000          ;ADR OF FIRST DM11A
001606  175000                  AD.DN:  175200          ;ADR OF FIRST DN11
001610  175200                  AD.DMB: 170500          ;ADR OF FIRST DM11BB (NO VECTOR REQUIRED)
001612  170500                  AD.KG:  170700          ;ADR OF FIRST KG11   (NO VECTOR REQUIRED)
001614  170700                  AD.DR:  167770          ;ADR OF FIRST DR11A, DR11C
001616  167770                  AD.PAR: 172600          ;ADR OF FIRST PA611 READER
001620  172600                  AD.PAP: 172700          ;ADR OF FIRST PA611 PUNCH
001622  172700                  AD.DT:  177420          ;ADR OF FIRST DT11
001624  177420                  AD.DX:  176200          ;ADR OF FIRST DX11
001626  176200                  AD.DLC: 175610          ;ADR OF FIRST DL11C, DL11D, DL11E
001630  175610                  AD.DJ:  160010          ;ADR OF FIRST DJ11
001632  160010
                                ;***    NOTE:
                                ;MODIFY (AD.???) TO 150000 TO REMOVE THAT TYPE DEVICE FROM THE CONFIGURATION.
                                ;MODIFY (AD.???) TO 174000 TO ALLOW UNCUT M7821 TO BE USED

                                BR.DC:  240             ;PRIORITY = 5 FOR DC11
001634  000240                  BR.KL:  200             ;PRIORITY = 4 FOR KL11, DL11A, DL11B
001636  000200                  BR.DP:  240             ;PRIORITY = 5 FOR DP11
001640  000240                  BR.DMA: 240             ;PRIORITY = 5 FOR DM11A
001642  000240                  BR.DN:  200             ;PRIORITY = 4 FOR DN11
001644  000200                  BR.DMB: 200             ;PRIORITY = 4 FOR DM11BB
001646  000200                  BR.DX:  200             ;PRIORITY = 4 FOR DX11
001650  000200                  BR.DLC: 200             ;PRIORITY = 4 FOR DL11C,D,E
001652  000200                  BR.DJ:  240             ;PRIORITY = 5 FOR DJ11
001654  000240                  BR.CTY: 200
001656  000200                  BR.LP:  200
001660  000200                  BR.TC:  300
001662  000300                  BR.RF:  240
001664  000240                  BR.RK:  240
001666  000240                  BR.RP:  240
001670  000240

                                FIRSTV: 300             ;ADDRESS OF FIRST FLOATING VECTOR
001672  000300                  KLXSET: 104             ;PATCH TO 100 TO TEST THE ASR33 READER
001674  000104

                                AD.KLX: 176504          ;ADDRESS OF FIRST KL XMIT REGISTER
001676  176504                  AD.DLX: 175614          ;ADDRESS OF FIRST DL11C,D,E XMIT REGISTER
001700  175614
```

```
 690
 691  001702  012767  000340  176066      6.4  BEGIN:  MOV     #340,   PS      ;PRIORITY =7
 692  001710  012706  001200              3.8          MOV     #ICNT,  SP      ;STACK POINTER = ICNT
 693  001714  005037  000006              3.7          CLR     @#6             ;TRAP CATCHER
 694  001720  012737  001734  000004      5.2          MOV     #BEGINX,@#4     ;SET
 695  001726  012737  000400  177774      5.2          MOV     #400,   @#SLR   ;STACK LIMIT REGISTER 11/40 OR 11/45
 696  001734  012737  000006  000004      5.2  BEGINX: MOV     #6,     @#4     ;+2   STACK OVERRUN
 697  001742  005067  177234              4.9          CLR     ERRORS          ;CLR ERROR COUNT
 698  001746  005067  177232              4.9          CLR     PASSES          ;CLR PASS COUNT
 699  001752  005067  000756              4.9          CLR     RPTFLG          ;CLR REPORT CONFIGURATION CONTROL FLAG
 700  001756  022737  023450  000020      4.7          CMP     #IOT$,  @#20    ;TEST FOR OVERLAY
 701  001764  001406                      2.6          BEQ     1$              ;BRANCH IF NONE
 702  001766  013767  000020  007750      6.4          MOV     @#20,   IOTSAV  ;SAVE OVERLAY ADDRESS
 703  001774  012737  023450  000020      5.2          MOV     #IOT$,  @#20    ;RESTORE TYPE ROUTINE ADDRESS
 704  002002  005037  000022              3.7  1$:     CLR     @#22            ;MAKE SURE TYPE PRIORITY IS LOW
 705
 706  002006  005737  000042              3.2          TST     @#42            ;CHECK ACT11 MONITOR
 707  002012  001004                      2.6          BNE     2$              ;YES BRANCHES
 708
 709  002014  032767  001200  175546      6.5          BIT     #1200,  SWR     ;NEW SYSTEM CONFIGURATION
 710                                                   ;
 711                                                   ;THE START OR RESTART ADDRESS SHOULD BE LEFT IN THE SWITCHES IF
 712                                                   ;THIS IS THE FIRST PASS SINCE THE PROGRAM HAS BEEN LOADED OR
 713                                                   ;IF THERE HAS BEEN ANY HARDWARE ADDED OR REMOVED.
 714                                                   ;
 715  002022  001413                      2.6          BEQ     DVICE           ;NO, INITIALIZE DEVICES AS PER
 716                                                                           ;LAST SWITCH SETTINGS
 717  002024  013767  000042  176772      6.4  2$:     MOV     @#42,   CLINK   ;SET MONITOR QUICK PASS CONTROL
 718  002032  004767  000030              7.0          JSR     PC,     CLRVEC  ;LOAD VECTOR AREA WITH .+2, IOT
 719  002036  004767  000066              7.0          JSR     PC,     SYSMAP  ;DETERMIN SYSTEM CONFIGURATION
 720  002042  004767  000774              7.0          JSR     PC,     SWITCH  ;DETERMIN TEST CONFIGURATION FROM SWITCHES
 721  002046  004767  002132              7.0          JSR     PC,     SYSGEN  ;INITIALIZE VECTOR AREA AS PER TEST CONF.
 722  002052  004767  003036              7.0  DVICE:  JSR     PC,     DEVICE  ;INITIALIZE DEVICES AS PER TEST CONFIGURATION
 723  002056  004767  006670              7.0          JSR     PC,     BCKGND  ;RUN BACKGROUND PROGRAM TO
 724                                                                           ;MONITOR SILENT DEVICES AND NPR
 725                                                                           ;DATA FILES
 726  002062  000773                      2.6          BR      DVICE           ;LOOP
 727
 728  002064  000000                      1.8          HALT                    ;HALT HERE SIGNIFIES RTS FAILURE
 729
```

```
                                                ;**********************CLRVEC**********************************

                                                ;CLRVEC, ROUTINE TO FILL COMMUNICATION VECTOR AREA WITH
                                                ;       .+2
                                                ;       HALT

                                                ;**********************CLRVEC**********************************

002066  012702  000300          3.8   CLRVEC: MOV     #300,R2         ;R2 COMM VECTOR AREA ADRS
002072  012701  000302          3.8           MOV     #302,R1         ;INIT R1 WITH ADRS OF HALT
002076  010122                  3.7   CV1:    MOV     R1,     (R2)+   ;MOVE .+2 INTO VECTOR
002100  005022                  3.7           CLR     (R2)+           ;MOVE HALT INTO VECTOR + 2
002102  022121                  4.7           CMP     (R1)+, (R1)+    ;INC TO NEXT VECTOR AREA
002104  022701  001000          3.8           CMP     #1000, R1       ;END OF VECTOR AREA
002110  003372                  2.6           BGT     CV1             ;NO
002112  012767  000137  176060  6.4           MOV     #137,200        ;REINIT START ADRS
002120  012767  001702  176054  6.4           MOV     #BEGIN,202      ;  "      "   "
002126  000207                  3.5           RTS     PC              ;RETURN

                                                ;**********************CLRVEC**********************************
```

```
                                        ;********************** SYSMAP ************************************
                                        ;SYSMAP, SYSTEM MAPING ROUTINE
                                        ;THE FUNCTION OF THIS ROUTINE IS TO DETERMINE WHAT COMMUNICATION
                                        ;OPTIONS EXIST ON THE MACHINE UNDER TEST AND WHAT
                                        ;"OTHER" PERPHERIALS CAN BE RUN IN CONJUNCTION WITH THE COMM EQUIP.
                                        ;"OTHER OPTIONS ARE:  RF11 DKSK, TC11 DECTAPE, LP11 LINE PRINTER AND
                                        ;KL11 CONSOLE TTY
                                        ;********************** SYSMAP ************************************
002130  004567  020712          7.0   SYSMAP: JSR     %5,CLEAR        ;CLEAR MONOTOR MAPS
002134  001210                                SY.MAP                  ;START HERE
002136  000122                                MAPSIZ*3+40+5           ;START ADDRESS FIVE TABLES
002140  012700  001600          3.8           MOV     #AD.DC, R0      ;GET ADDRESS TABLE POINTER
002144  012702  001214          3.8           MOV     #SY.DC1,R2      ;GET SYSTEM MAP POINTER
002150  012703  001506          3.8           MOV     #NO.DC, R3      ;SET R3 = FIRST DEVICE COUNT
002154  012704  001542          3.8           MOV     #MX.DC, R4
002160  012767  003020  175616  6.4           MOV     #NEXT,4         ;SET UP TIME OUT VECTOR
002166  012767  000340  175612  6.4           MOV     #340,6          ;TIME OUT STATUS

002174  004567  000536          7.0   ANYDC:  JSR     %5,MAPIT        ;MAP DC11'S
002200  000002                                FL.DC                   ;DC11 FLAG

002202  012702  001220          3.8   ANYKL:  MOV     #SY.KL, R2      ;RESET SYSMAP TABLE POINTER
002206  004567  000524          7.0           JSR     %5,MAPIT        ;MAP KL11'S
002212  000004                                FL.KL                   ;KL11 FLAG

002214  052767  100000  000546  6.4   ANYDP:  BIS     #BIT15,MIT5     ;CHANGE ADD TO SUB
002222  004567  000510          7.0           JSR     %5,MAPIT        ;MAP DP11'S
002226  000010                                FL.DP                   ;DP11 FLAG
002230  042767  100000  000532  7.0           BIC     #BIT15,MIT5     ;CHANGE SUB TO ADD

002236  012702  001226          3.8   ANYDMA: MOV     #SY.DMA,R2      ;RESET SYSMAP TABLE POINTER
002242  004567  000470          7.0           JSR     %5,MAPIT        ;MAP DM11A'S
002246  000020                                FL.DMA                  ;DM11A FLAG

002250  004567  000462          7.0   ANYDN:  JSR     %5,MAPIT        ;MAP DN11'S
002254  000040                                FL.DN                   ;DN11 FLAG

002256  004567  000454          7.0   ANYDMB: JSR     %5,MAPIT        ;MAP DM11BB'S
002262  000100                                FL.DMB                  ;DM11BB FLAG

002264  004567  000446          7.0   ANYKG:  JSR     %5,MAPIT        ;MAP KG11'S
002270  000200                                FL.KG                   ;KG11 FLAG

002272  012702  001442          3.8   ANYDR:  MOV     #SY.DR1,R2      ;RESET SYSTEM MAP POINTER
002276  052767  100000  000464  6.4           BIS     #BIT15,MIT5     ;CHANGE ADD TO SUB
002304  004567  000426          7.0           JSR     %5,MAPIT        ;MAP DR11A'S AND DR11C'S
002310  000000                                0                       ;NO FLAG
002312  042767  100000  000450  7.0           BIC     #BIT15,MIT5     ;CHANGE SUB TO ADD

002320  006267  000446          4.9   ANYPAR: ASR     MIT5+2          ;CHANGE ADR INCREMENT TO 4
002324  004567  000406          7.0           JSR     %5,MAPIT        ;MAP PA611 READERS
002330  000000                                0                       ;NO FLAG
```

```
 809
 810  002332  004567  000400          7.0  ANYPAP: JSR     %5,MAPIT              ;MAP PA611 PUNCHES
 811  002336  000000                       0                                     ;NO FLAG
 812
 813  002340  006267  000426          4.9  ANYDT:  ASR     MIT5+2                ;CHANGE ADR INCREMENT TO 2
 814  002344  004567  000366          7.0          JSR     %5,MAPIT              ;MAP DT11'S
 815  002350  000000                       0                                     ;NO FLAG
 816
 817  002352  012702  001236          3.8  ANYDX:  MOV     #SY.DX, R2            ;RESET SYSTEM MAP POINTER
 818  002356  012767  000040  000406  6.4          MOV     #40,    MIT5+2        ;CHANGE ADR INCREMENT TO 40
 819  002364  004567  000346          7.0          JSR     %5,MAPIT              ;MAP DX11'S
 820  002370  000400                               .WORD   FL.DX                 ;DX11 FLAG
 821
 822  002372  012767  000010  000372  6.4  ANYDLC: MOV     #10,    MIT5+2        ;CHANGE ADR INCREMENT BACK TO 10
 823  002400  004567  000332          7.0          JSR     %5,MAPIT              ;MAP DL11C,D,E'S
 824  002404  001000                               FL.DLC                        ;DL11 FLAG
 825
 826  002406  012702  001244          3.8  ANYDJ:  MOV     #SY.DJ, R2            ;RESET SYSTEMS MAP POINTER
 827  002412  004567  000320          7.0          JSR     %5,MAPIT              ;MAP DJ11'S
 828  002416  004000                               FL.DJ                         ;DJ11 FLAG
 829
 830
 831                                               ;ANCIL, CODE TO DETERMINE IF RF, TC, LP EXIST
 832
 833  002420  012767  003034  175356  6.4  ANCIL:  MOV     #ANEXT,4              ;SET UP TIME OUT POINTER
 834  002426  012767  002466  000404  6.4          MOV     #ANC1,  NT2           ;TIME OUT TRAPS TO NEXT TST
 835  002434  005777  020352          5.6          TST     @CTKS                 ;DOES CTY EXIST
 836  002440  052767  000001  176544  6.4          BIS     #BIT0,  SY.ANC        ;YES, SET CTY BIT
 837                                               ;***** NO SACK TIMEOUT TEST ***********
 838
 839  002446  105777  020344          5.6  NOSAC:  TSTB    @CTPS                 ;IS PUNCH READY
 840  002452  100375                  2.6          BPL     NOSAC                 ;WAIT FOR READY
 841  002454  052777  000100  020334  7.6          BIS     #100,@CTPS            ;SET INTERRUPT ENABLE
 842  002462  005077  020330          6.1          CLR     @CTPS                 ;CLEAR INTERRUPT ENABLE
 843                                               ;PROCESSOR WILL HANG HERE IF NO-SACK-TIMEOUT FAILS
 844                                               ;*****************************
 845  002466  012767  002506  000344  6.4  ANC1:   MOV     #ANC2,  NT2           ;TIME OUT TO NEXT DEVICE
 846  002474  005777  020326          5.6          TST     @LP11                 ;DOES LINE PRINTER EXIST
 847  002500  052767  000002  176504  6.4          BIS     #BIT1,  SY.ANC        ;YES, SET LP11 BIT
 848  002506  012767  002526  000324  6.4  ANC2:   MOV     #ANC3,  NT2           ;TIME OUT TO NEXT DEVICE
 849  002514  005777  020302          5.6          TST     @TC11                 ;DOES DECTAPE EXIST
 850  002520  052767  000004  176464  6.4          BIS     #BIT2,  SY.ANC        ;SET TC11 BIT
 851  002526  012767  002546  000304  6.4  ANC3:   MOV     #ANC4,  NT2           ;TIME OUT TO NEXT DEVICE
 852  002534  005777  020264          5.6          TST     @RF11                 ;DOES RF11 DISK EXIST
 853  002540  052767  000010  176444  6.4          BIS     #BIT3,  SY.ANC        ;YES, SET RF11 BIT
 854  002546  012767  002566  000264  6.4  ANC4:   MOV     #ANC5,  NT2           ;TIME OUT TO NEXT DEVICE
 855  002554  005777  017570          5.6          TST     @RKCSR                ;TEST FOR RK11 DISK
 856  002560  052767  000020  176424  6.4          BIS     #BIT4,  SY.ANC        ;SET RK FLAG
 857  002566  012767  002606  000244  6.4  ANC5:   MOV     #ANC6,  NT2           ;TIMEOUT TO NEXT DEVICE
 858  002574  005777  017732          5.6          TST     @RPCSR                ;DOES RP EXIST
 859  002600  052767  000040  176404  6.4          BIS     #BIT5,  SY.ANC        ;YES SET RP BIT
 860  002606  012767  000006  175170  6.4  ANC6:   MOV     #6,4                  ;REINSTATE TRAP TO HALT
 861  002614  012767  000000  175164  6.4          MOV     #HALT,6               ;
 862  002622  005737  000042          3.2          TST     @#42                  ;CHECK FOR A MONITOR
 863  002626  001417                  2.6          BEQ     SYSMO                 ;BRANCH IF NONE
 864  002630  012701  001210          3.8          MOV     #SY.MAP,R1            ;GET SYSTEM MAP ADR
```

```
002634  012702  001246            3.8           MOV     #SW.MAP,R2          ;GET SWITCH SETTING MAP ADR
002640  012703  000017            3.8           MOV     #MAPSIZ,R3          ;GET MAP SIZE
002644  012122                    5.2  SY.SW:   MOV     (R1)+,  (R2)+       ;MOVE SY.MAP INTO SW.MAP
002646  005303                    2.3           DEC     R3                  ;CHECK FOR END
002650  003375                    2.6           BGT     SY.SW               ;BRANCH IF NOT DONE
002652  062716  000004            5.2           ADD     #4,     (SP)        ;SKIP "JSR PC,SWITCH"
002656  005767  000052            4.4           TST     RPTFLG              ;TEST CONFIGURATION REPORT FLAG
002662  001401                    2.6           BEQ     SYSM0               ; FIRST PASS BRANCHES
002664  000207                    3.5           RTS     PC

002666  005767  176320            4.4  SYSM0:   TST     SY.ANC              ;CHECK FOR ANY ANCILLARIES
002672  001403                    2.6           BEQ     1$                  ;BRANCH IF NONE
002674  052767  000001  176306    6.4           BIS     #BIT0,  SY.MAP      ;SET ANCIL BIT OF SYSTEM MAP
002702  032737  020000  177570    5.3  1$:      BIT     #BIT13, @#SWR       ;CHECK INHIBIT CONFIGURATION REPORT
002710  001010                    2.6           BNE     SYSM1               ;BRANCH IF SET
002712  000004  027714                          TYPE,   MSG1                ;TYPE "SYSTEM CONFIGURATION"
002716  012701  001212            3.8           MOV     #SY.ANC,R1          ;POINT TO SYSTEM MAP
002722  010167  000006            4.9           MOV     R1,     RPTFLG      ;SET PASS CONTROL FLAG
002726  004767  020140            7.0           JSR     PC,     REPORT      ;REPORT CONFIGURATION
002732  000207                    3.5  SYSM1:   RTS     PC                  ;RETURN TO MAIN LINE

002734  000000                         RPTFLG:  0                           ;CONFIGURATION REPORT CONTROL FLAG


                                       ;MAPIT, THIS SUBROUTINE PLACES A FLAG IN THE MAP OF EACH DEVICE TYPE.
                                       ;        EACH BIT IN THE DEVICE MAP INDICATES A UNIT.  FOR EXAMPLE,
                                       ;        A LOGIC ONE IN BIT LOCATIONS ZERO AND ONE OF THE DP11 MAP
                                       ;        INDICATES TWO DP11'S EXIST.

002736  012001                    3.8  MAPIT:   MOV     (R0)+,  R1          ;FETCH DEVICE ADDRESS
002740  012467  020020            6.4           MOV     (R4)+,  MAX         ;FETCH MAX NUMBER OF DEVICE
002744  005067  020074            4.9           CLR     DEVCNT              ;CLEAR DEVICE COUNT
002750  012767  000001  020010    6.4  MIT1:    MOV     #1,     MARK        ;INC "DEVICE EXISTS" MARKER
002756  005711                    3.2  MIT2:    TST     @R1                 ;TIME OUT TO NEXT DEVICE IF NON EXISTANT

                                       ;NOTE:   IF FIRST DEVICE DOES NOT EXIST THIS
                                       ;        ROUTINE WILL STOP LOOKING FOR ANY MORE

002760  051567  176224            6.4           BIS     (R5),   SY.MAP      ;SET BIT IN MAIN MAP
002764  005267  020054            4.9           INC     DEVCNT              ;INC DEVICE COUNT
002770  062701  000010            3.8  MIT5:    ADD     #10,R1              ;INC TO NEXT ADRS
002774  056712  017766            6.4           BIS     MARK,@R2            ;SET MAP BIT
003000  005367  017760            4.9           DEC     MAX                 ;HAS THE MAX # BEEN TESTED
003004  001406                    2.6           BEQ     MIT4                ;YES
003006  006167  017754            4.9           ROL     MARK                ;NO, SHIFT MARKER
003012  103361                    2.6           BCC     MIT2                ;MAP WORD FULL
003014  005722                    3.2           TST     (R2)+               ;INC TO NEXT MAP
003016  000754                    2.6           BR      MIT1

                                       ;NEXT,TIME OUT ROUTINE TO ADJUST STACK AND JUMP TO
                                       ;NEXT DEVICE TEST

003020  022626                    4.7  NEXT:    CMP     (SP)+,(SP)+         ;ADJUST STACK
003022  005722                    3.2  MIT4:    TST     (R2)+               ;UPDATE SYSTEM MAP POINTER
003024  016723  020014            6.4           MOV     DEVCNT, (R3)+       ;SAVE DEVICE COUNT
003030  005725                    3.2           TST     (R5)+               ;INC RETURN ADR.
```

```
 921  DC3032  000205                    3.5          RTS     %5              ;RETURN
 922
 923                                                 ;TIMEOUT TRAP FOR ANCILLARIES
 924  003034  022626                    4.7  ANEXT:  CMP     (SP)+,(SP +     ;ADJUST STACK
 925  003036  000137                    3.7  NT1:    JMP     @(PC)+          ;TEST NEXT DEVICE
 926  003040  000000                         NT2:    0
 927
 928                                         ;********************** SYSMAP ************************************
```

```

                                                ;**************************** SWITCH ************************************

                                                ;SWITCH ROUTINE TO SAVE CONSOL SWITCH SETTING
                                                ;THESE SWITCH SETTINGS DETERMINE WHICH DEVICES ARE TO BE TESTED

003042  004567  020000                  7.0     SWITCH: JSR     R5,     CLEAR   ;CLEAR TABLE SUBROUTINE
003046  001246                                          SW.MAP                  ;START HERE
003050  000017                                          MAPSIZ                  ;THIS MANY WORDS
003052  005067  003366                  4.9             CLR     DX.OLF          ;RESET DX ACTIVITY

003056  005737  000042                  3.2             TST     @#42            ;CHECK ACT11 MONITOR
003062  001412                          2.6             BEQ     1$              ;NO BYPASS

003064  012700  000017                  3.8             MOV     #MAPSIZ,R0      ;SCHEDULE
003070  012701  001210                  3.8             MOV     #SY.MAP,R1      ;ALL
003074  012702  001246                  3.8             MOV     #SW.MAP,R2      ;DEVICES
003100  012122                          5.2     2$:     MOV     (R1)+,(R2)+     ;ON SYSTEM
003102  005300                          2.3             DEC     R0              ;FOR
003104  001375                          2.6             BNE     2$              ;TEST
003106  000207                          3.5             RTS     PC              ;RETURN TO MAINLINE

003110  012700  000001                  3.8     1$:     MOV     #1,     R0      ;SET R0 TO DISPLAY SETTING 1
003114  000000                          1.8     HLT01:  HALT                    ;SELECT DEVICES
                                                                                ;PRESS CONTINUE
003116  016767  174446  176122          7.6             MOV     SWR,    SW.MAP  ;SAVE SWITCH REG
003124  032767  000001  176114          6.5             BIT     #BIT0,  SW.MAP  ;CHECK FOR NON-COMM DEVICES
003132  001406                          2.6             BEQ     STCH0           ;BRANCH IF NONE
003134  012700  000002                  3.8             MOV     #2,     R0      ;DISPLAY SETTING #2
003140  000000                          1.8     HLT02:  HALT                    ;SELECT NON-COMM TEST CONFIGURATION
                                                                                ;PRESS CONTINUE
003142  016767  174422  176100          7.6             MOV     SWR,    SW.ANC  ;SAVE SWITCH REG
003150  032767  000002  176070          6.5     STCH0:  BIT     #BIT1,  SW.MAP  ;CHECK FOR ANY DC11'S
003156  001417                          2.6             BEQ     STCH1           ;BRANCH IF NONE
003160  012700  000003                  3.8             MOV     #3,     R0      ;DISPLAY SETTING #3
003164  000000                          1.8     HLT03:  HALT                    ;FIRST DC11 SETTING
                                                                                ;PRESS CONTINUE
003166  016767  174376  176056          7.6             MOV     SWR,    SW.DC1  ;SAVE SWITCH REG
003174  005767  176016                  4.4             TST     SY.DC2          ;ARE THERE DC11 LINES 16-31
003200  001406                          2.6             BEQ     STCH1           ;BRANCH IF NOT
003202  012700  000004                  3.8             MOV     #4,     R0      ;DISPLAY SETTING #4
003206  000000                          1.8     HLT04:  HALT                    ;SECOND DC11 SETTING
                                                                                ;PRESS CONTINUE
003210  016767  174354  176036          7.6             MOV     SWR,    SW.DC2  ;SAVE SETTINGS
003216  032767  000004  176022          6.5     STCH1:  BIT     #BIT2,  SW.MAP  ;NEW KL11 SETTINGS
003224  001406                          2.6             BEQ     STCH2           ;NO
003226  012700  000005                  3.8             MOV     #5,     R0      ;YES, DISPLAY SETTING 5=TTY
003232  000000                          1.8     HLT05:  HALT                    ;SET SWR TO TEST PATTERS
                                                                                ;PRESS CONTINUE
003234  016767  174330  176014          7.6             MOV     SWR,    SW.KL   ;SAVE SETTINGS
003242  032767  000010  175776          6.5     STCH2:  BIT     #BIT3,  SW.MAP  ;NEW DP11 TEST CONFIGURATION
003250  001417                          2.6             BEQ     STCH3           ;NO
003252  012700  000006                  3.8             MOV     #6,     R0      ;DISPLAY SETTING 6=DP11
003256  000000                          1.8     HLT06:  HALT                    ;SELECT DP11 TEST CONFIGURATION
                                                                                ;PRESS CONTINUE
003260  016767  174304  175772          7.6             MOV     SWR,    SW.DP1  ;SAVE DP LINES 0-15
```

```
  995  003266  005767  175732          4.4          TST     SY.DP2          ;ARE THERE DP11 LINES 16-31
  996  003272  001406                  2.6          BEQ     STCH3           ;BRANCH IF NOT
  997  003274  012700  000007          3.8          MOV     #7,     R0      ;DISPLAY SETTING 7
  998  003300  000000                  1.8  HLT07:  HALT                    ;SELECT DP LINES 16-31
  999                                                                       ;PRESS CONTINUE
  990  003302  016767  174262  175752  7.6          MOV     SWR,    SW.DP2  ;SAVE SETTINGS
  991  003310  032767  000020  175730  6.5  STCH3:  BIT     #BIT4,  SW.MAP  ;NEW DM11 TEST CONFIGURATION
  992  003316  001406                  2.6          BEQ     STCH4
  993  003320  012700  000010          3.8          MOV     #10,    R0      ;DISPLAY SETTING #10
  994  003324  000000                  1.8  HLT10:  HALT                    ;SELECT DM11'S
  995                                                                       ;PRESS CONTINUE
  996  003326  016767  174236  175730  7.6          MOV     SWR,    SW.DMA  ;SAVE SETTINGS
  997  003334  032767  000040  175704  6.5  STCH4:  BIT     #BIT5,  SW.MAP  ;NEW DM11 TEST CONFIGURATION
  998  003342  001406                  2.6          BEQ     STCH5
  999  003344  012700  000011          3.8          MOV     #11,    R0      ;DISPLAY SETTING #11
 1000  003350  000000                  1.8  HLT11:  HALT                    ;SELECT DN11'S
 1001                                                                       ;PRESS CONTINUE
 1002  003352  016767  174212  175706  7.6          MOV     SWR,    SW.DN   ;SAVE SETTINGS
 1003  003360  032767  000100  175660  6.5  STCH5:  BIT     #BIT6,  SW.MAP  ;CHECK FOR DM11BB'S
 1004  003366  001406                  2.6          BEQ     STCH6           ;BRANCH IF NONE
 1005  003370  012700  000012          3.8          MOV     #12,    R0      ;DISPLAY SETTING #12
 1006  003374  000000                  1.8  HLT12:  HALT                    ;SELECT DM11BB'S
 1007                                                                       ;PRESS CONTINUE
 1008  003376  016767  174166  175664  7.6          MOV     SWR,    SW.DMB  ;SAVE SETTINGS
 1009  003404  032767  000200  175634  6.5  STCH6:  BIT     #BIT7,  SW.MAP  ;CHECK FOR KG11'S
 1010  003412  001406                  2.6          BEQ     STCH7           ;BRANCH IF NONE
 1011  003414  012700  000013          3.8          MOV     #13,    R0      ;DISPLAY SETTING #13
 1012  003420  000000                  1.8  HLT13:  HALT                    ;SELECT KG11'S
 1013                                                                       ;PRESS CONTINUE
 1014  003422  016767  174142  175642  7.6          MOV     SWR,    SW.KG   ;SAVE SETTINGS
 1015  003430  032767  000400  175610  6.5  STCH7:  BIT     #BIT8,  SW.MAP  ;CHECK FOR DX11'S
 1016  003436  001436                  2.6          BEQ     STCH8           ;BRANCH IF NONE
 1017  003440  012700  000014          3.8          MOV     #14,    R0      ;DISPLAY SETTING #14
 1018  003444  000000                  1.8  HLT14:  HALT                    ;SELECT DX11'S
 1019                                                                       ;PRESS CONTINUE
 1020  003446  113767  177570  175620  6.4          MOVB    @#SWR,  SW.DX   ;SAVE SETTINGS
 1021  003454  113737  177571  006444  5.2          MOVB    @#SWR+1,@#DX.OLF ;SAVE ON-LINE SELECTION
 1022  003462  053767  006444  175604  6.4          BIS     @#DX.OLF,SW.DX  ;MAKE SURE DX SELECTED FOR ON-LINE SELECTED.
 1023  003470  012701  000001          3.8          MOV     #1,     R1      ;SET UP MARKER
 1024  003474  012700  177400          3.8          MOV     #177400,R0      ;SET UP DATA LIGHTS
 1025  003500  012702  017430          3.8          MOV     #DXLEGA,R2      ;ADDRESS POINTER IN R2
 1026  003504  030137  001274          3.8  STCH70: BIT     R1,     @#SW.DX ;CHECK FOR DX11 SELECTED
 1027  003510  001403                  2.6          BEQ     STCH80          ;BRANCH IF NOT
 1028  003512  000000                  1.8  HLT70:  HALT                    ;SELECT DX11 LEGAL ADDRESS
 1029                                                                       ;PRESS CONTINUE
 1030  003514  013712  177570          5.2          MOV     @#SWR,  (R2)    ;SAVE IT
 1031  003520  005722                  3.2  STCH80: TST     (R2)+           ;UPDATE POINTER
 1032  003522  006301                  2.3          ASL     R1              ;UPDATE MARKER
 1033  003524  005200                  2.3          INC     R0              ;UPDATE DATA LIGHTS
 1034  003526  120067  176002          4.4          CMPB    R0,     NO.DX   ;CHECK FOR ALL DONE
 1035  003532  001364                  2.6          BNE     STCH70          ;BRANCH IF NOT
 1036  003534  032767  001000  175504  6.5  STCH8:  BIT     #BIT9,  SW.MAP  ;CHECK FOR DL11C,D,E'S
 1037  003542  001420                  2.6          BEQ     STCH9           ;BRANCH IF NONE
 1038  003544  012700  000015          3.8          MOV     #15,    R0      ;DISPLAY SETTING #15
 1039  003550  000000                  1.8  HLT15:  HALT                    ;SELECT DL11C,D,E'S
 1040                                                                       ;PRESS CONTINUE
```

```
1041  003552  016767  174012  175516    7.6           MOV     SWR,    SW.DL1  ;SAVE SETTINGS
1042  003560  005767  175456            4.4           TST     SY.DL2          ;ARE THERE DL11 LINES 16-31
1043  003564  001407                    2.6           BEQ     STCH9           ;BRANCH IF NOT
1044  003566  012700  000016            3.8           MOV     #16,    R0      ;DISPLAY SETTING #16
1045  003572  000000                    1.8   HLT16:  HALT                    ;SELECT DL11C,D,E'S
1046                                                                          ;PRESS CONTINUE
1047  003574  016767  173770  175476    7.6           MOV     SWR,    SW.DL2  ;SAVE SETTINGS
1048
1049  003602  000400                    2.6           BR      STCH9           ;*********
1050
1051  003604  032767  004000  175434    6.5   STCH9:  BIT     #BIT11, SW.MAP  ;CHECK FOR DJ11'S
1052  003612  001526                    2.6           BEQ     STCH30          ;BRANCH IF NONE
1053
1054  003614  012700  000200            3.8           MOV     #200,   R0      ;DISPLAY SETTING #200
1055  003620  000000                    1.8   HLT200: HALT                    ;SELECT DJ11 DEVICE #0-#7
1056  003622  016767  173742  175452    7.6           MOV     SWR,    SW.DJ   ;RECORD SETTING
1057
1058
1059  003630  032767  000001  175444    6.5           BIT     #BIT0,  SW.DJ   ;DJ11 DEVICE #0 TO BE TESTED?
1060  003636  001406                    2.6           BEQ     STCH10          ;BRANCH IF NOT
1061
1062  003640  012700  000020            3.8           MOV     #20,    R0      ;DISPLAY SETTING #20
1063  003644  000000                    1.8   HLT20:  HALT                    ;SELECT DJ11 DEVICE #0 LINES 0 THRU 15 FOR TEST
1064
1065  003646  016767  173716  175602    7.6           MOV     SWR,    SW.DJ0  ;SAVE SETTING
1066
1067
1068  003654  032767  000002  175420    6.5   STCH10: BIT     #BIT1,  SW.DJ   ;DJ11 DEVICE #1 TO BE TESTED?
1069  003662  001406                    2.6           BEQ     STCH11          ;BRANCH IF NOT
1070
1071  003664  012700  000021            3.8           MOV     #21,    R0      ;DISPLAY SETTING #21
1072  003670  000000                    1.8   HLT21:  HALT,                   ;SELECT DJ11 DEVICE #1 LINES 0 THRU 15 FOR TEST
1073
1074  003672  016767  173672  175560    7.6           MOV     SWR,    SW.DJ1  ;SAVE SETTING
1075
1076
1077  003700  032767  000004  175374    6.5   STCH11: BIT     #BIT2,  SW.DJ   ;DJ11 DEVICE #2 TO BE TESTED?
1078  003706  001406                    2.6           BEQ     STCH12          ;BRANCH IF NOT
1079  003710  012700  000022            3.8           MOV     #22,    R0      ;DISPLAY SETTING #22
1080  003714  000000                    1.8   HLT22:  HALT                    ;SELECT DJ11 DEVICE #2 LINES 0 THRU 15 FOR TEST
1081
1082  003716  016767  173646  175536    7.6           MOV     SWR,    SW.DJ2  ;SAVE SETTING
1083
1084
1085
1086  003724  032767  000010  175350    6.5   STCH12: BIT     #BIT3,  SW.DJ   ;DJ11 DEVICE #3 TO BE TESTED?
1087  003732  001406                    2.6           BEQ     STCH13          ;BRANCH IF NOT
1088
1089  003734  012700  000023            3.8           MOV     #23,    R0      ;DISPLAY SETTING #23
1090  003740  000000                    1.8   HLT23:  HALT                    ;SELECT DJ11 DEVICE #3 LINES 0 THRU 15 FOR TEST
1091
1092  003742  016767  173622  175514    7.6           MOV     SWR,    SW.DJ3  ;SAVE SETTING
1093
1094
1095
1096  003750  032767  000020  175324    6.5   STCH13: BIT     #BIT4,  SW.DJ   ;DJ11 DEVICE #4 TO BE TESTED?
```

```
1097  003756  001406                    2.6          BEQ     STCH14          ;BRANCH IF NOT
1098
1099  003760  012700  000024            3.8          MOV     #24,    R0      ;DISPLAY SETTING #24
1100  003764  000000                    1.8  HLT24:  HALT                    ;SELECT DJ11 DEVICE #4 LINES 0 THRU 15 FOR TEST
1101
1102  003766  016767  173576  175472    7.6          MOV     SWR,    SW.DJ4  ;SAVE SETTING
1103
1104
1105
1106  003774  032767  000040  175300    6.5  STCH14: BIT     #BIT5,  SW.DJ   ;DJ11 DEVICE #5 TO BE TESTED?
1107  004002  001406                    2.6          BEQ     STCH15          ;BRANCH IF NOT
1108
1109  004004  012700  000025            3.8          MOV     #25,    R0      ;DISPLAY SETTING #25
1110  004010  000000                    1.8  HLT25:  HALT                    ;SELECT DJ11 DEVICE #5 LINES 0 THRU 15 FOR TEST
1111
1112  004012  016767  173552  175450    7.6          MOV     SWR,    SW.DJ5  ;SAVE SETTING
1113
1114
1115
1116  004020  032767  000100  175254    6.5  STCH15: BIT     #BIT6,  SW.DJ   ;DJ11 DEVICE #6 TO BE TESTED?
1117  004026  001406                    2.6          BEQ     STCH16          ;BRANCH IF NOT
1118
1119  004030  012700  000026            3.8          MOV     #26,    R0      ;DISPLAY SETTING #26
1120  004034  000000                    1.8  HLT26:  HALT                    ;SELECT DJ11 DEVICE #6 LINES 0 THRU 15 FOR TEST
1121
1122  004036  016767  173526  175426    7.6          MOV     SWR,    SW.DJ6  ;SAVE SETTING
1123
1124
1125
1126  004044  032767  000200  175230    6.5  STCH16: BIT     #BIT7,  SW.DJ   ;DJ11 DEVICE #7 TO BE TESTED?
1127  004052  001406                    2.6          BEQ     STCH30          ;BRANCH IF NOT
1128
1129  004054  012700  000027            3.8          MOV     #27,    R0      ;DISPLAY SETTING #27
1130  004060  000000                    1.8  HLT27:  HALT                    ;SELECT DJ11 DEVICE #7 LINES 0 THRU 15 FOR TEST
1131
1132  004062  016767  173502  175404    7.6          MOV     SWR,    SW.DJ7  ;SAVE SETTING
1133  004070  012701  001210            3.8  STCH30: MOV     #SY.MAP,R1      ;GET SYSTEM MAP ADR
1134  004074  012702  001246            3.8          MOV     #SW.MAP,R2      ;GET SWITCH SETTING MAP ADR
1135
1136  004100  012703  000017            3.8          MOV     #MAPSIZ,R3      ;GET MAP SIZE
1137  004104  005111                    3.7  SWCHK:  COM     (R1)
1138  004106  031122                    5.3          BIT     (R1),   (R2)+   ;CHECK IF SELECTED DEV. EXIST
1139  004110  001425                    2.6          BEQ     SWCHK2          ;BRANCH IF THEY DO
1140  004112  005121                    3.7          COM     (R1)+           ;RESTORE SY.MAP
1141  004114  000004  004120                         TYPE,   .+2
1142  004120  005015  042523  042514                .ASCIZ  <15><12>"SELECTED NON-EXISTANT DEVICE"
1143  004126  052103  042105  047040
1144  004134  047117  042455  044530
1145  004142  052123  047101  020124
1146  004150  042504  044526  042503
1147  004156     000
1148          004160                             .EVEN
1149  004160  000167  176656            4.9          JMP     SWITCH          ;TRY AGAIN!
1150
1151  004164  005121                    3.7  SWCHK2: COM     (R1)+           ;RESTORE SY.MAP AND INCREMENT
1152  004166  005303                    2.3          DEC     R3              ;CHECK FOR END OF MAPS
```

```
1153  004170  003345                2.6          BGT     SWCHK           ;BRANCH IF NOT DONE
1154  004172  012700  177777        3.8          MOV     #-1,    R0      ;DISPLAY SETTING #-1
1155  004176  000000                1.8  HLT77:  HALT                    ;SELECT DYNAMIC SWITCH SETTINGS
1156
1157  004200  005000                2.3          CLR     R0
1158  004202  000207                3.5          RTS     PC              ;RETURN TO MAIN LINE
```

```
1159
1160                                    ;*************************** SYSGEN *****************************
1161
1162                                    ;SYSGEN,THE FUNCTION OF THIS ROUTINE IS TO LINK DEVICE VECTORS WITH
1163                                    ;       THEIR APPROPRIATE INTERRUPT SERVICE ROUTINE (ISR).  AND REPORT
1164                                    ;       THE ERRONEOUS SELECTION OF NONEXISTANT DEVICES.
1165
1166                                    ;*************************** SYSGEN *****************************
1167
1168  004204  016700  175462   5.0  SYSGEN: MOV     FIRSTV, R0      ;LOAD R0 WITH FIRST COMM VECTOR
1169  004210  012701  031424   3.8          MOV     #LINKER,R1      ;LOAD R1 WITH ADRS OF LINKER AREA
1170  004214  012702  001634   3.8          MOV     #BR.DC, R2      ;SET UP BR TABLE POINTER
1171  004220  012703  001506   3.8          MOV     #NO.DC, R3      ;SET UP DEVICE COUNT TABLE POINTER
1172  004224  012704  001252   3.8          MOV     #SW.DC1,R4      ;SET UP DEVICE SELECTED MAP POINTER
1173
1174                                    ;LINK DC'S WITH THEIR ISR
1175
1176  004230  004537  004572   5.8          JSR     %5,@#LINK       ;GENERATE CODE TO LINK DC'S WITH ISR
1177  004234  012776                       DC.RCV                  ;RCV ISR ADRS
1178  004236  012730                       DC.XMT                  ;XMIT ISR ADRS
1179
1180                                    ;LINK KL VECTORS WITH THEIR ISR'S
1181
1182  004240  012704  001256   3.8          MOV     #SW.KL,R4
1183  004244  004537  004572   5.8          JSR     %5,@#LINK       ;LINK KL'S WITH ISR'S
1184  004250  013302                       KL.RCV                  ;RCV ISR ADRS
1185  004252  013204                       KL.XMT                  ;XMIT ISR ADRS
1186
1187                                    ;LINK DP'S WITH ISR'S
1188
1189  004254  004537  004572   5.8          JSR     %5,@#LINK       ;LINK DP'S WITH ISR'S
1190  004260  013532                       DP.RCV                  ;RCV ISR ADRS
1191  004262  013704                       DP.XMT                  ;XMIT ISR ADRS
1192
1193                                    ;LINK DM'S WITH ISR'S
1194
1195  004264  012704  001264   3.8          MOV     #SW.DMA,R4
1196  004270  004537  004572   5.8          JSR     %5,@#LINK       ;LINK DM'S WITH ISR'S
1197  004274  014342                       DM.RCV                  ;RCV ISR ADRS
1198  004276  014222                       DM.XMT                  ;XMIT ISR ADRS
1199
1200                                    ;LINK DN'S WITH ISR'S
1201
1202  004300  004537  004676   5.8          JSR     %5,@#LINK1      ;LINK DN'S WITH ISR
1203  004304  015054                       DN.ISR                  ;ISR ADR
1204
1205                                    ;LINK DM11BB'S WITH ISR
1206
1207  004306  004537  004676   5.8          JSR     %5,@#LINK1
1208  004312  015370                       .WORD   DMBISR
1209
1210  004314  005723           3.2          TST     (R3)+           ;SKIP KG DEVICE COUNT
1211  004316  005724           3.2          TST     (R4)+           ;SKIP KG SWITCH MAP
1212
1213  004320  004567  000452   7.0          JSR     %5,SKIPVA       ;DR11
1214  004324  000010                       .WORD   10
```

```
1215  004326  004567  000444            7.0          JSR     %5,SKIPVA       ;PA611 R
1216  004332  000004                                 .WORD   4
1217  004334  004567  000436            7.0          JSR     %5,SKIPVA       ;PA611 P
1218  004340  000004                                 .WORD   4
1219  004342  004567  000430            7.0          JSR     %5,SKIPVA       ;DT11
1220  004346  000010                                 .WORD   10
1221
1222                                          ;LINK DX11'S WITH ISR
1223
1224  004350  004767  000450            7.0          JSR     PC,     MOD10   ;MAKE SURE VECTOR ADR POINTER IS ON MOD10
1225  004354  004537  004572            5.8          JSR     %5,@#LINK
1226  004360  015442                                 .WORD   DX.ISR          ;DEFAULT TO OFF LINE
1227  004362  015436                                 .WORD   DMY.ISR
1228  004364  005767  002054            4.4          TST     DX.OLF          ;CHECK FOR ANY DX ON-LINE FLAGS
1229  004370  001451                    2.6          BEQ     6$              ;BRANCH IF NONE
1230  004372  012767  000001  016366    6.4          MOV     #1,     MARK    ;SET UP MARKER
1231  004400  016767  175130  016356    7.6          MOV     NO.DX,  MAX     ;SET UP MAX COUNTER
1232  004406  036767  016354  174660    7.7  1$:     BIT     MARK,   SW.DX   ;CHECK FOR DX SELECTED
1233  004414  001402                    2.6          BEQ     2$              ;BRANCH IF NOT
1234  004416  162701  000014            3.8          SUB     #14,    R1      ;DECREMENT LINKER POINTER
1235  004422  006367  016340            4.9  2$:     ASL     MARK            ;UPDATE MARKER
1236  004426  005367  016332            4.9          DEC     MAX             ;CHECK FOR DONE
1237  004432  001365                    2.6          BNE     1$              ;BRANCH IF NOT
1238  004434  012767  000001  016324    6.4          MOV     #1,     MARK    ;SET UP MARKER
1239  004442  016767  175066  016314    7.6          MOV     NO.DX,  MAX     ;SET UP COUNTER
1240  004450  036767  016312  174616    7.7  3$:     BIT     MARK,   SW.DX   ;CHECK FOR DX SELECTED
1241  004456  001411                    2.6          BEQ     5$              ;BRANCH IF NOT
1242  004460  036767  016302  001756    7.7          BIT     MARK,   DX.OLF  ;CHECK FOR ON-LINE
1243  004466  001403                    2.6          BEQ     4$              ;BRANCH IF NOT
1244  004470  012761  015636  000002    6.4          MOV     #DXOL.ISR,2(R1) ;CHANGE THE ISR ADDRESS TO ON LINE
1245  004476  062701  000014            3.8  4$:     ADD     #14,    R1      ;RESTORE R1
1246  004502  006367  016260            4.9  5$:     ASL     MARK            ;UPDATE MARKER
1247  004506  005367  016252            4.9          DEC     MAX             ;CHECK FOR DONE
1248  004512  001356                    2.6          BNE     3$              ;BRANCH IF NOT
1249
1250                                          ;LINK DL11C,D,E WITH THEIR ISR'S
1251
1252  004514  004767  000304            7.0  6$:     JSR     PC,     MOD10   ;MAKE SURE VECTOR ADR POINTER IS ON MOD10
1253  004520  004537  004572            5.8          JSR     %5,     @#LINK  ;LINK DL'S WITH ISR'S
1254  004524  017742                                 .WORD   DL.RCV          ;RECEIVER ISR ADR
1255  004526  017652                                 .WORD   DL.XMT          ;TRANSMITTER ISR ADR
1256
1257                                          ;LINK DJ11'S WITH THEIR ISR'S
1258
1259
1260  004530  004767  000270            7.0          JSR     PC,     MOD10   ;MAKE SURE VECTOR ADR POINTER IS ON MOD10
1261  004534  012704  001302            3.8          MOV     #SW.DJ,R4       ;DEVICE SELECTED MAP POINTER MOD10
1262  004540  004537  004572            5.8          JSR     %5,     @#LINK  ;LINK DJ'S WITH ISR'S
1263  004544  020344                                 .WORD   DJ.RCV          ;RECEIVER ISR ADR
1264  004546  020224                                 .WORD   DJ.XMT          ;TRANSMITTER ISR ADR
1265                                          ;*************************
1266                                          ;       MOV     #SW.NEXT,R4
1267                                          ;       JSR     PC,     @#LINK
1268                                          ;*************************
1269
1270  004550  004767  000250            7.0          JSR     PC,     MOD10   ;MAKE SURE VECTOR ADD POINTER IS ON MOD10
```

