RH70/RS03/4

DATA RELIABILITY TEST
CERSBC0

AH-8017C-MC

FICHE 1 OF 1

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IDENTIFICATION

PRODUCT CODE:	AC-8015C-MC
PRODUCT NAME:	CERSBCO RH70-RS03-RS04 DATA RELIABILITY DIAGNOSTIC
DATE CREATED:	AUG 1978
MAINTAINER:	DIAGNOSTIC GROUP
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1. ABSTRACT

This Diagnostic was designed to test RS03 and RS04 drives.

The CERSB Disk Data Test is a series of address and data reliability routines which verify to the user that the controller (RH70) and the disks (RS03 or RS04) are operating correctly. This test should be used in conjunction with the DERSA diagnostic.

NOTE

This program will destroy all data on the disks. Turn off all drives that you do not want to test.

2. REQUIREMENTS

2.1 Equipment

PDP11 standard computer with a minimum of 8K of memory, and an RH70 controller with an RS03 or an RS04 disk.

2.2 Preliminary Programs

DZRSA

3. LOADING PROCEDURE

Use standard procedure for ABS tapes.

4. STARTING PROCEDURE

4.1 Control Switch Settings

See 5.1 (all down for worst case testing)

4.2 Starting Address

Program and/or operator action

Load program into memory using ABS loader.

1. Starting address 200.

   A. Set switches (see sec 5.1). All down for worst case

   B. The display on the 11/45 will show the iteration count in the left byte and test number in the right. To use, set the data display switch to the display position.

   C. Press start.

The program will now map the data buffers in 4K segments on -A- port for all memory It will then type out the parameters of the data buffers. The program will only do this the first time it is started, for it stores these addresses and continues using them. To have the program remap the system, the program must be reloaded. All of memory will be tested. You may enter conversation mode and put data buffer where you wish and what ever size you wish.

5. OPERATIONAL SWITCH SETTINGS

Switch Settings Are:

SW<15> = 1 ..... HALT ON ERROR
SW<14> = 1 ..... LOOP ON FUNCTION
SW<13> = 1 ..... INHIBIT PRINTOUT
SW<12> = 1 ..... INHIBIT COMPARISON
WITH THIS SWITCH SET, THE
PROGRAM WILL NOT COMPARE THE
DATA IT READ FROM THE DISK WITH
THE KNOWN GOOD DATA.
SW<11> = 1 ..... HALT ON COMPLETION OF TRANSFER
SW<10> = 1 ..... ENTER CONVERSATION MODE
SW<09> = 1 ..... LOOP ON ERROR
SW<07> = 1 ..... WAIT IN WAIT MODE
PROGRAM RUNS IN A BACKGROUND TEST
WHILE WAITING FOR INTERRUPT, WITH
SW SET PROGRAM WAITS IN A WAIT
INSTRUCTION.
SW<06> = 1 ..... OPTIONAL TYPEOUT OF RETRY ERRORS
SW<05> = 1 ..... INHIBIT PASS COUNT
SW<04> = 1 ..... ALLOWS 8 ERROR TYPEOUTS IN THE
COMPARE ROUTINE BEFORE EXECUTING NEXT READ
COMMAND. WHEN SWITCH IS 0, ONLY 1 ERROR
TYPEOUT IS RECORDED.
SW<03> = 1 ..... TYPEOUT # OF ERRORS
SW<02> = 1 ..... INHIBIT MEMORY MANAGEMENT
SW<01> = 1 ..... DATA TEST ONLY
SW<00> = 1 ..... DROPS DRIVE AFTER 20 ERRORS

5.1 Data Reliability Test Mode

With SW8 set, the program will set the "BAI" bit in RHCS2 and transfer 64K of data at a time for all patterns except random. Random will be executed as usual with standard buffers. No compares are done in this mode of operation except on random patterns. This option should only be used in data test or conversation mode. When used in conversation mode it over rides the non standard word count. You should not select a desired disk address in conversation mode for it can produce a disk address overflow error for this data reliability test mode only does 64K word transfers. If SW8 is changed, while the program is running, the program will finish its pass before executing the switch change.

5.2 Conversation Mode for Program Parameters for Data Test Only

In conversation mode the operator can specify any one or all of the program parameters.

NOTE

Once in conversation mode, the only way to remap the system is to reload the program. To restart the program in conversation mode without having to reanswer the questions, the starting address is 210. Reset switch 10. To restart the program without having to reanswer the port sizing questions, restart at 220. Reset switch 10.

Description

The program will now ask several questions, the table below will help you answer the questions.

TYPE TO START AT		TYPE TO START AT	
0	000000		
1	020000	20	400000
2	040000	21	420000
3	060000	22	440000
4	100000	23	460000
5	120000	24	500000
6	140000	25	520000
7	160000	26	540000
10	200000	27	560000
11	220000	30	600000
12	240000	31	620000
13	260000	32	640000
14	300000	33	660000
15	320000	34	700000
16	340000	35	720000
17	360000	36	740000
		37	760000

TYPE TO START AT		TYPE TO START AT	
40	1000000	60	1400000
41	1020000	61	14200000
42	1040000	62	1440000
43	1060000	63	1460000
44	1100000	64	1500000
45	1120000	65	1520000
46	1140000	66	1540000
47	1160000	67	1560000
50	1200000	70	1600000
51	1220000	71	1620000
52	1240000	72	1640000
53	1260000	73	1660000
54	1300000	74	1700000
55	1320000	75	1720000
56	1340000	76	1740000
57	1360000	77	1760000

TYPE TO START AT		TYPE TO START AT	
100	2000000	120	2500000
101	2020000	121	25200000
102	2040000	122	2540000
103	2060000	123	2560000
104	2200000	124	2600000
105	2220000	125	2620000

106	2240000	126	2640000
107	2260000	127	2660000
110	2300000	130	2700000
111	2320000	131	2720000
112	2340000	132	2740000
113	2360000	133	2760000
114	2400000	134	3000000
115	2420000	135	3020000
116	2440000	136	3040000
117	2460000	137	3060000

NOTE:The formula to get numbers
to be typed is: Every 4Kboundry end
in four zeros
so disregard the last four digits and
divid the remaining
address by two. The resulting number is
to be typed in for
that 4K
bank.

NOTE: Type only numbers shown!!!

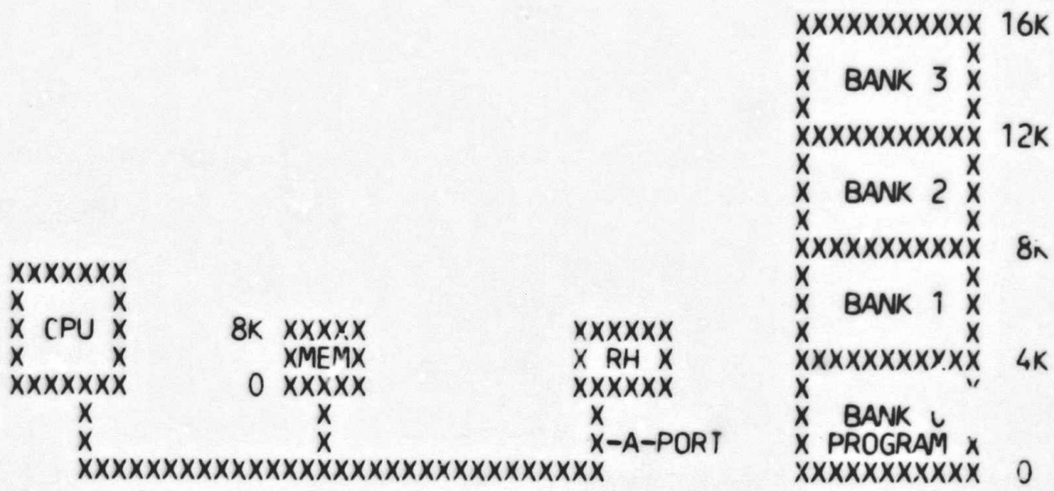
1. Type starting 4K bank # for data buffer on port A

   This will determine where your buffer area will start on -A-
   port. Use table above

NOTE:

Program is located in 1st 4K bank.
Therefore, this bank can not be used as
a buffer.

EXAMPLE:



These answers given below will test the configuration in the given example. Answers:

To Test -A- port
1) 1
2) 1

Program Conversation

MULTI DRIVE MODE? (YES-NO)

Multi disk mode is a mode in the program which allows the operator to exercise all the disks on the system without re-starting the program. The program, after exercising one disk will report a message telling the operator which disk will be selected next, and then the program will exercise that disk. When a complete pass is accomplished, a pass complete will be reported and the test will recycle.

If the answer to the multi drive mode was 'NO", the following question is asked.

TYPE UNIT #

The operator can now select the unit he wishes to test by typing the unit number.

OPTIONAL WORD COUNT (YES-NO)

If the operator answers 'NO" to this question the next question will be deleted from the conversation.

WD CT

The operator can specify any length transfer from 1(8). The normal transfer length is n(8) words where n is the maximum buffer size for the available core.

This program maps the system in 4K segments. If there is a 1K block of memory on the system that you would like to reach, you can type in that 4K bank # and then specify a wc of 2000.

If the word count number typed, is larger than the core size given in the setup routine, the question will be repeated.

OPTIONAL DSK ADDR (YES-NO)

If the answer to this question is no, the whole disk will be written and the next question is not asked.

DSK ADDR

The operator can now specify the starting sector

DATA PATTERN NO.?

If no optional data pattern is requested (#22) the program will execute the following list of data patterns.

PATTERN	0	= 000000
"	1	= 177777
"	2	= 031463
"	3	= 066666
"	4	= 100001
"	5	= 107070
"	6	= 070707
"	7	= 052525
"	10	= 125252
"	11	= 177737
"	12	= 146314
"	13	= 136363
"	14	= 063636
"	15	= 000001
"	16	= 100005
"	17	= 155555
"	20	= 133333
"	21	= Random data
"	22	= Run all data patterns under program control

In this section of the program parameter conversation mode, the operator can select any one or all three of the control functions to be executed. The normal sequence of disk functions under program control are WRITE, WRITE CHECK, and then READ. By entering the conversation mode the operator has gained complete control over the disk functions. He must specify yes or no to all of the following questions.

WRITE? (YES - NO)
READ? (YES - NO)
WRITE CHECK? (YES - NO)

To perform a WRITE CHECK only, the operator must first write some known data on the disk. This course of action also prevails for a READ only operation.
* If an error occurs in the line the operator is typing, depress the rub-out key and retype answer.
ALL ANSWERS SHOULD BE FOLLOWED BY A CARRIAGE-RETURN

5.3 Routine Abstracts

ADDRESS TEST

This test writes each sector with its own address then reads it back and compares it for the correct data.

RANEX - Random data, address and word count test

This routine tests the ability of the system to access random addresses with random data. Two sectors of random data are written at a starting random address on the disk. It is then write checked and read. All errors are reported. This is repeated 1000 times.

DATA RELIABILITY - data pattern test

In this portion of the test, the reliability of the disk surface is tested by WRITE, WRITE CHECK, and READ functions. The routine first writes the complete surface with a set data pattern, then a write check of the complete surface is accomplished, thus reporting all errors between the data written and the data in memory. The disk is then read. The data read from the disk is compared against the known data pattern. This compare is taking place the same time the disk is being read. The buffer is cleared as it is being compared.

5.4 Subroutine Abstracts

5.4.1 SCOPE

This subroutine call is placed between each subtest in the instruction section. It records the starting address of each subtest as it is being entered in location 'LAD'. If a scope loop is requested, the current subtest will be looped upon. The contents of LAD may be used to determine the last subtest successfully completed.

5.4.2 HLT

This routine prints out an error message (See 6.1). To inhibit typeouts, put SW<13> on a 1.

5.4.3 TRAPCATCHER

A ''.+2'' - ''HALT'' sequence is repeated from 0 - 776 to catch any unexpected traps. Thus any unexpected traps or interrupts will HALT at the vector + 2.

6. ERRORS

6.1 Error Printout

The format is as follows:

```
ADR    CS1 = ----- CS2 = ----- ER = -----
GOOD     . = ----- BAD = -----
```

Where:

CS1,CS2,ER etc.	= RS11 Disk Registers.
Good	= Expected Data.
Bad	= Data Received.

To find the failing test, look at the listing above the address typed.

If SW0 is set, a drive will be dropped from the test sequence after 20 errors. The program will state which drive was dropped and on which pass it was dropped. If all the drives have been dropped, the program will type "TESTING UNIT 0" and HALT", indicating that it could not find any more drives on the system to test.

7. RESTRICTIONS

None

8. MISCELLANEOUS

8.1 Execution Time

Pass complete will be typed out at end of pass. It will take between 15 to 20 minutes to complete a pass. add 30 seconds for each 4K. for data test.

