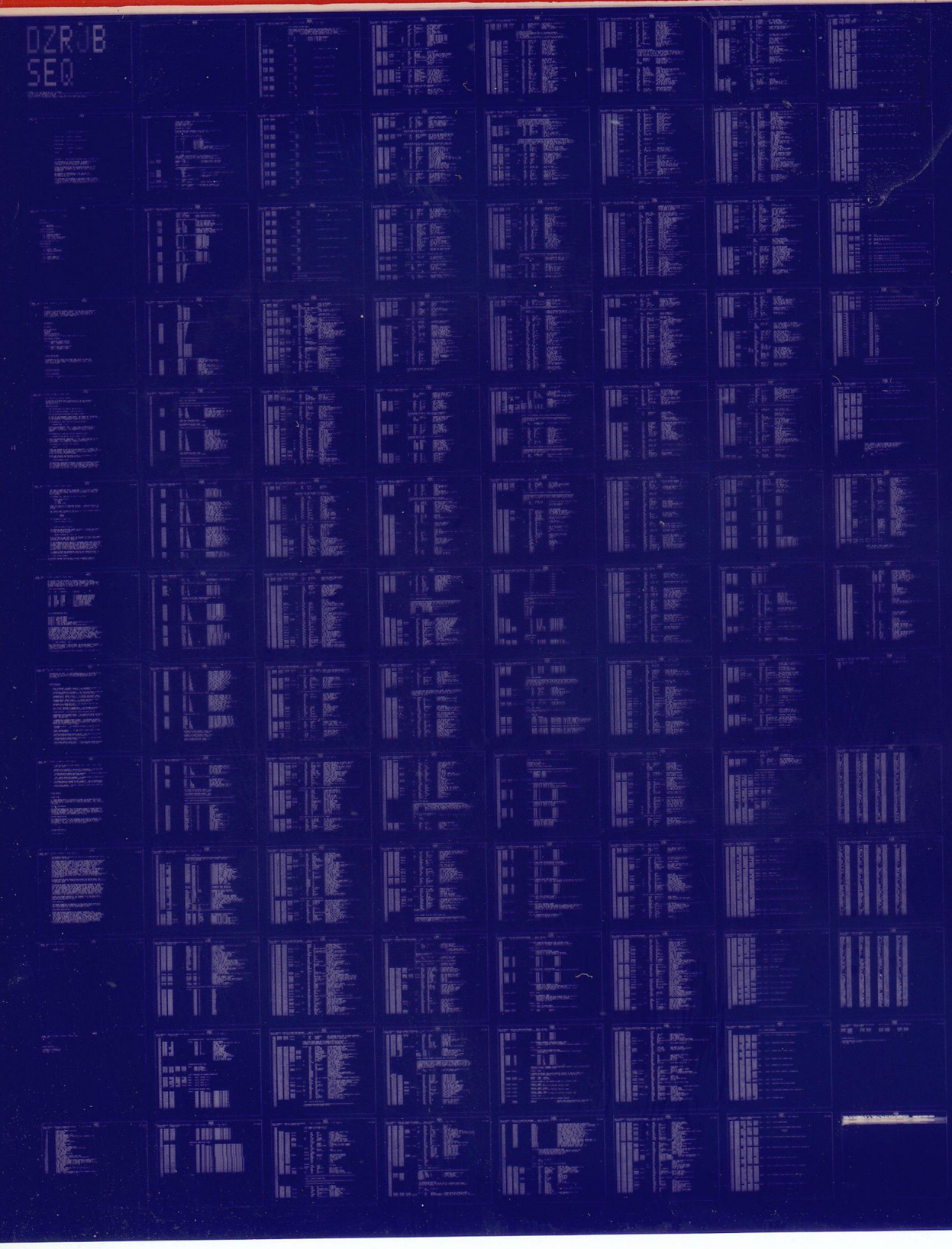
RP04/05/06

FORMATTER
MD-11-DZRJB-A

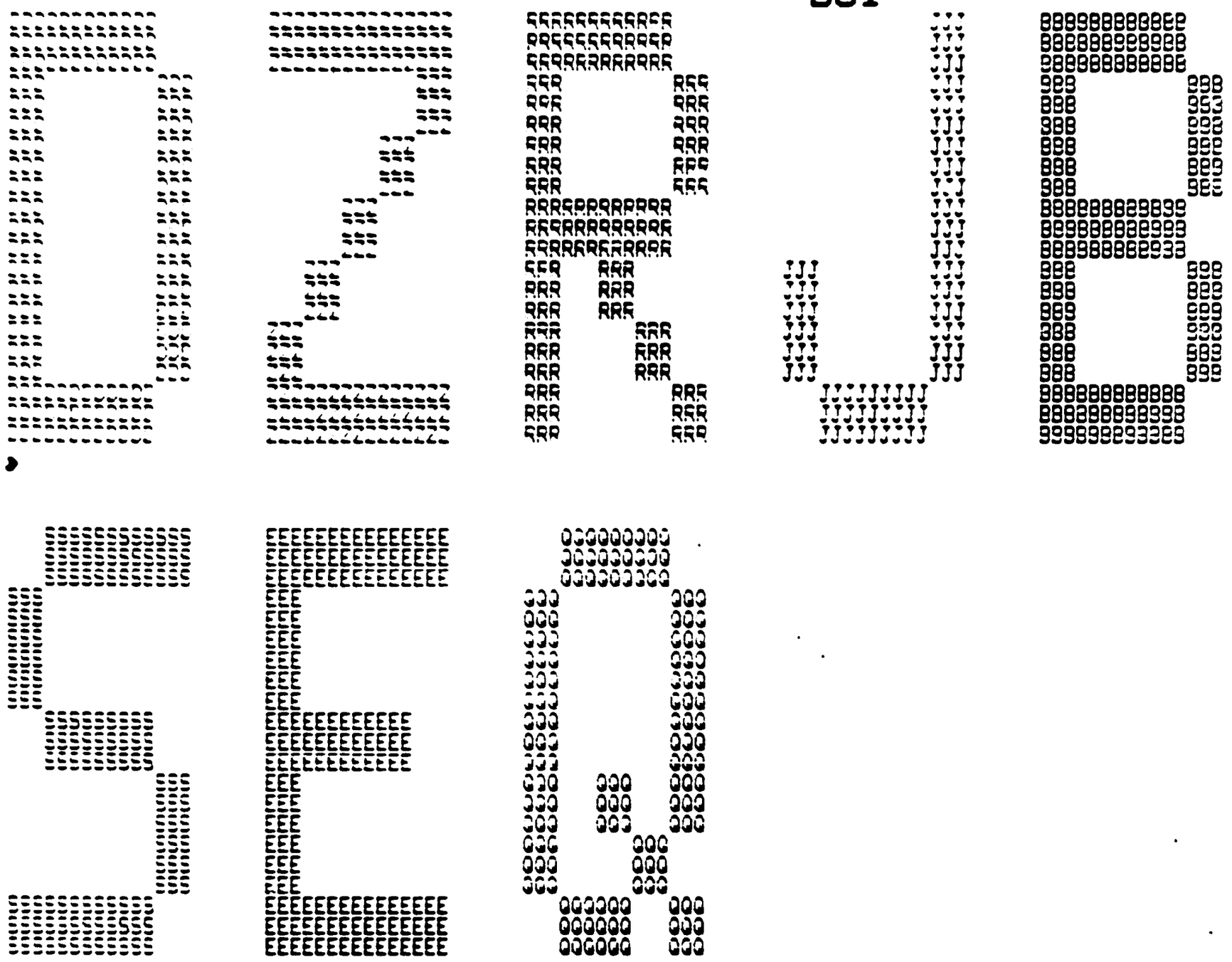
EP-DZRJB-A-DL-A

FICHE 1 OF 1

NOV 1976
digital
MADE IN USA



B01



```
[PSP, version 101(2111) Running on MTA140
 *START* User WELLINGHAM,AI[1,2] Job  DZRJB Seq. 5143 Date 07-May-76 10:42:33 Monitor     RV243A KI10 SYS#514 *START*
Request created: 07-May-76 10:35:27
File: DSK:DZRJB.SEQ;055)[400,3722] Created: 03-May-76 10:15:15 Printed: 07-May-76 10:42:42
QUEUE Switches: /FILE:ASCII /COPIES:1 /SPACING:1 /LIMIT:238 FORMS:NORMAL
```

```
        .REM
```

I D E N T I F I C A T I O N

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

PRODUCT NAME: RP04/5/6 FORMATTER PROGRAM

DATE CREATED: MAY 1976

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: C. HESS

CONTENTS

1. ABSTRACT

THE RPO4/5/6 FORMATTER PROGRAM FORMATS THE DISK PACK AND PERFORMS A CURSORY CHECK OF THE PACK'S SURFACE. THE PROGRAM ALLOWS THE OPERATOR TO SPECIFY ADDRESS LIMITS, PATTERNS, AND EITHER 16 BIT OR 18 BIT FORMAT MODE. THE PROGRAM VERIFIES EACH TRACK WRITTEN AS WELL AS VERIFYING THE FORMAT OPERATION.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
8K MEMORY
TELETYPE
PROGRAM LOAD DEVICE
KW11-L OR KW11-P CLOCK
RH11 OR RH70 WITH 1 - 8 RPO4, RPO5, RPO6 DISK DRIVES

2.2 PRELIMINARY PROGRAMS

RPO4/5/6 DISKLESS CONTROLLER TEST
PART 1 (MAINDEC-11-DZRJG)
PART 2 (MAINDEC-11-DZRJH)

RPO4/5/6 FUNCTIONAL CONTROLLER TEST
PART 1 (MAINDEC-11-DZRJI)
PART 2 (MAINDEC-11-DZRJJ)

3. LOADING PROCEDURES

THE PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR IT MAY BE LOADED FROM THE APPROPRIATE 'XXDP' MEDIA USING THE ASSOCIATED LOADER. THE PROGRAM MAY NOT BE INCLUDED IN AN 'XXDP' CHAIN.

4. STARTING PROCEDURES

4.1 STARTING ADDRESSES

THE PROGRAM IS STARTED FROM LOCATION 200(8) IF THE ADDRESS OF THE

RH11 OR RH70 WILL NOT BE CHANGED

THE PROGRAM IS STARTED FROM LOCATION 204(8) IF THE ADDRESS OF THE RH11 OR RH70 IS TO BE CHANGED FROM THE PRELOADED VALUE (SEE SECTION 4.3)

4.2 OPERATION ACTION

1. LOAD THE PROGRAM INTO MEMORY (SEE SECTION 3).

2. LOAD THE STARTING ADDRESS - 200(8) OR 204(8).

3. SET THE SWITCHES AS REQUIRED AND PRESS 'START'.

   IF THIS IS THE PROGRAM'S FIRST START, THE STATUS OF THE DRIVES ON THE SELECTED MASSBUS SUBSYSTEM WILL BE TYPED OUT. THIS TYPEOUT MAY BE INHIBITED ON SUBSEQUENT STARTS BY SETTING SW(02).

4. THE PROGRAM WILL THEN TYPE THE FOLLOWING MESSAGE:

   'PROGRAM MODE (C OR F):'

   ENTER THE APPROPRIATE CODE: 'C' FOR 'CHECK' OPERATION OR 'F' FOR 'FORMAT & VERIFY'. IF A 'CARRIAGE RETURN' IS ENTERED IN RESPONSE TO THE REQUEST, THE PROGRAM WILL ASSUME 'FORMAT & VERIFY'.

5. THE PROGRAM WILL THEN ASK FOR THE FORMATTING MODE:

   'OPERATE IN 22 SECTOR (16 BIT) MODE (Y OR N)'

   ENTER THE APPROPRIATE CHARACTER: 'Y' FOR 16 BIT MODE OR 'N' FOR 18 BIT MODE. IF A 'CARRIAGE RETURN' IS ENTERED IN RESPONSE TO THIS REQUEST, THE PROGRAM WILL ASSUME 16 BIT MODE.

6. THE PROGRAM WILL THEN ASK FOR A DRIVE:

   'DRIVE: '

   ENTER THE ADDRESS OF THE DRIVE TO BE FORMATTED. A 'PERIOD' OR 'CARRIAGE RETURN' ENTRY WILL SELECT DRIVE 0. IF THE DRIVE SELECTED IS NOT AVAILABLE, THE PROGRAM WILL TYPE AN ERROR MESSAGE AND RETURN TO THE DRIVE ADDRESS REQUEST.

7. AFTER THE OPERATOR HAS SELECTED A DRIVE, THE PROGRAM WILL ASK FOR ADDRESS LIMITS FOR THE SELECTED DRIVE:

   'ENTER ADDRESS LIMITS: '

   THE PREVIOUSLY SELECTED OR DEFAULT VALUES FOR BEGINNING CYLINDER AND TRACK AND FOR ENDING CYLINDER AND TRACK WILL BE TYPED OUT. IF A 'CARRIAGE RETURN' IS TYPED AS A RESPONSE, THE PRESENT VALUE WILL BE USED; IF A 'PERIOD' IS TYPED, THE PROGRAM WILL BYPASS THE REMAINING ENTRIES AND WILL USE THEIR PRESENT VALUES. NOTE

THAT THE CYLINDER AND TRACK VALUES ARE D E C I M A L NUMBERS.
THE ADDRESS SPECIFIED BY THE BEGINNING CYLINDER AND TRACK MUST
BE LESS THAN THE ADDRESS SPECIFIED BY THE ENDING CYLINDER AND
TRACK ADDRESS.

7. THE PROGRAM WILL THEN ASK FOR THE DATA PATTERN:

```
'SELECT DATA PATTERN
  (0) ZERO'S
  (1) ONES
  (2) WORST CASE:'
```

ENTER THE CODE FOR THE REQUIRED PATTERN. 'CARRIAGE RETURN' OR
'PERIOD' ENTRIES WILL CAUSE THE PROGRAM TO USE THE 'WORST CASE'
PATTERN.

THE 'WORST CASE' PATTERN IS THE FOLLOWING OCTAL SEQUENCE REPEATED
THROUGH THE DATA AREA OF THE SECTOR:

```
165555
133333
```

8. THE PROGRAM WILL THEN TYPE:

'STARTING FORMAT ON DRIVE N'

OR

'STARTING CHECK ON DRIVE N'

9. THE OPERATOR CAN DETERMINE WHERE THE DRIVE IS DURING THE FORMAT
OR CHECK OPERATION BY TYPING A 'CONTROL C'. THE PROGRAM WILL
TYPE THE FOLLOWING MESSAGE:

'PRESENT ADDRESS IS: CXXX TXX'

IF A 'CONTROL C' IS TYPED WHILE THE PROGRAM IS TYPING THE CURRENT
ADDRESS, THE PROGRAM WILL ABORT THE FORMAT (OR CHECK) OPERATION
AND RETURN TO THE 'DRIVE' REQUEST.

10. IF THE OPERATOR DOES NOT SELECT A DIFFERENT DRIVE WHEN THE FORMAT
OR CHECK OPERATION HAS COMPLETED, THE PROGRAM WILL NOT ALTER THE
ADDRESS LIMITS SPECIFIED AT THE START OF THE PREVIOUS OPERATION.
IF THE FORMAT OR CHECK OPERATION IS TERMINATED BY A 'CONTROL C' OR
IF A DIFFERENT DRIVE IS SELECTED, THE PROGRAM WILL RESET THE
ADDRESS LIMITS TO THE VALUES APPROPRIATE FOR THE DRIVE TYPE.

11. TO CHANGE EITHER THE ADDRESSING MODE OR THE OPERATION MODE, THE
PROGRAM MUST BE STARTED FROM LOCATION 200(8) OR 204(8) AGAIN.

4.3 RH11 - RH70 UNIBUS ADDRESS

THE PROGRAM ASSUMES THAT THE RH11 OR RH70 ADDRESSES START AT
176700 AND THAT THE VECTOR ADDRESS IS 254. THESE ADDRESSES MAY

BE CHANGED WHEN THE PROGRAM IS STARTED FROM LOCATION 204(8).
IF THE RH11 - RH70 IS NOT AT THE DEFAULT ADDRESS, THE PROGRAM MUST
BE STARTED FROM 204(8) INITIALLY AS THE PROGRAM GOES THROUGH THE
ADDRESS CHANGE ROUTINE AT INITIAL START ONLY. ENTER THE RH11 RH70
ADDRESS IN RESPONSE TO THE REQUEST FROM THE PROGRAM.

4.4 OTHER UNIBUS ADDRESSES

LOC	TAG	CONTENTS	FUNCTION
1144	$TKS	177560	TTY KEYBOARD STATUS REGISTER
1146	$TKB	177562	TTY KEYBOARD BUFFER REGISTER
1150	$TPS	177564	TTY PRINTER STATUS REGISTER
1152	$TPB	177566	TTY PRINTER BUFFER REGISTER
1176	$LKCSR	172540	KW11-P CONTROL REGISTER
1200	$LKCSB	172542	KW11-P COUNTER REGISTER
1202	$LPVEC	104	KW11-P VECTOR ADDRESS
1206	$LKS	177546	KW11-L CONTROL REGISTER
1210	$LKV	100	;ADDRESS OF KW11-L VECTOR

5. SWITCH REGISTER SETTINGS

SW<15>=1...HALT ON ERROR
SW<13>=1...INHIBIT ERROR TYPEOUTS
SW<10>=1...BELL ON ERROR
SW<09>=1...LOOP ON ERROR
SW<02>=1...DON'T DISPLAY SYSTEM STATUS AFTER INITIAL START
SW<01>=1...LOOP ON THE CURRENT TRACK
SW<00>=1...LOOP THE PROGRAM ON THE SELECTED DRIVE

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/34)
THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS
NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE
'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE
SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD
ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL
RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM
IS AT A HIGHER PRIORITY PROCESSING AN RP04/5/6 INTERRUPT. THE
'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE
TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER
IMAGE MUST BE ENTERED. LEADING ZEROS ARE NOT REQUIRED., 'RJBOUT' AND
'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING ERRORS
DURING SWITCH ENTRY.

ON PROCESSORS WITH HARDWARE SWITCH REGISTERS, THE 'SOFTWARE' SWITCH

REGISTER MAY BE USED. IF THE PROGRAM FINDS ALL 16 SWITCHES IN THE 'UP' POSITION, ALL SWITCH REGISTER REFERENCES WILL BE TO THE 'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

5. ERROR MESSAGES

1. 'RH11 INTERRUPT OCCURRED (RPAS=0) - AN INTERRUPT OCCURRED, BUT NOTHING ON THE MASSBUS IS INDICATING AN ATTENTION.

2. 'UNEXPECTED ATTENTION OCCURRED' - THE INDICATED DRIVE INTERRUPTED, BUT NO INTERRUPT WAS EXPECTED FROM THE INDICATED DRIVE.

3. 'MASSBUS PARITY ERROR (MCPE=1)' - A CONTROL BUS PARITY ERROR WAS DETECTED BY THE RH11 WHEN THE INDICATED REGISTER WAS READ.

4. 'MASSBUS PARITY ERROR (PAR=1)' - A CONTROL BUS PARITY ERROR OCCURRED WHEN THE INDICATED REGISTER WAS WRITTEN.

5. 'ADDRESS PLUG CHANGE BIT SET' - THE PROGRAM FOUND THE 'OPE' BIT SET FOR THE INDICATED DRIVE.

6. 'RH11 DIDN'T RESPOND TO ADDRESSING' - THE PROGRAM ACCESSED THE RH11 AT THE INDICATED ADDRESS AND RECEIVED NO RESPONSE.

7. 'DRIVE OFFLINE' - THE INDICATED DRIVE HAS GONE OFFLINE

8. 'PERSISTENT DRIVE UNSAFE ERROR' - THE INDICATED DRIVE HAS BECOME UNSAFE AND THE CONDITION CANNOT BE CLEARED BY ISSUING 'DRIVE CLEAR' INSTRUCTIONS.

9. 'UNCORRECTABLE MASSBUS PARITY ERROR' - THE PROGRAM ATTEMPTED TO PERFORM AN OPERATION AND DETECTED 3 SUCESSIVE MASSBUS PARITY ERRORS OR THE PROGRAM ATTEMPTED TO CLEAR A 'PAR' ERROR IN THE DRIVE AND A PARITY ERROR OCCURRED.

10. 'SOFTWARE TIMEOUT' - THE OPERATION FAILED TO COMPLETE WITHIN 1 SECOND.

11. 'DRIVE UNSAFE ERROR' - A NON-PERSISTENT UNSAFE ERROR OCCURRED DURING THE OPERATION.

12. 'CONTROLLER/DRIVE ERROR DURING WRITE' - THE INDICATED NON-DATA ERROR WAS DETECTED DURING A FORMAT OPERATION.

13. 'CONTROLLER/DRIVE ERROR DURING WRITE CHECK' - A NON-DATA ERROR OCCURRED DURING THE WRITE CHECK.

14. 'DATA ERROR DURING WRITE CHECK' - A DATA RELATED ERROR OCCURRED DURING A WRITE CHECK OPERATION. A DATA ERROR IS CONSIDERED

TO BE ONE OF THE FOLLOWING ERRORS: 'DCK', 'OPI', 'DTE', 'HCRC', 'HCE', OR 'FER'.