```
1271
1272  004554  010067  174716          4.9          MOV     R0,ENDVEC       ;STORE END OF VECTOR AREA
1273  004560  010037  001026          3.7  FVECTX: MOV     R0,@#FVECT      ;SET NXT AVAILABLE FLOATING VECTOR ADDRESS GLOBA
1274  004564  010167  174710          4.9          MOV     R1,ENDLNK       ;STORE END OF LINKER AREA
1275  004570  000207                  3.5          RTS     PC              ;RETURN TO MAIN LINE
1276
1277
1278                                               ;LINK, ROUTINES TO LINK DEVICE VECTORS WITH THEIR ISR'S
1279
1280  004572  005067  016172          4.9  LINK:   CLR     LINE            ;SET LINE EQUAL TO ZERO
1281  004576  012567  000304          6.4          MOV     (R5)+,  RCVISR  ;FETCH ADRS OF RCV ISR ADRS
1282  004602  012567  000302          6.4          MOV     (R5)+,  XMTISR  ;FETCH ADRS OF XMIT ISR ADRS
1283  004606  012267  000300          6.4          MOV     (R2)+,  PRTLVL  ;GET PRIORITY LEVEL
1284  004612  012367  016146          6.4          MOV     (R3)+,  MAX     ;FETCH NUMBER OF DEVICES ON THE SYSTEM
1285  004616  001465                  2.6          BEQ     LNK15           ;BRANCH IF NONE
1286  004620  012767  000001  016140  6.4  LNK1:   MOV     #1,MARK         ;SET UP LINE POINTER
1287  004626  036714  016134          6.5  LNK2:   BIT     MARK,   (R4)    ;WAS THIS LINE SELECTED
1288  004632  001003                  2.6          BNE     LNK3            ;YES
1289  004634  062700  000010          3.8          ADD     #10,R0          ;NO, INC TO NEXT VECTOR ADRS
1290  004640  000404                  2.6          BR      LNK4            ;CONTINUE
1291  004642  004767  000170          7.0  LNK3:   JSR     %7,CODRCV       ;LOAD LINKING CODE
1292  004646  004767  000210          7.0          JSR     %7,CODXMT
1293  004652  005267  016112          4.9  LNK4:   INC     LINE            ;INC TO NEXT LINE NUMBER
1294  004656  005367  016102          4.9          DEC     MAX             ;HAS MAXIMUM NUMBER BEEN CHECKED
1295  004662  003443                  2.6          BLE     LNK15           ;BRANCH TO EXIT IF FINISHED
1296  004664  006367  016076          4.9          ASL     MARK            ;SHIFT LINE POINTER
1297  004670  103356                  2.6          BCC     LNK2
1298  004672  005724                  3.2          TST     (R4)+           ;INC TO MAP 2
1299  004674  000751                  2.6          BR      LNK1            ;REINIT LINE POINTER
1300
1301  004676  005067  016066          4.9  LINK1:  CLR     LINE            ;SET LINE EQUAL TO ZERO
1302  004702  012567  000200          6.4          MOV     (R5)+,  RCVISR  ;FETCH ADRS OF RCV ISR ADRS
1303  004706  012267  000200          6.4          MOV     (R2)+,  PRTLVL  ;GET PRIORITY LEVEL
1304  004712  012367  016046          6.4          MOV     (R3)+,  MAX     ;FETCH NUMBER OF DEVICES ON THE SYSTEM
1305  004716  001425                  2.6          BEQ     LNK15           ;BRANCH IF NONE
1306  004720  012767  000001  016040  6.4  LNK11:  MOV     #1,MARK         ;SET UP LINE POINTER
1307  004726  036714  016034          6.5  LNK12:  BIT     MARK,   (R4)    ;WAS THIS LINE SELECTED
1308  004732  001003                  2.6          BNE     LNK13           ;YES
1309  004734  062700  000004          3.8          ADD     #4,R0           ;NO, INC TO NEXT VECTOR ADRS
1310  004740  000402                  2.6          BR      LNK14           ;CONTINUE
1311  004742  004767  000070          7.0  LNK13:  JSR     %7,CODRCV       ;LOAD LINKING CODE
1312  004746  005267  016016          4.9  LNK14:  INC     LINE            ;INC TO NEXT LINE NUMBER
1313  004752  005367  016006          4.9          DEC     MAX             ;HAS MAXIMUM NUMBER BEEN CHECKED
1314  004756  003405                  2.6          BLE     LNK15           ;BRANCH TO EXIT IF FINISHED
1315  004760  006367  016002          4.9          ASL     MARK            ;SHIFT LINE POINTER
1316  004764  103360                  2.6          BCC     LNK12
1317  004766  005724                  3.2          TST     (R4)+           ;INC TO MAP 2
1318  004770  000753                  2.6          BR      LNK11           ;REINIT LINE POINTER
1319  004772  005724                  3.2  LNK15:  TST     (R4)+
1320  004774  000205                  3.5          RTS     %5              ;RETURN
1321
1322  004776  004767  000022          7.0  SKIPVA: JSR     PC,     MOD10   ;MAKE SURE VECTOR ADR POINTER IS ON MOD10
1323  005002  012367  015756          6.4          MOV     (R3)+,MAX
1324  005006  005367  015752          4.9  SKIPV1: DEC     MAX
1325  005012  100402                  2.6          BMI     SKIPV2
1326  005014  061500                  3.8          ADD     (5),R0
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1327  005016  000773                    2.6          BR      SKIPV1
1328  005020  005725                    3.2  SKIPV2: TST     (R5)+
1329  005022  000205                    3.5          RTS     R5
1330
1331                                                 ;SUBROUTINE TO UPDATE VECTOR ADDRESS POINTER (R0) TO A MOD10(8) BOUNDARY
1332  005024  062700  000004            3.8  MOD10:  ADD     #4,     R0      ;INC BY 4
1333  005030  042700  000004            4.4          BIC     #4,     R0      ;MAKE MOD10(8)
1334  005034  000207                    3.5          RTS     PC
1335
1336                                                 ;CODE, ROUTINES TO FILL IN CODE FOR VECTOR AND LINKER AREA
1337
1338  005036  010120                    3.7  CODRCV: MOV     R1,(R0)+        ;POINT RCV VECTOR TO LINKER
1339  005040  016720  000046            6.4          MOV     PRTLVL,(R0)+    ;SET UP DEVICE PRIORITY
1340  005044  012721  004537            5.2          MOV     #4537,(R1)+     ;LOAD LINKER WITH JSR
1341  005050  016721  000032            6.4          MOV     RCVISR, (R1)+   ;LOAD LINKER WITH DESTINATION
1342  005054  016721  015710            6.4          MOV     LINE,   (R1)+   ;LOAD LINKER WITH LINE #
1343  005060  000207                    3.5          RTS     %7
1344
1345  005062  010120                    3.7  CODXMT: MOV     R1,(R0)+        ;POINT XMT VECTOR TO LINKER
1346  005064  016720  000022            6.4          MOV     PRTLVL,(R0)+    ;SET UP DEVICE PRIORITY
1347  005070  012721  004537            5.2          MOV     #4537,(R1)+     ;LOAD LINKER WITH JSR
1348  005074  016721  000010            6.4          MOV     XMTISR, (R1)+   ;LOAD LINKER WITH DESTINATION
1349  005100  016721  015664            6.4          MOV     LINE,   (R1)+   ;LOAD LINKER WITH LINE #
1350  005104  000207                    3.5          RTS     %7              ;RETURN
1351
1352  005106  000000                        RCVISR: 0                       ;TEMP RCV ISR ADR
1353  005110  000000                        XMTISR: 0                       ;TEMP XMT ISR ADR
1354  005112  000000                        PRTLVL: 0                       ;TEMP PRIORITY LEVEL
1355
1356                                                 ;***************************** SYSGEN *******************************
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1357
1358                                        ;*************************** DEVICE ******************************
1359
1360                                        ;DEVICE, ROUTINE TO PRIME DEVICE CSR AND DATA
1361
1362                                        ;*************************** DEVICE ******************************
1363
1364                                        ;DETERMINE MEMORY SIZE
1365
1366  005114  000240                  1.5  DEVICE: NOP
1367  005116  012737  005140  000004  5.2          MOV     #XMISR, @#4     ;TRAP TO XMISR ON TIMEOUT
1368  005124  016700  174350          5.0          MOV     ENDLNK, R0      ;FETCH BEGINNING OF FREE MEMORY
1369  005130  010067  174346          4.9          MOV     R0,     ENDTAB  ;SET UP END OF TABLE POINTER
1370  005134  005720                  3.2          TST     (R0)+           ;TIMEOUT AT END OF MEMORY
1371  005136  000776                  2.6          BR      .-2
1372
1373                                        ;ENTER HERE ON TIMEOUT
1374
1375  005140  022626                  4.7  XMISR:  CMP     (SP)+,  (SP)+   ;ADJUST STACK
1376  005142  012737  000006  000004  5.2          MOV     #6,     @#4     ;REINSTATE TIME OUT TRAP
1377  005150  162700  001000          3.8          SUB     #1000,  R0      ;SAVE ROOM TO BOOT.
1378  005154  005737  000042          3.2          TST     @#42            ;CHECK FOR MONITOR
1379  005160  001410                  2.6          BEQ     XMHOOK          ;BRANCH IF NONE
1380  005162  023767  000042  005310  5.9          CMP     @#42,PROEND
1381  005170  001404                  2.6          BEQ     XMHOOK
1382  005172  013700  000042          3.8          MOV     @#42,   R0      ;42 HAS TOP OF CORE
1383  005176  162700  000200          3.8          SUB     #200,   R0      ;SAVE ROOM FOR LAST CORE TEST
1384  005202  010067  174276          4.9  XMHOOK: MOV     R0,     ENDCOR  ;SAVE END OF USEABLE CORE
1385
1386                                        ;INITIALIZE DC11'S
1387
1388  005206  032767  000002  174032  6.5  DCINIT: BIT     #FL.DC,SW.MAP   ;CHECK FOR DC11'S
1389  005214  001433                  2.6          BEQ     KLINIT          ;BRANCH IF NONE
1390  005216  016700  174264          5.0          MOV     NO.DC,R0        ;NUMBER OF DC11'S ON SYSTEM
1391  005222  012701  001252          3.8          MOV     #SW.DC1,R1      ;SELECTED MAP ADR.
1392  005226  016702  174346          5.0          MOV     AD.DC,R2        ;DEVICE ADR
1393  005232  012703  013104          3.8          MOV     #DCDATA,R3      ;DATA TABLE ADR.
1394  005236  012704  000001          3.8  1$:     MOV     #1,R4           ;MARKER
1395  005242  012723  000400          5.2  2$:     MOV     #400,(R3)+      ;INIT DATA TABLE
1396  005246  030411                  3.8          BIT     R4,(R1)         ;CHECK FOR LINE SELECTED
1397  005250  001405                  2.6          BEQ     3$              ;BRANCH IF NOT
1398  005252  012712  003130          5.2          MOV     #3130,(R2)      ;5-BIT, HIGH SPEED, INTENB RCV
1399  005256  012762  000534  000004  6.4          MOV     #534,4(R2)      ;1 STOP CODE, INT ENB XMT, HIGH SPEED MAIN
1400  005264  062702  000010          3.8  3$:     ADD     #10,R2          ;INC TO NEXT DEV ADR.
1401  005270  005300                  2.3          DEC     R0              ;CHECK FOR DONE
1402  005272  001404                  2.6          BEQ     KLINIT          ;BRANCH IF DONE
1403  005274  006304                  2.3          ASL     R4              ;INC TO NEXT UNIT
1404  005276  103361                  2.6          BCC     2$              ;BRANCH IF SAME MAP
1405  005300  005721                  3.2          TST     (R1)+           ;INC TO NEXT MAP
1406  005302  000755                  2.6          BR      1$              ;BRANCH TO RESET MARKER
1407
1408                                        ;TEST KL11'S
1409
1410  005304  005767  173746          4.4  KLINIT: TST     SW.KL           ;CHECK FOR KL11'S SELECTED
1411  005310  001443                  2.6          BEQ     DPINIT          ;BRANCH IF NONE
1412  005312  012701  013432          3.8          MOV     #KLDATA,R1      ;KL DATA STORAGE
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1413  005316  012767  000020  015440      6.4          MOV     #16.,MAX                ;8 WORDS TIMES 2 BYTES = 16
1414  005324  012721  000400              5.2  KLDAT:  MOV     #400,(R1)+      ;TWO BYTES "1" DATA
1415  005330  005367  015430              4.9          DEC     MAX             ;HAVE ALL DATA BUFFERS BEEN INITIALIZED
1416  005334  001373                      2.6          BNE     KLDAT           ;NO
1417
1418  005336  016701  015436              5.0          MOV     KLRSO,R1        ;KL11 RCV STATUS, LINE 0
1419  005342  016702  015426              5.0          MOV     KLXSO,R2        ;KL11 XMT STATUS, LINE 0
1420  005346  012767  000001  015412      6.4          MOV     #1,MARK         ;SET UP MARKER
1421  005354  036767  015406  173674      7.7  KLCSR:  BIT     MARK,SW.KL      ;ACTIVATE THIS TTY
1422  005362  001406                      2.6          BEQ     KLOFF           ;NO
1423  005364  052711  000101              5.2          BIS     #101,@R1        ;INT ENB RDR, RDR ENB
1424  005370  056712  174300              6.4          BIS     KLXSET, @R2     ;INT ENB PUNCH,MAINTENANCE MODE
1425  005374  005761  000002              4.4          TST     2(R1)           ;DBL-BUFFERED FLUSH DL' TYPE BRK/CHARS
1426  005400  062701  000010              3.8  KLOFF:  ADD     #10,R1          ;INC TO NEXT ADRS
1427  005404  062702  000010              3.8          ADD     #10,R2          ;INC TO NEXT ADRS
1428  005410  000241                      1.5          CLC                     ;CLEAR CARRY
1429  005412  006367  015350              4.9          ASL     MARK            ;HAVE ALL BEEN CHECKED
1430  005416  103356                      2.6          BCC     KLCSR           ;NO
1431
1432                                              ;ACTIVATE DP11'S
1433
1434  005420  032767  000010  173620      6.5  DPINIT: BIT     #FL.DP, SW.MAP  ;CHECK FOR DP11'S SELECTED
1435  005426  001461                      2.6          BEQ     DMANIT          ;BRANCH IF NONE
1436  005430  012767  001260  000044      6.4          MOV     #SW.DP1,DPIA+4
1437  005436  012704  014122              3.8          MOV     #DPXMTDATA,R4   ;DP TRANSMITTER DATA
1438  005442  012703  014022              3.8          MOV     #DPRCVDATA,R3   ;DP RCV DATA FILE
1439  005446  012701  174770              3.8          MOV     #174770,R1      ;R1=DP RECEIVER CSR ADRS
1440  005452  012702  174774              3.8          MOV     #174774,R2      ;R2=DP TRANSMITTER CSR ADRS
1441  005456  052767  100000  015274      6.4          BIS     #BIT15,TMPDAT   ;SET UP CONTROL FLAG
1442  005464  005167  015270              4.9  DPIB:   COM     TMPDAT          ;  "  "  "  "
1443  005470  012767  000001  015270      6.4          MOV     #1,MARK
1444  005476  036737  015264  001260      6.5  DPIA:   BIT     MARK,@#SW.DP1   ;TEST THIS DP LINE
1445  005504  001411                      2.6          BEQ     DPIC            ;NO
1446  005506  052711  000105              5.2          BIS     #105,@R1        ;RCV INT ENB, MAINT MODE STRIP SYNC
1447  005512  116761  007334  000003      7.6          MOVB    TSYNC,3(R1)             ;LOAD SYNC BUFFER
1448  005520  052712  000312              5.2          BIS     #312,@R2        ;INIT TRANSMITTER STATUS
1449                                                                          ;BIT7=DONE
1450                                                                          ;BIT6=INTERRUPT ENABLE
1451                                                                          ;BIT3=TRANSMIT SYNC ON INT
1452                                                                          ;BIT1=IDLE SYNC
1453  005524  105062  000003              4.9          CLRB    3(R2)           ;CLR SYNC EXT
1454  005530  062701  177770              3.8  DPIC:   ADD     #-10,R1         ;INDEX TO NEXT RCV CSR
1455  005534  062702  177770              3.8          ADD     #-10,R2         ;  "  "  "  XMIT  "
1456  005540  005023                      3.7          CLR     (R3)+           ;CLEAR DP RCV DATA FILE
1457  005542  012724  002000              5.2          MOV     #2000,(R4)+     ;INIT SYNC COUNT (4 IN HI-BYTE)
1458  005546  000241                      1.5          CLC                     ;CLEAR CARRY
1459  005550  006367  015212              4.9          ASL     MARK            ;HAS A BANK OF 16 BEEN INT'D
1460  005554  103350                      2.6          BCC     DPIA            ;NO
1461  005556  062767  000002  177716      6.4          ADD     #2,DPIA+4       ;YES, ENTER SECOND BANK
1462  005564  005767  015170              4.4          TST     TMPDAT          ;HAVE ALL 32 BEEN CHECKED
1463  005570  100735                      2.6          BMI     DPIB            ;NO
1464
1465                                              ;DM      INITIALIZATION
1466
1467  005572  005767  173466              4.4  DMANIT: TST     SW.DMA          ;CHECK FOR DM11A'S SELECTED FOR TEST
1468  005576  001002                      2.6          BNE     1$              ;BRANCH IF ANY
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1469  005600  000167  000534          4.9          JMP     DNINIT          ;OTHERWISE SKIP
1470
1471  005604  112767  177777  021422  6.4   1$:    MOVB    #-1,    BINCNT  ;SET  FIRST DATA BYTE TO ALL 1'S
1472  005612  004567  015230          7.0          JSR     %5,     CLEAR   ;CLEAR TABLE
1473  005616  014612                               .WORD   DM.LDAT         ;STARTING AT THIS ADDRESS
1474  005620  000120                               .WORD   80.             ;THIS MANY WORDS
1475
1476                                       ;AT THIS POINT THE FOLLOWING TABLES HAVE BEEN CLEARED
1477                                       ;       DM.LDAT                 ;DM DTAT LIMITS FOR EACH CHANNEL
1478                                       ;       DM.CAT                  ;ADDRESSES OF CURRENT ADDRESS TABLES
1479                                       ;       DM.WCT                  ;ADDRESSES OF WORD COUNT TABLES
1480                                       ;       DM.TT                   ;TUMBLE TABLE POINTERS
1481                                       ;       DM.RCVDAT               ;RECEIVE DATA FILES
1482
1483  005622  105067  173654          4.9          CLRB    ENDTAB          ;FORM MOD400(8) ADRS
1484  005626  105267  173651          4.9          INCB    ENDTAB+1        ;
1485  005632  016700  173644          5.0          MOV     ENDTAB, R0      ;R0 = ADRS OF FIRST CAT
1486  005636  016701  015144          5.0          MOV     DMADRS,R1       ;(R1)= ADRS OF DM CSR ADRS
1487
1488  005642  004537  006264          5.8          JSR     %5,@#BMOV               ;BLOCK MOVE
1489  005646  006250                               DMA.11                  ;FROM THIS ADRS
1490  005650  014422                               DM.R6                   ;TO THIS ADRS
1491  005652  000003                               3                       ;THIS MANY WORD
1492
1493  005654  012702  014652          3.8          MOV     #DM.CAT,R2      ;(R2)=ADRS OF CAT ADRS'S
1494  005660  012703  014712          3.8          MOV     #DM.WCT,R3      ;(R3)=ADRS OF WCT ADRS'S
1495  005664  012704  014752          3.8          MOV     #DM.TT,R4       ;(R4)=TT POINTERS
1496
1497                                       ;ACTIVATE LINE 0 OF EACH CHANNEL AND TRANSMIT A
1498                                       ;CHARACTER OF ALL "1"S TO DETERMINE CHARACTER LENGTH
1499                                       ;OF EACH CHANNEL
1500                                       ;
1501                                       ;NOTE:
1502                                       ;       IF DEVICE FAILS TO RESPOND PROGRAM WILL HANG UP
1503                                       ;
1504
1505  005670  012767  000001  015070  6.4          MOV     #1,MARK         ;SETUP CHANNEL ACTIVE POINTER
1506  005676  036737  015064  001264  6.5   DMA.0: BIT     MARK,@#SW.DMA   ;TEST CHANNEL 0 FOR ACTIVATION
1507  005704  001437                   2.6          BEQ     DMA.1           ;BRANCH IF CH 0 NOT SELECTED
1508
1509  005706  012710  027234          5.2          MOV     #BINCNT,@R0     ;LOAD CAT WITH ADRS OF BINARY COUNT
1510  005712  010012                   3.7          MOV     R0,@R2          ;SAVE CAT ADRS IN CAT ADRS TABLE
1511  005714  062700  000040          3.8          ADD     #40,R0          ;(R0)=ADRS OF WORD COUNT TABLE (WCT)
1512  005720  010023                   3.7          MOV     R0,(R3)+        ;SAVE WCT ADRS IN WCT ADRS TABLE
1513  005722  012710  177777          5.2          MOV     #-1,@R0         ;SET LINE 0 WORD COUNT = ONE
1514  005726  062700  000140          3.8          ADD     #140,R0         ;(R0)=TUMBLE TABLE ADRS
1515  005732  010024                   3.7          MOV     R0,(R4)+        ;SAVE TT ADRS IN TT ADRS TABLE
1516  005734  012767  000100  014754  6.4          MOV     #100,CNT        ;TT WORD COUNT
1517  005742  005020                   3.7   DMA.00: CLR     (R0)+           ;CLEAR TT ENTRY
1518  005744  005367  014746          4.9          DEC     CNT             ;DEC TT WORD COUNT
1519  005750  001374                   2.6          BNE     DMA.00          ;BRANCH IF TT NOT CLEARED
1520  005752  042721  000001          5.8          BIC     #BIT0,(R1)+     ;ZERO TT POINTER ,INC TO BAR
1521  005756  005721                   3.2          TST     (R1)+           ;INC TO BCR
1522  005760  042721  177777          5.8          BIC     #177777,(R1)+   ;CLEAR ALL BREAK BITS
1523  005764  012221                   5.2          MOV     (R2)+,  (R1)+   ;LOAD BASE ADRS REG WITH CAT ADRS
1524  005766  052761  000105  177770  6.4          BIS     #105,   -10(R1) ;SET RCV INTERRUPT ENABLE. MAINT,GO
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1525  005774  052761  000001  177772  6.4          BIS     #BIT0,  -6(R1)  ;ACTIVATE LINE 0, BAR
1526  006002  000405                  2.6          BR      DMA.2
1527
1528  006004  062701  000010          3.8  DMA.1:  ADD     #10,R1          ;INC R1 TO NEXT CSR ADRS
1529  006010  005722                  3.2          TST     (R2)+           ;INC CAT ADRS TABLE POINTER
1530  006012  005723                  3.2          TST     (R3)+           ;INC WCT ADRS TABLE POINTER
1531  006014  005724                  3.2          TST     (R4)+           ;INC TT POINTER TABLE POINTER
1532
1533  006016  006367  014744          4.9  DMA.2:  ASL     MARK            ;SHIFT CH POINTER TO NEXT CH
1534  006022  103325                  2.6          BCC     DMA.0           ;CONTINUE UNTIL ALL 16 CH CHECKED
1535  006024  012701  014612          3.8          MOV     #DM.LDAT,R1
1536  006030  012767  000001  014730  6.4          MOV     #1,     MARK
1537  006036  033767  022766  173220  6.5  DMA.3:  BIT     @#MARK, SW.DMA
1538  006044  001402                  2.6          BEQ     DMA.13
1539  006046  005711                  3.2          TST     (R1)
1540  006050  001776                  2.6          BEQ     .-2
1541  006052  005721                  3.2  DMA.13: TST     (R1)+
1542  006054  006367  014706          4.9          ASL     MARK
1543  006060  103366                  2.6          BCC     DMA.3
1544  006062  004567  000176          7.0          JSR     %5,BMOV         ;REINSTATE RCV ISR
1545  006066  006256                               DMA.12
1546  006070  014422                               DM.R6
1547  006072  000003                               3
1548
1549                                       ;DM11 NPR CORE INITIALIZATION
1550
1551  006074  112767  000000  021132  6.4          MOVB    #0,BINCNT       ;RESTORE DATA FILE
1552  006102  016701  014700          5.0          MOV     DMADRS,R1       ;FIRST DM CSR ADRS
1553  006106  012702  014652          3.8          MOV     #DM.CAT,R2      ;TABLE OF CURRENT ADRS TABLE
1554  006112  012703  014712          3.8          MOV     #DM.WCT,R3      ;TABLE OF WORD COUNT TABLE
1555  006116  012705  014752          3.8          MOV     #DM.TT,R5       ;TABLE OF TUMBLE TABLE
1556  006122  012704  014612          3.8          MOV     #DM.LDAT,R4     ;WORD COUNT
1557  006126  012767  000001  014632  6.4          MOV     #1,MARK
1558  006134  036767  014626  173122  7.7  DMA.10: BIT     MARK,SW.DMA     ;ACTIVATE THIS LINE?
1559  006142  001427                  2.6          BEQ     DMA.8
1560  006144  012267  000020          6.4          MOV     (R2)+,DMA.4     ;CAT ADRS
1561  006150  012367  000026          6.4          MOV     (R3)+,DMA.5     ;WCT ADRS
1562  006154  005114                  3.7          COM     @R4             ;
1563  006156  012467  000016          6.4          MOV     (R4)+,DMA.6     ;WCT
1564
1565  006162  004567  000124          7.0          JSR     %5,LOAD         ;LOAD
1566  006166  027234                               BINCNT                  ;BINARY COUNT ADRS
1567  006170  000000                       DMA.4:  OPEN                    ;INTO CAT
1568  006172  000020                               16.                     ;
1569
1570  006174  004567  000112          7.0          JSR     %5,LOAD         ;LOAD
1571  006200  000000                       DMA.6:  OPEN                    ;DATA LIMIT INTO
1572  006202  000000                       DMA.5:  OPEN                    ;WORD COUNT TABLE (WCT)
1573  006204  000020                               16.                     ;WORT COUNT TABLE (WCT)
1574
1575  006206  012721  010105          5.2          MOV     #010105,(R1)+   ;RCV+XMT INT ENB,MAINT,GO
1576  006212  052721  177777          5.2          BIS     #177777,(R1)+   ;ACTIVATE ALL LINES
1577  006216  022121                  4.7          CMP     (R1)+,  (R1)+   ;INC TO NEXT CSR
1578  006220  000405                  2.6          BR      DMA.9
1579
1580  006222  005722                  3.2  DMA.8:  TST     (R2)+           ;INC TO NEXT CAT ADRS
```

```
1581  006224  005723                  3.2          TST     (R3)+           ;INC TO NEXT WCT ADRS
1582  006226  005724                  3.2          TST     (R4)+           ;INC TO NEXT WCT
1583  006230  062701  000010          3.8          ADD     #10,R1          ;INC TO NEXT CSR
1584  006234  006367  014526          4.9  DMA.9:  ASL     MARK            ;SHIFT CH POINTER TO NEXT CH
1585  006240  103335                  2.6          BCC     DMA.10          ;BRANCH IF NOT END CH
1586  006242  010067  173234          4.9          MOV     R0,     ENDTAB  ;SAVE END OF CODE
1587  006246  000434                  2.6          BR      DNINIT          ;GO SET UP NON-COMM DEVICES
1588
1589                                               ;*****************************************************************
1590                                               ;THIS CODE WILL BE MOVED INTO THE DM.RCV ISR IN ORDER TO
1591                                               ;ESTABLISH THE CHARACTER SIZE AND THEREFORE DATA LIMIT
1592                                               ;OF EACH CHANNEL
1593
1594  006250  111561  014612          6.4  DMA.11: MOVB    @R5,DM.LDAT(R1) ;LOAD RECEIVED DATA INTO
1595  006254  000421                  2.6          BR      .+44            ;DATA LIMIT
1596                                                                       ;ALL 1'S WERE TRANSMITTED
1597                                                                       ;THEREFORE THIS CHARACTER
1598                                                                       ;SHOULD REPRESENT THE MAX
1599                                                                       ;WORD COUNT (DATA LIMIT)FOR
1600                                                                       ;THIS PARTICULAR CHANNEL
1601
1602                                               ;*****************************************************************
1603
1604                                               ;RESTORATION CODE
1605
1606  006256  121561  015012          5.9  DMA.12: CMPB    @R5,DM.RDAT(R1) ;NORMAL RUNNING CODE FOR RCV.ISR
1607  006262  001401                  2.6          BEQ     .+4
1608
1609                                               ;*****************************************************************
1610
1611                                               ;BMOV,  BLOCK MOVE ROUTINE
1612
1613  006264  004767  014654          7.0  BMOV:   JSR     PC,     SAVRG   ;SAVE REGISTERS
1614  006270  012501                  3.8          MOV     (R5)+,R1        ;FETCH SOURCE ADRS
1615  006272  012502                  3.8          MOV     (R5)+,R2        ;FETCH DESTINATION ADRS
1616  006274  012503                  3.8          MOV     (R5)+,R3        ;FETCH WORD COUNT
1617  006276  012122                  5.2  T.B1:   MOV     (R1)+,(R2)+     ;MOVE
1618  006300  005303                  2.3          DEC     R3              ;DEC WORD COUNT
1619  006302  001375                  2.6          BNE     T.B1            ;BRANCH IF BLOCK NOT MOVED
1620  006304  004767  014656          7.0          JSR     PC,     RSTRG   ;RESTORE R0-R4
1621  006310  000205                  3.5          RTS     %5              ;RETURN
1622
1623  006312  004767  014626          7.0  LOAD:   JSR     PC,     SAVRG
1624  006316  012501                  3.8          MOV     (R5)+,R1        ;FETCH DATA
1625  006320  012502                  3.8          MOV     (R5)+,R2        ;FETCH DESTINATION ADRS
1626  006322  012503                  3.8          MOV     (R5)+,R3        ;FETCH WORD COUNT
1627  006324  010122                  3.7  T.LOD1: MOV     R1,(R2)+        ;LOAD DATA
1628  006326  005303                  2.3          DEC     R3              ;DEC WORD COUNT
1629  006330  001375                  2.6          BNE     T.LOD1          ;BRANCH IF LOAD NOT COMPLETE
1630  006332  004767  014630          7.0          JSR     PC,     RSTRG   ;RESTORE REG
1631  006336  000205                  3.5          RTS     %5              ;RETURN
1632
1633                                               ;ACTIVATE DN11'S
1634  006340  005767  172722          4.4  DNINIT: TST     SW.DN           ;CHECK FOR ANY DN11'S SELECTED
1635  006344  001446                  2.6          BEQ     DXINIT
1636  006346  012701  015242          3.8          MOV     #DNDATA,R1
```

```
1637  006352  012702  175200          3.8          MOV     #175200,R2
1638  006356  012767  000001  014402  6.4          MOV     #1,MARK
1639  006364  036737  014376  001266  6.5  DNPR1:  BIT     MARK,@#SW.DN
1640  006372  001415                  2.6          BEQ     DNPR2
1641  006374  012704  000004          3.8          MOV     #4,     R4      ;SET UP COUNTER
1642  006400  105021                  3.7  DNPR4:  CLRB    (R1)+           ;CLEAR PONTER TABLE
1643  006402  012712  000111          5.2          MOV     #111,   (R2)    ;SET INTENB, MAINT, FCRQ
1644  006406  056722  006730          6.4          BIS     DNXMTD, (R2)+   ;MOVE DATA BITS INTO CSR
1645  006412  005304                  2.3          DEC     R4              ;COUNT LINES
1646  006414  001371                  2.6          BNE     DNPR4           ;BRANCH IF MORE
1647  006416  052762  000004  177770  6.4          BIS     #BIT2,  -10(R2) ;SET MASTER INTERUPT ENABLE
1648  006424  000403                  2.6          BR      DNPR3
1649  006426  022121                  4.7  DNPR2:  CMP     (R1)+,  (R1)+   ;ADD 4 TO R1
1650  006430  062702  000010          3.8          ADD     #10,    %2
1651  006434  006367  014326          4.9  DNPR3:  ASL     MARK
1652  006440  103351                  2.6          BCC     DNPR1
1653  006442  000407                  2.6          BR      DXINIT
1654                                               ;DX11 INITIALIZATION
1655
1656  006444  000000                               DX.OLF: 0               ;DX11 ON-LINE FLAGS
1657  006446  000000                               SPW:    0               ;ADRS OF STATUS POINTER WORD
1658  006450  000000                               TT:     0               ;ADRS OF TUMBLE TABLE
1659  006452  000000                               TTTT:   0               ;TT TRACE TABLE
1660  006454  000000                               DST:    0               ;ADRS OF DEVICE STATUS TABLE
1661  006456  000000                               DXDAT:  0               ;ADRS OF DX NPR DATA FILE
1662  006460  000000                               DCTA:   0               ;ADRS OF DEVICE CONTROL TABLE AREA
1663
1664  006462  005767  172606          4.4  DXINIT: TST     SW.DX           ;CHECK FOR ANY DX11'S
1665  006466  001002                  2.6          BNE     DXI.0
1666  006470  000167  000534          4.9          JMP     DLINIT
1667
1668  006474  052767  001777  173000  6.4  DXI.0:  BIS     #1777,ENDTAB
1669  006502  005267  172774          4.9          INC     ENDTAB
1670  006506  016767  172770  177732  7.6          MOV     ENDTAB,SPW
1671  006514  062767  001000  172760  6.4          ADD     #1000,ENDTAB
1672  006522  016767  172754  177720  7.6          MOV     ENDTAB,TT
1673  006530  062767  001000  172744  6.4          ADD     #1000,ENDTAB
1674  006536  016767  172740  177706  7.6          MOV     ENDTAB,TTTT
1675  006544  062767  001000  172730  6.4          ADD     #1000,ENDTAB
1676  006552  016767  172724  177674  7.6          MOV     ENDTAB,DST
1677  006560  062767  000400  172714  6.4          ADD     #256.,ENDTAB
1678  006566  016767  172710  177662  7.6          MOV     ENDTAB,DXDAT
1679  006574  062767  000400  172700  6.4          ADD     #256.,ENDTAB
1680  006602  016701  177642          5.0          MOV     TT,R1           ;BOTTOM OF TT
1681  006606  005021                  3.7  CL1:    CLR     (R1)+           ;CLEAR TT
1682  006610  020167  177640          4.4          CMP     R1,DST          ;TEST FOR END OF TT TRACE TABLE
1683  006614  001374                  2.6          BNE     CL1             ;BRANCH IF NOT END
1684  006616  016777  177624  010560  8.8          MOV     SPW,@DXOS       ;LOAD DX OFFSET REG
1685
1686                                               ;DST    DEVICE STATUS TABLE SETUP
1687
1688                                               ;SET DST TO CU FIRST
1689
1690  006624  012701  000400          3.8          MOV     #256.,R1        ;FILL DST WITH UC
1691  006630  016702  177620          5.0          MOV     DST,R2
1692  006634  112722  000002          5.2  DS.4:   MOVB    #UC,(R2)+
```

```
1693  006640  005301                    2.3          DEC     R1
1694  006642  001374                    2.6          BNE     DS.4
1695
1696
1697
1698  006644  016701  177576            5.0          MOV     SPW,R1  ;SPW IMMEDIATE UNIT CHECK
1699  006650  012702  000400            3.8          MOV     #256.,R2
1700  006654  012721  000002            5.2  DS.5:   MOV     #UC,(R1)+
1701  006660  005302                    2.3          DEC     R2
1702  006662  001374                    2.6          BNE     DS.5
1703
1704  006664  016701  177564            5.0  DS.0:   MOV     DST,R1
1705  006670  012727  000020            5.2          MOV     #16.,(PC)+
1706  006674  000000                        DS.1:    0
1707  006676  012702  017572            3.8          MOV     #CMD.STAT,R2
1708  006702  112221                    5.2  DS.2:   MOVB    (R2)+,(R1)+
1709  006704  005367  177764            4.9          DEC     DS.1
1710  006710  001374                    2.6          BNE     DS.2
1711
1712
1713
1714                                                ;DX11 ON LINE INITIALIZATION
1715
1716  006712  005767  177526            4.4  DXOLI:  TST     DX.OLF          ;TEST FOR OFF/ON LINE TEST
1717  006716  001527                    2.6          BEQ     DXOFLI                  ;BRANCH IF OFFLINE
1718  006720  012767  177770  000022    6.4          MOV     #-DEVNUM,NUMDEV
1719
1720                                                ;THE FOLLOWING CODE CHECKS MEMORY SIZE FOR 8K SYSTEMS
1721                                                ;IT REDUCES THE NUMBER OF ONLINE DEVICES FOR TEST TO 1.
1722                                                ;I.E. IF ONLINE AND 8K OF MEMORY SET NONL = 1
1723
1724  006726  032737  140000  001504      5.3          BIT     #140000,@#ENDCOR        ;TEST MORE THAN 8K OF MEMORY
1725  006734  001006                    2.6          BNE     CX1$            ;(YES) BRANCHES
1726
1727  006736  012737  000001  007174      5.2          MOV     #1,@#NONL       ;(NO)  REDUCE NUMBER OF DEVICES ON LINE TO 1.
1728  006744  012727  177776            5.2          MOV     #177776,(PC)+
1729  006750  177770                        NUMDEV:  177770
1730
1731  006752  005067  007232            4.9  CX1$:   CLR     DEV                     ;START POLLING DEV 0
1732  006756  005067  007250            4.9          CLR     WAIT
1733  006762  016701  177462            5.0          MOV     TT,TTP                  ;INIT TT POINTER
1734  006766  010167  007234            4.9          MOV     TTP,SAVTTP              ;SAVE TT POINTER
1735  006772  016767  172504  177460    7.6          MOV     ENDTAB,DCTA             ;START OF DEV CNTL TBL ADRS
1736
1737                                                ;INITIALIZE SOFTWARE TABLES
1738  007000  013702  007174            3.8          MOV     @#NONL,T1               ;GET # OF DEVICES
1739  007004  016700  177450            5.0          MOV     DCTA,   DCT             ;START OF AREA
1740  007010  012703  017632            3.8          MOV     #DCTP,  T2              ;START OF DCTP TABLE
1741
1742  007014  010023                    3.7  INIT2:  MOV     DCT,    (T2)+           ;STORE ADDRESS OF DCT
1743  007016  012704  000420            3.8          MOV     #DCTZ,  T3              ;CLEAR OUT THIS DCT
1744  007022  105020                    3.7  INIT1:  CLRB    (DCT)+                  ;
1745  007024  005304                    2.3          DEC     T3                      ;
1746  007026  001375                    2.6          BNE     INIT1                   ;
1747  007030  005302                    2.3          DEC     T1                      ;GO FOR NEXT DCT
1748  007032  001370                    2.6          BNE     INIT2                   ;TILL ALL DONE
```

```
 1749  007034  010067  172442            4.9          MOV     DCT,ENDTAB
 1750
 1751
 1752
 1753                                                ;PUT FIRST NONL DEVICES ONLINE
 1754
 1755  007040  013702  007174            3.8          MOV     @#NONL, T1              ;GET # OF DEVS
 1756  007044  012703  017632            3.8          MOV     #DCTP,  T2              ;START WITH DEV #0
 1757  007050  017704  007154            6.2          MOV     @CU,    T3              ;GET 1ST SPW ENTRY
 1758  007054  006304                    2.3          ASL     T3                      ;
 1759  007056  066704  177364            5.0          ADD     SPW,    T3              ;OFFSET SPW
 1760
 1761  007062  012300                    3.8  INIT3:  MOV     (T2)+,  DCT             ;GET DCT
 1762  007064  012760  177777  000006    6.4          MOV     #-1,    ONLF(DCT)       ;SET FLAG
 1763  007072  016724  177356            6.4          MOV     DST,    (T3)+           ;SET UP SPW WITH DST
 1764
 1765  007076  005302                    2.3          DEC     T1                      ;DO NEXT TILL DONE
 1766  007100  001370                    2.6          BNE     INIT3                   ;
 1767
 1768                                                ;SET DXCS ACCORDING TO MODE
 1769  007102  012777  000001  010272    7.6          MOV     #1,@DXCS                ;DXRESET
 1770  007110  112777  000100  177336    7.6          MOVB    #SM,    @DST            ;RESPONSE TO TIO IS SM FOR 2703
 1771  007116  005077  010260            6.1          CLR     @DXCS                   ;CLEAR OUT DXCS BITS
 1772  007122  052777  020000  010252    7.6          BIS     #ENDEN, @DXCS
 1773  007130  005767  007070            4.4          TST     MODE                    ;2703?
 1774  007134  001410                    2.6          BEQ     INIT4                   ;YES - JUST PUT ONLINE
 1775  007136  052777  004000  010236    7.6          BIS     #BSYEN, @DXCS           ;CUBSY ENABLED FOR 2848
 1776  007144  042777  020000  010230    8.2          BIC     #ENDEN, @DXCS
 1777  007152  105077  177276            6.1          CLRB    @DST                    ;RESPONSE TO TIO IS 0 FOR 2848
 1778
 1779  007156  052777  001000  010216    7.6  INIT4:  BIS     #ONLINA,@DXCS           ;PUT DX ONLINE
 1780  007164  052777  000100  010210    7.6          BIS     #100,@DXCS              ;INTEN
 1781  007172  000416                    2.6          BR      DLINIT
 1782
 1783
 1784  007174  000004                                NONL:   4                       ;NUMBER OF DEVICES TO PUT ONLINE
 1785
 1786                                                ;OFFLINE INITIALIZATION
 1787
 1788
 1789  007176  012777  000001  010176    7.6  DXOFLI: MOV     #1,@DXCS
 1790  007204  004767  006324            7.0          JSR     PC,CLRDXD       ;CLEAR DX DATA FILE
 1791  007210  012777  100525  010174    7.6          MOV     #100525,@DXMO   ;LOAD BUS0 WITH DATA PATTERN
 1792  007216  052777  000100  010156    7.6          BIS     #100,@DXCS
 1793  007224  004767  006324            7.0          JSR     PC,DXGO
 1794                                              ;INITIALIZE DL11C, DL11D, DL11E
 1795
 1796  007230  032767  001000  172010    6.5  DLINIT: BIT     #FL.DLC,SW.MAP  ;CHECK FOR DL11'S
 1797  007236  001500                    2.6          BEQ     DJINIT          ;BRANCH IF NONE
 1798  007240  016700  172272            5.0          MOV     NO.DLC,R0       ;NUMBER OF DL11'S ON SYSTEM
 1799  007244  012701  001276            3.8          MOV     #SW.DL1,R1      ;SELECTED MAP ADR
 1800  007250  016702  172354            5.0          MOV     AD.DLC,R2       ;DEVICE ADR
 1801  007254  012703  020114            3.8          MOV     #DLDATA,R3      ;DATA TABLE ADR
 1802  007260  012704  000001            3.8  1$:     MOV     #1,R4           ;MARKER
 1803  007264  012723  000400            5.2  2$:     MOV     #400,(R3)+      ;INIT DATA TABLE
 1804  007270  030411                    3.8          BIT     R4,(R1)         ;CHECK FOR LINE SELECTED
```

```
 1805  007272  001450                        2.6          BEQ     3$                ;BRANCH IF NOT
 1806  007274  012762  000004  000004        6.4          MOV     #4,     4(R2)     ;SET MAINTENANCE MODE
 1807  007302  005067  000126                4.9          CLR     DLYCNT            ;CLEAR COUNTER
 1808  007306  105762  000004                4.4  4$:     TSTB    4(R2)             ;TST FOR XMIT READY
 1809  007312  100404                        2.6          BMI     5$                ;BRANCH IF SET
 1810  007314  005267  000114                4.9          INC     DLYCNT            ;COUNT
 1811  007320  001372                        2.6          BNE     4$                ;BRANCH IF NOT LONG ENOUGH
 1812
 1813  007322  104000                                     HLT                       ;XMIT READY NEVER CAME UP
 1814
 1815  007324  012762  000037  000006        6.4  5$:     MOV     #37,    6(R2)     ;SEND A CHARACTER
 1816  007332  005067  000076                4.9          CLR     DLYCNT            ;CLR COUNTER
 1817  007336  105712                        3.2  6$:     TSTB    (R2)              ;TEST FOR RCV DONE
 1818  007340  100404                        2.6          BMI     7$                ;BRANCH WHEN DONE
 1819  007342  005267  000066                4.9          INC     DLYCNT            ;TIME OUT COUNTER
 1820  007346  001373                        2.6          BNE     6$                ;BRANCH IF OK
 1821
 1822  007350  104000                                     HLT                       ;DONE NEVER CAME UP
 1823                                                 ;                             ;EXPECTED BREAK CHARACTER
 1824                                                 ;                             ;MODEM TIED IN OR PULLUP VOLTAGE MISSING
 1825
 1826  007352  016267  000002  000056        7.6  7$:     MOV     2(R2),  SAVE      ;RECORD RCV DATA
 1827  007360  122767  000037  000050        5.9          CMPB    #37,    SAVE      ;CHECK DATA
 1828  007366  001405                        2.6          BEQ     8$                ;BRANCH IF OK
 1829  007370  022767  120000  000040        5.9          CMP     #120000,SAVE      ;TEST FOR BREAK
 1830  007376  001757                        2.6          BEQ     6$                ;BRANCH IF BREAK
 1831
 1832  007400  104000                                     HLT                       ;ILLEGAL CHARACTER.  SHOULD BE #120000, OR #37
 1833
 1834  007402  052762  000100  000004        6.4  8$:     BIS     #100,   4(R2)     ;SET XMIT INT ENB
 1835  007410  012712  000100                5.2          MOV     #100,(R2)         ;RCV. INT ENB
 1836  007414  062702  000010                3.8  3$:     ADD     #10,R2            ;INC TO NEXT DEV ADR.
 1837  007420  005300                        2.3          DEC     R0                ;CHECK FOR DONE
 1838  007422  001406                        2.6          BEQ     DJINIT            ;BRANCH IF DONE
 1839  007424  006304                        2.3          ASL     R4                ;INC TO NEXT UNIT
 1840  007426  103316                        2.6          BCC     2$                ;BRANCH IF SAME MAP
 1841  007430  005721                        3.2          TST     (R1)+             ;INC TO NEXT MAP
 1842  007432  000712                        2.6          BR      1$                ;BRANCH TO RESET MARKER
 1843
 1844  007434  000000                                DLYCNT: 0                       ;DELAY COUNTER
 1845  007436  000000                                SAVE:   0                       ;DATA SAVER
```