8.2 Stack Pointer

Stack is initially set to 500

8.3 Power Fail

The starting address for the Write Power Fail Test is 270. A message will be typed out "load SW with unit # and cont." The operator now has to load the unit # in octal into the SW register in bits 00-01 and 02. Then hit continue. The program will tell the operator when to power down. When the system is powered up, only one error is allowed. The starting address for the Writecheck Power Fail Test is 274. Here as in the Write Power Fail Test, the program will tell the operator when to power down. When the power comes back, no errors should occur.

```
                                .TITLE  CERSB-C RH70-RS03 DATA AND RELIABILITY TEST
                                ;COPYRIGHT 1973,1974,1975, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                ;PROGRAM BY STANLEY HARACKIEWICZ

                                ;          SWITCH                    USE
                                ;          ------                    ---
                                        SW15=   100000          ;HALT ON ERROR
                                        SW14=   40000           ;LOOP ON FUNCTION
                                        SW13=   20000           ;INHIBIT ERROR TYPEOUTS
                                        SW12=   10000           ;INHIBIT COMPARISON
                                        SW11=   4000            ;HALT ON COMPLETION OF TRANSFER
                                        SW10=   2000            ;CONVERSATION MODE
                                        SW9=    1000            ;LOOP ON ERROR
                                        SW8=    400             ;
                                        SW7=    200             ;WAIT IN BACKGROUND TEST
                                        SW6=    100             ;OPTIONAL TYPEOUT OF RETRY ERRORS
                                        SW5=    40              ;INHIBIT PASS COUNT AND UNIT #
                                        SW4=    20              ;ALLOWS 8 LOCATIONS TO BE TESTED IN COMPARE ROUTINE
                                        SW3=    10              ;TYPE OUT TOTAL # OF ERRORS
                                        SW2=    4               ;INHIBIT MEMORY MANAGEMENT
                                        SW1=    2               ;DATA TEST ONLY
                                        SW0=    1               ;DROP DRIVE AFTER 20 ERRORS
000000                          .=      0                       ;TRAP CATCHER FROM 0 - 776
000046                          .=      46                      ;HOOKS FOR ACT 11
000046  013776                  $ENDAD
000052                          .=      52
000052  040000                  BIT14

000200                          .=      200
000200  000137  001234                  JMP     @#BEGIN         ;START TEST

000210                          .=      210
000210  012706  000500                  MOV     #500,SP         ;SETUP STACK
000214  000137  003176                  JMP     @#ADTST         ;RESTART ADDR

000220                          .=      220
000220  012706  000500                  MOV     #500,SP         ;CONVERSATION MODE WITHOUT
000224  000137  002322                  JMP     @#A1            ;DATA BUFFER QUESTIONS

000230                          .=      230
000230  000137  015142                  JMP     @#RLDR          ;RESTORE LOADER

000260                          .=      260
000260  000137  003252                  JMP     @#ADTL          ;TRACK AND SECTOR SELECT TEST
                                                                ;WRITE EACH WORD ADDR ON ITSELF AND READ IT BACK
                                                                ;LOCATION 1150 CONTAINS UNIT NO.

000264                          .=      264
000264  000137  005130                  JMP     @#RANEL         ;RANDOM ADDRESS, DATA TEST
                                                                ;LOCATION 1150 CONTAINS UNIT NO.

000270                          .=      270
000270  000137  012334                  JMP     @#PFT1          ;DISK WRITE POWER FAIL TEST

000274                          .=      274
000274  000137  012670                  JMP     @#PFT2          ;DISK WRITE CHECK POWER FAIL TEST
```

```
                                        ;RH70 DATA PATTERNS
                                        
000300  000000                          PAT0:   0
000302  177777                          PAT1:   177777
000304  031463                          PAT2:   031463
000306  066666                          PAT3:   066666
000310  100001                          PAT4:   100001
000312  107070                          PAT5:   107070
000314  070707                          PAT6:   070707
000316  052525                          PAT7:   052525
000320  125252                          PAT10:  125252
000322  177737                          PAT11:  177737
000324  146314                          PAT12:  146314
000326  136363                          PAT13:  136363
000330  063636                          PAT14:  063636
000332  000001                          PAT15:  000001
000334  100005                          PAT16:  100005
000336  155555                          PAT17:  155555
000340  133333                          PAT20:  133333
                                        ;PAT21  RANDOM DATA
                                        
                                        ;CLEAR ALL REGISTERS
000342  012777  000040  000464          .CLRDV: MOV     #40,@RSCS2      ;CLEAR ALL REG
000350  013777  001164  000456                  MOV     UNNUM,@RSCS2    ;GET UNIT #
000356  000002                                  RTI
```

```
                        .SBTTL          $KMMR - KERNAL MEMORY MANAGEMENT REGISTER ASSIGNMENTS

            177572                      SR0=177572          ;ADDRESS OF MEM MGMT REGISTER SR0
            177574                      SR1=177574          ;    ''   ''    ''       ''    SR1
            177576                      SR2=177576          ;    ''   ''    ''       ''    SR2
            172516                      SR3=172516          ;ADDRESS OF MEM MGMT REGISTER SR3

            172300                      KIPDR0=172300       ;ADDRESS OF KERNEL 'I' PAGE
            172302                      KIPDR1=172302       ;DESCRIPTOR REGISTERS
            172304                      KIPDR2=172304
            172306                      KIPDR3=172306
            172310                      KIPDR4=172310
            172312                      KIPDR5=172312
            172314                      KIPDR6=172314
            172316                      KIPDR7=172316

            172320                      KDPDR0=172320       ;ADDRESSES OF KERNEL 'D' PAGE
            172322                      KDPDR1=172322       ;DESCRIPTOR REGISTERS
            172324                      KDPDR2=172324
            172326                      KDPDR3=172326
            172330                      KDPDR4=172330
            172332                      KDPDR5=172332
            172334                      KDPDR6=172334
            172336                      KDPDR7=172336

            172340                      KIPAR0=172340       ;ADDRESSES OF KERNEL 'I' PAGE
            172342                      KIPAR1=172342       ;ADRESS REGISTERS
            172344                      KIPAR2=172344
            172346                      KIPAR3=172346
            172350                      KIPAR4=172350
            172352                      KIPAR5=172352
            172354                      KIPAR6=172354
            172356                      KIPAR7=172356

            172360                      KDPAR0=172360       ;ADDRESSES OF KERNEL 'D' PAGE
            172362                      KDPAR1=172362       ;ADDRESS REGISTERS
            172364                      KDPAR2=172364
            172366                      KDPAR3=172366
            172370                      KDPAR4=172370
            172372                      KDPAR5=172372
            172374                      KDPAR6=172374
            172376                      KDPAR7=172376
```

```
                        N=      1               ;INITALIZE FOR NEWTST
                        HLT=    EMT             ;SET HLT TO EMT FOR ERROR TYPEOUTS
                        PS=     177776          ;PROCESSOR STATUS
                        PSW=    PS              ;PROCESSOR STATUS WORD
                        SWR=    177570          ;SWITCH REGISTER
                        DISPLAY=SWR             ;DISPLAY REGISTER
                        BELL=   7               ;BELL
                        R0=     %0              ;R0 - DEFINE REGISTERS
                        R1=     %1              ;R1
                        R2=     %2              ;R2
                        R3=     %3              ;R3
                        R4=     %4              ;R4
                        R5=     %5              ;R5
                        SP=     %6              ;R6 - STACK POINTER
                        PC=     %7              ;R7 - PROGRAM COUNTER
                        BIT0=   1               ;BIT EQUATES
                        BIT1=   2
                        BIT2=   4
                        BIT3=   10
                        BIT4=   20
                        BIT5=   40
                        BIT6=   100
                        BIT7=   200
                        BIT8=   400
                        BIT9=   1000
                        BIT10=  2000
                        BIT11=  4000
                        BIT12=  10000
                        BIT13=  20000
                        BIT14=  40000
                        BIT15=  100000
                GOOD=   R1              ;FOR GOOD DATA
                BAD=    R0              ;FOR BAD DATA
```

```
                        000510                          .=      510
                                                        
000510  005015  044524  042515  NOINT:  .ASCIZ  <15><12>''TIMED OUT NO INTERRUPT''
000516  020104  052517  020124
000524  047516  044440  052116
000532  051105  052522  052120
000540     000
                                                        
000541     015  046412  046505  MTRAP:  .ASCIZ  <15><12>''MEM MGMT TRAP''
000546  046440  046507  020124
000554  051124  050101     000
                                                        
000561     015  046012  040517  LOADSW: .ASCIZ  <15><12>''LOAD SW WITH UNIT # AND CONT''
000566  020104  053523  053440
000574  052111  020110  047125
000602  052111  021440  040440
000610  042116  041440  047117
000616  000124
                                                        
000620  005015  040504  040524  DATA:   .ASCIZ  <15><12>''DATA ''
000626  000040
                                                        
000630  051127  052111  020105  WRTERR: .ASCIZ  ''WRITE ERR''
000636  051105  000122
                                                        
000642  051127  052111  020105  WCKERR: .ASCIZ  ''WRITE CK ERR''
000650  045503  042440  051122
000656     000
                                                        
000657     122  040505  020104  RDERR:  .ASCIZ  ''READ ERR''
000664  051105  000122
                                                        
000670  005015  040522  042116  RANDM:  .ASCIZ  <15><12>''RANDOM ''
000676  046517  000040
                                                        
000702  005015  042522  047503  RECOV:  .ASCIZ  <15><12>''RECOVERED RETRY CT ''
000710  042526  042522  020104
000716  042522  051124  020131
000724  052103  000040
                                                        
000730  005015  047503  046125  NOFND:  .ASCIZ  <15><12>''COULD NOT FIND DRIVE''
000736  020104  047516  020124
000744  044506  042116  042040
000752  044522  042526     000
000757     015  005012     000  CRLFLF: .ASCIZ  <15><12><12>
                                                        
000763     040  054450  047440  YORN:   .ASCIZ  '' (Y OR N)''
000770  020122  024516     000
                                                        
                        000776                          .EVEN
```

```
                        001000                  .=      1000
                        
001000  000000          000000          ICNT:   0               ;LH = ITERATION COUNT  ;RH = TEST NO.
001002  000000                          ERRORS: 0               ;ERROR COUNT
001004  000000  000000                  PCNT:   0,0             ;2 WORD PASS COUNT
001010  000000                          LAD:    0               ;LOOP ADDRESS FOR SCOPE
001012  000000                          HLTADR: 0               ;ADDRESS OF LAST HLT INSTRUCTION  EXECUTED
001014  001000                          FILCHR: 1000            ;FILCHR=0 (CHAR)  ;FILCHR+1=2 (COUNT)
001016  177564                          TPS:    177564          ;OUTPUT STATUS REGISTER
001020  177566                          TPB:    177566          ;OUTPUT BUFFER
                        
001022  000000                          TEMP1:  0
001024  000000                          TEMP2:  0
001026  000000                          TEMP3:  0
001030  000000                          TEMP4:  0
                        
                        
                        
                        
                                        ;DISK I/O REGISTERS
                        
001032  172040                          RSCS1:  172040          ;DISK CONTROL + STATUS REGISTER
001034  172050                          RSCS2:  172050          ;DISK CONTROL + STATUS REGISTER
001036  172042                          RSWC:   172042          ;WORD COUNT REGISTER
001040  172044                          RSBA:   172044          ;BUS ADDRESS
001042  172046                          RSDA:   172046          ;DISK ADDRESS (DESIRED ADDRESS)
001044  172052                          RSDS:   172052          ;DRIVE STATUS
001046  172054                          RSER:   172054          ;ERROR REG.
001050  172056                          RSAS:   172056          ;ATTENTION SUMMARY
001052  172060                          RSLA:   172060          ;LOOK AHEAD
001054  172062                          RSDB:   172062          ;DATA BUFFER REGISTER
001056  172064                          RSMR:   172064          ;MAINTENANCE REGISTER
001060  172066                          RSDT:   172066          ;DRIVE TYPE REGISTER
001062  172070                          RSBAE:172070            ;BUS ADDRESS EXTENSION
001064  172072                          RSCS3:  172072  ;CONTROL AND STATUS 3
001066  000204                          RSVEC:  204             ;INTERUPT RSVEC
                        
                                        ;BIT ASSIGNMENTS FOR ERROR TYPE OUTS
                        
                                                DB=2            ;DATA BUFFER
                        000002          
                                                DA=4            ;DESIRED ADD
                        000004          
                                                WC=10           ;WORD COUNT
                        000010          
                                                BA=20           ;BUS ADDRESS
                        000020          
                                                DS=40           ;DRIVE STATUS
                        000040          
                                                AS=100          ;ATTENTION SUMMARY
                        000100          
                                                LA=204          ;LOOK AHEAD
                        000204          
                                                MR=220          ;MAINTENANCE
                        000220          
                                                DT=240          ;DRIVE TYPE
                        000240          
                        
001070  000206                          STATUS: 206                     ;DISK !NTERRUPT STATUS
001072  000200                          PRIORITY:BIT7                   ;DISK PRIORITY LEVEL
```

```
                    000006          RW=6                    ;R/W IN PDR REG
                    000000          UP=0                    ;UP BITY IN PDR REG
                    000250          MMVEC=250               ;ADDR OF MEM MGMT ERROR TRAP
001074  000000                      STAMEM: 0               ;STARTING LOC FOR -A- PORT
001076  000000                      SAVAST: 0               ;SAVE LOC FOR STAMEM
001100  000000                      STBCOM: 0               ;STARTING LOC FOR -B- PORT
001102  000000                      SAVCPU: 0               ;SAVE LOC FOR CPUBM
001104  000000                      SAVMGA: 0               ;STARTING ADDR FOR -A- PORT  WITH MEM MGMT
001106  000000                      SAVMGB: 0               ;STARTING ADDR FOR B PORT W/MEM MGMT
001110  000000                      SAVMGC: 0               ;STARTING LOC FOR CPU W/MEM MGMT
001112  000000                      SIZEAP: 0               ;SIZE OF A PORT
001114  000000                      SIZEBP: 0               ;SIZE OF B PORT
001116  000000                      WDCTB:  0               ;WC FOR A PORT
001120  000000                      AOB1:   0               ;FLAG FOR PORT BEING TESTED
001122  000000                      VADDR:  0               ;VIRTUAL ADDR
001124  000000                      PHADDR: 0               ;PHYSICAL ADDR
001126  000000                      FLAG2:  0               ;FLAG FOR RESTART AND FOUND DRIVE
001130  000000                      DROP:   0               ;BAD UNITS ON SYSTEM THAT GET DUMPED

                        ;DISCRIPTION OF FLAG2

                        ;BIT0 = RESTART
                        ;BIT1 = FOUND DRIVE
                        ;BIT2 = ERROR DO A CRLF FOR UNIT #
                        ;BIT3 = DOING COMPARE
                        ;BIT4 = SET A16 IN CS1
                        ;BIT5 = SET A17 IN CS1
                        ;BIT6 = SET IF MEMORY HAS ALREADY BEEN FOUND
                        ;BIT7 = WHEN SET MAKE WC UP TO 28K
                        ;BIT8 = FOUND MEMORY ON -B- PORT
                        ;BIT9 = POWER DID FAIL
                        ;BIT10 = WAITING IN BACKGROUND TEST
                        ;BIT11 = PARITY ERROR ROUTINE
                        ;BIT12 = POWER FAIL TEST
                        ;BIT13 = IN MAP ROUTINE
                        ;BIT14 = IN POWER FAIL OR CONVERSATION MODE
                        ;BIT15 = ERROR IN POWER FAIL

                        ;DISCRIPTION OF FLAG

                        ;BIT0 = USED FOR WRITE COUNTER
                        ;BIT1 = USED FOR WRITE COUNTER
                        ;BIT2 = TRANSFER MODE 64K
                        ;BIT5 = OPTIONAL DMA
                        ;BIT6 = TEST -B- PORT
                        ;BIT7 = LAST DISK BUFFER FLAG
                        ;BIT8 = PROGRAM IS IN ADDRESS OR RANDOM TEST
                        ;BIT9 = ERROR DURING TRANSFER
                        ;BIT10 = DATA TEST ONLY
                        ;BIT11 = MULTIPORT
                        ;BIT12 = READ
                        ;BIT13 = WRITE CHECK
                        ;BIT14 = WRITE
                        ;BIT15 = PROGRAM CONTROL MODE
```

```
                                ;RH70 DEDICATE REGISTERS (MEMORY)

001132  000000                  FLAG:    0              ;TEST REGISTER
001134  000000                  WRDCT:   0              ;WORKING WORD COUNT
001136  000000                  TRACK:   0              ;WORKING DAE
001140  000000                  DMA:     0              ;WORKING DAR
001142  000000                  PATNU:   0              ;DATA PATTERN INDEX
001144  000000                  BUF:     0              ;WORKING DATA BUFFER (OUT-IN)
001146  000000                  TDMA:    0              ;TEMP DAR
001150  000000                  SWRDCT:  0              ;STANDARD WORD COUNT
001152  000000                  ERCOUNT:0               ;ERROR COUNT FOR MESSAGES.
001154  000000                  SAVE:    0
001156  000000                  HRDER:   0              ;POINTER FOR HARD ERROR
001160  000000                  BLOCK:   0
001162  000000                  PASSC:   0
001164  000000                  UNNUM:   0              ;UNIT CURRENTLY BEING TESTED
001166  000000                  UNITSV:  0              ;SET BIT=UNIT ON BUS
001170  000000                  UNCMP:   0              ;FOR COMPARING FOR # OF DEVICE
001172  000000                  RS04DT:  0              ;FLAG FOR RS04
001174  000000                  NUM$:    0              ;WORK LOC FOR NUMBER INPUTS
001176  000000                  CMD:     0              ;LOC FOR CS2 COMMANDS
001200  000000                  SWITCH:  0              ;FLAG FOR WHICH RANDOM NUMBER GEN
001202  000000                  INTFLG:  0              ;FLAG FOR INTERRUPT
001204  000000                  LOPCNT:  0              ;ERROR FLAG AND LOOP COUNTER FLAG
001206  000000                  WRITER:  0              ;CONTAINS # OF WRITE ERRORS
001210  000000                  WCERR:   0              ;CONTAINS # OF WRITE CHECK ERRORS
001212  000000                  READER:  0              ;CONTAINS # OF READ ERRORS
001214  000000                  COMERR:  0              ;CONTAINS # OF COMPARE ERRORS
001216  000000                  MMAVA:   0              ;MEM MGMT AVAILABLE INDICATOR
001220  000000                  SAVWC:   0              ;SAVE LOC FOR CONVERSATION WC ROUTINE
001222  000000                  FLAG3:   0              ;LOOP IN ADDRESS + RANDOM TST FLAG
001224  000000                  SAVWCB:  0              ;SAVE WC SIZE FOR -B- PORT

                                ;RH70 WORK REGISTERS
                                ;(CAN BE CHANGED IN ANY ROUTINE)
001226  000000                  WORK:    0
001230  000000                  WORK1:   0
001232  000000                  WORK2:   0
        000004                  ERRVEC=4
        177740                  LERADD=177740
        177742                  HERADD=177742
        177744                  MEMERR=177744
```

```
353  001234  012706  000500          BEGIN:  MOV     #500,SP         ;SET STACK TO  *** 500 ***
354  001240  012737  016350  000024          MOV     #.POWER,@#24    ;SET UP PF VECTOR
355  001246  012737  000340  000026          MOV     #340,@#26       ;LOCK OUT THE WORLD
356  001254  012737  016014  000030          MOV     #.HLT,@#30      ;SET EMT VECTOR
357  001262  012737  000340  000032          MOV     #340,@#32       ;LOCK UP
358  001270  012737  016744  000034          MOV     #.TRAP,@#34     ;SET TRAP VECTOR
359  001276  012737  000340  000036          MOV     #340,@#36       ;LOCK UP
360  001304  005037  001000                  CLR     ICNT            ;INIT ICNT
361  001310  005037  001010                  CLR     LAD             ;INIT LAD
362  001314  042737  177677  001132          BIC     #177677,FLAG    ;CLEAR FLAG
363  001322  042737  177776  001126          BIC     #177776,FLAG2   ;CLEAR ALL EXECPT RESTART
364  001330  005037  001222                  CLR     FLAG3           ;CLEAR LOOP IN ADDRESS + RANDOM TST FLAG
365  001334  032737  000001  001126          BIT     #BIT0,FLAG2     ;IS THIS THE FIRST TIME?
366  001342  001002                          BNE     1$              ;NO
367  001344  004737  020000                  JSR     PC,LDR          ;SAVE LOADER
368  001350  000005                  1$:     RESET                   ;CLEAR THE WORLD
369  001352  012737  000340  177776          MOV     #340,PS         ;LOCK UP INTERRUPT LEVELS
370  001360  004537  012300                  JSR     R5,ERRCL        ;CLEAR ERROR COUNTER + PASS CNT
371  001364  005037  001216                  CLR     MMAVA           ;CLEAR MEM MGMT FLAG
372  001370  005037  001120                  CLR     A0B1            ;TEST A PORT FIRST
373  001374  032737  000004  177570          BIT     #BIT2,SWR       ;WANT MEM MGMT?
374  001402  001021                          BNE     3$              ;NO
375  001404  012737  001432  000004          MOV     #5$,4           ;SET TIMEOUT TRAP
376  001412  012737  000340  000006          MOV     #340,6          ;SET PS
377  001420  005037  177572                  CLR     @#SR0           ;IS MEM MGMT AVAILABLE?
378  001424  005137  001216                  COM     MMAVA           ;YES
379  001430  000401                          BR      4$              ;CONT
380  001432  022626                  5$:     CMP     (6)+,(6)+       ;CLEAR STACK
381  001434  012737  000006  000004  4$:     MOV     #6,4            ;RESET
382  001442  005037  000006                  CLR     6               ;TRAP
383  001446  032737  000001  001126  3$:     BIT     #BIT0,FLAG2     ;IS THIS THE FIRST TIME
384  001454  001002                          BNE     CALM            ;NO
385  001456  000137  020070                  JMP     SIZZAP          ;SIZE BUFFERS
386  001462  004737  011464          CALM:   JSR     PC,@#EXTMEM     ;SET UP DATA BUFFERS
387  001466  004737  015170          CALM1:  JSR     PC,.MAMK        ;TURN ON PARITY MEM
388  001472  032737  000001  001126          BIT     #BIT0,FLAG2     ;1ST TIME ?
389  001500  001003                          BNE     3$              ;NO
390  001502  013737  001150  001220          MOV     SWRDCT,SAVWC    ;SAVE WC FOR CONVERSATION MODE COMPARE
391  001510  052737  000001  001126  3$:     BIS     #BIT0,FLAG2     ;SET 1ST TIME FLAG
392  001516  005037  001140                  CLR     DMA             ;CLEAR DAR REGISTERS
393  001522  005037  001142                  CLR     PATNU           ;CLEAR PATTER COUNT
394  001526  013737  001150  001134          MOV     SWRDCT,WRDCT
395  001534  032737  000002  177570          BIT     #BIT1,SWR       ;DATA TEST ONLY?
396  001542  001403                          BEQ     2$              ;NO
397  001544  052737  002000  001132          BIS     #BIT10,FLAG     ;YES
398  001552  032737  002000  177570  2$:     BIT     #BIT10,SWR      ;ENTER CONVERSATION MODE?
399  001560  001015                          BNE     1$              ;YES GO TO CONVERSATION MODE
400  001562  052737  074000  001132          BIS     #74000,FLAG
401  001570  004537  010214                  JSR     R5,RESTOR       ;RESTORE ORIGINAL WD CNT
402  001574  012737  017426  000004          MOV     #TIEOUT,ERRVEC
403  001602  012737  000340  000006          MOV     #340,ERRVEC+2
404  001610  000137  003176                  JMP     ADTST
405  001614  000137  002220          1$:     JMP     @#CONM          ;ENTER CONVERSATION MODE
```

```
                                        ;FIND OUT HOW MANY DRIVES
                                        ;FIRST TEST RSAS
                                        
001620  012701  000010          DRVENO: MOV     #8.,R1          ;PUT 8 INTO R1 FOR COUNT
001624  042737  000002  001126          BIC     #BIT1,FLAG2     ;CLEAR FOUND DRIVE FLG
001632  012777  000000  177174          MOV     #0,@RSCS2       ;SET DEVICE TO ZERO
001640  012777  000007  177200  TRY:    MOV     #7,@RSER        ;CAUSE AN ERROR +SETS BIT IN AS REG
001646  005301                          DEC     R1              ;DO A MAXIMUN OF 16 TIMES
001650  001403                          BEQ     DVNUM           ;TESTED FOR ALL DRIVES GET OUT
001652  005277  177156                  INC     @RSCS2          ;INCREMENT DRIVE UNIT
001656  000770                          BR      TRY             ;REPEAT FOR NEXT DRIVE
001660  017737  177164  001166  DVNUM:  MOV     @RSAS,UNITSV    ;SAVE
001666  043737  001130  001166          BIC     DROP,UNITSV     ;DROP BAD DRIVES
001674  012737  000401  001170          MOV     #401,UNCMP      ;SETUP TO CMP WITH UNITSV
001702  012737  000000  001164          MOV     #0,UNNUM        ;PUT 0 INTO UNIT NO.
001710  032737  000040  177570          BIT     #BIT5,SWR       ;INHIBIT TYPE OUT?
001716  001015                          BNE     STTEST          ;YES
001720  104402  001724                  TYPE    ,.+2            ;.ASCIZ <15><12>'TESTING UNIT ''
001744  042737  000004  001126          BIC     #BIT2,FLAG2     ;CLEAR ERROR FLAG
001752  033737  001170  001166  STTEST: BIT     UNCMP,UNITSV    ;IS THIS DRIVE ON THE SYSTEM
001760  001463                          BEQ     TRYNX           ;NO
001762  013777  001164  177044  UNTYP:  MOV     UNNUM,@RSCS2    ;YES PUT UNIT # INTO CS2
001770  005037  001172                  CLR     RS04DT          ;CLEAR DRIVE TYPE FLAG
001774  005777  177060                  TST     @RSDT           ;IS THIS A RS03?
002000  001417                          BEQ     1$              ;YES
002002  022777  000001  177050  2$:     CMP     #1,@RSDT        ;IS THIS A RS03 4US?
002010  001413                          BEQ     1$              ;YES
002012  022777  000002  177040  3$:     CMP     #2,@RSDT        ;IS THIS A RS04?
002020  001404                          BEQ     6$              ;YES
002022  022777  000003  177030          CMP     #3,@RSDT        ;RS04?
002030  001037                          BNE     TRYNX           ;GET A NEW NUMBER
002032  052737  177777  001172  6$:     BIS     #-1,RS04DT      ;YES RS04
002040  032737  040000  001126  1$:     BIT     #BIT14,FLAG2    ;IN POWER FAIL OR CONVERSATION?
002046  001401                          BEQ     7$              ;NO
002050  000207                          RTS     PC              ;YES
002052  032777  000200  176764  7$:     BIT     #BIT7,@RSDS     ;IS THIS DRIVE READY ?
002060  001423                          BEQ     TRYNX           ;NO GET ANOTHER DRIVE
002062  032737  000040  177570          BIT     #BIT5,SWR       ;TYPEOUT?
002070  001016                          BNE     4$              ;NO
002072  032737  000004  001126          BIT     #BIT2,FLAG2     ;WAS THERE AN ERRER?
002100  001402                          BEQ     5$              ;NO
002102  104402  000757                  TYPE    ,CRLFLF
002106                          5$:
002106  013746  001164                  MOV     UNNUM,-(6)      ;PUT UNNUM ON STACK
002112  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
002114  104402  000040                  TYPE    ,40             ;TYPE SPACE
002120  042737  000004  001126          BIC     #BIT2,FLAG2     ;CLEAR ERROR FLAG
002126  000430                  4$:     BR      NOWGO           ;NOW TEST
```

```
                                TRYNX:  ASL     UNCMP           ;CHECK NEXT BIT FOR DRIVE
                                        BCS     CHCKDV          ;DID WE TEST ANY REG?
                                        INC     UNNUM           ;INC UNIT #
                                        BR      STTEST          ;CHECK FOR NEXT DRIVE

                                CHCKDV: BIT     #BIT1,FLAG2     ;FOUND DRIVE?
                                        BNE     DONEE           ;YES WE DID TEST A DRIVE
                                        MOV     #100000,UNCMP   ;NO DRIVES TESTED, COULD NOT SET
                                        CLR     UNNUM           ;ANY AS BITS, THUS DEFAULTS TO 0
                                        MOV     UNNUM,-(6)      ;PUT UNNUM ON STACK
                                        TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
                                        TYPE    ,NOFND
                                        HALT                    ;COULD NOT SET ANY ATA BITS
                                                                ;BY SETTING ERROR BITS
                                                                ;GO BACK AND USE OTHER DIAG.
                                        BR      NOWGO           ;TEST DRIVE 0
                                DONEE:  JMP     OUT             ;GET OUT
                                NOWGO:  BIS     #BIT1,FLAG2     ;FOUND DRIVE
                                        RTS     PC

                                ;ENTER OPERATOR CONVERSATION MODE

                                CONM:   TYPE    ,STABUF
                                        RDOCT
                                        MOV     (6)+,STAMEM     ;START BUFFER AT 4K
                                        JMP     NOPORT          ;GET OUT
```

```
                                                1$:     TYPE    ,STABUF
                                                        TYPE    ,..+2           ;.ASCIZ 'B ''
                                                        RDOCT                   ;GET ANS
                                                        MOV     (6)+,STBCOM     ;AND SAVE IT
                                                4$:     TYPE    ,BUFSIZ
                                                        RDOCT                   ;GET ANS
                                                        MOV     (6)+,SIZEBP     ;SAVE IT
                                                        CMP     #6,SIZEBP       ;GREATER THEN 24K?
                                                        BLT     4$              ;YES ASK AGAIN
                                                        BIS     #BIT6,FLAG      ;SET B PORT FLAG
                                                NOPORT: JSR     PC,EXTMEM       ;CAL BUFFERS AND WC
                                                        MOV     SWRDCT,WRDCT    ;GET STANDARD WC
                                                A1:     BIS     #BIT10,FLAG     ;SET BIT FOR DATA TEST ONLY
                                                        JSR     R5,ERRCL        ;CLEAR ERROR CNT + PASS CNT
                                                        BIC     #174040,FLAG    ;CLEAR MULTI FLAG MODE +PATTERN SELECT
                                                        TYPE    ,..+2           ;.ASCIZ <15><12>'MULTI DRIVE''
                                                        JSR     PC,CMPY         ;COMPARE FOR YES
                                                        BNE     DATTES          ;ANS IS NO
                                                        BIS     #BIT11,FLAG     ;SET BIT FOR MULTI DRIVE
                                                1$:     BR      ASKWC
                                                DATTES:
                                                        TYPE    ,..+2           ;.ASCIZ <15><12>'TYPE UNIT # ''
                                                        RDOCT
                                                        MOV     (6)+,NUM$       ;GET NUMBER
                                                        CMP     #10,NUM$        ;CORRECT # ?
                                                        BLO     DATTES          ;NO
                                                        MOV     NUM$,UNNUM      ;SET UNIT #
                                                        JSR     PC,FNDTYP               ;TEST FOR RS04 OR 03
                                                1$:     CLR     R2              ;CLEAR WORK AREA
                                                        SEC                     ;SET CARRY
                                                2$:     ROL     R2              ;SET BIT IN WORK
                                                        TST     NUM$            ;IS THIS THE RIGHT BIT FOR THE RIGHT DISK
                                                        BEQ     3$              ;YES
                                                        DEC     NUM$            ;NO TRY AGAIN
                                                        BR      2$              ;TEST AGAIN
                                                3$:     MOV     R2,UNITSV       ;SET DRIVE BIT IN UNITSV
                                                        BIS     #BIT1,FLAG2     ;SET FOUND DRIVE FLAG