15. 'RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE' - THE INDICATED SECTOR FAILED DURING RETRY FOLLOWING A DATA ERROR.

16. 'CONTROLLER/DRIVE ERROR VERIFYING HEADERS' - AN ERROR OCCURRED DURING THE VERIFICATION PASS AFTER FORMATTING.

17. ''HCE' ERROR VERIFYING HEADERS' - A HEADER ERROR OCCURRED DURING THE VERIFICATION PASS AFTER FORMATTING.

18. 'CYLINDER FIELD IN HEADER IS NOT CORRECT' - THE CYLINDER FIELD FROM A HEADER READ DURING THE VERIFICATION PASS IS NOT CORRECT.

19. 'WRITE CHECK ERROR' - THE RH11 REPORTED A WRITE CHECK ERROR AND NO DRIVE ERRORS WERE SET.

7. MISCELLANEOUS

7.1 FORMAT TIME

IT TAKES APPROXIMATELY 8 MINUTES TO FORMAT AN ENTIRE RP04/5 PACK AND APPROXIMATELY 16 MINUTES TO FORMAT AN RP06 PACK. THE 'CHECK' MODE TIME FOR AN ENTIRE PACK IS 4 MINUTES FOR RP04/5'S AND 9 MINUTES FOR RP06'S.

7.2 HALTING THE PROGRAM

THE OPERATOR SHOULD NOT HALT THE PROGRAM DURING A FORMAT OPERATION. HALTING THE PROGRAM MAY LEAVE A SECTOR INCORRECTLY FORMATTED. TO TERMINATE THE FORMAT, TYPE A 'CONTROL C' AND WHILE THE PROGRAM IS TYPING THE ADDRESS, TYPE ANOTHER 'CONTROL C'; THIS SEQUENCE RETURNS THE PROGRAM TO THE DRIVE ADDRESS ENTRY ROUTINE.

7.3 SURFACE VERIFICATION

THE FORMATTER PROGRAM IS NOT INTENDED TO BE USED TO PERFORM DISK PACK VERIFICATION. IF THE PROGRAM REPORTS A SECTOR AS BEING 'NOT ACCEPTABLE', THIS MAY IN FACT INDICATE A BAD SURFACE; HOWEVER, SECTORS WHICH 'PASSED' MAY OR MAY NOT BE GOOD.

8. PROGRAM DESCRIPTION

8.1 FORMAT OPERATION

THE PROGRAM FORMATS THE PACK ONE TRACK AT A TIME BETWEEN THE LIMITS SPECIFIED BY THE DRIVE.

THE FORMAT OPERATION CONSISTS OF A WRITE HEADER AND DATA COMMAND FOR THE ENTIRE TRACK FOLLOWED BY A WRITE CHECK HEADER AND DATA COMMAND. IF AN ERROR OCCURS DURING THE WRITE, THE PROGRAM WILL RETRY THE WRITE BEFORE CONTINUING. IF A DATA RELATED ERROR IS DETECTED DURING THE WRITE CHECK (A DATA ERROR IS DEFINED AS ONE OF THE FOLLOWING ERRORS: 'DCK', 'OPI', 'DTE', 'HCRC', 'HCE' OR 'FER'), THE SECTOR IN ERROR WILL BE REWRITTEN. THE PROGRAM WILL CHECK THE SECTOR TWICE; IF A DATA ERROR IS DETECTED IN THE SECTOR DURING EITHER OF THE WRITE CHECKS, THE PROGRAM WILL DECLARE THE SECTOR AS BEING 'UNACCEPTABLE'. FOLLOWING THIS SEQUENCE, THE REMAINDER OF THE TRACK IS CHECKED. IF DATA ERRORS ARE ENCOUNTERED IN ANY OF THE REMAINING SECTORS, EACH SECTOR WILL BE HANDLED AS DESCRIBED ABOVE.

IF A NON-DATA RELATED ERROR OCCURS DURING THE WRITE CHECK, THE PROGRAM WILL RETRY THE COMMAND FOR THE ENTIRE TRACK BEFORE PROCEEDING TO THE NEXT TRACK.

IT SHOULD BE NOTED THAT THE FORMATTER PROGRAM FORMATS THE PACK ONLY AND IS NOT DIRECTLY VERIFYING THE SURFACE OF THE PACK. ERRORS THAT ARE ENCOUNTERED MAY BE THE RESULT OF BAD AREAS ON THE PACK BUT, AS THE PROGRAM IS NOT DESIGNED TO PERFORM AN EXHAUSTIVE CHECK OF THE DISK PACK SURFACE, THE PROGRAM CANNOT MAKE THIS CONCLUSION. IN GENERAL, HOWEVER, THE OPERATOR CAN ASSUME THAT SECTORS WHICH THE PROGRAM CALLS 'UNACCEPTABLE' INDICATE BAD AREAS OF THE PACK; UNFORTUNATELY, SECTORS WHICH 'PASS' CANNOT BE ASSUMED TO BE GOOD.

DURING THE FORMAT OPERATION, THE PROGRAM FILLS THE DATA FIELD WITH THE PATTERN SELECTED BY THE OPERATOR. THE KEYWORDS IN THE HEADER ARE ALWAYS SET TO ZERO.

8.2 CHECK OPERATION

THE CHECK OPERATION IS IDENTICAL TO THE WRITE CHECK PORTION OF THE FORMAT OPERATION OPERATION DESCRIBED IN SECTION 8.1 EXCEPT THAT THE PROGRAM WILL NOT RE-WRITE ERROR SECTORS.

8.3 POSITIONER VERIFICATION

AFTER THE PROGRAM COMPLETES THE FORMAT OPERATION, THE POSITIONER IS RETURNED TO THE STARTING CYLINDER AND THE HEADER FROM SECTOR 0 ON THE STARTING TRACK IS READ. THE CYLINDER ADDRESS FIELD FROM THE HEADER IS COMPARED TO THE REQUESTED CYLINDER; IF THE CYLINDER ADDRESSES DO NOT COMPARE, AN ERROR MESSAGE IS TYPED. THE PROGRAM CHECKS THE CYLINDER ADDRESS FIELD FROM THE HEADER OF SECTOR 0 ON THE BEGINNING TRACK OF EACH CYLINDER FORMATTED. THIS CHECK IS PERFORMED TO CONFIRM THAT THE DISK'S POSITIONER ADVANCED PROPERLY DURING THE FORMAT OPERATION.

9. PROGRAM LISTING

```
        .END

ERRORS DETECTED:  0

*.DZRJBA/SOL=DZRJBA.DOC
RUN-TIME:  1 2 0 SECONDS
CORE USED:  3K
```

DZRJB.013 TABLE OF CONTENTS

```
                        .TITLE  MD-11-DZRJB-A, RP04/5/6 FORMATTTER PROGRAM
                        ;*COPYRIGHT (C) 1976
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY C. HESS
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C1),MAR 24, 1976.
                        ;*

                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            DON'T DISPLAY SYSTEM STATUS AFTER INITIAL START
                        ;*         1            LOOP ON THE CURRENT TRACK
                        ;*         0            LOOP THE PROGRAM ON THE SELECTED DRIVE

                        .SBTTL  TRAP CATCHER

000000                          .=0
                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
000174                          .=174
000174  000000         DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000         SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER

                        .SBTTL  ACT11 HOOKS

                        ;;*****************************************************************
                        ;HOOKS REQUIRED BY ACT11
000200                          $SVPC=.                 ;SAVE PC
000046                          .=46
000046  005174                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .SCOP
000052                          .=52
000052  020000                  .WORD   20000           ;;2)SET LOC.52 TO 20000
000200                          .=$SVPC                 ;; RESTORE PC

                        .SBTTL  STARTING ADDRESS = 200
000200                          .=200
000200  000137  002076          JMP     BEGIN1          ;NORMAL STARTING ADDRESS

                        .SBTTL  STARTING ADDRESS TO CHANGE THE RH11 ADDRESS = 204
000204  000137  002066          JMP     BEGIN           ;CHANGE THE RH11 ADDRESS

                        .SBTTL  BASIC DEFINITIONS
```

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

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

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  R7,PC           ;;PROGRAM COUNTER