```
1846                                            .SBTTL          DJ11 INITIALIZATION
1847
1848
1849                                            ;INITIALIZE DJ11
1850
1851  007440  032767  004000  171600    6.5   DJINIT: BIT     #FL.DJ, SW.MAP  ;CHECK FOR DJ11'S
1852  007446  001500                      2.6           BEQ     ANCNIT          ;BRANCH IF NONE
1853
1854  007450  004567  013372              7.0           JSR     %5,     CLEAR   ;CLEAR DJ TABLES
1855  007454  030420                                    .WORD   DJ.XTBL         ;START ADDRESS
1856  007456  000256                                    .WORD   256             ;THIS MANY WORDS
1857
1858  007460  016767  172054  000156    7.6           MOV     NO.DJ,  DJ.CNT  ;NO. OF DJ'S
1859  007466  005000                      2.3           CLR     R0              ;INITIALIZE INDEX >R0
1860  007470  012701  001302              3.8           MOV     #SW.DJ, R1      ;SELECT MAP ADDRESS >R1
1861  007474  016702  172132              5.0           MOV     AD.DJ,  R2      ;DEVICE BASE ADDRESS >R2
1862  007500  012703  031022              3.8           MOV     #DJ.EXP,R3      ;EXPECTED DATA TABLE >R3
1863  007504  012704  000001              3.8           MOV     #1,     R4              ;DEVICE CURSOR >R4
1864
1865  007510  005067  011012              4.9           CLR     DJ.XTLY         ;CLR XMIT TALLY COUNTER
1866  007514  005067  011010              4.9           CLR     DJ.RTLY         ;CLR RECV TALLY COUNTER
1867
1868  007520  030411                      3.8   1$:     BIT     R4,     (R1)    ;CHECK CURRENT DEVICE SELECTED
1869  007522  001444                      2.6           BEQ     5$              ;NO BRANCHES
1870
1871
1872  007524  005067  000112              4.9           CLR     DJLINE          ;
1873  007530  016062  001456  000004      7.6           MOV     SW.DJO(R0),4(R2)        ;SET DJTCR LINE SCAN CONTROL (XMIT)
1874
1875  007536  000240                      1.5           NOP                     ;******
1876
1877  007540  012767  000001  000100      6.4           MOV     #1,DJ.BNT       ;LINE CURSOR
1878
1879  007546  005013                      3.7   2$:     CLR     (R3)            ;INITIALIZE
1880  007550  036760  000072  001456      7.7           BIT     DJ.BNT, SW.DJO(R0)      ;CHECK CURRENT LINE SELECTED
1881  007556  001405                      2.6           BEQ     3$              ;BRANCH IF NOT
1882
1883  007560  016713  000056              6.4           MOV     DJLINE, (R3)    ;SET LINE#
1884  007564  000313                      3.7           SWAB    (R3)            ;TO LINE FIELD 11 THRU 8
1885  007566  052713  100000              5.2           BIS     #BIT15, (R3)    ;SET VALID DATA BIT
1886
1887  007572  005267  000044              4.9   3$:     INC     DJLINE          ;ADVANCE LINE INDEX
1888  007576  005723                      3.2           TST     (R3)+           ;ADVANCE TABLE INDEX
1889
1890  007600  006367  000042              4.9           ASL     DJ.BNT          ;NEXT POSITION
1891  007604  103360                      2.6           BCC     2$              ;TEST LINE GROUP COMPLETED
1892                                                  ;       SET DJCSR REG BITS      15   14  12      8   6   3   2   0
1893  007606  012712  150515              5.2           MOV     #150515,(R2)    ;XMT XMT STATUS SCN RCV CLR MAIN RCV
1894                                                  ;                       ;RDY INT ENABLE ENB INT MOS ENB  ENB
1895
1896  007612  062700  000002              3.8   4$:     ADD     #2,     R0      ;ADVANCE INDEX
1897  007616  006304                      2.3           ASL     R4              ;DEVICE CURSOR
1898  007620  062702  000010              3.8           ADD     #10,    R2      ;ADVANCE TO NEXT DEVICE ADDRESS
1899  007624  005367  000014              4.9           DEC     DJ.CNT          ;CHECK SCAN COMPLETED
1900
1901  007630  001333                      2.6           BNE     1$              ;NO BRANCHES
```

```
1902
1903  007632  000406                    2.6          BR      ANCNIT          ;YES INITIALIZE ANCILLARIES
1904
1905  007634  062703  000040            3.8  5$:     ADD     #40,    R3      ;ADVANCE TABLE INDEX
1906  007640  000764                    2.6          BR      4$              ;CONTINUE
1907
1908  007642  000000                         DJLINE: 0               ;LINE INDEX
1909  007644  000000                         DJ.CNT: 0               ;DEVICE COUNTER
1910  007646  000000                         DJ.BNT: 0               ;LINE CURSOR
1911
1912
1913
1914                                         ;INITIALIZE ANCILLARIES
1915                                         ;NOTE:
1916                                         ;       UNCONDITIONAL EXECUTION OF THE FOLLOWING
1917                                         ;CODE ASSURES THAT ALL DEVICES WILL HAVE RESPONDED
1918                                         ;DURING QUICK VERIFICATION SELECTION. (I.E. SWITCHES
1919                                         ;#11, #9, #8.)
1920
1921
1922                                         ;INITIALIZE DISK AND DECTAPE DATA FILES
1923
1924  007650  005067  013030          4.9  ANCNIT: CLR     FSEG            ;CLEAR SEGMENT COUNT
1925  007654  012767  024234  013026  6.4          MOV     #BUFF,@DFILE    ;INIT DATA FILE ADDRESS
1926  007662  012767  000001  013022  6.4  DATINT: MOV     #1,ONE          ;MAKE ONE = 1
1927  007670  012767  000001  013010  6.4          MOV     #1,FDATA        ;INIT FILE DATA
1928  007676  012767  000101  012776  6.4          MOV     #101,LIMIT      ;INIT DATA LIMIT
1929  007704  016777  012776  012776  8.8  DI1:    MOV     FDATA,@DFILE    ;STORE DATA
1930  007712  062767  000002  012770  6.4          ADD     #2,DFILE        ;INC DATA ADDRESS TO NEXT WORD
1931  007720  005167  012762          4.9          COM     FDATA           ;1'S COMPLEMENT
1932  007724  016777  012756  012756  8.8          MOV     FDATA,@DFILE    ;STORE DATA
1933  007732  062767  000002  012750  6.4          ADD     #2,DFILE        ;INC DATA ADDRESS TO NEXT WORD
1934
1935  007740  005167  012742          4.9          COM     FDATA           ;1'S COMPLEMENT DATA
1936  007744  066767  012742  012734  7.6          ADD     ONE,FDATA       ;ADD ONE (OR -1) TO DATA
1937  007752  026767  012730  012722  7.1          CMP     FDATA,LIMIT     ;FIRST HALF OF DATA COMPLETE
1938  007760  001351                  2.6          BNE     DI1             ;NO
1939  007762  005267  012716          4.9          INC     FSEG
1940  007766  022767  000006  012710  5.9          CMP     #6,FSEG         ;ALL DATA FILES INITIALIZED
1941  007774  001414                  2.6          BEQ     CTYNIT          ;BRANCH IF DONE
1942  007776  032767  000001  012700  6.5          BIT     #1,FSEG         ;DECREMENT DATA
1943  010004  001726                  2.6          BEQ     DATINT
1944  010006  012767  177777  012666  6.4          MOV     #-1,LIMIT       ;INIT LOWER LIMIT (-0) OF DATA
1945  010014  005367  012666          4.9          DEC     FDATA           ;DEC TO 100
1946  010020  005167  012662          4.9          COM     FDATA           ;FDATA=1'S COM OF 100
1947  010024  000727                  2.6          BR      DI1
1948
1949                                         ;TEST CTY INITIALIZE
1950
1951  010026  032767  000001  171214  6.5  CTYNIT: BIT     #BIT0,SW.ANC    ;TEST CTY
1952  010034  001430                  2.6          BEQ     LPINIT          ;NO
1953  010036  012737  020614  000060  5.2          MOV     #CTYR,@#60
1954  010044  016737  171606  000062  6.4          MOV     BR.CTY,@#62
1955  010052  012737  020534  000064  5.2          MOV     #CTYP,@#64
1956  010060  016737  171572  000066  6.4          MOV     BR.CTY,@#66
1957  010066  012767  000001  010626  6.4          MOV     #1,CTKDAT       ;INIT KEYBOARD DATA
```

```
 1958  010074  012767  000000  010510  6.4          MOV     #0,CTPDAT       ;INIT PUNCH DATA
 1959  010102  052777  000100  012706  7.6          BIS     #BIT6,@CTPS     ;INT ENB PUNCH
 1960  010110  052777  000101  012674  7.6          BIS     #101,@CTKS      ;INT ENBRDR, RDRENB
 1961
 1962                                               ;INITIALIZE LINE PRINTER
 1963
 1964  010116  032767  000002  171124  6.5  LPINIT: BIT     #BIT1,SW.ANC    ;TEST LINE PRINTER
 1965  010124  001422                    2.6          BEQ     TCINIT          ;NO
 1966  010126  012737  020742  000200  5.2          MOV     #LPVECT,@#200   ;INITIALIZE INT VECTOR
 1967  010134  016737  171520  000202  6.4          MOV     BR.LP,  @#202   ;PRIORITY=4
 1968  010142  016767  010564  010566  7.6          MOV     LPSIZE, CHRLIN  ;FIRST LINE CHARACTER COUNT
 1969  010150  016767  010556  010556  7.6          MOV     LPSIZE, LINGTH  ;LINE LENGHT
 1970  010156  012767  000040  010554  6.4          MOV     #40,CARGEN      ;FIRST CHARACTER
 1971  010164  052777  000100  010534  7.6          BIS     #100,@LPS       ;INT ENB
 1972
 1973                                               ;INITIALIZE TC11 DECTAPE
 1974
 1975  010172  032767  000004  171050  6.5  TCINIT: BIT     #BIT2,SW.ANC    ;ACTIVATE DECTAPE
 1976  010200  001431                    2.6          BEQ     RFINIT
 1977  010202  012777  021142  010672  7.6          MOV     #FENDZ,@TCIV
 1978  010210  016777  171446  010666  8.8          MOV     BR.TC,  @TCPRT
 1979  010216  012701  021124            3.8          MOV     #SAT,R1         ;R1 FIRST TC COMMAND CONTROL WORD
 1980  010222  042721  003400            5.8  USEL:   BIC     #3400,(R1)+     ;CLEAR UNIT SELECT NUMBER
 1981  010226  022701  021140            3.8          CMP     #REVRN,R1       ;ALL CONTROL WORDS INITIALIZED
 1982  010232  001373                    2.6          BNE     USEL            ;NO
 1983  010234  005737  000042            3.2          TST     @#42            ;CHECK ACT11 MONITOR
 1984  010240  001403                    2.6          BEQ     NACT            ;NO BRANCHES
 1985
 1986  010242  052767  000400  010670  6.4          BIS     #400,   REVRN   ;YES SELECT DEVICE #1
 1987
 1988  010250  016777  010664  010612  8.8  NACT:   MOV     REVRN,@TCCM     ;REVERSE
 1989                                               ;READ BLOCK NUMBER
 1990                                               ;INTERRUPT ENABLE
 1991                                               ;DO
 1992  010256  012767  000000  010626  6.4          MOV     #0,TCFIRST      ;FIRST BLOCK #
 1993                                               ;RF11 DISK?
 1994
 1995  010264  032767  000010  170756  6.5  RFINIT: BIT     #BIT3,  SW.ANC  ;ACTIVATE RF12
 1996  010272  001417                    2.6          BEQ     RKINIT          ;NO
 1997  010274  012737  021720  000204  5.2          MOV     #RFISR,@#204
 1998  010302  016737  171356  000206  6.4          MOV     BR.RF,@#206
 1999  010310  005067  011374            4.9          CLR     SERV            ;ZERO SERVICE QUEUE
 2000  010314  005067  011372            4.9          CLR     LOWADR          ;CLEAR LSB'S OF DISK ADDRESS (RF11)
 2001  010320  005067  011370            4.9          CLR     UPADRS          ;CLEAR MSB'S OF DISK ADDRESS (RF11)
 2002  010324  052777  000100  011336  7.6          BIS     #BIT6,@DCS      ;DISK INTERRUPT ENABLE
 2003                                               ;ACTIVATE RK11 DISK
 2004  010332  032767  000020  170710  6.5  RKINIT: BIT     #BIT4,  SW.ANC  ;TEST RK11
 2005  010340  001432                    2.6          BEQ     RPINIT
 2006  010342  032777  000040  011762  7.7          BIT     #40,@RKDS               ;TEST WRITE PROTECT SWITCH
 2007  010350  001401                    2.6          BEQ     .+4             ;BYPASS
 2008  010352  104000                                HLT                     ;HALT WRITE PROTECTED
 2009  010354  012737  022424  000220  5.2          MOV     #RKISR,@#220
 2010  010362  016737  171300  000222  6.4          MOV     BR.RK,@#222
 2011  010370  012767  043503  012112  6.4          MOV     #43503,RKFUNCTION ;WRITE AND WRITE CHECK
 2012  010376  016777  012112  011742  8.8          MOV     LLIMIT,@RKBAR   ;
 2013  010404  016777  012102  011732  8.8          MOV     RKWORDCT,@RKWC
```

```
2014  010412  012777  000000  011716  7.6          MOV     #0,@RKDAE
2015  010420  012777  000103  011722  7.6          MOV     #103,@RKCSR
2016
2017                                               ;ACTIVATE RP11 DISK 0
2018  010426  032767  000040  170614  6.5  RPINIT: BIT     #BIT5,  SW.ANC  ;CHECK FOR RP11 SELECTED
2019  010434  001435                    2.6          BEQ     OVERLY          ;BRANCH FOR NONE
2020  010436  012737  022536  000254  5.2          MOV     #RPISR,@#254
2021  010444  016737  171220  000256  6.4          MOV     BR.RP,@#256
2022  010452  012767  043503  012220  6.4          MOV     #43503,RPFUNC    ;WRITE/WRITE CHECK DISK
2023  010460  016777  012030  012042  8.8  RPD:    MOV     LLIMIT,@RPBAR
2024  010466  016777  012204  012032  8.8          MOV     RPWORDCT,@RPWC
2025  010474  012777  000015  012030  7.6          MOV     #00015,@RPCSR   ;HOME
2026  010502  105777  012024          5.6          TSTB    @RPCSR
2027  010506  100375                    2.6          BPL     .-4             ;CONTROL READY
2028  010510  005777  012006          5.6          TST     @RPDSR
2029  010514  100375                    2.6          BPL     .-4             ;UNIT DRIVE READY
2030  010516  005077  012000          6.1          CLR     @RPDSR          ;CLR ATTENTION
2031  010522  012777  000103  012002  7.6          MOV     #103,@RPCSR
2032
2033                                               ;FOREGROUND OVERLAY ROUTINES
2034                                               ;INITIALIZE AND PRIME DEVICE
2035  010530  005737  001020          3.2  OVERLY: TST     @#OVINIT                ;TEST INITIALIZATION REQUIRED
2036  010534  001405                    2.6          BEQ     PRIME           ;NO BRANCHES
2037  010536  013737  001020  010546  5.2          MOV     @#OVINIT,@#LINKOI+2;YES SET LINKAGE JSR ENTRY
2038  010544  004737  001020          5.8  LINKOI: JSR     PC,@#OVINIT     ;LINKOI+2 = (OVINIT)
2039
2040  010550  005737  001022          3.2  PRIME:  TST     @#OVPRIM                ;TEST DEVICE PRIME REQUIRED
2041  010554  001405                    2.6          BEQ     CORNIT          ;NO BRANCHES
2042  010556  013737  001022  010566  5.2          MOV     @#OVPRIM,@#LINKOP+2;YES SET LINKAGE JSR ENTRY
2043  010564  004737  001022          5.8  LINKOP: JSR     PC,@#OVPRIM     ;LINKOP+2 = (OVPRIM)
2044
2045                                               ;ROUTINE TO LOAD EXCESS CORE WITH WORSE CASE MEMORY TEST.
2046
2047  010570  005767  001150          4.4  CORNIT: TST     IOTSAV          ;CHECK FOR OVERLAY
2048  010574  001403                    2.6          BEQ     1$              ;BRANCH IF NONE
2049  010576  012767  057400  170676  6.4          MOV     #57400, ENDTAB  ;START OF MEMORY TEST ROUTINE NOW STARTS AFTER 0
2050  010604  013700  001504          3.8  1$:     MOV     @#ENDCOR, R0    ;GET HIGHEST USEABLE CORE ADDRESS
2051  010610  013701  001502          3.8          MOV     @#ENDTAB,       R1      ;GET END OF CORE USED BY PROGRAM
2052  010614  020001                    2.3          CMP     R0,     R1      ;IS THERE ENOUGH ROOM?
2053  010616  103420                    2.6          BLO     XMRTS           ;IF NOT BRANCH
2054  010620  012702  010700          3.8  XMLOP1: MOV     #MEMTST,R2      ;MOVE THE CODE BETWEEN
2055  010624  012221                    5.2  XMLOP2: MOV     (R2)+,  (R1)+   ;MEMTST AND MEMEND 'TILL
2056  010626  026162  177776  177776  7.1          CMP     -2(R1), -2(R2)  ;VALIDATE CORRECT VALUE STORED
2057  010634  001403                    2.6          BEQ     XMLOP3          ;OK BRANCHES
2058
2059  010636  014103                    5.0          MOV     -(R1),  R3      ;WAS TO R3
2060  010640  014204                    5.0          MOV     -(R2),  R4      ;SHOULD BE TO R4
2061                                               ;SUGGEST YOU RUN MEMORY TESTS
2062  010642  104004                                HLT+4                   ;DISPLAY REGISTERS
2063
2064  010644  022702  010752          3.8  XMLOP3: CMP     #MEMEND,R2      ;CORE IS FULL
2065  010650  001365                    2.6          BNE     XMLOP2          ;
2066  010652  000240                    1.5          NOP                     ;PATCH FOR TRACE
2067  010654  020100                    2.3          CMP     R1,     R0      ;HOW ARE WE DOING ON MEMORY
2068  010656  101760                    2.6          BLOS    XMLOP1
2069  010660  012721  000137          5.2  XMRTS:  MOV     #137,(R1)+      ;SET UP JMP @# TO RETURN TO BCKGND
```

```
2070  010664  012721  011716          5.2          MOV     #OVERL,(R1)+
2071  010670  005021                  3.7          CLR     (R1)+
2072  010672  005021                  3.7          CLR     (R1)+
2073  010674  000207                  3.5          RTS     PC              ;RETURN TO MAINLINE
2074
2075  010676  151456                               ROTVAL: 151456
2076
2077  010700  000277                  1.5  MEMTST: SCC                     ;SET CARRY BIT
2078  010702  012727  123456          5.2          MOV     #123456,(PC)+   ;MEMDAT CONTAINS VALUE
2079  010706  151456                       MEMDAT: 151456                  ;WORKING STORRAGE
2080  010710  106067  177773          4.9          RORB    MEMDAT+1                ;ROTATE LEFT BYTE OF MEMDAT
2081  010714  103401                  2.6          BCS     .+4
2082  010716  104000                               HLT                     ;C BIT WAS NOT SET
2083  010720  102001                  2.6          BVC     .+4
2084  010722  104000                               HLT                     ;V BIT WAS SET
2085  010724  022767  151456  177754  5.9          CMP     #151456,MEMDAT  ;CHECK HERE FOR CORRECT ROTATE BYTE
2086  010732  001401                  2.6          BEQ     .+4
2087  010734  104000                               HLT                     ;ROTATE FAILED
2088  010736  026737  177744  010676  5.9          CMP     MEMDAT, @#ROTVAL ;CHECK AGAIN, REFERENCING LOW MEMORY
2089  010744  001401                  2.6          BEQ     .+4
2090  010746  104000                               HLT                     ;REF: TO LOW MEMORY FAILED
2091  010750  104400                               SCOPE
2092  010752                               MEMEND:
2093
2094                                   ;****************************** DEVICE ******************************
```

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                                        ;***************************** BCKGND ****************************

                                        ;BCKGND, BACKGROUND ROUTINE TO VERIFY SILENT DEVICES
                                        ;       ARE RUNNING AND DISK AND DECTAPE DATA CHECKS

                                        ;***************************** BCKGND ****************************

010752  012767  000140  167316    6.4   BCKGND: MOV     #140,PS         ;SET PRIORITY TO LEVEL 3
010760  012701  024234              3.8           MOV     #BUFF,R1        ;COMMON OUTPUT BUFFER
010764  012702  026234              3.8           MOV     #INBFTC,R2      ;TC11 INPUT BUFFER
010770  012703  025234              3.8           MOV     #INBFRF,R3      ;RF11, INPUT BUFFER
010774  021122                    4.7   1$:     CMP     (R1),(R2)+      ;TC11 DATA OK
010776  001401                    2.6           BEQ     .+4             ;YES
011000  104000                            HLT                             ;NO, REPORT ERROR
011002  022123                    4.7           CMP     (R1)+,(R3)+     ;RF11 DATA OK
011004  001401                    2.6           BEQ     .+4             ;YES
011006  104000                            HLT                             ;NO, REPORT ERROR
011010  022701  025234              3.8           CMP     #BUFF+1000,R1   ;TESTED ENTIRE BUFFER
011014  001367                    2.6           BNE     1$              ;NO
011016  005067  170156            4.9   2$:     CLR     ICNT
011022  005067  013042            4.9           CLR     LAD             ;SCOPE
                                                                        ;DN11 BACKGROUND
011026  005767  170234            4.4   DNACT:  TST     SW.DN           ;CHECK FOR DN11'S
011032  001422                    2.6           BEQ     DM11BB          ;BRANCH IF NONE
011034  104400                            SCOPE
011036  012701  015242              3.8           MOV     #DNDATA,R1      ;START AT END OF DN DATA TABLE
011042  016702  170542              5.0           MOV     AD.DN,R2
011046  016703  170444              5.0           MOV     NO.DN,R3
011052  006303                    2.3           ASL     R3              ;X2
011054  006303                    2.3           ASL     R3              ;X4
011056  105721                    3.2   DNBK1:  TSTB    (R1)+           ;CHECK FOR ACTIVE FLAG
011060  100004                    2.6           BPL     DNBK2           ;BRANCH IF NOT
011062  105341                    4.9           COMB    -(R1)           ;RESTORE DATA POINTER
011064  112104                    3.8           MOVB    (R1)+,  R4      ;RETREIVE IT
011066  056412  015342            6.4           BIS     DNXMTD(4),(2)   ;TRANSMIT, INTERUPT ENABLED
011072  005722                    3.2   DNBK2:  TST     (R2)+
011074  005303                    2.3           DEC     R3
011076  003367                    2.6           BGT     DNBK1

                                        ;DM11-BB MODEM CONTROL MULTIPLEXER
                                        ;SCANNER LOGIC TEST
                                        ;INPUT 1'S INTO ALL SCANNER MEMORY LOCATIONS
                                        ;VERIFY THAT AN INTERRUPT OCCURS FOR EACH LINE

                004000                  CLRSCN=4000
                002000                  CLRMUX=2000
                001000                  MAINT=1000
                000400                  STEP=400
                000100                  INTENB=100
                000040                  SCNENA=40
                000200                  DONE=200
                000020                  BUSY=20
011100  005767  170164            4.4   DM11BB: TST     SW.DMB                  ;CHECK FOR DM11BB'S
011104  001470                    2.6           BEQ     KGSTRT                  ;BRANCH IF NONE
```

```
011106  104400                           SCOPE
011110  005001                     2.3           CLR     R1
011112  016702  170474             5.0           MOV     AD.DMB,R2
011116  012767  000001  011642     6.4           MOV     #1,MARK
011124  036767  011636  170136     7.7  DMBTOP:  BIT     MARK,SW.DMB
011132  001447                     2.6           BEQ     DMBBOT
011134  012712  006000             5.2  SCNT1:   MOV     #CLRMUX+CLRSCN,(R2)
011140  032712  000020             5.3           BIT     #BUSY,(R2)           ;CLEAR ALL MULTIPLEXER FLIPFLOPS
011144  001374                     2.6           BNE     .-6
011146  012700  000020             3.8           MOV     #16.,R0              ;SET UP TO WRITE 1'S INTO
011152  005012                     3.7           CLR     (R2)                 ;ALL LINE ENABLE FLIPFLOPS
011154  012762  000001  000002     6.4  SCNT1A:  MOV     #1,2(R2)             ;SET FLIPFLOP
011162  052712  000400             5.2           BIS     #STEP,(R2)           ;GO TO NEXT LINE
011166  005300                     2.3           DEC     R0
011170  001371                     2.6           BNE     SCNT1A
011172  012705  171340             3.8           MOV     #171340,R5
011176  012700  000020             3.8           MOV     #16.,R0
011202  012712  001117             5.2           MOV     #MAINT+INTENA+17,(R2) ;SET INTERRUPT ENABLE AND MAINTENANCE MO
011206  052767  000200  166562     6.4  SCNT1B:  BIS     #200,PS              ;INHIBIT INTERRUPTS
011214  052712  000040             5.2           BIS     #SCNENA,(R2)         ;START SCANNER
011220  042767  000200  166550     7.0           BIC     #200,PS
011226  105712                     3.2           TSTB    (R2)
011230  100375                     2.6           BPL     .-4
011232  020512                     3.2           CMP     R5,(R2)
011234  001401                     2.6           BEQ     SCNT1D
011236  104000                                   HLT                          ;SCANNER LOGIC ERROR
011240  042712  000240             5.8  SCNT1D:  BIC     #SCNENA+DONE,(R2)    ;CLEAR SCAN ENABLE AND DONE
011244  005205                     2.3           INC     R5                   ;UPDATE EXPECTED RESULT
011246  005300                     2.3           DEC     R0                   ;CONTINUE IF NOT DONE
011250  001356                     2.6           BNE     SCNT1B
011252  005721                     3.2  DMBBOT:  TST     (R1)+
011254  062702  000010             3.8           ADD     #10,    R2     ;UPDATE DM11BB ADDRESS POINTER
011260  006367  011502             4.9           ASL     MARK
011264  103317                     2.6           BCC     DMBTOP

                                        ;KG11-A CYCLIC REDUNDANCY CHECK OPTION
                                        ;TEST THE RESULTS OF CRC16, CCITT, AND CRC12 BY COMPARING
                                        ;KNOWN RESULTS AGAINST HARDWARE GENERATED DATA

011266  005767  170000             4.4  KGSTRT:  TST     SW.KG          ;CHECK FOR ANY KG11'S
011272  001567                     2.6           BEQ     BCKCOR               ;SKIP IF NONE
011274  104400                                   SCOPE
011276  005001                     2.3           CLR     R1
011300  016702  170310             5.0           MOV     AD.KG,R2
011304  012767  000001  011454     6.4           MOV     #1,MARK
011312  036767  011450  167752     7.7  KGTOP:   BIT     MARK,SW.KG
011320  001440                     2.6           BEQ     KGEND
011322  012700  011444             3.8  KGTEST:  MOV     #KGIP,R0             ;INSRTUCTION TO BE EXECUTED
011326  012703  011452             3.8           MOV     #KGDP,R3             ;TABLE OF DATA
011332  012704  011512             3.8           MOV     #KGCP,R4             ;TABLE OF RESULTS
011336  012712  000020             5.2  KGTA:    MOV     #20,(R2)             ;CLEAR BCC REGISTER
011342  011012                     5.2           MOV     (R0),(R2)            ;SET UP CSR FROM INSTRUCTION TABLE
011344  011362  000004             6.4           MOV     (R3),4(R2)           ;SEND DATA TO DEVICE
                                                                              ;START BCC COMPUTATION
011350  105712                     3.2           TSTB    (R2)                 ;TEST FOR DONE
011352  100023                     2.6           BPL     KGEND          ;(NO) CONTINUE WITH NEXT
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2207                                                                    ;DEVICE WILL BE REPORTED AS NOT RUNNING
2208  011354  016267  000002  000060      7.6          MOV     2(R2),  KGTEMP          ;READ RESULTS OF BCC
2209  011362  021467  000004              5.9          CMP     (R4),   KGTEMP          ;COMPARE EXPECTED AND RECEIVED RESULTS
2210  011366  001401                      2.6          BEQ     .+4
2211  011370  104000                                   HLT                             ;BCC INCORRECT, ERROR
2212
2213  011372  022324                      4.7          CMP     (R3)+,  (R4)+           ;ADVANCE DATA AND RESULT POINTERS
2214  011374  020327  011512              3.2          CMP     R3,     #KGCP           ;END OF DATA
2215  011400  001356                      2.6          BNE     KGTA                    ;NO, CONTINUE
2216  011402  012703  011452              3.8          MOV     #KGDP,  R3              ;RESET DATA POINTER
2217  011406  022067  000036              5.9          CMP     (R0)+,KGC12             ;ADVANCE INSTRUCTION POINTER
2218  011412  001351                      2.6          BNE     KGTA
2219  011414  052761  000200  001342      6.4          BIS     #FL.KG, MAP(R1) ;SET RUN MAP FLAG
2220  011422  005721                      3.2  KGEND:  TST     (R1)+
2221  011424  062702  000010              3.8          ADD     #10,    R2      ;UPDATE KG11 ADDRESS POINTER
2222  011430  006367  011332              4.9          ASL     MARK
2223  011434  103326                      2.6          BCC     KGTOP
2224  011436  000167  000210              4.9          JMP     BCKCOR
2225
2226  011442  000000                           KGTEMP: 0
2227  011444  000111                           KGIP:   000111                          ;CRC16 INSTRUCTION WORD
2228  011446  000115                           KGCIT:  000115                          ;CCITT INSTRUCTION WORD
2229  011450  000100                           KGC12:  000100                          ;CRC12 INSTRUCTION WORD
2230
2231                                                   ;DATA TABLE FOR CRC TESTS
2232
2233  011452  000401                           KGDP:   000401
2234  011454  177376                                   177376
2235  011456  001002                                   001002
2236  011460  176775                                   176775
2237  011462  002004                                   002004
2238  011464  175773                                   175773
2239  011466  004010                                   004010
2240  011470  173767                                   173767
2241  011472  010020                                   010020
2242  011474  167757                                   167757
2243  011476  020040                                   020040
2244  011500  157737                                   157737
2245  011502  040100                                   040100
2246  011504  137677                                   137677
2247  011506  100200                                   100200
2248  011510  077577                                   077577
2249
2250                                                   ;RESULT TABLE FOR CRC16
2251
2252  011512  050300                           KGCP:   050300
2253  011514  160301                                   160301
2254  011516  120600                                   120600
2255  011520  010601                                   010601
2256  011522  001403                                   001403
2257  011524  131402                                   131402
2258  011526  003006                                   003006
2259  011530  133007                                   133007
2260  011532  006014                                   006014
2261  011534  136015                                   136015
2262  011536  014030                                   014030
```

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 2263  011540  124031                                          124031
 2264  011542  030060                                          030060
 2265  011544  100061                                          100061
 2266  011546  060140                                          060140
 2267  011550  150141                                          150141
 2268
 2269                                                          ;RESULT TABLE FOR CCITT
 2270
 2271  011552  004121                                          004121
 2272  011554  174351                                          174351
 2273  011556  010242                                          010242
 2274  011560  160032                                          160032
 2275  011562  020504                                          020504
 2276  011564  150774                                          150774
 2277  011566  041210                                          041210
 2278  011570  131060                                          131060
 2279  011572  102420                                          102420
 2280  011574  072650                                          072650
 2281  011576  001061                                          001061
 2282  011600  171211                                          171211
 2283  011602  002142                                          002142
 2284  011604  172332                                          172332
 2285  011606  004304                                          004304
 2286  011610  174174                                          174174
 2287
 2288                                                  ;RESULT TABLE FOR CRC12
 2289  011612  024051                                          024051
 2290  011614  030061                                          030061
 2291  011616  024421                                          024421
 2292  011620  030411                                          030411
 2293  011622  025041                                          025041
 2294  011624  031071                                          031071
 2295  011626  026401                                          026401
 2296  011630  032431                                          032431
 2297  011632  021001                                          021001
 2298  011634  035031                                          035031
 2299  011636  036001                                          036001
 2300  011640  022031                                          022031
 2301  011642  000000                                          000000
 2302  011644  014030                                          014030
 2303  011646  000000                                          000000
 2304  011650  014030                                          014030
 2305
 2306  011652  032737  001000  177570      5.3  BCKCOR: BIT     #BIT9,  @#SWR   ;CHECK MEMORY TEST INHIBIT
 2307  011660  001007                      2.6          BNE     EXPND3          ;SW(9) SET BYPASS MEMORY TEST
 2308  011662  104400                                   SCOPE
 2309  011664  005000                      2.3          CLR     R0              ;START AT 0
 2310  011666  005520                      3.7  COREX:  ADC     (R0)+           ;FAST READ/WRITE ON ALL MEMORY
 2311  011670  001376                      2.6          BNE     COREX           ;CHECK FOR A HALT
 2312  011672  026700  167606              5.0          CMP     ENDCOR, R0      ;CHECK FOR END
 2313  011676  101373                      2.6          BHI     COREX           ;BRANCH IF NOT
 2314  011700  032737  000400  177570      5.3  EXPND3: BIT     #BIT8,  @#SWR   ;CHECK MEMORY TEST INHIBIT
 2315  011706  001003                      2.6          BNE     OVERL           ;SW(8) SET BYPASS MEMORY TEST
 2316
 2317  011710  104400                                   SCOPE
 2318  011712  000177  167564              6.1          JMP     @ENDTAB         ;DO WORST NOISE TEST ON EXCESS MEMORY
```

```
2319                                                                    ;MEMORY TEST
2320
2321
2322                                            ;IOT TRAPS TO OVERLAY BACKGROUND
2323                                            ;IF ONE EXISTS
2324  011716  005767  000022          4.4  OVERL:  TST     IOTSAV          ;TEST FOR BACKGROUND OVERLAY
2325  011722  001411                   2.6          BEQ     TABTRN          ;NOT OVERLAY BRANCH
2326  011724  013746  177776          6.4          MOV     @#PS,-(R6)      ;YES PUT CURRENT STATUS ON STACK
2327  011730  012746  011746          6.4          MOV     #TABTRN,-(R6)   ;PUT RETURN ON STACK FOR RTI
2328  011734  012767  011742  012126  6.4          MOV     #ZO,    LAD     ;INITIALIZE SCOPE LINKAGE
2329  011742  000137                   3.7  ZO:     JMP     @(R7)+          ;LINK TO BACKGROUND PSEUDO IOT
2330
2331  011744  000000                       IOTSAV: 0                       ;BACKGROUND OVERLAY START ADDRESS
2332
2333  011746  004567  011074          7.0  TABTRN: JSR     %5,CLEAR
2334  011752  001310                           RU.DC1                  ;START HERE
2335  011754  000015                           MAPSIZ-2                ;THIS MANY WORDS
2336  011756  012700  001310          3.8          MOV     #RU.DC1,R0
2337  011762  012702  001542          3.8          MOV     #MX.DC,R2
2338  011766  004567  000536          7.0          JSR     %5,TRANSP
2339  011772  000002                           FL.DC
2340  011774  004567  000530          7.0          JSR     %5,TRANSP
2341  012000  000004                           FL.KL
2342  012002  004567  000522          7.0          JSR     %5,TRANSP
2343  012006  000010                           FL.DP
2344  012010  004567  000514          7.0          JSR     %5,TRANSP
2345  012014  000020                           FL.DMA
2346  012016  004567  000506          7.0          JSR     %5,TRANSP
2347  012022  000040                           FL.DN
2348  012024  004567  000500          7.0          JSR     %5,TRANSP
2349  012030  000100                           FL.DMB
2350  012032  004567  000472          7.0          JSR     %5,TRANSP
2351  012036  000200                           FL.KG
2352  012040  012702  001570          3.8          MOV     #MX.DX,R2
2353  012044  004567  000460          7.0          JSR     %5,TRANSP
2354  012050  000400                           FL.DX
2355  012052  005767  174366          4.4          TST     DX.OLF          ;CHECK FOR DX ON LINE
2356  012056  001403                   2.6          BEQ     Z1
2357  012060  052767  000001  167244  6.4          BIS     #1,RU.DX                ;FORCE SET DX RUN FLAG
2358  012066  004567  000436          7.0  Z1:     JSR     %5,TRANSP
2359  012072  001000                           FL.DLC
2360  012074  004567  000430          7.0          JSR     %5,TRANSP
2361  012100  004000                           FL.DJ
2362  012102  004567  010740          7.0          JSR     %5,CLEAR
2363  012106  001342                           MAP
2364  012110  000040                           32.
2365  012112  012701  001250          3.8          MOV     #SW.ANC,R1
2366  012116  012702  001306          3.8          MOV     #RU.ANC,R2
2367  012122  012703  000016          3.8          MOV     #MAPSIZ-1,R3
2368  012126  012767  030052  000070  6.4          MOV     #MSGMAP,TYDEV
2369  012134  022122                   4.7  MONIT:  CMP     (R1)+,(R2)+
2370  012136  001457                   2.6          BEQ     MONIT1
2371
2372                                            ;THE FOLLOWING CODE ALLOWS ADDITIONAL TIME FOR LOW SPEED
2373                                            ;DOUBLE BUFFERED DEVICES TO RESPOND ON FIRST PASS UNDER
2374                                            ;ACT11 (MONITOR MODE). I.E. QUICK VERIFICATION.
```

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2375
2376  012140  005737  001204          3.2          TST     @#PASSES        ;TEST FIRST PASS
2377  012144  001014                  2.6          BNE     MONITX          ;(NO) BRANCHES
2378
2379  012146  005727                  3.2          TST     (PC)+           ;MONITOR MODE
2380  012150  000000                          MONITZ: 0                       ;STALL FLAG
2381  012152  001011                  2.6          BNE     MONITX          ;(INACTIVE) BRANCHES
2382  012154  024142                  7.1          CMP     -(R1),-(R2)     ;RESTORE
2383  012156  062737  000001  012150  5.2     1$:  ADD     #1,@#MONITZ     ;DELAY
2384
2385  012164  022737  177777  012150  4.7          CMP     #177777,@#MONITZ        ;HERE
2386  012172  001371                  2.6          BNE     1$
2387
2388  012174  000757                  2.6          BR      MONIT           ;TRY ONCE MORE
2389
2390  012176  005267  167000          4.9     MONITX: INC     ERRORS
2391  012202  032737  020000  177570  5.3          BIT     #BIT13, @#SWR   ;CHECK FOR INHIBIT TYPEOUT
2392  012210  001032                  2.6          BNE     MONIT1
2393  012212  004767  000364          7.0          JSR     PC,     CTYDWN
2394  012216  000004  030022                       TYPE,   MSGDNR
2395  012222  000004                               TYPE
2396  012224  000000                          TYDEV: 0
2397                                               ;
2398  012226  014105                  5.0          MOV     -(R1),TTY       ;DEVICE NOT RUNNING
2399  012230  004767  011322          7.0          JSR     PC,BITYP$       ;PUT -(R1) INTO TTY
2400  012234  000004  027642                       TYPE,   SPACE+3         ;TYPE -(R1) IN BITS
2401  012240  014205                  5.0          MOV     -(R2),TTY       ;PUT -(R2) INTO TTY
2402  012242  004767  011310          7.0          JSR     PC,BITYP$       ;TYPE -(R2) IN BITS
2403
2404
2405  012246  005737  000042          3.2          TST     @#42            ;CHECK ACT11 MONITOR
2406  012252  001406                  2.6          BEQ     2$              ;NO BRANCHES
2407
2408  012254  005112                  3.7          COM     (R2)            ;EXTRACT DEVICE(S) NOT RUNNING MASK*
2409  012256  041211                  5.8          BIC     (R2),(R1)       ;SHUT DOWN DEVICE(S) NOT RUNNING
2410  012260  005112                  3.7          COM     (R2)            ;RESTORE ACTIVITY
2411
2412  012262  012737  177777  001024  5.2          MOV     #177777,@#CLINK ;RESET MONITOR PASS CONTROL
2413
2414  012270  022122                  4.7     2$:  CMP     (R1)+,(R2)+
2415  012272  004767  000336          7.0          JSR     PC,     CTYUP
2416  012276  062767  000020  177720  6.4     MONIT1: ADD  #20,    TYDEV   ;UPDATE POINTER TO NEXT MESSAGE
2417  012304  005303                  2.3          DEC     R3
2418  012306  003312                  2.6          BGT     MONIT
2419  012310  005067  166772          4.9          CLR     RU.ANC          ;CLEAR ANC RUN FLAG
2420  012314  005267  166664          4.9          INC     PASSES          ;UPDATE PASS COUNTER
2421  012320  032737  020000  177570  5.3          BIT     #BIT13, @#SWR   ;CHECK FOR INHIBIT TYPEOUT
2422  012326  001024                  2.6          BNE     BELL1           ;BRANCH IF SET
2423  012330  004767  000246          7.0          JSR     PC,     CTYDWN
2424  012334  000004  027634                  PASEND: TYPE,   RETURN          ;TYPE CR-LF
2425  012340  016705  166640          5.0          MOV     PASSES,TTY      ;TYPE PASSES IN OCTAL
2426  012344  004767  011226          7.0          JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
2427  012350  000004  027743                       TYPE,   MSGPAS          ;TYPE " PASSES, "
2428  012354  016705  166622          5.0          MOV     ERRORS,TTY      ;TYPE ERRORS IN OCTAL
2429  012360  004767  011212          7.0          JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
2430  012364  000004  027760                       TYPE,   MSGERR          ;TYPE " ERRORS."
```

```
2431  012370  000004  027634                        TYPE,   RETURN          ;TYPE CR-LF
2432  012374  004767  000234              7.0       JSR     PC,     CTYUP
2433  012400  032767  002000  165162      6.5  BELL1: BIT     #BIT10,SWR      ;CHECK FOR INHIBIT BELL
2434  012406  001006                      2.6       BNE     BELL2
2435  012410  004767  000166              7.0       JSR     PC,     CTYDWN
2436  012414  000004  000207                        TYPE    ,BELL           ;TYPE THE CHARACTER BELL
2437  012420  004767  000210              7.0       JSR     PC,     CTYUP
2438  012424  005737  000042              3.2  BELL2: TST     @#42            ;TEST CONTENTS OF 42 (SOFT VECTOR)
2439  012430  001435                      2.6       BEQ     HOOK            ;BRANCH IF NO MONITOR
2440  012432  005737  001024              3.2       TST     @#CLINK         ;TEST MONITOR CONTROL
2441  012436  001007                      2.6       BNE     BELL3           ;QUICK PASS BYPASS
2442  012440  005737  012722              3.2       TST     @#XLINK         ;TEST REPORT FLAG
2443  012444  001404                      2.6       BEQ     BELL3           ;CLEARED BYPASS
2444  012446  004767  000216              7.0       JSR     PC,     SYSRPT  ;REPORT CONFIGURATION TESTED
2445  012452  005037  012722              3.7       CLR     @#XLINK         ;CLEAR REPORT FLAG
2446  012456  005037  001024              3.7  BELL3: CLR     @#CLINK         ;CLEAR MONITOR CONTROL
2447  012462  022737  040000  000042      4.7       CMP     #40000,@#42     ;TEST PSEUDO MONITOR
2448  012470  001401                      2.6       BEQ     1$              ;(YES) OVERLAY BRANCHES
2449  012472  000005                      1.5       RESET                   ;(NO) ACT11/DDT RESET
2450  012474  013700  000042              3.8  1$:  MOV     @#42,   %0      ;INITIALIZE FOR
2451  012500  004710                      5.8  PROEND: JSR    %7,     (0)     ;RETURN TO MONITOR
2452  012502  000240                      1.5       NOP                     ;ROOM FOR OVERLAY
2453  012504  000240                      1.5       NOP
2454  012506  000240                      1.5       NOP
2455  012510  022737  040000  000042      4.7       CMP     #40000,@#42     ;TEST PSEUDO MONITOR
2456  012516  001402                      2.6       BEQ     HOOK            ;(YES) BYPASS
2457  012520  004767  172370              7.0       JSR     PC,DEVICE       ;RESTART DEVICES MONITOR RETURN
2458  012524  000167  176222              4.9  HOOK:  JMP     BCKGND          ;REPEAT
2459
2460
2461  012530  012503                      3.8  TRANSP: MOV    (R5)+,R3        ;GET FLAG
2462  012532  012267  010226              6.4       MOV     (R2)+,MAX       ;GET MAX NO DEVICE
2463  012536  012701  001342              3.8       MOV     #MAP,R1         ;GET MAP POINTER
2464  012542  012704  000001              3.8  TR1:  MOV     #1,R4           ;GET RUN MAP MARKER
2465  012546  030321                      3.8  TR2:  BIT     R3,(R1)+        ;CHECK FOR FLAG
2466  012550  001403                      2.6       BEQ     TR3
2467  012552  050410                      3.7       BIS     R4,(R0)
2468  012554  050367  166524              4.9       BIS     R3,RU.MAP
2469  012560  005367  010200              4.9  TR3:  DEC     MAX
2470  012564  001404                      2.6       BEQ     TR4
2471  012566  006304                      2.3       ASL     R4
2472  012570  103366                      2.6       BCC     TR2
2473  012572  005720                      3.2       TST     (R0)+
2474  012574  000762                      2.6       BR      TR1
2475  012576  005720                      3.2  TR4:  TST     (R0)+
2476  012600  000205                      3.5       RTS     R5
2477
2478  012602  032767  000001  166440      6.5  CTYDWN: BIT    #BIT0,  SW.ANC  ;CHECK FOR CTY
2479  012610  001410                      2.6       BEQ     1$              ;NO BRANCHES
2480  012612  042777  000100  010176      8.2       BIC     #BIT6,  @CTPS   ;CLEAR PUNCH INT ENB
2481  012620  004767  000036              7.0       JSR     PC,     WAITER  ;WAIT
2482  012624  042777  000100  010160      8.2       BIC     #BIT6,  @CTKS   ;CLEAR READER INT ENB
2483  012632  000207                      3.5  1$:  RTS     PC
2484
2485  012634  032767  000001  166406      6.5  CTYUP: BIT     #BIT0,  SW.ANC  ;CHECK FOR CTY
2486  012642  001406                      2.6       BEQ     2$              ;NO BRANCHES
```