                                                ASKWC:
                                                        TYPE    ,..+2           ;.ASCIZ <15><12>'OPTIONAL WD CT''
                                                        JSR     PC,CMPY         ;COMPARE FOR YES
                                                        BEQ     WCCON           ;YES
                                                        BR      OPDAR           ;CONT
```

```
                                                WCCON:
                                                        TYPE    ,.+2            ;.ASCIZ <15><12>'WD CT ''
                                                        RDOCT
                                                        MOV     (6)+,NUM$       ;GET NUMBER
                                                        TST     NUM$            ;IS IT 0?
                                                        BEQ     WCCON           ;YES ASK AGAIN FOR LENGTH
                                                        MOV     SAVWC,R2        ;GET STANDARD WC FOR -A- PORT
                                                1$:     INC     R2
                                                        CMP     R2,NUM$         ;IS NUM$ LESS THAN SWRDCT
                                                        BLOS    WCCON           ;YES ASK FOR COUNT AGAIN
                                                        MOV     NUM$,SWRDCT     ;OPERATING WORD COUNT
                                                        MOV     SWRDCT,WRDCT

                                                OPDAR:
                                                        TYPE    ,.+2            ;.ASCIZ <15><12>'OPTIONAL DSK ADDR''
                                                        JSR     PC,CMPY         ;COMPARE FOR YES
                                                        BNE     OPPAT           ;ANS IS NO
                                                        BIS     #BIT5,FLAG      ;SET OPTIONAL DMA FLAG
                                                        TYPE    ,.+2            ;.ASCIZ <15><12>'DSK ADDR ''
                                                        RDOCT
                                                        MOV     (6)+,NUM$       ;GET NUMBER
                                                        TST     RS04DT          ;IS THIS A RS04?
                                                        BEQ     1$              ;NO
                                                        CMP     #17777,NUM$     ;IS ADD. CORRECT?
                                                        BR      2$              ;GET OUT
                                                1$:     CMP     #7777,NUM$      ;IS ADD. CORRECT?
                                                2$:     BLOS    OPDAR           ;NO
                                                        MOV     NUM$,TDMA       ;TEMP SECTOR REGISTER
```

```
551  002760                                  OPPAT:
552  002760  104402  002764                  TYPE    ,..+2           ;.ASCIZ <15><12>'DATA PATTERN # ''
553  003006  104420                          RDOCT
554  003010  012637  001174                  MOV     (6)+,NUM$       ;GET NUMBER
555  003014  022737  000023  001174          CMP     #23,NUM$        ;TEST FOR CORRECT NO
556  003022  101756                          BLOS    OPPAT           ;ASK AGAIN
557  003024  005037  001142                  CLR     PATNU           ;CLEAR PATTERN #
558  003030  022737  000022  001174          CMP     #22,NUM$
559  003036  001411                          BEQ     OPWRT           ;DATA PATTERN UNDER PROGRAM CONTROL
560  003040  052737  100000  001132          BIS     #BIT15,FLAG     ;SET PROGRAM FLAG
561  003046  013737  001174  001142          MOV     NUM$,PATNU      ;OPERATOR WANTS TO SELECT DATA
562  003054  000241                          CLC
563  003056  006137  001142                  ROL     PATNU
564
565  003062                                  OPWRT:
566  003062  104402  003066                  TYPE    ,..+2           ;.ASCIZ <15><12>'WRITE''
567  003076  004737  003234                  JSR     PC,CMPY         ;COMPARE FOR YES
568  003102  001003                          BNE     OPRD            ;ASK ABOUT WRITE CHECK
569  003104  052737  040000  001132          BIS     #BIT14,FLAG     ;YES SET FLAG BIT
570
571  003112                                  OPRD:
572  003112  104402  003116                  TYPE    ,..+2           ;.ASCIZ <15><12>'READ''
573  003126  004737  003234                  JSR     PC,CMPY         ;COMPARE FOR YES
574  003132  001003                          BNE     OPWCK
575  003134  052737  010000  001132          BIS     #BIT12,FLAG     ;SET FLAG TO READ
576
577  003142                                  OPWCK:
578  003142  104402  003146                  TYPE    ,..+2           ;.ASCIZ <15><12>'WRITE CK''
579  003162  004737  003234                  JSR     PC,CMPY         ;COMPARE FOR YES
580  003166  001003                          BNE     ADTST
581  003170  052737  020000  001132          BIS     #BIT13,FLAG
582
583  003176  032737  004000  001132  ADTST:  BIT     #BIT11,FLAG     ;ARE WE IN MULTI DRIVE MODE
584  003204  001402                          BEQ     EXMFLG          ;BRANCH IF NO.
585  003206  004737  001620                  JSR     PC,DRVENO       ;GET DRIVES TO BE TESTED
586  003212  042737  000004  001132  EXMFLG: BIC     #BIT2,FLAG      ;CLEAR XFER MODE FLAG
587  003220  032737  002000  001132  1$:     BIT     #BIT10,FLAG     ;TEST FOR DATA TEST ONLY
588  003226  001414                          BEQ     ADT1            ;DO COMPLETE TEST
589  003230  000137  003660                  JMP     DATAT           ;DO DATA TEST ONLY
590
591  003234  104402  000763          CMPY:   TYPE    ,YORN
592  003240  104422                          RDLIN
593  003242  122737  000131  017246          CMPB    #'Y,INPUT       ;TEST FOR YES
594  003250  000207                          RTS     PC
595  003252  052737  100000  001222  ADTL:   BIS     #BIT15,FLAG3    ;SET LOOP IN ADDRESS TEST FLAG GOT HERE
596                                                                  ;BECAUSE PROGRAM WAS STARTED AT 260
```

```
                                        ;RH70 ADDRESS TEST #1 (TRACK AND SECTOR SELECTION TEST)
                                        ;WRITE 100(OCTAL) RS03, 200(OCTAL) RS04, WORDS IN EACH SECTOR
                                        ;THE WORD CONTAINS THE ADDRESS OF EACH SECTOR
                                        ;WHEN THE COMPLETE DISK IS WRITTEN READ
                                        ;BACK EACH SECTOR AND COMPARE FOR THE CORRECT
                                        ;DATA IN THE SECTOR
                                        ;PS IS AT LEVEL 7 SO NO INTERRUPTS

003260                                  ADT1:                           ;ADDRESS TEST
                                        ;*****************************************************************************
                                        ;TEST 1         ADDRESS TEST
                                        ;*****************************************************************************
003260  104400                          TST1:   SCOPE
003262  012737  000340  177776          ADT1A:  MOV     #340,PS         ;LOCK UP PS
003270  005037  001024                          CLR TEMP2
003274  012737  020000  017326                  MOV     #20000,OUTBUF   ;START BUF AT 20000
003302  052737  000400  001132                  BIS     #BIT8,FLAG      ;SET TEST FLAG
003310  013737  001150  001154                  MOV     SWRDCT,SAVE     ;SAVE STD WD COUNT
003316  005037  001140                          CLR     DMA             ;CLEAR DISK ADD
003322  104426                                  CLRDV                   ;INIT DRIVE
003324  012737  000200  001134                  MOV     #200,WRDCT      ;SETUP WC
003332  012737  000200  001150                  MOV     #200,SWRDCT
003340  005737  001172                          TST     RS04DT          ;IS THIS A RS04?
003344  001006                                  BNE     2$              ;YES
003346  012737  000100  001134  1$:             MOV     #100,WRDCT      ;SETUP WORD COUNT
003354  012737  000100  001150                  MOV     #100,SWRDCT
003362  013737  017326  001144  2$:             MOV     OUTBUF,BUF      ;SET UP CURRENT ADDRESS
003370  104414                  SEABUF: ERCLR                           ;CLEAR RS REGISTERS IF ERROR
003372  013700  017326                          MOV     OUTBUF,R0       ;SET UP ADDRESS BUFFER
003376  013701  001134                          MOV     WRDCT,R1        ;
003402  013720  001140          XSEABUF:MOV     DMA,(0)+                ;LOAD OUTBUF WITH DATA TO BE WRITTEN
003406  005301                                  DEC     R1              ;FILL OUTBUF
003410  001374                                  BNE     XSEABUF         ;WITH DATA
003412  012737  000061  001176                  MOV     #61,CMD         ;WRITE NO I/E
003420  104416                                  DKCMD                   ;GO WRITE
003422  105777  175404                          TSTB    @RSCS1          ;CHECK FOR READY
003426  100375                                  BPL     .-4
003430  005777  175376                          TST     @RSCS1          ;TEST FOR ERROR
003434  100010                                  BPL     WRNEXB          ;BRANCH IF NO ERROR
003436  012737  003370  001010                  MOV     #SEABUF,LAD     ;SET UP LOOP ADDRESS
003444  052737  001000  001132                  BIS     #BIT9,FLAG      ;SET ERROR BIT IN FLAG
003452  104430                                  LOGW                    ;LOG WRITE ERROR
003454  104034                                  HLT     !WC!DA!BA
003456  104400                  WRNEXB: SCOPE
003460  004737  007204                          JSR     PC,DISBUF       ;SET UP NEXT DISK ADDR.
003464  000741                                  BR      SEABUF          ;WRITE NEXT SECTOR
003466  104400                  RRDSEC: SCOPE
```

```
644  003470  104414                    RDSECT: ERCLR                   ;CLEAR ERRORS
645  003472  012737  000071  001176            MOV     #71,CMD         ;READ NO I/E
646  003500  104416                            DKCMD                   ;DO A READ
647  003502  105777  175324                    TSTB    @RSCS1          ;CHECK FOR READY
648  003506  100375                            BPL     .-4             ;NOT READY BRANCH BACK
649  003510  005777  175316                    TST     @RSCS1          ;TEST FOR ERROR
650  003514  100006                            BPL     ADHGT           ;BRANCH IF NO ERROR
651  003516  052737  001000  001132            BIS     #BIT9,FLAG      ;SET ERROR FLAG
652  003524  104432                            LOGR                    ;LOG READ ERROR
653  003526  104014                            HLT     !WC!DA
654  003530  104400                            SCOPE
655  003532  013702  017326            ADHGT:  MOV     OUTBUF,R2
656  003536  005737  001172                    TST     RS04DT          ;RS04?
657  003542  001403                            BEQ     1$              ;NO
658  003544  012703  000200                    MOV     #200,R3         ;YES
659  003550  000402                            BR      SANHT           ;CONT
660  003552  012703  000100            1$:     MOV     #100,R3
661  003556  023712  001140            SANHT:  CMP     DMA,(2)         ;CMP FOR CORRECT ADDR.
662  003562  001004                            BNE     ADERR           ;BRANCH IF DATA DID NOT COMPARE
663  003564  005722                            TST     (2)+            ;GET NEXT ADDRESS OF INBUF
664  003566  005303                            DEC     R3              ;DEC SECTOR COUNT
665  003570  001372                            BNE     SANHT           ;TEST NEXT WORD
666  003572  000412                            BR      CHKADT
667  003574  013701  001140            ADERR:  MOV     DMA,GOOD        ;CORRECT ADDRESS
668  003600  011200                            MOV     (2),BAD         ;DATA IN ERROR
669  003602  104000                            HLT                     ;DISK ADD DID NOT MATCH WRITTEN ADDRESS
670  003604  104436                            LOGC                    ;LOG COMPARE ERROR
671  003606  004737  014112                    JSR     PC,PRNT         ;INHIBIT TYPEOUT?
672  003612  001002                            BNE     CHKADT          ;YES
673  003614  104402  000757                    TYPE    ,CRLFLF
674
675                                     ;*****REPORT ONLY ONE ERROR PER SECTOR*****
676
677  003620  104400                    CHKADT: SCOPE
678  003622  004737  007204                    JSR     PC,DISBUF       ;SET UP NEXT DISK BUFFER
679  003626  000717                            BR      RRDSEC          ;CHECK NEXT SECTOR
680  003630  013737  001154  001150            MOV     SAVE,SWRDCT     ;GET STD WD COUNT
681  003636  042737  000400  001132            BIC     #BIT8,FLAG      ;CLEAR TEST FLAG
682  003644  032737  100000  001222            BIT     #BIT15,FLAG3    ;DOES OPERATOR WANT TO LOOP ON TEST
683  003652  001402                            BEQ     .+6             ;NO
684  003654  000137  003262                    JMP     ADT1A           ;YES
685  003660                            DATAT:                          ;DATA TEST
686                                     ;*************************************************************************
687                                     ;TEST 2         DATA TEST
688                                     ;*************************************************************************
689  003660  104400                    TST2:   SCOPE
690                                     ;XYZ***********?*********************************************************
691                                     ;*************************************************************************
692                                     ;*************************************************************************
693                                     ;XYZ***********?*********************************************************
694                                     ;*************************************************************************
695                                     ;*************************************************************************
696                                     ;XYZ***********?*********************************************************
697                                     ;*************************************************************************
698  003662  012737  177777  001024            MOV     #-1,TEMP2               ;TEST 2 INDICATOR
699  003670  013737  001074  001026            MOV     STAMEM,TEMP3
```

```
 700  003676  013737  001150  001134  LDAT3:  MOV     SWRDCT,WRDCT
 701  003704  005037  001140          LDAT2:  CLR     DMA             ;CLEAR DISK ADDRESS
 702  003710  104426                          CLRDV                   ;CLEAR RS REGISTERS
 703  003712  004737  011376                  JSR     PC,APORT
 704  003716  004737  007130          2$:     JSR     PC,VECTRR       ;SETUP INT VECTOR
 705  003722  012777  000340  175140          MOV     #340,@STATUS    ;SET DISK STATUS REG LOC (206)
 706  003730  012737  003762  001156          MOV     #LDAT,HRDER     ;SETUP FOR HARD ERROR RETURN
 707  003736  013737  017326  001144          MOV     OUTBUF,BUF      ;SETUP OUTPUT BUFFER
 708  003744  052737  000003  001132          BIS     #3,FLAG         ;SET COUNTER TO 3
 709  003752  004537  007650                  JSR     R5,PASEL        ;SET UP DATA BUFFERS
 710  003756  005037  001204          LDAT1:  CLR     LOPCNT          ;CLEAR ERROR FLAG
 711  003762  104414                  LDAT:   ERCLR                   ;CLEAR RS REG. IF ERROR
 712  003764  004537  006546                  JSR     R5,OPDSEL       ;SET UP DISK ADDRESS
 713  003770  032737  040000  001132          BIT     #BIT14,FLAG     ;TEST FOR WRITE
 714  003776  001462                          BEQ     SLH             ;TEST FOR READ
 715  004000  012737  000161  001176          MOV     #161,CMD        ;WRITE WITH I/E
 716  004006  104416                          DKCMD                   ;DO A WRITE
 717  004010  004737  011600                  JSR     PC,WATT         ;WAIT FOR INTERRUPT
 718  004014  012737  003762  001010          MOV     #LDAT,LAD       ;SETUP SCOPE LOOP
 719  004022  032737  001000  001132          BIT     #BIT9,FLAG      ;WAS THERE AN ERROR?
 720  004030  001427                          BEQ     WRXBL           ;CONT
 721  004032  104430                          LOGW                    ;LOG WRITE ERROR
 722  004034  005237  001204                  INC     LOPCNT          ;SET ERROR FLAG
 723  004040  022737  000001  001204          CMP     #1,LOPCNT       ;IS THIS THE FIRST TIME?
 724  004046  001000                          BNE     2$              ;NO
 725  004050  004737  014112          2$:     JSR     PC,PRNT         ;TYPE ?
 726  004054  001004                          BNE     1$              ;NO
 727  004056  104402  000620                  TYPE    ,DATA
 728  004062  104402  000630                  TYPE    ,WRTERR
 729  004066  104044                  1$:     HLT     !DS!DA          ;WRITE ERROR
 730  004070  005337  001132                  DEC     FLAG            ;DEC COUNTER
 731  004074  032737  000003  001132          BIT     #3,FLAG         ;DONE YET WITH 3RD TRY?
 732  004102  001327                          BNE     LDAT            ;NOT 3 TRIES YET? TRY AGAIN
 733  004104  004737  011444                  JSR     PC,WTNO         ;TYPE CAN NOT WRITE
```

```
  734  004110  005737  001204          WRXBL:  TST     LOPCNT          ;WAS THERE AN ERROR?
  735  004114  001402                          BEQ     WRX1            ;NO
  736  004116  004737  011622                  JSR     PC,TYPREC       ;TYPE RECOVERED
  737  004122  005037  001204          WRX1:   CLR     LOPCNT          ;CLEAR ERROR FLAG
  738  004126  104400                          SCOPE
  739  004130  052737  000003  001132          BIS     #3,FLAG         ;CLEAR RETRY COUNT
  740  004136  004737  007204                  JSR     PC,DISBUF       ;SET BUFFER FOR WRITE CHECK
  741  004142  000705                          BR      LDAT1
  742  004144  104400          SLH:    SCOPE
  743  004146  104414          SLH2:   ERCLR                           ;CLEAR RS REG IF ERRORS
  744  004150  004537  006546                  JSR     R5,OPDSEL       ;IS THE OPERATOR SELECTING THE TRACK
  745  004154  032737  020000  001132          BIT     #BIT13,FLAG     ;TEST FOR WRITE CHECK
  746  004162  001002                          BNE     1$              ;YES
  747  004164  000137  004470                  JMP     ESH1            ;NO
  748  004170  013737  017326  001144  1$:     MOV     OUTBUF,BUF      ;SET UP CURRENT ADDRESS
  749  004176  012737  000151  001176          MOV     #151,CMD        ;WRITE CHECKWITH I/E
  750  004204  104416                          DKCMD                   ;GO WRITE CHECK
  751  004206  004737  011600                  JSR     PC,WATT         ;WAIT FOR INTERRUPT
  752  004212  032737  001000  001132  XESH:   BIT     #BIT9,FLAG      ;IS THERE AN ERROR?
  753  004220  001505                          BEQ     1$              ;NO ERROR
  754  004222  005737  001204                  TST     LOPCNT          ;1ST ERROR?
  755  004226  001001                          BNE     2$              ;NO
  756  004230  104434                          LOGWC                   ;YES LOG ERROR
  757  004232  032737  000100  177570  2$:     BIT     #BIT6,SWR       ;TYPE ALL ERRORS?
  758  004240  001007                          BNE     3$              ;YES
  759  004242  032737  001000  177570          BIT     #BIT9,SWR       ;LOOP ON ERROR?
  760  004250  001003                          BNE     3$              ;YES
  761  004252  005737  001204                  TST     LOPCNT          ;FIRST ERROR?
  762  004256  001056                          BNE     10$             ;NO
  763  004260  004737  014112          3$:     JSR     PC,PRNT         ;TYPE OUT?
  764  004264  001052                          BNE     4$              ;NO
  765  004266  104402  000620                  TYPE    ,DATA
  766  004272  104402  000642                  TYPE    ,WCKERR
  767  004276  017702  174536                  MOV     @RSBA,R2        ;GET CORRECT BA
  768  004302  023702  017326                  CMP     OUTBUF,R2       ;DID A WD GET XFERED?
  769  004306  001406                          BEQ     9$              ;NO
  770  004310  032737  000400  177570          BIT     #BIT8,SWR       ;XFER MODE?
  771  004316  001002                          BNE     9$              ;YES
  772  004320  162702  000002                  SUB     #2,R2
  773  004324  004737  014112          9$:     JSR     PC,PRNT         ;TYPEOUT ERRORS?
  774  004330  001030                          BNE     4$              ;NO
  775  004332  005737  001216                  TST     MMAVA           ;IS MEM MGMT AVAILABLE?
  776  004336  001402                          BEQ     7$              ;NO
```

```
777  004340  004737  006762                  JSR     PC,PHYCOV       ;YES GET VITURAL ADDR
778  004344  010237  001226          7$:     MOV     R2,WORK         ;GET BA
779  004350                          8$:
780  004350  104402  004354                  TYPE    ,.+2            ;.ASCIZ <15><12>''(BA)=''
781  004364                          6$:
782  004364  017746  174636                  MOV     @WORK,-(6)      ;PUT @WORK ON STACK
783  004370  104404                          TYPEO                   ;TYPE STACK IN OCTAL
784  004372  104402  004376                  TYPE    ,.+2            ;.ASCIZ '' WC=''
785  004404  017746  174426                  MOV     @RSWC,-(6)      ;PUT @RSWC ON STACK
786  004410  104404                          TYPEO                   ;TYPE STACK IN OCTAL
787  004412  104026                  4$:     HLT     !DA!DB!BA       ;NOTE: BA REG. = +2 OF ACTUAL MEMORY
788                                                                   ;LOC AFTER WORDS HAVE BEEN XFERED
789  004414  005237  001204          10$:    INC     LOPCNT          ;INC ERROR COUNT
790  004420  022737  000010  001204        CMP     #10,LOPCNT      ;10 TRYS YET?
791  004426  001247                        BNE     SLH2            ;NO
792  004430  004737  006720                JSR     PC,NOREC        ;TYPE UNRECOVERABLE
793  004434  005737  001204          1$:     TST     LOPCNT          ;ANY ERRORS?
794  004440  001402                        BEQ     5$              ;NO
795  004442  004737  011622                JSR     PC,TYPREC       ;TYPE RECOVERED
796  004446  005037  001204          5$:     CLR     LOPCNT          ;CLEAR ERROR COUNTER
797  004452  104400                          SCOPE
798  004454  012737  004146  001010        MOV     #SLH2,LAD       ;SETUP LOOP ADDRESS
799  004462  004737  007204                JSR     PC,DISBUF       ;SET UP THE DISK BUFFER
800  004466  000422                        BR      SLH2A
801  004470  004537  011312          ESH1:   JSR     R5,CLEAR        ;CLEAR BUFFER
802  004474  004537  006546          ESH:    JSR     R5,OPDSEL       ;OPERATOR SELECTED DISK ADDRESS?
803  004500  032737  010000  001132        BIT     #BIT12,FLAG     ;TEST FOR READ
804  004506  001002                        BNE     1$              ;YES
805  004510  000137  004724                JMP     MSTR            ;NO READ
806  004514  104400                  1$:     SCOPE
807  004516  042737  000003  001132        BIC     #3,FLAG         ;CLEAR RE-READ COUNT
808  004524  005037  001204                CLR     LOPCNT          ;CLEAR FLAG
809  004530  000137  004540                JMP     DSKRD           ;CONT
810  004534  000137  004146          SLH2A:  JMP     SLH2
811  004540  104414                  DSKRD:  ERCLR                   ;CLEAR RS REG IF ERRORS
812  004542  012737  000171  001176        MOV     #171,CMD        ;READ WITH I/E
813  004550  104416                          DKCMD                   ;READ
814  004552  004737  011600                JSR     PC,     WATT
815  004556  032737  010000  177570        BIT     #10000,SWR      ;COMPARE?
816  004564  001007                        BNE     TAG             ;NO
817  004566  032737  000004  001132        BIT     #BIT2,FLAG      ;COMPARE?
818  004574  001003                        BNE     TAG             ;NO
819  004576  004537  010414                JSR     R5,COMPARE      ;COMPARE
820  004602  000400                        BR      ELH
```

```
                                TAG:
004604  032737  001000  001132  ELH:    BIT     #BIT9,FLAG      ;IS THERE AN ERROR?
004612  001433                          BEQ     ADRD            ;NO
004614  032737  000100  177570          BIT     #BIT6,SWR       ;SOFT ERROR TYPEOUT?
004622  001003                          BNE     3$              ;YES
004624  005737  001204                  TST     LOPCNT          ;FIRST ERROR?
004630  001011                          BNE     2$              ;NO
004632  004737  014112          3$:     JSR     PC,PRNT         ;TYPEOUT?
004636  001004                          BNE     1$              ;NO
004640  104402  000620                  TYPE    ,DATA
004644  104402  000657                  TYPE    ,RDERR
004650  104432                  1$:     LOGR                    ;LOG READ ERROR
004652  104044                          HLT     !DS!DA
004654  104400                  2$:     SCOPE
004656  005237  001204                  INC     LOPCNT          ;COUNT ERRORS
004662  022737  000010  001204          CMP     #10,LOPCNT      ;LAST RETRY?
004670  001323                          BNE     DSKRD           ;NO
004672  004737  006720                  JSR     PC,NOREC        ;TYPE UNRECOVERABLE
004676  000137  004716          4$:     JMP     ADR1            ;CONT
004702  104400                  ADRD:   SCOPE
004704  005737  001204                  TST     LOPCNT          ;ANY ERRORS?
004710  001402                          BEQ     ADR1            ;NO
004712  004737  011622                  JSR     PC,TYPREC       ;TYPE RECOVERED
004716  004737  007204          ADR1:   JSR     PC,DISBUF       ;GO SET UP DISK BUFFER.
004722  000500                          BR      READCT          ;CONT. READING
004724  005737  001132          MSTR:   TST     FLAG
004730  100467                          BMI     3$              ;OPERATOR SELECTED PATTERN
                        ;*******************************************************************
                        ;*******************************************************************
                        ;*******************************************************************
                        ;*******************************************************************
                        ;*******************************************************************
                        ;*******************************************************************
004732  013746  001134                  MOV     WRDCT,-(SP)
004736  000316                          SWAB    (SP)
004740  042716  177400                  BIC     #177400,(SP)
004744  006216                          ASR     (SP)
004746  006216                          ASR     (SP)
004750  006216                          ASR     (SP)
004752  006216                          ASR     (SP)
004754  061637  001026                  ADD     (SP),TEMP3
004760  023737  001022  001026          CMP     TEMP1,TEMP3
004766  003424                          BLE     5$
004770  061637  001026                  ADD     (SP),TEMP3
004774  023737  001022  001026          CMP     TEMP1,TEMP3
005002  003416                          BLE     4$
005004  162637  001026                  SUB     (SP)+,TEMP3
005010  005037  017326                  CLR     OUTBUF
005014  013746  001026                  MOV     TEMP3,-(SP)
005020  062737  020000  017326  6$:     ADD     #20000,OUTBUF
005026  005316                          DEC     (SP)
005030  001373                          BNE     6$
005032  005726                          TST     (SP)+
```

```
 877  005034  000137  003676                 JMP     LDAT3
 878  005040                           4$:
 879  005040  005726                   5$:   TST     (SP)+
 880  005042  062737  000002  001142         ADD     #2,PATNU        ;INC PATTERN INDEX
 881  005050  022737  000044  001142         CMP     #44,PATNU
 882  005056  001402                         BEQ     .+6
 883  005060  000137  003660                 JMP     DATAT           ;NOT LAST PATTERN EXIT
 884  005064  005037  001142                 CLR     PATNU           ;LAST PATTERN EXIT
 885  005070  032737  000002  177570         BIT     #BIT1,SWR       ;DATA TEST ONLY?
 886  005076  001006                         BNE     2$              ;YES
 887  005100  032737  002000  001132         BIT     #BIT10,FLAG     ;DATA TEST ONLY?
 888  005106  001404                         BEQ     1$              ;NO
 889  005110  005137  001120           3$:   COM     A0B1            ;ALTERNATE PORTS
 890  005114  000137  006154           2$:   JMP     EXTPPR          ;LOOP
 891  005120  000137  005136           1$:   JMP     RANEX           ;DO NEXT TEST
 892
 893  005124  000137  004474   READCT: JMP     ESH             ;CONT. READING
 894  005130  052737  100000  001222 RANEL:  BIS     #BIT15,FLAG3    ;SET LOOP IN RANDOM TEST GOT
 895                                                                 ;HERE BY STARTING AT LOC 264
```

```
 896  005136                          RANEX:                          ;RANDOM ADDRESS DATA TEST
 897                                  ;THIS PROGRAM WRITES, WRITECHECKS AND READS 1 SECTOR OF RANDOM DATA FROM RANDOM DISK
 898                                  ;ADDRESSES. THIS TEST WILL MAKE 1000(10) PASSES BEFORE IT IS COMPLETED
 899
 900                                  ;*****************************************************************************
 901                                  ;TEST 3          RANDOM ADDRESS RANDOM DATA TEST
 902                                  ;*****************************************************************************
 903  005136  104400                 TST3:   SCOPE
 904                                  ;XYZ***********?*************************************************************
 905                                  ;*****************************************************************************
 906                                  ;*****************************************************************************
 907                                  ;XYZ***********?*************************************************************
 908                                  ;*****************************************************************************
 909                                  ;*****************************************************************************
 910                                  ;XYZ***********?*************************************************************
 911                                  ;*****************************************************************************
 912  005140  005037  001024                  CLR     TEMP2           ;NOMORE A TEST 2
 913  005144  052737  000400  001132  2$:     BIS     #BIT8,FLAG      ;SET TEST FLAG
 914  005152  012737  020000  017326          MOV     #20000,OUTBUF   ;GET STARTING ADDR OF BUF
 915  005160  013737  017326  001122          MOV     OUTBUF,VADDR    ;SAVE BUFFER ADDR
 916  005166  005737  001216                  TST     MMAVA           ;MEM MGMT AVAILABLE?
 917  005172  001402                          BEQ     1$              ;NO
 918  005174  005037  177572                  CLR     @#SR0           ;TURN IT OFF
 919  005200  012737  000042  001142  1$:     MOV     #42,PATNU       ;DO RANDOM COMPARE
 920  005206  104426                          CLRDV                   ;INIT DRIVE
 921  005210  012737  176030  001162          MOV     #-1000.,PASSC   ;SET UP PASS COUNT
 922  005216  012737  005774  001156          MOV     #RWRED,HRDER    ;SET UP FOR HARD ERROR
 923  005224  004737  007130                  JSR     PC,VECTRR       ;SETUP INTERRUPT VECTOR
 924  005230  012777  000340  173632          MOV     #340,@STATUS
 925  005236  012737  005356  001010  WRLG1:  MOV     #WRERR,LAD      ;SETUP LOOP ADDRESS
 926  005244  012737  000001  001226          MOV     #1,WORK         ;SET UP RANDOM GENERATOR WORD
 927  005252  013701  017326                  MOV     OUTBUF,R1
 928  005256  004537  010010                  JSR     R5,RANDOM       ;GENERATE RANDOM DATA
 929  005262  017737  012040  001140          MOV     @OUTBUF,DMA     ;SET UP DISK ADDRESS
 930  005270  042737  170000  001140          BIC     #170000,DMA
 931  005276  052737  000003  001132          BIS     #3,FLAG         ;SET COUNTER
 932  005304  012737  000200  001134          MOV     #200,WRDCT      ;RS04
 933  005312  005737  001172                  TST     RS04DT          ;RS04?
 934  005316  001003                          BNE     2$              ;YES
 935  005320  012737  000100  001134          MOV     #100,WRDCT      ;SET UP WOPD COUNT =1SECTOP
 936  005326  013737  001134  001226  2$:     MOV     WRDCT,WORK      ;GENERATE RANDOM BUFFER
 937  005334  013701  017326                  MOV     OUTBUF,R1
 938  005340  004537  010010                  JSR     R5,RANDOM
 939  005344  013737  017326  001144          MOV     OUTBUF,BUF      ;SET UP OUTPUT BUFFER
 940  005352  005037  001204                  CLR     LOPCNT          ;CLR ERROR FLAG
```

```
941  005356  104414                          WRERR:  ERCLR
942  005360  012737  000161  001176                  MOV     #161,CMD        ;WRITE WITH I/E
943  005366  104416                                  DKCMD                   ;WRITE
944  005370  004737  011600                          JSR     PC,WATT         ;WAIT FOR INTERRUPT
945  005374  032737  001000  001132          2$:     BIT     #BIT9,FLAG      ;WAS THERE AN ERROR?
946  005402  001435                                  BEQ     WRRCK1          ;NO
947  005404  032737  000100  177570                  BIT     #BIT6,SWR       ;TYPE RETRY ?
948  005412  001004                                  BNE     5$              ;YES
949  005414  005737  001204                          TST     LOPCNT          ;FIRST TIME?
950  005420  001013                                  BNE     6$              ;NO
951  005422  104430                                  LOGW                    ;LOG WRITE ERROR
952  005424  005237  001204                  5$:     INC     LOPCNT          ;SET ERROR FLAG
953  005430  004737  014112                          JSR     PC,PRNT         ;TYPEOUT?
954  005434  001004                                  BNE     3$              ;YES
955  005436  104402  000670                          TYPE    ,RANDM
956  005442  104402  000630                          TYPE    ,WRTERR
957  005446  104044                          3$:     HLT     !DS!DA
958  005450  104400                          6$:     SCOPE
959  005452  005337  001132                          DEC     FLAG
960  005456  032737  000003  001132                  BIT     #3,FLAG
961  005464  001334                                  BNE     WRERR           ;RETRY
962  005466  004737  011444                          JSR     PC,WTNO         ;TYPE CAN NOT WRITE
963  005472  000137  006076                          JMP     EXRAX           ;GET NEW NUMBER