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

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
```

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

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

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

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

                        .SBTTL  RH11 REGISTERS

                        ;;*****************************************************************

                        ;CONTROL AND STATUS REGISTER 1 (RPCS1)

000100                  IE=     100             ;INTERRUPT ENABLE (BIT #6)
000200                  RDY=    200             ;READY (BIT #7)
000400                  A16=    400             ;HIGH ORDER BUS ADDRESS BIT (BIT #8)
001000                  A17=    1000            ;HIGH ORDER BUS ADDRESS BIT (BIT #9)
002000                  PSEL=   2000            ;PORT SELECT (BIT #10)
020000                  MCPE=   20000           ;MASSBUSS PARITY ERROR (BIT #13)
040000                  TRE=    40000           ;TRANSFER ERROR (BIT #14)
                        :SC=    100000          ;SPECIAL CONDITION (BIT #15)

                        ;WORD COUNT REGISTER (RPWC)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;BUS ADDRESS REGISTER (RPBA)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;CONTROL AND STATUS REGISTER 2 (RPCS2)

000001                  US1=    1               ;UNIT SELECT (BIT #0)
000002                  US2=    2               ;UNIT SELECT (BIT #1)
000004                  US4=    4               ;UNIT SELECT (BIT #2)
000010                  BAI=    10              ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
000020                  PAT=    20              ;MASSBUS PARITY TEST (BIT #4)
000040                  CLR=    40              ;CLEAR (BIT #5)
000100                  IR=     100             ;INPUT READY (BIT #6)
000200                  OR=     200             ;OUTPUT READY (BIT #7)
000400                  MPE=    400             ;MASS BUS PARITY ERROR (BIT #8)
001000                  MXF=    1000            ;MISSED TRANSFER ERROR (BIT #9)
002000                  PGE=    2000            ;PROGRAM ERROR (BIT #10)
004000                  NEM=    4000            ;NON EXISTENT MEMORY (BIT #11)
010000                  NED=    10000           ;NON EXISTENT DRIVE (BIT #12)
020000                  UPE=    20000           ;UNIBUS PARITY ERROR (BIT #13)
040000                  WCE=    40000           ;WRITE CHECK ERROR (BIT #14)
100000                  DLT=    100000          ;DATA LATE (BIT #15)

                        ;DATA BUFFER REGISTER (RPDB)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)


                        ;;*****************************************************************

                        .SBTTL  RP04/5/6 REGISTERS

                        ;;*****************************************************************

                        ;CONTROL AND STATUS 1 REGISTER. (#00)
```

```
000001          GO=     1               ;GO BIT (BIT #0)
000002          F1=     2               ;FUNCTION CODE BIT #1
000004          F2=     4               ;FUNCTION CODE BIT #2
000010          F3=     10              ;FUNCTION CODE BIT #3
000020          F4=     20              ;FUNCTION CODE BIT #4
000040          F5=     40              ;FUNCTION CODE BIT #5
004000          DVA=    4000            ;DEVICE AVAILABLE (BIT #11)

                ;DRIVE STATUS REGISTER (RPDS1) (#01)

                ;DFS=    1              DRIVE FORWARD 5"/SEC.  (BIT #0)
000002          DFF20=   2              ;DRIVE FORWARD 20"/SEC.  (BIT #1)
000004          DIGB=    4              ;DRIVE TO INNER GUARD BAND (BIT #2)
000010          GRV=     10             ;GO REVERSE (BIT #3)
000020          DL64=    20             ;DIFFERENCE LESS THAN 64 (BIT #4)
000040          DE1=     40             ;DIFFERENCE EQUALS 1 (BIT #5)
000100          VV=      100            ;VOLUME VALID (BIT #6)
000200          DRY=     200            ;DRIVE READY (BIT #7)
000400          DPR=     400            ;DRIVE PRESENT (BIT #8)
001000          PGM=     1000           ;PROGRAMABLE (BIT #9)
002000          LST=     2000           ;LAST SECTOR TRANSFERRED (BIT #10)
004000          WRL=     4000           ;WRITE LOCK (BIT #11)
010000          MOL=     10000          ;MEDIUM ON-LINE (BIT #12)
020000          PIP=     20000          ;POSITIONING OPERATION IN PROGRESS (BIT #13
040000          ERR=     40000          ;COMPOSITE ERROR (BIT #14)
100000          ATA=     100000         ;ATTENTION ACTIVE (BIT #15)

                ;ERROR REGISTER #1 (RPER1) (#02)

000001          ILF=     1              ;ILLEGAL FUNCTION (BIT #0)
000002          ILR=     2              ;ILLEGAL REGISTER (BIT #1)
000004          RMR=     4              ;REGISTER MODIFICATION REFUSED (BIT #2
000010          PAR=     10             ;PARITY ERROR (BIT #3)
000020          FER=     20             ;FORMAT ERROR (BIT #4)
000040          WCF=     40             ;WRITE CLOCK FAIL (BIT #5)
000100          ECH=     100            ;ECC HARD ERROR (BIT #6)
000200          HCE=     200            ;HEADER COMPARE ERROR (BIT #7)
000400          HCRC=    400            ;HEADER CRC ERROR (BIT #8)
001000          AOE=     1000           ;ADDRESS OVERFLOW ERROR (BIT #9)
002000          IAE=     2000           ;INVALID ADDRESS ERROR (BIT #10)
004000          WLE=     4000           ;WRITE LOCK ERROR (BIT #11)
010000          DTE=     10000          ;DRIVE TIMING ERROR (BIT #12)
020000          OPI=     20000          ;OPERATION INCOMPLETE (BIT #13)
040000          UNS=     40000          ;DRIVE UNSAFE (BIT #14)
100000          DCK=     100000         ;DATA CHECK ERROR (BIT 15)

                ;MAINTAINABILITY REGISTER (RPMR)(#03)

000001          CMD=     1              ;DIAGINOSTIC MODE (BIT #0)
000002          MCLK=    2              ;MAINTAINABILITY CLOCK (BIT #1)
000004          MINX=    4              ;MAINTAINABILITY INDEX (BIT #2)
000010          MSTCK=   10             ;MAINTAINABILITY SECTOR CLOCK (BIT #3)
000020          MRD=     20             ;MAINTAINABILITY READ (BIT #4
```

```
000040                  MWR=    40              ;MAINTAINABILITY WRITE (BIT #5)
000200                  D*SY=   200             ;MAINTAINABILITY SYNC DETECTED (BIT #7)

                        ;ATTENTION SUMMARY PSEUDO-REGISTER (RPAS) (#04)

000001                  AT0=    1               ;DEVICE 0 (BIT #0)
000002                  AT1=    2               ;DEVICE 1 (BIT #1)
000004                  AT2=    4               ;DEVICE 2 (BIT #2)
000010                  AT3=    10              ;DEVICE 3 (BIT #3)
000020                  AT4=    20              ;DEVICE 4 (BIT #4)
000040                  AT5=    40              ;DEVICE 5 (BIT #5)
000100                  AT6=    100             ;DEVICE 6 (BIT #6)
000200                  AT7=    200             ;DEVICE 7 (BIT #7)

                        ;DESIRED SECTOR/TRACK ADDRESS REGISTER (RPDA) (#05)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;DRIVE TYPE REGISTER (RPDT) (#06)

000001                  DT00=   1               ;DRIVE TYPE NUMBER BIT 1
000002                  DT01=   2               ;DRIVE TYPE NUMBER BIT 2
000004                  DT02=   4               ;DRIVE TYPE NUMBER BIT 3
000010                  DT03=   10              ;DRIVE TYPE NUMBER BIT 4
000020                  DT04=   20              ;DRIVE TYPE NUMBER BIT 5
000040                  DT05=   40              ;DRIVE TYPE NUMBER BIT 6
000100                  DT06=   100             ;DRIVE TYPE NUMBER BIT 7
000200                  DT07=   200             ;DRIVE TYPE NUMBER BIT 8
000400                  DT08=   400             ;DRIVE TYPE NUMBER BIT 9
004000                  DRQ=    4000            ;DRIVE REQUEST REQUIRED (BIT #11
020000                  MOH=    20000           ;MOVING HEAD (BIT #13)
040000                  TAP=    40000           ;TAPE DRIVE (BIT #14)
100000                  NBA=    100000          ;NOT BLOCK ADDRESSED (BIT #15)

                        ;LOOK-AHEAD REGISTER (RPLA) (#07)

000001                  EXT1=   1               ;EXTENSION 1 (BIT #0)
000002                  EXT2=   2               ;EXTENSION 2 (BIT #1)
000004                  EXT4=   4               ;EXTENSION 3 (BIT #2)
000010                  EXT10=  10              ;EXTENSION 4 (BIT #3)
000020                  EXT20=  20              ;EXTENSION 5 (BIT #4)
000040                  EXT40=  40              ;EXTENSION 6 (BIT #5)
000100                  SC1=    100             ;SECTOR COUNT FIELD 0 (BIT #6)
000200                  SC2=    200             ;SECTOR COUNT FIELD 1 (BIT #7)
                        ;SC4=   400             ;SECTOR COUNT FIELD 2 (BIT #8)
001000                  SC10=   1000            ;SECTOR COUNT FIELD 3 (BIT #9)
002000                  SC20=   2000            ;SECTOR COUNT FIELD 4 (BIT #10)
004000                  TRK1=   4000            ;TRACK FIELD 1 (BIT #11)
010000                  TRK2=   10000           ;TRACK FIELD 2 (BIT #12)
020000                  TRK4=   20000           ;TRACK FIELD 3 (BIT #13)
040000                  TRK10=  40000           ;TRACK FIELD 4 (BIT #14)
100000                  TRK20=  100000          ;TRACK FIELD 5 (BIT #15)

                        ;RP04 ERROR REGISTER #2 (RPER2) (#10)
```

```
                        WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
                        CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
                        WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
                        CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
                        MSE=    20              ;MOTOR SEQUENCE ERROR (BIT #4)
                        TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
                        TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
                        FEN=    200             ;FAILSAFE ENABLED (BIT #7)
                        WRU=    400             ;WRITE READY UNSAFE (BIT #8)
                        MHS=    1000            ;MULTIPLE HEAD SELECT (BIT #9)
                        NHS=    2000            ;NO HEAD SELECTION (BIT #10)
                        IXE=    4000            ;INDEX ERROR (BIT #11)
                        VU30=   10000           ;30VOLT UNSAFE (BIT #12)
                        PLU=    20000           ;PLO UNSAFE (BIT #13)
                        ACU=    100000          ;AC UNSAFE (BIT #15)

                ;RP05/6 ERROR REGISTER #02 (RPER2) (#10)

                        WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
                        CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
                        WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
                        CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
                        RAW=    20              ;READ AND WRITE (BIT #4)
                        TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
                        TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
                        ABS=    200             ;ABNORMAL STOP (BIT #7)
                        WRU=    400             ;WRITE READY UNSAFE (BIT #8)
                        MHS=    1000            ;MUTLTIPLE HEAD SELECT (BIT #9)
                        NHS=    2000            ;NO HEAD SELECTION (BIT #10)
                        IXE=    4000            ;INDEX ERROR (BIT #11)
                        PLU=    20000           ;PLO UNSAFE (BIT #12)

                ;OFFSET REGISTER (RPOF) (#11)

                        OF25=   1               ;OFFSET 25 MICRO INCHES (BIT #0)
                        OF50=   2               ;OFFSET 50 MICRO INCHES (BIT #1)
                        OF100=  4               ;OFFSET 100 MICRO INCHES (BIT #2)
                        OF200=  10              ;OFFSET 200 MICRO INCHES (BIT #3)
                        OF400=  20              ;OFFSET 400 MICRO INCHES (BIT #4)
                        OF800=  40              ;OFFSET 800 MICRO INCHES (BIT #5)
                        OFREV=  200             ;OFFSET NEGATIVE (REVERSE) (BIT #5)
                        HCI=    2000            ;HEADER COMPARE INHIBIT (BIT #10)
                        ECI=    4000            ;ERROR CORRECTION CODE INHIBIT (BIT #11)
                        FMT22=  10000           ;FORMAT BIT (BIT #12

                ;DESIRED CYLINDER ADDRESS (RPCA) (#12)
                ;(EACH BIT IS CALLED BY BIT NUMBER)

                ;CURRENT CYLINDER ADDRESS (RPCC) (#13)
                ;(EACH BIT IS CALLED BY BIT NUMBER)

                ;SERIAL NUMBER REGISTER (RPSN) (#14)
                ;(EACH IS CALLED BY BIT NUMBER)
```

```
                                ;RP04 ERROR REGISTER #03 (RPER3) (#15)

000001                          PSU=    1               ;PACK SPEED UNSAFE (BIT #0)
000002                          VUF=    2               ;VELOCITY UNSAFE (BIT #1)
000010                          UWR=    10              ;ANY UNSAFE EXCEPT READ/WRITE (BIT #3)
000040                          ACL=    40              ;AC LOW (BIT #5)
000100                          DCL=    100             ;DC LOW (BIT #6)
040000                          SKI=    40000           ;SEEK INCOMPLETE (BIT #14)
100000                          OCYL=   100000          ;OFF CYLINDER (BIT #15)

                                ;RP05/6 ERROR REGISTER #03 (RPER3) (#15)

000001                          DCU=    1               ;DC UNSAFE (BIT #0)
000002                          WAO=    2               ;WRITE AND OFFSET (BIT #1)
000040                          ACL=    40              ;AC LOW (BIT #5)
000100                          DCL=    100             ;DC LOW (BIT #6)
020000                          OPE=    20000           ;OPERATOR PLUG ERROR (BIT #13)
040000                          SKI=    40000           ;SEEK INCOMPLETE (BIT #14)
100000                          OCYL=   100000          ;OFF CYLINDER ERROR (BIT #15)

                                ;ECC POSITION REGISTER (RPEC1) (#16)
                                ;(EACH BIT IS CALLED BY BIT NUMBER)

                                ;ECC PATTERN REGISTER (RPEC2) (#17)
                                ;(EACH BIT IS CALLED BY BIT NUMBER)

                                ;;*****************************************************************

                                .SBTTL  RP04/5/6 DRIVER COMMANDS

                                ;;*****************************************************************

000101                          RNOP    =       101             ;NO OPERATION
000103                          UNLOAD  =       103             ;UNLOAD
000105                          SEEK    =       105             ;SEEK
000107                          RECAL   =       107             ;RECALIBRATE
000111                          DRVCLR  =       111             ;DRIVE CLEAR
000113                          RELSE   =       113             ;RELEASE
000115                          OFFSET  =       115             ;OFFSET
000117                          RTC     =       117             ;RETURN TO CENTER LINE
000121                          READIN  =       121             ;READ IN PRESET
000123                          ACK     =       123             ;PACK ACKNOWLEDGE
000131                          SEARCH  =       131             ;SEARCH
000141                          GETREG  =       141             ;GET REGISTERS
000143                          SETFMT  =       143             ;SET FORMAT (& ECI OR HCI)
000145                          SELDRV  =       145             ;SELECT DRIVE
000151                          WCKD    =       151             ;WRITE CHECK DATA
000153                          WCKHD   =       153             ;WRITE CHECK HEADER & DATA
000161                          WRTDAT  =       161             ;WRITE DATA
000163                          WRTHD   =       163             ;WRITE HEADER & DATA
000171                          RDDAT   =       171             ;READ DATA
000173                          RDHD    =       173             ;READ HEADER & DATA
```

```
                                .SBTTL  COMMON TAGS

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

                    001100              .=1100
001100                          $CMTAG:                         ;;START OF COMMON TAGS
001100  000000      $PASS:      .WORD   0                       ;;CONTAINS PASS COUNT
001102     000      $TSTNM:     .BYTE   0                       ;;CONTAINS THE TEST NUMBER
001103     000      $ERFLG:     .BYTE   0                       ;;CONTAINS ERROR FLAG
001104  000000      $ICNT:      .WORD   0                       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000      $LPADR:     .WORD   0                       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000      $LPERR:     .WORD   0                       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000      $ERTTL:     .WORD   0                       ;;CONTAINS TOTAL ERRORS DETECTED
001114     000      $ITEMB:     .BYTE   0                       ;;CONTAINS ITEM CONTROL BYTE
001115     001      $ERMAX:     .BYTE   1                       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000      $ERRPC:     .WORD   0                       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000      $GDADR:     .WORD   0                       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000      $BDADR:     .WORD   0                       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000      $GDDAT:     .WORD   0                       ;;CONTAINS 'GOOD' DATA
001126  000000      $BDDAT:     .WORD   0                       ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0                       ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134     000      $AUTOB:     .BYTE   0                       ;;AUTOMATIC MODE INDICATOR
001135     000      $INTAG:     .BYTE   0                       ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570      SWR:        .WORD   DSWR                    ;;ADDRESS OF SWITCH REGISTER
001142  177570      DISPLAY:    .WORD   DDISP                   ;;ADDRESS OF DISPLAY REGISTER
001144  177560      $TKS:       177560                          ;;TTY KBD STATUS
001146  177562      $TKB:       177562                          ;;TTY KBD BUFFER
001150  177564      $TPS:       177564                          ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566      $TPB:       177566                          ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000      $NULL:      .BYTE   0                       ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002      $FILLS:     .BYTE   2                       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012      $FILLC:     .BYTE   12                      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157     000      $TPFLG:     .BYTE   0                       ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES,
001160  000000      $ESCAPE:0                                   ;;ESCAPE ON ERROR ADDRESS
001162  177607  000377  $BELL:  .ASCIZ  <207><377><377>        ;;CODE FOR BELL
001166     077      $QUES:      .ASCII  /?/                     ;;QUESTION MARK
001167     015      $CRLF:      .ASCII  <15>                    ;;CARRIAGE RETURN
001170  000012      $LF:        .ASCIZ  <12>                    ;;LINE FEED
                                ;;*****************************************************************
                    000015      CR      =       15
                    000012      LF      =       12
001172  176700      $RPADR:     .WORD   176700          ;RH11/RP04/5/6 UNIBUS ADDRESS
001174  000254      $RPVEC:     .WORD   254             ;RH11 INTERRUPT VECTOR
001176  172540      $LKCSR:     .WORD   172540          ;ADDRESS OF KW11-P CSR
001200  172542      $LKCSB:     .WORD   172542          ;ADDRESS OF KW11-P COUNTER BUFFER
001202  000104  000106  $LPVEC: .WORD   104,106         ;ADDRESS OF KW11-P VECTOR
001206  177546      $LKS:       .WORD   177546          ;ADDRESS OF KW11-L CONTROL REGISTER
001210  000100  000102  $LLVEC: .WORD   100,102         ;ADDRESS OF KW11-L VECTOR
001214  000000      DRIVE:      .WORD   0               ;CONTAINS DRIVE NUMBER SELECTED
001216  000000      SOFSW:      .WORD   0               ;CONTENTS ARE FOR SOFTWARE DECISIONS
```

```
488  001220  000000                MODE:    .WORD   0          ;'FORMAT & VERIFY' OR 'CHECK' MODE INDICATOR
489  001222  000632                ENDCYL:  .WORD   410.       ;ENDING CYLINDER
490  001224  000000                BEGCYL:  .WORD   0          ;STARTING CYLINDER
491  001226  000022                ENDTRK:  .WORD   18.        ;ENDING TRACK
492  001230  000000                BEGTRK:  .WORD   0          ;STARTING TRACK
493  001232  000000                TTRKS:   .WORD   0          ;TOTAL # OF TRACKS TO BE FORMATTED
494  001234  000000                TTRKSC:  .WORD   0          ;TOTAL # OF TRACKS COUNTER
495  001236  000000                TRKCNT:  .WORD   0          ;COUNTS TRKS FROM 0-18 PER CYL
496  001240  000000                PATSEL:  .WORD   0          ;CONTAINS PATTERN SELECTED
497  001242  000000                PATA:    .WORD   0          ;1ST WORD OF PATTERN
498  001244  000000                PATB:    .WORD   0          ;2ND WORD OF PATTERN
499  001246  000000                CYLCK:   .WORD   0          ;STORE CYLINDER ADDRESS FOR FORMAT VERIFICATION
500  001250  000000                RETRY:   .WORD   0          ;MAINTAINS # OF WRITE RETRIES MADE
501  001252  000000                SAVSEC:  .WORD   0          ;CONTAINS LAST BAD SECTOR ON FORMAT
502  001254  000000                SAVWC:   .WORD   0          ;CONTAINS WC FOR REMAINING SECTORS ON ERROR
503  001256  000000                WC:      .WORD   0          ;20 OR 22 SECTOR TRACK SIZE (IN WORDS)
504  001260  000000                MWC:     .WORD   0          ;2'S COMPLEMENT OF 'WC'
505  001262  000000                HEDERR:  .WORD   0          ;POSITIONING ERROR DURING FORMAT INDICATOR
506  001264  000000                SEC20:   .WORD   0          ;20 OR 22 SECTOR MODE INDICATOR
507                                                           ;0 = 20 SECTOR MODE
508                                                           ;1'S = 22 SECTOR MODE
509  001266  000000                MAXSEC:  .WORD   0          ;MAXIMUM SECTOR ADDRESS (FOR EITHER 20 OR 22 SECTOR
510                                                           ;FORMAT)
511  001270  000000                DS.CYL:  .WORD   0          ;ADDRESS OF CURRENT CYLINDER
512  001272  000000                DS.TRK:  .WORD   0          ;ADDRESS OF CURRENT TRACK
513  001274  000000                DDRIVE:  .WORD   0          ;DRIVE NUMBER OF 'DRIVER' ERROR MESSAGES
514  001276  000000                ATTN:    .WORD   0          ;ATTENTION REGISTER IMAGE FOR 'DRIVER'
515                                                           ;ERROR MESSAGES
516  001300  000000                CNTLC:   .WORD   0          ;ADDRESS OF '↑C' RETURN
517  001302  000000                CHGADR:  .WORD   0          ;'CHANGE RH11 ADDRESS' FLAG
518
519                                ;RH11/RP04/5/6 REGISTERS STORED HERE AFTER AN OPERATION
520
521  001304  000000                RP.REG:  .WORD   0          ;RPCS1
522  001306  000000                         .WORD   0          ;RPWC
523  001310  000000                         .WORD   0          ;RPBA
524  001312  000000                         .WORD   0          ;RPDA
525  001314  000000                         .WORD   0          ;RPCS2
526  001316  000000                         .WORD   0          ;RPDS1
527  001320  000000                         .WORD   0          ;RPER1
528  001322  000000                         .WORD   0          ;RPAS
529  001324  000000                         .WORD   0          ;RPLA
530  001326  000000                         .WORD   0          ;RPDB
531  001330  000000                         .WORD   0          ;RPMR
532  001332  000000                         .WORD   0          ;RPDT
533  001334  000000                         .WORD   0          ;RPSN
534  001336  000000                         .WORD   0          ;RPOF
535  001340  000000                         .WORD   0          ;RPCA
536  001342  000000                         .WORD   0          ;RPCC
537  001344  000000                         .WORD   0          ;RPER2
538  001346  000000                         .WORD   0          ;RPER3
539  001350  000000                         .WORD   0          ;RPEC1
540  001352  000000                         .WORD   0          ;RPEC2
541
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                                        ;DATA PARAMETER BLOCK - USED FOR ALL DRIVE OPERATION

001354  000             FMTDPB: .BYTE   0               ;DRIVE NUMBER
001355  000                     .BYTE   0               ;OFFSET VALUE OR FMT22,ECI, AND HCI
001356  000                     .BYTE   0               ;COMMAND
001357  000                     .BYTE   0               ;PSEL AND A17 AND A16
001360  000000                  .WORD   0               ;WORD COUNT (NEG)
001362  000000                  .WORD   0               ;BUFFER ADDRESS
001364  000                     .BYTE   0               ;SECTOR ADDRESS
001365  000                     .BYTE   0               ;TRACK ADDRESS
001366  000000                  .WORD   0               ;CYLINDER ADDRESS
001370  001304                  .WORD   RP.REG          ;ERROR TABLE POINTER
001372  000000                  .WORD   0               ;STATUS-ERROR INDICATOR
                                                        ;BIT 15 = 1: ERROR OCCURRED
                                                        ;BIT 07 = 1: DONE
                                                        ;BIT 14-10 AND BIT 06-03
                                                        ;INDICATE TYPE OF ERROR

                                        ;PARAMETER POINTER TABLE

001374  001426  000000  001224  TABLE:  PAR1,0,BEGCYL
001402  001441  000022  001230          PAR2,18.,BEGTRK
001410  001454  000000  001222          PAR3,0,ENDCYL
001416  001465  000022  001226          PAR4,18.,ENDTRK,0
001424  000000

                                        ;ASCII MESSAGES FOR ADDRESS PARAMETERS

001426  052123  051101  020124  PAR1:   .ASCIZ  @START CYL @
001434  054503  020114     000
001441     123  040524  052122  PAR2:   .ASCIZ  @START TRK @
001446  052040  045522  000040
001454  047105  020104  054503  PAR3:   .ASCIZ  @END CYL @
001462  020114     000
001465     105  042116  052040  PAR4:   .ASCIZ  @END TRK @
001472  045522  000040

                                        ;SECTOR BUFFER ADDRESS TABLE

001476  025130          ADRTBL: .WORD   BUFP             ;ADDRESS OF SECTOR 0
001500  026140                  .WORD   BUFP+<520.*1.>   ;ADDRESS OF SECTOR 1
001502  027150                  .WORD   BUFP+<520.*2.>   ;ADDRESS OF SECTOR 2
001504  030160                  .WORD   BUFP+<520.*3.>   ;ADDRESS OF SECTOR 3
001506  031170                  .WORD   BUFP+<520.*4.>   ;ADDRESS OF SECTOR 4
001510  032200                  .WORD   BUFP+<520.*5.>   ;ADDRESS OF SECTOR 5
001512  033210                  .WORD   BUFP+<520.*6.>   ;ADDRESS OF SECTOR 6
001514  034220                  .WORD   BUFP+<520.*7.>   ;ADDRESS OF SECTOR 7
001516  035230                  .WORD   BUFP+<520.*8.>   ;ADDRESS OF SECTOR 8
001520  036240                  .WORD   BUFP+<520.*9.>   ;ADDRESS OF SECTOR 9
001522  037250                  .WORD   BUFP+<520.*10.>  ;ADDRESS OF SECTOR 10
001524  040260                  .WORD   BUFP+<520.*11.>  ;ADDRESS OF SECTOR 11
001526  041270                  .WORD   BUFP+<520.*12.>  ;ADDRESS OF SECTOR 12
```

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                                        .WORD   BUFP+<520.*13.> ;ADDRESS OF SECTOR 13
                                        .WORD   BUFP+<520.*14.> ;ADDRESS OF SECTOR 14
                                        .WORD   BUFP+<520.*15.> ;ADDRESS OF SECTOR 15
                                        .WORD   BUFP+<520.*16.> ;ADDRESS OF SECTOR 16
                                        .WORD   BUFP+<520.*17.> ;ADDRESS OF SECTOR 17
                                        .WORD   BUFP+<520.*18.> ;ADDRESS OF SECTOR 18
                                        .WORD   BUFP+<520.*19.> ;ADDRESS OF SECTOR 19
                                        .WORD   BUFP+<520.*20.> ;ADDRESS OF SECTOR 20
                                        .WORD   BUFP+<520.*21.> ;ADDRESS OF SECTOR 21

                                ;REMAINING WORD COUNT TABLE

001552  000404                  WCTBL:  .WORD   260.             ;REMAINING WORD COUNT AFTER SECTOR 0
001554  001010                          .WORD   260.+<260.*1.>   ;REMAINING WORD COUNT AFTER SECTOR 1
001556  001414                          .WORD   260.+<260.*2.>   ;REMAINING WORD COUNT AFTER SECTOR 2
001560  002020                          .WORD   260.+<260.*3.>   ;REMAINING WORD COUNT AFTER SECTOR 3
001562  002424                          .WORD   260.+<260.*4.>   ;REMAINING WORD COUNT AFTER SECTOR 4
001564  003030                          .WORD   260.+<260.*5.>   ;REMAINING WORD COUNT AFTER SECTOR 5
001566  003434                          .WORD   260.+<260.*6.>   ;REMAINING WORD COUNT AFTER SECTOR 6
001570  004040                          .WORD   260.+<260.*7.>   ;REMAINING WORD COUNT AFTER SECTOR 7
001572  004444                          .WORD   260.+<260.*8.>   ;REMAINING WORD COUNT AFTER SECTOR 8
001574  005050                          .WORD   260.+<260.*9.>   ;REMAINING WORD COUNT AFTER SECTOR 9
001576  005454                          .WORD   260.+<260.*10.>  ;REMAINING WORD COUNT AFTER SECTOR 10
001600  006060                          .WORD   260.+<260.*11.>  ;REMAINING WORD COUNT AFTER SECTOR 11
001602  006464                          .WORD   260.+<260.*12.>  ;REMAINING WORD COUNT AFTER SECTOR 12
001604  007070                          .WORD   260.+<260.*13.>  ;REMAINING WORD COUNT AFTER SECTOR 13
001606  007474                          .WORD   260.+<260.*14.>  ;REMAINING WORD COUNT AFTER SECTOR 14
001610  010100                          .WORD   260.+<260.*15.>  ;REMAINING WORD COUNT AFTER SECTOR 15
001612  010504                          .WORD   260.+<260.*16.>  ;REMAINING WORD COUNT AFTER SECTOR 16
001614  011110                          .WORD   260.+<260.*17.>  ;REMAINING WORD COUNT AFTER SECTOR 17
001616  011514                          .WORD   260.+<260.*18.>  ;REMAINING WORD COUNT AFTER SECTOR 19
001620  012120                          .WORD   260.+<260.*19.>  ;REMAINING WORD COUNT AFTER SECTOR 19
001622  012524                          .WORD   260.+<260.*20.>  ;REMAINING WORD COUNT AFTER SECTOR 20
001624  013130                          .WORD   260.+<260.*21.>  ;REMAINING WORD COUNT AFTER SECTOR 21

                                .EVEN
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                                .SBTTL  ERROR POINTER TABLE

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

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


001626                          $ERRTB:
                                ;ERROR 1

001626  022112                          EM1                     ;RH11 INTERRUPT OCCURRED (RPAS=3)
001630  023221                          DH1
001632  024502                          DT1
001634  025014                          DF1

                                ;ERROR 2

001636  022153                          EM2                     ;UNEXPECTED ATTENTION OCCURRED
001640  023236                          DH2
001642  024504                          DT2
001644  025020                          DF2

                                ;ERROR 3

001646  022211                          EM3                     ;MASSBUS PARITY ERROR (MCPE=1)
001650  023313                          DH3
001652  024520                          DT3
001654  025024                          DF3

                                ;ERROR 4

001656  022247                          EM4                     ;MASSBUS PARITY ERROR (PAR=1)
001660  023341                          DH4
001662  024526                          DT4
001664  025030                          DF4

                                ;ERROR 5

001666  022304                          EM5                     ;ADDRESS PLUG CHANGE BIT SET
001670  023236                          DH2
001672  024504                          DT2
001674  025020                          DF2

                                ;ERROR 6

001676  022340                          EM6                     ;RH11 DIDN'T RESPOND TO ADDRESSING
001700  023400                          DH6
```

```
001702  024536                  DT6
001704  025014                  DF1

                        :ERROR 7

001706  000000                  0                       ;UNUSED
001710  000000                  0
001712  000000                  0
001714  000000                  0

                        :ERROR 10

001716  022402                  EM10                    ;DRIVE OFFLINE
001720  023413                  DH10
001722  024540                  DT10
001724  025034                  DF10

                        :ERROR 11

001726  022420                  EM11                    ;PERSISTENT DRIVE UNSAFE ERROR
001730  023413                  DH10
001732  024540                  DT10
001734  025034                  DF10

                        :ERROR 12

001736  022456                  EM12                    ;UNCORRECTABLE MASSBUS PARITY ERROR
001740  023413                  DH10
001742  024540                  DT10
001744  025034                  DF10

                        :ERROR 13

001746  022521                  EM13                    ;SOFTWARE TIMEOUT
001750  023413                  DH10
001752  024540                  DT10
001754  025034                  DF10

                        :ERROR 14

001756  022542                  EM14                    ;DRIVE UNSAFE ERROR
001760  023413                  DH10
001762  024540                  DT10
001764  025034                  DF10

                        :ERROR 15

001766  022565                  EM15                    ;CONTROLLER DRIVE ERROR DURING WRITE
001770  023413                  DH10
001772  024540                  DT10
001774  025034                  DF10

                        :ERROR 16
```

```
                                                EM16            ;CONTROLLER DRIVE ERROR DURING WRITE CHECK
                                                DH15
                                                DT10
                                                DF10

                                        ;ERROR 17

                                                EM17            ;RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE
                                                DH17
                                                DT17
                                                DF17

                                        ;ERROR 20

                                                EM20            ;DATA ERROR DURING WRITE CHECK
                                                DH20
                                                DT20
                                                DF20

                                        ;ERROR 21

                                                EM21            ;CONTROLLER DRIVE ERROR VERIFYING HEADERS
                                                DH10
                                                DT10
                                                DF10

                                        ;ERROR 22

                                                EM22            ;'HCE' ERROR VERIFYING HEADERS
                                                DH10
                                                DT10
                                                DF10

                                        ;ERROR 23

                                                EM23            ;CYLINDER FIELD IN HEADER IS NOT CORRECT
                                                DH23
                                                DT23
                                                DF23

                                        ;ERROR 24

                                                EM24            ;WRITE CHECK ERROR
                                                DH24
                                                DT24
                                                DF24