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2487  012644  052777  000100  010144  7.6          BIS     #BIT6,  @CTPS
2488  012652  052777  000100  010132  7.6          BIS     #BIT6,  @CTKS
2489  012660  000207                   3.5  2$:     RTS     PC
2490
2491  012662  000004  030412                WAITER: TYPE,   PADDERS          ;INSERT PADDER CHARACTERS (377
2492  012666  000207                   3.5          RTS     PC
2493
2494  012670  004767  177706           7.0  SYSRPT: JSR     PC,     CTYDWN
2495  012674  000004  027665                       TYPE,   MSGX             ;OUTPUT DZQCA-F TESTED
2496  012700  000004  027714                       TYPE,   MSG1             ;SYSTEMS CONFIGURATION
2497  012704  012701  OC1250               3.8      MOV     #SW.ANC,R1       ;CURRENT SELECTION TABLE
2498  012710  004767  010156           7.0          JSR     PC,     REPORT   ;OUTPUT
2499  012714  004767  177714           7.0          JSR     PC,     CTYUP
2500  012720  000207                   3.5          RTS     PC               ;RETURN
2501
2502  012722  177777                        XLINK:  177777                   ;ONE PASS CONTROL FLAG (ACTIVE)
2503
2504
2505  012724  000000                        COUNT1: 0
2506  012726  000000                        COUNT2: 0
2507
2508                                        ;****** COMMUNICATION INTERRUPT SERVICE ROUTINES (ISR'S) *****
2509
2510                                        ;COMM ISR ARE ENTERED THROUGH THE FOLLOWING INSTRUCTIONS
2511                                        ;
2512                                        ;       JSR     %5,DEV.ISR       ;JUMP TO DEVICE ISR
2513                                        ;       LINE NUMBER              ;THIS IS YOUR LINE NUMBER
2514                                        ;
2515                                        ;THEREFORE, THE FIRST TASK OF THE ISR'S IS TO FETCH
2516                                        ;THE LINE NUMBER TO DETERMINE WHICH LINE TO SERVICE.
2517
2518
2519                                        ;DC11 DATASET TRANSMITTER SERVICE ROUTINE
2520
2521  012730  010146                   4.9  DC.XMT: MOV     R1,-(SP)         ;SAVE REGISTER 1 ON STACK
2522  012732  010246                   4.9          MOV     R2,-(SP)         ;SAVE REGISTER 2 ON STACK
2523  012734  011501                   3.8          MOV     (R5),R1
2524  012736  006301                   2.3          ASL     R1               ;FORM MOD(2) INDEX
2525  012740  010102                   2.3          MOV     R1,R2            ;DUPLICATE LINE NUMBER
2526  012742  006302                   2.3          ASL     R2               ;FORM MOD10(8) INDEX
2527  012744  006302                   2.3          ASL     R2               ;
2528  012746  062702  174004           3.8          ADD     #174004,R2       ;FORM DEVICE ADDRESS
2529  012752  105712                   3.2          TSTB    @R2              ;TEST FOR TRANS DONE INC TO BUFF
2530  012754  100401                   2.6          BMI     .+4              ;YES
2531  012756  104000                                HLT                      ;NO.  REPORT ERROR, PC, PS,
2532  012760  105261  013104           4.9          INCB    DCDATA(R1)       ;INCREMENT SAVE DATA
2533  012764  005722                   3.2  DCOUT:  TST     (R2)+            ;INC TO XMIT BUFF
2534  012766  116112  013104           6.4          MOVB    DCDATA(R1),(R2)  ;TRANSMIT DATA
2535  012772  000167  005216           4.9          JMP     CLEANUP
2536
2537                                        ;DC11 DATASET RECEIVER SERVICE ROUTINE
2538
2539  012776  010146                   4.9  DC.RCV: MOV     R1,-(SP)         ;SAVE REGISTER 1 ON STACK
2540  013000  010246                   4.9          MOV     R2,-(SP)         ;SAVE REGISTER 2 ON STACK
2541  013002  011501                   3.8          MOV     (R5),R1
2542  013004  006301                   2.3          ASL     R1               ;FORM MOD(2) INDEX
```

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2543  013006  010102                    2.3          MOV     R1,R2           ;DUPLICATE LINE NUMBER
2544  013010  006302                    2.3          ASL     R2              ;FORM MOD10(8) INDEX
2545  013012  006302                    2.3          ASL     R2              ;
2546  013014  062702  174000            3.8          ADD     #174000,R2      ;DEVICE-CSR ADDRESS
2547  013020  005712                    3.2          TST     (R2)            ;ERROR BIT SET?
2548  013022  100001                    2.6          BPL     .+4             ;NO
2549  013024  104000                                 HLT
2550  013026  105712                    3.2          TSTB    (R2)            ;DONE
2551  013030  100401                    2.6          BMI     .+4             ;YES
2552  013032  104000                                 HLT                     ;NO, FALSE INTERRUPT
2553  013034  005722                    3.2          TST     (R2)+           ;INC TO DATA BUFF
2554  013036  121261  013105            5.9          CMPB    (R2),DCDATA+1(R1)       ;TEST DATA
2555  013042  001401                    2.6          BEQ     .+4
2556  013044  104000                                 HLT                     ;FALSE DATA
2557  013046  122761  000037  013105    5.9          CMPB    #37,DCDATA+1(R1)        ;UPPER DATA LIMIT FOR 5 BIT ASCII
2558  013054  001403                    2.6          BEQ     DCRX1           ;YEY
2559  013056  105261  013105            4.9          INCB    DCDATA+1(R1)    ;NO INCREMENT DATA
2560  013062  000403                    2.6          BR      DCRX2
2561  013064  112761  000000  013105    6.4  DCRX1:  MOVB    #0,DCDATA+1(R1) ;REINITIALIZE DATA
2562  013072  052761  000002  001342    6.4  DCRX2:  BIS     #FL.DC,MAP(R1)  ;SET FLAG TO INDICATE LINE SERVISED
2563  013100  000167  005110            4.9          JMP     CLEANUP
2564                                               ;DC11 CSR AND DATA STORAGE
2565
2566
2567  013104                                     DCDATA:
2568  013104  000000                                    0                       ;DC11 DATA, LINE 0
2569  013106  000000                                    0                       ;DC11 DATA, LINE 1
2570  013110  000000                                    0                       ;DC11 DATA, LINE 2
2571  013112  000000                                    0                       ;DC11 DATA, LINE 3
2572  013114  000000                                    0                       ;DC11 DATA, LINE 4
2573  013116  000000                                    0                       ;DC11 DATA, LINE 5
2574  013120  000000                                    0                       ;DC11 DATA, LINE 6
2575  013122  000000                                    0                       ;DC11 DATA, LINE 7
2576  013124  000000                                    0                       ;DC11 DATA, LINE 10
2577  013126  000000                                    0                       ;DC11 DATA, LINE 11
2578  013130  000000                                    0                       ;DC11 DATA, LINE 12
2579  013132  000000                                    0                       ;DC11 DATA, LINE 13
2580  013134  000000                                    0                       ;DC11 DATA, LINE 14
2581  013136  000000                                    0                       ;DC11 DATA, LINE 15
2582  013140  000000                                    0                       ;DC11 DATA, LINE 16
2583  013142  000000                                    0                       ;DC11 DATA, LINE 17
2584  013144  000000                                    0                       ;DC11 DATA, LINE 20
2585  013146  000000                                    0                       ;DC11 DATA, LINE 21
2586  013150  000000                                    0                       ;DC11 DATA, LINE 22
2587  013152  000000                                    0                       ;DC11 DATA, LINE 23
2588  013154  000000                                    0                       ;DC11 DATA, LINE 24
2589  013156  000000                                    0                       ;DC11 DATA, LINE 25
2590  013160  000000                                    0                       ;DC11 DATA, LINE 26
2591  013162  000000                                    0                       ;DC11 DATA, LINE 27
2592  013164  000000                                    0                       ;DC11 DATA, LINE 30
2593  013166  000000                                    0                       ;DC11 DATA, LINE 31
2594  013170  000000                                    0                       ;DC11 DATA, LINE 32
2595  013172  000000                                    0                       ;DC11 DATA, LINE 33
2596  013174  000000                                    0                       ;DC11 DATA, LINE 34
2597  013176  000000                                    0                       ;DC11 DATA, LINE 35
2598  013200  000000                                    0                       ;DC11 DATA, LINE 36
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013202  000000                              0                                   ;DC11 DATA, LINE 37

                                      ;KL11 TRANSMITTER (PUNCH) SERVICE ROUTINE

        176504                        KLXA=176504                               ;KL11 TRANSMITTER ADDRESS

013204  010146                  4.9   KL.XMT: MOV     R1,-(SP)                  ;SAVE REGISTER 1 ON STACK
013206  010246                  4.9           MOV     R2,-(SP)                  ;SAVE REGISTER 2 ON STACK
013210  011501                  3.8           MOV     (R5),R1
013212  006301                  2.3           ASL     R1                        ;FORM MOD(2) INDEX
013214  010102                  2.3           MOV     R1,R2                     ;DUPLICATE LINE NUMBER
013216  006302                  2.3           ASL     R2                        ;FORM MOD10(8) INDEX
013220  006302                  2.3           ASL     R2                        ;
013222  105762  176504          4.4           TSTB    KLXA(R2)                  ;"READY" SET
013226  100401                  2.6           BMI     .+4                       ;YES
013230  104000                                HLT                               ;NO, REPORT ERROR
013232  032762  000100  176504  6.5           BIT     #100,KLXA(R2)             ;INT ENB, INC TO DATA BUFFER
013240  001001                  2.6           BNE     .+4                       ;YES
013242  104000                                HLT                               ;FALSE INT ,POSSIBLE CROSS TALK
013244  005722                  3.2           TST     (R2)+                     ;INC INDX TO DATA BUFFER
013246  105261  013432          4.9           INCB    KLDATA(R1)                ;INC DATA
013252  122761  000147  013432  5.9           CMPB    #147,KLDATA(R1)           ;UPPER LIMIT OF DATA
013260  001003                  2.6           BNE     KLXT                      ;NO
013262  112761  000000  013432  6.4           MOVB    #0,KLDATA(R1)             ;REINITIALIZE DATA
013270  116162  013432  176504  7.6   KLXT:   MOVB    KLDATA(R1),KLXA(R2)       ;TRANSMIT DATA
013276  000167  004712          4.9           JMP     CLEANUP

                                      ;KL11, RECEIVER SERVICE ROUTINE

        176502                        KLRA=176502                               ;KL11 RECEIVER BUFFER ADDRESS

013302  010146                  4.9   KL.RCV: MOV     R1,-(SP)                  ;SAVE REGISTER 1 ON STACK
013304  010246                  4.9           MOV     R2,-(SP)                  ;SAVE REGISTER 2 ON STACK
013306  011501                  3.8           MOV     (R5),R1
013310  006301                  2.3           ASL     R1                        ;FORM MOD(2) INDEX
013312  010102                  2.3           MOV     R1,R2                     ;DUPLICATE LINE NUMBER
013314  006302                  2.3           ASL     R2                        ;FORM MOD10(8) INDEX
013316  006302                  2.3           ASL     R2                        ;
013320  105762  176500          4.4           TSTB    KLRA-2(R2)                ;"DONE" SET
013324  100401                  2.6           BMI     .+4                       ;YES
013326  104000                                HLT
013330  032762  000100  176500  6.5           BIT     #100,KLRA-2(R2)           ;INT ENB SET
013336  001001                  2.6           BNE     .+4                       ;YES
013340  104000                                HLT                               ;FALSE INTERRUPT
013342  105762  176502          4.4           TSTB    KLRA(R2)                  ;TEST FOR LEADER
013346  001422                  2.6           BEQ     KLR2                      ;BRANCH IF LEADER
013350  126261  176502  013433  7.1           CMPB    KLRA(R2),KLDATA+1(R1)     ;NOT LEADER TEST FOR DATA
013356  001405                  2.6           BEQ     KLR3                      ;CORRECT DATA
013360  122762  000207  176502  5.9           CMPB    #207,KLRA(R2)             ;BELL
013366  001403                  2.6           BEQ     KLR4                      ;YES
013370  104000                                HLT                               ;NO, REPORT DATA ERROR
013372  105261  013433          4.9   KLR3:   INCB    KLDATA+1(R1)              ;INCREMENT DATA
013376  122761  000147  013433  5.9   KLR4:   CMPB    #147,KLDATA+1(R1)         ;TEST FOR UPPER LIMIT
013404  001003                  2.6           BNE     KLR2
013406  112761  000001  013433  6.4   KLR1:   MOVB    #1,KLDATA+1(R1)           ;BASE DATA
013414  005262  176500          4.9   KLR2:   INC     KLRA-2(R2)                ;START READER
```

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 2655  013420  052761  000004  001342     6.4          BIS     #FL.KL,MAP(R1)  ;SET RUN FLAG
 2656  013426  000167  004562             4.9          JMP     CLEANUP
 2657
 2658                                                 ;KL11 TRANSMITTER DATA (BYTES
 2659
 2660          013432                                 KLXB=KLDATA
 2661          013433                                 KLRB=KLDATA+1
 2662
 2663  013432                                         KLDATA:
 2664  013432  000000                                        0                       ;KL11 DATA, LINE 0
 2665  013434  000000                                        0                       ;KL11 DATA, LINE 1
 2666  013436  000000                                        0                       ;KL11 DATA, LINE 2
 2667  013440  000000                                        0                       ;KL11 DATA, LINE 3
 2668  013442  000000                                        0                       ;KL11 DATA, LINE 4
 2669  013444  000000                                        0                       ;KL11 DATA, LINE 5
 2670  013446  000000                                        0                       ;KL11 DATA, LINE 6
 2671  013450  000000                                        0                       ;KL11 DATA, LINE 7
 2672  013452  000000                                        0                       ;KL11 DATA, LINE 10
 2673  013454  000000                                        0                       ;KL11 DATA, LINE 11
 2674  013456  000000                                        0                       ;KL11 DATA, LINE 12
 2675  013460  000000                                        0                       ;KL11 DATA, LINE 13
 2676  013462  000000                                        0                       ;KL11 DATA, LINE 14
 2677  013464  000000                                        0                       ;KL11 DATA, LINE 15
 2678  013466  000000                                        0                       ;KL11 DATA, LINE 16
 2679  013470  000000                                        0                       ;KL11 DATA, LINE 17
 2680  013472  000000                                        0                       ;KL11 DATA, LINE 20
 2681  013474  000000                                        0                       ;KL11 DATA, LINE 21
 2682  013476  000000                                        0                       ;KL11 DATA, LINE 22
 2683  013500  000000                                        0                       ;KL11 DATA, LINE 23
 2684  013502  000000                                        0                       ;KL11 DATA, LINE 24
 2685  013504  000000                                        0                       ;KL11 DATA, LINE 25
 2686  013506  000000                                        0                       ;KL11 DATA, LINE 26
 2687  013510  000000                                        0                       ;KL11 DATA, LINE 27
 2688  013512  000000                                        0                       ;KL11 DATA, LINE 30
 2689  013514  000000                                        0                       ;KL11 DATA, LINE 31
 2690  013516  000000                                        0                       ;KL11 DATA, LINE 32
 2691  013520  000000                                        0                       ;KL11 DATA, LINE 33
 2692  013522  000000                                        0                       ;KL11 DATA, LINE 34
 2693  013524  000000                                        0                       ;KL11 DATA, LINE 35
 2694  013526  000000                                        0                       ;KL11 DATA, LINE 36
 2695  013530  000000                                        0                       ;KL11 DATA, LINE 37
 2696
 2697
 2698  013532  010146                     4.9  DP.RCV:  MOV     R1,-(SP)        ;SAVE REGISTER 1 ON STACK
 2699  013534  010246                     4.9           MOV     R2,-(SP)        ;SAVE REGISTER 2 ON STACK
 2700  013536  011501                     3.8           MOV     (R5),R1
 2701  013540  006301                     2.3           ASL     R1              ;FORM MOD(2) INDEX
 2702  013542  010102                     2.3           MOV     R1,R2           ;DUPLICATE LINE NUMBER
 2703  013544  006302                     2.3           ASL     R2              ;FORM MOD10(8) INDEX
 2704  013546  006302                     2.3           ASL     R2              ;
 2705  013550  005402                     2.3           NEG     R2
 2706  013552  062702  174770            3.8           ADD     #174770,R2      ;R2=RCV STATUS REG
 2707  013556  032712  000200            5.3           BIT     #BIT7,@R2       ;DONE SET
 2708  013562  001001                     2.6           BNE     .+4             ;
 2709  013564  104000                                   HLT                     ;REPORT FALSE INTERRUPT
 2710
```

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2711  013566  116261  000002  014023  7.6          MOVB    2(R2),DPRCVDATA+1(R1) ;SAVE RCV DATA
2712  013574  126161  014023  014022  7.1          CMPB    DPRCVDATA+1(R1),DPRCVDATA(R1) ;CHECK DATA
2713  013602  001426                  2.6          BEQ     DP.R1                 ;BRANCH IF DATA OK
2714  013604  126167  014023  001241  7.1          CMPB    DPRCVDATA+1(R1),TSYNC+1 ;DATA=SYNC PLUS ONE
2715  013612  001420                  2.6          BEQ     DP.R2                 ;BRANCH IF SYNC
2716  013614  032762  040000  000004  6.5          BIT     #RCVORUN,4(R2)        ;TEST XMT STATUS FOR RCV O'RUN
2717  013622  001001                  2.6          BNE     .+4                   ;DATA CHECK INVALID IF O'RUN
2718                                                                             ;THEREFORE, REMOVE ACTIVE, EXIT
2719  013624  104000                               HLT                           ;REPORT DATA ERROR
2720  013626  105061  014022          4.9          CLRB    DPRCVDATA(R1)         ;ZERO EXPECTED DATA
2721  013632  105061  014122          4.9          CLRB    DPXMTDATA(R1)         ;CLEAR XMIT DATA
2722  013636  042762  160000  000004  7.0          BIC     #160000,4(R2)         ;CLR O'RUN+ERRORS
2723  013644  052762  000010  000004  6.4          BIS     #RESYNC,4(R2)         ;SET RESYNC FLAG
2724  013652  000405                  2.6          BR      DP.R5                 ;EXIT
2725  013654  105261  014022          4.9  DP.R2:  INCB    DPRCVDATA(R1)         ;MAKE UP FOR SYNC STRIP
2726  013660  105261  014022          4.9  DP.R1:  INCB    DPRCVDATA(R1)         ;INC EXPECTED DATA
2727  013664  001002                  2.6          BNE     DP.R4                 ;EXIT
2728  013666  042712  004000          5.8  DP.R5:  BIC     #ACTIVE,@R2           ;CLEAR ACTIVE
2729  013672  052761  000010  001342  6.4  DP.R4:  BIS     #FL.DP,MAP(R1)        ;SET DP RUN FLAG
2730  013700  000167  004310          4.9          JMP     CLEANUP
2731
2732                                               ;DP TRANSMITTER ISR
2733
2734  013704  010146                  4.9  DP.XMT: MOV     R1,-(SP)              ;SAVE REGISTER 1 ON STACK
2735  013706  010246                  4.9          MOV     R2,-(SP)              ;SAVE REGISTER 2 ON STACK
2736  013710  011501                  3.8          MOV     (R5),R1
2737  013712  006301                  2.3          ASL     R1                    ;FORM MOD(2) INDEX
2738  013714  010102                  2.3          MOV     R1,R2                 ;DUPLICATE LINE NUMBER
2739  013716  006302                  2.3          ASL     R2                    ;FORM MOD10(8) INDEX
2740  013720  006302                  2.3          ASL     R2                    ;
2741  013722  005402                  2.3          NEG     R2                    ;DP STATUS REGS ARE DESENDING
2742  013724  062702  174774          3.8          ADD     #174774,R2            ;DP XMT STATUS
2743  013730  105712                  3.2          TSTB    @R2                   ;TEST DONE BIT
2744  013732  100401                  2.6          BMI     .+4                   ;BRANCH IF DONE
2745  013734  104000                               HLT                           ;REPORT ERROR, FALSE INTERRUPT
2746  013736  032712  000010          5.3          BIT     #RESYNC,(R2)          ;TEST FOR RESYNC
2747  013742  001012                  2.6          BNE     DP.X2                 ;BRANCH IF IN SYNC
2748  013744  116162  014122  000002  7.6          MOVB    DPXMTDATA(R1),2(R2)   ;TRANSMIT DATA
2749  013752  105261  014122          4.9          INCB    DPXMTDATA(R1)         ;INC TRANSMIT DATA
2750  013756  001017                  2.6          BNE     DP.X3                 ;BRANCH IF NOT DONE
2751  013760  052712  000010          5.2          BIS     #RESYNC,(R2)          ;SET RE-SYNC BITS
2752  013764  000167  004224          4.9          JMP     CLEANUP               ;EXIT
2753  013770  116262  177777  000002  7.6  DP.X2:  MOVB    -1(R2),2(R2)          ;XMIT SYNC CHAR
2754  013776  105361  014123          4.9          DECB    DPXMTDATA+1(R1)       ;DEC SYNC COUNT
2755  014002  001005                  2.6          BNE     DP.X3                 ;EXIT IF SYNC COUNT NOT ZERO
2756  014004  112761  000004  014123  6.4          MOVB    #4,DPXMTDATA+1(R1)    ;REINIT SYNC COUNT
2757  014012  042712  000010          5.8          BIC     #RESYNC,(R2)          ;CLEAR RESYNC FLAG
2758  014016  000167  004172          4.9  DP.X3:  JMP     CLEANUP
2759
2760  014022                                       DPRCVDATA:
2761                                                         ;LOW BYTE FOR EXPECTED DATA, HI BYTE FOR RECIEVED DATA
2762  014022  000000                               0                             ;DP11 RECEVER DATA LINE 0
2763  014024  000000                               0                             ;DP11 RECEVER DATA LINE 1
2764  014026  000000                               0                             ;DP11 RECEVER DATA LINE 2
2765  014030  000000                               0                             ;DP11 RECEVER DATA LINE 3
2766  014032  000000                               0                             ;DP11 RECEVER DATA LINE 4
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2767  014034  000000                0                ;DP11 RECEVER DATA LINE 5
2768  014036  000000                0                ;DP11 RECEVER DATA LINE 6
2769  014040  000000                0                ;DP11 RECEVER DATA LINE 7
2770  014042  000000                0                ;DP11 RECEVER DATA LINE 10
2771  014044  000000                0                ;DP11 RECEVER DATA LINE 11
2772  014046  000000                0                ;DP11 RECEVER DATA LINE 12
2773  014050  000000                0                ;DP11 RECEVER DATA LINE 13
2774  014052  000000                0                ;DP11 RECEVER DATA LINE 14
2775  014054  000000                0                ;DP11 RECEVER DATA LINE 15
2776  014056  000000                0                ;DP11 RECEVER DATA LINE 16
2777  014060  000000                0                ;DP11 RECEVER DATA LINE 17
2778  014062  000000                0                ;DP11 RECEVER DATA LINE 20
2779  014064  000000                0                ;DP11 RECEVER DATA LINE 21
2780  014066  000000                0                ;DP11 RECEVER DATA LINE 22
2781  014070  000000                0                ;DP11 RECEVER DATA LINE 23
2782  014072  000000                0                ;DP11 RECEVER DATA LINE 24
2783  014074  000000                0                ;DP11 RECEVER DATA LINE 25
2784  014076  000000                0                ;DP11 RECEVER DATA LINE 26
2785  014100  000000                0                ;DP11 RECEVER DATA LINE 27
2786  014102  000000                0                ;DP11 RECEVER DATA LINE 30
2787  014104  000000                0                ;DP11 RECEVER DATA LINE 31
2788  014106  000000                0                ;DP11 RECEVER DATA LINE 32
2789  014110  000000                0                ;DP11 RECEVER DATA LINE 33
2790  014112  000000                0                ;DP11 RECEVER DATA LINE 34
2791  014114  000000                0                ;DP11 RECEVER DATA LINE 35
2792  014116  000000                0                ;DP11 RECEVER DATA LINE 36
2793  014120  000000                0                ;DP11 RECEVER DATA LINE 37
2794
2795  014122                DPXMTDATA:
2796  014122  000000                0                ;DP11 TRANSMITTER DATA LINE 0
2797  014124  000000                0                ;DP11 TRANSMITTER DATA LINE 1
2798  014126  000000                0                ;DP11 TRANSMITTER DATA LINE 2
2799  014130  000000                0                ;DP11 TRANSMITTER DATA LINE 3
2800  014132  000000                0                ;DP11 TRANSMITTER DATA LINE 4
2801  014134  000000                0                ;DP11 TRANSMITTER DATA LINE 5
2802  014136  000000                0                ;DP11 TRANSMITTER DATA LINE 6
2803  014140  000000                0                ;DP11 TRANSMITTER DATA LINE 7
2804  014142  000000                0                ;DP11 TRANSMITTER DATA LINE 10
2805  014144  000000                0                ;DP11 TRANSMITTER DATA LINE 11
2806  014146  000000                0                ;DP11 TRANSMITTER DATA LINE 12
2807  014150  000000                0                ;DP11 TRANSMITTER DATA LINE 13
2808  014152  000000                0                ;DP11 TRANSMITTER DATA LINE 14
2809  014154  000000                0                ;DP11 TRANSMITTER DATA LINE 15
2810  014156  000000                0                ;DP11 TRANSMITTER DATA LINE 16
2811  014160  000000                0                ;DP11 TRANSMITTER DATA LINE 17
2812  014162  000000                0                ;DP11 TRANSMITTER DATA LINE 20
2813  014164  000000                0                ;DP11 TRANSMITTER DATA LINE 21
2814  014156  000000                0                ;DP11 TRANSMITTER DATA LINE 22
2815  014170  000000                0                ;DP11 TRANSMITTER DATA LINE 23
2816  014172  000000                0                ;DP11 TRANSMITTER DATA LINE 24
2817  014174  000000                0                ;DP11 TRANSMITTER DATA LINE 25
2818  014176  000000                0                ;DP11 TRANSMITTER DATA LINE 26
2819  014200  000000                0                ;DP11 TRANSMITTER DATA LINE 27
2820  014202  000000                0                ;DP11 TRANSMITTER DATA LINE 30
2821  014204  000000                0                ;DP11 TRANSMITTER DATA LINE 31
2822  014206  000000                0                ;DP11 TRANSMITTER DATA LINE 32
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2823  014210  000000                                    0                       ;DP11 TRANSMITTER DATA LINE 33
2824  014212  000000                                    0                       ;DP11 TRANSMITTER DATA LINE 34
2825  014214  000000                                    0                       ;DP11 TRANSMITTER DATA LINE 35
2826  014216  000000                                    0                       ;DP11 TRANSMITTER DATA LINE 36
2827  014220  000000                                    0                       ;DP11 TRANSMITTER DATA LINE 37
2828
2829                                          ;DM11 TRANSMITTER ISR
2830                                          ;ONE DM11 REPRESENTS ONE CHANNEL, 16 LINES/CHANNEL
2831
2832
2833  014222  010146                    4.9   DM.XMT: MOV     R1,-(SP)          ;SAVE REGISTER 1 ON STACK
2834  014224  010246                    4.9           MOV     R2,-(SP)          ;SAVE REGISTER 2 ON STACK
2835  014226  011501                    3.8           MOV     (R5),R1
2836  014230  006301                    2.3           ASL     R1                ;FORM MOD(2) INDEX
2837  014232  010102                    2.3           MOV     R1,R2             ;DUPLICATE LINE NUMBER
2838  014234  006302                    2.3           ASL     R2                ;FORM MOD10(8) INDEX
2839  014236  006302                    2.3           ASL     R2                ;
2840  014240  062702  175000            3.8           ADD     #175000,R2        ;FORM DEVICE ADRS
2841  014244  032712  060000            5.3           BIT     #60000,@R2        ;TEST FOR 0'RUN OR TIMEOUT ERROR
2842  014250  001401                    2.6           BEQ     DM.X1             ;BRANCH IF NO ERRORS
2843  014252  104000                                  HLT                       ;REPORT ERRORS
2844  014254  005722                    3.2   DM.X1:  TST     (R2)+             ;TEST "TRANSMITTER READY"
2845                                                                            ;INC TO "BUFFER ACTIVE" REGISTER
2846  014256  100401                    2.6           BMI     DM.X2             ;BRANCH IF READY
2847  014260  104000                                  HLT                       ;REPORT FALSE INTERRUPT
2848  014262  016205  000004            5.0   DM.X2:  MOV     4(R2),R5          ;FETCH BASE ADRS
2849  014266  012767  000001  000252    6.4           MOV     #1,     DMARK     ;SET UP LINE POINTER
2850  014274  036712  000246            6.5   DM.X3:  BIT     DMARK,  @R2       ;TEST LINE FOR REACTIVATION
2851  014300  001007                    2.6           BNE     DM.X4             ;BRANCH IF CHANNEL STILL ACTIVE
2852  014302  012715  027234            5.2           MOV     #BINCNT,@R5       ;REINIT BASE ADRS
2853  014306  016165  014612  000040    7.6           MOV     DM.LDAT(R1),40(R5)      ;REINIT WCT
2854  014314  056712  000226            6.4           BIS     DMARK,  @R2       ;ACTIVE LINE
2855
2856  014320  005725                    3.2   DM.X4:  TST     (R5)+             ;INCREMENT DM CORE INDEX TO NEXT LINE
2857  014322  006367  000220            4.9           ASL     DMARK             ;SHIFT LINE POINTER TO NEXT LINE
2858  014326  103362                    2.6           BCC     DM.X3             ;BRANCH UNLESS 16 LINES TESTED
2859  014330  042762  100000  177776    7.0           BIC     #BIT15,-2(R2)     ;CLEAR XMT DONE
2860  014336  000167  003652            4.9           JMP     CLEANUP
2861
2862                                          ;DM11 RECEIVER ISR
2863          017000                          LINE0=17000                       ;TUMBLE TABLE MASK TO DETERMINE LINE#
2864
2865  014342  010146                    4.9   DM.RCV: MOV     R1,-(SP)          ;SAVE REGISTER 1 ON STACK
2866  014344  010246                    4.9           MOV     R2,-(SP)          ;SAVE REGISTER 2 ON STACK
2867  014346  011501                    3.8           MOV     (R5),R1
2868  014350  006301                    2.3           ASL     R1                ;FORM MOD(2) INDEX
2869  014352  010102                    2.3           MOV     R1,R2             ;DUPLICATE LINE NUMBER
2870  014354  006302                    2.3           ASL     R2                ;FORM MOD10(8) INDEX
2871  014356  006302                    2.3           ASL     R2                ;
2872  014360  062702  175000            3.8           ADD     #175000,R2        ;FORM DEVICE ADDRESS
2873  014364  105712                    3.2           TSTB    @R2               ;TEST FOR RCV DONE
2874  014366  100401                    2.6           BMI     DM.R1             ;BRANCH IF DONE
2875  014370  104000                                  HLT                       ;REPORT FALSE INTERRUPT
2876  014372  016105  014752            5.0   DM.R1:  MOV     DM.TT(R1),R5      ;FETCH TUMBLE TABLE POINTER
2877  014376  005715                    3.2   DM.R2:  TST     @R5               ;TEST FOR VALID ENTRY
2878  014400  100401                    2.6           BMI     DM.R3             ;BRANCH IF VALID ENTRY
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2879  014402  104000                          HLT                             ;REPORT INVALID ENTRY
2880  014404  011561  014552          6.4   DM.R3:  MOV     @R5,TTDAT(R1)   ;TEST FOR MORE ENTRIES
2881                                                                          ;SAVE TT DATA
2882  014410  100045                  2.6             BPL     DM.R5           ;EXIT IF NO MORE ENTRIES
2883  014412  142761  000341  014553  7.0             BICB    #341,TTDAT+1(R1) ;MASK NON LINE # BITS
2884  014420  001024                  2.6             BNE     DM.R4           ;BRANCH IF NOT LINE 0
2885                                                  ;***************************************************
2886  014422  121561  015012          5.9   DM.R6:  CMPB    @R5,DM.RDAT(R1) ;COMPARE RCV DATA WITH EXPECTED
2887  014426  001401                  2.6             BEQ     .+4             ;BRANCH IF DATA OK
2888                                                  ;***************************************************
2889  014430  104000                                  HLT                     ;REPORT DATA ERROR LINE 0
2890  014432  005161  014612          4.9             COM     DM.LDAT(R1)     ;
2891  014436  026161  014612  015012  7.1             CMP     DM.LDAT(R1),DM.RDAT(R1) ;TEST FOR DATA LIMIT
2892  014444  001006                  2.6             BNE     DM.R7           ;BRANCH IF NOT END OF DATA
2893  014446  012761  000000  015012  6.4             MOV     #0,DM.RDAT(R1)  ;REINITILIZE DATA
2894  014454  005161  014612          4.9             COM     DM.LDAT(R1)     ;
2895  014460  000404                  2.6             BR      DM.R4
2896  014462  005161  014612          4.9   DM.R7:  COM     DM.LDAT(R1)     ;
2897  014466  005261  015012          4.9             INC     DM.RDAT(R1)     ;INCREMENT EXPECTED DATA
2898  014472  005025                  3.7   DM.R4:  CLR     (R5)+           ;CLEAR TT ENTRY
2899  014474  016267  000006  000046  7.6             MOV     6(R2),DM.R8     ;SAVE BASE ADRS
2900  014502  062767  000400  000040  6.4             ADD     #400,DM.R8      ;END OF TT
2901  014510  020567  000034          4.4             CMP     R5,DM.R8        ;TEST FOR END OF TT
2902  014514  001333                  2.6             BNE     DM.R3           ;BRANCH IF NOT END
2903  014516  162705  000200          3.8             SUB     #200,R5         ;POINT R5 TO BOTTOM OF TT
2904  014522  000730                  2.6             BR      DM.R3           ;CONTINUE TO EXAMINE TT
2905  014524  010561  014752          4.9   DM.R5:  MOV     R5,DM.TT(R1)    ;STORE TT POINTER
2906  014530  052761  000020  001342  6.4             BIS     #FL.DMA,MAP(R1) ;SET RUN FLAG
2907  014536  042712  000200          5.8             BIC     #BIT7,@R2       ;CLEAR DONE
2908  014542  000167  003446          4.9             JMP     CLEANUP
2909
2910
2911  014546  000000                          DMARK:  0                       ;SCRATCH PAD FOR LINE #
2912  014550  000000                          DM.R8:  0                       ;SCRATCH PAD
2913  014552                                  TTDAT:                          ;SAVED TT DATA
2914  014552  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 0
2915  014554  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 1
2916  014556  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 2
2917  014560  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 3
2918  014562  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 4
2919  014564  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 5
2920  014566  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 6
2921  014570  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 7
2922  014572  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 10
2923  014574  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 11
2924  014576  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 12
2925  014600  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 13
2926  014602  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 14
2927  014604  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 15
2928  014606  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 16
2929  014610  000000                                  0                       ;DM11 TUMBLE TABLE DATA, CHANNEL 17
2930
2931  014612                                  DM.LDAT:                        ;DATA LIMITS FOR EACH CHANNEL
2932  014612  000000                                  0                       ;DM11 DATA LIMIT, CHANNEL 0
2933  014614  000000                                  0                       ;DM11 DATA LIMIT, CHANNEL 1
2934  014616  000000                                  0                       ;DM11 DATA LIMIT, CHANNEL 2
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2935  014620  000000                    0          ;DM11 DATA LIMIT, CHANNEL 3
2936  014622  000000                    0          ;DM11 DATA LIMIT, CHANNEL 4
2937  014624  000000                    0          ;DM11 DATA LIMIT, CHANNEL 5
2938  014626  000000                    0          ;DM11 DATA LIMIT, CHANNEL 6
2939  014630  000000                    0          ;DM11 DATA LIMIT, CHANNEL 7
2940  014632  000000                    0          ;DM11 DATA LIMIT, CHANNEL 10
2941  014634  000000                    0          ;DM11 DATA LIMIT, CHANNEL 11
2942  014636  000000                    0          ;DM11 DATA LIMIT, CHANNEL 12
2943  014640  000000                    0          ;DM11 DATA LIMIT, CHANNEL 13
2944  014642  000000                    0          ;DM11 DATA LIMIT, CHANNEL 14
2945  014644  000000                    0          ;DM11 DATA LIMIT, CHANNEL 15
2946  014646  000000                    0          ;DM11 DATA LIMIT, CHANNEL 16
2947  014650  000000                    0          ;DM11 DATA LIMIT, CHANNEL 17
2948
2949  014652                    DM.CAT:            ;CURRENT ADDRESS TABLE (CAT) ADDRESS TABLE
2950  014652  000000                    0          ;DM11 CAT ADR, CHANNEL 0
2951  014654  000000                    0          ;DM11 CAT ADR, CHANNEL 1
2952  014656  000000                    0          ;DM11 CAT ADR, CHANNEL 2
2953  014660  000000                    0          ;DM11 CAT ADR, CHANNEL 3
2954  014662  000000                    0          ;DM11 CAT ADR, CHANNEL 4
2955  014664  000000                    0          ;DM11 CAT ADR, CHANNEL 5
2956  014666  000000                    0          ;DM11 CAT ADR, CHANNEL 6
2957  014670  000000                    0          ;DM11 CAT ADR, CHANNEL 7
2958  014672  000000                    0          ;DM11 CAT ADR, CHANNEL 10
2959  014674  000000                    0          ;DM11 CAT ADR, CHANNEL 11
2960  014676  000000                    0          ;DM11 CAT ADR, CHANNEL 12
2961  014700  000000                    0          ;DM11 CAT ADR, CHANNEL 13
2962  014702  000000                    0          ;DM11 CAT ADR, CHANNEL 14
2963  014704  000000                    0          ;DM11 CAT ADR, CHANNEL 15
2964  014706  000000                    0          ;DM11 CAT ADR, CHANNEL 16
2965  014710  000000                    0          ;DM11 CAT ADR, CHANNEL 17
2966
2967  014712                    DM.WCT:            ;ADRS OF WORD COUNT (BYTES)
2968  014712  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 0
2969  014714  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 1
2970  014716  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 2
2971  014720  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 3
2972  014722  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 4
2973  014724  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 5
2974  014726  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 6
2975  014730  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 7
2976  014732  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 10
2977  014734  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 11
2978  014736  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 12
2979  014740  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 13
2980  014742  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 14
2981  014744  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 15
2982  014746  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 16
2983  014750  000000                    0          ;DM11 WORD COUNT POINTER, CHANNEL 17
2984
2985  014752                    DM.TT:             ;TUMBLE TABLE POINTERS
2986  014752  000000                    0          ;DM11 TUMBLE TABLE POINTER, CHANNEL 0
2987  014754  000000                    0          ;DM11 TUMBLE TABLE POINTER, CHANNEL 1
2988  014756  000000                    0          ;DM11 TUMBLE TABLE POINTER, CHANNEL 2
2989  014760  000000                    0          ;DM11 TUMBLE TABLE POINTER, CHANNEL 3
2990  014762  000000                    0          ;DM11 TUMBLE TABLE POINTER, CHANNEL 4
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2991  014764  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 5
2992  014766  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 6
2993  014770  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 7
2994  014772  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 10
2995  014774  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 11
2996  014776  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 12
2997  015000  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 13
2998  015002  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 14
2999  015004  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 15
3000  015006  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 16
3001  015010  000000                          0                       ;DM11 TUMBLE TABLE POINTER, CHANNEL 17
3002
3003  015012                          DM.RDAT:                        ;DM RCV DATA
3004  015012  000000                          0                       ;CHANNEL 0
3005  015014  000000                          0                       ;CHANNEL 1
3006  015016  000000                          0                       ;CHANNEL 2
3007  015020  000000                          0                       ;CHANNEL 3
3008  015022  000000                          0                       ;CHANNEL 4
3009  015024  000000                          0                       ;CHANNEL 5
3010  015026  000000                          0                       ;CHANNEL 6
3011  015030  000000                          0                       ;CHANNEL 7
3012  015032  000000                          0                       ;CHANNEL 8
3013  015034  000000                          0                       ;CHANNEL 9
3014  015036  000000                          0                       ;CHANNEL 10
3015  015040  000000                          0                       ;CHANNEL 11
3016  015042  000000                          0                       ;CHANNEL 12
3017  015044  000000                          0                       ;CHANNEL 13
3018  015046  000000                          0                       ;CHANNEL 14
3019  015050  000000                          0                       ;CHANNEL 15
3020
3021          104400                  STALL=TRAP
3022          040000                  RCVORUN=40000
3023          004000                  ACTIVE=4000
3024          000010                  RESYNC=10               ;RESYNC FLAG IS BIT2 IN THE SYNC BUFFER
3025
3026  015052  013426                  TSYNC:  13426           ;TSYNC=26,TSYNC+1=27
3027                                                          ;IF SYNC CHAR IS CHANGED MAKE SURE RESYNC FITS
3028
3029                                  ;DN11 INTERUPT SERVICE ROUTINE
3030
3031  015054  010146                  4.9     DN.ISR: MOV     R1,-(SP)        ;SAVE REGISTER 1 ON STACK
3032  015056  010246                  4.9             MOV     R2,-(SP)        ;SAVE REGISTER 2 ON STACK
3033  015060  011501                  3.8             MOV     (R5),R1
3034  015062  006301                  2.3             ASL     R1              ;FORM MOD(2) INDEX
3035  015064  052761  000040  001342  6.4             BIS     #FL.DN,MAP(R1)
3036  015072  006301                  2.3             ASL     R1              ;FORM MOD(4) INDEX
3037  015074  010102                  2.3             MOV     R1,R2           ;DUPLICATE LINE NUMBER
3038  015076  006302                  2.3             ASL     R2              ;FORM MOD10(8) INDEX
3039  015100  066702  005704          5.0             ADD     DNADRS, %2      ;CALCULATE DN11 CSR ADDDRESS
3040  015104  005067  000256          4.9             CLR     DNIFLG          ;CLR INTERUPT SERVICE FLAG
3041  015110  042712  000004          5.8             BIC     #BIT2,  (2)     ;MASTER INTERUPT DISABLE
3042  015114  105712                  3.2     DN.I1:  TSTB    (2)             ;CHECK DONE
3043  015116  100033                  2.6             BPL     DN.I2           ;BRANCH IF NOT DONE
3044  015120  116105  015242          5.0             MOVB    DNDATA(1),%5    ;GET DATA POINTER
3045  015124  100007                  2.6             BPL     1$              ;BRANCH IF POINTER IS IN RIGHT STATE
3046  015126  011203                  3.8             MOV     (2),    R3      ;ACTUAL DATA
```

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3047  015130  010304                    2.3          MOV     R3,     R4      ;SET UP " SHOULD BE"
3048  015132  142704  000200            4.4          BICB    #BIT7,  R4      ;CLEAR "DONE"
3049  015136  006201                    2.3          ASR     R1              ;FROM
3050  015140  006201                    2.3          ASR     R1              ;UNIT #
3051  015142  104004                                 HLT+4                   ;DN11 "DONE" SET WHEN IT SHOULDN'T HAVE
3052
3053  015144  026512  015354            5.9  1$:     CMP     DNRCVD(5),(2)   ;CHECK DATA
3054  015150  001401                    2.6          BEQ     2$              ;BRANCH IF OK
3055  015152  104000                                 HLT                     ;DN11 ERROR (ADRS OF LINE CSR IN R2)
3056
3057  015154  005012                    3.7  2$:     CLR     (2)             ;CLR DN11 STATUS REGISTER
3058  015156  005725                    3.2          TST     (5)+            ;UPDATE POINTER OFFSET
3059  015160  022705  000010            3.8          CMP     #10,    %5      ;CHECK FOR END OF DATA TABLE
3060  015164  002001                    2.6          BGE     .+4
3061  015166  005005                    2.3          CLR     %5
3062  015170  005105                    2.3          COM     %5
3063  015172  110561  015242            4.9          MOVB    %5,DNDATA(1)
3064  015176  012712  000011            5.2          MOV     #11,    (2)     ;SET MAINT. FCRQ
3065  015202  005267  000160            4.9          INC     DNIFLG          ;"SET" INTERUPT SERVICED FLAG
3066  015206  005722                    3.2  DN.I2:  TST     (2)+
3067  015210  005201                    2.3          INC     %1
3068  015212  032702  000007            4.4          BIT     #7,     %2      ;CHECK FOR LAST LINE
3069  015216  001336                    2.6          BNE     DN.I1
3070  015220  005767  000142            4.4          TST     DNIFLG          ;CHECK FOR INTERUPT SERVICED
3071  015224  001001                    2.6          BNE     .+4             ;BRANCH IF IT WAS
3072  015226  104000                                 HLT                     ;DN11 FALSE INTERUPT
3073
3074  015230  052762  000004  177770    6.4          BIS     #BIT2,  -10(2)  ;MASTER INTERUPT ENABLE
3075  015236  000167  002752            4.9          JMP     CLEANUP
3076
3077  015242                                 DNDATA:                         ;DATA TABLE POINTER TABLE
3078  015242      000                                .BYTE   0               ;DN11 DATA, LINE 0
3079  015243      000                                .BYTE   0               ;DN11 DATA, LINE 1
3080  015244      000                                .BYTE   0               ;DN11 DATA, LINE 2
3081  015245      000                                .BYTE   0               ;DN11 DATA, LINE 3
3082  015246      000                                .BYTE   0               ;DN11 DATA, LINE 4
3083  015247      000                                .BYTE   0               ;DN11 DATA, LINE 5
3084  015250      000                                .BYTE   0               ;DN11 DATA, LINE 6
3085  015251      000                                .BYTE   0               ;DN11 DATA, LINE 7
3086  015252      000                                .BYTE   0               ;DN11 DATA, LINE 10
3087  015253      000                                .BYTE   0               ;DN11 DATA, LINE 11
3088  015254      000                                .BYTE   0               ;DN11 DATA, LINE 12
3089  015255      000                                .BYTE   0               ;DN11 DATA, LINE 13
3090  015256      000                                .BYTE   0               ;DN11 DATA, LINE 14
3091  015257      000                                .BYTE   0               ;DN11 DATA, LINE 15
3092  015260      000                                .BYTE   0               ;DN11 DATA, LINE 16
3093  015261      000                                .BYTE   0               ;DN11 DATA, LINE 17
3094  015262      000                                .BYTE   0               ;DN11 DATA, LINE 20
3095  015263      000                                .BYTE   0               ;DN11 DATA, LINE 21
3096  015264      000                                .BYTE   0               ;DN11 DATA, LINE 22
3097  015265      000                                .BYTE   0               ;DN11 DATA, LINE 23
3098  015266      000                                .BYTE   0               ;DN11 DATA, LINE 24
3099  015267      000                                .BYTE   0               ;DN11 DATA, LINE 25
3100  015270      000                                .BYTE   0               ;DN11 DATA, LINE 26
3101  015271      000                                .BYTE   0               ;DN11 DATA, LINE 27
3102  015272      000                                .BYTE   0               ;DN11 DATA, LINE 30
```