```

```
 964  005476  005737  001204          WRRCK1: TST     LOPCNT          ;ANY ERRORS?
 965  005502  001402                  BEQ     1$              ;NO
 966  005504  004737  011622          JSR     PC,TYPREC       ;TYPE RECOVERED
 967  005510  104400                  1$:     SCOPE
 968  005512  005037  001204          CLR     LOPCNT          ;CLEAR LOOP COUNT
 969  005516  104414                  WRRCK:  ERCLR           ;CLEAR RS REG IF ERRORS
 970  005520  012737  000151  001176  MOV     #151,CMD        ;WRITE CHECK WITH I/E
 971  005526  104416                  DKCMD                   ;WRITE CHECK
 972  005530  004737  011600          JSR     PC,WATT         ;WAIT FOR INTERRUPT
 973  005534  032737  001000  001132  4$:     BIT     #BIT9,FLAG      ;ERROR?
 974  005542  001453                  BEQ     1$              ;NO
 975  005544  032737  000100  177570  BIT     #BIT6,SWR       ;TYPE ALL RETRYS?
 976  005552  001003                  BNE     2$              ;YES
 977  005554  005737  001204          TST     LOPCNT          ;FIRST ERROR?
 978  005560  001030                  BNE     5$              ;NO
 979  005562  104434                  2$:     LOGWC           ;LOG WRITE CK
 980  005564  004737  014112          JSR     PC,PRNT         ;TYPEOUT?
 981  005570  001052                  BNE     6$              ;NO
 982  005572  104402  000670          TYPE    ,RANDM
 983  005576  104402  000642          TYPE    ,WCKERR
 984  005602  017737  173232  001226  MOV     @RSBA,WORK      ;GET CORRECT BA
 985  005610  162737  000002  001226  SUB     #2,WORK
 986  005616  104402  005622          TYPE    ,.+2            ;.ASCIZ <15><12>''(BA)=''
 987  005632  017746  173370          MOV     @WORK,-(6)      ;PUT @WORK ON STACK
 988  005636  104404                  TYPEO                   ;TYPE STACK IN OCTAL
 989  005640  104026                  HLT     !DB!DA!BA       ;BA=MEMORY LOC +2 OF ACTUAL WORD
 990  005642  005237  001204          5$:     INC     LOPCNT          ;INC RETRY COUNT
 991  005646  022737  000010  001204  CMP     #10,LOPCNT      ;LAST ONE YET?
 992  005654  001320                  BNE     WRRCK           ;NO
 993  005656  104402  006651          TYPE    ,UNRECO
 994  005662  005037  001204          CLR     LOPCNT          ;CLEAR LOPCNT
 995  005666  000137  006076          JMP     EXRAX           ;GET NEW NUMBER
 996  005672  005737  001204          1$:     TST     LOPCNT          ;ANY ERRORS?
 997  005676  001407                  BEQ     6$              ;NO
 998  005700  104402  000702          TYPE    ,RECOV
 999  005704  013746  001204          MOV     LOPCNT,-(6)     ;GET NUMBER
1000  005710  104406                  TYPES                   ;TYPE IT
1001  005712  104402  000757          TYPE    ,CRLFLF
1002  005716  104400                  6$:     SCOPE
1003  005720  052737  000003  001132  BIS     #3,FLAG         ;SET COUNTER
```

```
1004  005726  104400                          SCOPE
1005  005730  005037  001204                  CLR     LOPCNT          ;CLEAR COUNTER
1006  005734  004537  011312                  JSR     R5,CLEAR        ;CLEAR BUFFER
1007  005740  104414                  RREAD:  ERCLR                   ;CLEAR RS REG IF ERRORS
1008  005742  012737  000171  001176          MOV     #171,CMD        ;READ WITH I/E
1009  005750  104416                          DKCMD                   ;READ
1010  005752  004737  011600                  JSR     PC,     WATT
1011  005756  032737  010000  177570          BIT     #BIT12,SWR      ;COMPARE ?
1012  005764  001003                          BNE     TAG1            ;NO
1013  005766  004537  010414                  JSR     R5,COMPARE      ;YES
1014  005772  000400                          BR      RWRED           ;CONT
1015  005774                          TAG1:
1016  005774  032737  001000  001132  RWRED:  BIT     #BIT9,FLAG      ;IS THERE AN ERROR?
1017  006002  001435                          BEQ     EXRAX           ;NO
1018  006004  104432                          LOGR                    ;LOG READ ERR
1019  006006  032737  000100  177570  1$:     BIT     #BIT6,SWR       ;TYPE ALL ERRORS?
1020  006014  001016                          BNE     2$              ;YES
1021  006016  032737  001000  177570          BIT     #BIT9,SWR       ;LOOP ON ERROR?
1022  006024  001012                          BNE     2$              ;YES
1023  006026  005737  001204                  TST     LOPCNT          ;FIRST ERROR?
1024  006032  001010                          BNE     3$              ;NO
1025  006034  004737  014112                  JSR     PC,PRNT         ;TYPEOUT?
1026  006040  001004                          BNE     2$              ;NO
1027  006042  104402  000670                  TYPE    ,RANDM
1028  006046  104402  000657                  TYPE    ,RDERR
1029  006052  104006                  2$:     HLT     !DB!DA
1030  006054  104400                  3$:     SCOPE
1031  006056  005237  001204                  INC     LOPCNT          ;UPDATE COUNTER
1032  006062  022737  000010  001204          CMP     #10,LOPCNT      ;LAST TRY YET?
1033  006070  001323                          BNE     RREAD           ;RETRY
1034  006072  004737  006720                  JSR     PC,NOREC        ;TYPE UNRECOVERABLE
1035  006076  005737  001204          EXRAX:  TST     LOPCNT          ;ANY ERRORS?
1036  006102  001402                          BEQ     EXRXX           ;NO
1037  006104  004737  011622                  JSR     PC,TYPREC       ;TYPE RECOVERED
1038  006110  104400                  EXRXX:  SCOPE
1039  006112  005237  001162                  INC     PASSC           ;+1 PASS COUNT
1040  006116  001402                          BEQ     1$              ;IS TEST DONE?
1041  006120  000137  005236                  JMP     WRLG1           ;NO
1042  006124  005037  001142          1$:     CLR     PATNU           ;END OF TEST
1043  006130  042737  000400  001132          BIC     #BIT8,FLAG      ;CLEAR TEST FLAG
1044  006136  032737  100000  001222          BIT     #BIT15,FLAG3    ;LOOP ON THIS TEST?
1045  006144  001402                          BEQ     .+6             ;NO
1046  006146  000137  005136                  JMP     RANEX           ;YES
```

```
                                        ;CHECK FOR MULTI DISK MODE
                                        ;IF IN MULTI DISK MODE REPORT 'END'
                                        ;IF LAST DISK ON SYSTEM HAS BEEN EXERCISED.
                                        ;
                                        ;*************************************************************************
                                        ;TEST 4          TEST FOR MULTI DISK MODE
                                        ;*************************************************************************
006152  104400                  TST4:   SCOPE
006154  005037  001140          EXTPPR: CLR     DMA
006160  005037  001024                  CLR     TEMP2
006164  104426                          CLRDV                   ;INIT DRIVE
006166  032737  004000  001132          BIT     #BIT11,FLAG     ;ARE WE IN MULTI DISK MODE
006174  001404                          BEQ     EXTPP           ;NO REPORT 'END'
006176  004737  002130                  JSR     PC,TRYNX        ;YES TEST FOR ALL DRIVES
006202  000137  003212                  JMP     EXMFLG          ;RESTART TESTING OF DRIVES
006206  004737  002204          EXTPP:  JSR     PC,DONEE        ;GET PASS COUNT
                                        ;
                                        ;THIS ROUTINE CLEARS THE DRIVE
                                        ;REGISTERS IF THERE WAS AN ERROR
                                        ;
006212  032737  001000  001132  .ERCLR: BIT     #BIT9,FLAG      ;ANY ERRORS?
006220  001404                          BEQ     1$              ;NO
006222  104426                          CLRDV                   ;CLEAR ALL ERRORS
006224  042737  001000  001132          BIC     #BIT9,FLAG      ;CLEAR ERROR FLAG
006232  000002                  1$:     RTI                     ;EXIT
                                        ;
                                        ;ENTER DISK HANDLER BY THE TRAP INSTRUCTION
                                        ;ARGUMENT TO TRAP INSTRUCTION IS TWO ORDER
                                        ;BYTE OF THE CONTROL REGISTER.
                                        ;
006234  013777  001140  172600  .DKCMD: MOV     DMA,@RSDA       ;LOAD DISK ADD
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
                                        ;*************************************************************************
006242  005737  001024                          TST     TEMP2
006246  001422                                  BEQ     5$
006250  013746  001026                          MOV     TEMP3,-(6)
006254  005077  172602                          CLR     @RSBAE
006260  005037  001030                          CLR     TEMP4
006264  062737  020000  001030  6$:     ADD     #20000,TEMP4
006272  013737  001030  001144          MOV     TEMP4,BUF
006300  103002                          BCC     7$
006302  005277  172554                  INC     @RSBAE
006306  005316                  7$:     DEC     (6)
006310  001365                          BNE     6$
006312  005726                          TST     (6)+
006314  005037  001202          5$:     CLR     INTFLG          ;CLEAR INTERRUPT FLAG
006320  013777  001144  172512  4$:     MOV     BUF,@RSBA       ;LOAD (CMA) BUSS ADDRESS
006326  013702  001134                  MOV     WRDCT,R2        ;GET NEGATIVE
006332  005402                          NEG     R2              ;WORD COUNT
006334  010277  172476                  MOV     R2,@RSWC        ;LOAD WC
```

```
 1103  006340  032737  000400  001132          BIT     #BIT8,FLAG      ;RANDOM TEST?
 1104  006346  001021                          BNE     1$              ;YES A PORT ONLY WITH NO MEM MGMT
 1105  006350  005737  001216                  TST     MMAVA           ;MEM MGMT AVAILIABLE?
 1106  006354  001416                          BEQ     1$              ;NO
 1107  006356  032737  000040  001126          BIT     #BIT5,FLAG2     ;SET A17 IN RSCS1
 1108  006364  001403                          BEQ     3$              ;NO
 1109  006366  052737  001000  001176          BIS     #BIT9,CMD       ;YES
```

```
1110  006374  032737  000020  001126  3$:     BIT     #BIT4,FLAG2     ;SET A16?
1111  006402  001403                          BEQ     1$              ;NO
1112  006404  052737  000400  001176          BIS     #BIT8,CMD       ;YES
1113  006412  113777  001176  172412  1$:     MOVB    CMD,@RSCS1      ;LOAD FUNCTION REG.
1114  006420  000002                          RTI                     ;RETURN FROM TRAP
1115
1116                                  ;RH70 DISK INTERRUPT HANDLER
1117                                  ;ROUTINE CONTINUES ON ERRORS
1118
1119  006422  042737  001000  001132  DKINT:  BIC     #BIT9,FLAG      ;CLEAR ERROR BIT
1120  006430  005777  172376                  TST     @RSCS1          ;TEST FOR ERROR
1121  006434  100401                          BMI     2$
1122  006436  000425                          BR      INTEXT          ;JUMP IF NO ERRORS
1123  006440  017702  172366          2$:     MOV     @RSCS1,R2       ;GET CONTENTS OF CS1
1124  006444  042702  037777                  BIC     #37777,R2       ;CLEAR ALL BUT SC AND TRE
1125  006450  022702  140000                  CMP     #140000,R2      ;IS SC AND TRE BOTH SET?
1126  006454  001413                          BEQ     TRUERR          ;YES THERE IS SOME KIND OF XFER ERROR
1127  006456  032777  100000  172360          BIT     #100000,@RSDS   ;IS THE ATA BIT SET?
1128  006464  001007                          BNE     TRUERR          ;YES
1129  006466  104140                          HLT     !AS!DS          ;WRONG UNIT INTERRUPTED
1130                                                                  ;IF YOU HAVE JUST POWERED UP A DRIVE OR
1131                                                                  ;ARE RUNNING THE POWER FAIL TEST,
1132                                                                  ;INTERRUPTS WILL OCCUR FROM DRIVES OTHER
1133                                                                  ;THAN THE UNIT UNDER TEST. IF THIS TYPEOUT
1134                                                                  ;SHOWS NO ERRORS IN THE REGISTERS OF THE DRIVE
1135                                                                  ;UNDER TEST, THAT DRIVE IS OK
1136  006470  012777  177777  172352  1$:     MOV     #-1,@RSAS       ;CLEAR ALL ATA BITS
1137  006476  013716  001156                  MOV     HRDER,(SP)      ;GET RETURN ADD.
1138  006502  000002                          RTI                     ;RETRY
1139  006504  052737  001000  001132  TRUERR: BIS     #BIT9,FLAG      ;SET ERROR BIT
1140  006512  032737  004000  177570  INTEXT: BIT     #BIT11,SWR      ;HALT ON COMPLETION FLAG
1141  006520  001401                          BEQ     .+4
1142  006522  000000                          HALT                    ;YES BIT 11 SET IN SWR HALT
1143  006524  032737  002000  001126          BIT     #BIT10,FLAG2    ;WAIT IN BACKGROUND TEST?
1144  006532  001402                          BEQ     1$              ;NO
1145  006534  012716  012264          2$:     MOV     #NPRRET,(SP)    ;MODIFY RETURN ADD.
1146  006540  010637  001202          1$:     MOV     SP,INTFLG       ;SET INT FLG
1147  006544  000002                          RTI                     ;EXIT
1148                                  ;ROUTINE TO SET UP TRACK # FROM OPTION
1149                                  ;ENTER FROM JSR R5, OPDSEL
1150
1151  006546  032737  000040  001132  OPDSEL: BIT     #BIT5,FLAG      ;OPTIONAL DMA?
1152  006554  001403                          BEQ     1$              ;NO
1153  006556  013737  001146  001140          MOV     TDMA,DMA        ;GET OPT. DMA
1154  006564  000205                  1$:     RTS     R5              ;EXIT
```

```
1155  006566  005015  052123  051101  STABUF: .ASCIZ  <15><12>''STARTING 4K BANK #''
1156  006574  044524  043516  032040
1157  006602  020113  040502  045516
1158  006610  021440     000
1159
1160  006613     015  044012  053517  BUFSIZ: .ASCIZ  <15><12>''HOW MANY 4K BANKS? (OCTAL) ''
1161  006620  046440  047101  020131
1162  006626  045464  041040  047101
1163  006634  051513  020077  047450
1164  006642  052103  046101  020051
1165  006650     000
1166
1167  006651     015  052412  051116  UNRECO: .ASCIZ  <15><12>''UNRECOVERABLE''<15><12><12>
1168  006656  041505  053117  051105
1169  006664  041101  042514  005015
1170  006672  000012
1171
1172  006674  005015  047125  041101  NOWRIT: .ASCIZ  <15><12>''UNABLE TO WRITE''<15><12>
1173  006702  042514  052040  020117
1174  006710  051127  052111  006505
1175  006716  000012
1176
1177                                  .EVEN
1178
1179  006720  004737  014112          NOREC:  JSR     PC,PRNT         ;TYPEOUT?
1180  006724  001002                          BNE     1$              ;NO
1181  006726  104402  006651                  TYPE    ,UNRECO
1182  006732  005037  001204          1$:     CLR     LOPCNT          ;CLEAR LOOP COUNTER
1183  006736  000207                          RTS     PC
1184
1185  006740  052737  040000  001126  FNDTYP: BIS     #BIT14,FLAG2    ;SET CHECK DRIVE TYPE FLAG
1186  006746  004737  001762                  JSR     PC,UNTYP        ;CHECK DRIVE TYPE FLAG
1187  006752  042737  040000  001126          BIC     #BIT14,FLAG2    ;CLEAR DRIVE TYPE FLAG
1188  006760  000207                          RTS     PC
```

```
1189                                    ;ROUTINE TO CALCULATE VITURAL ADDR
1190
1191  006762  000302                    PHYCOV: SWAB    R2              ;CALCULATE FROM PHYSICAL ADDR
1192  006764  004737  011566                    JSR     PC,RRR2
1193  006770  006002                            ROR     R2
1194  006772  042702  177770                    BIC     #177770,R2      ;GET REG #
1195  006776  032777  000400  172026            BIT     #BIT8,@RSCS1    ;IS A16 SET?
1196  007004  001402                            BEQ     1$              ;NO
1197  007006  052702  000010                    BIS     #BIT3,R2        ;YES
1198  007012  032777  001000  172012  1$:       BIT     #BIT9,@RSCS1    ;IS A17 SET?
1199  007020  001402                            BEQ     2$              ;NO
1200  007022  052702  000020                    BIS     #BIT4,R2        ;YES
1201  007026  013737  001074  001230  2$:       MOV     STAMEM,WORK1    ;GET BANK # FOR -A- PORT
1202                                    ;*****************************************************************
1203                                    ;*****************************************************************
1204                                    ;*****************************************************************
1205                                    ;*****************************************************************
1206                                    ;*****************************************************************
1207                                    ;*****************************************************************
1208                                    ;*****************************************************************
1209  007034  005737  001024                    TST     TEMP2
1210  007040  001403                            BEQ     3$
1211  007042  013737  001026  001230            MOV     TEMP3,WORK1
1212  007050  163702  001230  3$:       SUB     WORK1,R2        ;GET STARTING BANK #
1213  007054  062702  000001                    ADD     #1,R2           ;GET OFFSET FOR REG #
1214  007060  000302                            SWAB    R2              ;GET BANK # INTO
1215  007062  006102                            ROL     R2              ;UPPER BITS
1216  007064  006102                            ROL     R2
1217  007066  006102                            ROL     R2
1218  007070  006102                            ROL     R2
1219  007072  006102                            ROL     R2
1220  007074  017737  171740  001230            MOV     @RSBA,WORK1     ;GET OFFSET FOR ADDR IF ANY
1221  007102  162737  000002  001230            SUB     #2,WORK1        ;CORRECT IT
1222  007110  042737  160000  001230            BIC     #160000,WORK1   ;CLEAR JUNK
1223  007116  050237  001230                    BIS     R2,WORK1        ;GET REG NO
1224  007122  013702  001230                    MOV     WORK1,R2
1225  007126  000207                            RTS     PC
1226
1227  007130  012777  006422  171730  VECTRR: MOV     #DKINT,@RSVEC   ;SETUP INTERRUPT VECTORS
1228  007136  013737  001072  177776            MOV     PRIORITY,PS     ;PRIORITY 4
1229  007144  000207                            RTS     PC
1230
1231                                    ;THIS ROUTINE IS USED FOR DELAYING THE START OF THIS PROGRAM
1232                                    ;IF POWER FAILED DURING TESTING. THIS WILL GIVE THE DRIVES TIME TO GET UP
1233                                    ;TO SPEED. THE DELAY WILL BE ABOUT 3-5 MINUTES DEPENDING UPON THE PROCESSOR
1234
1235  007146  012737  177777  001226  TIMUP:  MOV     #177777,WORK
1236  007154  012737  177777  001230  1$:     MOV     #177777,WORK1
1237  007162  000240                  2$:     NOP
1238  007164  005337  001230                  DEC     WORK1
1239  007170  001374                          BNE     2$
1240  007172  005337  001226                  DEC     WORK
1241  007176  001366                          BNE     1$
1242  007200  000137  003176                  JMP     ADTST
1243                                    ;ROUTINE TO SETUP DISK BUFFERS
1244                                    ;ADD WORD COUNT TO STARTING DISK ADDRESSES
```

```
1245                                    ;COMPARE CALCULATED ADDRESS TO TERMINATING ADDRESS
1246
1247  007204  032737  000040  001132  DISBUF: BIT     #BIT5,FLAG      ;DID OPERATOR SELECT PATTERNS
1248  007212  001402                          BEQ     1$              ;NO
1249  007214  000137  007360                  JMP     BUFEXIT         ;YES
1250  007220  004737  007550          1$:     JSR     PC,BLSZ         ;DEFINE BLOCK SIZE
1251  007224  013737  001160  001230          MOV     BLOCK,WORK1
1252  007232  005237  001140          INCSEC: INC     DMA             ;+1 SECTOR COUNT
1253  007236  022737  010000  001140          CMP     #10000,DMA      ;DONE YET?
1254  007244  001445                          BEQ     BUFEXIT         ;YES
1255  007246  005337  001160                  DEC     BLOCK           ;-1 FROM BLOCK COUNT
1256  007252  001401                          BEQ     COMDAR          ;CMP DMA TO RSDA
1257  007254  000766                          BR      INCSEC          ;RECYCLE
1258  007256  032737  001000  001132  COMDAR: BIT     #BIT9,FLAG      ;ANY ERRORS?
1259  007264  001401                          BEQ     1$              ;NO ERRORS DO COMPARE ON RSDA
1260  007266  000207                          RTS     PC              ;FRRORS DO NOT COMPARE RSDA
1261  007270  023777  001140  171544  1$:     CMP     DMA,@RSDA       ;COMPARE RSDA WITH DMA
1262  007276  001425                          BEQ     CMDAE           ;SHOULD BE EQUAL
1263  007300  104432                          LOGR                    ;AFTER TRANSFER RSDA AND DMA SHOULD BE =
1264                                          ;IF NOT, RSDA IS NOT CORRECT. DMA CONTAINS
1265                                          ;WHAT RSDA SHOULD =
1266  007302  013701  001140                  MOV     DMA,GOOD        ;GET DMA FOR CORRECT ANS IN GOOD
1267  007306  017700  171530                  MOV     @RSDA,BAD       ;GET RSDA INTO BAD
1268  007312  104000                          HLT                     ;RSDA=BAD DMA=GOOD SEE COMMENTS 7 LINES ABOVE
1269  007314  004737  014112                  JSR     PC,PRNT         ;TYPEOUT?
1270  007320  001014                          BNE     CMDAE           ;NO
1271  007322  011637  001226                  MOV     (SP),WORK       ;GET TEST PC FROM WHERE IT CAME
1272  007326  104402  007332                  TYPE    ,..+2           ;.ASCIZ '' TST PC=''
1273  007344  013746  001226                  MOV     WORK,-(6)       ;PUT WORK ON STACK
1274  007350  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
1275  007352  105737  001132          CMDAE:  TSTB    FLAG            ;LAST DISK BUFFER?
1276  007356  100032                          BPL     BUFINX          ;NO
```

```
 1277  007360  005037  001140          BUFEXIT:CLR     DMA             ;CLEAR ADDRESS BITS LAST DISK BUFFER
 1278  007364  062716  000002                  ADD     #2,(6)          ;INC STOCK POINTER
 1279  007370  042737  000200  001132  AKH:    BIC     #200,FLAG       ;CLEAR LAST DISK BUFFER FLAG
 1280  007376  032737  000400  001132          BIT     #BIT8,FLAG      ;RANDOM TEST OR ADDR TEST?
 1281  007404  001404                          BEQ     1$              ;NO
 1282  007406  013737  001150  001134  2$:     MOV     SWRDCT,WRDCT
 1283  007414  000454                          BR      EXTDR           ;EXIT
 1284  007416  032737  000100  001132  1$:     BIT     #BIT6,FLAG      ;MULTI PORT?
 1285  007424  001770                          BEQ     2$              ;NO
 1286  007426  005737  001120                  TST     A0B1            ;A OR B PORT?
 1287  007432  001765                          BEQ     2$              ;A PORT
 1288  007434  013737  001116  001134          MOV     WDCTB,WRDCT     ;B PORT
 1289  007442  000441                          BR      EXTDR           ;GET OUT
 1290  007444  005037  001232          BUFINX: CLR     WORK2           ;CLEAR WORK2 FOR BLOCK COUNTER
 1291  007450  013702  001140                  MOV     DMA,R2          ;PUT WORKING DISK ADD INTO WORK
 1292  007454  005237  001232          XINCSEC:INC     WORK2           ;INCREMENT BLOCK COUNT
 1293  007460  022702  007777                  CMP     #7777,R2        ;CMP FOR LAST SECTOR
 1294  007464  001405                          BEQ     XINCSUR         ;+1 SURFACE LAST SECTOR BRANCH
 1295  007466  005202                          INC     R2              ;INC DMA
 1296  007470  005337  001230                  DEC     WORK1           ;DEC BLOCK COUNT
 1297  007474  001367                          BNE     XINCSEC         ;FILLED STANDARD BUFFER YET?
 1298  007476  000734                          BR      AKH             ;WILL TAKE STANDARD SIZE WORD COUNT
 1299  007500  013746  001232          XINCSUR:MOV     WORK2,-(SP)     ;SETTING UP BLOCK COUNT
 1300  007504  000241                          CLC                     ;FOR NON STANDARD BUFFER SIZE
 1301  007506  006116                          ROL     (SP)
 1302  007510  006116                          ROL     (SP)
 1303  007512  006116                          ROL     (SP)
 1304  007514  006116                          ROL     (SP)
 1305  007516  006116                          ROL     (SP)
 1306  007520  006116                          ROL     (SP)
 1307  007522  012637  001134                  MOV     (SP)+,WRDCT
 1308  007526  005737  001172                  TST     RS04DT          ;RS04?
 1309  007532  001402                          BEQ     1$              ;NO
 1310  007534  006137  001134                  ROL     WRDCT           ;YES
 1311  007540  052737  000200  001132  1$:     BIS     #200,FLAG       ;SET LAST DISK BUFFER FLAG
 1312  007546  000207                  EXTDR:  RTS     PC              ;EXIT
```

```
1313                                    ;THIS ROUTINE CONVERTS A WORD COUNT TO A BLOCK COUNT
1314
1315  007550  012737  000177  001160  BLSZ:   MOV     #177,BLOCK      ;SETUP FOR RS04
1316  007556  005737  001172                  TST     RS04DT          ;RS04?
1317  007562  001003                          BNE     2$              ;YES
1318  007564  012737  000077  001160  1$:     MOV     #77,BLOCK       ;PUT SECTOR SIZE INTO BLOCK
1319  007572  013702  001134          2$:     MOV     WRDCT,R2        ;FETCH WORD COUNT
1320  007576  033702  001160                  BIT     BLOCK,R2        ;ARE THEY EQUAL?
1321  007602  001406                          BEQ     RORBLK          ;YES
1322  007604  043702  001160                  BIC     BLOCK,R2        ;SET UP BLOCK OVERFLOW
1323  007610  005237  001160                  INC     BLOCK
1324  007614  063702  001160                  ADD     BLOCK,R2
1325  007620  000241                  RORBLK: CLC
1326  007622  006002                          ROR     R2
1327  007624  006002                          ROR     R2
1328  007626  004737  011566                  JSR     PC,RRR2
1329  007632  005737  001172                  TST     RS04DT          ;RS04?
1330  007636  001401                          BEQ     1$              ;NO
1331  007640  006002                          ROR     R2              ;YES
1332  007642  010237  001160          1$:     MOV     R2,BLOCK        ;BLOCK COUNT
1333  007646  000207                          RTS     PC              ;EXIT
1334
1335                                    ;ROUTINE TO SELECT DATA PATTERNS FOR TEST
1336
1337                                    ;ENTER FROM JSR R5,PASEL
1338
1339  007650  012737  010344  000004  PASEL:  MOV     #MEM,@#4        ;SETUP TRAP
1340  007656  012737  000340  000006          MOV     #340,@#6        ;VECTOR
1341  007664  013700  001142                  MOV     PATNU,R0        ;SET UP PATTERN NUMBER
1342  007670  010003                          MOV     R0,R3           ;GET PATTERN #
1343  007672  000241                          CLC                     ;MAKE IT =
1344  007674  006003                          ROR     R3              ;TO PATTERN # IN LISTING
1345  007676  010337  177570                  MOV     R3,@#DISPLAY    ;DISPLAY PATTERN #
1346  007702  013737  001134  001226          MOV     WRDCT,WORK      ;SET UP WORK
1347  007710  013701  001122                  MOV     VADDR,R1        ;LOC. OF OUTBUFFER
1348  007714  022700  000042          1$:     CMP     #42,R0          ;TEST FOR RANDOM DATA NUMBER
1349  007720  001433                          BEQ     RANDOM          ;GO GENERATE RANDOM DATA
1350  007722  032737  000004  001132          BIT     #BIT2,FLAG      ;MAX TST?
1351  007730  001404                          BEQ     2$              ;NO
1352  007732  016037  000300  017326          MOV     PAT0(0),OUTBUF  ;GET PATTERN
1353  007740  000205                          RTS     R5
1354  007742  016000  000300          2$:     MOV     PAT0(0),R0
1355                                    ;XYZ************?*************************************************************
1356                                    ;*****************************************************************************
1357                                    ;*****************************************************************************
1358                                    ;XYZ************?*************************************************************
1359                                    ;*****************************************************************************
1360                                    ;*****************************************************************************
1361                                    ;XYZ************?*************************************************************
1362                                    ;*****************************************************************************
1363  007746  004737  017372                  JSR     PC,MMPSET       ;PRESET MEMORY MANAGEMENT REG
1364  007752  005737  001024                  TST     TEMP2           ;IS IT A TEST 2
1365  007756  001402                          BEQ     FILBUF          ;BRANCH IF NOT TEST 2
1366  007760  004537  017330          FILDAT: JSR     R5,MMUSE        ;DO NEXT INSTRUCTION WITH MM
1367  007764  010021                  FILBUF: MOV     R0,(1)+         ;FILL BUFFER
1368  007766  005337  001226                  DEC     WORK            ;DEC. WORK COUNT
```

```
 1369  007772  001372                          BNE     FILDAT          ;LOAD NEXT WORD
 1370  007774  012737  000006  000004  PASEX:  MOV     #6,@#4          ;RESTORE
 1371  010002  005037  000006                  CLR     @#6             ;TRAP
 1372  010006  000205                          RTS     R5              ;BUFFER FULL
```

```
1373                                        ;RANDOM DATA GENERATOR SUBROUTINE
1374
1375  010010  013737  010204  010210  RANDOM: MOV     LONUM,LOSAV
1376  010016  013737  010206  010212          MOV     HINUM,HISAV
1377                                        ;XYZ***********?*****************************************************************
1378                                        ;*********************************************************************************
1379                                        ;*********************************************************************************
1380                                        ;XYZ***********?*****************************************************************
1381                                        ;*********************************************************************************
1382                                        ;*********************************************************************************
1383                                        ;XYZ***********?*****************************************************************
1384                                        ;*********************************************************************************
1385  010024  004737  017372                        JSR     PC,MMPSET       ;PRESET MEMORY MANAGEMENT REG
1386  010030  013700  010204  RAND1:        MOV     LONUM,R0        ;SET UP R0 WITH 5 DIGITS LOW
1387  010034  013704  010206                MOV     HINUM,R4        ;SET UP R1 WITH 5 DIGITS HIGH
1388  010040  012703  000007                MOV     #7,R3           ;SET UP SHIFT COUNT
1389  010044  005002                        CLR     R2              ;CLEAR R2
1390  010046  006300  SHIFT:        ASL     R0              ;SHIFT R0 LEFT AND
1391  010050  006104                        ROL     R4              ;ROTATE CARRY INTO LSB OF R1 INTO
1392  010052  006102                        ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
1393  010054  005303                        DEC     R3              ;DECREMENT R3
1394  010056  001373                        BNE     SHIFT           ;CONTINUE SHIFT LOOP
1395  010060  063700  010204                ADD     LONUM,R0        ;ADDN IN NUMBER TO MAKE X 129
1396  010064  005504                        ADC     R4              ;PROPOGATE CARRY
1397  010066  063704  010206                ADD     HINUM,R4        ;ADDN IN NUMBER TO MAKE X 129
1398  010072  005502                        ADC     R2              ;PROPOGATE CARRY
1399  010074  062700  001057                ADD     #1057,R0        ;ADDN LOW CONSTANT
1400  010100  005504                        ADC     R4              ;PROPOGATE CARRIES
1401  010102  005502                        ADC     R2              ;PROPOGATE AGAIN
1402  010104  062704  047401                ADD     #47401,R4       ;ADDN HIGH CONSTANT
1403  010110  005502                        ADC     R2              ;PROPOGATE CARRY
1404  010112  062702  000006                ADD     #6,R2           ;ADDN HIGHEST CONSTANT
1405  010116  062700  000002                ADD     #2,R0           ;REPRIME R0 WITH HIGH DIGIT
1406  010122  005504                        ADC     R4              ;PROPOGATE CARRY
1407  010124  010037  010204                MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
1408                                        ;XYZ***********?*****************************************************************
1409                                        ;*********************************************************************************
1410                                        ;*********************************************************************************
1411                                        ;XYZ***********?*****************************************************************
1412                                        ;*********************************************************************************
1413                                        ;*********************************************************************************
1414                                        ;XYZ***********?*****************************************************************
1415                                        ;*********************************************************************************
1416  010130  005737  001024                TST     TEMP2           ;IS IT A TEST 2
1417  010134  001402                        BEQ     1$              ;BRANCH IF NOT TEST 2
1418  010136  004537  017330                JSR     R5,MMUSE        ;DO NEXT INSTRUCTION WITH MM
1419  010142  010021          1$:           MOV     R0,(1)+         ;HOLD LONUM FOR PROGRAM
1420  010144  005337  001226                DEC     WORK
1421  010150  001413                        BEQ     EXGEN
1422  010152  010437  010206                MOV     R4,HINUM        ;PUT R1 BACK IN HINUM
1423                                        ;XYZ***********?*****************************************************************
1424                                        ;*********************************************************************************