                                        ;;**************************************************************

                                        .SBTTL  MAIN PROGRAM

                                        ;;**************************************************************

002066  013737  177777  001302  BEGIN:  MOV     #-1,CHGADR      ;SET CHANGE 'RH11 BUS ADDRESS' INDICATOR
```

```
                                                BR      BEGIN2          ;START THE PROGRAM
002076  005037  001302                  BEGIN1: CLR     CHGADR          ;CLEAR THE 'CHANGE RH11 ADDRESS' INDICATOR
002102  000005                          BEGIN2: RESET                   ;CLEAR THE BUS
                                                .SBTTL  INITIALIZE THE COMMON TAGS
                                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
002104  012706  001100                          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
002110  005026                                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
002112  022706  001140                          CMP     #SWR,R6 ;;DONE?
002116  001374                                  BNE     .-6             ;;LOOP BACK IF NO
002120  012706  001100                          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                                ;;INITIALIZE A FEW VECTORS
002124  012737  006636  000030                  MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
002132  012737  000340  000032                  MOV     #340,@#EMTVEC+2 ;;LEVEL 7
002140  012737  012014  000034                  MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
002146  012737  000340  000036                  MOV     #340,@#TRAPVEC+2;LEVEL 7
002154  005037  001160                          CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
002160  112737  000001  001115                  MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
002166  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
002172  012737  002226  000004                  MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
002200  012737  177570  001140                  MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
002206  012737  177570  001142                  MOV     #CDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
002214  022777  177777  176716                  CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
002222  001012                                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                        ;;AND  THE HARDWARE SWR IS NOT = -1
002224  000403                                  BR      65$             ;;BRANCH IF NO TIMEOUT
002226  012716  002234          64$:            MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
002232  000002                                  RTI
002234  012737  000176  001140  65$:            MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
002242  012737  000174  001142                  MOV     #DISPREG,DISPLAY
002250  012637  000004          66$:            MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

002254  000005                                  RESET                   ;CLEAR WORLD
002256  012737  000240  000036                  MOV     #PR5,@#TRAPVEC+2  ;CHANGE TRAP PRIORITY BACK TO 5
002264  012737  000240  000032                  MOV     #PR5,@#EMTVEC+2 ;CHANGE EMT PRIORITY BACK TO 5
002272  012737  002076  001300                  MOV     #BEGIN1,CNTLC   ;'CONTROL C' ADDRESS
002300  005227  177777                          INC     #-1             ;FIRST START ?
002304  001010                                  BNE     1$              ;BR IF NOT
002306  104401  025130                          TYPE    ,TITLE          ;ADRS OF 'TITLE' MESSAGE
002312  122737  000011  000041                  CMPB    #11.,41         ;LOADED FROM AN RP04/5 6 ?
002320  001002                                  BNE     1$              ;BR IF NOT
002322  104401  025215                          TYPE    ,LOADRV         ;INSTRUCT OPERATOR TO REMOVE 'XXDP'
                                                                        ;PACK FROM DRIVE 0
002326  004737  010204          1$:             JSR     PC,$TKINT       ;TURN ON THE KEYBOARD INTERRUPT
                                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
002332  005737  000042                          TST     @#42            ;;ARE WE RUNNING UNDER XXDP 'ACT'
002336  001006                                  BNE     67$             ;;BRANCH IF YES
002340  023727  001140  000176                  CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
002346  001005                                  BNE     68$             ;;BRANCH IF NO
002350  104406                                  GTSWR                   ;;GET SOFT-SWR SETTINGS
002352  000403                                  BR      68$
002354  112737  000001  001134  67$:            MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
002362                          68$:
```

```
                                                INC     #-1             ;CHECK FOR FIRST START
                                                BNE     SETVEC          ;BR IF NOT
                                                JSR     PC,BUSADR       ;CHECK THE RH11 ADDRESS
                                                MOV     $RPADR,RPADR    ;RH11 ADDRESS
                                                MOV     $RPVEC,RPVEC    ;RH11 VECTOR ADDRESS

                                        ;DISPLAY DRIVE STATUS AND SET UP THE OTHER UNITS THE
                                        ;       PROGRAM WILL USE

                                SETVEC: JSR     PC,ST.CLK       ;START THE CLOCK
                                        JSR     PC,PPINIT       ;INITIALIZE THE RPO4/5/6 DRIVER
                                        MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
                                        INC     #-1             ;SEE IF FIRST START
                                        BEQ     11$             ;BR IF YES
                                        BIT     #SW02,@SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
                                        BNE     10$             ;BR IF NOT
                                11$:    MOV     #PR7,PS         ;SET PRIORITY TO 7
                                        CLR     R4              ;DRIVE TABLE POINTER
                                        TYPE    ,$CRLF          ;CR-LF
                                        TYPE    ,SYSTAT         ;TYPE STATUS HEADING
                                1$:
                                        MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
                                                                ;;TYPE DRIVE NUMBER
                                        TYPOS                   ;;GO TYPE--OCTAL ASCII
                                        .BYTE   2               ;;TYPE 2 DIGIT(S)
                                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                        TYPE    ,LIN4SP         ;SPACES
                                        TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
                                        BMI     4$              ;BR IF UNSAFE
                                        BNE     5$              ;BR IF ONLINE
                                        TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
                                        BEQ     2$              ;BR IF NONEXISTENT
                                        BPL     3$              ;BR IF OFFLINE
                                        TYPE    ,NOTRP          ;DRIVE NOT AN RPO4 5.6
                                        BR      9$              ;CHECK NEXT DRIVE
                                2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
                                        BR      9$              ;CHECK NEXT DRIVE
                                3$:     TYPE    ,UNTOFF         ;DRIVE OFFLINE
                                        BR      6$              ;PRINT DRIVE TYPE
                                4$:     TYPE    ,NOTSAF         ;DRIVE UNSAFE
                                        BR      6$              ;PRINT DRIVE TYPE
                                5$:     TYPE    ,UNTON          ;DRIVE ONLINE
                                6$:     TYPE    ,LINSP          ;SPACES
                                        MOV     #RP04B,8$       ;ADDRESS OF RPO4 MESSAGE
                                        BITB    #BIT00,DRVTYP(R4)   ;RPO4 ?
                                        BNE     7$              ;BR IF YES
                                        MOV     #RP05,8$        ;ADDRESS OF RPO5 MESSAGE
                                        BITB    #BIT01,DRVTYP,R4)   ;RPO5 ?
                                        BNE     7$              ;BR IF YES
                                        MOV     #RP06,8$        ;ADDRESS OF RPO6 MESSAGE
                                7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
                                8$:     .WORD   0               ;MESSAGE ADDRESS HERE
                                9$:     TYPE    ,$CRLF          ;CR-LF
                                        INC     R4              ;INCREMENT DRIVE NUMBER TABLE POINTER
```

```
                                        CMP     R4,#8.          ;FINISHED ?
                                        BNE     1$              ;BR IF NOT
                                10$:    TYPE    ,$CRLF          ;CR-LF


                                ;SEE WHICH MODE THE PROGRAM IS TO BE RUN IN.
                                ;MODES ARE: 'FORMAT & VERIFY' OR 'CHECK FORMAT'

                                M1:     CLR     MODE            ;SET MODE TO 'CHECK FORMAT'
                                        TYPE    ,MMODE          ;TYPE 'PROGRAM MODE'
                                        RDLIN                   ;READ THE KEYBOARD
                                        MOV     (SP)+,R1        ;GET ADDRESS OF INPUT
                                        TSTB    (R1)            ;'CR' ENTERED (DEFAULT)
                                        BEQ     2$              ;BR IF YES
                                        CMPB    #'C,(R1)        ;'CHECK' ?
                                        BEQ     1$              ;BR IF YES
                                        CMPB    #'F,,R1)        ;'FORMAT' ?
                                        BEQ     3$              ;BR IF YES
                                        TYPE    ,$QUES          ;NO CORRECT ENTRY
                                        BR      M1              ;TRY AGAIN
                                1$:     TYPE    ,MHECK          ;TYPE REST OF 'CHECK'
                                        BR      M1A             ;GET STARTING ADDRESS
                                2$:     TYPE    ,MFORMT         ;TYPE DEFAULT MESSAGE
                                        BR      4$              ;SET UP MODE
                                3$:     TYPE    ,MORMAT         ;TYPE REST OF 'FORMAT'
                                4$:     MOV     #-1,MODE        ;SET MODE TO 'FORMAT & VERIFY'

                                ;FIND OUT IF FORMAT IS TO BE IN 20 OR 22 SECTOR MODE

                                M1A:    TYPE    ,MSIZE          ;TYPE FORMAT MODE REQUEST
                                        RDLIN                   ;READ THE KEYBOARD
                                        MOV     (SP)+,R1        ;ADDRESS OF ENTRY
                                        CMPB    #'Y,(R1         ;IS ENTRY A 'Y' ?
                                        BEQ     1$              ;BR IF IT IS
                                        CMPB    #'N,,R1)        ;IS ENTRY A 'N' ?
                                        BEQ     2$              ;BR IF IT IS
                                        TSTB    (R1)            ;DEFAULT MODE ?
                                        BEQ     1$              ;BR IF IT IS
                                        TYPE    ,$QUES          ;TYPE '?'
                                        BR      M1A             ;TRY AGAIN
                                1$:     TYPE    ,MSEC22         ;TYPEOUT MODE SELECTED
                                        MOV     #<260.*22.)/2.,WC       ;TRACK SIZE IN 22 SECTOR MODE
                                        MOV     #-<260.*22.)/2.,MWC     ;2'S COMPLEMENT WORD COUNT
                                        MOV     #-1,SEC20       ;22 SECTOR INDICATOR
                                        MOV     #21.,MAXSEC     ;MAX SECTOR ADDRESS IN 22 SECTOR MODE
                                        BR      M1B             ;CONTINUE
                                2$:     TYPE    ,MSEC20         ;TYPE OUT 20 SECTOR MODE SELECTED
                                        MOV     #<260.*20.)/2.,WC       ;TRACK SIZE IN 20 SECTOR MODE
                                        MOV     #-<260.*20.)/2.,MWC     ;2'S COMPLEMENT WORD COUNT
                                        CLR     SEC20           ;20 SECTOR INDICATOR
                                        MOV     #19.,MAXSEC     ;MAX SECTOR ADDRESS IN 20 SECTOR MODE
                                M1B:    CLR     BEGTRK          ;CLEAR STARTING TRACK ADDRESS
                                        CLR     BEGCYL          ;CLEAR BEGINNING CYLINDER ADDRESS
                                        MOV     #18.,ENDTRK     ;SETUP END TRACK ADDRESS
```

```
                003100  012737  000002  001240          MOV     #2,PATSEL       ;SETUP FOR WORST CASE PATTERN
                003106  112737  177777  001354          MOVB    #-1,FMTDPB      ;SETUP INVALID DRIVE NUMBER
                003114  000400                          BR      M0              ;BRANCH TO START

                                        ;GO FIND OUT WHAT DRIVE

                003116  012737  006116  001300  M0:     MOV     #CENTER,CNTLC   ;CONTROL C ABORT ENTRANCE
                003124  005037  001112                  CLR     $ERTTL          ;CLEAR THE ERROR ACCUMULATOR
                003130  004737  010204                  JSR     PC,$TKINT       ;INITIALIZE THE TTY KEYBOARD
                003134  104401  020657                  TYPE    ,MUNIT          ;ASK FOR DRIVE NUMBER
                003140  104411                          RDLIN                   ;READ THE KEYBOARD
                003142  012601                          MOV     (SP)+,R1        ;ADDRESS OF ENTRY
                003144  004537  006426                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
                003150  003176                          3$                      ;ILLEGAL CHARACTER
                003152  003164                          2$                      ;CARRIAGE RETURN
                003154  003176                          3$                      ;"."
                003156  003164                          2$                      ;","
                003160  003204                          4$                      ;DIGIT 0-7
                003162  003176                          3$                      ;DIGIT 8-9
                003164  005037  001214          2$:     CLR     DRIVE           ;SELECT DRIVE ZERO
                003170  104401  020701                  TYPE    ,MDRVD          ;GO TYPE DEFAULT DRIVE NUMBER
                003174  000413                          BR      5$              ;GO SEE IF DRIVE ZERO IS THERE
                003176  104401  001166          3$:     TYPE    ,$QUES          ;TYPE '?'
                003202  000745                          BR      M0              ;ASK FOR DRIVE NUMBER AGAIN
                003204  010237  001214          4$:     MOV     R2,DRIVE        ;SAVE DRIVE NUMBER
                003210  005702                          TST     R2              ;SEE IF DRIVE 0
                003212  001004                          BNE     5$              ;BR IF NOT
                003214  122737  000011  000041          CMPB    #11,41          ;PROGRAM LOADED FROM AN RPC4 5.6 ?
                003222  001431                          BEQ     7$              ;BR IF IT WAS, CAN'T FORMAT THE DRIVE
                003224  004737  005742          5$:     JSR     PC,ST.CLK       ;START THE CLOCK
                003230  004737  012264                  JSR     PC,RPINIT       ;GO SEE WHAT DRIVES ARE AVAILABLE
                003234  012737  177777  012206          MOV     #-1,SAVEFG      ;SAVE THE REGISTERS
                003242  012737  177777  012210          MOV     #-1,SEEKFG      ;SET 'NO OPTIMIZATION' FLAG
                003250  005037  177776                  CLR     PS              ;SET PRIORITY BACK TO ZERO
                003254  105762  012120                  TSTB    DRVSTA(R2)      ;LOOK AT DRIVE STATUS
                003260  003015                          BGT     8$              ;BRANCH IF ONLINE
                003262  001403                          BEQ     6$              ;BR IF DRIVE NOT AVAILABLE
                003264  104401  021067                  TYPE    ,MUSDR          ;'DRIVE UNSAFE'
                003270  000712                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
                003272  105762  012130          6$:     TSTB    DRVTYP(R2)      ;A DRIVE PRESENT?
                003276  001003                          BNE     7$              ;BR IF SO
                003300  104401  020762                  TYPE    ,MDRNP          ;TYPE 'DRIVE NOT PRESENT'
                003304  000704                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
                003306  104401  021007          7$:     TYPE    ,MER11          ;'DRIVE NOT AVAILABLE'
                003312  000701                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
                003314  123737  001214  001354  8$:     CMPB    DRIVE,FMTDPB    ;SAME DRIVE AS LAST TIME ?
                003322  001430                          BEQ     M2              ;BR IF IT IS
                003324  113737  001214  001354          MOVB    DRIVE,FMTDPB    ;SETUP DRIVE ADDRESS
                003332  012737  000632  001222          MOV     #410.,ENDCYL    ;SETUP FOR RP04/5
                003340  132762  000003  012130          BITB    #BIT00!BIT01,DRVTYP(R2)  ;SEE IF DRIVE RPC4 5
                003346  001003                          BNE     9$              ;BR IF EITHER
                003350  012737  001456  001222          MOV     #814.,ENDCYL    ;SETUP ENDING CYLINDER FOR RP06
                003356  005037  001230          9$:     CLR     BEGTRK          ;CLEAR STARTING TRACK ADDRESS
                003362  005037  001224                  CLR     BEGCYL          ;CLEAR STARTING CYLINDER ADDRESS
```

```
1011  003366  013737  001222  001376          MOV     ENDCYL,TABLE+2  ;ENTRY LIMIT FOR BEGINNING CYLINDER
1012  003374  013737  001222  001412          MOV     ENDCYL,TABLE+16 ;ENTRY LIMIT FOR END CYLINDER
1013  003402  000400                          BR      M2              ;GET ADDRESS LIMITS FROM THE OPERATOR
1014
1015                                  ;GET ADDRESS LIMITS
1016
1017  003404  104401  020710          M2:     TYPE    ,ENTADR         ;'ENTER ADDRESS LIMITS'
1018  003410  004737  006236                  JSR     PC,PARENT       ;GET THE ADDRESS LIMITS
1019  003414  023737  001222  001224          CMP     ENDCYL,BEGCYL   ;SEE IF ENDING CYLINDER EQ TO GT THAN BEGINNING
1020  003422  101010                          BHI     M4              ;BR IF HIGHER
1021  003424  103404                          BLO     3$              ;BR IF LESS
1022  003426  023737  001226  001230  2$:     CMP     ENDTRK,BEGTRK   ;SEE IF ENDING TRACK EQ OR GT THAN BEGINNING
1023  003434  103003                          BHIS    M4              ;BR IF YES
1024  003436  104401  021456          3$:     TYPE    ,MADRER         ;INVALID ADDRESS ENTERED
1025  003442  000760                          BR      M2              ;TRY AGAIN
1026
1027                                  ;GO GET DATA PATTERN FOR FORMAT
1028
1029  003444  104401  021560          M4:     TYPE    ,MSELP          ;GO TYPE 'SELECT PATTERN'
1030  003450  104411                          RDLIN                   ;READ THE KEYBOARD
1031  003452  012601                          MOV     (SP)+,R1        ;ENTRY ADDRESS
1032  003454  004537  006426                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
1033  003460  003514                          3$                      ;ILLEGAL CHARACTER
1034  003462  003474                          1$                      ;CARRIAGE RETURN
1035  003464  003514                          3$                      ;"."
1036  003466  003474                          1$                      ;"."
1037  003470  003506                          2$                      ;DIGIT 0-7
1038  003472  003514                          3$                      ;DIGIT 8-9
1039  003474  104401  021660          1$:     TYPE    ,MPATD          ;TYPE DEFAULT PATTERN
1040  003500  012702  000002                  MOV     #2,R2           ;WORST CASE PATTERN
1041  003504  000406                          BR      4$              ;GO SAVE PATTERN
1042  003506  020227  000002          2$:     CMP     R2,#2           ;IS # LARGER THAN 2
1043  003512  101403                          BLOS    4$              ;BRANCH IF NOT
1044  003514  104401  001166          3$:     TYPE    ,$QUES          ;TYPE '?'
1045  003520  000751                          BR      M4              ;RETYPE LINE
1046  003522  010237  001240          4$:     MOV     R2,PATSEL       ;SAVE PATTERN SELECTED
1047
1048                                  ;GO TYPE 'STARTING FORMAT ON DRIVE N'
1049
1050  003526  012737  006136  001300  M5:     MOV     #TYPADR,CNTLC   ;CHANGE ^C ENTRANCE
1051  003534  005737  001220                  TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
1052  003540  001403                          BEQ     1$              ;BR IF 'CHECK' MODE
1053  003542  104401  021673                  TYPE    ,MSFOU          ;TYPE 'STARTING FORMAT ON DRIVE N'
1054  003546  000402                          BR      2$
1055  003550  104401  021730          1$:     TYPE    ,MSCHK          ;TYPE 'STARTING CHECK ON DRIVE N'
1056  003554                          2$:
1057  003554  013746  001214                  MOV     DRIVE,-(SP)     ;;SAVE DRIVE FOR TYPEOUT
1058                                                                  ;;TYPE DRIVE NUMBER
1059  003560  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
1060  003562     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
1061  003563     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
1062  003564  104401  001167                  TYPE    ,$CRLF          ;CR-LF
1063
1064                                  ;SETUP TOTAL TRACK COUNT FOR FORMAT
```

```
1065
1066  003570  023737  001222  001224  CkADRS: CMP     ENDCYL,BEGCYL   ;STARTING AND ENDING CYLINDERS THE SAME ?
1067  003576  001011                          BNE     1$              ;BRANCH IF BEGCYL NOT EQUAL TO ENDCYL
1068  003600  013737  001226  001232          MOV     ENDTRK,TTRKS    ;END TRACK ADDRESS
1069  003606  163737  001230  001232          SUB     BEGTRK,TTRKS    ;SUBTRACT THE STARTING TRACK ADDRESS
1070  003614  005237  001232                  INC     TTRKS           ;MAKE THE NUMBER OF TRACKS INCLUSIVE
1071  003620  000427                          BR      SETPAT          ;SETUP THE DATA PATTERN
1072  003622  013702  001222          1$:     MOV     ENDCYL,R2       ;ENDING CYLINDER
1073  003626  163702  001224                  SUB     BEGCYL,R2       ;SUBTRACT THE STARTING CYLINDER
1074  003632  013737  001226  001232          MOV     ENDTRK,TTRKS    ;CALCULATE THE RESIDUAL TRACKS
1075  003640  163737  001230  001232          SUB     BEGTRK,TTRKS    ;SUBTRACT THE STARTING TRACK
1076  003646  100004                          BPL     2$              ;BR IF ENDING TRACK GREA
1077  003650  062737  000023  001232          ADD     #19.,TTRKS      ;CORRECT THE VALUE
1078  003656  005302                          DEC     R2              ;COUNT THE PARTIAL TRACK
1079  003660  005237  001232          2$:     INC     TTRKS           ;MAKE THE NUMBER INCLUSIVE
1080  003664  005302                  3$:     DEC     R2              ;DECREMENT THE CYLINDER COUNT
1081  003666  100404                          BMI     SETPAT          ;BR IF DONE
1082  003670  062737  000023  001232          ADD     #19.,TTRKS      ;ADD CYLINDER WORTH OF TRACKS
1083  003676  000772                          BR      3$              ;CONTINUE
1084
1085                                  ;THIS CODE SETS UP THE SELECTED DATA PATTERN TO BE WRITTEN ON EACH SECTOR IMAGE
1086
1087  003700  005037  001242          SETPAT: CLR     PATA            ;CLEAR DATA PATTERN A
1088  003704  005037  001244                  CLR     PATB            ;CLEAR DATA PATTERN B
1089  003710  005737  001240                  TST     PATSEL          ;SEE IF PATTERN OF ONES
1090  003714  001416                          BEQ     1$              ;BR IF SO
1091  003716  005137  001242                  COM     PATA            ;SET PATA TO ONES
1092  003722  005137  001244                  COM     PATB            ;SET PATB TO ONES
1093  003726  022737  000001  001240          CMP     #1,PATSEL       ;SEE IF PATTERN OF ZEROS
1094  003734  001406                          BEQ     1$              ;BRANCH IF SO
1095  003736  012737  165555  001242          MOV     #165555,PATA    ;SET UP WORST CASE
1096  003744  012737  133333  001244          MOV     #133333,PATB    ;SET UP WORST CASE
1097  003752  013703  001256          1$:     MOV     WC,R3           ;SET UP COUNTER
1098  003756  012700  025130                  MOV     #BUFP,R0        ;SET UP MEMORY POINTER
1099  003762  013701  001242                  MOV     PATA,R1         ;SET UP PATTERN IN R1
1100  003766  013702  001244                  MOV     PATB,R2         ;SET UP PATTERN IN R2
1101  003772  010120                  2$:     MOV     R1,(R0)+        ;MOV 1ST PAT INTO MEM
1102  003774  010220                          MOV     R2,(R0)+        ;MOV 2ND PAT INTO MEM
1103  003776  005303                          DEC     R3              ;KEEP COUNT
1104  004000  005303                          DEC     R3              ;KEEP COUNT
1105  004002  001373                          BNE     2$              ;DO IT AGAIN IF R3 NOT 0
1106
1107                                  ;THIS CODE SETS UP FOR THE ACTUAL FORMAT
1108
1109  004004  004737  005402          WRTRK:  JSR     PC,SETTBL       ;GO SET UP DRIVER TABLE
1110  004010  004737  005602                  JSR     PC,SETHDR       ;GO INITIALIZE HEADERS IN THE SECTOR BUFFER IN CORE
1111  004014  112737  000020  001355          MOVB    #20,FMTDPB+1    ;LOAD FMT22 BIT
1112  004022  005737  001264                  TST     SEC20           ;18 BIT MODE ?
1113  004026  001002                          BNE     1$              ;BR IF NOT
1114  004030  105037  001355                  CLRB    FMTDPB+1        ;CLEAR THE FMT22 BIT
1115  004034  112737  000143  001356  1$:     MOVB    #SETFMT,FMTDPB+2  ;'LOAD FORMAT' COMMAND
1116  004042  004037  013034          2$:     JSR     R0,RP04         ;START THE COMMAND
1117  004046  001354                          FMTDPB                  ;DPB ADDRESS
1118  004050  000774                          BR      2$              ;QUEUE FULL RETURN
```