```
3103  015273  000                    .BYTE   0               ;DN11 DATA, LINE 31
3104  015274  000                    .BYTE   0               ;DN11 DATA, LINE 32
3105  015275  000                    .BYTE   0               ;DN11 DATA, LINE 33
3106  015276  000                    .BYTE   0               ;DN11 DATA, LINE 34
3107  015277  000                    .BYTE   0               ;DN11 DATA, LINE 35
3108  015300  000                    .BYTE   0               ;DN11 DATA, LINE 36
3109  015301  000                    .BYTE   0               ;DN11 DATA, LINE 37
3110  015302  000                    .BYTE   0               ;DN11 DATA, LINE 40
3111  015303  000                    .BYTE   0               ;DN11 DATA, LINE 41
3112  015304  000                    .BYTE   0               ;DN11 DATA, LINE 42
3113  015305  000                    .BYTE   0               ;DN11 DATA, LINE 43
3114  015306  000                    .BYTE   0               ;DN11 DATA, LINE 44
3115  015307  000                    .BYTE   0               ;DN11 DATA, LINE 45
3116  015310  000                    .BYTE   0               ;DN11 DATA, LINE 46
3117  015311  000                    .BYTE   0               ;DN11 DATA, LINE 47
3118  015312  000                    .BYTE   0               ;DN11 DATA, LINE 50
3119  015313  000                    .BYTE   0               ;DN11 DATA, LINE 51
3120  015314  000                    .BYTE   0               ;DN11 DATA, LINE 52
3121  015315  000                    .BYTE   0               ;DN11 DATA, LINE 53
3122  015316  000                    .BYTE   0               ;DN11 DATA, LINE 54
3123  015317  000                    .BYTE   0               ;DN11 DATA, LINE 55
3124  015320  000                    .BYTE   0               ;DN11 DATA, LINE 56
3125  015321  000                    .BYTE   0               ;DN11 DATA, LINE 57
3126  015322  000                    .BYTE   0               ;DN11 DATA, LINE 60
3127  015323  000                    .BYTE   0               ;DN11 DATA, LINE 61
3128  015324  000                    .BYTE   0               ;DN11 DATA, LINE 62
3129  015325  000                    .BYTE   0               ;DN11 DATA, LINE 63
3130  015326  000                    .BYTE   0               ;DN11 DATA, LINE 64
3131  015327  000                    .BYTE   0               ;DN11 DATA, LINE 65
3132  015330  000                    .BYTE   0               ;DN11 DATA, LINE 66
3133  015331  000                    .BYTE   0               ;DN11 DATA, LINE 67
3134  015332  000                    .BYTE   0               ;DN11 DATA, LINE 70
3135  015333  000                    .BYTE   0               ;DN11 DATA, LINE 71
3136  015334  000                    .BYTE   0               ;DN11 DATA, LINE 72
3137  015335  000                    .BYTE   0               ;DN11 DATA, LINE 73
3138  015336  000                    .BYTE   0               ;DN11 DATA, LINE 74
3139  015337  000                    .BYTE   0               ;DN11 DATA, LINE 75
3140  015340  000                    .BYTE   0               ;DN11 DATA, LINE 76
3141  015341  000                    .BYTE   0               ;DN11 DATA, LINE 77
3142
3143  015342  000500          DNXMTD: 000500
3144  015344  001100                  001100
3145  015346  002100                  002100
3146  015350  004100                  004100
3147  015352  007500                  007500
3148
3149  015354  010731          DNRCVD: 010731
3150  015356  011351                  011351
3151  015360  112311                  112311
3152  015362  054311                  054311
3153  015364  157771                  157771
3154
3155  015366  000000          DNIFLG: 0                       ;DN11 INTERUPT SERVICE FLAG
3156
3157                                  ;ENTER HERE ON DM11 -BB INTERRUPT
3158
```

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3159  015370  010146                        4.9  DMBISR: MOV     R1,     -(SP)   ;SAVE R1
3160  015372  010246                        4.9          MOV     R2,     -(SP)   ;SAVE R2
3161  015374  011501                        3.8          MOV     (R5),   R1      ;GET UNIT NUMBER
3162  015376  006301                        2.3          ASL     R1              ;*2
3163  015400  010102                        2.3          MOV     R1,     R2      ;ALSO IN R2
3164  015402  006302                        2.3          ASL     R2              ;*4
3165  015404  006302                        2.3          ASL     R2              ;*10
3166  015406  063702  001612                3.8          ADD     @#AD.DMB,R2     ;SET UP DM11BB CSR ADDRESS
3167  015412  105712                        3.2          TSTB    (R2)            ;IS DONE BIT SET
3168  015414  100401                        2.6          BMI     .+4
3169  015416  104000                                     HLT                     ;INTERRUPT WITH DONE NOT SE
3170  015420  052761  000100  001342        6.4          BIS     #FL.DMB,MAP(R1)
3171  015426  000167  002562                4.9          JMP     CLEANUP
3172
3173
3174                                             ; DX11 DEFINITIONS
3175
3176          000010                             CE=10
3177          000004                             DE=4
3178          000400                             TIOC=400                ;TEST I/O
3179          000001                             WRITEC=001              ;WRITE
3180          000002                             READC=002               ;READ
3181          000403                             NOPC=403                ;NOP
3182          000004                             SENSEC=4                ;SENSE
3183          000405                             ILLC=405                ;ILLEGAL COMMAND
3184          000002                             UC=2
3185
3186          000010                             DEVNUM=8.
3187  015432  000010                             MAX.DEV.CU:     DEVNUM
3188
3189  015434  000002                             ERRDST: UC
3190
3191                                             ;OFFLINE INTERRUPT SERVICE ROUTINE
3192
3193                                             ;DUMMY DX INTERRUPT SERVICE ROUTINE
3194
3195  015436  104000                             DMY.ISR:        HLT                     ;FALSE DX INTERRUPT CHECK M7821
3196  015440  000002                        4.8          RTI
3197
3198
3199  015442  010146                        4.9  DX.ISR: MOV     %1,     -(6)            ;SAVE REGISTERS
3200  015444  010246                        4.9          MOV     %2,     -(6)
3201  015446  016701  171004                5.0          MOV     DXDAT,  %1
3202  015452  012702  000200                3.8          MOV     #128.,  %2
3203  015456  022711  052525                4.7  DXDCK:  CMP     #52525, (1)             ;CHECK DATA (TWO BYTES)
3204  015462  001404                        2.6          BEQ     DXDTE                   ;BRANCH IF OK
3205  015464  122741  000125                5.9          CMPB    #125,   -(1)            ;RESTORE DISPLAY VALUE
3206  015470  104002                                     HLT+2
3207  015472  000416                        2.6          BR      DXOUT
3208  015474  005021                        3.7  DXDTE:  CLR     (1)+                    ;CLEAR CURRENT AND INCREMENT TO NEXT (TW
3209  015476  005302                        2.3          DEC     %2
3210  015500  001366                        2.6          BNE     DXDCK
3211  015502  042777  000004  001712        8.2          BIC     #4,@DXES                ;CLEAR SOSIEN
3212  015510  042777  000200  001664        8.2          BIC     #200,@DXCS              ;CLEAR DONE
3213  015516  004767  000032                7.0          JSR     %7,     DXGO            ;START NEXT NPR
3214  015522  052767  000400  163612        6.4          BIS     #FL.DX,MAP
```

```
3215  015530  000137  020214            3.7  DXOUT.  JMP     @#CLEANUP
3216
3217
3218  015534  016701  170716            5.0  CLRDXD: MOV     DXDAT,R1
3219  015540  012702  000400            3.8          MOV     #256.,R2
3220  015544  105021                    3.7  DS.3:   CLRB    (R1)+
3221  015546  005302                    2.3          DEC     R2
3222  015550  001375                    2.6          BNE     DS.3
3223  015552  000207                    3.5          RTS     PC
3224
3225  015554  016777  170676  001624    8.8  DXGO:   MOV     DXDAT,@DXBA             ;SET UP BASE ADRS REG
3226  015562  012777  177400  001620    7.6          MOV     #-256.,@DXBC            ;SET DXBC
3227  015570  052777  000003  001604    7.6          BIS     #3,@DXCS                ;SET GO
3228  015576  052777  060000  001606    7.6          BIS     #60000,@DXMO            ;CUI - SELO, HLDO
3229  015604  042777  060000  001600    8.2          BIC     #60000,@DXMO
3230  015612  052777  002000  001572    7.6          BIS     #2000,@DXMO             ;CMDO
3231  015620  042777  002000  001564    8.2          BIC     #2000,@DXMO             ;
3232
3233  015626  052777  000004  001566    7.6          BIS     #4,@DXES                ;SOSIEN FOR FAST NPR
3234  015634  000207                    3.5          RTS     %7
3235
3236
3237                                          ;INTRRUPT SERVICE ROUTINE FOR ONLINE OPERATION
3238                                          .REM    *
3239                                          DCT=%0                                  ;CURRENT DCT BASE (BACKGROUND TASK)
3240                                          TTP=%1                                  ;CURRENT TUMBLE TABLE POINTER (INTERRUPT
3241                                          T1=%2                                   ;WORK REGISTER (BACKGROUND)
3242                                          T2=%3                                   ;WORK REGISTER (BACKGROUND)
3243                                          T3=%4                                   ;WORK REGISTER (BACKGROUND)
3244                                          W=%5                                    ;DCT BASE (INTERRUPT)
3245                                                  *
3246                                          ;NOTE:
3247                                          ;       NO ERRORS ARE DETECTED BY CTP FOR ONLINE OPERATION
3248                                          ;       AND THE DX IS NOT MONITORED FOR DEVICE ACTIVITY (RUNNING).
3249
3250
3251  015636  052767  000400  163476    6.4  DXOL.ISR:BIS    #FL.DX,MAP
3252  015644  010527                    3.7          MOV     %5,(PC)+
3253  015646  000000                            R5S:    0
3254  015650  010427                    3.7          MOV     %4,(PC)+
3255  015652  000000                            R4S:    0
3256  015654  010327                    3.7          MOV     %3,(PC)+
3257  015656  000000                            R3S:    0
3258  015660  010227                    3.7          MOV     %2,(PC)+
3259  015662  000000                            R2S:    0
3260  015664  010127                    3.7          MOV     %1,(PC)+
3261  015666  000000                            R1S:    0
3262  015670  010027                    3.7          MOV     %0,(PC)+
3263  015672  000000                            R0S:    0
3264  015674  016701  000326            5.0          MOV     SAVTTP,TTP              ;RESTORE TTP
3265  015700  042777  000200  001474    8.2  RETRY:  BIC     #DONE,@DXCS             ;CLEAR LOCK
3266  015706  011161  001000            6.4          MOV     (TTP),  1000(TTP)       ;TRACE T/T
3267  015712  016161  000002  001002    7.6          MOV     2(TTP), 1002(TTP)
3268  015720  032711  010000            5.3          BIT     #SYSRST,@TTP            ;SYSTEM RESET?
3269  015724  001404                    2.6          BEQ     INT1                    ;NO
3270  015726  042777  000400  001446    8.2          BIC     #CUBSY,@DXCS
```

```
3271  015734  000466                    2.6          BR      INTOUT
3272
3273  015736  147761  000266  000002    9.4  INT1:   BICB    @CU,CUART(TTP)  ;CLEAR CU OUT OF DXCA
3274  015744  116105  000002            5.0          MOVB    CUART(TTP),W
3275  015750  006305                    2.3          ASL     W
3276  015752  016505  017632            5.0          MOV     DCTP(W),W
3277
3278  015756  005767  000250            4.4          TST     WAIT                    ;PREVIOUS REQUEST?
3279  015762  001412                    2.6          BEQ     INT2                    ;NO
3280
3281  015764  010546                    4.9          MOV     W,      -(SP)           ;NO - REQUEUE IT
3282  015766  116705  000216            5.0          MOVB    DEV,    W
3283  015772  006305                    2.3          ASL     W
3284  015774  016505  017632            5.0          MOV     DCTP(W ,W
3285  016000  016565  000002  000000    7.6          MOV     LREQ(W),REQ(W)
3286  016006  012605                    3.8          MOV     (SP)+,  W               ;BACK TO CURRENT DEV
3287
3288  016010  005067  000216            4.9  INT2:   CLR     WAIT                    ;CLEAR WAIT FLAG
```

```
3289 016014 005711              3.2     TST     (TTP)                   ;ANY ENTRY?
3290 016016 001447              2.6     BEQ     CLEAN                   ;NO - CLEAN UP
3291
3292 016020 032711 004000       5.3     BIT     #INFDSC,(TTP)           ;CHECK FOR HIO
```

```
3293  016024  001404                    2.6          BEQ     DS1
3294  016026  004767  000772            7.0          JSR     PC,     DXDSC
3295  016032  000167  000054            4.9          JMP     INTOUT
3296  016036  032711  000102            5.3  DS1:    BIT     #ESEND!STKSTB,(TTP)     ;CHECK FOR ES END
3297  016042  001404                    2.6          BEQ     DS2
3298  016044  004767  000630            7.0          JSR     PC,     ESDONE
3299  016050  000167  000036            4.9          JMP     INTOUT
3300  016054  032711  000200            5.3  DS2:    BIT     #CHIS,  (TTP)           ;CHECK FOR ISS
3301  016060  001404                    2.6          BEQ     DS3
3302  016062  004767  001044            7.0          JSR     PC,     DXISS
3303  016066  000167  000020            4.9          JMP     INTOUT
3304  016072  032711  000060            5.3  DS3:    BIT     #CUDEND!CHDEND,(TTP)    ;CHECK FOR DT END
3305  016076  001404                    2.6          BEQ     DS4
3306  016100  004767  000530            7.0          JSR     PC,     DTDONE
3307  016104  000167  000002            4.9          JMP     INTOUT
3308
3309  016110  000240                    1.5  DS4:    NOP                             ;UNRECOGNIZED T/T ENTRY
3310
3311  016112                                INTOUT:
3312  016112  005011                    3.7          CLR     @TTP                    ;CLEAR THIS ENTRY
3313  016114  062701  000004            3.8          ADD     #4,     TTP             ;SET FOR NEXT
3314  016120  020167  170326            4.4          CMP     TTP,TTTT                ;END OF TT
3315  016124  002665                    2.6          BLT     RETRY                   ;NO - OK
3316  016126  016701  170316            5.0          MOV     TT,TTP                  ;YES - START OVER
3317  016132  000167  177542            4.9          JMP     RETRY                   ;
3318
3319                                    ;EXIT FROM INTERRUPT
3320
3321
3322                                    .SBTTL          DX11 BACKGROUND TASK
3323                                    ;DX BACKGROUND TASK
3324                                    ;POLL REQUEST LOOP
3325                                    .REM    *
3326                                    DCT=%0                                  ;CURRENT DCT BASE (BACKGROUND TASK)
3327                                    TTP=%1                                  ;CURRENT TUMBLE TABLE POINTER (INTERRUPT
3328                                    T1=%2                                   ;WORK REGISTER (BACKGROUND)
3329                                    T2=%3                                   ;WORK REGISTER (BACKGROUND)
3330                                    T3=%4                                   ;WORK REGISTER (BACKGROUND)
3331                                    W=%5                                    ;DCT BASE (INTERRUPT)
3332                                            *
3333  016136  005067  000046            4.9  CLEAN:  CLR     DEV                     ;DO ALL POSSIBLE DEVICES
3334  016142  016702  000042            5.0  LOOP:   MOV     DEV,    T1              ;GET DEVICE TO TEST
3335  016146  006302                    2.3          ASL     T1                      ;WORD INDEX
3336  016150  016200  017632            5.0          MOV     DCTP(T1),DCT            ;SET UP DCT
3337  016154  016002  000000            5.0          MOV     REQ(DCT),T1             ;GET REQUEST CODE
3338  016160  006302                    2.3          ASL     T1                      ;WORD INDEX
3339  016162  004772  016212            8.2          JSR     PC,     @REQTBL(T1)     ;DISPATCH TO HANDLER
3340
3341  016166  005267  000016            4.9          INC     DEV                     ;TO NEXT DEVICE
3342  016172  046767  170552  000010    8.2          BIC     NUMDEV,DEV              ;MASK TO DESIRED LEVEL
3343  016200  005767  000004            4.4          TST     DEV                     ;ALL DONE?
3344  016204  001356                    2.6          BNE     LOOP                    ; NO
3345  016206  000572                    2.6  DXLP:   BR      SS4                     ;EXIT
3346  016210  000000                         DEV:    0                               ;CURRENT POLL
3347
3348  016212  016234                         REQTBL: SNULL
```

```
3349  016214  016236                          SINPUT
3350  016216  016336                          SOUTPT
3351  016220  016436                          SSTAT
3352  016222  016522                          SSCUE
3353                              ;MODE CONTROL
3354  016224  177777             MODE:   -1                  ;0 FOR 2703. -1 FOR 2848
3355  016226  000000             SAVTTP: 0                   ;SAVED TT POINTER
```

```
3356  016230  017430                          CU:     DXLEGA                  ;LOW ORDER DEVICE ADDRESS
3357
3358                                          ;CONTROL UNIT STATUS
3359
3360  016232  000000                          WAIT:   0                               ;CU STATE -
3361
3362          000000                          CUIDL=0                                 ;IDLE CU
3363          000001                          CUES=1                                  ;STATUS END EXPECTED
3364          000002                          CUDT=2                                  ;DT END EXPECTED
3365
3366  016234  000207                    3.5   SNULL:  RTS     PC                      ;NULL ENTRY
3367
3368  016236  005060  000000            4.9   SINPUT: CLR     REQ(DCT)                ;CLEAR REQUEST
3369  016242  026027  000004  000001    5.9           CMP     DEVSTA(DCT),#DATA
3370  016250  001031                    2.6           BNE     ST1
3371  016252  012767  000002  177752    6.4           MOV     #CUDT,  WAIT            ;SET WAIT STATE
3372  016260  116777  177724  001112    8.8           MOVB    DEV,    @DXCA           ;SET DEV
3373  016266  157777  177736  001104   10.0           BISB    @CU,    @DXCA
3374  016274  016077  000012  001104    8.8           MOV     BUFA(DCT),@DXBA         ;SET UP BUF ADDR
3375  016302  012777  177774  001100    7.6           MOV     #-4,    @DXBC
3376  016310  026027  000014  177774    5.9           CMP     BUFC(DCT),#-4
3377  016316  003403                    2.6           BLE     .+10
```

```
3378  016320  016077  000014  001062     8.8          MOV     BUFC(DCT),@DXBC
3379  016326  052777  000003  001046     7.6          BIS     #FCTNR, @DXCS           ;SET FUNCTION
3380  016334  000207                     3.5  ST1:    RTS     PC                      ;DONE
3381
3382  016336  005060  000000             4.9  SOUTPT: CLR     REQ(DCT)
3383  016342  026027  000004  000001     5.9          CMP     DEVSTA(DCT),#DATA
3384  016350  001031                     2.6          BNE     SO1
3385  016352  012767  000002  177652     6.4          MOV     #CUDT,  WAIT
3386  016360  116777  177624  001012     8.8          MOVB    DEV,    @DXCA           ;SET DEV
3387  016366  157777  177636  001004    10.0          BISB    @CU,    @DXCA
3388  016374  016077  000012  001004     8.8          MOV     BUFA(DCT),@DXBA
3389  016402  012777  177774  001000     7.6          MOV     #-4,@DXBC
3390  016410  026027  000014  177774     5.9          CMP     BUFC(DCT),#-4
3391  016416  003403                     2.6          BLE     .+10
3392  016420  016077  000014  000762     8.8          MOV     BUFC(DCT),@DXBC
3393  016426  052777  000005  000746     7.6          BIS     #FCTNX, @DXCS
3394  016434  000207                     3.5  SO1:    RTS     PC
3395
3396  016436  005060  000000             4.9  SSTAT:  CLR     REQ(DCT)
3397  016442  026027  000004  000001     5.9          CMP     DEVSTA(DCT),#DATA
3398  016450  001404                     2.6          BEQ     SS1
3399  016452  026027  000004  000002     5.9          CMP     DEVSTA(DCT),#STA
3400  016460  001017                     2.6          BNE     SS2
3401  016462  012767  000001  177542     6.4  SS1:    MOV     #CUES,  WAIT
3402  016470  116777  177514  000702     8.8          MOVB    DEV,    @DXCA           ;SET DEV
3403  016476  157777  177526  000674    10.0          BISB    @CU,    @DXCA
3404  016504  116077  000016  000672     8.8          MOVB    STS(DCT),@DXOS
3405  016512  052777  000007  000662     7.6          BIS     #FCTNS, @DXCS
3406  016520  000207                     3.5  SS2:    RTS     PC
3407
3408
3409  016522  005060  000000             4.9  SSCUE:  CLR     REQ(DCT)
3410  016526  005760  000004             4.4          TST     DEVSTA(DCT)
3411  016532  001017                     2.6          BNE     SS3
3412  016534  012767  000001  177470     6.4          MOV     #CUES,  WAIT
3413  016542  116777  177442  000630     8.8          MOVB    DEV,    @DXCA
3414  016550  157777  177454  000622    10.0          BISB    @CU,    @DXCA
3415  016556  116077  000016  000620     9.8          MOVB    STS(DCT),@DXOS
3416  016564  052777  000007  000610     7.6          BIS     #FCTNS, @DXCS
3417  016572  000207                     3.5  SS3:    RTS     PC
3418  016574  010167  177426             4.9  SS4:    MOV     TTP,SAVTTP
3419  016600  016705  177042             5.0          MOV     R5S,%5
3420  016604  016704  177042             5.0          MOV     R4S,%4
3421  016610  016703  177042             5.0          MOV     R3S,%3
3422  016614  016702  177042             5.0          MOV     R2S,%2
3423  016620  016701  177042             5.0          MOV     R1S,%1
3424  016624  016700  177042             5.0          MOV     R0S,%0
3425  016630  000137  020220             3.7          JMP     @#CLENUP1
3426
3427
3428
3429                                           ;DT END EXPECTED
3430
3431  016634                                   DTDONE:
3432  016634  032711  004040             5.3          BIT     #CHDEND!INFDSC,@TTP     ;CH END?
3433  016640  001045                     2.6          BNE     REQES                   ;YES - REQUEST STATUS
```

```
3434  016642  032711  000020          5.3          BIT     #CUDEND,@TTP            ;CU DATA END?
3435  016646  001413                  2.6          BEQ     DTERR                   ;NO - ERROR
3436  016650  062765  000004  000014  6.4          ADD     #4,     BUFC(W)         ;DECREMENT RESID COUNT
3437  016656  002036                  2.6          BGE     REQES                   ;IF OVERFLOW - DO ES
3438  016660  062765  000004  000012  6.4          ADD     #4,     BUFA(W)         ;BUMP BUFFER ADDRESS
3439  016666  016565  000002  000000  7.6          MOV     LREQ(W),REQ(W)          ;REQUEST NEXT DT
3440  016674  000207                  3.5          RTS     PC                      ;ALL DONE
3441
3442  016676  000000                  1.8  DTERR:  HALT                            ;ERROR ON DT
3443
3444                                       ;ES END EXPECTED
3445
3446  016700                            ESDONE:
3447  016700  032711  000002          5.3          BIT     #STKSTB,@TTP            ;STATUS STACKED?
3448  016704  001040                  2.6          BNE     REQUX                   ;YES - REQUEUE
3449  016706  005065  000002          4.9          CLR     LREQ(W)                 ;
3450  016712  005065  000000          4.9          CLR     REQ(W)                  ;
3451  016716  005065  000004          4.9          CLR     DEVSTA(W)               ;SET TO IDLE STATE
3452  016722  032711  000004          5.3          BIT     #CMDCHN,(TTP)
3453  016726  001403                  2.6          BEQ     ES1
3454  016730  012765  000003  000004  6.4          MOV     #CHAIN, DEVSTA(W)
3455  016736  004767  000110          7.0  ES1:    JSR     PC,     TSTCUE
3456  016742  000207                  3.5          RTS     PC
3457
3458                                       ;REQUEUE REQUEST
3459
3460  016744  016565  000002  000000  7.6  REQU:   MOV     LREQ(W),REQ(W)          ;REQUEUE
3461  016752  000207                  3.5          RTS     PC                      ;BACK TO DISPATCH
3462
3463                                       ;REQUEST ENDING STATUS
3464
3465  016754  012765  000014  000016  6.4  REQES:  MOV     #CE!DE, STS(W)          ;PUT IN DESIRED
3466  016762  012765  000003  000000  6.4  REQST:  MOV     #RSTS,  REQ(W)          ;REQUEST
3467  016770  012765  000003  000002  6.4          MOV     #RSTS,  LREQ(W)         ;STATUS
3468  016776  012765  000002  000004  6.4          MOV     #STA,   DEVSTA(W)       ;SET STATE
3469  017004  000207                  3.5          RTS     PC                      ;GET OUT
3470
3471                                       ;STACK STATUS
3472
3473  017006  005767  177212          4.4  REQUX:  TST     MODE                    ;2703 MODE?
3474  017012  001754                  2.6          BEQ     REQU                    ;YES - REQUEUE STATUS
3475  017014  012767  000001  177210  6.4          MOV     #CUES,  WAIT            ;SET WAIT FLAG AGAIN
3476  017022  000207                  3.5          RTS     PC
3477
3478                                       ;HIO RECEIVED
3479
3480  017024  026527  000004  000001  5.9  DXDSC:  CMP     DEVSTA(W),#DATA         ;COMMAND ACTIVE?
3481  017032  001750                  2.6          BEQ     REQES                   ;YES - DO ES
3482
3483  017034  026527  000004  000002  5.9          CMP     DEVSTA(W),#STA          ;STATUS REQUIRED?
3484  017042  001744                  2.6          BEQ     REQES                   ;YES - PRESENT IT
3485
3486  017044  004767  000002          7.0          JSR     PC,     TSTCUE          ;CHECK FOR CUE
3487  017050  000207                  3.5          RTS     PC                      ;AND RETURN
3488
3489                                       ;TEST FOR CUE REQUIRED
```

```
3490
3491  017052                                    TSTCUE:
3492
3493  017052  005767  177146          4.4       TST     MODE                    ;2703
3494  017056  001424                  2.6       BEQ     TSTX                    ;YES - NO CUE
3495
3496  017060  005765  000004          4.4       TST     DEVSTA(W)               ;DEVICE IDLE?
3497  017064  001021                  2.6       BNE     TSTX
3498
3499  017066  032777  000400  000306  7.7       BIT     #CUBSY, @DXCS           ;CU BUSY SET?
3500  017074  001415                  2.6       BEQ     TSTX
3501  017076  032777  000010  000272  7.7       BIT     #ISSREJ,@DXDS           ;ISS REJECTED?
3502  017104  001411                  2.6       BEQ     TSTX
3503
3504  017106  012765  000040  000016  6.4       MOV     #CUE,   STS(W)          ;SET STATUS
3505  017114  012765  000004  000000  6.4       MOV     #RCUE,  REQ(W)          ;AND REQUEST
3506  017122  012765  000004  000002  6.4       MOV     #RCUE,  LREQ(W)         ;
3507
3508  017130  000207                  3.5 TSTX: RTS     PC                      ;RETURN
3509
3510
3511                                            ;ISS HANDLER
3512
3513  017132                                    DXISS:
3514
3515                                            ;SET UP STATUS BYTE FROM INFO IN T/T
3516
3517  017132  005065  000016          4.9       CLR     STS(W)                  ;RESET TO START
3518  017136  032711  002000          5.3       BIT     #UCHKS, @TTP            ;UNIT CHECK?
3519  017142  001415                  2.6       BEQ     ISSH1                   ;
3520  017144  052765  000002  000016  6.4       BIS     #UC,    STS(W)          ;
3521  017152  005765  000006          4.4       TST     ONLF(W)                 ;DEVICE ONLINE?
3522  017156  001404                  2.6       BEQ     ISSH1A                  ;NO - SET INT REQ
3523  017160  052765  000200  000010  6.4       BIS     #CMDREJ,SNS(W)          ;SET COMMAND REJECT IN SENSE
3524  017166  000403                  2.6       BR      ISSH1                   ;GO ON
3525
3526  017170  052765  000100  000010  6.4 ISSH1A: BIS   #INTREQ,SNS(W)         ;SET INTERVENTION IN SENSE
3527
3528  017176  032711  001000          5.3 ISSH1: BIT    #CHENDS,@TTP            ;CHANNEL END?
3529  017202  001403                  2.6       BEQ     ISSH2                   ;
3530  017204  052765  000014  000016  6.4       BIS     #CE!DE, STS(W)          ;
3531
3532                                            ;IF STATUS NON-ZERO, HANDLE STACKED CASE
3533
3534  017212  005765  000016          4.4 ISSH2: TST    STS(W)                  ;STATUS ZERO?
3535  017216  001402                  2.6       BEQ     ISSH3                   ;YES - GO ON
3536  017220  000167  177454          4.9       JMP     ESDONE                  ;NO - DO ES
3537
3538                                            ;COMMAND ACCEPTED - HANDLE TIO, SENSE, READ, WRITE
3539
3540  017224  105761  000003          4.4 ISSH3: TSTB   CUCRT(TTP)             ;TIO?
3541  017230  001425                  2.6       BEQ     ISSHX                   ;YES - ALL DONE NOW
3542  017232  122761  000004  000003  5.9       CMPB    #SENSE, CUCRT(TTP)      ;SENSE?
3543  017240  001022                  2.6       BNE     ISSH4                   ;NO
3544
3545                                            ;HANDLE SENSE HERE
```

```
017242  012765  000001  000004    6.4           MOV     #DATA,  DEVSTA(W)       ;SET STATE
017250  012765  000010  000012    6.4           MOV     #SNS,   BUFA(W)         ;SET BA
017256  060565  000012            4.9           ADD     W,      BUFA(W)         ;
017262  012765  177777  000014    6.4           MOV     #-1,    BUFC(W)         ;SET BC
017270  012765  000002  000000    6.4           MOV     #ROUTP, REQ(W)          ;REQUEST OUTPUT
017276  012765  000002  000002    6.4           MOV     #ROUTP, LREQ(W)         ;
017304  000207                    3.5   ISSHX:  RTS     PC                      ;ALL DONE

                                        ;READ, WRITE

        000400                          ZFUB=256.
017306  005065  000010            4.9   ISSH4:  CLR     SNS(W)                  ;CLEAR SENSE
017312  012765  000001  000004    6.4           MOV     #DATA,  DEVSTA(W)       ;SET STATE
017320  012765  000020  000012    6.4           MOV     #DXBF,  BUFA(W)         ;SET BA
017326  060565  000012            4.9           ADD     W,      BUFA(W)         ;
017332  012765  177400  000014    6.4           MOV     #-ZFUB, BUFC(W)         ;SET BC
017340  132761  000001  000003    6.5           BITB    #1,     CUCRT(TTP)      ;WRITE?
017346  001404                    2.6           BEQ     ISSH5                   ;NO
017350  012765  000001  000000    6.4           MOV     #RINP,  REQ(W)          ;YES - REQUEST INPUT
017356  000403                    2.6           BR      ISSH6                   ;
017360  012765  000002  000000    6.4   ISSH5:  MOV     #ROUTP, REQ(W)          ;REQUEST OUTPUT
017366  016565  000000  000002    7.6   ISSH6:  MOV     REQ(W), LREQ(W)         ;
017374  000207                    3.5           RTS     PC                      ;ALL DONE


017376  176200                          DXDS:   176200                  ;DEVICE STATUS ->TT
017400  176202                          DXCA:   176202                  ;COMMAND AND ADDRESS ->TT
017402  176204                          DXCS:   176204                  ;CONTROL UNIT STATUS
017404  176206                          DXOS:   176206                  ;OFFSET AND STATUS
017406  176210                          DXBA:   176210                  ;BUS ADDRESS FOR NPR'S
017410  176212                          DXBC:   176212                  ;BYTE COUNT
017412  176214                          DXMO:   176214                  ;MAINTENANCE OUT
017414  176216                          DXMI:   176216                  ;MAINTENANCE IN
017416  176220                          DXCB:   176220                  ;CONTROL BITS
017420  176222                          DXND:   176222                  ;NPR DATA
017422  176224                          DXES:   176224                  ;EXTRA SIGNALS
017424  176226                          DXMOB:  176226                  ;MAINTENANCE OUT BUFFERED
017426  176230                          DXES1:  176230          ;EXTRA EXTRA SIGNALS

                                        ;LEGAL ADDRESS LIST

017430                                  DXLEGA:
017430  000020                          .WORD   20              ;PATCH PATCH CH ADRS HERE
017432  177777                          .WORD   -1
017434  177777                          .WORD   -1
017436  177777                          .WORD   -1
017440  177777                          .WORD   -1
017442  177777                          .WORD   -1
017444  177777                          .WORD   -1
017446  177777                          .WORD   -1
017450  177777                          .WORD   -1
017452  177777                          .WORD   -1
017454  177777                          .WORD   -1
017456  177777                          .WORD   -1
017460  177777                          .WORD   -1
```

```
3602  017462  177777                  .WORD   -1
3603  017464  177777                  .WORD   -1
3604  017466  177777                  .WORD   -1
3605  017470  177777                  .WORD   -1
3606
3607  017472                          SCALD.ADRS:
3608
3609  017472  000000                  .WORD   0
3610  017474  000000                  .WORD   0
3611  017476  000000                  .WORD   0
3612  017500  000000                  .WORD   0
3613  017502  000000                  .WORD   0
3614  017504  000000                  .WORD   0
3615  017506  000000                  .WORD   0
3616  017510  000000                  .WORD   0
3617  017512  000000                  .WORD   0
3618  017514  000000                  .WORD   0
3619  017516  000000                  .WORD   0
3620  017520  000000                  .WORD   0
3621  017522  000000                  .WORD   0
3622  017524  000000                  .WORD   0
3623  017526  000000                  .WORD   0
3624  017530  000000                  .WORD   0
3625
3626
3627                                  ;LIST OF DEFAULT COMMANDS
3628
3629  017532                          DFLT.CMD:
3630
3631  017532  000400                          TIOC                    ;TEST I/O COMMAND
3632  017534  000001                          WRITEC                  ;WRITE COMMAND
3633  017536  000002                          READC                   ;READ COMMAND
3634  017540  000403                          NOPC                    ;NOP COMMAND
3635  017542  000004                          SENSEC                  ;SENSE COMMAND
3636  017544  000405                          ILLC                    ;ILLAGAL COMMAND
3637  017546  177777                          -1                      ;LIST TERMINATOR
3638  017550  177777                          -1                      ;LIST TERMINATOR
3639  017552  177777                          -1                      ;LIST TERMINATOR
3640  017554  177777                          -1                      ;LIST TERMINATOR
3641  017556  177777                          -1                      ;LIST TERMINATOR
3642  017560  177777                          -1                      ;LIST TERMINATOR
3643  017562  177777                          -1                      ;LIST TERMINATOR
3644  017564  177777                          -1                      ;LIST TERMINATOR
3645  017566  177777                          -1                      ;LIST TERMINATOR
3646  017570  177777                          -1                      ;LIST TERMINATOR
3647
3648
3649  017572                          CMD.STAT:
3650  017572     000                          .BYTE   0
3651  017573     000                          .BYTE   0
3652  017574     000                          .BYTE   0
3653  017575     014                          .BYTE   CE!DE
3654  017576     000                          .BYTE   0
3655  017577     002                          .BYTE   UC
3656  017600     002                          .BYTE   UC
3657  017601     002                          .BYTE   UC
```

```
3658  017602  002                                   .BYTE   UC
3659  017603  002                                   .BYTE   UC
3660  017604  002                                   .BYTE   UC
3661  017605  002                                   .BYTE   UC
3662  017606  002                                   .BYTE   UC
3663  017607  002                                   .BYTE   UC
3664  017610  002                                   .BYTE   UC
3665  017611  002                                   .BYTE   UC
3666                                        ;DEFAULT STATUS LIST
3667
3668  017612                                DFLT.STAT:
3669  017612  000                                   .BYTE   0               ;TIO ACCEPT
3670  017613  000                                   .BYTE   0               ;WBITE ACCEPT
3671  017614  000                                   .BYTE   0               ;READ ACCEPT
3672  017615  014                                   .BYTE   CE!DE           ;NOP GETS IMMEDIATE END
3673  017616  000                                   .BYTE   0               ;SENSE ACCEPT
3674  017617  002                                   .BYTE   UC
3675  017620  002                                   .BYTE   UC
3676  017621  002                                   .BYTE   UC
3677  017622  002                                   .BYTE   UC
3678  017623  002                                   .BYTE   UC
3679  017624  002                                   .BYTE   UC
3680  017625  002                                   .BYTE   UC
3681  017626  002                                   .BYTE   UC
3682  017627  002                                   .BYTE   UC
3683  017630  002                                   .BYTE   UC
3684  017631  002                                   .BYTE   UC
3685
3686                                        ;DEVICE CONTROL TABLE (DCT) POINTER
3687
3688          000000                        N=0
3689  017632                                DCTP:
3690  017632  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3691          000001                        N=N+1
3692  017634  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3693          000002                        N=N+1
3694  017636  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3695          000003                        N=N+1
3696  017640  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3697          000004                        N=N+1
3698  017642  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3699          000005                        N=N+1
3700  017644  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3701          000006                        N=N+1
3702  017646  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3703          000007                        N=N+1
3704  017650  000000                        .WORD   0               ;POINTER TO DCT DEVICE 'N
3705          000010                        N=N+1
3706
3707
3708                                        ;DL11 C,D,E (ASYNCHRONOUS R/T) TRANSMITTER SERVICE ROUTINE
3709
3710  017652  010146          4.9   DL.XMT: MOV     R1,-(SP)        ;SAVE REGISTER 1 ON STACK
3711  017654  010246          4.9           MOV     R2,-(SP)        ;SAVE REGISTER 2 ON STACK
3712  017656  011501          3.8           MOV     (R5),R1
3713  017660  006301          2.3           ASL     R1              ;FORM MOD(2) INDEX
```

```
3714  017662  010102                    2.3          MOV     R1,R2           ;DUPLICATE LINE NUMBER
3715  017664  006302                    2.3          ASL     R2              ;FORM MOD10(8) INDEX
3716  017666  006302                    2.3          ASL     R2              ;
3717  017670  066702  182004            5.0          ADD     AD.DLX,R2       ;FORM DEVICE ADDRESS
3718  017674  105712                    3.2          TSTB    @R2             ;TEST FOR TRANS DONE INC TO BUFF
3719  017676  100407                    2.6          BMI     1$              ;YES
3720  017700  011203                    3.8          MOV     @R2,R3          ;IS DISPLAY
3721  017702  010304                    2.3          MOV     R3,R4           ;SHOULD BE
3722  017704  052704  000200            3.8          BIS     #BIT7,R4                ;XMIT READY
3723  017710  042704  174000            4.4          BIC     #174000,R4
3724                                                ;
3725                                                ;NOTE:
3726                                                ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3727                                                ;       FOR EXTENDED ERROR DISPLAY
3728                                                ;       BIT 07:(R4) ONLY SIGNIFICANT BIT (SHOULD BE)
3729                                                ;
3730                                                ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3731                                                ;
3732                                                ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3733                                                ;
3734  017714  104000                                        HLT                     ;NO REPORT ERROR
3735  017716  105261  020114            4.9  1$:     INCB    DLDATA(R1)      ;INCREMENT SAVE DATA
3736  017722  142761  000340  020114    7.0          BICB    #340,DLDATA(R1)
3737  017730  005722                    3.2  DLOUT:  TST     (R2)+           ;INC TO XMIT BUFF
3738  017732  116112  020114            6.4          MOVB    DLDATA(R1),(R2) ;TRANSMIT DATA
3739  017736  000167  000252            4.9          JMP     CLEANUP
3740
3741                                                ;DL11 C,D,E (ASCHRONOUS R/T) RECEIVER SERVICE ROUTINE
3742
3743  017742  010146                    4.9  DL.RCV: MOV     R1,-(SP)        ;SAVE REGISTER 1 ON STACK
3744  017744  010246                    4.9          MOV     R2,-(SP)        ;SAVE REGISTER 2 ON STACK
3745  017746  011501                    3.8          MOV     (R5),R1
3746  017750  006301                    2.3          ASL     R1              ;FORM MOD(2) INDEX
3747  017752  010102                    2.3          MOV     R1,R2           ;DUPLICATE LINE NUMBER
3748  017754  006302                    2.3          ASL     R2              ;FORM MOD10(8) INDEX
3749  017756  006302                    2.3          ASL     R2              ;
3750  017760  066702  161644            5.0          ADD     AD.DLC,R2       ;SET UP DEVICE CSR ADDRESS
3751  017764  105712                    3.2          TSTB    (R2)            ;DONE
3752  017766  100405                    2.6          BMI     2$              ;YES
3753  017770  011203                    3.8          MOV     @R2,R3          ;IS DISPLAY
3754  017772  010304                    2.3          MOV     R3,R4           ;SHOULD BE
3755  017774  052704  000200            3.8          BIS     #BIT7,R4                ;RECV DONE
3756                                                ;
3757                                                ;NOTE:
3758                                                ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3759                                                ;       FOR EXTENDED ERROR DISPLAY
3760                                                ;       BIT 07:(R4) ONLY SIGNIFICANT BIT (SHOULD BE)
3761                                                ;
3762                                                ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3763                                                ;
3764                                                ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3765                                                ;
3766  020000  104000                                        HLT                     ;NO, FALSE INTERRUPT
3767  020002  005722                    3.2  2$:     TST     (R2)+
3768  020004  005712                    3.2          TST     (R2)            ;ERROR BIT SET?
3769  020006  100005                    2.6          BPL     3$              ;NO
```

```
3770  020010  011203                    3.8          MOV     @R2,R3          ;IS DISPLAY
3771  020012  010304                    2.3          MOV     R3,R4           ;SHOULD BE
3772  020014  042704  174000            4.4          BIC     #174000,R4              ;ERROR BIT #15 SET
3773                                                ;
3774                                                ;NOTE:
3775                                                ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3776                                                ;       FOR EXTENDED ERROR DISPLAY
3777                                                ;       BIT 15:(R4) ONLY SIGNIFICANT BIT SHOULD BE
3778                                                ;
3779                                                ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3780                                                ;
3781                                                ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3782                                                ;
3783  020020  104000                                        HLT
3784
3785  020022  011267  000064            6.4  3$:     MOV     (R2),   DLSAVE  ;SAVE THE DATA
3786  020026  126761  000060  020115    7.1          CMPB    DLSAVE, DLDATA+1(R1) ;TEST THE DATA
3787  020034  001407                    2.6          BEQ     4$              ;BRANCH IF OK
3788  020036  116104  020115            5.0          MOVB    DLDATA+1(R1),R4         ;SHOULD BE
3789  020042  016703  000044            5.0          MOV     DLSAVE, R3      ;IS DISPLAY
3790  020046  042704  174000            4.4          BIC     #174000,R4
3791                                                ;
3792                                                ;NOTE:
3793                                                ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3794                                                ;       FOR EXTENDED ERROR DISPLAY
3795                                                ;       BITS 07:00:(R4) ONLY SIGNIFICANT BITS (SHOULD BE)
3796                                                ;
3797                                                ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3798                                                ;
3799                                                ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3800                                                ;
3801  020052  104000                                        HLT                     ;FALSE DATA
3802  020054  122761  000037  020115    5.9  4$:     CMPB    #37,DLDATA+1(R1)        ;UPPER DATA LIMIT FOR 5 BIT ASCII
3803  020062  001403                    2.6          BEQ     DLRX1           ;YEY
3804  020064  105261  020115            4.9          INCB    DLDATA+1(R1)    ;NO INCREMENT DATA
3805  020070  000403                    2.6          BR      DLRX2
3806  020072  112761  000000  020115    6.4  DLRX1:  MOVB    #0,DLDATA+1(R1) ;REINITIALIZE DATA
3807  020100  052761  001000  001342    6.4  DLRX2:  BIS     #FL.DLC,MAP(R1) ;SET FLAG TO INDICATE LINE SERVICED
3808  020106  000167  000102            4.9          JMP     CLEANUP
3809
3810  020112  000000                         DLSAVE: 0                       ;DATA SAVE
3811
3812                                                ;DL11 CSR AND DATA STORAGE
3813
3814
3815  020114                             DLDATA:
3816  020114  000000                                 0                       ;DL11 DATA, LINE 0
3817  020116  000000                                 0                       ;DL11 DATA, LINE 1
3818  020120  000000                                 0                       ;DL11 DATA, LINE 2
3819  020122  000000                                 0                       ;DL11 DATA, LINE 3
3820  020124  000000                                 0                       ;DL11 DATA, LINE 4
3821  020126  000000                                 0                       ;DL11 DATA, LINE 5
3822  020130  000000                                 0                       ;DL11 DATA, LINE 6
3823  020132  000000                                 0                       ;DL11 DATA, LINE 7
3824  020134  000000                                 0                       ;DL11 DATA, LINE 10
3825  020136  000000                                 0                       ;DL11 DATA, LINE 11
```

```
3826  020140  000000                          0                       ;DL11 DATA, LINE 12
3827  020142  000000                          0                       ;DL11 DATA, LINE 13
3828  020144  000000                          0                       ;DL11 DATA, LINE 14
3829  020146  000000                          0                       ;DL11 DATA, LINE 15
3830  020150  000000                          0                       ;DL11 DATA, LINE 16
3831  020152  000000                          0                       ;DL11 DATA, LINE 17
3832  020154  000000                          0                       ;DL11 DATA, LINE 20
3833  020156  000000                          0                       ;DL11 DATA, LINE 21
3834  020160  000000                          0                       ;DL11 DATA, LINE 22
3835  020162  000000                          0                       ;DL11 DATA, LINE 23
3836  020164  000000                          0                       ;DL11 DATA, LINE 24
3837  020166  000000                          0                       ;DL11 DATA, LINE 25
3838  020170  000000                          0                       ;DL11 DATA, LINE 26
3839  020172  000000                          0                       ;DL11 DATA, LINE 27
3840  020174  000000                          0                       ;DL11 DATA, LINE 30
3841  020176  000000                          0                       ;DL11 DATA, LINE 31
3842  020200  000000                          0                       ;DL11 DATA, LINE 32
3843  020202  000000                          0                       ;DL11 DATA, LINE 33
3844  020204  000000                          0                       ;DL11 DATA, LINE 34
3845  020206  000000                          0                       ;DL11 DATA, LINE 35
3846  020210  000000                          0                       ;DL11 DATA, LINE 36
3847  020212  000000                          0                       ;DL11 DATA, LINE 37
3848
3849  020214  012602                3.8  CLEANUP: MOV     (SP)+,R2
3850  020216  012601                3.8          MOV     (SP)+,R1
3851  020220  012605                3.8  CLENUP1: MOV     (SP)+,R5
3852
3853
3854
3855  020222  000002                4.8          RTI
                                          ;DJ11 (ASYNCHRONOUS) TRANSMITTER SERVICE ROUTINE
3857
3858  020224  010146                4.9  DJ.XMT: MOV     R1,     -(SP)   ;SAVE
3859  020226  010246                4.9          MOV     R2,     -(SP)   ;REGISTERS
3860  020230  010346                4.9          MOV     R3,     -(SP)   ;ON
3861  020232  010446                4.9          MOV     R4,     -(SP)   ;STACK
3862
3863  020234  011501                3.8          MOV     (R5),   R1      ;FECTH DEVICE # >R1
3864
3865  020236  010102                2.3          MOV     R1,     R2      ;
3866
3867  020240  006302                2.3          ASL     R2              ;FORM
3868  020242  006302                2.3          ASL     R2              ;MOD10 (8)
3869  020244  006302                2.3          ASL     R2              ;OFFSET >R2
3870
3871  020246  010203                2.3          MOV     R2,     R3      ;RECORD
3872
3873  020250  006303                2.3          ASL     R3              ;SCALE MOD20 (16)
3874
3875
3876  020252  066702  161354        5.0          ADD     AD.DJ,  R2      ;FORM DEVICE BASE ADDRESS
3877
3878
3879  020256  005712                3.2          TST     (R2)            ;TEST XMIT READY CSR BIT 15
3880
3881  020260  100407                2.6          BMI     1$              ;OK BRANCHES
```

```

                                                      *******
020262  011203                   3.8  ;         MOV   (R2),    R3      ;IS DISPLAY
020264  010304                   2.3            MOV   R3,      R4      ;SHOULD BE
020266  042704  074000           4.4            BIC   #74000,R4

020272  052704  100000           3.8            BIS   #100000,R4       ;READY BIT 15


                                      ;NOTE:
                                      ;         MODIFY HLT TO HLT+4 IE (104000=104004)
                                      ;         FOR EXTENDED ERROR DISPLAY
                                      ;         BIT 15:(R4) ONLY SIGNIFICANT BIT SHOULD BE
                                      ;
                                      ;         PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
                                      ;
                                      ;         (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
                                      ;
020276  104000                                  HLT                    ;ERROR XMIT READY BIT 15 FAILURE

020300  116204  000007           5.0  1$:       MOVB  7(R2),   R4      ;FETCH XMIT BUFFER LINE REQUEST FIELD
020304  060304                   2.3            ADD   R3,      R4      ;COMBINE OFFSET AND LINE #
020306  006304                   2.3            ASL   R4               ;SCALE MOD20(16) XMIT CHARACTER OFFSET
020310  016462  030420  000006   7.6            MOV   DJ.XTBL(R4),6(R2);TRANSMIT DATA CHARACTER ON CURRENT LINE
020316  105264  030420           4.9            INCB  DJ.XTBL(R4)      ;ADVANCE TO NEXT CHARACTER
020322  042764  000340  030420   7.0            BIC   #340,DJ.XTBL(R4);MASK TO LEVEL 5
                                      ;NOTE
                                      ;         FOR HIGHER DATA LEVEL VERIFICATION
                                      ;         MODIFY #340 ENTRY TO THE FOLLOWING:
                                      ;         #300 = 6 LEVEL CODE
                                      ;         #200 = 7 LEVEL CODE
                                      ;         #400 = 8 LEVEL CODE
                                      ;
                                      ;         BIC   #340,DJ.EXP(R4) IN DJ.RCV HAS TO BE MODIFIED ALSO.
020330  005267  000172           4.9            INC   DJ.XTLY          ;ADVANCE DJ XMIT CHARACTER TALLY
020334  005712                   3.2            TST   (R2)                     ;TEST ADDITIONAL ACTIVITY
020336  100760                   2.6            BMI   1$               ;YES SERVICE ADDITIONAL LINES

020340  000167  000146           4.9            JMP   CLENDJ           ;NO RESTORE REGISTERS AND EXIT


                                      ;



                                      ;DJ11 (ASYNCHRONOUS) RECEIVER SERVICE ROUTINE

020344  010146                   4.9  DJ.RCV:   MOV   R1,      -(SP)   ;SAVE
020346  010246                   4.9            MOV   R2,      -(SP)   ;REGISTERS
020350  010346                   4.9            MOV   R3,      -(SP)   ;ON
020352  010446                   4.9            MOV   R4,      -(SP)   ;STACK

020354  011501                   3.8            MOV   (R5),    R1      ;FETCH DEVICE # >R1

020356  006301                   2.3            ASL   R1
020360  010102                   2.3            MOV   R1,R2
020362  006302                   2.3            ASL   R2               ;MOD10 (8)
020364  006302                   2.3            ASL   R2               ;OFFSET >R2
```

```
3938
3939
3940  020366  010267  000140          4.9          MOV     R2,DJ.TEMP      ;RECORD MOD10 OFFSET
3941  020372  006367  000134          4.9          ASL     DJ.TEMP         ;OFFSET
3942  020376  066702  161230          5.0          ADD     AD.DJ,  R2      ;FORM DEVICE BASE ADDRESS
3943
3944  020402  011203                  3.8          MOV     (R2),   R3      ;RECORD CSR (IS)
3945  020404  105703                  2.3          TSTB    R3              ;TEST DONE (RCV)
3946
3947  020406  100405                  2.6          BMI     1$              ;OK BRANCHES
3948
3949  020410  010304                  2.3          MOV     R3,     R4      ;MOVE IS TO
3950  020412  052704  000200          3.8          BIS     #200,   R4      ;SHOULD BE DONE BIT 7
3951  020416  006201                  2.3          ASR     R1
3952
3953                                               ;NOTE:
3954                                               ;
3955                                               ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3956                                               ;       FOR EXTENDED ERROR DISPLAY
3957                                               ;       BIT 07:(R4) ONLY SIGNIFICANT BIT (SHOULD BE)
3958                                               ;
3959                                               ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3960                                               ;
3961                                               ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3962                                               ;
3963  020420  104000                                       HLT                             ;ERROR DONE BIT 7 FAILURE
3964
3965  020422  016203  000002          5.0  1$:     MOV     2(R2),  R3      ;RECORD RECEIVED DATA WORD >R3
3966
3967  020426  010304                  2.3          MOV     R3,     R4
3968  020430  000304                  2.3          SWAB    R4              ;LINE AND STATUS TO LOW BYTE
3969  020432  042704  177760          4.4          BIC     #177760,R4      ;EXTRACT LINE #
3970
3971  020436  066704  000070          5.0          ADD     DJ.TEMP,R4      ;COMBINE OFFSET (MOD10 + LINE#)
3972  020442  006304                  2.3          ASL     R4              ;SCALE MOD20(16) TO RECV TABLE DEPTH
3973  020444  020364  031022          4.4          CMP     R3,DJ.EXP(R4)   ;DATA COMPARE IS WITH SHOULD BE
3974  020450  001404                  2.6          BEQ     2$              ;OK BRANCHES
3975
3976  020452  016404  031022          5.0          MOV     DJ.EXP(R4),R4   ;FETCH SHOULD BE
3977  020456  006201                  2.3          ASR     R1
3978
3979                                               ;
3980                                               ;NOTE:
3981                                               ;       MODIFY HLT TO HLT+4 IE (104000=104004)
3982                                               ;       FOR EXTENDED ERROR DISPLAY
3983                                               ;
3984                                               ;       PC      PS      SP      UNIT    DEVADR  WAS     SHOULD BE
3985                                               ;
3986                                               ;       (R7)    (PSW)   (R6)    (R1)    (R2)    (R3)    (R4)
3987                                               ;
3988  020460  104000                                       HLT                             ;ERROR DATA COMPARE FAILURE
3989
3990  020462  105264  031022          4.9  2$:     INCB    DJ.EXP(R4)      ;ADVANCE EXPECTED TABLE ENTRY TO NEXT CHARACTER
3991  020466  142764  000340  031022  7.0          BICB    #340,DJ.EXP(R4) ;MASK TO LEVEL 5
3992  020474  005267  000030          4.9          INC     DJ.RTLY         ;ADVANCE CHARACTER RECEIVED TALLY
3993  020500  105712                  3.2          TSTB    (R2)            ;TEST ADDITIONAL LINE ACTIVITY
```

```
3994
3995  020502  100747                    2.6          BMI     1$              ;YES SERVICE ADDITIONAL LINES
3996
3997  020504  052761  004000  001342    6.4          BIS     #FL.DJ, MAP(R1) ;SET FLAG
3998
3999  020512  012604                    3.8  CLENDJ: MOV     (SP)+,  R4      ;RESTORE
4000  020514  012603                    3.8          MOV     (SP)+,  R3      ;REGISTERS
4001  020516  012602                    3.8          MOV     (SP)+,  R2      ;FROM
4002  020520  012601                    3.8          MOV     (SP)+,  R1      ;STACK
4003  020522  012605                    3.8          MOV     (SP)+,  R5      ;
4004
4005  020524  000002                    4.8          RTI                     ;EXIT
4006
4007                                          ;
4008
4009  020526  000000                        DJ.XTLY:        0               ;TRANSMITTED CHARACTER TALLY
4010  020530  000000                        DJ.RTLY:        0               ;RECEIVER  CHARACTER TALLY
4011  020532  000000                        DJ.TEMP:        0               ;WORK STORAGE
4012
```

```
4013
4014                                        ;CONSOL TELETYPE PUNCH SERVICE ROUTINE
4015
4016  020534  032777  000200  002254  7.7  CTYP:   BIT     #BIT7,@CTPS     ;DONE?
4017  020542  001001                  2.6          BNE     .+4             ;YES
4018  020544  104000                               HLT                     ;NO,REPORT FALSE INTERRUPT
4019  020546  105267  000040          4.9          INCB    CTPDAT          ;INC TRANSMIT DATA
4020  020552  122767  000147  000032  5.9          CMPB    #147,CTPDAT     ;TEST FOR UPPER LIMIT
4021  020560  001002                  2.6          BNE     CTP1
4022  020562  105067  000024          4.9          CLRB    CTPDAT          ;REINITIALIZE XMIT DATA
4023  020566  116777  000020  002224  8.8  CTP1:   MOVB    CTPDAT,@CTPB    ;TRANSMIT DATA
4024  020574  052767  000001  160502  6.4          BIS     #FL.ANC,RU.MAP
4025  020602  052767  000001  160476  6.4          BIS     #FL.CTY,RU.ANC
4026  020610  000002                  4.8          RTI                     ;RETURN
4027
4028  020612  000000                       CTPDAT: 0                       ;TRANSMIT DATA
4029
4030
4031                                        ;CONSOL TELETYPE READER SERVICE ROUTINE
4032
4033  020614  032777  000200  002170  7.7  CTYR:   BIT     #BIT7,@CTKS             ;DONE?
4034  020622  001001                  2.6          BNE     .+4             ;YES
4035  020624  104000                               HLT                     ;NO,REPORT FALSE INTERRUPT
4036  020626  105777  002162          5.6          TSTB    @CTKB           ;TEST FOR LEADER
4037  020632  001421                  2.6          BEQ     CTYR4           ;BRANCH IF LEADER
4038  020634  127767  002154  000060  8.3          CMPB    @CTKB,CTKDAT    ;NOT LEADER TEST FOR DATA
4039  020642  001413                  2.6          BEQ     CTYR3           ;BRANCH IF DATA
4040  020644  017767  002144  000052  8.8          MOV     @CTKB,  CTKRCV  ;RECORD CHARACTER
4041  020652  042767  000200  000044  7.0          BIC     #200,   CTKRCV  ;MASK OFF 8TH BIT
4042  020660  122777  000007  002126  7.1          CMPB    #7,@CTKB        ;NOT DATA, TEST FOR BELL
4043  020666  001412                  2.6          BEQ     CTYR2           ;BRANCH IF BELL
4044  020670  104000                               HLT                     ;NONE OF ABOVE,REPORT ERROR
4045  020672  105267  000024          4.9  CTYR3:  INCB    CTKDAT          ;INC DATA
4046  020676  122767  000147  000016  5.9  CTYR4:  CMPB    #147,CTKDAT     ;TEST FOR UPPER LIMIT
4047  020704  001003                  2.6          BNE     CTYR2
4048  020706  112767  000001  000006  6.4          MOVB    #1,CTKDAT       ;REINIT RCV DATA
4049  020714  005277  002072          6.1  CTYR2:  INC     @CTKS           ;START READER
4050  020720  000002                  4.8          RTI
4051
4052  020722  000001                       CTKDAT: 1                       ;RCV DATA
4053
4054  020724  000000                       CTKRCV: 0                       ;RCV DATA RECORDED
4055                                        ;*****************************************************************************
4056
4057                                        ;LINE PRINTER TEST SECTION
4058                                        ;HARDWARE REGISTERS
4059
4060  020726  177514                       LPS:    177514                  ;LINE PRINTER STATUS
4061                                                                        ;BIT15=ERROR
4062                                                                        ;BIT7=READY
4063                                                                        ;BIT6=INTERRUPT ENABLE
4064  020730  177516                       LPB:    177516                  ;DATA BUFFER REGISTER
4065                                                                        ;BITS 0-6=7 BIT ASCII CHARACTER
4066                                        ;MEMORY LOCATIONS USED AS FLAGS AND COUNTERS
4067  020732  000120                       LPSIZE: 120                     ;MAXIMUM LINE LENGTH IN CHARACTERS
4068  020734  000120                       LINGTH: 120                     ;NUMBER OF CHARACTERS PER LINE
```

```
4069  020736  000120                    CHRLIN: 120                     ;LINE LENGTH IN CHARACTERS
4070  020740  020040                    CARGEN: 40                      ;CHARACTER GENERATOR
4071
4072                                    ;LPVEC. LINE PRINTER INTERRUPT SERVICE ROUTINE
4073
4074  020742  005777  177760      5.6  LPVECT: TST     @LPS            ;ERROR
4075  020746  100001            2.6          BPL     .+4             ;NO
4076  020750  104000                         HLT                     ;YES, REPORT ERROR
4077  020752  105777  177750      5.6          TSTB    @LPS            ;READY
4078  020756  100401            2.6          BMI     .+4             ;YES
4079  020760  104000                         HLT                     ;NO
4080  020762  005267  177752      4.9  LP0:    INC     CARGEN          ;GENERATE NEXT CHARACTER
4081  020766  022767  000140  177744  5.9          CMP     #140,   CARGEN  ;64 CHARACTER LINE PRINTER
4082  020774  001003            2.6          BNE     LP1
4083  020776  012767  000040  177734  6.4          MOV     #40,    CARGEN  ;RE-INITIALIZE CHARACTER GENERATOR
4084  021004  005367  177726      4.9  LP1:    DEC     CHRLIN          ;COUNT CHARACTERS
4085  021010  001015            2.6          BNE     LP2             ;BRANCH IF NOT AT LINE'S END
4086  021012  012777  000012  177710  7.6          MOV     #12,    @LPB    ;YES, LINE FEED
4087  021020  005367  177710      4.9          DEC     LINGTH          ;END OF WEDGE
4089  021024  001003            2.6          BNE     LP3             ;NO
4089  021026  016767  177700  177700  7.6          MOV     LPSIZE, LINGTH  ;YES, REINITIALIZE LINE LENGHT
4090  021034  016767  177674  177674  7.6  LP3:    MOV     LINGTH, CHRLIN  ;DECREASE # OF CHAR PER LINE
4091  021042  000002            4.8          RTI
4092
4093  021044  016777  177670  177656  8.8  LP2:    MOV     CARGEN, @LPB    ;TRANSMIT CHARACTER
4094  021052  052767  000001  160224  6.4          BIS     #FL.ANC,RU.MAP
4095  021060  052767  000002  160220  6.4          BIS     #FL.LP,RU.ANC
4096  021066  000002            4.8          RTI
4097                                    ;TC11 DECTAPE EXERCISER
4098
4099                                    ;CONTROL REGISTER ADDRESSES
4100
4101  021070  177342                    TCCM:   177342                  ;TC COMMAND REGISTER
4102  021072  177340                    TCST:   177340                  ;TC STATUS REGISTER
4103  021074  177350                    TCDT:   177350                  ;TC DATA REGISTER
4104  021076  177344                    TCWC:   177344                  ;TC WORD COUNT
4105  021100  177346                    TCBA:   177346                  ;TC BUS ADDRESS
4106                                    ;CONSTANTS FOR FUNCTION CODE
4107  021102  000214                    TCIV:   214                     ;TC INTERRUPT VECTOR
4108  021104  000216                    TCPRT:  216
4109  021106  000000                    UNIT:   0                       ;UNIT SELECT CODE
4110
4111  021110  000000                    TCMSK:  0
4112  021112  000000                    TCFIRST:0                       ;FIRST BLOCK TO BE SEARCHED
4113  021114  001101                    TCLAST: 1101                    ;LASTED BLOCK SEARCHED FOR
4114  021116  000000                    TCBLK:  0                       ;CURRENT BLOCK FOUND
4115  021120  000000                    TCEXPT: 0                       ;EXPECTED BLOCK
4116  021122  000000                    SEGCNT: 0
4117  021124  000101                    SAT:    101                     ;DO,STOP ALL TRANSPORTS
4118  021126  000103                    RNUM:   103                     ;DO,READ BLOCK NUMBER
4119  021130  000105                    RDAT:   105                     ;DO,READ DATA
4120  021132  000107                    RALL:   107                     ;DO,READ ALL
4121  021134  000113                    WRTM:   113                     ;DO,WRITE TIMING AND MARK TRACK
4122  021136  000115                    WDATA:  115                     ;DO,WRITE DATA
4123  021140  004103                    REVRN:  4103
4124
```

```
021142  012777  021142  177732   7.6  FENDZ:  MOV   #FENDZ,@TCIV      ;VECTOR=FIND END ZONE
021150  005777  177716           5.6          TST   @TCST             ;TEST FOR END ZONE
021154  100404                   2.6          BMI   FEND1
021156  005277  177706           6.1          INC   @TCCM             ;SET DO
021162  000167  000464           4.9          JMP   TCRTI             ;NO, WAIT

021166  012777  021220  177706   7.6  FEND1:  MOV   #TCF1,@TCIV       ;INT VECTOR=READ ALL BLOCK #
021174  042777  104000  177666   8.2          BIC   #104000,@TCCM     ;CLEAR ERROR AND REVERSE BIT
021202  016767  177704  177710   7.6          MOV   TCFIRST,TCEXPT    ;INIT EXPECTED BLOCK
021210  105277  177654           6.1  TCF1A:  INCB  @TCCM             ;DO
021214  000167  000432           4.9          JMP   TCRTI

021220  032777  100200  177642   7.7  TCF1:   BIT   #100200,@TCCM     ;ANY ERROR ON READ
021226  100001                   2.6          BPL   .+4
021230  104000                                HLT                     ;PRINT ERROR
021232  001001                   2.6          BNE   .+4               ;READY
021234  104000                                HLT                     ;PRINT ERROR
021236  027767  177632  177654   8.3          CMP   @TCDT,TCEXPT      ;TEST FOR CORRECT BLOCK #
021244  002761                   2.6          BLT   TCF1A             ;IF BLK # LOWER THAN EXPECTED
021246  001401                   2.6          BEQ   TCF2              ;NO, IS BLK #=EXPECTED
021250  104000                                HLT                     ;NO, WE MISSED BLK #

021252  012777  021270  177622   7.6  TCF2:   MOV   #TCF3,@TCIV       ;VECTOR FOR SEQUENTIAL READS
021260  105277  177604           6.1          INCB  @TCCM             ;DO
021264  000167  000362           4.9          JMP   TCRTI

021270  032777  100200  177572   7.7  TCF3:   BIT   #100200,@TCCM     ;TEST ERROR AND READY
021276  100001                   2.6          BPL   .+4
021300  104000                                HLT                     ;PRINT FORWARD READ ERROR
021302  001001                   2.6          BNE   .+4
021304  104000                                HLT                     ;FALSE READ
021306  027767  177562  177600   8.3          CMP   @TCDT,TCLAST      ;HAVE ALL BLOCK #'S BEEN READ
021314  001410                   2.6          BEQ   RENDZ             ;YES, DRIVE UNIT IN END ZONE
021316  005267  177576           4.9          INC   TCEXPT            ;NO, INC BLOCK #
021322  027767  177546  177570   8.3          CMP   @TCDT,TCEXPT      ;IS CURRENT BLOCK CORRECT
021330  001401                   2.6          BEQ   .+4
021332  104000                                HLT
021334  000423                   2.6          BR    TCWBK             ;TCWBK, WRITES 1 BLOCK

                                      ;MOVE TAPE TO REVERSE
021336  012777  021336  177536   7.6  RENDZ:  MOV   #RENDZ,@TCIV      ;VECTOR=REVERSE END ZONE
021344  016767  177544  177546   7.6          MOV   TCLAST,TCEXPT     ;INIT FOR REVERSE SEARCH
021352  005777  177514           5.6          TST   @TCST
021356  100403                   2.6          BMI   REND1             ;YES, CHANGE TAPE DIRECTION
021360  005277  177504           6.1          INC   @TCCM             ;DO
021364  000532                   2.6          BR    TCRTI
021366  016777  177546  177474   8.8  REND1:  MOV   REVRN,@TCCM       ;REVERSE AND READ BLOCK #,DO
021374  012777  021454  177500   7.6          MOV   #TCR1,@TCIV       ;SET UP NEW INTERRUPT VECTRO
021402  000523                   2.6          BR    TCRTI

                                      ;WRITE FORWARD ALL BLOCKS EXCEPT 0

021404  012777  021436  177470   7.6  TCWBK:  MOV   #TCWB1,@TCIV      ;INTERRUPT VECTOR POINTS TO WRITE
021412  012777  177400  177456   7.6          MOV   #-400,@TCWC       ;WORD COUNT=1BLOCK OF DATA
021420  012777  024234  177452   7.6          MOV   #BUFF,@TCBA       ;INITIALIZE BUS ADDRESS
021426  116777  177504  177434   8.8          MOVB  WDATA,@TCCM       ;WRITE DATA
```

```
 4181  021434  000506                    2.6          BR      TCRTI
 4182  021436  012777  021270  177436    7.6  TCWB1:  MOV     #TCF3,@TCIV     ;SEARCH FOR NEXT BLOCK #
 4183  021444  116777  177456  177416    8.8          MOVB    RNUM,@TCCM      ;READ BLOCK #
 4184  021452  000477                    2.6          BR      TCRTI
 4185
 4186                                               ;READ REVERSE ALL BLOCKS
 4187
 4188  021454  032777  100200  177406    7.7  TCR1:   BIT     #100200,@TCCM   ;TEST ERROR, READY
 4189  021462  100001                    2.6          BPL     .+4
 4190  021464  104000                                 HLT                     ;ERROR ON READ BLOCK REVERSE
 4191  021466  001001                    2.6          BNE     .+4
 4192  021470  104000                                 HLT                     ;FALSE INTERRUPT
 4193  021472  027767  177376  177420    8.3          CMP     @TCDT,TCEXPT    ;IS BLOCK # CORRECT
 4194  021500  001406                    2.6          BEQ     TCR2            ;YES
 4195  021502  002002                    2.6          BGE     TCR1A           ;NO, HAVE WE PASSED THE BLOCK
 4196  021504  104000                                 HLT                     ;YES
 4197  021506  000713                    2.6          BR      RENDZ           ;FIND END ZONE AND RESTART
 4198  021510  005277  177354            6.1  TCR1A:  INC     @TCCM
 4199  021514  000456                    2.6          BR      TCRTI
 4200  021516  012777  021532  177356    7.6  TCR2:   MOV     #TCR3,@TCIV     ;TEST BLOCK # ON INTERRUPT
 4201  021524  105277  177340            6.1          INCB    @TCCM
 4202  021530  000450                    2.6          BR      TCRTI
 4203
 4204                                               ;FIND SEQUENTIAL BLOCKS IN REVERSE DIRECTION
 4205
 4206  021532  032777  100200  177330    7.7  TCR3:   BIT     #100200,@TCCM   ;TEST ERROR, READY
 4207  021540  100001                    2.6          BPL     .+4
 4208  021542  104000                                 HLT                     ;ERROR, REVERSE READ
 4209
 4210  021544  001001                    2.6          BNE     .+4
 4211  021546  104000                                 HLT                     ;FALSE INTERRUPT
 4212  021550  026777  177336  177316    8.3          CMP     TCFIRST,@TCDT   ;HAVE ALL BLOCK #'S BEEN READ
 4213  021556  001002                    2.6          BNE     TCR4
 4214  021560  000167  177356            4.9          JMP     FENDZ           ;YES, ENTER FORWARD END ZONE, RESTART
 4215  021564  005367  177330            4.9  TCR4:   DEC     TCEXPT          ;NO, DEC BLOCK #
 4216  021570  027767  177300  177322    8.3          CMP     @TCDT,TCEXPT
 4217  021576  001401                    2.6          BEQ     .+4
 4218  021600  104000                                 HLT
 4219  021602  000400                    2.6          BR      TCRBK           ;READ A BLOCK
 4220
 4221                                               ;READ DATA REVERSE ALL BLOCKS EXCEPT FIRST AND LAST
 4222  021604  012777  021636  177270    7.6  TCRBK:  MOV     #TCRB1,@TCIV    ;READ ON INTERRUPT
 4223  021612  012777  177400  177256    7.6          MOV     #-400,@TCWC     ;1 BLOCK OF WORDS
 4224  021620  012777  026234  177252    7.6          MOV     #INBFTC,@TCBA   ;INIT READ BUFFER
 4225  021626  116777  177276  177234    8.8          MOVB    RDAT,@TCCM      ;READ DATA
 4226  021634  000406                    2.6          BR      TCRTI
 4227  021636  012777  021532  177236    7.6  TCRB1:  MOV     #TCR3,@TCIV     ;BLOCK SEARCH
 4228  021644  116777  177256  177216    8.8          MOVB    RNUM,@TCCM      ;READ NUMBER
 4229  021652  052767  000001  157424    6.4  TCRTI:  BIS     #FL.ANC,RU.MAP
 4230  021660  052767  000004  157420    6.4          BIS     #FL.TC, RU.ANC
 4231  021666  000002                    4.8          RTI
 4232
 4233                                               ;RF11 DISK EXERCISER SECTION
 4234
 4235  021670  177460                               DCS:    177460          ;DISK CONTROL REGISTER
 4236  021672  177462                               WC:     177462          ;WORD COUNT REGISTER
```