1425                                        ;*********************************************************************************
1426                                        ;XYZ***********?*****************************************************************
1427                                        ;*********************************************************************************
1428                                        ;*********************************************************************************
```

```
1429                                    ;XYZ************?****************************************************************
1430                                    ;*********************************************************************************
1431  010156  005737  001024                      TST     TEMP2           ;IS IT A TEST 2
1432  010162  001402                              BEQ     2$              ;BRANCH IF NOT TEST 2
1433  010164  004537  017330                      JSR     R5,MMUSE        ;DO NEXT INSTRUCTION WITH MM
1434  010170  010421                      2$:     MOV     R4,(1)+         ;HOLD HINUM FOR PROGRAM
1435  010172  005337  001226                      DEC     WORK
1436  010176  001314                              BNE     RAND1
1437  010200  000137  007774              EXGEN:  JMP     PASEX           ;RETURN TO PROGRAM
1438  010204  000000                      LONUM:  0
1439  010206  000000                      HINUM:  0
1440  010210  000000                      LOSAV:  0
1441  010212  000000                      HISAV:  0
1442
1443  010214  013737  001220  001150    RESTOR: MOV     SAVWC,SWRDCT    ;RESTORE ORIGINAL
1444  010222  013737  001150  001134            MOV     SWRDCT,WRDCT    ;WORD COUNT
1445  010230  000205                            RTS     R5
```

```
                                        ;RANDOM DATA GENERATOR SUBROUTINE
                                        ;WHEN SWITCH = 0 WE COME HERE

1446
1447
1448
1449  010232  013700  010340    RAND:   MOV     LONUM1,R0       ;SET UP R0 WITH 5 DIGITS LOW
1450  010236  013704  010342            MOV     HINUM1,R4       ;SET UP R1 WITH 5 DIGITS HIGH
1451  010242  012703  000007            MOV     #7,R3           ;SET UP SHIFT COUNT
1452  010246  005002                    CLR     R2              ;CLEAR R2
1453  010250  006300            SHIFT1: ASL     R0              ;SHIFT R0 LEFT AND
1454  010252  006104                    ROL     R4              ;ROTATE CARRY INTO LSB OF R1 INTO
1455  010254  006102                    ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
1456  010256  005303                    DEC     R3              ;DECREMENT R3
1457  010260  001373                    BNE     SHIFT1          ;CONTINUE SHIFT LOOP
1458  010262  063700  010340            ADD     LONUM1,R0       ;ADDN IN NUMBER TO MAKE X 129
1459  010266  005504                    ADC     R4              ;PROPOGATE CARRY
1460  010270  063704  010342            ADD     HINUM1,R4       ;ADDN IN NUMBER TO MAKE X 129
1461  010274  005502                    ADC     R2              ;PROPOGATE CARRY
1462  010276  062700  001057            ADD     #1057,R0        ;ADDN LOW CONSTANT
1463  010302  005504                    ADC     R4              ;PROPOGATE CARRIES
1464  010304  005502                    ADC     R2              ;PROPOGATE AGAIN
1465  010306  062704  047401            ADD     #47401,R4       ;ADDN HIGH CONSTANT
1466  010312  005502                    ADC     R2              ;PROPOGATE CARRY
1467  010314  062702  000006            ADD     #6,R2           ;ADDN HIGHEST CONSTANT
1468  010320  062700  000002            ADD     #2,R0           ;REPRIME R0 WITH HIGH DIGIT
1469  010324  005504                    ADC     R4              ;PROPOGATE CARRY
1470  010326  010037  010340            MOV     R0,LONUM1       ;PUT R0 BACK IN LONUM
1471  010332  010437  010342            MOV     R4,HINUM1       ;PUT R1 BACK IN HINUM
1472  010336  000205            EXGEN1: RTS     R5              ;RETURN TO PROGRAM
1473  010340  000000            LONUM1: 0
1474  010342  000000            HINUM1: 0
1475
1476                                    ;TRAP OUT ROUTINE WHEN CREATING DATA BUFFER
1477
1478  010344                    MEM:
1479  010344  104402  010350            TYPE    ,.+2            ;.ASCIZ <15><12>'NON-X-MEM''
1480  010364  012737  000006  000004 4$: MOV     #6,@#4          ;RESTORE
1481  010372  005037  000006            CLR     @#6             ;TRAP
1482  010376  032737  100000  177570    BIT     #BIT15,SWR      ;HALT?
1483  010404  001401                    BEQ     2$              ;NO
1484  010406  000000                    HALT
1485  010410  000137  001234    2$:     JMP     @#BEGIN
```

```
                                ;THIS ROUTINE COMPARES THE DATA READ AGAINST THE DATA EXPECTED.
                                ;ALL ERRORS ARE REPORTED TO THE OPERATOR. IF BIT 4 OF THE SWITCH
                                ;REGISTER IS SET, THIS ROUTINE WILL CONTINUE COMPARING AFTER AN ERROR HAS BEEN
                                ;FOUND AND WILL REPORT UP TO 8 VERIFY ERRORS WITHIN THE SAME INPUT OPERATION.

010414  012737  177770  001152   COMPAR: MOV     #-10,ERCOUNT    ;ERROR RETRY COUNTER
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
010422  004737  017372             JSR     PC,MMPSET       ;PRESET MEMORY MANAGEMENT REG
010426  052737  000010  001126     BIS     #BIT3,FLAG2     ;DOING COMPARE
010434  013737  001134  001232     MOV     WRDCT,WORK2     ;GET THE WORD COUNT
010442  013737  001122  001154     MOV     VADDR,SAVE      ;SET UP OUTBUFFER POINTER
010450  005037  001200             CLR     SWITCH          ;CLEAR RANDOM PATTERN FLAG
010454  013737  010210  010340     MOV     LOSAV,LONUM1    ;GET RANDOM BASE NOS.
010462  013737  010212  010342     MOV     HISAV,HINUM1
010470  005737  001142             TST     PATNU           ;TEST FOR PATTERN 0
010474  001017                     BNE     1$              ;NO
010476  005037  001226             CLR     WORK            ;CLEAR COUNTER
010502  062737  000001  001226 2$: ADD     #1,WORK         ;INC COUNTER
010510  001005                     BNE     3$              ;INTERRUPT YET?
010512  104402  000510             TYPE    ,NOINT
010516  104054                     HLT     !DA!WC!DS
010520  000137  001234             JMP     @#BEGIN
010524  005737  001202     3$:     TST     INTFLG          ;TEST FOR INT
010530  001764                     BEQ     2$              ;WAIT FOR INT BEFORE COMPARING
010532  000426                     BR      CMPLP1          ;CONT
010534  022737  000042  001142 1$: CMP     #42,PATNU       ;IS THIS RANDOM PATTERN?
010542  001022                     BNE     CMPLP1          ;BRANCH IF YES
010544  005737  001202     CMPLP:  TST     INTFLG          ;INTERRUPT YET?
010550  001775                     BEQ     CMPLP           ;NO WAIT
010552  005737  001200             TST     SWITCH
010556  001007                     BNE     2$
010560  004537  010232             JSR     R5,RAND
010564  013701  010340             MOV     LONUM1,GOOD     ;GET EVEN RANDOM WORD
010570  010637  001200             MOV     SP,SWITCH       ;SET RANDOM PATTERN FLAG
010574  000411                     BR      WRDCMP
010576  005037  001200     2$:     CLR     SWITCH
010602  013701  010342             MOV     HINUM1,GOOD
010606  000404                     BR      WRDCMP
010610  013700  001142     CMPLP1: MOV     PATNU,R0
010614  016001  000300             MOV     PAT0(R0),GOOD
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;XYZ************?*****************************************************
                                ;*************************************************************************
010620  005737  001024     WRDCMP: TST     TEMP2
```

```
1542  010624  001406                          BEQ     1$
1543  010626  042737  160000  001154          BIC     #160000,SAVE    ;CLEAR PAR REG
1544  010634  052737  060000  001154          BIS     #60000,SAVE     ;SET PAR 3
1545  010642  160177  170306          1$:     SUB     GOOD,@SAVE      ;COMPARE DATA
1546  010646  001037                          BNE     WDERR           ;WORD IN ERROR
1547  010650  005337  001232          WRDINC: DEC     WORK2           ;DECREMENT THE WORD COUNT
1548  010654  001430                          BEQ     ADAM            ;EXIT ROUTINE IF ZERO
1549  010656  062737  000002  001154          ADD     #2,SAVE         ;UPDATE PATTERN ADDRESS
1550                                  ;XYZ************?*****************************************************
1551                                  ;*************************************************************************
1552                                  ;*************************************************************************
1553                                  ;XYZ************?*****************************************************
1554                                  ;*************************************************************************
1555                                  ;*************************************************************************
1556                                  ;XYZ************?*****************************************************
1557                                  ;*************************************************************************
1558  010664  005737  001024                  TST     TEMP2
1559  010670  001415                          BEQ     1$
1560  010672  032737  100000  001154          BIT     #100000,SAVE    ;IS 4K DONE
1561  010700  001411                          BEQ     1$              ;BRANCH IF 4K NOT DONE
1562  010702  042737  100000  001154          BIC     #100000,SAVE    ;CLEAR PAR BITS
1563  010710  052737  060000  001154          BIS     #60000,SAVE     ;SET PAR 3
1564  010716  062737  000200  172346          ADD     #200,KIPAR3     ;UPDATE PAR 3 TO NEXT 4K
1565  010724  022737  000042  001142  1$:     CMP     #42,PATNU       ;IS THIS RANDOM PATTERN
1566  010732  001704                          BEQ     CMPLP           ;BRANCH IF YES
1567  010734  000731                          BR      WRDCMP          ;COMPARE NEXT WORD
1568  010736  042737  000010  001126  ADAM:   BIC     #BIT3,FLAG2     ;DONE WITH COMPARE
1569  010744  000205                          RTS     R5              ;EXIT THIS ROUTINE
```

```
1570  010746  005737  001202          WDERR:  TST     INTFLG          ;DID INTERRUPT OCCUR YET?
1571  010752  001722                          BEQ     WRDCMP          ;BRANCH IF NO
1572  010754  032737  000100  177570          BIT     #BIT6,SWR       ;TRY ALL?
1573  010762  001006                          BNE     10$             ;YES
1574  010764  005737  001204                  TST     LOPCNT          ;FIRST READ ERROR?
1575  010770  001403                          BEQ     10$             ;YES
1576  010772  005777  170034                  TST     @RSCS1          ;ANY ERRORS?
1577  010776  100757                          BMI     ADAM            ;YES DO NOT COMPARE
1578  011000  060177  170150          10$:    ADD     GOOD,@SAVE
1579  011004  017700  170144                  MOV     @SAVE,BAD       ;GET GOOD DATA
1580  011010  104436                          LOGC                    ;LOG COMPARE ERROR
1581  011012  032737  001000  177570          BIT     #BIT9,SWR       ;LOOP ON ERROR?
1582  011020  001401                          BEQ     11$             ;NO
1583  011022  005726                          TST     (6)+            ;YES UPDATE SP
1584  011024  004737  014112          11$:    JSR     PC,PRNT         ;TYPEOUT?
1585  011030  001011                          BNE     3$              ;NO
1586  011032  104402  011036                  TYPE    ,..+2           ;.ASCIZ <15><12>''COMPARE ERR''
1587  011054  104000                  3$:     HLT                     ;DATA COMPARE ERROR
1588  011056  004737  014112                  JSR     PC,PRNT         ;HAD TO DO IT THIS WAY SO
1589  011062  001022                          BNE     13$             ;PROGRAM COULD LOOP ON ERROR
1590  011064  104402  011070                  TYPE    ,..+2           ;.ASCIZ '' ADDR=''
1591  011100  005737  001216                  TST     MMAVA           ;IS MEM MGMT ON?
1592  011104  001406                          BEQ     12$             ;NO
1593  011106  013746  177776                  MOV     PS,-(6)         ;GET PS
1594  011112  013746  001154                  MOV     SAVE,-(6)       ;GET VIRTUAL ADDR
1595  011116  104412                          TYPEA                   ;CONVERT TO PHY AND TYPE
1596  011120  000403                          BR      13$             ;CONT
1597  011122  013746  001154          12$:    MOV     SAVE,-(6)       ;GET ADDR
1598  011126  104406                          TYPES                   ;TYPE IT
1599  011130  005037  001160          13$:    CLR     BLOCK           ;CLEAR THE BLOCK COUNTER
1600  011134  013702  001134                  MOV     WRDCT,R2        ;GET THE WORD COUNT
1601  011140  005202                          INC     R2              ;CORRECT FOR DA CALCULATIONS
1602  011142  163702  001232                  SUB     WORK2,R2        ;DETERMINE DISTANCE OF FAILURE INTO BUFFER
1603  011146  005737  001172          2$:     TST     RS04DT          ;RS04?
1604  011152  001403                          BEQ     7$              ;NO
1605  011154  162702  000200                  SUB     #200,R2         ;RS03
1606  011160  000402                          BR      9$              ;CONT
1607  011162  162702  000100          7$:     SUB     #100,R2
1608  011166  100403                  9$:     BMI     8$
1609  011170  005237  001160                  INC     BLOCK           ;UPDATE BLOCK COUNT FOR EACH 400 WORDS
1610  011174  000764                          BR      2$
```

```
1611  011176  005737  001172          8$:   TST   RS04DT          ;RS04?
1612  011202  001403                        BEQ   4$              ;NO
1613  011204  062702  000200                ADD   #200,R2         ;RS04
1614  011210  000402                        BR    6$              ;CONT
1615  011212  062702  000100          4$:   ADD   #100,R2         ;RESTORE POSITIVE NUMBER
1616  011216  013737  001140  001230  6$:   MOV   DMA,WORK1       ;GET HEAD AND SECTOR ADDRESS
1617  011224  063737  001160  001230  5$:   ADD   BLOCK,WORK1
1618  011232  004737  014112                JSR   PC,PRNT         ;TYPEOUT?
1619  011236  001014                        BNE   1$              ;NO
1620  011240  104402  011244                TYPE  ,.+2            ;.ASCIZ '' DA=''
1621  011252  013746  001230                MOV   WORK1,-(6)      ;PUT WORK1 ON STACK
1622  011256  104406                        TYPES                 ;TYPE STACK IN OCTAL - SUPRESS
1623  011260  104402  011264                TYPE  ,.+2            ;.ASCIZ <15><12>
1624  011270  032737  000020  177570  1$:   BIT   #BIT4,SWR       ;RETRY?
1625  011276  001405                        BEQ   CLEAR           ;NO
1626  011300  005237  001152                INC   ERCOUNT         ;UPDATE ERROR COUNTER
1627  011304  001402                        BEQ   CLEAR
1628  011306  000137  010650                JMP   WRDINC
1629  011312  032737  000004  001132  CLEAR: BIT   #BIT2,FLAG      ;XFER TEST?
1630  011320  001404                        BEQ   3$              ;NO
1631  011322  032737  010000  001132        BIT   #BIT12,FLAG     ;READ?
1632  011330  001421                        BEQ   2$              ;NO
1633                                ;XYZ***********?*****************************************************
1634                                ;*************************************************************************
1635                                ;*************************************************************************
1636                                ;XYZ***********?*****************************************************
1637                                ;*************************************************************************
1638                                ;*************************************************************************
1639                                ;XYZ***********?*****************************************************
1640                                ;*************************************************************************
1641  011332  013701  001122          3$:   MOV   VADDR,R1          ;GET STARTING ADD OF BUFFER
1642  011336  013700  001134                MOV   WRDCT,R0          ;NOW
1643  011342  004737  017372                JSR   PC,MMPSET         ;PRESET MM
1644  011346  005737  001024                TST   TEMP2             ;IS IT TEST 2
1645  011352  001402                        BEQ   1$                ;BRANCH IF NOT TEST 2
1646  011354  004537  017330          4$:   JSR   R5,MMUSE          ;DO NEXT INSTRUCTION WITH MM
1647  011360  005021                  1$:   CLR   (R1)+             ;CLEAR BUFFER
1648  011362  005300                        DEC   R0                ;COUNT LOCATIONS
1649  011364  001373                        BNE   4$                ;WAIT TILL DONE
1650  011366  042737  000010  001126        BIC   #BIT3,FLAG2       ;DONE WITH COMPARE
1651  011374  000205                  2$:   RTS   R5                ;NOW GET OUT
1652
1653  011376  013737  001076  017326  APORT: MOV   SAVAST,OUTBUF    ;SET STARTING ADDR FOR OUTBUF
1654  011404  013737  001076  001122        MOV   SAVAST,VADDR      ;SAVE OUTBUF ADDR
1655  011412  005737  001216                TST   MMAVA             ;MEM MGMT?
1656  011416  001411                        BEQ   EXTT              ;NO
1657  011420  013702  001104                MOV   SAVMGA,R2         ;SET UP MEM MGMT
1658  011424  004737  011650          MMSET: JSR   PC,STMM2          ;SETUP MEM MGMT
1659  011430  010237  001122                MOV   R2,VADDR
1660  011434  013737  001124  017326        MOV   PHADDR,OUTBUF
1661  011442  000207                  EXTT: RTS   PC
```

```
                                        ;TYPE CAN NOT WRITE BLOCK
011444  004737  014112        WTNO:   JSR     PC,PRNT         ;TYPEOUT?
011450  001002                        BNE     1$              ;NO
011452  104402  006674                TYPE    ,NOWRIT
011456  005037  001204        1$:     CLR     LOPCNT          ;CLEAR ERR COUNTER
011462  000207                        RTS     PC

                                        ;ROUTINE TO SET UP STARTING ADDRESS FOR ALL PORTS
                                        ;AND TO CREATE WORD COUNT MAX= 20K

011464  013702  001074        EXTMEM: MOV     STAMEM,R2       ;GET BANK #
011470  005702                        TST     R2              ;DID  HE TYPE 0?
011472  001001                        BNE     3$              ;NO
011474  005202                        INC     R2              ;YES MAKE 1
011476  005737  001216        3$:     TST     MMAVA
011502  001006                        BNE     1$              ;BRANCH IF MEM MGMT AVAILABLE
011504  000241                        CLC
011506  004737  011566                JSR     PC,RRR2
011512  010237  001076                MOV     R2,SAVAST       ;SAVE A STARTIND ADDR
011516  000404                        BR      2$              ;GET WC
011520  000302                1$:     SWAB    R2
011522  006002                        ROR     R2
011524  010237  001104                MOV     R2,SAVMGA       ;SAVE ADDR FOR A PORT
011530  013702  001112        2$:     MOV     SIZEAP,R2       ;GET 4K BLOCK COUNT
011534  005202                        INC     R2              ;
011536  163702  001074                SUB     STAMEM, R2      ;LIMIT WC TO MEMORY SIZE
011542  000241                8$:     CLC
011544  006002                        ROR     R2              ;NO CONVERT TO WC
011546  004737  011566                JSR     PC,RRR2
011552  042702  000[illegible]        BIC     #77,R2          ;CLEAR BLOCK COUNT
011556  010237  001[illegible]        MOV     R2,SWRDCT       ;SAVE -A- PORT WC
011562  000400                        BR      7$              ;CONT
                                ;4$:MOV#60000,SWRDCT;MAKE 20K
011564  000207                7$:     RTS     PC

011566  006002                RRR2:   ROR     R2
011570  006002                        ROR     R2
011572  006002                        ROR     R2
011574  006002                        ROR     R2
011576  000207                        RTS     PC

011600  032737  000200  177570  WATT:   BIT     #BIT7,SWR       ;WAIT IN BACKGROUND?
011606  001003                        BNE     1$              ;NO
011610  004737  012154                JSR     PC,XWAIT        ;YES
011614  000401                        BR      2$              ;CONT
011616  000001                1$:     WAIT
011620  000207                2$:     RTS     PC

011622  004737  014112        TYPREC: JSR     PC,PRNT         ;TYPEOUT?
011626  001007                        BNE     1$              ;NO
011630  104402  000702                TYPE    ,RECOV
011634  013746  001204                MOV     LOPCNT,-(6)     ;GET COUNT
011640  104406                        TYPES                   ;TYPE IT
011642  104402  000757                TYPE    ,CRLFLF
011646  000207                1$:     RTS     PC
```

```
1718
1719  011650  005737  001216          STMM2:  TST     MMAVA           ;MEM MGMT?
1720  011654  001002                          BNE     3$              ;YES
1721  011656  000137  012142                  JMP     MDON            ;GET OUT
1722  011662  005037  172340          3$:     CLR     @#KIPAR0
1723  011666  010237  001154                  MOV     R2,SAVE         ;SAVE R2
1724  011672  010237  172342                  MOV     R2,@#KIPAR1
1725  011676  006302                          ASL     R2              ;CALCULATE PHYSICAL ADDR
1726  011700  006302                          ASL     R2
1727  011702  006302                          ASL     R2
1728  011704  006302                          ASL     R2
1729  011706  006302                          ASL     R2              ;THIS BIT IS A17
1730  011710  042737  000040  001126        BIC     #BIT5,FLAG2     ;CLEAR A17?
1731  011716  103003                          BCC     1$              ;SET A17
1732  011720  052737  000040  001126        BIS     #BIT5,FLAG2     ;SET BIT 5 FOR A17
1733  011726  042737  000020  001126  1$:     BIC     #BIT4,FLAG2     ;CLEAR A16 FLAG
1734  011734  006302                          ASL     R2              ;GET A16 BIT
1735  011736  103003                          BCC     2$              ;CLEAR A16
1736  011740  052737  000020  001126        BIS     #BIT4,FLAG2     ;SET FLAG FOR A16
1737  011746  010237  001124          2$:     MOV     R2,PHADDR       ;GET PHYSICAL ADDR
1738  011752  013702  001154                  MOV     SAVE,R2         ;SET UP MEM MGMT
1739  011756  062702  000200                  ADD     #200,R2
1740  011762  010237  172344                  MOV     R2,@#KIPAR2
1741  011766  062702  000200                  ADD     #200,R2
1742  011772  010237  172346                  MOV     R2,@#KIPAR3
1743  011776  062702  000200                  ADD     #200,R2
1744  012002  010237  172350                  MOV     R2,@#KIPAR4
1745  012006  062702  000200                  ADD     #200,R2
1746  012012  010237  172352                  MOV     R2,@#KIPAR5
1747  012016  062702  000200                  ADD     #200,R2
1748  012022  010237  172354                  MOV     R2,@#KIPAR6
1749  012026  012737  077406  172300          MOV     #200*256.-400+UP+RW,@#KIPDR0    ;SET KIPDR0=RW UP 200 BLOCKS
1750  012034  012737  077406  172302          MOV     #200*256.-400+UP+RW,@#KIPDR1    ;SET KIPDR1=RW UP 200 BLOCKS
1751  012042  012737  077406  172304          MOV     #200*256.-400+UP+RW,@#KIPDR2    ;SET KIPDR2=RW UP 200 BLOCKS
1752  012050  012737  077406  172306          MOV     #200*256.-400+UP+RW,@#KIPDR3    ;SET KIPDR3=RW UP 200 BLOCKS
1753  012056  012737  077406  172310          MOV     #200*256.-400+UP+RW,@#KIPDR4    ;SET KIPDR4=RW UP 200 BLOCKS
1754  012064  012737  077406  172312          MOV     #200*256.-400+UP+RW,@#KIPDR5    ;SET KIPDR5=RW UP 200 BLOCKS
1755  012072  012737  077406  172314          MOV     #200*256.-400+UP+RW,@#KIPDR6    ;SET KIPDR6=RW UP 200 BLOCKS
1756  012100  012737  077406  172316          MOV     #200*256.-400+UP+RW,@#KIPDR7    ;SET KIPDR7=RW UP 200 BLOCKS
1757  012106  012737  177600  172356          MOV     #177600,@#KIPAR7
1758  012114  012702  020000                  MOV     #20000,R2
1759  012120  012737  012144  000250          MOV     #MMABT0,@#MMVEC
1760  012126  012737  000020  172516          MOV     #20,SR3         ;TURN ON 22 BIT MODE
1761  012134  012737  000001  177572          MOV     #1,@#SR0        ;TURN ON MEM MGMT
1762  012142  000207                  MDON:   RTS     PC
1763                                  ;MEMORY MANAGEMENT ABORT ROUTINE FOR WRITE UP
1764  012144  104402  000541        MMABT0: TYPE    ,MTRAP
1765  012150  000000                          HALT
1766  012152  000002                          RTI                     ;CAUSED THE ABORT
```

```
1767                                        ;BACKGROUND TEST FOR INTERRUPTS
1768
1769  012154  052737  002000  001126  XWAIT:  BIS     #BIT10,FLAG2    ;WAITING IN BACKGROUND TEST
1770  012162  012737  070000  012274          MOV     #70000,NPRCNT   ;SETUP TIMEOUT COUNTER
1771  012170  012701  012277                  MOV     #NPR1+1,R1      ;SETUP WAIT LOOP
1772  012174  112711  000200                  MOVB    #200,(R1)
1773  012200                              2$:
1774  012200  105421                          NEGB    (R1)+
1775  012202  105441                          NEGB    -(R1)
1776  012204  105421                          NEGB    (R1)+
1777  012206  105441                          NEGB    -(R1)
1778  012210  105421                          NEGB    (R1)+
1779  012212  105441                          NEGB    -(R1)
1780  012214  105421                          NEGB    (R1)+
1781  012216  105441                          NEGB    -(R1)
1782  012220  105421                          NEGB    (R1)+
1783  012222  105441                          NEGB    -(R1)
1784  012224  105421                          NEGB    (R1)+
1785  012226  105441                          NEGB    -(R1)
1786  012230  105421                          NEGB    (R1)+
1787  012232  105441                          NEGB    -(R1)
1788  012234  105421                          NEGB    (R1)+
1789  012236  105441                          NEGB    -(R1)
1790  012240  102401                          BVS     1$
1791  012242  000000                          HALT                    ;ARITHMETIC OPERATION FAILED RUN DIAG
1792  012244  005337  012274          1$:     DEC     NPRCNT
1793  012250  001353                          BNE     2$
1794  012252  104402  000510                  TYPE    ,NOINT
1795  012256  104054                          HLT     !DA!WC!DS
1796  012260  000137  001234                  JMP     @#BEGIN
1797  012264  042737  002000  001126  NPRRET: BIC     #BIT10,FLAG2    ;CLEAR BKGROUND FLG
1798  012272  000207                          RTS     PC
1799  012274  000000                      NPRCNT: 0
1800  012276  000000                      NPR1:   0
1801                                        ;CLEAR ERROR TABLE
1802
1803  012300  012704  000020  ERRCL:  MOV     #20,R4          ;CLEAR
1804  012304  012703  017266          MOV     #ERTAB,R3       ;ERROR
1805  012310  005023          1$:     CLR     (R3)+           ;TABLE
1806  012312  005304                  DEC     R4              ;DONE YET?
1807  012314  001375                  BNE     1$              ;NO
1808  012316  005037  001004          CLR     PCNT            ;CLEAR
1809  012322  005037  001006          CLR     PCNT+2          ;PASS COUNT
1810  012326  005037  001130          CLR     DROP            ;CLEAR ALL DROPPED DRIVES
1811  012332  000205                  RTS     R5              ;RETURN
```

```
                                        ;RH70 POWER FAIL TEST #1
                                        ;THE STARTING ADDRESS FOR THE WRITE POWER FAIL TEST IS 270.
                                        ;A MESSAGE WILL BE TYPED OUT 'LOAD SW WITH UNIT # AND CONT.'
                                        ;THE OPERATOR NOW HAS TO LOAD THE UNIT # IN OCTAL INTO THE SW REGISTER
                                        ;IN BITS 00-01-AND 02. THEN HIT CONT. THE PROGRAM WILL
                                        ;WRITE THE COMPLETE DISK WITH A 125252 PATTERN. THE PROGRAM WILL THEN
                                        ;TELL OPERATOR TO POWER DOWN. UNTIL THE POWER FAIL, THE PROGRAM WILL
                                        ;CONTINUE WRITING THE SAME PATTERN ON THE DISK.
                                        ;WHEN POWER FAIL OCCURS THE TRANSFER IS ABORTED
                                        ;AND THE PROGRAM HALTS. THE OPERATOR SHOULD
                                        ;NOW TURN POWER BACK ON. THE PROGRAM RESTARTS AND CHECKS FOR WRITE ERRORS.
                                        ;ONLY ONE ERROR IS ACCEPTABLE. THAT ERROR MAY BE AN OPI (BIT13 RSER)OR A DCK
                                        ;(BIT 15 RSER). IF THESE ARE THE ONLY ERRORS THAT OCCUR, THE DRIVE IS OK.
                                        ;IF NO ERRORS OCCUR, THE PROGRAM WILL TYPE OUT 'OK'.
                                        ;THE PROGRAM WILL THEN TELL YOU WHEN TO POWER DOWN AGAIN

                                        ;***ONLY ONE ERROR IS CONSIDERED ACCEPTABLE***

012334  012706  000500          PFT1:   MOV     #500,SP         ;SET UP STACK
012340  005037  001024                  CLR     TEMP2
012344  104402  000561                  TYPE    ,LOADSW
012350  000000                          HALT
012352  004737  007130                  JSR     PC,VECTRR       ;SETUP INT VECTOR
012356  013737  177570  001164          MOV     @#SWR,UNNUM     ;SAVE IT
012364  004737  006740                  JSR     PC,FNDTYP       ;TST FOR RS03 OR 04
012370  104426                  PFWATT: CLRDV                   ;CLEAR ALL REG
012372  004737  013152                  JSR     PC,POWFAL       ;WRITE 125252 ON DISK
012376  005037  001140          PFWAT:  CLR     DMA
012402  012737  012624  000024          MOV     #DOWN,24        ;SET UP POWER FAIL VEC.
012410  012737  000340  000026          MOV     #340,26
012416  012737  000161  001176  MYBYWR: MOV     #161,CMD        ;WRITE WITH I/E
012424  104416                          DKCMD                   ;DO IT
012426  004737  011600                  JSR     PC,WATT         ;WAIT FOR INTERRUPT
012432  032737  001000  001132  3$:     BIT     #BIT9,FLAG      ;ANY ERRORS?
012440  001406                          BEQ     1$              ;NO
012442  104006                          HLT     !DA!DB
012444  012777  177777  166376          MOV     #-1,@RSAS       ;CLEAR ALL
012452  005077  166370                  CLR     @RSER           ;ERRORS
012456  004737  007204          1$:     JSR     PC,DISBUF       ;SET UP NEW DISK BUFFER
012462  000755                          BR      MYBYWR
012464  000744                          BR      PFWAT
```

```
 1853  012466  012737  012474  001156  UPCHK:  MOV     #1$,HRDER       ;RETURN HERE IF WRONG DRIVE INTERRUPTS
 1854  012474  005037  001140          1$:     CLR     DMA
 1855  012500  104426                          CLRDV                   ;INIT DRIVE
 1856  012502  013737  001072  177776  CHKDAT: MOV     PRIORITY,PS
 1857  012510  012737  000151  001176          MOV     #151,CMD        ;WRITECHECK WITH I/E
 1858  012516  104416                          DKCMD                   ;DO IT
 1859  012520  013737  001072  177776          MOV     PRIORITY,PS
 1860  012526  004737  011600                  JSR     PC,WATT         ;WAIT FOR INTERRUPT
 1861  012532  032737  001000  001132  3$:     BIT     #BIT9,FLAG      ;ANY ERRORS?
 1862  012540  001411                          BEQ     1$              ;NO
 1863  012542  104006                          HLT     !DB!DA
 1864  012544  052737  100000  001126          BIS     #BIT15,FLAG2    ;SET ERROR FLAG
 1865  012552  005077  166270                  CLR     @RSER           ;CLEAR ALL
 1866  012556  012777  177777  166264          MOV     #-1,@RSAS       ;ERRORS
 1867  012564  004737  007204          1$:     JSR     PC,DISBUF       ;SET UP NEW DISK BUFFER
 1868  012570  000744                          BR      CHKDAT
 1869  012572  005737  001126                  TST     FLAG2           ;ANY ERRORS?
 1870  012576  100405                          BMI     2$              ;YES
 1871  012600  104402  012604                  TYPE    ,..+2           ;.ASCIZ <15><12>''OK''
 1872  012612  042737  100000  001126  2$:     BIC     #BIT15,FLAG2    ;CLEAR ERROR FLAG
 1873  012620  000137  012370                  JMP     PFWAIT          ;GO WAIT FOR ANOTHER
 1874                                                                  ;POWER FAIL
 1875
 1876                                  ;POWER DOWN ROUTINE - ABORT DISK AND HALT
 1877
 1878  012624  012737  012634  000024  DOWN:   MOV     #UPP,24         ;SET POWER FAIL VECTOR
 1879  012632  000000                          HALT
 1880
 1881  012634  012737  012624  000024  UPP:    MOV     #DOWN,24
 1882  012642  012706  000500                  MOV     #500,SP
 1883  012646  013777  001164  166160          MOV     UNNUM,@RSCS2    ;GET UNIT #
 1884  012654  032777  000200  166162  1$:     BIT     #BIT7,@RSDS     ;WAIT FOR DRIVE READY
 1885  012662  001774                          BEQ     1$
 1886  012664  000137  012466                  JMP     UPCHK           ;GO CHECK DISK
```

```
                                        ;POWER FAIL TEST #2
                                        ;THIS TEST WILL TEST THE SAME DRIVE THAT WAS TESTED IN THE 1ST POWER FAIL TEST
                                        ;THE PROGRAM WILL WRITE THE COMPLETE DISK WITH A 125252 PATTERN AND WILL
                                        ;THEN TELL THE OPERATOR TO POWER DOWN THE PROCESSOR.
                                        ;THE PROGRAM WILL THEN WRITE CHECK THE DISK WHILE WAITING FOR A POWER FAIL.
                                        ;WHEN THE POWER FAIL OCCURS, THE WRITE CHECKING IS ABORTED AND
                                        ;THE PROCESSOR WILL HALT.
                                        ;THE OPERATOR SHOULD THEN TURN POWER BACK ON, THE PROGRAM WILL
                                        ;START WRITE CHECKING THE DISK AGAIN
                                        ;***NO ERRORS SHOULD OCCUR.***
                                        ;THE PROGRAM WILL TYPE OUT "OK" IF NO ERRORS OCCUR.
                                        ;THE PROGRAM WILL THEN TELL YOU TO POWER DOWN.
                                        ;DO NOT POWER OFF THE PROCESSOR AGAIN UNTIL THE PROGRAM TELLS YOU SO.

012670 012706 000500          PFT2:   MOV     #500,SP         ;SET UP STACK
012674 005037 001024                  CLR     TEMP2
012700 042737 001000 001126           BIC     #BIT9,FLAG2     ;CLEAR POWER FAIL
012706 012737 012730 001156           MOV     #PWRF1,HRDER    ;RETURN HERE IF WRONG DRIVE INT.
012714 104426                         CLRDV                   ;INIT DRIVE
012716 004737 007130                  JSR     PC,VECTRR       ;SETUP INT VECTOR
012722 004737 013152          PWRFL2: JSR     PC,POWFAL       ;WRITE 125252 ON DISK
012726 000401                         BR      PWRFL           ;WRITE CHECK
012730 104426                 PWRF1:  CLRDV                   ;INIT DRIVE