```
1119  004052  005737  001372          3$:     TST     FMTDPB+16       ;LOOK FOR DONE
1120  004056  001775                          BEQ     3$              ;LOOP UNTIL FINISHED
1121  004060  005037  001216          WRTRK1: CLR     SOFSW           ;CLEAR ERROR COUNTER
1122  004064  005037  001250                  CLR     RETRY           ;ZERO THE RETRY COUNTER
1123  004070  105037  001364                  CLRB    FMTDPB+10       ;RESTORE SECTOR
1124  004074  013737  001260  001360          MOV     MWC,FMTDPB+4    ;RESTORE WC
1125  004102  012737  025130  001362          MOV     #BUFP,FMTDPB+6  ;RESTORE BA
1126  004110  005737  001220                  TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
1127  004114  001450                          BEQ     CKTRK           ;BR IF 'CHECK' MODE
1128  004116  112737  000163  001356  WRTRK2: MOVB    #WRTHD,FMTDPB+2 ;SET WRITE HEADER & DATA COMMAND IN TBL
1129  004124  012737  004124  001110          MOV     #.,$LPERR       ;SETUP LOOP ON ERROR ADDRESS
1130  004132  012706  001100                  MOV     #STACK,SP       ;LOAD STACK POINTER
1131  004136  004037  013034          1$:     JSR     R0,RP04         ;GO FORMAT A TRACK
1132  004142  001354                          FMTDPB                  ;ADRS OF PARAMETERS - TBL
1133  004144  000774                          BR      1$              ;WAIT FOR QUEUE IF FULL
1134  004146  005737  001372          2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMP_ETE
1135  004152  001775                          BEQ     2$              ;BRANCH IF NOT DONE
1136  004154  100024                          BPL     4$              ;BRANCH IF NO ERROR
1137  004156  012737  004204  001160          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
1138  004164  004737  005234                  JSR     PC,ERINDX       ;SEE WHICH ERROR
1139  004170  104010                          ERROR   10              ;DRIVE OFFLINE
1140  004172  104011                          ERROR   11              ;PERSISTENT DRIVE UNSAFE ERROR
1141  004174  104012                          ERROR   12              ;UNCORRECTABLE MASSBUS PARITY ERROR
1142  004176  104013                          ERROR   13              ;SOFTWARE TIMEOUT
1143  004200  104014                          ERROR   14              ;DRIVE UNSAFE ERROR
1144  004202  104015                          ERROR   15              ;DRIVE/CONTROLLER ERROR DURING WRITE
1145  004204  004737  005334          3$:     JSR     PC,LOP.CK       ;LOOP ON THE ERROR ?
1146  004210  022737  000003  001250          CMP     #3,RETRY        ;ERROR RETRY LIMIT ?
1147  004216  001403                          BEQ     4$              ;BR IF REACHED
1148  004220  005237  001250                  INC     RETRY           ;COUNT THE ERROR
1149  004224  000744                          BR      1$              ;TRY AGAIN
1150  004226  005037  001160          4$:     CLR     $ESCAPE         ;C'     ERROR ESCAPE ADDRESS
1151  004232  005037  001250                  CLR     RETRY           ;CLEHR THE RETRY COUNTER
1152
1153                                  ;CHECK THE TRACK JUST WRITTEN
1154
1155  004236  112737  000153  001356  CKTRK:  MOVB    #WCKHD,FMTDPB+2 ;SET WRITE CHECK HEADER & DATA COMMAND IN TBL
1156  004244  012737  004244  001110          MOV     #.,$LPERR       ;SETUP LOOP ON ERROR ADDRESS
1157  004252  012706  001100                  MOV     #STACK,SP       ;LOAD STACK POINTER
1158  004256  004037  013034          1$:     JSR     R0,RP04         ;GO CHECK THE TRACK JUST FORMATTED
1159  004262  001354                          FMTDPB                  ;ADRS OF PARAMETERS - TBL
1160  004264  000774                          BR      1$              ;WAIT FOR QUEUE IF FULL
1161  004266  005737  001372          2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
1162  004272  001775                          BEQ     2$              ;BRANCH IF NOT DONE
1163  004274  100112                          BPL     8$              ;BRANCH IF NO ERROR
1164  004276  113737  001312  001252          MOVB    RP.REG+RPDA,SAVSEC  ;GET THE SECTOR ADDRESS
1165  004304  001005                          BNE     3$              ;BRANCH IF NOT SECTOR 0
1166  004306  013737  001266  001252          MOV     MAXSEC,SAVSEC   ;RESTORE TO LAST SECTOR +1
1167  004314  005237  001252                  INC     SAVSEC          ;INCREMENT TO LAST SECTOR +1
1168  004320  005337  001252          3$:     DEC     SAVSEC          ;ADJUST SECTOR TO THE ONE THAT FAILED
1169  004324  012737  004570  001160          MOV     #10$,$ESCAPE    ;;ESCAPE TO 10$ ON ERROR
1170  004332  004737  005234                  JSR     PC,ERINDX       ;SEE WHICH ERROR
1171  004336  104010                          ERROR   10              ;DRIVE OFFLINE
1172  004340  104011                          ERROR   11              ;PERSISTENT DRIVE UNSAFE ERROR
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1173  004342  104012                          ERROR   12              ;UNCORRECTABLE MASSBUS PARITY ERROR
1174  004344  104013                          ERROR   13              ;SOFTWARE TIMEOUT
1175  004346  104014                          ERROR   14              ;DRIVE UNSAFE ERROR
1176  004350  032737  040000  001314          BIT     #WCE,RP.REG+RPCS2  ;WRITE CHECK ERROR ?
1177  004356  001005                          BNE     4$              ;BR IF SET
1178  004360  033727  001320                  BIT     RP.REG+RPER1,(PC)+  ;CHECK FOR DATA ERRORS
1179  004364  130620                          .WORD   DCK!OPI!DTE!HCRC!HCE!FER  ;DATA ERROR BITS
1180  004366  001001                          BNE     4$              ;BR IF SET
1181  004370  104016                          ERROR   16              ;CONTROLLER/DRIVE ERROR DURING WRITE CHECK
1182  004372  005737  001220          4$:     TST     MODE            ;FORMAT OR CHECK MODE ?
1183  004376  001407                          BEQ     5$              ;BR IF CHECK
1184  004400  005737  001216                  TST     SOFSW           ;RETRYING THE SECTOR ?
1185  004404  001404                          BEQ     5$              ;BR IF NOT
1186  004406  012737  004612  001160          MOV     #11$,$ESCAPE    ;;ESCAPE TO 11$ ON ERROR
1187  004414  104017                          ERROR   17              ;SECTOR NOT ACCEPTABLE
1188  004416  005037  001160          5$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
1189  004422  032737  040000  001316          BIT     #ERR,RP.REG+RPDS  ;DATA ERROR ?
1190  004430  001002                          BNE     6$              ;BR IF IT IS
1191  004432  104024                          ERROR   24              ;WRITE CHECK ERROR
1192  004434  000401                          BR      7$              ;CONTINUE
1193  004436  104020                  6$:     ERROR   20              ;DATA ERROR DURING WRITE CHECK
1194  004440  013701  001252          7$:     MOV     SAVSEC,R1       ;FAILING SECTOR ADDRESS
1195  004444  113737  001252  001364          MOVB    SAVSEC,FMTDPB+10  ;SECTOR ADDRESS
1196  004452  006301                          ASL     R1              ;SETUP INDEX TO ADDRESS WORDS
1197  004454  016137  001476  001362          MOV     ADRTBL(R1),FMTDPB+6  ;BUFFER ADDRESS FOR FAILING SECTOR
1198  004462  013746  001260                  MOV     MWC,-(SP)       ;GET MAXIMUM WORD COUNT VALUE (2'S COMP)
1199  004466  066116  001552                  ADD     WCTBL(R1),(SP)  ;ADD WORD COUNT THROUGH FAILING SECTOR
1200  004472  012637  001254                  MOV     (SP)+,SAVWC     ;STORE WORD COUNT FOR REMAINDER OF TRACK
1201  004476  005737  001220                  TST     MODE            ;FORMAT OR CHECK MODE ?
1202  004502  001421                          BEQ     9$              ;BR IF CHECK
1203  004504  012737  177374  001360          MOV     #-260.,FMTDPB+4 ;WORD COUNT FOR 1 SECTOR
1204  004512  005237  001216                  INC     SOFSW           ;INDICATE THAT A RETRY IS IN PROGRESS
1205  004516  000137  004116                  JMP     WRTRK2          ;REFORMAT ERROR SECTOR
1206  004522  005737  001216          8$:     TST     SOFSW           ;RETRY IN PROGRESS ?
1207  004526  001431                          BEQ     11$             ;BR IF NOT
1208  004530  022737  000002  001216          CMP     #2,SOFSW        ;SEE IF LAST RETRY
1209  004536  001403                          BEQ     9$              ;BR IF IT IS
1210  004540  005237  001216                  INC     SOFSW           ;INCREMENT RETRY COUNT
1211  004544  000644                          BR      1$              ;READ AGAIN
1212  004546  123737  001266  001364  9$:     CMPB    MAXSEC,FMTDPB+10  ;SEE IF LAST SECTOR ON THE TRACK
1213  004554  001416                          BEQ     11$             ;BR IF IT IS
1214  004556  004737  005554                  JSR     PC,SCAWC        ;SETUP TO CHECK REMAINING SECTORS ON THE TRACK
1215  004562  005037  001216                  CLR     SOFSW           ;CLEAR RETRY COUNTER
1216  004566  000633                          BR      1$              ;FINISH CHECKING THE TRACK
1217  004570  004737  005334          10$:    JSR     PC,LOP.CK       ;CHECK FOR LOOP ON ERROR
1218  004574  022737  000003  001250          CMP     #3,RETRY        ;ERROR RETRY REACHED ?
1219  004602  001403                          BEQ     11$             ;BR IF IT IS
1220  004604  005237  001250                  INC     RETRY           ;COUNT THE RETRY
1221  004610  000622                          BR      1$              ;DO THE WRITE CHECK AGAIN
1222  004612  005037  001160          11$:    CLR     $ESCAPE         ;CLEAR THE ERROR RETURN ESCAPE ADDRESS
1223  004616  005037  001250                  CLR     RETRY           ;CLEAR THE RETRY COUNTER
1224  004622  032777  000002  174310          BIT     #BIT1,@SWR      ;LOOP ON CURRENT TRACK ?
1225  004630  001402                          BEQ     12$             ;BR IF NOT
1226  004632  000137  004060                  JMP     WRTRK1          ;START AGAIN ON THE SAME TRACK
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1227  004636  004737  005472          12$:    JSR     PC,TRKTST       ;GET UPDATED TRACK AND CYLINDER ADDRESSES
1228  004642  000402                          BR      HDREAD          ;RETURN HERE IF DONE - DO QUICK CHECK OF DISK
1229  004644  000137  004060                  JMP     WRTRK1          ;CONTINUE WITH THE FORMAT
1230
1231                                          ;THIS CODE MAKES SURE EACH CYLINDER FORMATTED CONTAINS THE
1232                                          ;PROPER CYLINDER ADDRESS. THE PROGRAM IS LOOKING FOR
1233                                          ;POSSIBLE POSITIONER ERRORS THAT MAY HAVE OCCURRED DURING THE FORMAT.
1234
1235  004650  005037  001262          HDREAD: CLR     HEDERR          ;CLEAR HEADER CHECK ERROR INDICATOR
1236  004654  004737  005402                  JSR     PC,SETTBL       ;GO SET UP DRIVER TABLE
1237  004660  004737  005602                  JSR     PC,SETHDR       ;GO SET UP HEADERS IN CORE
1238  004664  013737  001224  001246          MOV     BEGCYL,CYLCK    ;USE 'BEGCYL' FOR FORMAT VERIFICATION
1239  004672  012737  177774  001360          MOV     #-4,FMTDPB+4    ;SET UP WORD COUNT
1240  004700  012737  025120  001362          MOV     #RBUF,FMTDPB+6  ;SET UP BUFFER ADRS
1241  004706  005037  001364                  CLR     FMTDPB+10       ;CLEAR THE SECTOR & TRACK ADDRESS FIELD
1242  004712  013737  001224  001366          MOV     BEGCYL,FMTDPB+12  ;SETUP THE CYLINDER FIELD
1243  004720  112737  000173  001356          MOVB    #RDHD,FMTDPB+2  ;SET UP READ HEADER & DATA COMMAND
1244  004726  012737  004726  001110          MOV     #.,$LPERR       ;SETUP LOOP ON ERROR ADDRESS
1245  004734  012706  001100                  MOV     #STACK,SP       ;LOAD STACK POINTER
1246  004740  004037  013034          1$:     JSR     R0,RF04         ;GO READ HEADER
1247  004744  001354                          FMTDPB                  ;ADRS OF PARAMETER TBL
1248  004746  000774                          BR      1$              ;WAIT IF QUEUE IS FULL
1249  004750  005737  001372          2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
1250  004754  001775                          BEQ     2$              ;BRANCH IF NOT DONE
1251  004756  100024                          BPL     4$              ;BR IF NOT ERROR
1252  004760  012737  005042  001160          MOV     #5$,$ESCAPE     ;;ESCAPE TO 5$ ON ERROR
1253  004766  004737  005234                  JSR     PC,ERINDX       ;SEE WHICH ERROR
1254  004772  104010                          ERROR   10              ;DRIVE OFFLINE
1255  004774  104011                          ERROR   11              ;PERSISTENT DRIVE UNSAFE ERROR
1256  004776  104012                          ERROR   12              ;UNCORRECTABLE MASSBUS PARITY ERROR
1257  005000  104013                          ERROR   13              ;SOFTWARE TIMEOUT
1258  005002  104014                          ERROR   14              ;DRIVE UNSAFE ERROR
1259  005004  032737  177577  001372          BIT     #1C<HCE>,FMTDPB+6  ;IS ONLY ERROR A HEADER COMPARE ERROR ?
1260  005012  001401                          BEQ     3$              ;BR IF YES
1261  005014  104021                          ERROR   21              ;CONTROLLER/DRIVE ERROR VERIFYING HEADERS
1262  005016  005037  001160          3$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
1263  005022  104022                          ERROR   22              ;HEADER COMPARE ERROR VERIFYING HEADERS
1264  005024  004737  005334                  JSR     PC,LOP.CK       ;CHECK FOR LOOP ON ERROR
1265  005030  023737  025120  025130  4$:     CMP     RBUF,BUFP       ;SEE IF CYL READ EQUALS CYL EXPECTED
1266  005036  001403                          BEQ     6$              ;BR IF CYL CORRECT
1267  005040  104023                          ERROR   23              ;CYLINDER NOT CORRECT
1268  005042  004737  005334          5$:     JSR     PC,LOP.CK       ;CHECK FOR LOOP ON ERROR
1269  005046  023737  001222  001246  6$:     CMP     ENDCYL,CYLCK    ;SEE IF LAST CYLINDER
1270  005054  001002                          BNE     7$              ;BR IF NOT FINISHED
1271  005056  000137  005100                  JMP     $EOP            ;END OF FORMAT
1272  005062  005237  001246          7$:     INC     CYLCK           ;INCREMENT CYLINDER ADDRESS BEING CHECKED
1273  005066  004737  005662                  JSR     PC,UPDACY       ;SET UP FOR NEXT CYL
1274  005072  005237  001366                  INC     FMTDPB+12       ;ADVANCE TO NEXT CYL #
1275  005076  000720                          BR      1$              ;GO READ NEXT HEADER
1276
1277                                          .SBTTL  END OF PASS ROUTINE
1278
1279                                          ;;*****************************************************************
1280                                          ;*INCREMENT THE PASS NUMBER ($PASS)
```

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1281                                    ;*IF THERES A MONITOR GO TO IT
1282                                    ;*IF THERE ISN'T JUMP TO DONE
1283
1284  005100                            $EOP:
1285  005100  005737  001220                   TST     MODE            ;'FORMAT' OR 'CHECK' MODE ^
1286  005104  001403                           BEQ     3$              ;BR IF 'CHECK'
1287  005106  104401  021764                   TYPE    ,MFCMPT         ;'FORMAT COMPLETE'
1288  005112  000402                           BR      4$              ;FINISH THE END MESSAGE
1289  005114  104401  022011           3$:     TYPE    ,MCCMPT         ;'CHECK COMPLETE'
1290  005120  104401  022035           4$:     TYPE    ,NUMERR         ;'TOTAL ERRORS DETECTED: '
1291  005124  013746  001112                   MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
1292  005130  104405                           TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
1293  005132  104401  001167                   TYPE    ,$CRLF          ;CR-LF
1294  005136  005237  001100                   INC     $PASS           ;;INCREMENT THE PASS NUMBER
1295  005142  042737  100000  001100           BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
1296  005150  005327                           DEC     (PC)+           ;;LOOP?
1297  005152  000001           $EOPCT: .WORD   1
1298  005154  003013                           BGT     $DOAGN          ;;YES
1299  005156  012737                           MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
1300  005160  000001           $ENDCT: .WORD   1
1301  005162  005152                           $EOPCT
1302  005164  013700  000042           $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
1303  005170  001405                           BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
1304  005172  000005                           RESET                   ;;CLEAR THE WORLD
1305  005174  004710           $ENDAD: JSR     PC,(R0)                 ;;GO TO MONITOR
1306  005176  000240                           NOP                     ;;SAVE ROOM
1307  005200  000240                           NOP                     ;;FOR
1308  005202  000240                           NOP                     ;;ACT11
1309  005204                           $DOAGN:
1310  005204  000137                           JMP     @(PC)+          ;;RETURN
1311  005206  005210           $RTNAD: .WORD   DONE
1312  005210  032777  000001  173722  DONE:   BIT     #SW0,@SWR       ;SEE IF SWR 0 SET
1313  005216  001002                           BNE     1$              ;BR IF SET
1314  005220  000137  003116                   JMP     M0              ;ASK FOR NEXT DRIVE
1315  005224  012706  001100           1$:     MOV     #STACK,SP       ;RESET STACK POINTER
1316  005230  000137  003526                   JMP     M5              ;DO THE FORMAT OR CHECK AGAIN
1317
1318                                    ;;*****************************************************************
1319
1320                                    .SBTTL  SUPPORT SUBROUTINES
1321
1322                                    ;;*****************************************************************
1323
1324                                    ;THIS ROUTINE DETERMINES THE ERROR TYPE
1325
1326  005234  010146           ERINDX: MOV     R1,-(SP)        ;STORE R1
1327  005236  005001                   CLR     R1              ;CLEAR R1
1328  005240  033727  001372           BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
1329  005244  060006                   .WORD   BIT14!BIT13!BIT2!BIT1  ;DRIVE OFFLINE
1330  005246  001025                   BNE     5$              ;BR IF OFFLINE
1331  005250  033727  001372           BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
1332  005254  010000                   .WORD   BIT12           ;DRIVE PERSISTENTLY UNSAFE
1333  005256  001020                   BNE     4$              ;BR IF UNSAFE
1334  005260  033727  001372           BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
```