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 4237  021674  177464                          CMA:    177464                  ;CURRENT MEMORY ADDRESS REGISTER
 4238  021676  177466                          DAR:    177466                  ;DSK ADRS REG (LOW 16 BITS)
 4239  021700  177470                          DAE:    177470                  ;DSK ADRS EXT AND ERR REGISTER
 4240  021702  177472                          DBR:    177472                  ;DATA BUFFER REGISTER
 4241  021704  177474                          MAR:    177474                  ;MAINTENANCE REGISTER
 4242  021706  177476                          ADS:    177476                  ;ADRS OF DSK SEGMENT REG
 4243  021710  000000                          SERV:   0                       ;SERVICE QUEUE
 4244  021712  000000                          LOWADR: 0                       ;LSB'S OF RF11 DISK ADDRESS
 4245  021714  000000                          UPADRS: 0                       ;MSB'S OF RF11 DISK ADDRESS
 4246  021716  000003                                  RFLIM:  3               ;UPPER LIMIT, 256K FOR ONE DISK
 4247
 4248                                                  ;
 4249                                                  ;DISK ADDRESS EXTENTION BITS
 4250                                                  ;BIT0=TA05              ;TRACK ADRS BIT5
 4251                                                  ;BIT1=TA06
 4252                                                  ;BIT2=DA00              ;DISK ADRS BIT00
 4253                                                  ;BIT3=DA01
 4254                                                  ;BIT4=DA02
 4255                                                  ;BIT5=DA03
 4256                                                  ;
 4257                                                  ;
 4258                                                  ;RF11 INTERRUPT ENTRY POINT
 4259                                                  ;DETERMINE FUNCTION TO PERFORM.
 4260                                                  ;WRITE, WRITE CHEC, READ
 4261                                                  ;
 4262
 4263  021720  005767  177764                  4.4  RFISR:  TST     SERV
 4264  021724  001412                          2.6          BEQ     WRITE
 4265  021726  032767  000001  177754          6.5          BIT     #1,SERV
 4266  021734  001054                          2.6          BNE     WRTCHK
 4267  021736  032767  000002  177744          6.5          BIT     #2,SERV
 4268  021744  001116                          2.6          BNE     READ
 4269  021746  104000                                       HLT                     ;DISK EMULATOR
 4270  021750  000000                          1.8          HALT
 4271                                                  ;
 4272                                                  ;WRITE 256 WORDS ON DISK
 4273                                                  ;
 4274
 4275  021752  005777  177712                  5.6  WRITE:  TST     @DCS            ;ERROR
 4276  021756  100001                          2.6          BPL     .+4             ;NO, SERVICE INTERRUPT
 4277  021760  104000                                       HLT                     ;YES, REPORT ERROR
 4278  021762  052777  000400  177700          7.6          BIS     #400,@DCS       ;BIT8, DISK CLEAR
 4279  021770  012777  024234  177676          7.6          MOV     #BUFF,@CMA      ;INITIALIZE CURRENT ADDRESS
 4280  021776  012777  177400  177666          7.6          MOV     #-400,@WC       ;WORD COUNT = 400(8)
 4281  022004  016777  177702  177664          8.8          MOV     LOWADR,@DAR     ;INIT DSK ADRS (16 LOW BITS)
 4282  022012  016777  177676  177660          8.8          MOV     UPADRS,@DAE     ;INIT DSK ADRS (EXT)
 4283  022020  052777  000103  177642          7.6          BIS     #103,@DCS       ;INT ENB, WRITE, GO
 4284  022026  062767  000430  177656          6.4          ADD     #430,LOWADR     ;INC DISK ADRS BY 430
 4285  022034  005567  177654                  4.9          ADC     UPADRS          ;ADD CARRY TO MSB'S
 4286  022040  026767  177652  177646          7.1          CMP     RFLIM,UPADRS    ;TEST FOR UPPER LIMIT, 256K
 4287  022046  001122                          2.6          BNE     RFRTI           ;NO, RTI
 4288  022050  005067  177636                  4.9          CLR     LOWADR          ;YES, CLEAR ADDRESS
 4289  022054  005267  177630                  4.9          INC     SERV            ;INC SERVICE COUNT TO NEXT FUNCTION
 4290  022060  005067  177630                  4.9          CLR     UPADRS          ;YES.
 4291  022064  000513                          2.6          BR      RFRTI
 4292                                                  ;
```

```
4293                                                    ;WRITE CHECK 256 WORDS ON DSK
4294                                                    ;
4295
4296  022066  005777  177576          5.6  WRTCHK: TST     @DCS            ;ERROR
4297  022072  100001                   2.6          BPL     .+4             ;NO
4298  022074  104000                               HLT                     ;YES, REPORT ERROR
4299  022076  052777  000400  177564   7.6          BIS     #400,@DCS       ;DISK CLEAR
4300  022104  012777  024234  177562   7.6          MOV     #BUFF,@CMA      ;INITIALIZE CURRENT ADDRESS
4301  022112  012777  177400  177552   7.6          MOV     #-400,@WC       ;WORD COUNT = 400(8)
4302  022120  016777  177566  177550   8.8          MOV     LOWADR,@DAR
4303  022126  016777  177562  177544   8.8          MOV     UPADRS,@DAE
4304  022134  052777  000107  177526   7.6          BIS     #107,@DCS       ;INT ENB, WRITE CHECK, GO
4305  022142  062767  000430  177542   6.4          ADD     #430,LOWADR     ;INC DISK ADRS BY 430
4306  022150  005567  177540           4.9          ADC     UPADRS          ;ADD CARRY TO MSB'S
4307  022154  026767  177536  177532   7.1          CMP     RFLIM,UPADRS    ;TEST FOR UPPER LIMIT, 256K
4308  022162  001054                   2.6          BNE     RFRTI           ;NO, RTI
4309  022164  005067  177522           4.9          CLR     LOWADR          ;YES, CLEAR ADDRESS
4310  022170  005267  177514           4.9          INC     SERV            ;INC SERVICE COUNT TO NEXT FUNCTION
4311  022174  005067  177514           4.9          CLR     UPADRS          ;YES,
4312  022200  000445                   2.6          BR      RFRTI
4313                                                    ;
4314                                                    ;READ 256 WORDS FROM DISK
4315                                                    ;
4316
4317  022202  005777  177462          5.6  READ:   TST     @DCS            ;ERROR
4318  022206  100001                   2.6          BPL     .+4             ;NO
4319  022210  104000                               HLT                     ;YES, REPORT ERROR
4320  022212  052777  000400  177450   7.6          BIS     #400,@DCS       ;DISK CLEAR
4321  022220  012777  025234  177446   7.6          MOV     #INBFRF,@CMA    ;INITIALIZE MEMORY ADDRESS
4322  022226  012777  177400  177436   7.6          MOV     #-400,@WC
4323  022234  016777  177452  177434   8.8          MOV     LOWADP,@DAR
4324  022242  016777  177446  177430   8.8          MOV     UPADRS,@DAE
4325  022250  052777  000105  177412   7.6          BIS     #105,@DCS       ;INT ENB. WRITE
4326  022256  062767  000430  177426   6.4          ADD     #430,LOWADR     ;INC DISK ADRS BY 430
4327  022264  005567  177424           4.9          ADC     UPADRS          ;ADD CARRY TO MSB'S
4328  022270  026767  177422  177416   7.1          CMP     RFLIM,UPADRS    ;TEST FOR UPPER LIMIT, 256K
4329  022276  001006                   2.6          BNE     RFRTI           ;NO, RTI
4330  022300  005067  177404           4.9          CLR     SERV            ;FUNCTION = WRITE
4331  022304  005067  177402           4.9          CLR     LOWADR          ;YES, CLEAR ADDRESS
4332  022310  005067  177400           4.9          CLR     UPADRS          ;YES
4333  022314  052767  000001  156762   6.4  RFRTI:  BIS     #FL.ANC,RU.MAP
4334  022322  052767  000010  156756   6.4          BIS     #FL.RF,RU.ANC
4335  022330  000002                   4.8          RTI
4336                                                    ;********************** RK11**************************
4337
4338                                                    ;177400                 ;DRIVE STATUS
4339                                                    ;177402                 ;MAINTENANCE REG
4340  022332  177400                                    RKDS:   177400          ;DRIVE STATUS REGISTER
4341  022334  177413                                    RKDAH:  177413          ;HIGH BYTE DISK ADRS
4342  022336  177412                                    RKDAE:  177412          ;DISK ADRS
4343  022340  177416                                    RKDBR:  177416          ;DATA BUFFER REG
4344  022342  177412                                    RKDAR:  177412          ;DISK ADRS REG
4345  022344  177406                                    RKWC:   177406          ;WORD COUNT REG
4346  022346  177410                                    RKBAR:  177410          ;CURRENT ADRS REG
4347  022350  177404                                    RKCSR:  177404          ;STATUS REG
4348  022352  177405                                    RKCSRH: 177405          ;HIGH BYTE ADRS OF CSR
```

```

022354  000240                          1.5  RKSTART:        NOP
022356  012777  000000  177752          7.6          MOV     #0,@RKDAE            ;INIT DISK DAR-DAE
022364  016777  000124  177754          8.8  RK1:    MOV     LLIMIT,@RKBAR        ;DATA BASE
022372  016777  000114  177744          8.8          MOV     RKWORDCT,@RKWC       ;LENGTH OF TRANSFER
022400  116777  000104  177742          8.8          MOVB    RKFUNCTION,@RKCSR ;WRITE OR WRITE CHECK TO DISK
022406  052767  000001  156670          6.4          BIS     #FL.ANC,RU.MAP
022414  052767  000020  156664          6.4          BIS     #FL.RK,RU.ANC
022422  000002                          4.8          RTI
022424  105777  177720                  5.6  RKISR:  TSTB    @RKCSR               ;READY?
022430  100402                          2.6          BMI     .+6
022432  104000                                       HLT
022434  000747                          2.6          BR      RKSTART
022436  005777  177702                  5.6          TST     @RKWC                ;IS WORD COUNT ZERO
022442  001402                          2.6          BEQ     .+6
022444  104000                                       HLT                          ;
022446  000742                          2.6          BR      RKSTART
022450  005777  177674                  5.6          TST     @RKCSR
022454  100002                          2.6          BPL     .+6
022456  104000                                       HLT                          ;RK11 ERROR FLAG
022460  000735                          2.6          BR      RKSTART
022462  032777  000037  177646          7.7          BIT     #37,@RKDAE           ;DISK AT UPPER LIMIT
022470  001335                          2.6          BNE     RK1                  ;NO
022472  122777  000031  177634          7.1          CMPB    #31,@RKDAH           ;
022500  001331                          2.6          BNE     RK1
022502  000367  000002                  4.9          SWAB    RKFUNCTION           ;CHANG COMMAND
022506  000722                          2.6          BR      RKSTART
022510  000000                               RKFUNCTION:     0                    ;DISK COMMAND
022512  177400                               RKWORDCT:       -400                 ;WORD COUNT
022514  024234                               LLIMIT: BUFF                         ;BEGINING OF DATA FILE


                                             ;*******************************************************************
                                             ;RP11 DISK SERVICE ROUTINE
022516  176722                               RPCA:   176722                       ;RP11 CYLINDER ADDRESS DISK
022520  176725                               RPDAH:  176725                       ;RP11 HIGH BYTE OF DISK ADDRESS
022522  176710                               RPDSR:  176710                       ;RP11 DRIVE STATUS REGISTER
022524  176724                               RPDAR:  176724                       ;RP11 DISK ADDRESS REGISTER
022526  176716                               RPWC:   176716                       ;RP11 WORD COUNT REGISTER
022530  176720                               RPBAR:  176720                       ;RP11 CURRENT ADDRESS REGISTER
022532  176714                               RPCSR:  176714                       ;RP11 STATUS REGISTER
022534  176715                               RPCSRH: 176715                       ;RP11 HIGH BYTE ADDRESS OF CSR
022536  105777  177770                  5.6  RPISR:  TSTB    @RPCSR               ;INTERRUPT VECTOR POINTS HERE
022542  100402                          2.6          BMI     .+6
022544  104000                                       HLT                          ;RP11 READY NOT UP
022546  000425                          2.6          BR      RPSTART
022550  005777  177756                  5.6          TST     @RPCSR
022554  100014                          2.6          BPL     RPX

022556  016700  177740                  5.0          MOV     RPDSR,R0             ;DEVICE STATUS REG ADDRESS > R0
022562  017701  177734                  6.2          MOV     @RPDSR,R1            ;CONTENTS OF STATUS REG    > R1
022566  016702  177736                  5.0          MOV     RPBAR,R2             ;DEVICE CURRENT ADD REG    > R2
022572  017703  177732                  6.2          MOV     @RPBAR,R3            ;CONTENTS OF ADD REG       > R3
022576  017704  177730                  6.2          MOV     @RPCSR,R4            ;CONTENTS OF STATUS REG    > R4
                                             ;NOTE:
                                             ;       CHANGE HLT TO HLT+4 (104000 = 104004)
                                             ;       TO DISPLAY CONTENTS OF REGISTERS SPECIFIED
```

```
4405                                                    :       ABOVE ON EXTENDED ERROR DISPLAY
4406
4407  022602  104000                                            HLT                             ;RP-11 ERROR FLAG UP
4408  022604  000406                                    2.6     BR      RPSTART
4409  022606  122777  000312  177702                    7.1 RPX:CMPB    #312,@RPCA              ;CYLINDER NO. 312
4410  022614  001010                                    2.6     BNE     RP1                     ;NO
4411  022616  000367  000056                            4.9     SWAB    RPFUNCTION              ;CHANGE COMMAND
4412  022622  012777  000001  177702                    7.6 RPSTART:MOV  #00001,@RPCSR          ;INITIALIZE DISK - DAR-DAE
4413
4414  022630  105777  177676                            5.6 RPO:TSTB    @RPCSR                  ;TEST CONTROLLER READY
4415  022634  100375                                    2.6     BPL     RPO                     ;NO WAIT
4416                                                        ;NOTE:
4417                                                        ;       PROGRAM LOOP (HUNG) ON RPO NO CONTROLLER READY RESPONSE
4418                                                        ;       RUN DEVICE DIAGNOSTICS
4419
4420  022636  016777  177652  177664                    8.8 RP1:MOV     LLIMIT,@RPBAR           ;INITIAL CORE ADDRESS
4421  022644  016777  000026  177654                    8.8     MOV     RPWORDCT,@RPWC          ;LENGTH OF TRANSFER
4422  022652  116777  000022  177652                    8.8     MOVB    RPFUNCTION,@RPCSR       ;WRITE OR WRITE CHECK TO DISK
4423  022660  052767  000001  156416                    6.4     BIS     #FL.ANC,RU.MAP
4424  022666  052767  000040  156412                    6.4     BIS     #FL.RP,RU.ANC
4425  022674  000002                                    4.8     RTI                             ;RETURN TO MAINLINE CODE
4426  022676  176000                                        RPWORD: -2000
4427  022700  000000                                        RPFUNC: 0
```

```
4428
4429                                    ;SCRATCH PAD AND CONSTANTS
4430
4431  022702  000101                    LIMIT:  101                     ;HIGH LIMIT OF DISK DATA
4432  022704  000000                    FSEG:   0                       ;SEGMENT COUNT (1/2 OF A FILE
4433  022706  000001                    FDATA:  1                       ;FILE DATA
4434  022710  000000                    DFILE:  0                       ;DATA FILE
4435  022712  000001                    ONE:    1
4436  022714  000000                    DACNT:  0                       ;BASE DATA INITIALIZATION COUNT
4437  022716  000000                    CNT:    0                       ;TTY INITIALIZATION VECTOR
4438  022720  000000                    PUNCNT: 0                       ;PUNCH INTERROGATION COUNT
4439  022722  000000                    RDRCNT: 0                       ;READER INTERROGATION COUNT
4440  022724  000000                    ACTVOC: 0                       ;ACTIVE DATA SETS
4441  022726  000000                    SAVPC:  0                       ;SAVE PC
4442  022730  000000                    SAVCC:  0                       ;SAVE PROCESSOR STATUS
4443  022732  000000                    SAVR2:  0                       ;SAVE R2 FOR ERROR PRINT
4444  022734  000000                    SAVR3:  0                       ;SAVE R3 FOR ERROR PRINT
4445  022736  000000                    SAVR4:  0                       ;SAVE R4 FOR ERROR PRINT
4446  022740  000000                    EMASK:  0                       ;EMULATOR MASK
4447  022742  000000                    STOR0:  0                       ;STORE R0
4448  022744  000000                    STOR1:  0                       ;STORE R1
4449  022746  000000                    STOR2:  0                       ;STORE R2
4450  022750  000000                    STOR3:  0
4451  022752  000000                    STOR4:  0
4452  022754  000000                    STOR5:  0
4453  022756  000000                    STOR6:  0                       ;STORE R6
4454  022760  000000                    TMPDAT: 0
4455  022762  000000                    STOPLT: 0                       ;STORE EMULATOR NUMBER
4456
4457  022764  000000                    MAX:    0                       ;MAX # OF DEVICE
4458  022766  000000                    MARK:   0                       ;DEVICE MARKER;
4459
4460                                    ;DEVICE PRIORITY TABLE
4461
4462  022770  000000                    LINE:   0                       ;STORAGE FOR LINE NUMBER
4463  022772  000000                    TERTMP: 0
4464
4465                                    ;DEVICE ADDRESSES
4466
4467  022774  176504                    KLXS0:  176504
4468  022776  176500                    KLADRS: 176500                  ;FIRST MULTI-USER KL11 ADDRESS
4469  023000  176500                    KLRS0:  176500
4470  023002  174000                    DCADRS: 174000                  ;ADDRESS ASSIGNED TO FIRST DC11
4471  023004  174770                    DPADRS: 174770                  ;ADDRESS ASSIGNED TO FIRST DP11
4472  023006  175000                    DMADRS: 175000                  ;FIRST DM11 ADRS
4473  023010  175200                    DNADRS: 175200                  ;FIRST DN11 ADRS
4474  023012  177560                    CTKS:   177560
4475  023014  177562                    CTKB:   177562
4476  023016  177564                    CTPS:   177564
4477  023020  177566                    CTPB:   177566
4478  023022  177342                    TC11:   177342                  ;TC11 ADRESS
4479  023024  177460                    RF11.   177460                  ;RF11 ADDPESS
4480  023026  177514                    LP11:   177514                  ;LP11 ADDRESS
4481
4482  023030  000000                    NDCS:   0                       ;NUMBER OF DC11'S
4483  023032  000000                    NKLS:   0                       ;NUMBER OF KL11'S
```

```
4484  023034  000000                NUPS:   0       ;NUMBER OF DP11'S
4485  023036  000000                NDMS:   0       ;NUMBER OF DM'S
4486  023040  000000                NDNS:   0       ;NUMBER OF DN'S
4487  023042  000000                ANCMAP: 0       ;MAP OF NON-COM ANCILLARIES
4488  023044  000000                DEVCNT: 0       ;DEVICE COUNT
```

```
4489
4490                                        ;THIS CALL CLEARS CORE BETWEEN THE ADDRESS LISTED
4491                                        ;AFTER THE CALL AND THE NUMBER OF WORDS SPECIFIED
4492
4493  023046                                CLEAR:
4494  023046  004767  000072          7.0           JSR     PC,     SAVRG   ;SAVE R0-R4
4495  023052  012501                    3.8           MOV     (R5)+,R1        ;FETCH ADRS OF FIRST WORD TO BE CLEARED
4496  023054  012502                    3.8           MOV     (R5)+,R2        ;FETCH WORD COUNT
4497  023056  005021                    3.7   CLR1:   CLR     (R1)+           ;CLEAR MEMORY
4498  023060  005302                    2.3           DEC     R2              ;DEC WORD COUNT
4499  023062  001375                    2.6           BNE     CLR1            ;BRANCH IF AREA NOT CLEARED
4500  023064  004767  000076          7.0           JSR     PC,     RSTRG   ;RESTORE R0-R4
4501  023070  000205                    3.5           RTS     %5              ;RETURN
4502
4503  023072  012700  000016          3.8   REPORT: MOV     #MAPSIZ-1,R0
4504  023076  012767  030052  000012  6.4           MOV     #MSGMAP,2$      ;SET UP MESSAGE POINTER
4505  023104  005711                    3.2   1$:     TST     (R1)            ;CHECK FOR ANY DEVICES
4506  023106  001407                    2.6           BEQ     3$              ;BRANCH IF NONE
4507  023110  000004  027634                          TYPE,   RETURN
4508  023114  000004                                  TYPE
4509  023116  000000                          2$:     0
4510  023120  011105                    3.8           MOV     (R1),TTY        ;PUT (R1) INTO TTY
4511  023122  004767  000430          7.0           JSR     PC,BITYP$       ;TYPE (R1) IN BITS
4512  023126  005721                    3.2   3$:     TST     (R1)+           ;UPDATE POINTER
4513  023130  062767  000020  177760  6.4           ADD     #20,    2$      ;UPDATE MESSAGE POINTER
4514  023136  005300                    2.3           DEC     R0              ;DONE?
4515  023140  001361                    2.6           BNE     1$              ;BRANCH IF NOT
4516  023142  000207                    3.5           RTS PC
4517
4518                                        ;SAVE REGS 0 TO 4 SUBROUTINE.
4519  023144  012667  000014          6.4   SAVRG:  MOV     (6)+,   SVRPC   ;SAVE PC
4520  023150  010446                    4.9           MOV     %4,     -(6)    ;SAVE REGS 0 - 4
4521  023152  010346                    4.9           MOV     %3,     -(6)    ;IN STACK.
4522  023154  010246                    4.9           MOV     %2,     -(6)
4523  023156  010146                    4.9           MOV     %1,     -(6)
4524  023160  010046                    4.9           MOV     %0,     -(6)
4525  023162  000137                    3.7           JMP     @(7)+           ;SIMULATE RTS PC
4526  023164  000000                          SVRPC:  0
4527
4528                                        ;RESTORE REGS 0 TO 4 SUBROUTINE.
4529  023166  012667  000014          6.4   RSTRG:  MOV     (6)+,   RSTPC   ;SAVE PC
4530  023172  012600                    3.8           MOV     (6)+,   %0      ;RESTORE REGS 0 - 4
4531  023174  012601                    3.8           MOV     (6)+,   %1      ;FROM STACK.
4532  023176  012602                    3.8           MOV     (6)+,   %2
4533  023200  012603                    3.8           MOV     (6)+,   %3
4534  023202  012604                    3.8           MOV     (6)+,   %4
4535
4536  023204  000137                    3.7           JMP     @(7)+           ;SIMULATE RTS PC
4537  023206  000000                          RSTPC:  0
```