012732 005037 001140          PWRFL:  CLR     DMA
012736 012737 013102 000024           MOV     #PWRDN,24       ;SET UP POWER FAIL VEC.
012744 012737 000340 000026           MOV     #340,26
012752 013737 001072 177776   CHKDSK: MOV     PRIORITY,PS     ;ENABLE I/E
012760 012737 000151 001176           MOV     #151,CMD        ;WRITE CHECK WITH I/E
012766 104416                         DKCMD                   ;DO IT
012770 004737 011600                  JSR     PC,WATT         ;WAIT FOR INTERRUPT
012774 032737 001000 001132   3$:     BIT     #BIT9,FLAG      ;ANY ERRORS?
013002 001411                         BEQ     1$              ;NO
013004 104002                         HLT     !DB             ;YES
013006 052737 100000 001126           BIS     #BIT15,FLAG2    ;SET ERROR FLAG
013014 005077 166026                  CLR     @RSER           ;CLEAR ALL
013020 012777 177777 166022           MOV     #-1,@RSAS       ;ERRORS
013026 004737 007204          1$:     JSR     PC,DISBUF       ;CHECK NEXT BUFFER
013032 000747                         BR      CHKDSK
013034 032737 001000 001126           BIT     #BIT9,FLAG2     ;DID POWER FAIL?
013042 001733                         BEQ     PWRFL           ;NO
013044 005737 001126                  TST     FLAG2           ;ANY ERRORS?
013050 100405                         BMI     2$              ;YES
013052 104402 013056                  TYPE    ,..+2           ;.ASCIZ <15><12>"OK"
013064 042737 100000 001126   2$:     BIC     #BIT15,FLAG2    ;CLEAR ERRORS
013072 042737 001000 001126           BIC     #BIT9,FLAG2     ;CLEAR POWER FAIL FLAG
013100 000710                 4$:     BR      PWRFL2
```

```
                                        ;ROUTINE TO ABORT DISK DURING POWER FAIL

013102  012737  013112  000024  PWRDN:  MOV     #PWRUP,24       ;SET UP RESTART
013110  000000                  HALT
013112  012737  013102  000024  PWRUP:  MOV     #PWRDN,24       ;RESET POWER FAIL VECTOR
013120  012706  000500          MOV     #500,SP
013124  013777  001164  165702          MOV     UNNUM,@RSCS2    ;GET UNIT #
013132  052737  001000  001126          BIS     #BIT9,FLAG2     ;SET POWER FAIL BIT
013140  032777  000200  165676  1$:     BIT     #BIT7,@RSDS     ;WAITING FOR
013146  001774                  BEQ     1$              ;DRIVE READY
013150  000667                  BR      PWRF1           ;GO CHECK DISK


                                        ;ROUTINE TO WRITE THE COMPLETE DISK
                                        ;WITH 125252 PATTERN
                                        ;WRITE CHECK AND REPORT ERRORS IF THEY  OCCUR
                                        ;REPORT 'OK'' AT COMPLETION

013152  012737  000020  001142  POWFAL: MOV     #20,PATNU       ;SET UP PATTERN
013160  042737  000004  001132          BIC     #BIT2,FLAG      ;CLEAR XFER MODE FLAG
013166  052737  010000  001126          BIS     #BIT12,FLAG2
013174  005037  001140          CLR     DMA
013200  012737  020000  017326          MOV     #20000,OUTBUF   ;GET STARTING ADDR FOR BUF
013206  012737  020000  001122          MOV     #20000,VADDR
013214  012737  010000  001150          MOV     #10000,SWRDCT   ;SETUP WORD COUNT
013222  013737  001150  001134          MOV     SWRDCT,WRDCT
013230  005037  001120          CLR     A0B1            ;A PORT ONLY
013234  013737  017326  001144          MOV     OUTBUF,BUF      ;SET UP CURRENT ADDRESS
013242  004537  007650          JSR     R5,PASEL        ;GENERATE DATA BUFFER
013246  012737  000161  001176  WRDNW:  MOV     #161,CMD        ;WRITE WITH I/E
013254  104416                  DKCMD                   ;DO IT
013256  004737  011600          JSR     PC,WATT         ;WAIT FOR INTERRUPT
013262  012737  000151  001176  2$:     MOV     #151,CMD        ;WRITECHECK I/E
013270  104416                  DKCMD                   ;DO IT
013272  004737  011600          JSR     PC,WATT         ;WAIT FOR INTERRUPT
013276  032737  001000  001132  4$:     BIT     #BIT9,FLAG      ;ANY ERRORS?
013304  001402                  BEQ     1$              ;NO
013306  104006                  HLT     !DB!DA          ;YES
013310  000000                  HALT                    ;CAN NOT WRITE WITHOUT ERROR
013312  004737  007204          1$:     JSR     PC,DISBUF       ;SET UP NEW DISK BUFFER
013316  000753                  BR      WRDNW           ;WRITE NEW BUFFER
013320  104402  013324          TYPE    ,.+2            ;.ASCIZ <15><12>'POWER DOWN''
013342  000207                  RTS     PC
```

```
 1977  013344  032737  000010  177570  OUT:    BIT     #BIT3,SWR       ;TYPEOUT ERROR COUNT?
 1978  013352  001532                          BEQ     1$              ;NO
 1979  013354  005004                          CLR     R4              ;CLEAR UNIT #
 1980  013356  005003                          CLR     R3
 1981  013360  053737  001130  001166          BIS     DROP,UNITSV     ;RESTORE ALL DRIVES
 1982  013366  013737  001166  001226          MOV     UNITSV,WORK     ;GET UNITS ON SYSTEM
 1983  013374  012705  000401                  MOV     #401,R5         ;SETUP TEST FOR UNITS
 1984  013400  030537  001226          4$:     BIT     R5,WORK         ;IS THIS UNIT ON SYS
 1985  013404  001006                          BNE     2$              ;YES
 1986  013406  005204                  5$:     INC     R4              ;INC UNIT #
 1987  013410  010403                          MOV     R4,R3           ;SAVE UNIT #
 1988  013412  000241                          CLC
 1989  013414  006105                          ROL     R5              ;GET NEXT DRIVE
 1990  013416  103505                          BCS     3$              ;DONE
 1991  013420  000767                          BR      4$              ;FIND NEXT DRIVE
 1992  013422                          2$:
 1993  013422  104402  013426                  TYPE    ,..+2           ;.ASCIZ <15><12>'UNIT ''
 1994  013436  010446                          MOV     R4,-(6)         ;PUT R4 ON STACK
 1995  013440  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 1996  013442  004737  013720                  JSR     PC,GETERR       ;GET ERROR COUNT
 1997  013446  010304                          MOV     R3,R4           ;RESTORE UNIT #
 1998  013450  104402  013454                  TYPE    ,..+2           ;.ASCIZ <15><12>
 1999  013460  104402  000630                  TYPE    ,WRTERR
 2000  013464  104402  013470                  TYPE    ,..+2           ;.ASCIZ ''S ''
 2001  013474  013746  001206                  MOV     WRITER,-(6)     ;PUT WRITER ON STACK
 2002  013500  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 2003  013502  104402  013506                  TYPE    ,..+2           ;.ASCIZ <15><12>
 2004  013512  104402  000657                  TYPE    ,RDERR
 2005  013516  104402  013522                  TYPE    ,..+2           ;.ASCIZ ''S ''
 2006  013526  013746  001212                  MOV     READER,-(6)     ;PUT READER ON STACK
 2007  013532  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 2008  013534  104402  013540                  TYPE    ,..+2           ;.ASCIZ <15><12>
 2009  013544  104402  000642                  TYPE    ,WCKERR
 2010  013550  104402  013554                  TYPE    ,..+2           ;.ASCIZ ''S ''
 2011  013560  013746  001210                  MOV     WCERR,-(6)      ;PUT WCERR ON STACK
 2012  013564  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 2013  013566  104402  013572                  TYPE    ,..+2           ;.ASCIZ <15><12>'COMPARE ERRS ''
 2014  013612  013746  001214                  MOV     COMERR,-(6)     ;PUT COMERR ON STACK
 2015  013616  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 2016  013620  104402  013624                  TYPE    ,..+2           ;.ASCIZ <15><12>
 2017  013630  000666                          BR      5$              ;GET NEXT DRIVE
 2018  013632  043737  001130  001166  3$:     BIC     DROP,UNITSV     ;REDROP DRIVES
 2019  013640  062706  000002          1$:     ADD     #2,SP           ;RESTORE SP DUE TO JMP EXIT FROM JSR ROUTINE
 2020  013644  005137  001120                  COM     A0B1            ;SET A OR B PORT FLAG
 2021  013650  032737  000040  177570          BIT     #BIT5,SWR       ;TYPEOUT PASS COUNT?
 2022  013656  001035                          BNE     DONE            ;NO
 2023  013660  104402  013664                  TYPE    ,..+2           ;.ASCIZ <15><12>'END PASS ''
 2024  013700  013746  001006                  MOV     PCNT+2,-(6)     ;PUT PCNT+2 ON STACK
 2025  013704  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
 2026  013706  104402  013712                  TYPE    ,..+2           ;.ASCIZ <15><12>
 2027  013716  000415                          BR      DONE
```

```
2028  013720  006304                  GETERR: ASL     R4              ;GET LOC IN
2029  013722  006304                          ASL     R4              ;ERR TABLE
2030  013724  062704  017266                  ADD     #ERTAB,R4
2031  013730  112437  001206                  MOVB    (R4)+,WRITER    ;GET WRITE ERRS
2032  013734  112437  001212                  MOVB    (R4)+,READER    ;GET READ ERRS
2033  013740  112437  001210                  MOVB    (R4)+,WCERR     ;GET WRITE CK ERRS
2034  013744  112437  001214                  MOVB    (R4)+,COMERR    ;GET COMPARE ERRS
2035  013750  000207                          RTS     PC
2036
2037                                  .SBTTL          $DONE - BELL AND SCOPE ROUTINE
2038
2039  013752  104400                  DONE:   SCOPE                   ;TERMINATIONG SCOPE FOR LOOPING
2040  013754  062737  000001  001006          ADD     #1,PCNT+2       ;ADD 1 TO THE PASS COUNT
2041  013762  005537  001004                  ADC     PCNT            ;MAKE IT DOUBLE PREC.
2042  013766  013700  000042          4$:     MOV     @#42,R0         ;GET MONITOR ADDRESS
2043  013772  001405                          BEQ     $END1           ;IF NONE
2044  013774  000005                          RESET
2045  013776  004710                  $ENDAD: JSR     7,(0)           ;GO TO MONITOR
2046  014000  000240  000240  000240          240,240,240             ;SAVE ROOM FOR ACT11
2047  014006  000137  003176          $END1:  JMP     ADTST           ;RETURN
2048
2049  014012  000000                  .TBIT:  0                       ;T BIT FLAG
2050
2051  014014  012702  000001          .LOGW:  MOV     #1,R2           ;LOG WRITE ERR
2052  014020  005003                  CLIND:  CLR     R3              ;CLEAR INDEX FOR TABLE
2053  014022  000413                          BR      ADDRR
2054
2055  014024  012702  000400          .LOGR:  MOV     #400,R2         ;LOG WRITE ERR
2056  014030  000773                          BR      CLIND
2057
2058  014032  012702  000001          .LOGWC: MOV     #1,R2           ;LOG WRITC CK ERR
2059  014036  012703  000002          SETIND: MOV     #2,R3           ;SET INDEX FOR NEXT WD
2060  014042  000403                          BR      ADDRR
2061
2062  014044  012702  000400          .LOGC:  MOV     #400,R2         ;LOG COMPARE ERR
2063  014050  000772                          BR      SETIND
2064
2065  014052  005737  001204          ADDRR:  TST     LOPCNT          ;1ST TIME ERROR?
2066  014056  001014                          BNE     1$              ;NO DO NOT COUNT IT
2067  014060  013704  001164                  MOV     UNNUM,R4        ;GET UNIT #
2068  014064  006304                          ASL     R4              ;GET
2069  014066  006304                          ASL     R4              ;POSITION IN
2070  014070  060304                          ADD     R3,R4           ;ERR TABLE
2071  014072  060264  017266                  ADD     R2,ERTAB(R4)    ;TO ADD ERROR
2072  014076  004737  014112                  JSR     PC,PRNT         ;TYPEOUT?
2073  014102  001402                          BEQ     1$              ;YES
2074  014104  004737  014760                  JSR     PC,DRP          ;SHOULD I DROP DRIVE?
2075  014110  000002          1$:     RTI
2076
2077  014112  032737  020000  177570  PRNT:   BIT     #BIT13,SWR      ;INHIBIT TYPEOUT?
2078  014120  000207                          RTS     PC
```

```
2079  014122  052737  000004  001126  RSREG:  BIS     #BIT2,FLAG2     ;SET ERROR FLAG
2080  014130  005737  016134                  TST     .HLTCT          ;SHOULD WE TYPE GOOD AND BAD
2081  014134  001017                          BNE     8$              ;NO
2082  014136  104402  014142                  TYPE    ,.+2            ;.ASCIZ 'BAD=''
2083  014150  010046                          MOV     BAD,-(6)        ;PUT BAD ON STACK
2084  014152  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2085  014154  104402  014160                  TYPE    ,.+2            ;.ASCIZ '' GOOD=''
2086  014170  010146                          MOV     GOOD,-(6)       ;PUT GOOD ON STACK
2087  014172  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2088  014174                          8$:
2089  014174  104402  014200                  TYPE    ,.+2            ;.ASCIZ '' CS1=''
2090  014206  017746  164620                  MOV     @RSCS1,-(6)     ;PUT @RSCS1 ON STACK
2091  014212  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2092  014214                          1$:
2093  014214  104402  014220                  TYPE    ,.+2            ;.ASCIZ '' ER=''
2094  014226  017746  164614                  MOV     @RSER,-(6)      ;PUT @RSER ON STACK
2095  014232  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2096  014234                          2$:
2097  014234  104402  014240                  TYPE    ,.+2            ;.ASCIZ '' CS2=''
2098  014246  017746  164562                  MOV     @RSCS2,-(6)     ;PUT @RSCS2 ON STACK
2099  014252  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2100  014254  104402  014260                  TYPE    ,.+2            ;.ASCIZ <15><12>'''
2101  014264  104402  014270                  TYPE    ,.+2            ;.ASCIZ '' CS3=''
2102  014276  017746  164562                  MOV     @RSCS3,-(6)     ;PUT @RSCS3 ON STACK
2103  014302  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2104  014304  104402  014310                  TYPE    ,.+2            ;.ASCIZ '' BAE=''
2105  014316  017746  164540                  MOV     @RSBAE,-(6)     ;PUT @RSBAE ON STACK
2106  014322  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2107  014324  104402  014330                  TYPE    ,.+2            ;.ASCIZ <15><12>'''
2108  014334  032737  000200  016134          BIT     #200,.HLTCT     ;PRINT SECOND SET ?
2109  014342  001112                          BNE     SEEC            ;YES
2110  014344  032737  000100  016134          BIT     #AS,.HLTCT      ;PRINT ER ?
2111  014352  001410                          BEQ     3$              ;NO
2112  014354  104402  014360                  TYPE    ,.+2            ;.ASCIZ '' AS=''
2113  014366  017746  164456                  MOV     @RSAS,-(6)      ;PUT @RSAS ON STACK
2114  014372  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2115  014374  032737  000020  016134  3$:     BIT     #BA,.HLTCT      ;PRINT BUS ASSRESS
2116  014402  001410                          BEQ     4$              ;NO
2117  014404  104402  014410                  TYPE    ,.+2            ;.ASCIZ '' BA=''
2118  014416  017746  164416                  MOV     @RSBA,-(6)      ;PUT @RSBA ON STACK
2119  014422  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2120  014424  032737  000004  016134  4$:     BIT     #DA,.HLTCT      ;PRINT DA ?
2121  014432  001410                          BEQ     5$              ;NO
2122  014434  104402  014440                  TYPE    ,.+2            ;.ASCIZ '' DA=''
2123  014446  017746  164370                  MOV     @RSDA,-(6)      ;PUT @RSDA ON STACK
2124  014452  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2125  014454  032737  000010  016134  5$:     BIT     #WC,.HLTCT      ;PRINT WC?
2126  014462  001410                          BEQ     6$              ;NO
2127  014464  104402  014470                  TYPE    ,.+2            ;.ASCIZ '' WC=''
2128  014476  017746  164334                  MOV     @RSWC,-(6)      ;PUT @RSWC ON STACK
2129  014502  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2130  014504  032737  000040  016134  6$:     BIT     #DS,.HLTCT      ;DRIVE STATUS
2131  014512  001410                          BEQ     9$              ;NO
2132  014514  104402  014520                  TYPE    ,.+2            ;.ASCIZ '' DS=''
2133  014526  017746  164312                  MOV     @RSDS,-(6)      ;PUT @RSDS ON STACK
2134  014532  104404                          TYPEO                   ;TYPE STACK IN OCTAL
```

```
  2135  014534  032737  000002  016134  9$:     BIT     #DB,.HLTCT      ;PRINT DATA BUFFER
```

```
2136  014542  001461                          BEQ     PTDONE          ;NO
2137  014544  104402  014550                  TYPE    ,.+2            ;.ASCIZ '' DB=''
2138  014556  017746  164272                  MOV     @RSDB,-(6)      ;PUT @RSDB ON STACK
2139  014562  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2140  014564  000137  014706                  JMP     PTDONE          ;GET OUT
2141  014570  042737  000200  016134  SEEC:   BIC     #200,.HLTCT     ;CLEAR COMMON BIT
2142  014576  032737  000240  016134          BIT     #DT,.HLTCT      ;PRINT DRIVE TYPE?
2143  014604  001410                          BEQ     10$             ;NO
2144  014606  104402  014612                  TYPE    ,.+2            ;.ASCIZ '' DT=''
2145  014620  017746  164234                  MOV     @RSDT,-(6)      ;PUT @RSDT ON STACK
2146  014624  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2147  014626  032737  000220  016134  10$:    BIT     #MR,.HLTCT      ;PRINT MN?
2148  014634  001410                          BEQ     11$             ;NO
2149  014636  104402  014642                  TYPE    ,.+2            ;.ASCIZ '' MR=''
2150  014650  017746  164202                  MOV     @RSMR,-(6)      ;PUT @RSMR ON STACK
2151  014654  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2152  014656  032737  000204  016134  11$:    BIT     #LA,.HLTCT      ;PRINT LA?
2153  014664  001410                          BEQ     PTDONE          ;NO
2154  014666  104402  014672                  TYPE    ,.+2            ;.ASCIZ '' LA=''
2155  014700  017746  164146                  MOV     @RSLA,-(6)      ;PUT @RSLA ON STACK
2156  014704  104404                          TYPEO                   ;TYPE STACK IN OCTAL
2157  014706  032737  010000  001126  PTDONE: BIT     #BIT12,FLAG2    ;POWER FAIL TEST?
2158  014714  001111                          BNE     RETT            ;YES
2159  014716  104402  014722                  TYPE    ,.+2            ;.ASCIZ <15><12>'PASS ''
2160  014732  013746  001006                  MOV     PCNT+2,-(6)     ;PUT PCNT+2 ON STACK
2161  014736  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
2162  014740  032737  001000  177570          BIT     #BIT9,SWR       ;LOOPING ON ERROR?
2163  014746  001404                          BEQ     DRP             ;NO
2164  014750  104402  014754                  TYPE    ,.+2            ;.ASCIZ <15><12>
2165  014760  032737  000001  177570  DRP:    BIT     #BIT0,SWR       ;DROP DRIVE?
2166  014766  001464                          BEQ     RETT            ;NO
2167  014770  013704  001164                  MOV     UNNUM,R4        ;GET UNIT #
2168  014774  004737  013720                  JSR     PC,GETERR       ;GET ERRORS
2169  015000  063737  001206  001212          ADD     WRITER,READER   ;ADD THE ERRORS
2170  015006  063737  001212  001210          ADD     READER,WCERR
2171  015014  063737  001210  001214          ADD     WCERR,COMERR
2172  015022  022737  000023  001214          CMP     #23,COMERR      ;DROP DRIVE?
2173  015030  103043                          BHIS    RETT            ;NO
2174  015032  053737  001170  001130          BIS     UNCMP,DROP      ;DROP DRIVE
2175  015040  104402  015044                  TYPE    ,.+2            ;.ASCIZ <15><12>'DROPPED UNIT ''
2176  015064  013746  001164                  MOV     UNNUM,-(6)      ;PUT UNNUM ON STACK
2177  015070  104406                          TYPES                   ;TYPE STACK IN OCTAL - SUPRESS
2178  015072  104402  000757                  TYPE    ,CRLFLF
2179  015076  113703  001130                  MOVB    DROP,R3         ;GET DROPPED UNITS
2180  015102  113704  001166                  MOVB    UNITSV,R4       ;GET ALL DRIVES
2181  015106  020304                          CMP     R3,R4           ;ALL DRIVES DROPPED?
2182  015110  001003                          BNE     2$              ;NO
2183  015112  000000                          HALT                    ;NO MORE DRIVES
2184  015114  000137  001234                  JMP     @#BEGIN         ;RESTART TEST
2185  015120  032737  100000  001132  2$:     BIT     #BIT15,FLAG     ;DID OPERATOR SELECT PATTERN
2186  015126  001002                          BNE     3$              ;YES
2187  015130  005037  001142                  CLR     PATNU           ;NO CLEAR IT
2188  015134  000137  006154          3$:     JMP     @#EXTPPR        ;GET NEXT DRIVE
2189  015140  000207                  RETT:   RTS     PC
```

```
                                        ;ROUTINE TO RESTORE LOADER
015142  013705  015166          RLDR:   MOV     LDR1,R5         ;GET FIRST ADDRESS OF WHERE LOADER IS
                                                                ;TO BE RESTORED
015146  012704  017500                  MOV     #17500,R4       ;ADDRESS WHERE LOADER IS STORED
015152  012702  000155                  MOV     #155,R2         ;WORD COUNT
015156  012425                  1$:     MOV     (R4)+,(R5)+     ;RESTORE
015160  005302                          DEC     R2
015162  001375                          BNE     1$
015164  000000                          HALT                    ;DONE
015166  017500                  LDR1:   .WORD   17500           ;FIRST ADDRESS WHERE LOADERS ARE SAVED

        172100                  PARCSR=172100
        000114                  PARVEC=114
015170  012737  015262  000114  .MAMK:  MOV     #.PARSRV,@#PARVEC
015176  012737  000340  000116          MOV     #340,@#PARVEC+2 ;SET PRI LEVEL TO 7
015204  013746  000004                  MOV     @#4,-(SP)       ;SAVE CURRENT ERROR VECTOR
015210  013746  000006                  MOV     @#6,-(SP)       ;SAVE PRIOITY LEVEL
015214  012737  000006  000004          MOV     #6,@#4
015222  012737  000002  000006          MOV     #RTI,@#6
015230  012700  172100                  MOV     #PARCSR,R0      ;GET FIRST CSR ADDR
015234  012702  000001                  MOV     #1,R2
015240  012720  000001          1$:     MOV     #1,(R0)+        ;SET ACTION ENABLE IF AVAILABLE
015244  006302                          ASL     R2              ;SHIFT AVAILABILITY INDICATOR
015246  103374                          BCC     1$
015250  012637  000006                  MOV     (SP)+,@#6       ;RESTORE ERROR VECTOR PRIORITY
015254  012637  000004                  MOV     (SP)+,@#4       ;AND INTERRUPT VECTOR
015260  000207                          RTS     PC
                                        ;PARITY MEMORY TRAP

015262                          .PARSRV:
015262  104402  015266                  TYPE    ,.+2            ;.ASCIZ <15><12>'PARITY ERR''
015304  052737  004000  001126          BIS     #BIT11,FLAG2    ;SET ERROR FLAG
015312  104402  000757                  TYPE    ,CRLFLF
015316  104402  015322                  TYPE    ,.+2            ;.ASCIZ 'HIER= ''
015332  013746  177742                  MOV     HERADD,-(SP)
015336  104404                          TYPEO
015340  104402  015344                  TYPE    ,.+2            ;.ASCIZ '' LOER=''
015354  013746  177740                  MOV     LERADD,-(SP)
015360  104404                          TYPEO
015362  104402  015366                  TYPE    ,.+2            ;.ASCIZ '' ME REG=''
015400  013746  177744                  MOV     MEMERR,-(SP)
015404  104404                          TYPEO
015406  032737  000010  001126          BIT     #BIT3,FLAG2     ;WERE WE COMPARING DURING ERROR?
015414  001422                          BEQ     13$             ;NO
015416  104402  015422                  TYPE    ,.+2            ;.ASCIZ '' ADDR=''
015432  005737  001216                  TST     MMAVA           ;IS MEM MGMT ON?
015436  001406                          BEQ     12$             ;NO
015440  013746  177776                  MOV     PS,-(6)         ;GET PS
015444  013746  001154                  MOV     SAVE,-(6)       ;GET VIRTUAL ADDR
015450  104412                          TYPEA                   ;CONVERT TO PHY AND TYPE
015452  000403                          BR      13$             ;CONT
015454  013746  001154          12$:    MOV     SAVE,-(6)       ;GET ADDR
015460  104406                          TYPES                   ;TYPE IT
015462  032737  100000  177570  13$:    BIT     #BIT15,SWR      ;HALT ON ERROR?
015470  001401                          BEQ     1$              ;NO
015472  000000                          HALT                    ;YES
```

```
 2246  015474  012706  000500          1$:     MOV     #500,SP         ;RESET STACK
 2247  015500  000137  003212                  JMP     EXMFLG          ;RESTART TEST
```

```
                                .SBTTL          $TYPE - TTY TYPEOUT ROUTINE

                                ;THIS ROUTINE IS USE TO TYPE ASCII MESSAGES ON THE TTY. THE
                                ;CALL CAN BE IN ONE OF 3 FORMS: 1) 'TYPE ,ADR'' - TYPES THE
                                ;MESSAGE STARTING IN LOCATION ''ADR:'' 2) 'TYPE ,CHAR'' - TYPES
                                ;THE ASCII ''CHAR'', AND 3) 'PRINT <<15><12>'MESSAGE'> - TYPES
                                ;THE MESSAGE WHICH IS INLINE ASCII. THE FILLER CHARACTER WHICH IS
                                ;TYPED AFTER A LINE FEED IS IN FILCHR AND THE NUMBER OF FILLERS
                                ;IS IN FILCHR+1.

015504  010446          .TYPE:  MOV     R4,-(6)         ;SAVE R4
015506  010546                  MOV     R5,-(6)         ;SAVE R5
015510  017605  000004          MOV     @4(6),R5        ;GET ADDRESS TO BE TYPED
015514  032705  177400          BIT     #177400,R5      ;IS IT A TYPEM?
015520  001002                  BNE     1$              ;NO
015522  016605  000004          MOV     4(6),R5         ;GET ADDRESS OF CHARACTER
015526  105715          1$:     TSTB    (R5)            ;TERMINATOR?
015530  001423                  BEQ     2$              ;GET OUT IF SO
015532  122715  000012          CMPB    #12,(R5)        ;IS THE CHAR A LINE FEED
015536  001012                  BNE     4$              ;NO - GET OUT
015540  113704  001015          MOVB    FILCHR+1,R4     ;GET THE FILL COUNT
015544  113777  001014  163246  5$:     MOVB    FILCHR,@TPB     ;TYPE A FILLER
015552  105777  163240          TSTB    @TPS            ;DONE YET?
015556  100375                  BPL     .-4             ;NO - WAIT
015560  005304                  DEC     R4              ;DEC COUNT
015562  001370                  BNE     5$              ;LOOP UNTIL 0
015564  112577  163230          MOVB    (R5)+,@TPB      ;LOAD AND TYPE THE CHARACTER
015570  105777  163222          TSTB    @TPS            ;IS THE PRINTER READY
015574  100375                  BPL     .-4             ;WAIT UNTIL IT IS
015576  000753                  BR      1$              ;GET THE NEXT CHARACTER
015600  017646  000004          MOV     @4(6),-(6)      ;GET ADDRESS TO BE TYPED
015604  062766  000002  000006  ADD     #2,6(6)         ;ADD 2 TO THE ADDRESS
015612  022666  000004          CMP     (6)+,4(6)       ;IS IT .+2?
015616  001006                  BNE     3$              ;NO
015620  062705  000002          ADD     #2,R5           ;ADD 2 TO THE ADDRESS
015624  042705  000001          BIC     #1,R5           ;BACK UP TO AN EVEN BYTE
015630  010566  000004          MOV     R5,4(6)         ;RESTORE ADDRESS
015634  012605          3$:     MOV     (6)+,R5         ;RESTORE R5
015636  012604                  MOV     (6)+,R4         ;RESTORE R4
015640  000002                  RTI                     ;RETURN
```

```
                                        .SBTTL          $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:"

015642  032737  040000  177570  .SCOPE: BIT     #SW14,@#SWR     ;LOOP ON TEST?
015650  001045                  .       BNE     .KIT            ;LOOP ON TEST IS SET
015652  000416                  .       BR      3$              ;SKIP - NOP FOR XOR TESTER
015654  013746  000004          .       MOV     @#4,-(6)        ;PUSH @#4 ON STACK
015660  012737  015700  000004  .       MOV     #4$,@#4         ;SET FOR TIMEOUT
015666  005737  177060          .       TST     @#177060        ;ERROR ON XOR?
015672  012637  000004          .       MOV     (6)+,@#4        ;POP STACK INTO @#4
015676  000422                  .       BR      .SVLAD          ;NO ERROR - GO TO NEXT TEST
015700  022626                  4$:     CMP     (6)+,(6)+       ;CLEAR STACK
015702  012637  000004          .       MOV     (6)+,@#4        ;POP STACK INTO @#4
015706  000426                  .       BR      .KIT            ;ERROR - LOOP ON TEST
015710  032737  004000  177570  3$:     BIT     #SW11,@#SWR     ;KILL ITERATIONS
015716  001012                  .       BNE     .SVLAD          ;YES - KILL ITERATIONS
015720  105737  001001          .       TSTB    ICNT+1          ;FIRST ONE?
015724  001404                  .       BEQ     2$              ;BRANCH IF FIRST
015726  123737  016012  001001  .       CMPB    TIMES,ICNT+1    ;DONE?
015734  003013                  .       BGT     .KIT            ;BRANCH IF NOT
015736  112737  000001  001001  2$:     MOVB    #1,ICNT+1       ;FIRST ITERATION
015744  105237  001000          .SVLAD: INCB    ICNT            ;COUNT TEST NUMBERS
015750  011637  001010          .       MOV     (6),LAD         ;SAVE LOOP ADDRESS
015754  013737  001000  177570  .       MOV     ICNT,@#DISPLAY  ;DISPLAY TEST NO. AND ITERATION COUNT
015762  000002                  .       RTI                     ;RETURN

015764  105237  001001          .KIT:   INCB    ICNT+1          ;INC THE ITERATION COUNT
015770  013737  001000  177570  .OVER:  MOV     ICNT,@#DISPLAY  ;SET UP DISPLAY
015776  005737  001010          .       TST     LAD             ;FIRST ONE?
016002  001760                  .       BEQ     .SVLAD          ;YES
016004  013716  001010          .       MOV     LAD,(6)         ;FUDGE RETURN ADDRESS
016010  000002                  .       RTI                     ;FIXES PS

016012  000001                  TIMES:  1                       ;RUN 1 TIMES
```

```
 2326                                   .SBTTL          $HLT - HLT ROUTINE (ERROR TYPEOUT)
 2327
 2328                                   ;THIS ROUTINE PRINTS OUT ERROR MESSAGES STARTING WITH THE
 2329                                   ;ADDRESS OF THE 'HLT'. IT ALSO COUNTS THE NUMBER OF ERRORS
 2330                                   ;AND HAS THE CAPABILITY OF LOOPING ON ERROR, BELL ON ERROR,
 2331                                   ;'HALT' ON ERROR, AND INHIBIT TYPEOUTS. AN OPTIONAL ARGUMENT
 2332                                   ;(HLT+3) WILL BE PLACED IN '.HLTCT:' FOR ADITIONAL TYPEOUTS.
 2333
 2334  016014  005237  001002          .HLT:   INC     ERRORS          ;INC THE ERROR COUNT
 2335  016020  032737  020000  177570          BIT     #SW13,@#SWR     ;SKIP TYPEOUT IF SET
 2336  016026  001025                          BNE     2$              ;SKIP TYPEOUTS
 2337  016030  104402  016034                  TYPE    ,.+2            ;.ASCIZ <15><12>
 2338  016040  011637  001012                  MOV     (6),HLTADR      ;PUT ADDRESS OF INSTRUCTION ON STACK
 2339  016044  162737  000002  001012          SUB     #2,HLTADR       ;FUDGE ADDRESS
 2340  016052  117737  162734  016134          MOVB    @HLTADR,.HLTCT  ;GET HLT ARGUEMENT
 2341  016060  013746  001012                  MOV     HLTADR,-(6)     ;PUT HLTADR ON STACK
 2342  016064  104404                          TYPEO                   ;TYPE STACK IN OCTAL
 2343  016066  104402  016072                  TYPE    ,.+2            ;.ASCIZ '' ''
 2344  016076  004737  014122                  JSR     PC,RSREG        ;GO TO USER ERROR ROUTINE
 2345  016102  005737  177570          2$:     TST     @#SWR           ;HALT ON ERROR
 2346  016106  100001                          BPL     .+4             ;SKIP IF CONTINUE
 2347  016110  000000                          HALT                    ;HALT ON ERROR!
 2348  016112  032737  001000  177570          BIT     #SW9,@#SWR      ;CHECK FOR INHIBIT LOOP ON ERROR
 2349  016120  001003                          BNE     3$              ;SKIP IF LOOP ON ERROR
 2350  016122  105037  001001                  CLRB    ICNT+1          ;CLEAR ITERATION COUNT
 2351  016126  000002                          RTI                     ;RETURN
 2352  016130  000137  015764          3$:     JMP     .KIT            ;LOOP ON TEST UNTIL NO ERRORS
 2353
 2354  016134  000000                  .HLTCT: 0                       ;HLT ARGUMENT
```

```
                                        .SBTTL          $OCTAL - OCTAL TYPEOUT ROUTINE

                                        ;THIS ROUTINE IS USED TO TYPE AN OCTAL NUMBER ON THE TTY. IT WILL TYPE
                                        ;ALL 6 CHARACTERS, SUPPRESS LEADING ZEROES, OR TYPE THE
                                        ;16 BITS. IT IS CALLED VIA THE TYPOCT, TYPBIT, OR TYPOCS MACRO'S.

016136  012737  170101  016324  .TYPEB: MOV     #170101,.PR     ;SET BIT FLAG AND 16. CHARACTER COUNT
016144  000411                          BR      .PTIT           ;NOW TYPE IT IN BIT FORM
016146  112737  000001  016324  .TYPEO: MOVB    #1,.PR          ;SET ZERO FILL SWITCH
016154  000402                          BR      .+6             ;SKIP
016156  005037  016324          .TYPES: CLR     .PR             ;SUPRESS LEADING ZERO'S
016162  112737  177772  016325          MOVB    #-6,.PR+1       ;SET COUNT
016170                          .PTIT:
016170  010446                          MOV     R4,-(6)         ;PUSH R4 ON STACK
016172  010546                          MOV     R5,-(6)         ;PUSH R5 ON STACK
016174  016605  000010                  MOV     10(6),R5        ;GET THE DATA
016200  012704  016326                  MOV     #.PR+2,R4       ;SET POINTER TO FIRST ASCII CHAR.
016204  105014                          CLRB    (4)             ;CLEAR FIRST BYTE
016206  000411                          BR      .PRF            ;ROTATE FIRST BIT
016210  105014                  .PRL:   CLRB    (4)             ;CLEAR BYTE OF CHARACTER
016212  032737  000100  016324          BIT     #100,.PR        ;BIT TYPING MODE?
016220  001004                          BNE     .PRF            ;YES - SKIP 2 ROTATES
016222  006105                          ROL     R5              ;ROTATE BIT INTO C
016224  106114                          ROLB    (4)             ;PACK IT
016226  006105                          ROL     R5              ;ROTATE BIT INTO C
016230  106114                          ROLB    (4)             ;PACK IT
016232  006105                  .PRF:   ROL     R5              ;ROTATE BIT INTO C
016234  106114                          ROLB    (4)             ;PACK IT
016236  105714                          TSTB    (4)             ;IS IT ZERO?
016240  001402                          BEQ     .+6             ;SKIP INC
016242  105237  016324                  INCB    .PR             ;SET FILL SWITCH
016246  105737  016324                  TSTB    .PR             ;CHECK FILL SWITCH