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                                                        ;UNCORRECTABLE MASSBUS PARITY ERROR ?
005264  006000                          .WORD   BIT11!BIT10
005266  001013                          BNE     3$              ;BR IF PARITY ERROR
005270  033727  001372                  BIT     @MTDPB+16,(PC)+ ;CHECK ERROR TYPE
005274  001000                          .WORD   BIT09!BIT08     ;SOFTWARE TIMEOUT ?
005276  001006                          BNE     2$              ;BR IF YES
005300  033727  001372                  BIT     @MTDPB+16,(PC)+ ;CHECK ERROR TYPE
005304  000020                          .WORD   BIT04           ;DRIVE UNSAFE ERROR ?
005306  001001                          BNE     1$              ;BR IF YES
005310  005201                          INC     R1              ;INCREMENT THE RETURN INDEX
005312  005201          1$:             INC     R1              ;INCREMENT THE RETURN INDEX
005314  005201          2$:             INC     R1              ;INCREMENT THE RETURN INDEX
005316  005201          3$:             INC     R1              ;INCREMENT THE RETURN INDEX
005320  005201          4$:             INC     R1              ;INCREMENT THE RETURN INDEX
005322  006301          5$:             ASL     R1              ;DOUBLE THE INCREMENT
005324  060166  000002                  ADD     R1,2(SP)        ;DEVELOP THE RETURN ADDRESS
005330  012601                          MOV     (SP)+,R1        ;RESTORE R1
005332  000207                          RTS     PC              ;RETURN

                        ;ROUTINE TO CHECK FOR LOOP ON ERROR

005334  032777  001000  173576  LOP.CK: BIT     #SW09,@SWR      ;LOOP ON ERROR ?
005342  001402                          BEQ     1$              ;BR IF NOT
005344  000177  173540                  JMP     @$LPERR         ;GO TO THE LOOP ON ERROR ADDRESS
005350  005037  001162          1$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
005354  033727  001372                  BIT     @MTDPB+16,(PC)+ ;CHECK FOR 'FATAL' ERROR
005360  072002                          .WORD   BIT14!BIT13!BIT12!BIT10!BIT01  ;'FATAL' ERROR BITS
005362  001004                          BNE     2$              ;BR IF NOT
005364  032737  004000  001320          BIT     #WLE,RP.REG+RPER1  ;WRITE LOCK ERROR ?
005372  001402                          BEQ     3$              ;BR IF NOT
005374  000137  005100          2$:     JMP     $EOP            ;TERMINATE THE FORMAT
005400  000207          3$:     RTS     PC              ;RETURN

                        ;THIS ROUTINE SETS UP THE INPUT TABLE FOR THE DRIVER ROUTINE

005402  113737  001214  001354  SETTBL: MOVB    DRIVE,@MTDPB    ;SET UP DRIVE #
005410  105037  001357                  CLRB    @MTDPB+3        ;CLEAR HIGH ORDER ADRS BITS
005414  013737  001260  001360          MOV     MWC,@MTDPB+4    ;LOAD UP WORD COUNT
005422  012737  025130  001362          MOV     #BUFP,@MTDPB+6  ;LOAD UP CURRENT ADRS
005430  105037  001364                  CLRB    @MTDPB+10       ;SET SECTOR TO ZERO
005434  113737  001230  001365          MOVB    BEGTRK,@MTDPB+11  ;SET UP STARTING TRK ADRS
005442  013737  001224  001366          MOV     BEGCYL,@MTDPB+12  ;SET UP STARTING CYL
005450  005037  001372                  CLR     @MTDPB+16       ;CLEAR RP04 STATUS
005454  013737  001230  001236          MOV     BEGTRK,TRKCNT   ;SET UP PARTIAL CYL TRACK COUNT
005462  013737  001232  001234          MOV     TTRKS,TTRKSC    ;SET UP TOTAL TRACKS COUNTER
005470  000207                          RTS     PC              ;RETURN FROM SETUP

                        ;THIS ROUTINE CONTROLS THE DISK ADDRESSING AND TOTAL TRK COUNT
                        ;IT IS ENTERED AFTER EVERY TRK OPERATION

005472  005337  001234  TRKTST: DEC     TTRKSC          ;SEE IF LAST TRACK
005476  001425                  BEQ     3$              ;BRANCH IF LAST TRACK
005500  022737  000022  001236          CMP     #18.,TRKCNT     ;IS THIS THE LAST TRACK IN THE CYLINDER ?
005506  001407                  BEQ     1$              ;BRANCH IF SO
005510  005237  001236                  INC     TRKCNT          ;COUNT UP TRACK WITHIN CYLINDER
```

```
1389  005514  105237  001365                  INCB    FMTDPB+11       ;INCREMENT TRACK NUMBER
1390  005520  004737  005712                  JSR     PC,UPDATK       ;UPDATE TRACK ADDRESS IN BUFFER
1391  005524  000410                          BR      2$              ;EXIT
1392  005526  005037  001236          1$:     CLR     TRKCNT          ;CLEAR TRACK COUNT FOR NEXT CYLINDER
1393  005532  105037  001365                  CLRB    FMTDPB+11       ;RESET TRACK ADDRESS TO 0
1394  005536  005237  001366                  INC     FMTDPB+12       ;UPDATE CYLINDER NUMBER
1395  005542  004737  005662                  JSR     PC,UPDACY       ;UPDATE CYLINDER NUMBER IN BUFFER
1396  005546  062716  000002          2$:     ADD     #2,(SP)         ;ADD TWO TO RETURN ADRS
1397  005552  000207                  3$:     RTS     PC              ;RETURN
1398
1399                                          ;THIS ROUTINE SETS UP WC & BA FOR REMAINING SECTORS
1400                                          ;AFTER A WRITE CHECK ERROR
1401
1402  005554  013737  001254  001360  SCAWC:  MOV     SAVWC,FMTDPB+4  ;SET UP WC FOR REMAINING SECTORS
1403  005562  062737  001010  001362          ADD     #520.,FMTDPB+6  ;SET UP BA FOR REMAINING SECTORS
1404  005570  005237  001364                  INC     FMTDPB+10       ;ADVANCE TO NEXT SECTOR IN TBL
1405  005574  005037  001216                  CLR     SOFSW           ;RESET RETRY COUNTER
1406  005600  000207                          RTS     PC              ;RETURN TO COMPLETE TRK FORMAT
1407
1408
1409                                          ;THIS ROUTINE SETS UP THE CYLINDER ADRS, FORMAT BIT, TRACK AND
1410                                          ;SECTOR ADRS IN MEMORY WITH THE STARTING CYL - TRK INFORMATION
1411
1412  005602  013701  001266          SETHDR: MOV     MAXSEC,R1       ;SET UP SECTOR COUNT
1413  005606  012700  025130                  MOV     #BUFP,R0        ;SET UP HEADER POINTER IN R0
1414  005612  013702  001224                  MOV     BEGCYL,R2       ;PUT STARTING CYL # IN R2
1415  005616  013703  001230                  MOV     BEGTRK,R3       ;PUT STARTING TRK # IN R3
1416  005622  000303                          SWAB    R3              ;JUSTIFY TRACK ADRS
1417  005624  005737  001254                  TST     SEC20           ;SEE IF 20 OR 22 SECTOR MODE
1418  005630  001402                          BEQ     1$              ;BR IF 20 SECTOR MODE
1419  005632  052702  010000                  BIS     #10000,R2       ;SET THE 22 SECTOR FORMAT BIT
1420  005636  010220          1$:     MOV     R2,(R0)+        ;WRITE IN HEADER AREA OF CORE THE CYL ADRS
1421  005640  010320                  MOV     R3,(R0)+        ;WRITE IN HEADER AREA OF CORE THE TRK ADRS
1422  005642  005020                  CLR     (R0)+           ;CLR 1ST KEYWORD
1423  005644  005010                  CLR     (R0)            ;CLR 2ND KEYWORD
1424  005646  062700  001002                  ADD     #514.,R0        ;SET UP FOR NEXT HEADER
1425  005652  005203                  INC     R3              ;UPDATE SECTOR ADRS FOR NEXT HEADER
1426  005654  005301                  DEC     R1              ;MAINTAIN COUNT OF SECTORS
1427  005656  002367                  BGE     1$              ;BRANCH IF NOT LAST SECTOR
1428  005660  000207                  RTS     PC              ;EXIT - HEADERS ARE LOADED INTO CORE
1429
1430                                          ;THIS ROUTINE UPDATES THE CYLINDER ADRS OF THE HEADER WORDS IN CORE
1431
1432  005662  013701  001266          UPDACY: MOV     MAXSEC,R1       ;SET UP SECTOR COUNT
1433  005666  012700  025130                  MOV     #BUFP,R0        ;SET UP HEADER POINTER IN R0
1434  005672  005220          1$:     INC     (R0)+           ;INCREMENT FOR NEXT CYLINDER
1435  005674  042710  177400                  BIC     #177400,(R0)    ;RESET TRK ADRS TO 0
1436  005700  062700  001006                  ADD     #518.,R0        ;SET UP FOR NEXT HEADER
1437  005704  005301                  DEC     R1              ;COUNT SECTORS
1438  005706  002371                  BGE     1$              ;BRANCH IF NOT LAST SECTOR
1439  005710  000207                  RTS     PC              ;EXIT
1440
1441                                          ;THIS ROUTINE UPDATES THE TRACK ADRS OF THE HEADER WORDS IN CORE
1442
```

```
                                ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
                                ;
005742  012737  006020  000004  ST.CLK: MOV     #STCLK1,@#ERRVEC  ;SET UP VECTOR FOR P CLK
005750  005037  000006          CLR     @#ERRVEC+2      ;NEW PSW
005754  005777  173216          TST     @#LKCSR         ;CHECK FOR KW11-P
005760  013746  001202          MOV     #LPVEC,-(SP)    ;VECTOR ADDRESS
005764  012776  006104  000000  MOV     #CLOCK,@(SP)    ;SET UP KW11-P VECTOR
005772  062716  000002          ADD     #2,(SP)         ;POINT TO PSW
005776  012736  000300          MOV     #PR6,@(SP)+     ;PSW - PRI 6
006002  012777  177777  173170  MOV     #-1,@#LKCSB     ;LOAD COUNTER BUFFER
006010  012777  000135  173160  MOV     #135,@#LKCSR    ;SET CLK - CNT UP
006016  000426                  BR      STCLK3
006020  062706  000004          STCLK1: ADD     #4,SP           ;RESTORE THE STACK POINTER
006024  012737  006070  000004  MOV     #STCLK2,@#ERRVEC        ;CHANGE ERROR VECTOR
006032  005777  173150          TST     @#LKS           ;LOOK FOR KW11-L
006036  013746  001210          MOV     #LLVEC,-(SP)    ;KW11-L VECTOR ADDRESS
006042  012776  006104  000000  MOV     #CLOCK,@(SP)    ;SET UP KW11-L VECTOR
006050  062716  000002          ADD     #2,(SP)         ;INCREMENT VECTOR ADDRESS
006054  012736  000300          MOV     #PR6,@(SP)+     ;PSW - PRI 6
006060  012777  000100  173120  MOV     #100,@#LKS      ;SET KW11-L INTERRUPT ENABLE
006066  000402                  BR      STCLK3
006070  062706  000004          STCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
006074  012737  000006  000004  STCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
006102  000207                  RTS     PC
                                ;
                                ;THIS CODE SERVICES A CLOCK INTERRUPT EVERY 16MS
                                ;
006104  012746  000020          CLOCK:  MOV     #16.,-(SP)      ;PUT MILLISECONDS ON THE STACK
006110  004737  016466          JSR     PC,RPTMR        ;GO REPORT TIME
006114  000002                  RTI                     ;RETURN AND CONTINUE
                                ;
                                ;ROUTINE TO INTERCEPT 'CONTROL C' TYPED DURING PARAMETER ENTRY TIME
                                ;
006116  012706  001100          CENTER: MOV     #STACK,SP       ;INITIALIZE THE STACK
006122  005737  012160          1$:     TST     TRNSWT          ;ALL ACTIVITY STOPPED ?
006126  001375                  BNE     1$              ;BR IF NOT
006130  000005                  RESET                   ;CLEAR THE BUS
006132  000137  003062          JMP     M1B             ;START AGAIN WITH DRIVE SELECTION
                                ;
                                ;ROUTINE TO TYPE THE PRESENT DISK ADDRESS.  ENTERED BY TYPING 'CONTROL C'
                                ;
006136  005037  177776          TYPADR: CLR     PSW             ;SET PROCESSOR TO PRIORITY 0
006142  012737  006116  001300  MOV     #CENTER,CNTLC   ;CHANGE 'CONTROL C' RETURN ADDRESS
006150  104401  022065          TYPE    ,ADDRIS         ;'PRESENT ADDRESS IS:'
006154  104401  022075          TYPE    ,C              ;'C'
```

```
 1497  006160  013746  001366                MOV     FMTDPB+12.,-(SP)  ;PUT THE CYLINDER ADDRESS ON THE STACK
 1498  006164  004737  011470                JSR     PC,$S82D          ;CONVERT IT TO DECIMAL
 1499  006170  004737  011430                JSR     PC,$SJPRS         ;TYPE IT
 1500  006174  104401  020705                TYPE    .LINSP            ;SPACES
 1501  006200  104401  020[..                TYPE    .T                ;'T'
 1502  006204  005046                        CLR     -(SP)             ;CLEAR THE STACK
 1503  006206  113716  001365                MOVB    FMTDPB+11.(SP)    ;PUT THE TRACK ADDRESS ON THE STACK
 1504  006212  004737  011470                JSR     PC,$S82D          ;CONVERT IT TO DECIMAL
 1505  006216  004737  011430                JSR     PC,$SJPRS         ;TYPE IT
 1506  006222  104401  001167                TYPE    .$CRLF            ;CR-LF
 1507  006226  012737  006136  001300        MOV     #TYPADR,CNTLC     ;RESTORE ENTRANCE TO THIS ROUTINE
 1508  006234  000002                        RTI                       ;RETURN
 1509
 1510                                  ;PARAMETER ENTRY ROUTINE
 1511                                  ;CALL
 1512                                  ;       MOV     #ADR,R3           ;PARAMETER TABLE ADDRESS
 1513                                  ;       JSR     PC,PARENT         ;GET THE PARAMETERS
 1514
 1515  006236  010346                  PARENT: MOV     R3,-(SP)          ;SAVE R3
 1516  006240  012703  001374                  MOV     #TABLE,R3         ;PARAMETER TABLE ADDRESS
 1517  006244  012337  006254          1$:     MOV     (R3)+,3$          ;ADDRESS OF PARAMETER NAME
 1518  006250  001436                          BEQ     9$                ;BR IF AT END OF TABLE
 1519  006252  104401                          TYPE                      ;TYPE THE PARAMETER NAME
 1520  006254  000000                  3$:     .WORD   0                 ;ADDRESS OF PARAMETER NAME TEXT
 1521  006256  012302                          MOV     (R3)+,R2          ;MAXIMUM PARAMETER VALUE
 1522  006260  012305                          MOV     (R3)+,R5          ;ADDRESS OF PARAMETER
 1523  006262  011546                          MOV     (R5),-(SP)        ;CURRENT VALUE OF PARAMETER
 1524  006264  104405                          TYPDS                     ;TYPE THE CURRENT VALUE OF THE PARAMETER
 1525  006266  104401  020671                TYPE    .SLASH            ;'/'
 1526  006272  104411                          RDLIN                     ;READ THE KEYBOARD
 1527  006274  012601                          MOV     (SP)+,R1          ;INPUT ASCII STRING ADDRESS
 1528  006276  004537  006500                JSR     R5,CK.DIG         ;CHECK THE DIGIT(S)
 1529  006302  006244                          1$                        ;CARRIAGE RETURN ONLY ENTERED
 1530  006304  006346                          9$                        ;PERIOD ONLY ENTERED
 1531  006306  006322                          6$                        ;ILLEGAL INPUT
 1532  006310  006316                          5$                        ;TERMINATED WITH A CARRIAGE RETURN
 1533  006312  006322                          5$                        ;TERMINATED WITH A ","
 1534  006314  006334                          7$                        ;TERMINATED WITH A "."
 1535  006316  010215                  5$:     MOV     R2,(R5)           ;MOVE NEW VALUE TO PARAMETER LOCATION
 1536  006320  000751                          BR      1$                ;GET MORE PARAMETERS
 1537  006322  104401  021436          6$:     TYPE    .BADENT           ;'BAD ENTRY'
 1538  006326  162703  000006                  SUB     #6,R3             ;DECREMENT THE TABLE POINTER
 1539  006332  000744                          BR      1$                ;TRY AGAIN
 1540  006334  010215                  7$:     MOV     R2,(R5)           ;NEW VALUE
 1541  006336  000403                          BR      9$                ;EXIT
 1542  006340  012703  001374          8$:     MOV     #TABLE,R3         ;RELOAD THE PARAMETER TABLE ADDRESS
 1543  006344  000737                          BR      1$                ;TRY AGAIN
 1544  006346  012603                  9$:     MOV     (SP)+,R3          ;RESTORE R3
 1545  006350  000207                          RTS     PC                ;RETURN
 1546
 1547
 1548                                  ;THIS ROUTINE IS USED TO CHECK IF AN
 1549                                  ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
 1550                                  ;CALL
```

```
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                        ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
                                        ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
                                        ;       RETURN2                 ;CHARACTER IS IN R2 AS A
                                        ;                               ;OCTAL DIGIT

006352  121127  000060        CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
006356  103407                  BLO     1$              ;YES -- BRANCH
006360  121127  000067          CMPB    (R1),#'7        ;GREATER THAN SEVEN?
006364  101004                  BHI     1$              ;YES -- BRANCH
006366  111102                  MOVB    (R1),R2         ;GET THE CHARACTER
006370  042702  177770          BIC     #^C7,R2         ;STRIP AWAY THE ASCII
006374  005725                  TST     (R5)+           ;ADJUST FOR RETURN
006376  000205          1$:     RTS     R5              ;RETURN

                                ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
                                ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                ;       JSR     R5,CK.DEC       ;CHECK THE CHARACTER
                                ;       RETURN1                 ;NOT BETWEEN 0 AND 9
                                ;       RETURN2                 ;BETWEEN 0 AND 9
                                ;                               ;R2 = DIGIT

006400  121127  000060        CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
006404  103407                  BLO     1$              ;YES -- BRANCH
006406  121127  000071          CMPB    (R1),#'9        ;GREATER THAN NINE?
006412  101004                  BHI     1$              ;YES -- BRANCH
006414  111102                  MOVB    (R1),R2         ;GET THE CHARACTER
006416  042702  000060          BIC     #'0,R2          ;STRIP AWAY THE ASCII
006422  005725                  TST     (R5)+           ;ADJUST FOR RETURN
006424  000205          1$:     RTS     R5              ;RETURN

                                ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
                                ;DETERMINE WHAT IT IS.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                ;       JSR     R5,CK.CHR       ;CHECK CHARACTER
                                ;       RETURN  ADR1            ;UNKNOWN CHARACTER
                                ;       RETURN  ADR2            ;CARRIAGE RETURN * .R1.=ADR+1
                                ;       RETURN  ADR3            ;COMMA * (R1)=ADR+1
                                ;       RETURN  ADR4            ;PERIOD * (R1)=ADR+1
                                ;       RETURN  ADR5            ;DIGIT BETWEEN 0 AND 7.
                                ;       RETURN  ADR6            ;DIGIT BETWEEN 8 AND 9.
                                ;                               ;R2 = DIGIT * (R1)=ADR+1