```
4538
4539  023210  011646                      6.4  HLT$:   MOV     (6),    -(6)    ;DUP RETURN ADDR
4540  023212  162716  000002              5.2          SUB     #2,     (6)     ;POINT TO EMT
4541  023216  117667  000000  000222      8.8          MOVB    @(6),   HLTAD$  ;SAVE HALT ARG
4542  023224  012737  000340  000022      5.2          MOV     #340,   @#22    ;DEFER FURTHER PRINTOUT
4543  023232  032737  002000  177570      5.3          BIT     #SW10,@#SWR     ;BELL ON ERROR?
4544  023240  001406                      2.6          BEQ     1$              ;NO - SKIP
4545  023242  004767  167334              7.0          JSR     PC,     CTYDWN
4546  023246  000004  000207                           TYPE    ,BELL           ;TYPE THE CHARACTER BELL
4547  023252  004767  167356              7.0          JSR     PC,     CTYUP
4548  023256  032737  020000  177570      5.3  1$:     BIT     #SW13,@#SWR     ;SKIP TYPEOUT IF SET
4549  023264  001044                      2.6          BNE     5$              ;SKIP TYPEOUTS
4550  023266  005767  155710              4.4          TST     ERRORS
4551  023272  001002                      2.6          BNE     2$
4552  023274  000004  027775                           TYPE    ,MSGHED
4553  023300  000004  027634              2$:          TYPE    ,RETURN
4554  023304  012605                      3.8          MOV     (6)+,TTY        ;TYPE (6)+ IN OCTAL
4555  023306  004767  000254              7.0          JSR     PC,PRINTR       ;TYPE LEADING ZERO'S
4556  023312  000004  027642                           TYPE    ,SPACE+3
4557  023316  016605  000002              5.0          MOV     2(6),TTY        ;TYPE 2(6) IN OCTAL
4558  023322  004767  000250              7.0          JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
4559  023326  000004  027642                           TYPE,   SPACE+3
4560  023332  010605                      2.3          MOV     R6,TTY          ;TYPE R6 IN OCTAL
4561  023334  004767  000236              7.0          JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
4562  023340  042767  007700  000020      7.0          BIC     #7700,4$
4563  023346  105367  000074              4.9  3$:     DECB    HLTAD$
4564  023352  100411                      2.6          BMI     5$
4565  023354  000004  027642                           TYPE,   SPACE+3
4566  023360  062767  000100  000000      6.4          ADD     #100,   4$
4567  023366                              4$:
4568  023366  010105                      2.3          MOV     R1,TTY          ;TYPE R1 IN OCTAL
4569  023370  004767  000172              7.0          JSR     PC,PRINTR       ;TYPE LEADING ZERO'S
4570  023374  000764                      2.6          BR      3$
4571  023376  005737  177570              3.2  5$:     TST     @#SWR           ;HALT ON ERROR
4572  023402  100001                      2.6          BPL     .+4             ;SKIP IF CONTINUE
4573  023404  000000                      1.8          HALT                    ;HALT ON ERROR!
4574  023406  005267  155570              4.9          INC     ERRORS          ;INC THE ERROR COUNT
4575  023412  032737  020000  177570      5.3          BIT     #SW13,@#SWR     ;TEST SUPPRESS TYPEOUT
4576  023420  001003                      2.6          BNE     6$              ;YES BRANCHES
4577  023422  000004  023426                           TYPE,   .+2
4578  023426  000377                                   .ASCIZ  <377>
4579
4580  023430  000005                      1.5  6$:     RESET                   ;CLEAR OUT THE WORLD
4581  023432  005037  000022              3.7          CLR     @#22            ;ALLOW FURTHER PRINTOUT
4582  023436  012706  001200              3.8          MOV     #1200,  SP      ;RESET STACK POINTER
4583  023442  000167  156404              4.9          JMP     DVICE           ;RESTART EVERYTHING
4584
4585  023446  000000                           HLTAD$: 0
4586
4587                                           ;       $TYPE           MESSAGE TYPEOUT ROUTINE
4588
4589                                           ;THIS ROUTINE IS USE TO TYPE ASCII MESSAGES ON THE TTY. THE
4590                                           ;CALL CAN BE IN ONE OF 3 FORMS: 1) "TYPE ,ADR" - TYPES THE
4591                                           ;MESSAGE STARTIN IN LOCATION "ADR:", 2) "TYPE ,CHAR" - TYPES
4592                                           ;THE ASCII "CHAR", AND 3) "PRINT <<15><12>"MESSAGE"> - TYPES
4593                                           ;THE MESSAGE WHICH IS INLINE ASCII.
```

```
 4594
 4595  023450  010546                    4.9  IOT$:   MOV     TTY,-(6)        ;SAVE TTY
 4596  023452  017605  000002            6.2          MOV     @2(6),TTY       ;GET ADDRESS TO BE TYPED
 4597  023456  032705  177400            4.4          BIT     #^C377,TTY      ;IS IT A TYPEM?
 4598  023462  001004                    2.6          BNE     1$              ;NO
 4599  023464  010567  000064            4.9          MOV     TTY,.TYPE       ;GET THE CHARACTER
 4600  023470  012705  023554            3.8          MOV     #.TYPE,TTY      ;FUDGE THE ADDRESS
 4601  023474  105715                    3.2  1$:     TSTB    (TTY)           ;TERMINATOR?
 4602  023476  001406                    2.6          BEQ     2$              ;GET OUT IF SO
 4603  023500  112537  177566            5.2          MOVB    (TTY)+,@#177566 ;LOAD AND TYPE THE CHARACTER
 4604  023504  105737  177564            3.2          TSTB    @#177564        ;IS THE PRINTER READY
 4605  023510  100375                    2.6          BPL     .-4             ;WAIT UNTIL IT IS
 4606  023512  000770                    2.6          BR      1$              ;GET THE NEXT CHARACTER
 4607  023514  017646  000002            8.8  2$:     MOV     @2(6),-(6)      ;GET ADDRESS TO BE TYPED
 4608  023520  062766  000002  000004    6.4          ADD     #2,4(6)         ;ADD 2 TO THE ADDRESS
 4609  023526  022666  000002            5.9          CMP     (6)+,2(6)       ;IS IT .+2?
 4610  023532  001006                    2.6          BNE     3$              ;NO
 4611  023534  062705  000002            3.8          ADD     #2,TTY          ;ADD 2 TO THE ADDRESS
 4612  023540  042705  000001            4.4          BIC     #1,TTY          ;BACK UP TO AN EVEN BYTE
 4613  023544  010566  000002            4.9          MOV     TTY,2(6)        ;RESTORE ADDRESS
 4614  023550  012605                    3.8  3$:     MOV     (6)+,TTY        ;RESTORE TTY
 4615  023552  000002                    4.8          RTI                     ;RETURN
 4616  023554  000000                        .TYPE:   0                       ;CHARACTER TYPE LOCATION
```

```
4617                                                    ;       $OCTAL          OCTAL TYPEOUT ROUTINE
4618
4619                                                    ;THIS ROUTINE IS USED TO TYPE AN OCTAL NUMBER ON THE TTY. IT WILL TYPE
4620                                                    ;ALL 6 CHARACTERS, SUPPRESS LEADING ZEROES, TYPE AN 18 BIT ADDRESS, OR T.PE
4621                                                    ;THE 16 BITS. IT IS CALLED VIA THE DUMP, SDUMP, DUMP18, OR BITYPE MACRO'S.
4622
4623  023556  012767  170101  000140      6.4   BITY?$: MOV     #170101,.PR     ;SET BIT FLAG ANS 16. CHARACTER COUNT
4624  023564  000411                      2.6           BR      .PTIT           ;NOW TYPE IT IN BIT FORM
4625  023566  112767  000001  000130      6.4   PRINTR: MOVB    #1,.PR          ;SET ZERO FILL SWITCH
4626  023574  000402                      2.6           BR      .+6             ;SKIP
4627  023576  005067  000122              4.9   PRINTS: CLR     .PR             ;SUPRESS LEADING ZERO'S
4628  023602  112767  177772  000115      6.4           MOVB    #-6,.PR+1       ;SET COUNT
4629  023610  010446                      4.9   .PTIT:  MOV     R4,-(6)         ;SAVE R4
4630  023612  012704  023726              3.8           MOV     #.PR+2,R4       ;SET POINTER TO FIRST ASCII CHAR.
4631  023616  105014                      3.7           CLRB    (4)             ;CLEAR FIRST BYTE
4632  023620  000411                      2.6           BR      .PRF            ;ROTATE FIRST BIT
4633  023622  105014                      3.7   .PRL:   CLRB    (4)             ;CLEAR BYTE OF CHARACTER
4634  023624  032767  000100  000072      6.5           BIT     #100,.PR        ;BIT TYPING MODE?
4635  023632  001004                      2.6           BNE     .PRF            ;YES - SKIP 2 ROTATES
4636  023634  006105                      2.3           ROL     TTY             ;ROTATE BIT INTO C
4637  023636  106114                      3.7           ROLB    (4)             ;PACK IT
4638  023640  006105                      2.3           ROL     TTY             ;ROTATE BIT INTO C
4639  023642  106114                      3.7           ROLB    (4)             ;PACK IT
4640  023644  006105                      2.3   .PRF:   ROL     TTY             ;ROTATE BIT INTO C
4641  023646  106114                      3.7           ROLB    (4)             ;PACK IT
4642  023650  105714                      3.2           TSTB    (4)             ;IS IT ZERO?
4643  023652  001402                      2.6           BEQ     .+6             ;SKIP INC
4644  023654  105267  000044              4.9           INCB    .PR             ;SET FILL SWITCH
4645  023660  105767  000040              4.4           TSTB    .PR             ;CHECK FILL SWITCH
4646  023664  001402                      2.6           BEQ     .+6             ;SKIP BITSET
4647  023666  152724  000060              5.2           BISB    #'0,(4)+        ;MAKE INTO ASCII CHAR
4648  023672  105267  000027              4.9           INCB    .PR+1           ;INC COUNT
4649  023676  001351                      2.6           BNE     .PRL            ;REPEAT
4650  023700  022704  023726              3.8           CMP     #.PR+2,R4       ;EMPTY BUFFER?
4651  023704  001002                      2.6           BNE     .+6             ;SKIP IF NOT
4652  023706  112724  000060              5.2           MOVB    #'0,(4)+        ;LOAD 1 ZERO
4653  023712  105014                      3.7           CLRB    (4)             ;NULL TERMINATOR
4654  023714  000004  023726                            TYPE    .PR+2           ;TYPE IT
4655  023720  012604                      3.8           MOV     (6)+,R4         ;RESTORE R4
4656  023722  000207                      3.5           RTS     PC              ;RETURN
4657  023724  000012                              .PR:    .BLKW   12              ;COUNT, SWITCH, AND OUTPUT BUFFER
4658
```

```
                                                ;       $SCOPE          SCOPE LOOP HANDLER
                                                ;
                                                ;THIS ROUTINE HANDLES THE ITERATIONS, LOOPING, ERROR
                                                ;LOOPING, AND THE DISPLAYING OF THE TEST NUMBER.
                                                ;
                                                ;"SCOPE" IS PLACED BETWEEN EACH SUBTEST IN THE TEST AND
                                                ;RECORDS THE STARTING ADDRESS OF THE SUBTEST IN "LAD:"
                                                ;
024750  005737  001024          3.2   TRAPS:  TST     @#1024          ;CHECK MONITOR CONTROL
024754  001022                  2.6           BNE     SVLAD$          ;(ACTIVE) QUICK ITERATIONS
024756  032737  040000  177570  5.3           BIT     #SW14,@#SWR     ;LOOP ON TEST?
024764  001026                  2.6           BNE     KIT$            ;LOOP ON TEST IS SET
024766  032737  004000  177570  5.3           BIT     #SW11,@#SWR     ;KILL ITERATIONS
024774  001012                  2.6           BNE     SVLAD$          ;YES - KILL ITERATIONS
024776  105767  155177          4.4           TSTB    ICNT+1          ;FIRST ONE?
025002  001404                  2.6           BEQ     2$              ;BRANCH IF FIRST
025004  126767  000062  155167  7.1           CMPB    TIMES,ICNT+1    ;DONE?
025012  001013                  2.6           BNE     KIT$            ;BRANCH IF NOT
025014  112767  000001  155157  6.4   2$:     MOVB    #1,ICNT+1       ;FIRST ITERATION
025022  105267  155152          4.9   SVLAD$: INCB    ICNT            ;COUNT TEST NUMBERS
025026  011667  000036          6.4           MOV     (6),LAD         ;SAVE LOOP ADDRESS
025032  016737  155142  177570  6.4           MOV     ICNT,@#DISPLAY  ;DISPLAY TEST NO. AND ITERATION COUNT
025040  000002                  4.8           RTI                     ;RETURN
                                                ;
025042  105267  155133          4.9   KIT$:   INCB    ICNT+1          ;INC THE ITERATION COUNT
025046  016737  155126  177570  6.4   OVER$:  MOV     ICNT,@#DISPLAY  ;SET UP DISPLAY
025054  005767  000010          4.4           TST     LAD             ;FIRST ONE?
025060  001760                  2.6           BEQ     SVLAD$          ;YES
025062  016716  000002          6.4           MOV     LAD,(6)         ;FUDGE RETURN ADDRESS
025066  000002                  4.8           RTI                     ;FIXES PS
                                                ;
025070  000000                  LAD:    0               ;LOOP ADDRESS
025072  000377                  TIMES:  377             ;RUN 377 TIMES
```

```
 4692  024074  012777  024222  000126      7.6  PDOWN$:  MOV     #ILLUP,@PUVEC$  ;SET FOR FAST UP
 4693  024102  012777  000340  000122      7.6           MOV     #340,@PUVEC$+2  ;PRIO:7
 4694  024110  010046                      4.9           MOV     R0,-(6)         ;PUSH R0 ON STACK
 4695  024112  010146                      4.9           MOV     R1,-(6)         ;PUSH R1 ON STACK
 4696  024114  010246                      4.9           MOV     R2,-(6)         ;PUSH R2 ON STACK
 4697  024116  010346                      4.9           MOV     R3,-(6)         ;PUSH R3 ON STACK
 4698  024120  010446                      4.9           MOV     R4,-(6)         ;PUSH R4 ON STACK
 4699  024122  010546                      4.9           MOV     R5,-(6)         ;PUSH R5 ON STACK
 4700  024124  010667  000076              4.9           MOV     SP,.SAVR6       ;SAVE SP
 4701  024130  012777  024140  000072      7.6           MOV     #PUP$,@PUVEC$   ;SET UP VECTOR
 4702  024136  000000                      1.8           HALT                    ;WAIT FOR PF
 4703
 4704  024140  016706  000062              5.0  PUP$:    MOV     .SAVR6,SP       ;GET SP
 4705  024144  005001                      2.3           CLR     R1              ;WAIT LOOP FOR THE TTY
 4706  024146  005201                      2.3  1$:      INC     R1              ;WAIT FOR THE INC
 4707  024150  001376                      2.6           BNE     1$              ;OF  WORD
 4708  024152  012605                      3.8           MOV     (6)+,R5         ;POP STACK INTO R5
 4709  024154  012604                      3.8           MOV     (6)+,R4         ;POP STACK INTO R4
 4710  024156  012603                      3.8           MOV     (6)+,R3         ;POP STACK INTO R3
 4711  024160  012602                      3.8           MOV     (6)+,R2         ;POP STACK INTO R2
 4712  024162  012601                      3.8           MOV     (6)+,R1         ;POP STACK INTO R1
 4713  024164  012600                      3.8           MOV     (6)+,R0         ;POP STACK INTO R0
 4714  024166  012737  024074  000024      5.2           MOV     #PDOWN$,@#24    ;SET UP THE POWER DOWN VECTOR
 4715  024174  012737  000340  000026      5.2           MOV     #340,@#26       ;PRIO:7
 4716  024202  000004  024206                            TYPE    .+2             ;.ASCIZ <15><12>"POWER"
 4717  024216  000167  155630              4.9           JMP     @VICE           ;JMP TO USER ADDRESS
 4718
 4719  024222  000000                      1.8  ILLUP:   HALT                    ;THE POWER UP SEQUENCE WAS STARTED
 4720  024224  000776                      2.6           BR      .-2             ; BEFORE THE POWER DOWN WAS COMPLETE
 4721
 4722  024226  000000                           .SAVR6:  0                       ;PUT THE SP HERE
 4723  024230  000024  000026               PUVEC$:  24,26                    ;POWER UP VECTOR
```

```
                                ;OUTPUT DATA FILE FOR DISK AND DECTAPE
024234  000001                  BUFF:   1                       ;COMMON OUTPUT FILE
        025234                  .=BUFF+1000
025234  000001                  INBFRF: 1                       ;RF11 INPUT BUFFER
        026234                  .=INBFRF+1000
026234  000001                  INBFTC: 1                       ;TC11 INPUT BUFFER
        027234                  .=INBFTC+1000
027234                          BINCNT:                         ;BEGINNING OF BINARY COUNT TABLE
027234     000                  .BYTE   0
027235     001                  .BYTE   1
027236     002                  .BYTE   2
027237     003                  .BYTE   3
027240     004                  .BYTE   4
027241     005                  .BYTE   5
027242     006                  .BYTE   6
027243     007                  .BYTE   7
027244     010                  .BYTE   10
027245     011                  .BYTE   11
027246     012                  .BYTE   12
027247     013                  .BYTE   13
027250     014                  .BYTE   14
027251     015                  .BYTE   15
027252     016                  .BYTE   16
027253     017                  .BYTE   17
027254     020                  .BYTE   20
027255     021                  .BYTE   21
027256     022                  .BYTE   22
027257     023                  .BYTE   23
027260     024                  .BYTE   24
027261     025                  .BYTE   25
027262     026                  .BYTE   26
027263     027                  .BYTE   27
027264     030                  .BYTE   30
027265     031                  .BYTE   31
027266     032                  .BYTE   32
027267     033                  .BYTE   33
027270     034                  .BYTE   34
027271     035                  .BYTE   35
027272     036                  .BYTE   36
027273     037                  .BYTE   37
027274     040                  .BYTE   40
027275     041                  .BYTE   41
027276     042                  .BYTE   42
027277     043                  .BYTE   43
027300     044                  .BYTE   44
027301     045                  .BYTE   45
027302     046                  .BYTE   46
027303     047                  .BYTE   47
027304     050                  .BYTE   50
027305     051                  .BYTE   51
027306     052                  .BYTE   52
027307     053                  .BYTE   53
027310     054                  .BYTE   54
027311     055                  .BYTE   55
027312     056                  .BYTE   56
```

```
 4780  027313      057                    .BYTE   57
 4781  027314      060                    .BYTE   60
 4782  027315      061                    .BYTE   61
 4783  027316      062                    .BYTE   62
 4784  027317      063                    .BYTE   63
 4785  027320      064                    .BYTE   64
 4786  027321      065                    .BYTE   65
 4787  027322      066                    .BYTE   66
 4788  027323      067                    .BYTE   67
 4789  027324      070                    .BYTE   70
 4790  027325      071                    .BYTE   71
 4791  027326      072                    .BYTE   72
 4792  027327      073                    .BYTE   73
 4793  027330      074                    .BYTE   74
 4794  027331      075                    .BYTE   75
 4795  027332      076                    .BYTE   76
 4796  027333      077                    .BYTE   77
 4797  027334      100                    .BYTE   100
 4798  027335      101                    .BYTE   101
 4799  027336      102                    .BYTE   102
 4800  027337      103                    .BYTE   103
 4801  027340      104                    .BYTE   104
 4802  027341      105                    .BYTE   105
 4803  027342      106                    .BYTE   106
 4804  027343      107                    .BYTE   107
 4805  027344      110                    .BYTE   110
 4806  027345      111                    .BYTE   111
 4807  027346      112                    .BYTE   112
 4808  027347      113                    .BYTE   113
 4809  027350      114                    .BYTE   114
 4810  027351      115                    .BYTE   115
 4811  027352      116                    .BYTE   116
 4812  027353      117                    .BYTE   117
 4813  027354      120                    .BYTE   120
 4814  027355      121                    .BYTE   121
 4815  027356      122                    .BYTE   122
 4816  027357      123                    .BYTE   123
 4817  027360      124                    .BYTE   124
 4818  027361      125                    .BYTE   125
 4819  027362      126                    .BYTE   126
 4820  027363      127                    .BYTE   127
 4821  027364      130                    .BYTE   130
 4822  027365      131                    .BYTE   131
 4823  027366      132                    .BYTE   132
 4824  027367      133                    .BYTE   133
 4825  027370      134                    .BYTE   134
 4826  027371      135                    .BYTE   135
 4827  027372      136                    .BYTE   136
 4828  027373      137                    .BYTE   137
 4829  027374      140                    .BYTE   140
 4830  027375      141                    .BYTE   141
 4831  027376      142                    .BYTE   142
 4832  027377      143                    .BYTE   143
 4833  027400      144                    .BYTE   144
 4834  027401      145                    .BYTE   145
 4835  027402      146                    .BYTE   146
```

```
027403	147		.BYTE	147
027404	150		.BYTE	150
027405	151		.BYTE	151
027406	152		.BYTE	152
027407	153		.BYTE	153
027410	154		.BYTE	154
027411	155		.BYTE	155
027412	156		.BYTE	156
027413	157		.BYTE	157
027414	160		.BYTE	160
027415	161		.BYTE	161
027416	162		.BYTE	162
027417	163		.BYTE	163
027420	164		.BYTE	164
027421	165		.BYTE	165
027422	166		.BYTE	166
027423	167		.BYTE	167
027424	170		.BYTE	170
027425	171		.BYTE	171
027426	172		.BYTE	172
027427	173		.BYTE	173
027430	174		.BYTE	174
027431	175		.BYTE	175
027432	176		.BYTE	176
027433	177		.BYTE	177
027434	200		.BYTE	200
027435	201		.BYTE	201
027436	202		.BYTE	202
027437	203		.BYTE	203
027440	204		.BYTE	204
027441	205		.BYTE	205
027442	206		.BYTE	206
027443	207		.BYTE	207
027444	210		.BYTE	210
027445	211		.BYTE	211
027446	212		.BYTE	212
027447	213		.BYTE	213
027450	214		.BYTE	214
027451	215		.BYTE	215
027452	216		.BYTE	216
027453	217		.BYTE	217
027454	220		.BYTE	220
027455	221		.BYTE	221
027456	222		.BYTE	222
027457	223		.BYTE	223
027460	224		.BYTE	224
027461	225		.BYTE	225
027462	226		.BYTE	226
027463	227		.BYTE	227
027464	230		.BYTE	230
027465	231		.BYTE	231
027466	232		.BYTE	232
027467	233		.BYTE	233
027470	234		.BYTE	234
027471	235		.BYTE	235
027472	236		.BYTE	236
```

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 4892  027473  237                    .BYTE   237
 4893  027474  240                    .BYTE   240
 4894  027475  241                    .BYTE   241
 4895  027476  242                    .BYTE   242
 4896  027477  243                    .BYTE   243
 4897  027500  244                    .BYTE   244
 4898  027501  245                    .BYTE   245
 4899  027502  246                    .BYTE   246
 4900  027503  247                    .BYTE   247
 4901  027504  250                    .BYTE   250
 4902  027505  251                    .BYTE   251
 4903  027506  252                    .BYTE   252
 4904  027507  253                    .BYTE   253
 4905  027510  254                    .BYTE   254
 4906  027511  255                    .BYTE   255
 4907  027512  256                    .BYTE   256
 4908  027513  257                    .BYTE   257
 4909  027514  260                    .BYTE   260
 4910  027515  261                    .BYTE   261
 4911  027516  262                    .BYTE   262
 4912  027517  263                    .BYTE   263
 4913  027520  264                    .BYTE   264
 4914  027521  265                    .BYTE   265
 4915  027522  266                    .BYTE   266
 4916  027523  267                    .BYTE   267
 4917  027524  270                    .BYTE   270
 4918  027525  271                    .BYTE   271
 4919  027526  272                    .BYTE   272
 4920  027527  273                    .BYTE   273
 4921  027530  274                    .BYTE   274
 4922  027531  275                    .BYTE   275
 4923  027532  276                    .BYTE   276
 4924  027533  277                    .BYTE   277
 4925  027534  300                    .BYTE   300
 4926  027535  301                    .BYTE   301
 4927  027536  302                    .BYTE   302
 4928  027537  303                    .BYTE   303
 4929  027540  304                    .BYTE   304
 4930  027541  305                    .BYTE   305
 4931  027542  306                    .BYTE   306
 4932  027543  307                    .BYTE   307
 4933  027544  310                    .BYTE   310
 4934  027545  311                    .BYTE   311
 4935  027546  312                    .BYTE   312
 4936  027547  313                    .BYTE   313
 4937  027550  314                    .BYTE   314
 4938  027551  315                    .BYTE   315
 4939  027552  316                    .BYTE   316
 4940  027553  317                    .BYTE   317
 4941  027554  320                    .BYTE   320
 4942  027555  321                    .BYTE   321
 4943  027556  322                    .BYTE   322
 4944  027557  323                    .BYTE   323
 4945  027560  324                    .BYTE   324
 4946  027561  325                    .BYTE   325
 4947  027562  326                    .BYTE   326
```

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 4948  027563      327                          .BYTE   327
 4949  027564      330                          .BYTE   330
 4950  027565      331                          .BYTE   331
 4951  027566      332                          .BYTE   332
 4952  027567      333                          .BYTE   333
 4953  027570      334                          .BYTE   334
 4954  027571      335                          .BYTE   335
 4955  027572      336                          .BYTE   336
 4956  027573      337                          .BYTE   337
 4957  027574      340                          .BYTE   340
 4958  027575      341                          .BYTE   341
 4959  027576      342                          .BYTE   342
 4960  027577      343                          .BYTE   343
 4961  027600      344                          .BYTE   344
 4962  027601      345                          .BYTE   345
 4963  027602      346                          .BYTE   346
 4964  027603      347                          .BYTE   347
 4965  027604      350                          .BYTE   350
 4966  027605      351                          .BYTE   351
 4967  027606      352                          .BYTE   352
 4968  027607      353                          .BYTE   353
 4969  027610      354                          .BYTE   354
 4970  027611      355                          .BYTE   355
 4971  027612      356                          .BYTE   356
 4972  027613      357                          .BYTE   357
 4973  027614      360                          .BYTE   360
 4974  027615      361                          .BYTE   361
 4975  027616      362                          .BYTE   362
 4976  027617      363                          .BYTE   363
 4977  027620      364                          .BYTE   364
 4978  027621      365                          .BYTE   365
 4979  027622      366                          .BYTE   366
 4980  027623      367                          .BYTE   367
 4981  027624      370                          .BYTE   370
 4982  027625      371                          .BYTE   371
 4983  027626      372                          .BYTE   372
 4984  027627      373                          .BYTE   373
 4985  027630      374                          .BYTE   374
 4986  027631      375                          .BYTE   375
 4987  027632      376                          .BYTE   376
 4988  027633      377                          .BYTE   377
 4989                                           .EVEN
 4990
 4991  027634  005015      000                  RETURN: .ASCIZ  <15><12>
 4992  027637      015  020012  020040           SPACE:  .ASCIZ  <15><12>"   "
 4993  027644      000
 4994  027645      015  042012  053105           MSG0:   .ASCIZ  <15><12>"DEVICE    MAP"
 4995  027652  041511  020105  020040
 4996  027660  046440  050101      000
 4997  027665      015  042012  050532           MSGX:   .ASCIZ  <15><12>"DZQCA-G TESTED WITH "
 4998  027672  040503  043455  052040
 4999  027700  051505  042524  020104
 5000  027706  044527  044124  000040
 5001  027714  005015  054523  052123           MSG1:   .ASCIZ  <15><12>"SYSTEM CONFIGURATION"
 5002  027722  046505  041440  047117
 5003  027730  044506  052507  040522
```

```
5004  027736  044524  047117     000
5005  027743     040  040520  051523          MSGPAS: .ASCIZ  " PASS(ES),  "
5006  027750  042450  024523  020054
5007  027756  000040
5008  027760  042440  051122  051117          MSGERR: .ASCIZ  " ERROR(S)."<15><12>
5009  027766  051450  027051  005015
5010  027774     000
5011  027775     377  005015  020377          MSGHED: .ASCIZ  <377><15><12><377>"  PC     PS   SP"
5012  030002  050040  020103  020040
5013  030010  020040  051520  020040
5014  030016  051440  000120
5015                                          ;    UNIT   DEVADR    IS   SHOULD BE"
5016  030022  005015  042504  044526          MSGDNR: .ASCIZ  <15><12>"DEVICE NOT RUNNING:"<15 <12>
5017  030030  042503  047040  052117
5018  030036  051040  047125  044516
5019  030044  043516  006472  000012
5020  030052  047101  044503  046114          MSGMAP: .ASCIZ  "ANCILLARIES:   "
5021  030060  051101  042511  035123
5022  030066  020040  000040
5023  030072  041504  030461  024040                  .ASCIZ  "DC11 (0-15):   "
5024  030100  026460  032461  035051
5025  030106  020040  000040
5026  030112  041504  030461  024040                  .ASCIZ  "DC11 (16-31):  "
5027  030120  033061  031455  024461
5028  030126  020072  000040
5029  030132  046113  030461  020054                  .ASCIZ  "KL11, DL11A,B: "
5030  030140  046104  030461  026101
5031  030146  035102  000040
5032  030152  050104  030461  024040                  .ASCIZ  "DP11 (0-15):   "
5033  030160  026460  032461  035051
5034  030166  020040  000040
5035  030172  050104  030461  024040                  .ASCIZ  "DP11 (16-31):  "
5036  030200  033061  031455  024461
5037  030206  020072  000040
5038  030212  046504  030461  035101                  .ASCIZ  "DM11A:         "
5039  030220  020040  020040  020040
5040  030226  020040  000040
5041  030232  047104  030461  020072                  .ASCIZ  "DN11:          "
5042  030240  020040  020040  020040
5043  030246  020040  000040
5044  030252  046504  030461  041102                  .ASCIZ  "DM11BB:        "
5045  030260  020072  020040  020040
5046  030266  020040  000040
5047  030272  043513  030461  020072                  .ASCIZ  "KG11:          "
5048  030300  020040  020040  020040
5049  030306  020040  000040
5050  030312  054104  030461  020072                  .ASCIZ  "DX11:          "
5051  030320  020040  020040  020040
5052  030326  020040  000040
5053  030332  046104  030461  042103                  .ASCIZ  "DL11CDE (0-15):"
5054  030340  020105  030050  030455
5055  030346  024465  000072
5056  030352  046104  030461  042103                  .ASCIZ  "DL11CDE(16-31):"
5057  030360  024105  033061  031455
5058  030366  024461  000072
5059  030372  045104  030461  024040                  .ASCIZ  "DJ11 (0-7):    "
```

```
5060  030400  026460  024467  020072
5061  030406  020040  000040
5062
5063  030412  177777  177777  000          PADDERS:.ASCIZ  <377><377><377><377>
5064
5065
5066          030420                               .EVEN
5067
5068  030420  000000                       DJ.XTBL:        0               ;DJ11 XMIT TABLE BUFFERS
5069          031016                       .=DJ.XTBL+376
5070  031016  000000  000000                       0,0
5071
5072  031022  000000                       DJ.EXP:         0               ;DJ11 RECV TABLE BUFFERS
5073          031420                       .=DJ.EXP+376
5074  031420  000000  000000                       0,0
5075
5076                                               .EVEN
```

```
5077
5078  031424  000000                    LINKER: 0                       ;BEGINNING OF LINKER AREA
5079                                    ;LINKER AREA LOOKS LIKE THIS
5080                                    ;VEC300:
5081                                    ;       JSR     %5,@#RCV.ISR FOR COMM DEVICE 0
5082                                    ;       DEV.#                           =0
5083                                    ;VEC304: JSR    %5,@#XMT.ISR
5084                                    ;       DEV.#                           =0
5085                                    ;       "
5086                                    ;       "
5087                                    ;       SAME DEVICE (IF MORE THAN ONE) NEXT LINE NUMBER
5088                                    ;       "
5089                                    ;       "
5090                                    ;       .
5091                                    ;       .
5092                                    ;VECXXX: JSR    %5,@#RCV.ISR FOR NEXT DEVICE TYPE
5093                                    ;       DEV.#                           =0
5094                                    ;       "
5095                                    ;       "                               =0
5096
5097                                    ;THE VECTOR FOR THE FIRST COMM DEVICE SHOULD BE 300
5098                                    ;THE CONTENTS OF 300 SHOULD BE # LINKER AND
5099                                    ;LINKER SHOULD POINT TO THE INTERRUPT SERVICE ROUTINE
5100                                    ;FOR THAT DEVICE AND SHOULD INTICATE LINE ZERO
5101                                    ;NOTE: SPECIAL PATCHES FOR PRODUCTION CHECKOUT WILL MAKE
5102                                    ;EXCEPTIONS TO THIS RULE-OK
5103                                    ;FOLLOWING THE LINKER AREA IS THE DM CORE.
5104
5105                                    ;CAT0:  =CURRENT ADDRESS TABLE FOR CHANNEL 0
5106
5107                                    ;"+40:  =WORD COUNT
5108                                    ;"+100: =BIT ASSEMBLY TABLE
5109                                    ;"+140: =UNUSED
5110                                    ;"+200: =TUMBLE TABLE
5111
5112                                    ;CAT1:  =CURRENT ADDRESS TABLE FOR CHANNEL 1
5113
5114                                    ;ETC.
5115
5116
5117
5118          000001                            .END
```

A = 000400

564# 565# 566# 567# 568# 569# 570# 571# 572# 573# 574# 575# 576#
577# 578# 579# 580# 581# 582# 583# 584# 585# 586# 587# 588# 589#
590# 591# 592# 593# 594# 595# 596# 2568# 2569# 2570# 2571# 2572# 2573#
2574# 2575# 2576# 2577# 2578# 2579# 2580# 2581# 2582# 2583# 2584# 2585# 2586#
2587# 2588# 2589# 2590# 2591# 2592# 2593# 2594# 2595# 2596# 2597# 2598# 2599#
2600# 2664# 2665# 2666# 2667# 2668# 2669# 2670# 2671# 2672# 2673# 2674# 2675#
2676# 2677# 2678# 2679# 2680# 2681# 2682# 2683# 2684# 2685# 2686# 2687# 2688#
2689# 2690# 2691# 2692# 2693# 2694# 2695# 2696# 2762# 2763# 2764# 2765# 2766#
2767# 2768# 2769# 2770# 2771# 2772# 2773# 2774# 2775# 2776# 2777# 2778# 2779#
2780# 2781# 2782# 2783# 2784# 2785# 2786# 2787# 2788# 2789# 2790# 2791# 2792#
2793# 2794# 2796# 2797# 2798# 2799# 2800# 2801# 2802# 2803# 2804# 2805# 2806#
2807# 2808# 2809# 2810# 2811# 2812# 2813# 2814# 2815# 2816# 2817# 2818# 2819#
2820# 2821# 2822# 2823# 2824# 2825# 2826# 2827# 2828# 2914# 2915# 2916# 2917#
2918# 2919# 2920# 2921# 2922# 2923# 2924# 2925# 2926# 2927# 2928# 2929# 2930#
2932# 2933# 2934# 2935# 2936# 2937# 2938# 2939# 2940# 2941# 2942# 2943# 2944#
2945# 2946# 2947# 2948# 2950# 2951# 2952# 2953# 2954# 2955# 2956# 2957# 2958#
2959# 2960# 2961# 2962# 2963# 2964# 2965# 2966# 2968# 2969# 2970# 2971# 2972#
2973# 2974# 2975# 2976# 2977# 2978# 2979# 2980# 2981# 2982# 2983# 2984# 2986#
2987# 2988# 2989# 2990# 2991# 2992# 2993# 2994# 2995# 2996# 2997# 2998# 2999#
3000# 3001# 3002# 3078# 3079# 3080# 3081# 3082# 3083# 3084# 3085# 3086# 3087#
3088# 3089# 3090# 3091# 3092# 3093# 3094# 3095# 3096# 3097# 3098# 3099# 3100#
3101# 3102# 3103# 3104# 3105# 3106# 3107# 3108# 3109# 3110# 3111# 3112# 3113#
3114# 3115# 3116# 3117# 3118# 3119# 3120# 3121# 3122# 3123# 3124# 3125# 3126#
3127# 3128# 3129# 3130# 3131# 3132# 3133# 3134# 3135# 3136# 3137# 3138# 3139#
3140# 3141# 3142# 3816# 3817# 3818# 3819# 3820# 3821# 3822# 3823# 3824# 3825#
3826# 3827# 3828# 3829# 3830# 3831# 3832# 3833# 3834# 3835# 3836# 3837# 3838#
3839# 3840# 3841# 3842# 3843# 3844# 3845# 3846# 3847# 3848# 4733# 4734# 4735#
4736# 4737# 4738# 4739# 4740# 4741# 4742# 4743# 4744# 4745# 4746# 4747# 4748#
4749# 4750# 4751# 4752# 4753# 4754# 4755# 4756# 4757# 4758# 4759# 4760# 4761#
4762# 4763# 4764# 4765# 4766# 4767# 4768# 4769# 4770# 4771# 4772# 4773# 4774#
4775# 4776# 4777# 4778# 4779# 4780# 4781# 4782# 4783# 4784# 4785# 4786# 4787#
4788# 4789# 4790# 4791# 4792# 4793# 4794# 4795# 4796# 4797# 4798# 4799# 4800#
4801# 4802# 4803# 4804# 4805# 4806# 4807# 4808# 4809# 4810# 4811# 4812# 4813#
4814# 4815# 4816# 4817# 4818# 4819# 4820# 4821# 4822# 4823# 4824# 4825# 4826#
4827# 4828# 4829# 4830# 4831# 4832# 4833# 4834# 4835# 4836# 4837# 4838# 4839#
4840# 4841# 4842# 4843# 4844# 4845# 4846# 4847# 4848# 4849# 4850# 4851# 4852#
4853# 4854# 4855# 4856# 4857# 4858# 4859# 4860# 4861# 4862# 4863# 4864# 4865#
4866# 4867# 4868# 4869# 4870# 4871# 4872# 4873# 4874# 4875# 4876# 4877# 4878#
4879# 4880# 4881# 4882# 4883# 4884# 4885# 4886# 4887# 4888# 4889# 4890# 4891#
4892# 4893# 4894# 4895# 4896# 4897# 4898# 4899# 4900# 4901# 4902# 4903# 4904#
4905# 4906# 4907# 4908# 4909# 4910# 4911# 4912# 4913# 4914# 4915# 4916# 4917#
4918# 4919# 4920# 4921# 4922# 4923# 4924# 4925# 4926# 4927# 4928# 4929# 4930#
4931# 4932# 4933# 4934# 4935# 4936# 4937# 4938# 4939# 4940# 4941# 4942# 4943#
4944# 4945# 4946# 4947# 4948# 4949# 4950# 4951# 4952# 4953# 4954# 4955# 4956#
4957# 4958# 4959# 4960# 4961# 4962# 4963# 4964# 4965# 4966# 4967# 4968# 4969#
4970# 4971# 4972# 4973# 4974# 4975# 4976# 4977# 4978# 4979# 4980# 4981# 4982#
4983# 4984# 4985# 4986# 4987# 4988# 4989#

ACTIVE= 004000 2728 3023#
ACTVOC 022724 4440#
ADS 021706 4242#
AD.DC 001600 650# 768 1392
AD.DJ 001632 663# 1861 3876 3942
AD.DLC 001630 662# 1800 3750
AD.DLX 001700 689# 3717
AD.DMA 001606 653#
AD.DMB 001612 655# 2153 3166

```
AD.DN   001610            654#  2122
AD.DP   001604            652#
AD.DR   001616            657#
AD.DT   001624            660#
AD.DX   001626            661#
AD.KG   001614            656#  2194
AD.KL   001602            651#
AD.KLX  001676            688#
AD.PAP  001622            659#
AD.PAR  001620            658#
ANCIL   002420            833#
ANCMAP  023042           4487#
ANCNIT  007650           1852   1903   1924#
ANC1    002466            834    845#
ANC2    002506            845    848#
ANC3    002526            848    851#
ANC4    002546            851    854#
ANC5    002566            854    857#
ANC6    002606            857    860#
ANEXT   003034            833    924#
ANYDC   002174            775#
ANYDJ   002406            826#
ANYDLC  002372            822#
ANYDMA  002236            787#
ANYDMB  002256            794#
ANYDN   002250            791#
ANYDP   002214            782#
ANYDR   002272            800#
ANYDT   002340            813#
ANYDX   002352            817#
ANYKG   002264            797#
ANYKL   002202            778#
ANYPAP  002332            810#
ANYPAR  002320            806#
BCKCOR  011652           2191   2224   2306#
BCKGND  010752            723   2103#  2458
BEGIN   001702            456    460    691#   749
BEGINX  001734            694    696#
BELL  = 000207            356#  2436   4546
BELL1   012400           2422   2433#
BELL2   012424           2434   2438#
BELL3   012456           2441   2443   2446#
BINCNT  027234           1471*  1509   1551*  1566   2852   4732#
BITYP$  023556           2399   2402   4511   4623#
BIT0  = 000001            297#   836    877    955   1059   1520   1525   1951   2478   2485
BIT1  = 000002            298#   847    961   1068   1964
BIT10 = 002000            307#  2433
BIT11 = 004000            308#  1051
BIT12 = 010000            309#
BIT13 = 020000            310#   878   2391   2421
BIT14 = 040000            311#
BIT15 = 100000            312#   782    785    801    804   1441   1885   2859
BIT2  = 000004            299#   850    973   1077   1647   1975   3041   3074
BIT3  = 000010            300#   853    979   1086   1995
BIT4  = 000020            301#   856    991   1096   2004
BIT5  = 000040            302#   859    997   1106   2018
```

```
BIT6  = 000100          303#  1003  1116  1959  2002  2480  2482  2487  2488
BIT7  = 000200          304#  1009  1126  2707  2907  3048  3722  3755  4016  4033
BIT8  = 000400          305#  1015  2314
BIT9  = 001000          306#  1036  2306
BMOV    006264         1488   1544  1613#
BR.CTY  001656          678#  1954  1956
BR.DC   001634          669#  1170
BR.DJ   001654          677#
BR.DLC  001652          676#
BR.DMA  001642          672#
BR.DMB  001646          674#
BR.DN   001644          673#
BR.DP   001640          671#
BR.DX   001650          675#
BR.KL   001636          670#
BR.LP   001660          679#  1967
BR.RF   001664          681#  1998
BR.RK   001666          682#  2010
BR.RP   001670          683#  2021
BR.TC   001662          680#  1978
BSYEN = 004000          394#  1775
BUFA  = 000012          366#  3374  3388  3438*  3548*  3549*  3560*  3561*
BUFC  = 000014          367#  3376  3378  3390  3392  3436*  3550*  3562*
BUFF    024234         1925   2104  2113  4179  4279  4300  4378  4726#  4727
BUSY  = 000020         2148#  2158
CARGEN  020740         1970*  4070#  4080*  4081  4083*  4093
CE    = 000010          411#  3176#  3465  3530  3653  3672
CHAIN = 000003          437#  3454
CHDEND= 000040          408#  3304  3432
CHENDS= 001000          403#  3528
CHIS  = 000200          405#  3300
CHRLIN  020736         1968*  4069#  4084*  4090*
CLEAN   016136         3290   3333#
CLEANU  020214         2535   2563  2624  2656  2730  2752  2758  2860  2908  3075  3171  3215  3739
                       3808   3849#
CLEAR   023046          765    935  1472  1854  2333  2362  4493#
CLENDJ  020512         3920   3999#
CLENUP  020220         3425   3851#
CLINK   001024          476#   717*  2412*  2440  2446*
CLRDXD  015534         1790   3218#
CLRMUX= 002000         2142#  2157
CLRSCN= 004000         2141#  2157
CLRVEC  002066          718    741#
CLR1    023056         4497#  4499
CL1     006606         1681#  1683
CMA     021674         4237#  4279*  4300*  4321*
CMDCHN= 000004          398#  3452
CMDREJ= 000200          418#  3523
CMD.ST  017572         1707   3649#
CNT     022716         1516*  1518*  4437#
CODRCV  005036         1291   1311  1338#
CODXMT  005062         1292   1345#
COREX   011666         2310#  2311  2313
CORNIT  010570         2041   2047#
COUNT1  012724         2505#
COUNT2  012726         2506#
```

DZQCAB.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
CTKB    023014          4036    4038    4040    4042    4475#
CTKDAT  020722          1957#   4038    4045#   4046    4048#   4052#
CTKRCV  020724          4040#   4041#   4054#
CTKS    023012           835    1960#   2482#   2488#   4033    4049#   4474#
CTPB    023020          4023#   4477#
CTPDAT  020612          1958#   4019#   4020    4022#   4023    4028#
CTPS    023016           839     841#    842#   1959#   2480#   2487#   4016    4476#
CTPI    020566          4021    4023#
CTYDWN  012602          2393    2423    2435    2478#   2494    4545
CTYNIT  010026          1941    1951#
CTYP    020534          1955    4016#
CTYR    020614          1953    4033#
CTYR2   020714          4043    4047    4049#
CTYR3   020672          4039    4045#
CTYR4   020676          4037    4046#
CTYUP   012634          2415    2432    2437    2485#   2499    4547
CU      016230          1757    3273    3356#   3373    3387    3403    3414
CUART = 000002           383#   3273#   3274
CUBSY = 000400           396#   3270    3499
CUCRT = 000003           384#   3540    3542    3563
CUDEMO= 000020           407#   3304    3434
CUDT  = 000002          3364#   3371    3385
CUE   = 000040           415#   3504
CUES  = 000001          3363#   3401    3412    3475
CUIDL = 000000          3362#
CV1     002076           743#    747
CX1$    006752          1725    1731#
DACNT   022714          4436#
DAE     021700          4239#   4282#   4303#   4324#
DAF     021676          4238#   4281#   4302#   4323#
DATA  = 000001           433#   3369    3383    3397    3480    3547    3559
DATINT  007662          1926#   1943
DBR     021702          4240#
DCADRS  023003          4470#
DCDATA  013104          1393    2532#   2534    2554    2557    2559#   2561#   2567#
DCINIT  005206          1388#
DCOUT   012764          2533#
DCRX1   013064          2558    2561#
DCRX2   013072          2560    2562#
DCS     021670          2002#   4235#   4275    4278#   4283#   4296    4299#   4304#   4317    4320#   4325#
DCT   = 000000           374#   1739#   1742    1744#   1749    1761#   1762#   3336#   3337    3368#   3369    3374    3376
                        3378    3382#   3383    3388    3390    3392    3396#   3397    3399    3404    3409#   3410    3415
DCTA    006460          1662#   1735#   1739
DCTP    017632          1740    1756    3276    3284    3336    3689#
DCTZ  = 000420           370#   1743
DC.RCV  012776          1177    2539#
DC.XMT  012730          1178    2521#
DE    = 000004           412#   3177#   3465    3530    3653    3672
DEV     016210          1731#   3282    3333#   3334    3341#   3342#   3343    3346#   3372    3386    3402    3413
DEVCNT  023044           896#    904#    919    4488#
DEVICE  005114           722    1366#   2457
DEVNUM= 000010          1718    3186#   3187
DEVSTA= 000004           363#   3369    3383    3397    3399    3410    3451#   3454#   3468#   3480    3483    3496    3547#
                        3559#
DFILE   022710          1925#   1929#   1930#   1932#   1933#   4434#
DFLT.C  017532          3629#
```