016252  001402                          BEQ     .+6             ;SKIP BITSET
016254  152724  000060                  BISB    #'0,(4)+        ;MAKE INTO ASCII CHAR
016260  105237  016325                  INCB    .PR+1           ;INC COUNT
016264  001351                          BNE     .PRL            ;REPEAT
016266  022704  016326                  CMP     #.PR+2,R4       ;EMPTY BUFFER?
016272  001002                          BNE     .+6             ;SKIP IF NOT
016274  112724  000060                  MOVB    #'0,(4)+        ;LOAD 1 ZERO
016300  105014                          CLRB    (4)             ;NULL TERMINATOR
016302  104402  016326                  TYPE    ,.PR+2          ;TYPE IT
016306  012605                          MOV     (6)+,R5         ;POP STACK INTO R5
016310  012604                          MOV     (6)+,R4         ;POP STACK INTO R4
016312  016666  000002  000004          MOV     2(6),4(6)       ;GET RID OF
016320  012616                          MOV     (6)+,(6)        ;DATA WORD
016322  000002                          RTI                     ;RETURN

016324  000012          .PR:    .BLKW   12              ;COUNT, SWITCH, AND OUTPUT BUFFER
```

```
                                        .SBTTL          $POWER - POWER DOWN AND UP ROUTINES

                                        ;THIS IS THE POWER FAIL ROUTINE WHICH WILL SAVE ALL
                                        ;THE GENERAL REGISTERS AND USER DEFINED REGISTERS THEN
                                        ;WAIT FOR POWER TO GO DOWN AND BE RESTORED.
                                        ;IF THERE ISN'T ENOUGH TIME FOR SAVING ALL THE REGISTERS,
                                        ;THE PROGRAM WILL HALT AT '.ILLUP'.

016350  012777  016476  000126  .POWER: MOV     #.ILLUP,@.PUVEC ;SET FOR FAST UP
016356  012777  000340  000122          MOV     #340,@.PUVEC$+2 ;PRIO:7
016364  010046                          MOV     R0,-(6)         ;PUSH R0 ON STACK
016366  010146                          MOV     R1,-(6)         ;PUSH R1 ON STACK
016370  010246                          MOV     R2,-(6)         ;PUSH R2 ON STACK
016372  010346                          MOV     R3,-(6)         ;PUSH R3 ON STACK
016374  010446                          MOV     R4,-(6)         ;PUSH R4 ON STACK
016376  010546                          MOV     R5,-(6)         ;PUSH R5 ON STACK
016400  010637  016502                  MOV     SP,.SAVR6       ;SAVE SP
016404  012777  016414  000072          MOV     #.POWUP,@.PUVEC ;SET UP VECTOR
016412  000000                          HALT                    ;WAIT FOR PF

016414  013706  016502          .POWUP: MOV     .SAVR6,SP       ;GET SP
016420  005001                          CLR     R1              ;WAIT LOOP FOR THE TTY
016422  005201                  1$:     INC     R1              ;WAIT FOR THE INC
016424  001376                          BNE     1$              ;OF  WORD
016426  012605                          MOV     (6)+,R5         ;POP STACK INTO R5
016430  012604                          MOV     (6)+,R4         ;POP STACK INTO R4
016432  012603                          MOV     (6)+,R3         ;POP STACK INTO R3
016434  012602                          MOV     (6)+,R2         ;POP STACK INTO R2
016436  012601                          MOV     (6)+,R1         ;POP STACK INTO R1
016440  012600                          MOV     (6)+,R0         ;POP STACK INTO R0
016442  012737  016350  000024          MOV     #.POWER,@#24    ;SET UP THE POWER DOWN VECTOR
016450  012737  000340  000026          MOV     #340,@#26       ;PRIO:7
016456  104402  016462                  TYPE    ,.+2            ;.ASCIZ <15><12>'POWER'
016472  000137  007146                  JMP     TIMJP           ;JMP TO USER ADDRESS

016476  000000          .ILLUP: HALT                    ;THE POWER UP SEQUENCE WAS STARTED
016500  000776                  BR      .-2             ; BEFORE THE POWER DOWN WAS COMPLETE

016502  000000          .SAVR6: 0                       ;PUT THE SP HERE
016504  000024  000026  .PUVEC: 24,26                   ;POWER UP VECTOR
```

```
2443                                    .SBTTL          $TYPEA - 18 BIT ADDRESS TYPER
2444
2445                                    ;THIS ROUTINE TAKES 2 ARGUMENTS OFF THE STACK (OLD
2446                                    ;SP AND ADDRESS) AND, USING THE MEMORY MANAGEMENT REGISTERS, TYPES
2447                                    ;THE ADDRESS SUPPLIED IN 18 BIT FORM. THIS ROUTINE IS LINKED
2448                                    ;VIA THE 'TYPADR' MACRO.
2449
2450  016510                            .TYPEA:
2451  016510  010446                           MOV     R4,-(6)         ;PUSH R4 ON STACK
2452  016512  010546                           MOV     R5,-(6)         ;PUSH R5 ON STACK
2453  016514  016605  000012                   MOV     12(6),R5        ;R5 - OLD PS WITH PREVIOUS MODE
2454  016520  016604  000010                   MOV     10(6),R4        ;R4 - ADDRESS TO BE DECODED AND TYPED
2455  016524  016666  000006  000010           MOV     6(6),10(6)      ;MOVE
2456  016532  016666  000004  000006           MOV     4(6),6(6)       ;DOWN
2457  016540  016666  000002  000004           MOV     2(6),4(6)       ;FOUR
2458  016546  012616                           MOV     (6)+,(6)        ;WORDS
2459  016550  010346                           MOV     R3,-(6)         ;PUSH R3 ON STACK
2460  016552  000305                           SWAB    R5              ;GET THE
2461  016554  006005                           ROR     R5              ;2 PREVIOUS
2462  016556  006005                           ROR     R5              ;MODE BITS
2463  016560  006005                           ROR     R5              ;INTO POSITION
2464  016562  042705  177771                   BIC     #177771,R5      ;TO USE AS AN OFFSET
2465  016566  016505  016742                   MOV     .SATAB(5),R5    ;R5 - SPACE ADDRESS FOR MM
2466  016572  010403                           MOV     R4,R3           ;R3 - REGISTER OFFSET
2467  016574  042704  160000                   BIC     #160000,R4      ;CLEAR THE MM REG SELECT BITS
2468  016600  000303                           SWAB    R3              ;NOW MAKE
2469  016602  006003                           ROR     R3              ;MM REG
2470  016604  006003                           ROR     R3              ;SELECT BITS
2471  016606  006003                           ROR     R3              ;INTO AN
2472  016610  006003                           ROR     R3              ;OFFSET
2473  016612  042703  177761                   BIC     #177761,R3      ;CLEAR THE JUNK BITS
2474  016616  060305                           ADD     R3,R5           ;ADD THE OFFSET TO THE TABLE
2475  016620  011505                           MOV     (5),R5          ;GET THE ISAR DATA
2476  016622  005003                           CLR R3
2477  016624  006305                           ASL     R5              ;THIS IS
2478  016626  006103                           ROL     R3
2479  016630  006305                           ASL     R5              ;TO SHIFT
2480  016632  006103                           ROL     R3
2481  016634  006305                           ASL     R5              ;THE SEGMENT
2482  016636  006103                           ROL     R3
2483  016640  006305                           ASL     R5              ;ADDRESS
2484  016642  006103                           ROL     R3
2485  016644  006305                           ASL     R5              ;AN 18 BIT
2486  016646  006103                           ROL     R3              ;ADDRESS
2487  016650  006305                           ASL     R5              ;POSITION
2488  016652  006103                           ROL     R3              ;WITH R3 CONTAINING
2489  016654  060405                           ADD     R4,R5           ;THE UPPER 2 BITS
2490  016656  005503                           ADC     R3              ;AND R5 CONTAINING
2491  016660  006305                           ASL     R5              ;THE 16 BIT ADDRESS
2492  016662  006103                           ROL     R3              ;THEN SHIFT FOR TYPING
2493  016664  010346                           MOV     R3,-(SP)
2494  016666  000241                           CLC
2495  016670  006016                           ROR     (SP)
2496  016672  000241                           CLC
2497  016674  006016                           ROR     (SP)
2498  016676  000241                           CLC
```

```
2499  016700  006016                        ROR     (SP)
2500  016702  104406                        TYPES
2501  016704  042703  177770                BIC     #177770,R3
2502  016710  110337  016326                MOVB    R3,.PR+2        ;GET THE FIRST NUMBER FROM R3
2503  016714  062737  000060  016326        ADD     #'0,.PR+2       ;MAKE IT INTO A NUMBER
2504  016722  012704  016327                MOV     #.PR+3,R4       ;FUDGE IN THE POINTER
2505  016726  012737  175401  016324        MOV     #175401,..PR    ;AND THE FLAGS (FILL & 5 BYTES)
2506  016734  012603                        MOV     (6)+,R3         ;POP STACK INTO R3
2507  016736  000137  016210                JMP     .PRL            ;DECODE AND TYPE THE REST
2508
2509  016742  172340              .SATAB: 172340                  ;KISAR0
```

```
                                .SBTTL          $TRAP - TRAP HANDLER

                                ;THIS ROUTINE DECODES A TRAP CALL AND JUMPS TO THE APROPRATE
                                ;SUBROUTINE. THE CALL IS A ''TRAP+N'' WHERE N IS A MULTIPLE OF 2.
                                ;THE ''SET'' MACRO WILL CREATE THE TABLE NEEDED. IT HAS TO
                                ;FOLLOW THIS MACRO.

016744  011646                  .TRAP:  MOV     (6),-(6)        ;GET ADDRESS OF TRAP +2
016746  162716  000002                  SUB     #2,(6)          ;MAKE IT ADDRESS OF TRAP
016752  017616  000000                  MOV     @(6),(6)        ;GET TRAP INSTRUCTION
016756  062716  112364                  ADD     #.TRP+2-TRAP,(6);GET DATA AND MAKE IT AN OFFSET
016762  013607                  .TRP:   MOV     @(6)+,PC        ;GO TO PROPER SUBROUTINE

016764  015642                          .SCOPE                  ;SCOPE   =  TRAP+0      (104400)
016766  015504                          .TYPE                   ;TYPE    =  TRAP+2      (104402)
016770  016146                          .TYPEO                  ;TYPEO   =  TRAP+4      (104404)
016772  016156                          .TYPES                  ;TYPES   =  TRAP+6      (104406)
016774  020556                          .TYPED                  ;TYPED   =  TRAP+10     (104410)
016776  016510                          .TYPEA                  ;TYPEA   =  TRAP+12     (104412)
017000  006212                          .ERCLR                  ;ERCLR   =  TRAP+14     (104414)
017002  006234                          .DKCMD                  ;DKCMD   =  TRAP+16     (104416)
017004  017024                          .RDOCT                  ;RDOCT   =  TRAP+20     (104420)
017006  017142                          .RDLIN                  ;RDLIN   =  TRAP+22     (104422)
017010  020524                          .UPDAT                  ;UPDAT   =  TRAP+24     (104424)
017012  000342                          .CLRDV                  ;CLRDV   =  TRAP+26     (104426)
017014  014014                          .LOGW                   ;LOGW    =  TRAP+30     (104430)
017016  014024                          .LOGR                   ;LOGR    =  TRAP+32     (104432)
017020  014032                          .LOGWC                  ;LOGWC   =  TRAP+34     (104434)
017022  014044                          .LOGC                   ;LOGC    =  TRAP+36     (104436)
```

```
                                .SBTTL          $RDOCT - OCTAL INPUT ROUTINE

                                ;THIS ROUTINE CALLS RDLIN, INPUTS A LINE FROM THE TTY AND CONVERTS
                                ;IT INTO AN OCTAL NUMBER WHICH IS THE FIRST WORD ON THE STACK.

017024  011646          .RDOCT: MOV     (6),-(6)        ;MOVE THE PC
017026  016666  000004  000002  MOV     4(6),2(6)       ;MOVE THE PS
017034  010146                  MOV     R1,-(6)         ;PUSH R1 ON STACK
017036  010246                  MOV     R2,-(6)         ;PUSH R2 ON STACK
017040  010346                  MOV     R3,-(6)         ;PUSH R3 ON STACK
017042  104422          4$:     RDLIN                   ;READ A LINE INTO INPUT
017044  005001                  CLR     R1              ;INIT DATA WORD
017046  012703  017246          MOV     #INPUT,R3       ;INIT POINTER
017052  112302          1$:     MOVB    (3)+,R2         ;GET A BYTE
017054  001417                  BEQ     2$              ;GET OUT IF ZERO
017056  122702  000060          CMPB    #'0,R2          ;CHECK FOR 0 OR GREATER
017062  003022                  BGT     3$              ;ERROR - LESS THAN 0
017064  122702  000067          CMPB    #'7,R2          ;CHECK FOR 7 OR LESS
017070  002417                  BLT     3$              ;ERROR - GREATER THAN 7
017072  006002                  ROR     R2              ;GET
017074  006002                  ROR     R2              ;INTO
017076  006002                  ROR     R2              ;POSITION
017100  006101                  ROL     R1              ;FIRST BIT
017102  006102                  ROL     R2              ;GET
017104  006101                  ROL     R1              ;SECOND BIT
017106  006102                  ROL     R2              ;GET
017110  006101                  ROL     R1              ;THIRD BIT
017112  000757                  BR      1$              ;LOOP
017114  010166  000012  2$:     MOV     R1,12(6)        ;SAVE THE RESULT
017120  012603                  MOV     (6)+,R3         ;POP STACK INTO R3
017122  012602                  MOV     (6)+,R2         ;POP STACK INTO R2
017124  012601                  MOV     (6)+,R1         ;POP STACK INTO R1
017126  000002                  RTI                     ;RETURN

017130                  3$:
017130  104402  017134          TYPE    ,,+2            ;.ASCIZ '?'<15><12>
017140  000740                  BR      4$              ;TRY AGAIN
```

```
                                .SBTTL          $RDLIN - TTY INPUT ROUTINE

                                ;THIS ROUTINE INPUTS A LINE TERMINATED BY A RETURN INTO ADDRESS
                                ;INPUT AND RETURNS A LINE FEED. THE BUFFER HAS A NULL TERMINATOR
                                ;INSTEAD OF THE RETURN. RUBOUTS ARE HANDLED BY RETYPING
                                ;THE LINE. BUFFER OVERFLOW ERRORS LIKE A RUBOUT.

017142  010546          .RDLIN: MOV     R5,-(6)         ;SAVE R5
017144  012705  017246  1$:     MOV     #INPUT,R5       ;GET ADDRESS
017150  022705  017266  2$:     CMP     #INPUT+16.,R5   ;BUFFER FULL?
017154  001412                  BEQ     4$              ;YES - TYPE '?'
017156  105737  177560          TSTB    @#177560        ;WAIT FOR
017162  100375                  BPL     .-4             ;A CHARACTER
017164  113715  177562          MOVB    @#177562,(5)    ;GET CHARACTER
017170  142715  000200          BICB    #200,(5)        ;GET RID OF JUNK
017174  122715  000177          CMPB    #177,(5)        ;IS IT A RUBOUT
017200  001005                  BNE     3$              ;SKIP IF NOT
017202                  4$:
017202  104402  017206          TYPE    ,.+2            ;.ASCIZ '?'<15><12>
017212  000754                  BR      1$              ;ZAP THE BUFFER AND LOOP
017214  111527  000000  3$:     MOVB    (5),#0          ;SET UP FOR TYPING
017220  104402  017216          TYPE    ,3$+2           ;ECHO IT
017224  122725  000015          CMPB    #15,(5)+        ;CHECK FOR RETURN
017230  001347                  BNE     2$              ;LOOP IF NOT RETURN
017232  105065  177777          CLRB    -1(5)           ;ZAP RETURN (THE 15)
017236  104402  000012          TYPE    ,12             ;TYPE A LINE FEED
017242  012605                  MOV     (6)+,R5         ;RESTORE R5
017244  000002                  RTI                     ;RETURN

017246  000020          INPUT:  .BLKB   16.             ;TTY INPUT AREA
017266  000020          ERTAB:  .BLKW   16.
017326  000000          OUTBUF: 0
```

```
                                        ;THIS SUBROUTINE HAS THE CALL
                                        ;       JSR     PC,MMUSE
                                        ;       XXX
                                        ;
                                        ;WHERE XXX IS AN EXECUTABLE ONE WORD INSTRUCTION
                                        ;MEM MANAGEMENT IS USED ON THE DESTINATION
                                        ;THE DESTINATION FIELD MUST BE (R1)+
                                        ;NO OTHER FORM IS ALLOWED


017330  005737  001024          MMUSE:  TST     TEMP2
017334  001415                          BEQ     2$
017336  012537  017352                  MOV     (R5)+,1$
017342  042701  160000                  BIC     #160000,R1
017346  052701  060000                  BIS     #60000,R1
017352  000000                  1$:     .WORD   0               ;CONTAINS INSTRUCTION JUST AFTER
                                                                ;THE JSR R5, MMUSE
017354  032701  100000                  BIT     #100000,R1
017360  001403                          BEQ     2$
017362  062737  000200  172346          ADD     #200,KIPAR3
017370  000205                  2$:     RTS R5


                                        ;THIS SETSUP MEM MANAGEMENT FOR A FOLLOWING INSTRUCTION
                                        ;CALL    JSR PC,MMPSET

017372  005737  001024          MMPSET: TST     TEMP2
017376  001412                          BEQ     2$
017400  013746  001026                  MOV     TEMP3,-(6)
017404  005037  172346                  CLR     KIPAR3
017410  062737  000200  172346  1$:     ADD     #200,KIPAR3
017416  005316                          DEC     (6)
017420  001373                          BNE     1$
017422  005726                          TST     (6)+
017424  000207                  2$:     RTS     PC


017426  104402  000757          TIEOUT: TYPE    ,CRLFLF
017432  104402  017436                  TYPE    ,.+2                    ;.ASCIZ ''TIMEOUT PC=''
017452  162746  000002                  SUB     #2,-(SP)
017456  104404                          TYPEO
017460  000000                          HALT


                                        ;NOTE FOR PROGRAMMER******** PROGRAM AT THIS POINT CAN NOT EXCEED A PC OF 17500*****
```

```
                020000                          .=      20000
                                                ;NOTE    ALL THIS CODE GETS DESTROYED WHEN PATTERN IS WRITTEN

                                                ;ROUTINE TO SAVE ABS LOADER
020000  012700  017776                  LDR:    MOV     #17776,R0
020004  012737  020024  000004                  MOV     #2$,4           ;SET TIME OUT TRAP VECTOR
020012  012737  000340  000006                  MOV     #340,6
020020  005720                                  TST     (R0)+
020022  000776                                  BR      .-2
020024  022626                          2$:     CMP     (SP)+,(SP)+
020026  012737  000006  000004                  MOV     #6,4
020034  005037  000006                          CLR     6
020040  162700  000334                          SUB     #334,R0         ;POINT R0 BACK TO LOADER
020044  010037  015166                          MOV     R0,LDR1         ;SAVE FOR RESTORE ROUTINE
020050  012702  000155                          MOV     #155,R2         ;WORD COUNT
020054  012703  017500                          MOV     #17500,R3       ;WHERE LOADER IS TO BE STORED
020060  012023                          1$:     MOV     (R0)+,(R3)+     ;STORE LOADER
020062  005302                                  DEC     R2
020064  001375                                  BNE     1$
020066  000207                                  RTS     PC              ;RETURN


                                                ; -A- PORT SIZE

020070  052737  020000  001126          SIZZAP: BIS     #BIT13,FLAG2    ;SET MAPPING BIT
020076  004737  001620                          JSR     PC,DRVENO       ;FIND DRIVE
020102  012737  000002  001230                  MOV     #2,WORK1        ;START WITH ONE 4K BUFFER
020110  012737  000001  001074                  MOV     #1,STAMEM       ;FIRST 4K BANK
020116  012737  057476  001144                  MOV     #57476,BUF      ;GET STARTING ADDR. 5K
020124  012737  000001  001134                  MOV     #1,WRDCT        ;LOAD WC
020132  005037  001140                          CLR     DMA             ;LOAD DA
020136  012777  000040  160670                  MOV     #40,@RSCS2      ;CLEAR ALL RS REG
020144  013777  001164  160662                  MOV     UNNUM,@RSCS2    ;GET DRIVE #
                                                ;XYZ***********?*****************************************************************
                                                ;*********************************************************************************
                                                ;*********************************************************************************
                                                ;XYZ***********?*****************************************************************
                                                ;*********************************************************************************
                                                ;*********************************************************************************
                                                ;XYZ***********?*****************************************************************
                                                ;*********************************************************************************

020152  005037  001026                          CLR     TEMP3
020156  012737  000061  001176                  MOV     #61,CMD         ;DO A ERITE
020164  104416                          4$:     DKCMD                   ;NOW
020166  105777  160640                  1$:     TSTB    @RSCS1          ;DONE YET?
020172  100375                                  BPL     1$              ;NO
020174  032777  004000  160632                  BIT     #4000,@RSCS2    ;DID NEM SET?
020202  001012                                  BNE     SIZ1            ;YES
020204  005777  160622                          TST     @RSCS1          ;ANY ERRORS?
020210  100005                                  BPL     3$              ;NO
020212  012737  000006  001112                  MOV     #6,SIZEAP       ;GET SIZE OF BUFFER
020220  000137  020326                          JMP     @#SIZERR        ;FOR USER IF HE WISHES IT
020224  104424                          3$:     UPDAT                   ;GET NEXT 4K BANK
020226  000756                                  BR      4$              ;TEST BANK
020230  005337  001230                  SIZ1:   DEC     WORK1           ;DEC SIZE OF BUFFER
020234  013737  001230  001112                  MOV     WORK1,SIZEAP    ;LOAD SIZE OF A BUFFER
```

```
 2715                                   ;XYZ************?*************************************************************
 2716                                   ;*****************************************************************************
 2717                                   ;*****************************************************************************
 2718                                   ;XYZ************?*************************************************************
 2719                                   ;*****************************************************************************
 2720                                   ;*****************************************************************************
 2721                                   ;XYZ************?*************************************************************
 2722                                   ;*****************************************************************************
 2723  020242  013737  001230  001022           MOV     WORK1,TEMP1
 2724  020250  104402  020254                  TYPE    ,.+2            ;.ASCIZ <15><12> 'PORT -A- DATA BUFFER     4K TO ''
 2725  020316  004737  020464                  JSR     PC,SIZPR
```

```
2726  020322  000137  020444          SIZZBP: JMP     NOB             ;GET OUT NO -B- PORT
2727  020326                          SIZERR:
2728  020326  104402  020332                  TYPE    ,.+2            ;.ASCIZ <15><12>'WILL NOT CONTINUE TO SIZE MEMORY BECAUS
2729  020416  012737  000006  001114          MOV     #6,SIZEBP       ;GIVE PROGRAM A BUFFER
2730  020424  104060                          HLT     !BA!DS          ;YOU CAN ENTER CONVERSATION MODE
2731  020426  052737  000001  001126          BIS     #BIT0,FLAG2     ;BEEN HERE BEFORE FLAG
2732  020434  042737  020000  001126          BIC     #BIT13,FLAG2    ;CLEAR MAPPING FLAG
2733  020442  000000                          HALT                    ;OR GO TO DERSA
2734  020444  042737  020000  001126  NOB:    BIC     #BIT13,FLAG2    ;CLEAR MAPPING FLAG
2735  020452  052737  000002  001126          BIS     #BIT1,FLAG2     ;SET BEEN HERE FLAG
2736  020460  000137  001462                  JMP     CALM            ;CAL BUFFER AND WC
2737
2738  020464  005001          SIZPR:  CLR     R1              ;INIT SETUP
2739  020466  012702  000004          MOV     #4,R2
2740  020472  062701  000001  SIZP:   ADD     #1,R1           ;SETUP FOR BANK NO
2741  020476  062702  000004          ADD     #4,R2           ;SETUP FOR SIZE FO MEMORY
2742  020502  020137  001230          CMP     R1,WORK1        ;IS THIS THE RIGHT SIZE?
2743  020506  001371                  BNE     SIZP            ;NO
2744  020510  010246                  MOV     R2,-(6)         ;PUT R2 ON STACK
2745  020512  104410                  TYPED                   ;TYPE STACK IN DECIMAL
2746  020514  104402  020520          TYPE    ,.+2            ;.ASCIZ 'K'
2747  020522  000207                  RTS     PC              ;RETURN
2748
2749                          ;ADD 4K TO TEST ADDR
2750
2751                          ;XYZ***********?*****************************************************************
2752                          ;*************************************************************************************
2753                          ;*************************************************************************************
2754                          ;XYZ***********?*****************************************************************
2755                          ;*************************************************************************************
2756                          ;*************************************************************************************
2757                          ;XYZ***********?*****************************************************************
2758                          ;*************************************************************************************
2759  020524  005237  001230  .UPDAT: INC     WORK1           ;INC BANK #
2760  020530  062737  020000  001144          ADD     #20000,BUF      ;UPDATE BY 4K
2761  020536  103005                  BCC     1$              ;BRANCH IF NO OVERFLOW
2762  020540  005237  001026          INC     TEMP3           ;INCREMENT FOR RSBAE
2763  020544  013777  001026  160310          MOV     TEMP3,@RSBAE
2764  020552  000002          1$:     RTI
2765
2766  020554  020556                  .TYPED                  ;TYPED   =  TRAP+40      (104440)
2767                          .SBTTL          $TYPED - CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
2768
2769  020556  012737  100040  021004  .TYPED: MOV     #100040,..DSIGN ;SET BLANK SWITCH AND SIGN
2770  020564  010046                  MOV     R0,-(6)         ;PUSH R0 ON STACK
2771  020566  010146                  MOV     R1,-(6)         ;PUSH R1 ON STACK
2772  020570  010246                  MOV     R2,-(6)         ;PUSH R2 ON STACK
2773  020572  010346                  MOV     R3,-(6)         ;PUSH R3 ON STACK
2774  020574  010546                  MOV     R5,-(6)         ;PUSH R5 ON STACK
2775  020576  012737  100040  021004          MOV     #100040,..DSIGN ;SET BLANK SWITCH AND SIGN
2776  020604  016605  000016          MOV     16(6),R5        ;GET DATA TO BE TYPED
2777  020610  100004                  BPL     1$              ;BR IF INPUT IS POS.
2778  020612  005405                  NEG     R5              ;MAKE THE BINARY NUMBER POS.
2779  020614  112737  000055  021004          MOVB    #'-,..DSIGN     ;MAKE THE ASCII NUMBER NEG.
2780  020622  005000          1$:     CLR     R0              ;ZERO THE CONSTANTS INDEX
2781  020624  012703  020774          MOV     #.DBLK,R3       ;SETUP THE OUTPUT POINTER
```

```
2782  020630  112723  000040          MOVB    #' ,(R3)+       ;SET THE FIRST CHARACTER TO A BLANK
2783  020634  005002            2$:   CLR     R2              ;CLEAR THE BCD NUMBER
2784  020636  016001  020764          MOV     .DTBL(R0),R1    ;GET THE CONSTANT
2785  020642  160105            3$:   SUB     R1,R5           ;FORM THIS BCD DIGIT
2786  020644  002402                  BLT     4$              ;BR IF DONE
2787  020646  005202                  INC     R2              ;INCREASE THE BCD DIGIT BY 1
2788  020650  000774                  BR      3$
2789  020652  060105            4$:   ADD     R1,R5           ;ADD BACK THE CONSTANT
2790  020654  005702                  TST     R2              ;CHECK IF BCD DIGIT=0
2791  020656  001003                  BNE     5$              ;FALL THROUGH IF 0
2792  020660  105737  021005          TSTB    .DSIGN+1        ;STILL DOING LEADING 0'S?
2793  020664  100410                  BMI     7$              ;BR IF YES
2794  020666  106337  021005    5$:   ASLB    .DSIGN+1        ;MSD?
2795  020672  103003                  BCC     6$              ;BR IF NO
2796  020674  113763  021004  177777  MOVB    .DSIGN,-1(R3)   ;YES--SET THE SIGN
2797  020702  052702  000060    6$:   BIS     #'0,R2          ;MAKE THE BCD DIGIT ASCII
2798  020706  052702  000040    7$:   BIS     #' ,R2          ;MAKE IT A SPACE IF NOT ALREADY A DIGIT
2799  020712  110223                  MOVB    R2,(R3)+        ;PUT THIS CHARACTER IN THE OUTPUT BUFFER
2800  020714  005720                  TST     (R0)+           ;JUST INCREMENTING
2801  020716  020027  000010          CMP     R0,#10          ;CHECK THE TABLE INDEX
2802  020722  002744                  BLT     2$              ;GO DO THE NEXT DIGIT
2803  020724  003002                  BGT     8$              ;GO TO EXIT
2804  020726  010502                  MOV     R5,R2           ;GET THE LSD
2805  020730  000764                  BR      6$              ;GO CHANGE TO ASCII
2806  020732  105013            8$:   CLRB    (R3)            ;SET THE TERMINATOR
2807  020734  012605                  MOV     (6)+,R5         ;POP STACK INTO R5
2808  020736  012603                  MOV     (6)+,R3         ;POP STACK INTO R3
2809  020740  012602                  MOV     (6)+,R2         ;POP STACK INTO R2
2810  020742  012601                  MOV     (6)+,R1         ;POP STACK INTO R1
2811  020744  012600                  MOV     (6)+,R0         ;POP STACK INTO R0
2812  020746  016666  000002  000004  MOV     2(6),4(6)       ;FUDGE DATA
2813  020754  012616                  MOV     (6)+,(6)        ;OFF STACK
2814  020756  104402  020774          TYPE    ,.DBLK          ;NOW TYPE THE NUMBER
2815  020762  000002                  RTI                     ;RETURN
2816
2817  020764  023420  001750  000144  .DTBL:  10000.,1000.,100.,10.
2818  020772  000012
2819  020774  000004            .DBLK:  .BLKW   4
2820  021004  000000            .DSIGN: 0
2821
2822          000001                    .END
```

```
ADAM     010736            1548    1568#   1577
ADDRR    014052            2053    2060    2065#
ADERR    003574             662     667#
ADHGT    003532             650     655#
ADRD     004702             823     840#
ADR1     004716             839     842     844#
ADTL     003252              44     595#
ADTST    003176              34     404     580     583#    1242    2047
ADT1     003260             588     605#
ADT1A    003262             610#    684
AKH      007370            1279#   1298
APORT    011376             703    1653#
AS     = 000100             250#   1129    2110
ASKWC    002512             499     518#
AOB1     001120             270#    372*    889*    1286    1960*   2020*
A1       002322              38     492#
BA     = 000020             248#    639     787     989    2115    2730
BEGIN    001234              30     353#   1485    1514    1796    2184
BELL   = 000007             128#
BIT0   = 000001             137#    365     383     388     391    2165    2731
BIT1   = 000002             138#    395     410     459     471     516     885    2735
BIT10  = 002000             147#    397     398     492     587     887    1143    1769    1797
BIT11  = 004000             148#    498     583    1058    1140    2221
BIT12  = 010000             149#    575     803    1011    1631    1954    2157
BIT13  = 020000             150#    581     745    2077    2683    2732    2734
BIT14  = 040000              27     151#    438     569     713    1185    1187
BIT15  = 100000             152#    560     595     682     894    1044    1482    1864    1872    1920    1930    2185    2243
BIT2   = 000004             139#    373     424     445     452     586     817    1350    1629    1953    2079
BIT3   = 000010             140#   1197    1501    1568    1650    1977    2232
BIT4   = 000020             141#   1110    1200    1624    1733    1736
BIT5   = 000040             142#    421     443     540    1107    1151    1247    1730    1732    2021
BIT6   = 000100             143#    489     757     824     947     975    1019    1284    1572
BIT7   = 000200             144#    256     441    1704    1884    1942
BIT8   = 000400             145#    613     681     770     913    1043    1103    1112    1195    1280
BIT9   = 001000             146#    637     651     719     752     759     822     945     973    1016    1021    1067    1070
                           1109    1119    1139    1198    1258    1581    1845    1861    1903    1917    1925    1931    1941
                           1969    2162
BLOCK    001160             324#   1251    1255*   1315*   1318*   1320    1322    1323*   1324    1332*   1599*   1609*   1617
BLSZ     007550            1250   1315#
BUF      001144             318#    623*    707*    748*    939*   1092*   1099    1961*   2687*   2760*
BUFEXI   007360            1249   1254    1277#
BUFINX   007444            1276   1290#
BUFSIZ   006613             484   1160#
CALM     001462             384     386#   2736
CALM1    001466             387#
CHCKDV   002144             455     459#
CHKADT   003620             666     672     677#
CHKDAT   012502            1856#   1868
CHKDSK   012752            1913#   1924
CLEAR    011312             801    1006    1625    1627    1629#
CLIND    014020            2052#   2056
CLRDV  = 104426             616     702     920    1057    1069    1837    1855    1905    1909    2534#
CMD      001176             331#    630*    645*    715*    749*    812*    942*    970*   1008*   1109*   1112*   1113    1842*
                           1857*   1914*   1963*   1966*   2701*
CMDAE    007352            1262   1270    1275#
CMPLP    010544            1520#   1521    1566
```