006426  105711          CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
006430  001417                  BEQ     3$              ;YES -- BRANCH
006432  121127  000054          CMPB    (R1),#',        ;"COMMA"?
006436  001413                  BEQ     2$              ;YES -- BRANCH
006440  121127  000056          CMPB    (R1),#'.        ;"PERIOD"?
006444  001407                  BEQ     1$              ;YES -- BRANCH
006446  004537  006400          JSR     R5,CK.DEC       ;"DIGIT"?
006452  000410                  BR      4$              ;NO -- BRANCH
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```
 1605  006454  004537  006352                 JSR     R5,CK.OCT       ;OCTAL ?
 1606  006460  005725                         TST     (R5)+           ;DIGIT BETWEEN 8-9
 1607  006462  005725                         TST     (R5)+           ;DIGIT BETWEEN 0-7
 1608  006464  005725                 1$:     TST     (R5)+           ;PERIOD
 1609  006466  005725                 2$:     TST     (R5)+           ;COMMA
 1610  006470  005725                 3$:     TST     (R5)+           ;CARRIAGE RETURN
 1611  006472  005201                         INC     R1              ;MOVE POINTER TO NEXT CHARACTER
 1612  006474  011505                 4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
 1613  006476  000205                         RTS     R5              ;RETURN
 1614
 1615                                 ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
 1616                                 ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
 1617                                 ;CALL
 1618                                 ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
 1619                                 ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
 1620                                 ;       JSR     R5,CK.DIG       ;CHECK DIGITS
 1621                                 ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2=0
 1622                                 ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2=0
 1623                                 ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
 1624                                 ;       RETURN  ADR4            ;"CR" -- R2 = NUMBER
 1625                                 ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
 1626                                 ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
 1627
 1628  006500  010446                 CK.DIG: MOV     R4,-(SP)        ;SAVE R4
 1629  006502  010346                         MOV     R3,-(SP)        ;SAVE R3
 1630  006504  010246                         MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
 1631  006506  005002                         CLR     R2              ;START WITH 0
 1632  006510  005003                         CLR     R3
 1633  006512  005004                         CLR     R4
 1634  006514  004537  006426                 JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
 1635  006520  006614                         6$                      ;ILLEGAL CHARACTER
 1636  006522  006622                         9$                      ;CARRIAGE RETURN
 1637  006524  006614                         6$                      ;","
 1638  006526  006616                         7$                      ;"."
 1639  006530  006534                         1$                      ;DIGIT 0-7
 1640  006532  006534                         1$                      ;DIGIT 8-9
 1641  006534  062705  000004         1$:     ADD     #4,R5           ;STEP RETURN POINTER PAST "CR" & "PERIOD" RETURNS
 1642  006540  006303                 2$:     ASL     R3              ;INPUT NUMBER *2
 1643  006542  010346                         MOV     R3,-(SP)        ;SAVE *2
 1644  006544  006303                         ASL     R3              ;*4
 1645  006546  006303                         ASL     R3              ;*8
 1646  006550  062603                         ADD     (SP)+,R3        ;(*2)+(*8) = *10
 1647  006552  060203                         ADD     R2,R3           ;UPDATE THE INPUT NUMBER
 1648  006554  004537  006426                 JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
 1649  006560  006620                         8$                      ;ILLEGAL CHARACTER
 1650  006562  006604                         5$                      ;CARRIAGE RETURN
 1651  006564  006602                         4$                      ;","
 1652  006566  006574                         3$                      ;"."
 1653  006570  006540                         2$                      ;DIGIT 0-7
 1654  006572  006540                         2$                      ;DIGIT 8-9
 1655  006574  105711                 3$:     TSTB    (R1)            ;DOES A "CR" FOLLOW THE "PERIOD"
 1656  006576  001010                         BNE     8$              ;BR IF NOT
 1657  006600  005724                         TST     (R4)+           ;INCREMENT THE RETURN
 1658  006602  005724                 4$:     TST     (R4)+           ;INCREMENT THE RETURN
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```
 1659  006604  005724                5$:     TST     (R4)+           ;INCREMENT THE RETURN
 1660  006606  020316                        CMP     R3,(SP)         ;CHECK THE MAGNITUDE OF THE NUMBER
 1661  006610  101004                        BHI     9$              ;BR IF ENTERED NUMBER TOO LARGE
 1662  006612  000402                        BR      8$              ;BYPASS INCREMENT
 1663  006614  005725                6$:     TST     (R5)+           ;INCREMENT RETURN PAST INVALID RETURN
 1664  006616  005725                7$:     TST     (R5)+           ;INCREMENT RETURN
 1665  006620  060405                8$:     ADD     R4,R5           ;SETUP RETURN POINTER
 1666  006622  010302                9$:     MOV     R3,R2           ;ENTERED VALUE
 1667  006624  005726                        TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
 1668  006626  012603                        MOV     (SP)+,R3        ;RESTORE R3
 1669  006630  012604                        MOV     (SP)+,R4        ;RESTORE R4
 1670  006632  011505                        MOV     (R5),R5         ;GET RETURN ADDRESS
 1671  006634  000205                        RTS     R5              ;RETURN
 1672
 1673                                  .SBTTL  MACRO ROUTINES
 1674
 1675
 1676                                  .SBTTL  ERROR HANDLER ROUTINE
 1677
 1678                                  ;;*****************************************************************
 1679                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT.
 1680                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 1681                                  ;*AND GO TO TYPERR ON ERROR
 1682                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 1683                                  ;*SW15=1         HALT ON ERROR
 1684                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 1685                                  ;*SW10=1         BELL ON ERROR
 1686                                  ;*SW09=1         LOOP ON ERROR
 1687                                  ;*CALL
 1688                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 1689
 1690  006636                        $ERROR:
 1691  006636  104407                        CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 1692  006640  010137  001274                MOV     R1,@DRIVE       ;DRIVE ADDRESS IF DRIVE ERROR CALL
 1693  006644  010337  001276                MOV     R3,@ATTN        ;ATTENTION REGISTER CONTENTS
 1694  006650  013737  001366  001270        MOV     @MTDPB+12,DS.CYL  ;CURRENT CYLINDER ADDRESS
 1695  006656  113737  001365  001272        MOVB    @MTDPB+11,DS.TRK  ;REQUESTED TRACK ADDRESS
 1696  006664  005737  001310                TST     RP.REG+RPBA     ;NON-ZERO BUFFER ADDRESS ?
 1697  006670  001406                        BEQ     7$              ;BR IF NO BUFFER ADDRESS
 1698  006672  013746  001310                MOV     RP.REG+RPBA,-(SP)  ;BUFFER ADDRESS
 1699  006676  162716  000002                SUB     #2,(SP)         ;DECREMENT THE ADDRESS
 1700  006702  013637  001124                MOV     @(SP)+,$GDDAT   ;GET THE BUFFER WORD WHICH DIDN'T COMPARE
 1701  006706  105237  001103        7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 1702  006712  001775                        BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 1703  006714  013777  001102  172220        MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 1704  006722  032777  002000  172210        BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 1705  006730  001402                        BEQ     1$              ;;NO - SKIP
 1706  006732  104401  001162                TYPE    ,$BELL          ;;RING BELL
 1707  006736  005237  001112        1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 1708  006742  011637  001116                MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 1709  006746  162737  000002  001116        SUB     #2,$ERRPC
 1710  006754  117737  172136  001114        MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 1711  006762  032777  020000  172150        BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 1712  006770  001004                        BNE     EOS             ;;SKIP TYPEOUTS
```

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1713  006772  004737  007044                  JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
1714  006776  104401  001167                  TYPE    ,$CRLF
1715  007002                          20$:
1716  007002  005777  172132          2$:     TST     @SWR            ;;HALT ON ERROR
1717  007006  100002                          BPL     3$              ;;SKIP IF CONTINUE
1718  007010  000000                          HALT                    ;;HALT ON ERROR!
1719  007012  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
1720  007014  032777  001000  172116  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
1721  007022  001402                          BEQ     4$              ;;BR IF NO
1722  007024  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
1723  007030  005737  001160          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
1724  007034  001402                          BEQ     5$              ;;BR IF NONE
1725  007036  013716  001160                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
1726  007042                          5$:
1727  007042  000002                          RTI                     ;;RETURN
1728
1729
1730                                    ;THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
1731                                    ;WHICH ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE "ERROR
1732                                    ;TABLE" ($ERRTB), AND REPORTS THE APPROPIATE INFORMATION
1733                                    ;CONCERNING THE ERROR.
1734
1735  007044  104412                  TYPERR: SAVREG                  ;SAVE R0-R5
1736  007046  005000                          CLR     R0              ;CLEAR R0 FOR ERROR NUMBER
1737  007050  113700  001114                  MOVB    $ITEMB,R0       ;ERROR NUMBER
1738  007054  005300                          DEC     R0              ;FORM INDEX FOR ERROR TABLE
1739  007056  006300                          ASL     R0
1740  007060  006300                          ASL     R0
1741  007062  006300                          ASL     R0
1742  007064  062700  001626          1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS
1743  007070  012037  007104                  MOV     (R0)+,2$        ;GET ERROR MESSAGE (EM) POINTER
1744  007074  001404                          BEQ     3$              ;BRANCH IF THERE ISN'T ONE
1745  007076  104401  001167                  TYPE    ,$CRLF          ;"CARRIAGE RETURN - LINE FEED
1746  007102  104401                          TYPE
1747  007104  000000                  2$:     .WORD   0               ;"EM" POINTER GOES HERE
1748  007106  012037  007122          3$:     MOV     (R0)+,4$        ;PICK UP DATA HEADER (DH) POINTER
1749  007112  001404                          BEQ     5$              ;BRANCH IF NONE
1750  007114  104401  001167                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
1751  007120  104401                          TYPE
1752  007122  000000                  4$:     .WORD   0               ;"DH" POINTER GOES HERE
1753  007124  012001                  5$:     MOV     (R0)+,R1        ;PICKUP DATA TABLE (DT) POINTER
1754  007126  001460                          BEQ     20$             ;BRANCH IF NONE
1755  007130  005005                          CLR     R5              ;SET INDENT SWITCH
1756  007132  012000                          MOV     (R0)+,R0        ;DATA FORMAT (DF) POINTER
1757  007134  012002                          MOV     (R0)+,R2        ;NUMBER OF DH'S TO TYPE
1758  007136  001451                          BEQ     17$             ;BRANCH IF DH NUMBER IS 0
1759  007140  005105                          COM     R5              ;NO INDENT
1760  007142  104401  001167                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
1761  007146  112003                  10$:    MOVB    (R0)+,R3        ;NUMBER OF DATA WORDS TO TYPE
1762  007150  112004                          MOVB    (R0)+,R4        ;AND HOW TO TYPE THEM
1763  007152  006004                  11$:    ROR     R4              ;OCTAL OR DECIMAL?
1764  007154  103403                          BCS     12$             ;DECIMAL--BRANCH
1765  007156  013146                          MOV     @-(R1)+,-(SP)   ;;SAVE @(R1)+ FOR TYPEOUT
1766  007160  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII ALL DIGITS
```

```
1767  007162  000402                        BR      13$
1768  007164                          12$:
1769  007164  013146                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
1770  007166  104405                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
1771  007170  005303                  13$:  DEC     R3              ;MORE NUMBERS TO TYPE?
1772  007172  001403                        BEQ     14$             ;NO--BRANCH
1773  007174  104401  020705                TYPE    ,LINSP          ;YES--TYPE SEPERATORS
1774  007200  000764                        BR      11$             ;LOOP
1775  007202  005302                  14$:  DEC     R2              ;MORE DH'S?
1776  007204  003431                        BLE     20$             ;NO--BRANCH
1777  007206  104401  001167                TYPE    ,$CRLF          ;YES--START A NEW LINE
1778  007212  005760  000002                TST     2(R0)           ;ONLY A 'DH' IN THIS REQUEST ?
1779  007216  001404                        BEQ     15$             ;BR IF YES - BYPASS THE INDENT
1780  007220  005105                        COM     R5              ;INDENT?
1781  007222  001002                        BNE     15$             ;NO--BRANCH
1782  007224  104401  020705                TYPE    ,LINSP          ;YES--TYPE SPACES
1783  007230  012037  007236          15$:  MOV     (R0)+,16$       ;GET NEXT DH
1784  007234  104401                        TYPE                    ;AND TYPE IT
1785  007236  000000                  16$:  .WORD   0               ;DH POINTER GOES HERE
1786  007240  005710                        TST     (R0)            ;TYPE A 'DT' ?
1787  007242  001003                        BNE     21$             ;BR IF A 'DT'
1788  007244  062700  000004                ADD     #4,R0           ;INCREMENT THE 'DF' POINTER
1789  007250  000754                        BR      14$             ;SEE IF END OF 'DF' BLOCK
1790  007252  104401  001167          21$:  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
1791  007256  005705                        TST     R5              ;INDENT?
1792  007260  001332                        BNE     10$             ;NO--BRANCH
1793  007262  104401  020705          17$:  TYPE    ,LINSP          ;YES--TYPE SPACES
1794  007266  000727                        BR      10$             ;LOOP
1795  007270  104413                  20$:  RESREG                  ;RESTORE R0-R5
1796  007272  000207                        RTS     PC              ;RETURN
1797
1798                                  .SBTTL  TYPE ROUTINE
1799
1800                                  ;;**************************************************************
1801                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
1802                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
1803                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
1804                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
1805                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
1806                                  ;*
1807                                  ;*CALL:
1808                                  ;*1) USING A TRAP INSTRUCTION
1809                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
1810                                  ;*OR
1811                                  ;*      TYPE
1812                                  ;*      MESADR
1813                                  ;*
1814
1815  007274  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
1816  007300  100002                        BPL     1$              ;;BR IF YES
1817  007302  000000                        HALT                    ;;HALT HERE IF NO TERMINAL
1818  007304  000407                        BR      3$              ;;LEAVE
1819  007306  010046                  1$:   MOV     R0,-(SP)        ;;SAVE R0
1820  007310  017600  000002                MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
```

```
 1821  007314  112046                 2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 1822  007316  001005                         BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 1823  007320  005726                         TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 1824  007322  012600                 60$:    MOV     (SP)+,R0        ;;RESTORE R0
 1825  007324  062716  000002         3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 1826  007330  000002                         RTI                     ;;RETURN
 1827  007332  122716  000011         4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 1828  007336  001430                         BEQ     8$
 1829  007340  122716  000200                 CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 1830  007344  001006                         BNE     5$
 1831  007346  005726                         TST     (SP)+           ;;POP  <CR><LF> EQUIV
 1832  007350  104401                         TYPE                    ;;TYPE A CR AND LF
 1833  007352  001167                         $CRLF
 1834  007354  105037  007510                 CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 1835  007360  000755                         BR      2$              ;;GET NEXT CHARACTER
 1836  007362  004737  007444         5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 1837  007366  123726  001156         6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 1838  007372  001350                         BNE     2$              ;;IF NO GO GET NEXT CHAR.
 1839  007374  013746  001154                 MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 1840                                                                 ;;AND THE NULL CHAR.
 1841  007400  105366  000001         7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 1842  007404  002770                         BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 1843  007406  004737  007444                 JSR     PC,$TYPEC       ;;GO TYPE A NULL
 1844  007412  105337  007510                 DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 1845  007416  000770                         BR      7$              ;;LOOP
 1846
 1847                                 :HORIZONTAL TAB PROCESSOR
 1848
 1849  007420  112716  000040         8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 1850  007424  004737  007444         9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
 1851  007430  132737  000007  007510         BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 1852  007436  001372                         BNE     9$              ;;TAB STOP
 1853  007440  005726                         TST     (SP)+           ;;POP SPACE OFF STACK
 1854  007442  000724                         BR      2$              ;;GET NEXT CHARACTER
 1855  007444  105777  171500         $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 1856  007450  100375                         BPL     $TYPEC
 1857  007452  116677  000002  171472         MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 1858  007460  122766  000015  000002         CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 1859  007466  001003                         BNE     1$              ;;BRANCH IF NO
 1860  007470  105037  007510                 CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 1861  007474  000406                         BR      $TYPEX          ;;EXIT
 1862  007476  122766  000012  000002 1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 1863  007504  001402                         BEQ     $TYPEX          ;;BRANCH IF YES
 1864  007506  105227                         INCB    (PC)+           ;;COUNT THE CHARACTER
 1865  007510  000000                 $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
 1866  007512  000207                 $TYPEX: RTS     PC
 1867
 1868
 1869                                 .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 1870
 1871                                 ;;**************************************************************
 1872                                 ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 1873                                 ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 1874                                 ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
```

```
1875                                    ;*CALL:
1876                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
1877                                    ;*      TYPOS                   ;;CALL FOR TYPEOUT
1878                                    ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
1879                                    ;*      .BYTE   M               ;;M=1 OR 0
1880                                    ;*                                      ;;1=TYPE LEADING ZEROS
1881                                    ;*                                      ;;0=SUPPRESS LEADING ZEROS
1882                                    ;*
1883                                    ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
1884                                    ;*$TYPOS OR $TYPOC
1885                                    ;*CALL:
1886                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
1887                                    ;*      TYPON                   ;;CALL FOR TYPEOUT
1888                                    ;*
1889                                    ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
1890                                    ;*CALL:
1891                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
1892                                    ;*      TYPOC                   ;;CALL FOR TYPEOUT
1893
1894  007514  017646  000000           $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
1895  007520  116637  000001  007737           MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
1896  007526  112637  007741                   MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
1897  007532  062716  000002                   ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
1898  007536  000406                           BR      $TYPON
1899  007540  112737  000001  007737  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
1900  007546  112737  000006  007741           MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
1901  007554  112737  000005  007736  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
1902  007562  010346                           MOV     R3,-(SP)        ;;SAVE R3
1903  007564  010446                           MOV     R4,-(SP)        ;;SAVE R4
1904  007566  010546                           MOV     R5,-(SP)        ;;SAVE R5
1905  007570  113704  007741                   MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
1906  007574  005404                           NEG     R4
1907  007576  062704  000006                   ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
1908  007602  110437  007740                   MOVB    R4,$OMODE       ;;SAVE IT FOR USE
1909  007606  113704  007737                   MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
1910  007612  016605  000012                   MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
1911  007616  005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
1912  007620  006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
1913  007622  000404                           BR      3$              ;;GO DO MSB
1914  007624  006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
1915  007626  006105                           ROL     R5
1916  007630  006105                           ROL     R5
1917  007632  010503                           MOV     R5,R3
1918  007634  006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
1919  007636  105337  007740                   DECB    $OMODE          ;;TYPE THIS DIGIT?
1920  007642  100016                           BPL     7$              ;;BR IF NO
1921  007644  042703  177770                   BIC     #177770,R3      ;;GET RID OF JUNK
1922  007650  001002                           BNE     4$              ;;TEST FOR 0
1923  007652  005704                           TST     R4              ;;SUPPRESS THIS 0?
1924  007654  001403                           BEQ     5$              ;;BR IF YES
1925  007656  005204                   4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
1926  007660  052703  000060                   BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
1927  007664  052703  000040           5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
1928  007670  110337  007734                   MOVB    R3,9$           ;;SAVE FOR TYPING
```

```
1929  007674  104401  007734                    TYPE    @8$             ;;GO TYPE THIS DIGIT
1930  007700  105337  007736          7$:       DECB    $OCNT           ;;COUNT BY 1
1931  007704  003347                            BGT     2$              ;;BR IF MORE TO DO
1932  007706  002402                            BLT     6$              ;;BR IF DONE
1933  007710  005204                            INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
1934  007712  000744                            BR      2$              ;;GO DO THE LAST DIGIT
1935  007714  012605                  6$:       MOV     (SP)+,R5        ;;RESTORE R5
1936  007716  012604                            MOV     (SP)+,R4        ;;RESTORE R4
1937  007720  012603                            MOV     (SP)+,R3        ;;RESTORE R3
1938  007722  016666  000002  000004            MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
1939  007730  012616                            MOV     (SP)+,(SP)
1940  007732  000002                            RTI                     ;;RETURN
1941  007734     000                  8$:       .BYTE   0               ;;STORAGE FOR ASCII DIGIT
1942  007735     000                            .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
1943  007736     000                  $OCNT:    .BYTE   0               ;;OCTAL DIGIT COUNTER
1944  007737     000                  $OFILL:   .BYTE   0               ;;ZERO FILL SWITCH
1945  007740  000000                  $OMODE:   .WORD   0               ;;NUMBER OF DIGITS TO TYPE
1946
1947                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
1948
1949                                  ;;**************************************************************
1950                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
1951                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
1952                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
1953                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
1954                                  ;*REPLACED WITH SPACES.
1955                                  ;*CALL:
1956                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
1957                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
1958
1959  007742                          $TYPDS:
1960  007742  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
1961  007744  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
1962  007746  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
1963  007750  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
1964  007752  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
1965  007754  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
1966  007760  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
1967  007764  100004                          BPL     1$              ;;BR IF INPUT IS POS.
1968  007766  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
1969  007770  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
1970  007776  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
1971  010000  012703  010156                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
1972  010004  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
1973  010010  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
1974  010012  016001  010146                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
1975  010016  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
1976  010020  002402                          BLT     4$              ;;BR IF DONE
1977  010022  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
1978  010024  000774                          BR      3$
1979  010026  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
1980  010030  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
1981  010032  001002                          BNE     5$              ;;FALL THROUGH IF 0
1982  010034  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
```

```
1983  010036  100407                      BMI     7$              ;;BR IF YES
1984  010040  106316              5$:     ASLB    (SP)            ;;MSD?
1985  010042  103003                      BCC     6$              ;;BR IF NO
1986  010044  116663  000001  177777      MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
1987  010052  052702  000060        6$:   BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
1988  010056  052702  000040        7$:   BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
1989  010062  110223                      MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
1990  010064  005720                      TST     (R0)+           ;;JUST INCREMENTING
1991  010066  020027  000010              CMP     R0,#10          ;;CHECK THE TABLE INDEX
1992  010072  002746                      BLT     2$              ;;GO DO THE NEXT DIGIT
1993  010074  003002                      BGT     8$              ;;GO TO EXIT
1994  010076  010502                      MOV     R5,R2           ;;GET THE LSD
1995  010100  000764                      BR      6$              ;;GO CHANGE TO ASCII
1996  010102  105726              8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
1997  010104  100003                      BPL     9$              ;;BR IF NO
1998  010106  116663  177777  177776      MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
1999  010114  105013              9$:     CLRB    (R3)            ;;SET THE TERMINATOR
2000  010116  012605                      MOV     (SP)+,R5        ;;POP STACK INTO R5
2001  010120  012603                      MOV     (SP)+,R3        ;;POP STACK INTO R3
2002  010122  012602                      MOV     (SP)+,R2        ;;POP STACK INTO R2
2003  010124  012601                      MOV     (SP)+,R1        ;;POP STACK INTO R1
2004  010126  012600                      MOV     (SP)+,R0        ;;POP STACK INTO R0
2005  010130  104401  010156              TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
2006  010134  016666  000002  000004      MOV     2(SP),4(SP)     ;;ADJUST THE STACK
2007  010142  012616                      MOV     (SP)+,(SP)
2008  010144  000002                      RTI                     ;;RETURN TO USER
2009  010146  023420              $DTBL:  10000.
2010  010150  001750                      1000.
2011  010152  000144                      100.
2012  010154  000012                      10.
2013  010156  000004              $DBLK:  .BLKW   4
2014
2015                                      .SBTTL  TTY INPUT ROUTINE
2016
2017                                      ;;*****************************************************************
2018                                      .ENABL  LSB
2019  010166  000000              $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
2020  010170  000000              $TKQIN: .WORD   0               ;;INPUT POINTER
2021  010172  000000              $TKQOUT: .WORD  0               ;;OUTPUT POINTER
2022  010174  000007              $TKQSRT: .BLKB  7               ;;TTY KEYBOARD QUEUE
2023          010203              $TKQEND=.
2024          010204                      .EVEN
2025
2026                                      ;*TK INITIALIZE ROUTINE
2027                                      ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
2028                                      ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
2029                                      ;
2030                                      ;*CALL:
2031                                      ;*      JSR     PC,$TKINT
2032                                      ;*      RETURN
2033                                      ;
2034  010204  005037  010166      $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
2035  010210  012737  010174  010170      MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
2036  010216  013737  010170  010172      MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
```

```
010224  012737  010254  000060          MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
010232  012737  000200  000062          MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
010240  005737  177562                  TST     @$TKB           ;;CLEAR DONE FLAG
010244  012737  000100  170672          MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
010252  000207                          RTS     PC              ;;RETURN TO CALLER

                                ;*TK SERVICE ROUTINE
                                ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                ;*IT IN THE QUEUE.
                                ;*IF THE CHARACTER IS A "CONTROL-C" (↑C) $TKINT IS CALLED AND
                                ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (@CNTLC)
                                ;
010254  117746  170666          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
010260  042716  177600                  BIC     #↑C177,(SP)     ;;STRIP THE JUNK
010264  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL C?
010270  001007                          BNE     1$              ;;BRANCH IF NO
010272  104401  011367                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (↑C)
010276  004737  010204                  JSR     PC,$TKINT       ;;INIT THE KEYBOARD
010302  005726                          TST     (SP)+           ;;CLEAN UP STACK
010304  000177  170770                  JMP     @CNTLC          ;;CONTROL C RESTART
010310  021627  000007          1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
010314  001004                          BNE     2$              ;;BRANCH IF NO
010316  022737  000176  001140          CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
010324  001500                          BEQ     6$              ;;GO TO SWR CHANGE

010326                          2$:
010326  022737  000007  010166          CMP     #7,$TKCNT       ;;IS THE QUEUE FULL?
010334  001004                          BNE     3$              ;;BRANCH IF NO
010336  104401  001162                  TYPE    ,$BELL          ;;RING THE TTY BELL
010342  005726                          TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
010344  000451                          BR      5$              ;;EXIT
010346  021627  000023          3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
010352  001021                          BNE     32$             ;;BRANCH IF NO
010354  005037  170564                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
010360  005726                          TST     (SP)+           ;;CLEAN CHAR OFF STACK
010362  105777  170556          31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
010366  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
010370  117746  170552                  MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
010374  042716  177600                  BIC     #↑C177,(SP)     ;;MAKE IT 7-BIT ASCII
010400  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
010404  001366                          BNE     31$             ;;BRANCH IF NO
010406  012777  000100  170530          MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
010414  000002                          RTI                     ;;RETURN
010416  005237  010166          32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
010422  021627  000140                  CMP     (SP),#140       ;;IS IT UPPER CASE?
010426  002405                          BLT     4$              ;;BRANCH IF YES
010430  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
010434  003002                          BGT     4$              ;;BRANCH IF YES
010436  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
010442  112677  177522          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
010446  005237  010170                  INC     $TKQIN          ;;UPDATE THE POINTER
010452  023727  010170  010203          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
010460  001003                          BNE     5$              ;;BRANCH IF NO
```

```
010462 012737 010174 010170          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
010470 000002                5$:     RTI                     ;;RETURN

                                     ;;**********************************************************************
                                     ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                     ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
                                     ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
                                     ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
010472 022737 000176 001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
010500 001124                        BNE     15$             ;;EXIT IF NOT
010502 105777 170436                 TSTB    @$TKS           ;;IS A CHAR WAITING?
010506 100121                        BPL     15$             ;;IF NOT, EXIT
010510 117746 170432                 MOVB    @$TKB,-(SP)     ;;YES
010514 042716 177600                 BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
010520 021627 000007                 CMP     (SP),#7         ;;IS IT A CONTROL-G?
010524 001300                        BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
                                                             ;;AND EXIT

                                     ;;**********************************************************************
                                     ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
                                     ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
                                     ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
010526 123727 001134 000001  5$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
010534 001574                        BEQ     2$              ;;BRANCH IF YES
010536 005726                        TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
010540 004737 010204                 JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
010544 005077 170374                 CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
010550 112737 000001 001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR

010556 104401 011401                 TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
010562 104401 011406         $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
010566 013746 000176                 MOV     $WREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
010572 104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
010574 104401 011417                 TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
010600 005046                19$:    CLR     -(SP)           ;;CLEAR COUNTER
010602 005046                        CLR     -(SP)           ;;THE NEW SWR
010604 105777 170334         7$:     TSTB    @$TKS           ;;CHAR THERE?
010610 100375                        BPL     7$              ;;IF NOT TRY AGAIN

010612 117746 170330                 MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
010616 042716 177600                 BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII

010622 021627 000003                 CMP     (SP),#3         ;;IS IT A CONTROL-C?
010626 001015                        BNE     9$              ;;BRANCH IF NOT
010630 104401 011367                 TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
010634 062706 000006                 ADD     #6,SP           ;;CLEAN UP STACK
010640 123727 001135 000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
010646 001003                        BNE     8$              ;;BRANCH IF NO
010650 012777 000100 170286          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
010656 000177 170416         8$:     JMP     @CNTLC          ;;CONTROL-C RESTART

010662 021627 000025         9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
010666 001005                        BNE     10$             ;;BRANCH IF NOT
```

```
                                TYPE    .$CNTLU         ;;YES, ECHO CONTROL-U (^U)
                                ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
                                BR      19$             ;;LET'S TRY IT AGAIN

                        10$:    CMP     (SP),#15        ;;IS IT A <CR>?
                                BNE     16$             ;;BRANCH IF NO
                                TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
                                BEQ     11$             ;;BRANCH IF YES
                                MOV     2(SP),$SWR      ;;SAVE NEW SWR
                                ADD     #6,SP           ;;CLEAR UP STACK
                        14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
                                CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS
                                BNE     15$             ;;BRANCH IF NOT
                                MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
                                RTI                     ;;RETURN
                        15$:    JSR     PC,$TYPEC       ;;ECHO CHAR
                        16$:    CMP     (SP),#60        ;;CHAR < 0?
                                BLT     18$             ;;BRANCH IF YES
                                CMP     (SP),#67        ;;CHAR > 7?
                                BGT     18$             ;;BRANCH IF YES
                                BIC     #60,(SP)+       ;;STRIP-OFF ASCII
                                TST     2(SP)           ;;IS THIS THE FIRST CHAR
                                BEQ     17$             ;;BRANCH IF YES
                                ASL     (SP)            ;;NO, SHIFT PRESENT
                                ASL     (SP)            ;;    CHAR OVER TO MAKE
                                ASL     (SP)            ;;    ROOM FOR NEW ONE.
                        17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
                                BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
                                BR      7$              ;;GET THE NEXT ONE
                        18$:    TYPE    ,$QUES          ;;TYPE '? <CR><LF>
                                BR      20$             ;;SIMULATE CONTROL-U
                                .DSABL  LSB


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

                        $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
                                MOV     4(SP),2(SP)     ;;THE PS
                                CLR     4(SP)           ;;GET READY FOR A CHARACTER
                                CLR     -(SP)           ;;PUT NEW PS ON STACK
                                MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
                                RTI                     ;;POP NEW PC AND PS
                        64$:
                        1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
                                BEQ     1$
                                DEC     $TKCNT          ;;DECREMENT THE COUNTER
                                MOVB    @$TKBUF,-(SP)   ;;GET ONE CHARACTER
```

```
011100  005237  010172                INC     $TKQOUT          ;;UPDATE THE POINTER
011104  023727  010172  010203        CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
011112  001003                        BNE     2$               ;;BRANCH IF NO
011114  013737  010174  010172        MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
011122  000002                2$:     RTI                      ;;RETURN
                              ;;*****************************************************************
                              ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                              ;*CALL:
                              ;*      RDLIN                    ;;INPUT A STRING FROM THE TTY
                              ;*      RETURN HERE              ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                              ;*                               ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
011124  010346                $RDLIN: MOV     R3,-(SP)         ;;SAVE R3
011126  005046                        CLR     -(SP)            ;;CLEAR THE RUBOUT KEY
011130  012703  011360        1$:     MOV     #$TTYIN,R3       ;;GET ADDRESS
011134  022703  011367        2$:     CMP     #$TTYIN+7,R3     ;;BUFFER FULL?
011140  101456                        BLOS    4$               ;;BR IF YES
011142  104410                        RDCHR                    ;;GO READ ONE CHARACTER FROM THE TTY
011144  112613                        MOVB    (SP)+,(R3)       ;;GET CHARACTER
011146  122713  000177        10$:    CMPB    #177,(R3)        ;;IS IT A RUBOUT
011152  001022                        BNE     5$               ;;BR IF NO
011154  005716                        TST     (SP)             ;;IS THIS THE FIRST RUBOUT?
011156  001007                        BNE     6$               ;;BR IF NO
011160  112737  000134  011356        MOVB    #'\,$$           ;;TYPE A BACK SLASH
011166  104401  011356                TYPE    ,$$
011172  012716  177777                MOV     #-1,(SP)         ;;SET THE RUBOUT KEY
011176  005303                4$:     DEC     R3               ;;BACKUP BY ONE
011200  020327  011360                CMP     R3,#$TTYIN       ;;STACK EMPTY?
011204  103434                        BLO     4$               ;;BR IF YES
011206  111337  011356                MOVB    (R3),$$          ;;SETUP TO TYPEOUT THE DELETED CHAR.
011212  104401  011356                TYPE    ,$$              ;;GO TYPE
011216  000746                        BR      2$               ;;GO READ ANOTHER CHAR.
011220  005716                5$:     TST     (SP)             ;;RUBOUT KEY SET?
011222  001406                        BEQ     7$               ;;BR IF NO
011224  112737  000134  011356        MOVB    #'\,$$           ;;TYPE A BACK SLASH
011232  104401  011356                TYPE    ,$$
011236  005016                        CLR     (SP)             ;;CLEAR THE RUBOUT KEY
011240  122713  000025        7$:     CMPB    #25,(R3)         ;;IS CHARACTER A CTRL U?
011244  001003                        BNE     8$               ;;BR IF NO
011246  104401  011374                TYPE    ,$CNTLU          ;;TYPE A CONTROL "U"
011252  000726                        BR      1$               ;;GO START OVER
011254  122713  000022        9$:     CMPB    #22,(R3)         ;;IS CHARACTER A "R"?
011260  001011                        BNE     3$               ;;BRANCH IF NO
011262  105013                        CLRB    (R3)             ;;CLEAR THE CHARACTER
011264  104401  001167                TYPE    ,$CRLF           ;;TYPE A "CR" & "LF"
011270  104401  011360                TYPE    ,$TTYIN          ;;TYPE THE INPUT STRING
011274  000717                        BR      2$               ;;GO PICKUP ANOTHER CHACTER
011276  104401  001166        4$:     TYPE    ,$QUES           ;;TYPE A '?'
011302  000712                        BR      1$               ;;CLEAR THE BUFFER AND LOOP
011304  111337  011356        3$:     MOVB    (R3),$$          ;;ECHO THE CHARACTER
011310  104401  011356                TYPE    ,$$
011314  122723  000015                CMPB    #15,(R3)+        ;;CHECK FOR RETURN
011320  001305                        BNE     2$               ;;LOOP IF NOT RETURN
011322  105063  177777                CLRB    -1(R3)           ;;CLEAR RETURN (THE 15
```

```
011326  104401  001170                  TYPE    $LF             ;;TYPE A LINE FEED
011332  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
011334  012603                          MOV     (SP)+,R3        ;;RESTORE R3
011336  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
011340  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
011346  012766  011360  000004          MOV     #$TTYIN,4(SP)
011354  000002                          RTI                     ;;RETURN
011356     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
011357     000                          .BYTE   0               ;;TERMINATOR
011360  000007              $TTYIN:     .BLKB   7               ;;RESERVE 7 BYTES FOR TTY INPUT
011367     136  006503  000012  $CNTLC: .ASCIZ  /↑C/<15><12>    ;;CONTROL "C"
011374  052536  005015     000  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
011401     136  006507  000012  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
011406  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
011414  020075     000
011417     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
011426  036440  000040

                                .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS

                                ;;******************************************************************
                                ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
                                ;*LEADING NUMBERS.
                                ;*CALL
                                ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
                                ;*      JSR     PC,@#$SUPRS

011430  010046              $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
011432  016600  000004              MOV     4(SP),R0        ;;PICKUP THE POINTER
011436  105710              1$:     TSTB    (R0)            ;;TERMINATEOR?
011440  001403                      BEQ     2$              ;;BR IF YES
011442  122720  000060              CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
011446  001773                      BEQ     1$              ;;BR IF YES
011450  005300              2$:     DEC     R0              ;;BACKUP BY "1"
011452  010037  011460              MOV     R0,3$           ;;SAVE FOR TYPING
011456  104401                      TYPE                    ;;GO TYPE
011460  000000              3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
011462  012600                      MOV     (SP)+,R0        ;;RESTORE R0
011464  012616                      MOV     (SP)+,(SP)      ;;RESTORE THE STACK
011466  000207                      RTS     PC              ;;RETURN

                                .SSTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE

                                ;;******************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED DECIMAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
                                ;*      JSR     PC,@#$S82D      ;;CALL
                                ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK

011470  016637  000002  011520  $S82D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
```

```
2307  011476  012746  011520                  MOV     #1$,-(SP)       ;;SET POINTER
2308  011502  004737  011524                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
2309  011506  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
2310  011512  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
2311  011516  000207                          RTS     PC              ;;RETURN
2312  011520  000000  000000          1$:     .WORD   0,0
2313
2314                                          .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
2315
2316                                          ;;*****************************************************************
2317                                          ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
2318                                          ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
2319                                          ;*POSITIVE.
2320                                          ;*CALL
2321                                          ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
2322                                          ;*      JSR     PC,@#$DB2D
2323                                          ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
2324                                                                          ;;IS ON THE STACK
2325
2326
2327  011524  104412                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
2328  011526  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
2329  011532  012700  011704                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
2330  011536  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
2331  011542  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
2332  011544  012202                          MOV     (R2)+,R2
2333  011546  012737  000012  011622          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
2334  011554  012704  011634                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
2335  011560  012705  011636                  MOV     #$TNPWR+2,R5
2336  011564  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
2337  011566  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
2338  011570  005602                          SBC     R2
2339  011572  161502                          SUB     (R5),R2
2340  011574  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
2341  011576  005203                          INC     R3              ;;ADD 1 TO PARTIAL
2342  011600  000772                          BR      2$              ;;LOOP
2343  011602  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
2344  011604  005502                          ADC     R2
2345  011606  062402                          ADD     (R4)+,R2
2346  011610  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
2347  011612  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
2348  011616  110320                          MOVB    R3,(R0)+        ;;SAVE IT
2349  011620  005327                          DEC     (PC)+           ;;DONE?
2350  011622  000000                  4$:     .WORD   0
2351  011624  001357                          BNE     1$              ;;BR IF NO
2352  011626  105020                          CLRB    (R0)+           ;;TERMINATOR
2353  011630  104413                          RESREG                  ;;RESTORE REGISTERS
2354  011632  000207                          RTS     PC              ;;RETURN
2355  011634  145000                  $TNPWR: 145000                  ;;1.0E09
2356  011636  035632                          35632
2357  011640  160400                          160400                  ;;1.0E08
2358  011642  002765                          2765
2359  011644  113200                          113200                  ;;1.0E07
2360  011646  000230                          230
```

```
2361  011650  041100                          041100                  ;;1.0E06
2362  011652  000017                          17
2363  011654  103240                          103240                  ;;1.0E05
2364  011656  000001                          1
2365  011660  023420                          23420                   ;;1.0E04
2366  011662  000000                          0
2367  011664  001750                          1750                    ;;1.0E03
2368  011666  000000                          0
2369  011670  000144                          144                     ;;1.0E02
2370  011672  000000                          0
2371  011674  000012                          12                      ;;1.0E01
2372  011676  000000                          0
2373  011700  000001                          1                       ;;1.0E00
2374  011702  000000                          0
2375  011704  000014                $DECVL:   .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
2376
2377                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
2378
2379                                ;;*****************************************************************
2380                                ;*SAVE R0-R5
2381                                ;*CALL:
2382                                ;*      SAVREG
2383                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
2384                                ;*
2385                                ;*TOP---(+16)
2386                                ;* +2---(+18)
2387                                ;* +4---R5
2388                                ;* +6---R4
2389                                ;* +8---R3
2390                                ;*+10---R2
2391                                ;*+12---R1
2392                                ;*+14---R0
2393
2394  011720                        $SAVREG:
2395  011720  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2396  011722  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2397  011724  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2398  011726  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
2399  011730  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
2400  011732  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
2401  011734  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
2402  011740  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
2403  011744  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
2404  011750  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
2405  011754  000002                        RTI
2406
2407                                ;*RESTORE R0-R5
2408                                ;*CALL:
2409                                ;*      RESREG
2410  011756                        $RESREG:
2411  011756  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
2412  011762  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
2413  011766  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
2414  011772  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
```

```
                                        MOV     (SP)+,R5        ;;POP STACK INTO R5
                                        MOV     (SP)+,R4        ;;POP STACK INTO R4
                                        MOV     (SP)+,R3        ;;POP STACK INTO R3
                                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                                        RTI

                                .SBTTL  TRAP DECODER

                                ;;**************************************************************
                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.

                                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
                                        MOV     2(SP),R0        ;;GET TRAP ADDRESS
                                        TST     -(R0)           ;;BACKUP BY 2
                                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
                                        ASL     R0              ;;POSITION FOR INDEXING
                                        MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
                                        RTS     R0              ;;GO TO ROUTINE

                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

                                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
                                        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
                                        RTI                     ;;RESTORE THE PSW

                                .SBTTL  TRAP TABLE

                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;*BY THE "TRAP" INSTRUCTION.

                                ;       ROUTINE
                                ;       -------
                                $TRPAD: .WORD   $TRAP2
                                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
                                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
                                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
                                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
                                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

                                        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

                                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
                                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
                                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
                                        $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
                                        $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
```