DZQCAG.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
DFLT.S  017612          3668#
DISPLA= 177570           348#   4680#   4684#
DII     007704          1929#   1938    1947
DJINIT  007440          1797    1838    1851#
DJLINE  007642          1872#   1883    1887#   1908#
DJ.BNT  007646          1877#   1880    1890#   1910#
DJ.CNT  007644          1858#   1899#   1909#
DJ.EXP  031022          1862    3973    3976    3990#   3991#   5072#   5073
DJ.RCV  020344          1263    3927#
DJ.RTL  020530          1866#   3992#   4010#
DJ.TEM  020532          3940#   3941#   3971    4011#
DJ.XMT  020224          1264    3858#
DJ.XTB  030420          1855    3905    3906#   3907#   5068#   5069
DJ.XTL  020526          1865#   3916#   4009#
DLDATA  020114          1801    3735#   3736#   3738    3786    3788    3802    3804#   3806#   3815#
DLINIT  007230          1666    1781    1796#
DLOUT   017730          3737#
DLRX1   020072          3803    3806#
DLRX2   020100          3805    3807#
DLSAVE  020112          3785#   3786    3789    3810#
DLYCNT  007434          1807#   1810#   1816#   1819#   1844#
DL.RCV  017742          1254    3743#
DL.XMT  017652          1255    3710#
DMADRS  023006          1486    1552    4472#
DMANIT  005572          1435    1467#
DMARK   014546          2849#   2850    2854    2857#   2911#
DMA.0   005676          1506#   1534
DMA.00  005742          1517#   1519
DMA.1   006004          1507    1528#
DMA.10  006134          1558#   1585
DMA.11  006250          1489    1594#
DMA.12  006256          1545    1606#
DMA.13  006052          1538    1541#
DMA.2   006016          1526    1533#
DMA.3   006036          1537#   1543
DMA.4   006170          1560#   1567#
DMA.5   006202          1561#   1572#
DMA.6   006200          1563#   1571#
DMA.8   006222          1559    1580#
DMA.9   006234          1578    1584#
DMBBOT  011252          2156    2181#
DMBISR  015370          1208    3159#
DMBTOP  011124          2155#   2184
DMY.IS  015436          1227    3195#
DM.CAT  014652          1493    1553    2949#
DM.LDA  014612          1473    1535    1556    1594#   2853    2890#   2891    2894#   2896#   2931#
DM.RCV  014342          1197    2865#
DM.RDA  015012          1606    2886    2891    2893#   2897#   3003#
DM.R1   014372          2874    2876#
DM.R2   014376          2877#
DM.R3   014404          2878    2880#   2902    2904
DM.R4   014472          2884    2895    2898#
DM.R5   014524          2882    2905#
DM.R6   014422          1490    1546    2886#
DM.R7   014462          2892    2896#
DM.R8   014550          2899#   2900#   2901    2912#
```

DZQCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
DM.TT   014752          1495    1555    2876    2905*   2985#
DM.WCT  014712          1494    1554    2967#
DM.XMT  014222          1190    2833#
DM.X1   014254          2842    2844#
DM.X2   014262          2846    2848#
DM.X3   014274          2850#   2858
DM.X4   014320          2851    2856#
DM11BB  011100          2119    2149#
DNACT   011026          2118#
DNADRS  023010          3039    4473#
DNBK1   011056          2126#   2133
DNBK2   011072          2127    2131#
DNDATA  015242          1636    2121    3044    3063*   3077#
DNIFLG  015366          3040#   3065*   3070    3155#
DNINIT  006340          1469    1587    1634#
DNPR1   006364          1639#   1652
DNPR2   006426          1640    1649#
DNPR3   006434          1648    1651#
DNPR4   006400          1642#   1646
DNRCVD  015354          3053    3149#
DNXMTD  015342          1644    2130    3143#
DN.ISR  015054          1203    3031#
DN.I1   015114          3042#   3069
DN.I2   015206          3043    3066#
DONE  = 000200           390#   2147#   2177    3265
DPADRS  023004          4471#
DPIA    005476          1436#   1444#   1460    1461*
DPIB    005464          1442#   1463
DPIC    005530          1445    1454#
DPINIT  005420          1411    1434#
DPRCVD  014022          1438    2711#   2712    2714    2720#   2725#   2726#   2760#
DPXMTD  014122          1437    2721#   2748    2749#   2754#   2756#   2795#
DP.RCV  013532          1190    2698#
DP.R1   013660          2713    2726#
DP.R2   013654          2715    2725#
DP.R4   013672          2727    2729#
DP.R5   013666          2724    2728#
DP.XMT  013704          1191    2734#
DP.X2   013770          2747    2753#
DP.X3   014016          2750    2755    2758#
DST     006454          1660#   1676#   1682    1691    1704    1763    1770#   1777#
DS.0    006664          1704#
DS.1    006674          1706#   1709#
DS.2    006702          1708#   1710
DS.3    015544          3220#   3222
DS.4    006634          1692#   1694
DS.5    006654          1700#   1702
DS1     016036          3293    3296#
DS2     016054          3297    3300#
DS3     016072          3301    3304#
DS4     016110          3305    3309#
DTDONE  016634          3306    3431#
DTERR   016676          3435    3442#
DVICE   002052           715     722#    726    4583    4717
DXBA    017406          3225*   3374*   3388*   3576#
DXBC    017410          3226*   3375*   3378*   3389*   3392*   3577#
```

```
DXBF  = 000020          369#  3560
DXCA    017400         3372*  3373*  3386*  3387*  3402*  3403*  3413*  3414*  3573#
DXCB    017416         3580#
DXCS    017402         1769*  1771*  1772*  1775*  1776*  1779*  1780*  1789*  1792*  3212*  3227*  3265*  3270*
                       3379*  3393*  3405*  3416*  3499   3574#
DXDAT   006456         1661#  1678*  3201   3218   3225
DXDCK   015456         3203#  3210
DXDS    017376         3501   3572#
DXDSC   017024         3294   3480#
DXDTE   015474         3204   3208#
DXES    017422         3211*  3233*  3582#
DXES1   017426         3584#
DXGO    015554         1793   3213   3225#
DXINIT  006462         1635   1653   1664#
DXISS   017132         3302   3513#
DXI.O   006474         1665   1668#
DXLEGA  017430         1025   3356   3588#
DXLP    016206         3345#
DXMT    017414         3579#
DXMO    017412         1791*  3228*  3229*  3230*  3231*  3578#
DXMOB   017424         3583#
DXND    017420         3581#
DXOFLI  007176         1717   1789#
DXOLI   006712         1716#
DXOL.I  015636         1244   3251#
DXOS    017404         1684*  3404*  3415*  3575#
DXOUT   015530         3207   3215#
DX.ISR  015442         1226   3199#
DX.OLF  006444          938*  1021*  1022   1228   1242   1656#  1716   2355
EMASK   022740         4446#
ENDCOR  001504          617#  1384*  1724   2050   2312
ENDEN = 020000          388#  1772   1776
ENDLNK  001500          615#  1274*  1368
ENDTAB  001502          616#  1369*  1483*  1484*  1485   1586*  1668*  1669*  1670   1671*  1672   1673*  1674
                       1675*  1676   1677*  1678   1679*  1735   1749*  2049*  2051   2318
ENDVEC  001476          614#  1272*
ERRDST  015434         3189#
ERRORS  001202          486#   697*  2390*  2428   4550   4574*
ESDONE  016700         3298   3446#  3536
ESEND = 000100          402#  3396
ES1     016736         3453   3455#
EXPND3  011700         2307   2314#
FCTNR = 000003          392#  3379
FCTNS = 000007          393#  3405   3416
FCTNW = 000005          391#  3393
FDATA   022706         1927*  1929   1931*  1932   1935*  1936*  1937   1945*  1946*  4433#
FENDZ   021142         1977   4125#  4214
FEND1   021166         4127   4131#
FIRSTV  001672          685#  1168
FL.ANC= 000001          491#  4024   4094   4229   4333   4355   4423
FL.CTY= 000001          503#  4025
FL.DC = 000002          492#   776   1388   2339   2562
FL.DJ = 004000          502#   828   1851   2361   3997
FL.DLC= 001000          500#   824   1796   2359   3807
FL.DMA= 000020          495#   789   2345   2906
FL.DMB= 000100          497#   795   2349   3170
```

F11

DZQCAG.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
FL.DN = 000040          496*    792    2347    3035
FL.DP = 000010          494*    784    1434    2343    2729
FL.DX = 000400          499*    820    2354    3214    3251
FL.KG = 000200          498*    798    2219    2351
FL.KL = 000004          493*    780    2341    2655
FL.LP = 000002          504*   4095
FL.RF = 000010          506*   4334
FL.RK = 000020          507*   4356
FL.RP = 000040          508*   4424
FL.TC = 000004          505*   4230
FSEG    022704         1924*  1939*   1940    1942    4432*
FVECT   001026          479*  1273*
FVECTX  004560         1273*
GO    = 000001          386*
HERE  = 000000          350*
HLT   = 104000          353*   1813    1822    1832    2008    2062    2082    2084    2087    2090    2109    2112    2176
                       2211    2531    2549    2552    2556    2614    2617    2639    2642    2649    2709    2719    2745
                       2843    2847    2875    2879    2889    3051    3055    3072    3169    3195    3206    3734    3766
                       3783    3801    3900    3963    3988    4018    4035    4044    4076    4079    4139    4141    4145
                       4153    4155    4161    4190    4192    4196    4208    4211    4218    4269    4277    4298    4319
                       4360    4364    4368    4392    4407
HLTADS  023446         4541*  4563*   4585*
HLTS    023210          451   4539*
HLT01   003114           10    952*
HLT02   003140           25    958*
HLT03   003164           37    964*
HLT04   003206           46    970*
HLT05   003232           55    976*
HLT06   003256           64    982*
HLT07   003300           73    988*
HLT10   003324           82    994*
HLT11   003350           91   1000*
HLT12   003374          100   1006*
HLT13   003420          109   1012*
HLT14   003444          118   1018*
HLT15   003550          132   1039*
HLT16   003572          141   1045*
HLT20   003644          158   1063*
HLT200  003620          150   1055*
HLT21   003670          169   1072*
HLT22   003714          180   1080*
HLT23   003740          191   1090*
HLT24   003764          202   1100*
HLT25   004010          213   1110*
HLT26   004034          221   1120*
HLT27   004060          231   1130*
HLT70   003512          129   1028*
HLT77   004176          241   1155*
HOOK    012524         2439   2456   2458*
ICNT    001200          485*   692   2115*   4673    4675    4677*   4678*   4680    4683*   4684    4690
IDLE  = 000000          431*
IE    = 000100          389*
ILLC  = 000405         3183*  3636
ILLUP   024222         4692   4719*
INBFRF  025234         2106   4321   4728*   4729
INBFTC  026234         2105   4224   4730*   4731
```

```
INFDSC= 004000          406#   3292   3432
INIT1   007022         1744#   1746
INIT2   007014         1742#   1748
INIT3   007062         1761#   1766
INIT4   007156         1774    1779#
INTENA= 000100         2145#   2168
INTOUT  016112         3271    3295   3299   3303   3307   3311#
INTREQ= 000100          419#   3526
INT1    015736         3269    3273#
INT2    016010         3279    3288#
IOTSAV  011744          702#   2047   2324   2331#
IOTS    023450          449     700    703   4595#
ISSHX   017304         3541    3553#
ISSH1   017176         3519    3524   3528#
ISSH1A  017170         3522    3526#
ISSH2   017212         3529    3534#
ISSH3   017224         3535    3540#
ISSH4   017306         3543    3558#
ISSH5   017360         3564    3567#
ISSH6   017366         3566    3568#
ISSREJ= 000010          397#   3501
KGCIT   011446         2228#
KGCP    011512         2200    2214   2252#
KGC12   011450         2217    2229#
KGDP    011452         2199    2216   2233#
KGEND   011422         2197    2206   2220#
KGIP    011444         2198    2227#
KGSTRT  011266         2150    2190#
KGTA    011336         2201#   2215   2218
KGTEMP  011442         2208#   2209   2226#
KGTEST  011322         2198#
KGTOP   011312         2196#   2223
KITS    024042         4670    4676   4683#
KLADRS  022776         4468#
KLCSR   005354         1421#   1430
KLDAT   005324         1414#   1416
KLDATA  013432         1412    2619#  2620   2622#  2623   2645   2650#  2651   2653#  2660   2661   2663#
KLINIT  005304         1389    1402   1410#
KLOFF   005400         1422    1426#
KLRA  = 176502         2628#   2637   2640   2643   2645   2647   2654#
KLRB  = 013433         2661#
KLRSD   023000         1418    4469#
KLR1    013406         2653#
KLR2    013414         2644    2652   2654#
KLR3    013372         2646    2650#
KLR4    013376         2648    2651#
KLXA  = 176504         2603#   2612   2615   2623#
KLXB  = 013432         2660#
KLXSET  001674          686#   1424
KL.SD   022774         1419    4467#
KL.XT   013270         2621    2623#
KL.RCV  013302         1184    2630#
KL.XMT  013204         1185    2605#
LAD     024070         2116#   2328#  4679#  4685   4687   4690#
LEVEL4= 000200          330#
LEVEL5= 000240          331#
```

```
MODE     016224     1773   3354#  3473   3493
MOD10    005024     1224   1252   1260   1270   1322   1332#
MONIT    012134     2369#  2388   2418
MONITX   012176     2377   2381   2390#
MONITZ   012150     2380#  2383*  2385
MONIT1   012276     2370   2392   2416#
MSGDNR   030022     2394   5016#
MSGERR   027760     2430   5008#
MSGHED   027775     4552   5011#
MSGMAP   030052     2368   4504   5020#
MSGPAS   027743     2427   5005#
MSGX     027665     2495   4997#
MSG0     027645     4994#
MSG1     027714      880   2496   5001#
MX.DC    001542      634#   771   2337
MX.DJ    001574      647#
MX.DLC   001572      646#
MX.DMA   001550      637#
MX.DMB   001554      639#
MX.DN    001552      638#
MX.DP    001546      636#
MX.DR    001560      641#
MX.DT    001566      644#
MX.DX    001570      645#  2352
MX.KG    001556      640#
MX.KL    001544      635#
MX.NEX   001576      648#
MX.PAP   001564      643#
MX.PAR   001562      642#
N      = 000010     3688#  3691#  3693#  3695#  3697#  3699#  3701#  3703#  3705#
NACT     010250     1984   1988#
NDCS     023030     4482#
NDMS     023036     4485#
NDNS     023040     4486#
NDPS     023034     4484#
NEXT     003020      772    917#
NKLS     023032     4483#
NONL     007174     1727*  1738   1755   1784#
NOP    = 000240      351#
NOPC   = 000403     3181#  3634
NOSAC    002446      839#   840
NO.DC    001506      619#   770   1171   1390
NO.DJ    001540      632#  1858
NO.DLC   001536      631#  1798
NO.DMA   001514      622#
NO.DMB   001520      624#
NO.DN    001516      623#  2123
NO.DP    001512      621#
NO.DR    001524      626#
NO.DT    001532      629#
NO.DX    001534      630#  1034   1231   1239
NO.KG    001522      625#
NO.KL    001510      620#
NO.PAP   001530      628#
NO.PAR   001526      627#
NT1      003036      925#
```

```
RFLIM   021716          4246#   4296    4307    4328
RFRTI   022314          4287    4291    4308    4312    4329    4333#
RF11    023024           852    4479#
RINP  = 000001           424#   3565
RK3AR   022346          2012*   4346#   4352*
RKCSR   022350           855    2015*   4347#   4354*   4358    4366
RKCSRH  022352          4348#
RKDAE   022336          2014*   4342#   4351*   4370
RKDAH   022334          4341#   4372
RKDAR   022342          4344#
RKDBR   022340          4343#
RKDS    022332          2006    4340#
RKFUNC  022510          2011*   4354    4374*   4376#
RKINIT  010332          1996    2004#
RKISR   022424          2009    4358#
RKSTAR  022354          4350#   4361    4365    4369    4375
RKWC    022344          2013*   4345#   4353*   4362
RKWORD  022512          2013    4353    4377#
RK1     022364          4352#   4371    4373
RNULL = 000000           423#
RNUM    021126          4118#   4183    4228
ROTVAL  010676          2075#   2088
ROUTP = 000002           425#   3551    3552    3567
RPBAR   022530          2023*   4387#   4399    4400    4420*
RPCA    022516          4382#   4409
RPCSR   022532           858    2025*   2026    2031*   4388#   4390    4394    4401    4412*   4414    4422*
RPCSRH  022534          4389#
RPD     010460          2023#
RPDAH   022520          4383#
RPDAR   022524          4385#
RPDSR   022522          2028    2030*   4384#   4397    4398
RPFUNC  022700          2022*   4411*   4422    4427#
RPINIT  010426          2005    2018#
RPISR   022536          2020    4390#
RPSTAR  022622          4393    4408    4412#
RPTFLG  002734           699*    871     882*    886#
RPWC    022526          2024*   4386#   4421*
RPWORD  022676          2024    4421    4426#
RPX     022606          4395    4409#
RPD     022630          4414#   4415
RPI     022636          4410    4420#
RSTART  001000           460#
RSTPC   023206          4529*   4537#
RSTRG   023166          1620    1630    4500    4529#
RSTS  = 000003           426#   3466    3467
RU.ANC  001306           544#   2366    2419*   4025*   4095*   4230*   4334*   4356*   4424*
RU.DC1  001310           545#   2334    2336
RU.DC2  001312           546#
RU.DJ   001340           557#
RU.DL1  001334           555#
RU.DL2  001336           556#
RU.DMA  001322           550#
RU.DMB  001326           552#
RU.DN   001324           551#
RU.DP1  001316           548#
RU.DP2  001320           549#
```

```
RU.DX   001332   554#  2357#
RU.KG   001330   553#
RU.KL   001314   547#
RU.MAP  001304   543#  2468*  4024*  4094*  4229*  4333*  4355*  4423*
R0      =%000000 334#   768*   894    943*   947*   951*   957*   963*   969*   975*   981*   987*   993*
                 999*  1005*  1011*  1017*  1024*  1033*  1034   1038*  1044*  1054*  1062*  1071*  1079*
                1089*  1099*  1109*  1119*  1129*  1154*  1157*  1168*  1272   1273   1289*  1309*  1326*
                1332*  1333*  1338*  1339*  1345*  1346*  1368*  1369   1370   1377*  1382*  1383*  1384
                1390*  1401*  1485*  1509*  1510   1511*  1512   1513*  1514*  1515   1517*  1586   1798*
                1837*  1859*  1873   1880   1896*  2050*  2052   2067   2160*  2164*  2167*  2179*  2198*
                2202   2217   2309*  2310*  2312   2336*  2467*  2473   2475   4397*  4503*  4514*  4694
                4713*
RCS     015672  3263#  3424
R1      =%000001 335#   742*   743    745    746    864*   867    881*   882    894*   898    905*   944*
                 946   1023*  1026   1032*  1133*  1137*  1138   1140*  1151*  1169*  1234*  1244*  1245*
                1274   1338   1340*  1341*  1342*  1345   1347*  1348*  1349*  1391*  1396   1405   1412*
                1414*  1418*  1423*  1425   1426*  1439*  1446*  1447*  1454*  1486*  1520*  1521   1522*
                1523*  1524*  1525*  1528*  1535*  1539   1541   1552*  1575*  1576*  1577   1583*  1594*
                1606   1614*  1617   1624*  1627   1636*  1642*  1649   1680*  1681*  1682   1690*  1693*
                1698*  1700*  1704*  1708*  1799*  1804   1841   1860*  1868   1979*  1980*  1981   2051*
                2052   2055*  2056   2059   2067   2069*  2070*  2071*  2072*  2104*  2107   2110   2113
                2121*  2126   2128*  2129   2152*  2181   2193*  2219*  2220   2365*  2369   2382   2398
                2409*  2414   2463*  2465   2497*  2521   2523*  2524*  2525   2532*  2534   2539   2541*
                2542*  2543   2554   2557   2559*  2561*  2562*  2605   2607*  2608*  2609   2619*  2620
                2622*  2623   2630   2632*  2633*  2634   2645   2650*  2651   2653*  2655*  2698   2700*
                2701*  2702   2711*  2712   2714   2720*  2721*  2725*  2726*  2729*  2734   2736*  2737*
                2738   2748   2749*  2754*  2756*  2833   2835*  2836*  2837   2853   2865   2867*  2868*
                2869   2876   2880*  2883*  2886   2890*  2891   2893*  2894*  2896*  2897*  2905*  2906*
                3031   3033*  3034*  3035*  3036*  3037   3049*  3050*  3159   3161*  3162*  3163   3170*
                3218*  3220*  3710   3712*  3713*  3714   3735*  3736*  3738   3743   3745*  3746*  3747
                3786   3788   3802   3804*  3806*  3807*  3850*  3858   3863*  3865   3927   3932*  3934*
                3935   3951*  3977*  3997*  4002*  4398*  4495*  4497*  4505   4510   4512   4568   4695
                4705*  4706*  4712*
R1S     015666  3261#  3423
R2      =%000002 336#   741*   743*   744*   769*   778*   787*   800*   817*   826*   865*   867*   906*
                 911    918    945*   946*  1025*  1030*  1031   1134*  1138   1170*  1283   1303   1392*
                1398*  1399*  1400*  1419*  1424*  1427*  1440*  1448*  1453*  1455*  1493*  1510*  1523
                1529   1553*  1560   1580   1615*  1617*  1625*  1627*  1637*  1643*  1644*  1647*  1691*
                1692*  1699*  1701*  1707*  1708   1800*  1806*  1808   1815*  1817   1826   1834*  1835*
                1836*  1861*  1873*  1893*  1898*  2054*  2055   2056   2060   2064   2105*  2107   2122*
                2131   2153*  2157*  2158   2161*  2162*  2163*  2168*  2170*  2172   2174   2177*  2182*
                2194*  2201*  2202*  2203*  2205   2208   2221*  2337*  2352*  2366*  2369   2382   2401
                2408*  2409   2410*  2414   2462   2522   2525*  2526*  2527*  2528*  2529   2533   2534*
                2540   2543*  2544*  2545*  2546*  2547   2550   2553   2554   2606   2609*  2610*  2611*
                2612   2615   2618   2623*  2631   2634*  2635*  2636*  2637   2640   2643   2645   2647
                2654*  2699   2702*  2703*  2704*  2705*  2706*  2707   2711   2716   2722*  2723*  2728*
                2735   2738*  2739*  2740*  2741*  2742*  2743   2746   2748*  2751*  2753*  2757*  2834
                2837*  2838*  2839*  2840*  2841   2844   2848   2850   2854*  2859*  2866   2869*  2870*
                2871*  2872*  2873   2899   2907*  3032   3037*  3038*  3160   3163*  3164*  3165*  3166*
                3167   3219*  3221*  3711   3714*  3715*  3716*  3717*  3718   3720   3737   3738*  3744
                3747*  3748*  3749*  3750*  3751   3753   3767   3768   3770   3785   3849*  3859   3865*
                3867*  3868*  3869*  3871   3876*  3879   3884   3902   3905*  3917   3928   3935*  3936*
                3937*  3940   3942*  3944   3965   3993   4001*  4399*  4496*  4498*  4696   4711*
R2S     015662  3259#  3422
R3      =%000003 337#   770*   866*   868*   919*  1136*  1152*  1171*  1210   1284   1304   1323   1393*
                1395*  1438*  1456*  1494*  1512*  1530   1554*  1561   1581   1616*  1618*  1626*  1628*
```

```
                    1801*  1803*  1862*  1879*  1883*  1884*  1885*  1888   1905*  2059*  2106*  2110   2123*
                    2124*  2125*  2132*  2199*  2203   2213   2214   2216*  2367*  2417*  2461*  2465   2468
                    3046*  3047   3720*  3721   3753*  3754   3770*  3771   3789*  3860   3871*  3873*  3884*
                    3885   3903   3929   3944*  3945   3949   3965*  3967   3973   4000*  4400*  4697   4710*
R3S     015656      3257#  3421
R4    =%000004       338#   771*   895   1172*  1182*  1195*  1211   1261*  1287   1298   1307   1317   1319
                    1394*  1396   1403*  1437*  1457*  1495*  1515*  1531   1556*  1562*  1563   1582   1641*
                    1645*  1802*  1804   1839*  1863*  1868   1897*  2060*  2129*  2200*  2209   2213   2464*
                    2467   2471*  3047*  3048*  3721*  3722*  3723*  3754*  3755*  3771*  3772*  3788*  3790*
                    3861   3885*  3886*  3888*  3902*  3903*  3904*  3905   3906*  3907*  3930   3949*  3950*
                    3967*  3968*  3969*  3971*  3972*  3973   3976*  3990*  3991*  3999*  4401*  4629   4630*
                    4650   4655*  4698   4709*
R4S     015652      3255#  3420
R5    =%000005       339#   903    920    935*  1281   1282   1302   1328   1329*  1555*  1594   1606   1614
                    1615   1616   1624   1625   1626   2166*  2174   2178*  2461   2476*  2523   2541   2607
                    2632   2700   2736   2835   2848*  2852*  2853*  2856   2867   2876*  2877   2880   2886
                    2898*  2901   2903*  2905   3033   3161   3712   3745   3851*  3863   3932   4003*  4495
                    4496   4699   4708*
R5S     015646      3253#  3419
R6    =%000006       340#  2326*  2327*  4560
R7    =%000007       341#  2329
SAT     021124     1979   4117#
SAVCC   022730     4442#
SAVE    007436     1826*  1827   1829   1845#
SAVPC   022726     4441#
SAVRG   023144     1613   1623   4494   4519#
SAVR2   022732     4443#
SAVR3   022734     4444#
SAVR4   022736     4445#
SAVTTP  016226     1734*  3264   3355#  3418*
SCALD.  017472     3607#
SCNENA= 000040     2146#  2170   2177
SCNT1   011134     2157#
SCNT1A  011154     2162#  2165
SCNT1B  011206     2169#  2180
SCNT1D  011240     2175   2177#
SCOPE = 104400      349#  2091   2120   2151   2192   2308   2317
SEGCNT  021122     4116#
SENSE = 000004      416#  3542
SENSEC= 000004     3182#  3635
SERV    021710     1999*  4243#  4263   4265   4267   4289*  4310*  4330*
SINPUT  016236     3349   3368#
SKIPVA  004776     1213   1215   1217   1219   1322#
SKIPV1  005006     1324#  1327
SKIPV2  005020     1325   1328#
SLR   = 177774      345#   695*
SM    = 000100      413#  1770
SMEN  = 010000      395#
SNS   = 000010      365#  3523*  3526*  3548   3558*
SNULL   016234     3348   3366#
SOUTPT  016336     3350   3382#
SO1     016434     3384   3394#
SP    =%000006      343#   692*   917    924   1375   2521*  2522*  2539*  2540*  2605*  2606*  2630*  2631*
                    2698*  2699*  2734*  2735*  2833*  2834*  2865*  2866*  3031*  3032*  3159*  3160*  3281*
                    3286   3710*  3711*  3743*  3744*  3849   3850   3851   3858*  3859*  3860*  3861*  3927*
                    3928*  3929*  3930*  3999   4000   4001   4002   4003   4582*  4700   4704*
```

```
SPACE   027637          2400    4556    4559    4565    4992#
SPW     006446          1657#   1670#   1684    1698    1759
SSCUE   016522          3352    3409#
SSTAT   016436          3351    3396#
SS1     016462          3398    3401#
SS2     016520          3400    3406#
SS3     016572          3411    3417#
SS4     016574          3345    3418#
STA   = 000002           435#   3399    3468    3483
STALL = 104400          3021#
START   000200           456#
STCH0   003150           956     961#
STCH1   003216           962     968     973#
STCH10  003654          1060    1068#
STCH11  003700          1069    1077#
STCH12  003724          1078    1086#
STCH13  003750          1087    1096#
STCH14  003774          1097    1106#
STCH15  004020          1107    1116#
STCH16  004044          1117    1126#
STCH2   003242           974     979#
STCH3   003310           980     986     991#
STCH30  004070          1052    1127    1133#
STCH4   003334           992     997#
STCH5   003360           998    1003#
STCH6   003404          1004    1009#
STCH7   003430          1010    1015#
STCH70  003504          1026#   1035
STCH8   003534          1016    1036#
STCH80  003520          1027    1031#
STCH9   003604          1037    1043    1049    1051#
STEP  = 000400          2144#   2163
STKSTB= 000002           401#   3296    3447
STOHLT  022762          4455#
STOR0   022742          4447#
STOR1   022744          4448#
STOR2   022746          4449#
STOR3   022750          4450#
STOR4   022752          4451#
STOR5   022754          4452#
STOR6   022756          4453#
STS   = 000016           368#    380#   3404    3415    3465*   3504*   3517*   3520*   3530*   3534
ST1     016334          3370    3380#
SVLAD$  024022          4668    4672    4678#   4686
SVRPC   023164          4519*   4526#
SWCHK   004104          1137#   1153
SWCHK2  004164          1139    1151#
SWITCH  003042           720     935#   1149
SWR   = 177570           347#    348     709     878     954     960     966     972     978     984     990     996    1002
                        1008    1014    1020    1021    1030    1041    1047    1056    1065    1074    1082    1092    1102
                        1112    1122    1132    2306    2314    2391    2421    2433    4543    4548    4571    4575    4669
                        4671
SW.ANC  001250           527#    960*   1951    1964    1975    1995    2004    2018    2365    2478    2485    2497
SW.DC1  001252           528#    966*   1172    1391
SW.DC2  001254           529#    972#
SW.DJ   001302           540#   1056*   1059    1068    1077    1086    1096    1106    1116    1126    1261    1860
```

```
SW.DJ0  001456          605#   1065*   1873    1880
SW.DJ1  001460          606#   1074#
SW.DJ2  001462          607#   1082#
SW.DJ3  001464          608#   1092#
SW.DJ4  001466          609#   1102#
SW.DJ5  001470          610#   1112#
SW.DJ6  001472          611#   1122#
SW.DJ7  001474          612#   1132#
SW.DL1  001276          538#   1041*   1799
SW.DL2  001300          539#   1047#
SW.DM0  001264          533#    996*   1195    1467    1506    1537    1558
SW.DM8  001270          535#   1008*   2149    2155
SW.DN   001266          534#   1002*   1634    1639    2116
SW.DP1  001260          531#    984*   1436    1444
SW.DP2  001262          532#    990#
SW.DX   001274          537#   1020*   1022*   1026    1232    1240    1664
SW.KG   001272          536#   1014*   2190    2196
SW.KL   001256          530#    979*   1182    1410    1421
SW.MAP  001246          526#    865     936     945     954*    955     961     973     979     991     997     1003    1009
                       1015    1036    1051    1134    1388    1434    1796    1851
SW00  =  000001         313#
SW01  =  000002         314#
SW02  =  000004         315#
SW03  =  000010         316#
SW04  =  000020         317#
SW05  =  000040         318#
SW06  =  000100         319#
SW07  =  000200         320#
SW08  =  000400         321#    329
SW09  =  001000         322#
SW10  =  002000         323#   4543
SW11  =  004000         324#   4671
SW12  =  010000         325#
SW13  =  020000         326#   4548    4575
SW14  =  040000         327#   4669
SW15  =  100000         328#
SWB   =  000400         329#   4667
SYSGEN  004204          721    1168#
SYSMAP  002130          719     765#
SYSM0   002666          863     872     875#
SYSM1   002732          879     884#
SYSRPT  012670         2444    2494#
SYSRST=  010000          400#   3268
SY.ANC  001212          511#    836*    847*    850*    853*    856*    859*    875     881
SY.DC1  001214          512#    769
SY.DC2  001216          513#    967
SY.DJ   001244          524#    826
SY.DL1  001240          522#
SY.DL2  001242          523#   1042
SY.DM0  001226          517#    787
SY.DM8  001232          519#
SY.DN   001230          518#
SY.DP1  001222          515#
SY.DP2  001224          516#    985
SY.DR1  001442          598#    800
SY.DR2  001444          599#
```

DZQCAG.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
SY.DT   001452            602#
SY.DX   001236            521#    817
SY.KG   001234            520#
SY.KL   001220            514#    778
SY.MAP  001210            510#    786     864     877#    903#    944     1133
SY.NXT  001454            603#
SY.PAP  001450            601#
SY.PAR  001446            600#
SY.SW   002644            867#    869
TABTRN  011746           2325     2327    2333#
TCBA    021100           4105#    4179#   4224#
TCBLK   021116           4114#
TCCM    021070           1988#    4101#   4128#   4132#   4134#   4137    4148#   4151    4169#   4171#   4180#   4183#   4188
                         4198#    4201#   4206    4225#   4228#
TCDT    021074           4103#    4142    4156    4159    4193    4212    4216
TCEXPT  021120           4115#    4133#   4142    4158#   4159    4166#   4193    4215#   4216
TCFIRS  021112           1992#    4112#   4133    4212
TCF1    021220           4131     4137#
TCF1A   021210           4134#    4143
TCF2    021252           4144     4147#
TCF3    021270           4147     4151#   4182
TCINIT  010172           1965     1975#
TCIV    021102           1977#    4107#   4125#   4131#   4147#   4165#   4172#   4177#   4182#   4200#   4222#   4227#
TCLAST  021114           4113#    4156    4166
TCMSK   021110           4111#
TCPRT   021104           1978#    4108#
TCRBK   021604           4219     4222#
TCRBI   021636           4222     4227#
TCRTI   021662           4129     4135    4149    4170    4173    4181    4184    4199    4202    4226    4229#
TCR1    021454           4172     4188#
TCR1A   021510           4195     4198#
TCR2    021516           4194     4200#
TCR3    021542           4200     4206#   4227
TCR4    021564           4213     4215#
TCST    021072           4102#    4126    4167
TCWBK   021404           4162     4177#
TCWBI   021436           4177     4182#
TCWC    021076           4104#    4178#   4223#
TCII    023022            849     4478#
TERTMP  022772           4463#
TIMES   024072           4675     4691#
TIOC    =000400          3178#    3631
TMPOAT  022760           1441#    1442#   1462    4454#
TRANSP  013540           2338     2340    2342    2344    2346    2348    2350    2353    2358    2360    2461#
TRAPS   023750            452     4667#
TR1     012542           2464#    2474
TR2     012546           2465#    2472
TR3     012560           2466     2469#
TR4     012576           2470     2475#
TSTCUE  017052           3455     3486    3491#
TSTX    017130           3494     3497    3500    3502    3508#
TSYNC   015052           1447     2714    3026#
TT      006460           1658#    1672#   1680    1733    3316
TTOAT   014552           2880#    2883#   2913#
TTP     =%000001          375#    1733#   1734    3264#   3266#   3267#   3268    3273#   3274    3289    3292    3296    3300
                         3304     3312#   3313#   3314    3316#   3418    3432    3434    3447    3452    3518    3528    3540
```

```
                    3542    3563
TTTT     006452     1659#   1674#   3314
TTY    =%000005      342#   2398#   2401#   2425#   2428#   4510#   4554#   4557#   4560#   4568#   4595    4596#   4597
                    4599    4600#   4601    4603    4611#   4612#   4613    4614#   4636#   4638#   4640#
TYDEV    012224     2368#   2396#   2416#
TYPE   = 000004      354#    880    1141    2394    2395    2400    2424    2427    2430    2431    2436    2491    2495
                    2496    4507    4508    4546    4552    4553    4556    4559    4565    4577    4654    4716
T.BI     006276     1617#   1619
T.LOD1   006324     1627#   1629
T1     =%000002      376#   1738#   1747#   1755#   1765#   3334#   3335#   3336    3337#   3338#   3339
T2     =%000003      377#   1740#   1742#   1756#   1761
T3     =%000004      378#   1743#   1745#   1757#   1758#   1759#   1763#
UC     = 000002      410#   1692    1700    3184#   3189    3520    3655    3656    3657    3658    3659    3660    3661
                    3662    3663    3664    3665    3674    3675    3676    3677    3678    3679    3680    3681    3682
                    3683    3684
UCHKS  = 002000      404#   3518
UNIT     021106     4109#
UPADRS   021714     2001#   4245#   4282    4285#   4286    4290#   4303    4306#   4307    4311#   4324    4327#   4328
                    4332#
USEL     010222     1980#   1982
W      =%000005      379#   3274#   3275#   3276#   3281    3282#   3283#   3284#   3285#   3286#   3436#   3438#   3439#
                    3443#   3450#   3451#   3454#   3460#   3465#   3466#   3467#   3468#   3480    3483    3496    3504#
                    3505#   3506#   3517#   3520#   3521    3523#   3526#   3530#   3534    3547#   3548#   3549#   3550#
                    3551#   3552#   3558#   3559#   3560#   3561#   3562#   3565#   3567#   3568#
WAIT     016232     1732#   3278    3288#   3360#   3371#   3385#   3401#   3412#   3475#
WAITER   012662     2481    2491#
WC       021672     4236#   4280#   4301#   4322#
WDATA    021136     4122#   4180
WRITE    021752     4264    4275#
WRITEC=  000001     3179#   3632
WRTCHK   022066     4266    4296#
WRTM     021134     4121#
XLINK    012722     2442    2445#   2502#
XMHOOK   005202     1379    1381    1384#
XMISR    005140     1367    1375#
XMLOP1   010620     2054#   2068
XMLOP2   010624     2055#   2065
XMLOP3   010644     2057    2064#
XMRTS    010660     2053    2069#
XMTISR   005110     1282#   1348    1353#
ZFLAB  = 000400     3557#   3562
Z0       011742     2328    2329#
Z1       012066     2356    2358#
.      = 031426      446#    447     448#    455#    459#    464#    467#    475#    478#    484#    1141    1148#   1371
                    1540    1595    1607    2007    2027    2029    2081    2083    2086    2089    2108    2111    2159
                    2173    2210    2530    2548    2551    2555    2613    2616    2638    2641    2708    2717    2744
                    2887    3060    3071    3168    3377    3391    4017    4034    4075    4078    4138    4140    4152
                    4154    4160    4189    4191    4207    4210    4217    4276    4297    4318    4359    4363    4367
                    4391    4572    4577    4605    4626    4643    4646    4651    4657#   4690    4716    4720    4727#
                    4729#   4731#   5066#   5069#   5073#
.BIT   = 166000        1#    355#   4667
.PR      023724     4623#   4625#   4627#   4628#   4630    4634    4644#   4645    4648#   4650    4654    4657#
.PRF     023644     4632    4635    4640#
.PRL     023622     4633#   4649
.PTIT    023610     4624    4629#
.SAVR6   024226     4700#   4704    4722#
```

.TYPE 023554 4599* 4600 4616#

```
BITYPE      1#  2398  2401  4510
BLKBLK      1#
BUFHOR      1#
C        4732#  4733  4734  4735  4736  4737  4738  4739  4740  4741  4742  4743  4744  4745  4746
         4747   4748  4749  4750  4751  4752  4753  4754  4755  4756  4757  4758  4759  4760  4761
         4762   4763  4764  4765  4766  4767  4768  4769  4770  4771  4772  4773  4774  4775  4776
         4777   4778  4779  4780  4781  4782  4783  4784  4785  4786  4787  4788  4789  4790  4791
         4792   4793  4794  4795  4796  4797  4798  4799  4800  4801  4802  4803  4804  4805  4806
         4807   4808  4809  4810  4811  4812  4813  4814  4815  4816  4817  4818  4819  4820  4821
         4822   4823  4824  4825  4826  4827  4828  4829  4830  4831  4832  4833  4834  4835  4836
         4837   4838  4839  4840  4841  4842  4843  4844  4845  4846  4847  4848  4849  4850  4851
         4852   4853  4854  4855  4856  4857  4858  4859  4860  4861  4862  4863  4864  4865  4866
         4867   4868  4869  4870  4871  4872  4873  4874  4875  4876  4877  4878  4879  4880  4881
         4882   4883  4884  4885  4886  4887  4888  4889  4890  4891  4892  4893  4894  4895  4896
         4897   4898  4899  4900  4901  4902  4903  4904  4905  4906  4907  4908  4909  4910  4911
         4912   4913  4914  4915  4916  4917  4918  4919  4920  4921  4922  4923  4924  4925  4926
         4927   4928  4929  4930  4931  4932  4933  4934  4935  4936  4937  4938  4939  4940  4941
         4942   4943  4944  4945  4946  4947  4948  4949  4950  4951  4952  4953  4954  4955  4956
         4957   4958  4959  4960  4961  4962  4963  4964  4965  4966  4967  4968  4969  4970  4971
         4972   4973  4974  4975  4976  4977  4978  4979  4980  4981  4982  4983  4984  4985  4986
         4987   4988
DUMP        1#  4554  4567
DUMP:8      1#
FILBLK      1#
HLTL        8#    10    25    37    46    55    64    73    82    91   100   109   118   129   132
          141   150   158   169   180   191   202   213   221   231   241
LNKBLK      1#
MONMAP    564#  565   566   567   568   569   570   571   572   573   574   575   576   577   578
          579   580   581   582   583   584   585   586   587   588   589   590   591   592   593
          594   595
POP         1#  4708
PRINT       1#  4716
PUSH        1#  4694
SCOPE.      1#
SCOP.       1#
SDUMP       1#  2425  2428  4557  4560
TABDC    2568#  2569  2570  2571  2572  2573  2574  2575  2576  2577  2578  2579  2580  2581  2562
         2583   2584  2585  2586  2587  2588  2589  2590  2591  2592  2593  2594  2595  2596  2597
         2598   2599
TABDL    3816#  3817  3818  3819  3820  3821  3822  3823  3824  3825  3826  3827  3828  3829  3830
         3831   3832  3833  3834  3835  3836  3837  3838  3839  3840  3841  3842  3843  3844  3845
         3846   3847
TABDM    2914#  2915  2916  2917  2918  2919  2920  2921  2922  2923  2924  2925  2926  2927  2928
         2929  2932#  2933  2934  2935  2936  2937  2938  2939  2940  2941  2942  2943  2944  2945
         2946   2947  2950#  2951  2952  2953  2954  2955  2956  2957  2958  2959  2960  2961  2962
         2963   2964  2965  2968#  2969  2970  2971  2972  2973  2974  2975  2976  2977  2978  2979
         2980   2981  2982  2983  2986#  2987  2988  2989  2990  2991  2992  2993  2994  2995  2996
         2997   2998  2999  3000  3001
TABDN    3078#  3079  3080  3081  3082  3083  3084  3085  3086  3087  3088  3089  3090  3091  3092
         3093   3094  3095  3096  3097  3098  3099  3100  3101  3102  3103  3104  3105  3106  3107
         3108   3109  3110  3111  3112  3113  3114  3115  3116  3117  3118  3119  3120  3121  3122
         3123   3124  3125  3126  3127  3128  3129  3130  3131  3132  3133  3134  3135  3136  3137
         3138   3139  3140  3141
TABKL    2664#  2665  2666  2667  2668  2669  2670  2671  2672  2673  2674  2675  2676  2677  2678
         2679   2680  2681  2682  2683  2684  2685  2686  2687  2688  2689  2690  2691  2692  2693
         2694   2695
```

DZQCAG.P11 CROSS REFERENCE TABLE -- MACRO NAMES

ADC	2310	4285	4306	4327											
ADD	870	905	1245	1289	1309	1326	1332	1400	1426	1427	1454	1455	1461	1511	1514
	1528	1583	1650	1671	1673	1675	1677	1679	1759	1836	1896	1898	1905	1930	1933
	1936	2182	2221	2383	2416	2528	2546	2706	2742	2840	2872	2900	3039	3166	3313
	3436	3438	3549	3561	3717	3750	3876	3903	3942	3971	4284	4305	4326	4513	4566
	4608	4611													
ASL	1032	1235	1246	1296	1315	1403	1429	1459	1533	1542	1584	1651	1758	1839	1890
	1897	2124	2125	2183	2222	2471	2524	2526	2527	2542	2544	2545	2608	2610	2611
	2633	2635	2636	2701	2703	2704	2737	2739	2740	2836	2838	2839	2857	2868	2870
	2871	3034	3036	3038	3162	3164	3165	3275	3283	3335	3338	3713	3715	3716	3746
	3748	3749	3867	3868	3869	3873	3904	3934	3936	3937	3941	3972			
ASR	806	813	3049	3050	3951	3977									
BCC	910	1297	1316	1404	1430	1460	1534	1543	1585	1652	1840	1891	2184	2223	2472
	2858														
BCS	2081														
BEQ	701	715	863	872	876	908	941	956	962	968	974	980	986	992	998
	1004	1010	1016	1027	1037	1043	1052	1060	1069	1078	1087	1097	1107	1117	1127
	1139	1229	1233	1241	1243	1285	1305	1379	1381	1389	1397	1402	1411	1422	1435
	1445	1507	1538	1540	1559	1607	1635	1640	1717	1774	1797	1805	1828	1830	1838
	1852	1869	1891	1941	1943	1952	1965	1976	1984	1996	2005	2007	2019	2036	2041
	2048	2057	2086	2089	2108	2111	2119	2150	2156	2175	2191	2197	2210	2325	2356
	2370	2406	2439	2443	2448	2456	2466	2470	2479	2486	2555	2558	2644	2646	2648
	2713	2715	2842	2887	3054	3204	3269	3279	3290	3293	3297	3301	3305	3398	3435
	3453	3474	3481	3484	3494	3500	3502	3519	3522	3529	3535	3541	3564	3787	3803
	3974	4037	4039	4043	4144	4157	4160	4194	4217	4264	4363	4506	4544	4602	4643
	4646	4674	4686												
BGE	3060	3437	4195												
BGT	747	869	1153	2133	2418										
BHI	2313														
BIC	785	804	1333	1520	1522	1776	1980	2171	2177	2409	2480	2482	2722	2728	2757
	2859	2907	3041	3211	3212	3229	3231	3265	3270	3342	3723	3772	3790	3886	3907
	3969	4041	4132	4562	4612										
BICB	2883	3048	3273	3736	3991										
BIS	782	801	836	841	847	850	853	856	859	877	903	906	1022	1423	1424
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