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CMPLP1  010610          1517    1519    1531#
CMPY    003234           496     520     538     567     573     579     591#
COMDAR  007256          1256    1258#
COMERR  001214           338#    2014    2034*   2171*   2172
COMPAR  010414           819    1013    1491#
CONM    002220           405     476#
CRLFLF  000757           199#    447     673    1001    1716    2178    2222    2650
DA    = 000004           246#    639     653     729     787     833     957     989    1029    1513    1795    1847    1863
                        1971    2120
DATA    000620           174#    727     765     830
DATAT   003660           589     685#    883
DATTES  002402           497     500#    505
DB    = 000002           245#    787     989    1029    1847    1863    1919    1971    2135
DISBUF  007204           641     678     740     799     844    1247#   1850    1867    1923    1973
DISPLA= 177570           127#   1345*   2315*   2319*
DKCMD = 104416           631     646     716     750     813     943     971    1009    1843    1858    1915    1964    1967
                        2530#   2702
DKINT   006422          1119#   1227
DMA     001140           316#    392*    615*    627     661     667     701*    929*    930*   1055*   1077   1153*   1252*
                        1253    1261    1266   1277*   1291    1616   1839*   1854*   1910*   1955*   2689*
DONE    013752          2022    2027    2039#
DONEE   002204           460     470#   1062
DOWN    012624          1840    1878#   1881
DROP    001130           274#    418    1810*   1981    2018   2174*   2179
DRP     014760          2074    2163    2165#
DRVENO  001620           409#    585    2684
DS    = 000040           249#    729     833     957    1129    1513    1795    2130    2730
DSKRD   004540           809     811#    837
DT    = 000240           253#   2142
DVNUM   001660           414     417#
ELH     004604           820     822#
ERCLR = 104414           624     644     711     743     811     941     969    1007   2529#
ERCOUN  001152           321#   1491*   1626*
ERRCL   012300           370     493    1803#
ERRORS  001002           209#   2334*   2354
ERRVEC= 000004           349#    402*    403*
ERTAB   017266          1804    2030    2071*   2606#
ESH     004474           802#    893
ESH1    004470           747     801#
EXGEN   010200          1421    1437#
EXGEN1  010336          1472#
EXMFLG  003212           584     586#   1061    2247
EXRAX   006076           963     995    1017    1035#
EXRXX   006110          1036    1038#
EXTDR   007546          1283    1289    1312#
EXTMEM  011464           386     490    1673#
EXTPP   006206          1059    1062#
EXTPPR  006154           890    1055#   2188
EXTT    011442          1656    1661#
FILBUF  007764          1365    1367#
FILCHR  001014           213#   2268    2269
FILDAT  007760          1366#   1369
FLAG    001132           313#    362*    397*    400*    489*    492*    494*    498*    540*    560*    569*    575*    581*
                         583     586*    587     613*    637*    651*    681*    708*    713     719     730*    731     739*
                         745     752     803     807*    817     822     846     887     913*    931*    945     959*    960
                         973    1003*   1016    1043*   1058    1067   1070*   1103    1119*   1139*   1151    1247    1258
```

		1275	1279*	1280	1284	1311*	1350	1629	1631	1845	1861	1917	1953*	1969
		2185												
FLAG2	001126	273#	363*	365	383	388	391*	410*	424*	438	445	452*	459	471*
		516*	1107	1110	1143	1185*	1187*	1501*	1568*	1650*	1730*	1732*	1733*	1736*
		1769*	1797*	1864*	1869	1872*	1903*	1920*	1925	1927	1930*	1931*	1941*	1954*
		2079*	2157	2221*	2232	2683*	2731*	2732*	2734*	2735*				
FLAG3	001222	341#	364*	595*	682	894*	1044							
FNDTYP	006740	507	1185#	1836										
GETERR	013720	1996	2028#	2168										
HERADD=	177742	351#	2224											
HINUM	010206	1376	1387	1397	1422*	1439#								
HINUM1	010342	1450	1460	1471*	1474#	1506*	1529							
HISAV	010212	1376*	1441#	1506										
HLT =	104000	123#	639	653	669	729	787	833	957	989	1029	1129	1268	1513
		1587	1795	1847	1863	1919	1971	2730						
HLTADR	001012	212#	2338*	2339*	2340	2341	2355							
HRDER	001156	323#	706*	922*	1137	1853*	1904*							
ICNT	001000	208#	360*	2308	2310	2312*	2313*	2315	2318*	2319	2325	2350*		
INCSEC	007232	1252#	1257											
INPUT	017246	593	2551	2584	2585	2605#								
INTEXT	006512	1122	1140#											
INTFLG	001202	333#	1098*	1146*	1515	1520	1570							
KDPAR0=	172360	113#												
KDPAR1=	172362	114#												
KDPAR2=	172364	115#												
KDPAR3=	172366	116#												
KDPAR4=	172370	117#												
KDPAR5=	172372	118#												
KDPAR6=	172374	119#												
KDPAR7=	172376	120#												
KDPDR0=	172320	95#												
KDPDR1=	172322	96#												
KDPDR2=	172324	97#												
KDPDR3=	172326	98#												
KDPDR4=	172330	99#												
KDPDR5=	172332	100#												
KDPDR6=	172334	101#												
KDPDR7=	172336	102#												
KIPAR0=	172340	104#	1722*											
KIPAR1=	172342	105#	1724*											
KIPAR2=	172344	106#	1740*											
KIPAR3=	172346	107#	1564*	1742*	2629*	2642*	2643*							
KIPAR4=	172350	108#	1744*											
KIPAR5=	172352	109#	1746*											
KIPAR6=	172354	110#	1748*											
KIPAR7=	172356	111#	1757*											
KIPDR0=	172300	86#	1749*											
KIPDR1=	172302	87#	1750*											
KIPDR2=	172304	88#	1751*											
KIPDR3=	172306	89#	1752*											
KIPDR4=	172310	90#	1753*											
KIPDR5=	172312	91#	1754*											
KIPDR6=	172314	92#	1755*											
KIPDR7=	172316	93#	1756*											
LA =	000204	251#	2152											
LAD	001010	211#	361*	636*	718*	798*	925*	2314*	2320	2322	2325			

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LDAT    003762  706   711#  718   732
LDAT1   003756  710#  741
LDAT2   003704  701#
LDAT3   003676  700#  877
LDR     020000  367   2663#
LDR1    015166  2191  2199#  2672*
LERADD= 177740  350#  2227
LOADSW  000561  167#  1832
LOGC  = 104436  670   1580  2538#
LOGR  = 104432  652   832   1018  1263  2536#
LOGW  = 104430  638   721   951   2535#
LOGWC = 104434  756   979   2537#
LONUM   010204  1375  1386  1395  1407* 1438#
LONUM1  010340  1449  1458  1470* 1473# 1505* 1525
LOPCNT  001204  334#  710*  722*  723   734   737*  754   761   789*  790   793   796*  808*
                826   835*  836   841   940*  949   952*  964   968*  977   990*  991   994*
                996   999   1005* 1023  1031* 1032  1035  1182* 1574  1667* 1714  2065
LOSAV   010210  1375* 1440#  1505
MDON    012142  1721  1762#
MEM     010344  1339  1478#
MEMERR= 177744  352#  2230
MMABTO  012144  1759  1764#
MMAVA   001216  339#  371*  378*  775   916   1105  1591  1655  1677  1719  2235
MMPSET  017372  1363  1385  1500  1643  2639#
MMSET   011424  1658#
MMUSE   017330  1366  1418  1433  1646  2620#
MMVEC = 000250  259#  1759*
MR    = 000220  252#  2147
MSTR    004724  805   846#
MTRAP   000541  163#  1764
MYBYWR  012416  1842# 1851
N     = 000005  122#  606   610#  686   690#  900   904#  1051  1055#
NOB     020444  2726  2734#
NOFND   000730  195#  465
NOINT   000510  157#  1512  1794
NOPORT  002310  479   490#
NOREC   006720  792   838   1034  1179#
NOWGO   002210  453   469   471#
NOWRIT  006674  1172# 1666
NPRCNT  012274  1770* 1792* 1799#
NPRRET  012264  1145  1797#
NPR1    012276  1771  1800#
NUM$    001174  330#  503*  504   506   511   513*  526*  527   531   533   543*  546   548
                550   554*  555   558   561
OPDAR   002632  522   536#  549
OPDSEL  006546  712   744   802   1151#
OPPAT   002760  539   551#  556
OPRD    003112  568   571#
OPWCK   003142  574   577#
OPWRT   003062  559   565#
OUT     013344  470   1977#
OUTBUF  017326  612*  623   625   655   707   748   768   871*  873*  914*  915   927   929
                937   939   1352* 1653* 1660* 1956* 1961  2607#
PARCSR= 172100  2201# 2209
PARVEC= 000114  2202# 2203* 2204*
PASEL   007650  709   1339# 1962
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PASEX   007774          1370#  1437
PASSC   001162           325#   921*  1039*
PATNU   001142           317#   393*   557*   561*   563*   880*   881    884*   919*  1042*  1341   1507   1518
                        1531   1565   1952*  2187*
PAT0    000300            56#  1352   1354   1532
PAT1    000302            57#
PAT10   000320            64#
PAT11   000322            65#
PAT12   000324            66#
PAT13   000326            67#
PAT14   000330            68#
PAT15   000332            69#
PAT16   000334            70#
PAT17   000336            71#
PAT2    000304            58#
PAT20   000340            72#
PAT3    000306            59#
PAT4    000310            60#
PAT5    000312            61#
PAT6    000314            62#
PAT7    000316            63#
PCNT    001004           210#  1808*  1809*  2024   2040*  2041*  2049   2160
PFT1    012334            51   1830#
PFT2    012670            53   1901#
PFWAT   012376          1839#  1852
PFWATT  012370          1837#  1873
PHADDR  001124           272#  1660   1737*
PHYCOV  006762           777   1191#
POWFAL  013152          1838   1907   1952#
PRIORI  001072           256#  1228   1856   1859   1913
PRNT    014112           671    725    763    773    828    953    980   1025   1179   1269   1584   1588   1618
                        1664   1711   2072   2077#
PS      = 177776         124#   125    369*   610*  1228*  1593   1856*  1859*  1913*  2237
PSW     = 177776         125#
PTDONE  014706          2136   2140   2153   2157#
PWRDN   013102          1911   1935#  1938
PWRFL   012732          1908   1910#  1926
PWRFL2  012722          1907#  1932
PWRF1   012730          1904   1909#  1944
PWRUP   013112          1935   1938#
QQ      = 000001         606#   686#   900#  1051#
RAND    010232          1449#  1524
RANDM   000670           187#   955    982   1027
RANDOM  010010           928    938   1349   1375#
RAND1   010030          1386#  1436
RANEL   005130            48   894#
RANEX   005136           891   896#  1046
RDERR   000657           184#   831   1028   2004
RDLIN   = 104422         592   2532#  2549
RDOCT   = 104420         477    482    485    502    525    542    553   2531#
RDSECT  003470           644#
READCT  005124           845   893#
READER  001212           337#  2006   2032*  2169*  2170
RECOV   000702           190#   998   1713
RESTOR  010214           401   1443#
RETT    015140          2158   2166   2173   2189#
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RLDR    015142   41  2191#
RORBLK  007620  1321  1325#
RRDSEC  003466   643#  679
RREAD   005740  1007#  1033
RRR2    011566  1192  1328  1680  1691  1698#
RSAS    001050   234#  417  1136*  1848*  1866*  1922*  2113
RSBA    001040   230#  767  984  1099*  1220  2118
RSBAE   001062   239#  1089*  1094*  2105  2763*
RSCS1   001032   227#  632  634  647  649  1113*  1120  1123  1195  1198  1576  2090  2703
                2707
RSCS2   001034   76*  77*  228#  411*  415*  427*  1883*  1940*  2098  2690*  2691*  2705
RSCS3   001064   240#  2102
RSDA    001042   231#  1077*  1261  1267  2123
RSDB    001054   236#  2138
RSDS    001044   232#  441  1127  1884  1942  2133
RSDT    001060   238#  429  431  433  435  2145
RSER    001046   233#  412*  1849*  1865*  1921*  2094
RSLA    001052   235#  2155
RSMR    001056   237#  2150
RSREG   014122  2079#  2344
RSVEC   001066   241#  1227*
RSWC    001036   229#  785  1102*  2128
RS04DT  001172   329#  428*  437*  544  619  656  933  1308  1316  1329  1603  1611
RW    = 000006   257#  1749  1750  1751  1752  1753  1754  1755  1756
RWRED   005774   922  1014  1016#
SANHT   003556   659  661#  665
SAVAST  001076   261#  1653  1654  1681*
SAVCPU  001102   263#
SAVE    001154   322#  614*  680  1503*  1543*  1544*  1545*  1549*  1560  1562*  1563*  1578*  1579
                1594  1597  1723*  1738  2238  2241
SAVMGA  001104   264#  1657  1685*
SAVMGB  001106   265#
SAVMGC  001110   266#
SAVWC   001220   340#  390*  529  1443
SAVWCB  001224   342#
SCOPE = 104400   609  640  643  654  677  689  738  742  797  806  834  840  903
                958  967  1002  1004  1030  1038  1054  2039  2523#
SEABUF  003370   624#  636  642
SEEC    014570  2109  2141#
SETIND  014036  2059#  2063
SHIFT   010046  1390#  1394
SHIFT1  010250  1453#  1457
SIZEAP  001112   267#  1686  2709*  2714*
SIZEBP  001114   268#  486*  487  2729*
SIZERR  020326  2710  2727#
SIZP    020472  2740#  2743
SIZPR   020464  2725  2738#
SIZZAP  020070   385  2683#
SIZZBP  020322  2726#
SIZ1    020230  2706  2713#
SLH     004144   714  742#
SLH2    004146   743#  791  798  810
SLH2A   004534   800  810#
SR0   = 177572   81#  377*  918*  1761*
SR1   = 177574   82#
SR2   = 177576   83#
```

```
SR3     = 172516   84#  1760*
STABUF  006566    476   480  1155#
STAMEM  001074    260#  478*  699  1201  1673  1688  2686*
STATUS  001070    255#  705*  924*
STBCOM  001100    262#  483*
STMM2   011650   1658  1719#
STTEST  001752    422   425#  457
SWITCH  001200    332#  1504*  1522  1526*  1528*
SWR     = 177570  126#   127   373   395   398   421   443   757   759   770   815   824   885
                  947   975  1011  1019  1021  1140  1482  1572  1581  1624  1704  1835  1977
                 2021  2077  2162  2165  2243  2295  2306  2335  2345  2348
SWRDCT  001150    320#   390   394   491   533*   534   614   618*   622*   680*   700  1282  1443*
                 1444  1693*  1958*  1959
SW0     = 000001   22#
SW1     = 000002   21#
SW10    = 002000   12#  2042  2334
SW11    = 004000   11#  2306
SW12    = 010000   10#  2042
SW13    = 020000    9#  2335
SW14    = 040000    8#  2295
SW15    = 100000    7#
SW2     = 000004   20#
SW3     = 000010   19#
SW4     = 000020   18#
SW5     = 000040   17#
SW6     = 000100   16#
SW7     = 000200   15#
SW8     = 000400   14#  2295
SW9     = 001000   13#  2348
TAG     004604    816   818  821#
TAG1    005774   1012  1015#
TDMA    001146    319#  550*  1153
TEMP1   001022    217#   865   868  2723*
TEMP2   001024    218#  611*  698*  912*  1056*  1086  1209  1364  1416  1431  1541  1558  1644
                 1831*  1902*  2620  2639
TEMP3   001026    219#   699*   864*   865   867*   868   870*   872  1088  1211  2641  2700*  2762*
                 2763
TEMP4   001030    220#  1090*  1091*  1092
TIEOUT  017426    402  2650#
TIMES   016012   2310  2325#
TIMUP   007146   1235#  2436
TPB     001020    215#  2269*  2274*
TPS     001016    214#  2270  2275
TRACK   001136    315#
TRUERR  006504   1126  1128  1139#
TRY     001640    412#   416
TRYNX   002130    426   436   442   454#  1060
TST1    003260    609#
TST2    003660    689#
TST3    005136    903#
TST4    006152   1054#
TYPE    = 104402   423   447   451   465   476   480   481   484   495   501   519   524   537
                   541   552   566   572   578   591   673   727   728   765   766   780   784
                   830   831   955   956   982   983   986   993   998  1001  1027  1028  1181
                  1272  1479  1512  1586  1590  1620  1623  1666  1713  1716  1764  1794  1832
                  1871  1929  1975  1993  1998  1999  2000  2003  2004  2005  2008  2009  2010
```

```
                    2013    2016    2023    2026    2082    2085    2089    2093    2097    2100    2101    2104    2107
                    2112    2117    2122    2127    2132    2137    2144    2149    2154    2159    2164    2175    2178
                    2220    2222    2223    2226    2229    2234    2337    2343    2395    2435    2524#   2574    2594
                    2597    2601    2650    2651    2724    2728    2746    2814
TYPEA = 104412      1595    2239    2528#
TYPED = 104440      2527#   2745    2766#
TYPEO = 104404       783     786     988    2084    2087    2091    2095    2099    2103    2106    2114    2119    2124
                    2129    2134    2139    2146    2151    2156    2225    2228    2231    2342    2525#   2653
TYPES = 104406       450     464    1000    1274    1598    1622    1715    1995    2002    2007    2012    2015    2025
                    2161    2177    2242    2500    2526#
TYPREC  011622       736     795     843     966    1037    1711#
UNCMP   001170       328#    419*    425     454*    461*   2174
UNITSV  001166       327#    417*    418*    425     515*   1981*   1982    2018*   2180
UNNUM   001164        77     326#    420*    427     449     456*    462*     463     506*   1835*   1883    1940    2067
                    2167    2176    2691
UNRECO  006651       993    1167#   1181
UNTYP   001762       427#   1186
UP      000000       258#   1749    1750    1751    1752    1753    1754    1755    1756
UPCHK   012466      1853#   1886
UPDAT = 104424      2533#   2711
UPP     012634      1878    1881#
VADDR   001122       271#    915*   1347    1503    1641    1654*   1659*   1957*
VECTRR  007130       704     923    1227#   1834    1906
WAIT    011600       717     751     814     944     972    1010    1704#   1844    1860    1916    1965    1968
WC      000010       247#    639     653    1513    1795    2125
WCCON   002550       521     523#    528     532
WCERR   001210       336#   2011    2033*   2170*   2171
WCKERR  000642       180#    766     983    2009
WDCTB   001116       269#   1288
WDERR   010746      1546    1570#
WORK    001226       346#    778*    782     926*    936*    984*    985*    987    1235*   1240*   1271*   1273    1346*
                    1368*   1420*   1435*   1509*   1510*   1982*   1984
WORK1   001230       347#   1201*   1211*   1212    1220*   1221*   1222*   1223*   1224    1236*   1238*   1251*   1296*
                    1616*   1617*   1621    2685*   2713*   2714    2723    2742    2759*
WORK2   001232       348#   1290*   1292*   1299    1502*   1547*   1602
WRDCMP  010620      1527    1530    1541#   1567    1571
WRDCT   001134       314#    394*    491*    534*    617*    621*    626     700*    857     932*    935*    936     1100
                    1282*   1288*   1307*   1310*   1319    1346    1444*   1502    1600    1642    1959*   2688*
WRDINC  010650      1547#   1628
WRDNW   013246      1963#   1974
WRERR   005356       925     941#    961
WRITER  001206       335#   2001    2031*   2169
WRLG1   005236       925#   1041
WRNEXB  003456       635     640#
WRRCK   005516       969#    992
WRRCK1  005476       946     964#
WRTERR  000630       177#    728     956    1999
WRXBL   004110       720     734#
WRX1    004122       735     737#
WTNO    011444       733     962    1664#
XESH    004212       752#
XINCSE  007454      1292#   1297
XINCSU  007500      1294    1299#
XSFABU  003402       627#    629
XWAIT   012154      1706    1769#
YORN    000763       201#    591
```

```
$ENDAD  013776    25  2045#
$END1   014006  2043  2047#
.     = 021006   23#   24#   26#   29#   32#   36#   40#   43#   47#   50#   52#  155#  204#
           206#  423   481   482#  495   501   502#  519   520#  524   525#  537   541
           552   566   572   573#  578   579#  633   648   683   780   784   785#  882
           986   1045  1141  1272  1273#  1479  1586  1590  1591#  1620  1621#  1623  1624#
          1871  1872#  1929  1930#  1975  1976#  1993  1998  1999#  2000  2001#  2003  2004#
          2005  2006#  2008  2009#  2010  2011#  2013  2016  2017#  2023  2026  2027#  2049
          2082  2083#  2085  2086#  2089  2093  2094#  2097  2100  2101#  2104  2107  2108#
          2112  2113#  2117  2118#  2122  2123#  2127  2128#  2132  2133#  2137  2138#  2144
          2145#  2149  2150#  2154  2155#  2159  2164  2165#  2175  2220  2221#  2223  2224#
          2226  2227#  2229  2230#  2234  2235#  2271  2276  2325  2337  2338#  2343  2344#
          2346  2354  2355  2364  2384  2387  2392  2402#  2435  2439  2574  2588  2594
          2605#  2606#  2651  2659#  2667  2724  2728  2746  2819#
.CLRDV  000342    76#  2534
.DBLK   020774  2781  2814  2819#
.DKCMD  006234  1077#  2530
.DSIGN  021004  2769*  2775*  2779*  2792  2794*  2796  2820#
.DTBL   020764  2784  2817#
.ERCLR  006212  1067#  2529
.HLT    016014   356  2334#
.HLTCT  016134  2080  2108  2110  2115  2120  2125  2130  2135  2141*  2142  2147  2152  2340*
          2354#
.ILLUP  016476  2411  2438#
.KIT    015764  2296  2305  2311  2318#  2352
.LOGC   014044  2062#  2538
.LOGR   014024  2055#  2536
.LOGW   014014  2051#  2535
.LOGWC  014032  2058#  2537
.MAMK   015170   387  2203#
.OVER   015770  2319#
.PARSR  015262  2203  2219#
.POWER  016350   354  2411#  2433
.POWUP  016414  2420  2423#
.PR     016324  2361*  2363*  2365*  2366*  2371  2375  2385*  2386  2389*  2391  2395  2402#  2502*
          2503*  2504  2505*
.PRF    016232  2373  2376  2381#
.PRL    016210  2374#  2390  2507
.PTIT   016170  2362  2367#
.PUVEC  016504  2411*  2412*  2420*  2442#
.QQ.    000042  2510#  2523  2524#  2525#  2526#  2527#  2528#  2529#  2530#  2531#  2532#  2533#  2534#
          2535#  2536#  2537#  2538#  2539#  2766  2767#
.RDLIN  017142  2532  2583#
.RDOCT  017024  2531  2544#
.SATAB  016742  2465  2509#
.SAVR6  016502  2419*  2423  2441#
.SCOPE  015642  2295#  2523
.SVLAD  015744  2302  2307  2313#  2321
.SWOPT= 121000    1#     7     8     9    10    11    12    13    14  2042  2295  2334  2335
          2348
.TBIT   014012  2049#
.TRAP   016744   358  2517#
.TRP    016762  2520  2521#
.TYPE   015504  2258#  2524
.TYPEA  016510  2450#  2528
.TYPEB  016136  2361#
```

```
.TYPED  020556          2527    2766    2769#
.TYPEO  016146          2363#   2525
.TYPES  016156          2365#   2526
.UPDAT  020524          2533    2759#
```

```
END       1#
LDPDR  1718#  1749  1750  1751  1752  1753  1754  1755  1756
NEWTST    1#   606   686   900  1051
ODT11     1#
ODT11X    1#
POP       1#   153#  2301  2304  2396  2427  2506  2568  2807
PRINT     1#   153#   423   481   495   501   519   524   537   541   552   566   572   578   780
           784   986  1272  1479  1586  1590  1620  1623  1871  1929  1975  1993  1998  2000  2003
          2005  2008  2010  2013  2016  2023  2026  2082  2085  2089  2093  2097  2100  2101  2104
          2107  2112  2117  2122  2127  2132  2137  2144  2149  2154  2159  2164  2175  2220  2223
          2226  2229  2234  2337  2343  2435  2573  2593  2651  2724  2728  2746
PUSH      1#   153#  2298  2367  2413  2450  2459  2546  2770
SCOPE.    1#   606#   686#   900#  1051#
SET    2510#  2523  2524  2525  2526  2527  2528  2529  2530  2531  2532  2533  2534  2535  2536
          2537  2538  2766
TYPADR    1#
TYPBIT    1#   153#
TYPCHR    1#   153#
TYPDEC    1#   153#  2744
TYPLIN    1#   153#
TYPOCS    1#   153#   448   463  1273  1621  1994  2001  2006  2011  2014  2024  2160  2176
TYPOCT    1#   153#   781   785   987  2083  2086  2090  2094  2098  2102  2105  2113  2118  2123
          2128  2133  2138  2145  2150  2155  2341
TYPTXT    1#   153#   423   481   495   500   518   523   536   541   551   565   571   577   779
           784   986  1272  1478  1586  1590  1620  1623  1871  1929  1975  1992  1998  2000  2003
          2005  2008  2010  2013  2016  2023  2026  2082  2085  2088  2092  2096  2100  2101  2104
          2107  2112  2117  2122  2127  2132  2137  2144  2149  2154  2159  2164  2175  2219  2223
          2226  2229  2234  2651  2724  2727  2746
$CATCH    1#    23
$CMTAG    1#   206
$DONE     1#  2037
$EQUAT    1#   122
$HLT      1#  2326
$KMMR     1#    79
$OCTAL    1#  2355
$POWER    1#  2403
$RAND2    1#
$RAND4    1#
$RDDEC    1#
$RDLIN    1#  2576
$RDOCT    1#  2539
$SCOPE    1#  2288
$SET   2510#  2523  2524  2525  2526  2527  2528  2529  2530  2531  2532  2533  2534  2535  2536
          2537  2538  2766
$SETUP    1#   353
$SMMR     1#
$SWDOC    1#     4
$TRAP     1#  2510
$TYPE     1#  2248
$TYPEA    1#  2443
$TYPED    1#  2767
$UMMR     1#

. ABS.  021006  000
```

```
 ERRORS DETECTED:  0

 CERSBC.BIN,CERSBC.LST/CRF/SOL/NL:TOC=DSKZ:CERSBC.SML,DSKZ:CERSBC.P11
 RUN-TIME:  7 11 1 SECONDS
 RUN-TIME RATIO:  58/20=2.8
 CORE USED:  21K  (41 PAGES)
```