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                                        .SBTTL  SINGLE/DUAL PORT RH11/RP04/5/6 DRIVER (REV 1.0)

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                                        ;MAYNARD, MA 01754
                                        ;AUTHOR(S): JIM LACEY/CHUCK HESS

                                        ;;*****************************************************************

                                        ;STORAGE FOR RPDS1, RPER1, RPER2, AND RPER3 ON AN ERROR "2"
                                                ;RPERRS   = RPDS1
                                                ;RPERRS+2 = RPER1
                                                ;RPERRS+4 = RPER2
                                                ;RPERRS+6 = RPER3

012100  000000  000000  000000  RPERRS: .WORD   0,0,0,0
012106  000000

                                        ;TABLE OF DRIVE ACTIVE INDICATORS (DRVACT=8 BYTES)
                                                ;DRVACT=0 IF DRIVE IS IDLE
                                                ;DRVACT>0 IF DRIVE IS ACTIVE WITH A COMMAND
                                                ;DRVACT<0 IF DRIVE IS ACTIVE WITH AN ERROR RECOVERY OPERATION

012110      000                 DRVACT: .BYTE   0               ;DRIVE 0
012111      000                         .BYTE   0               ;DRIVE 1
012112      000                         .BYTE   0               ;DRIVE 2
012113      000                         .BYTE   0               ;DRIVE 3
012114      000                         .BYTE   0               ;DRIVE 4
012115      000                         .BYTE   0               ;DRIVE 5
012116      000                         .BYTE   0               ;DRIVE 6
012117      000                         .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
                                        ;DRVSTA=0 IF DRIVE IS OFFLINE OR NONEXSITENT
                                        ;DRVSTA>0 IF DRIVE IS ONLINE
                                        ;DRVSTA<0 IF DRIVE IS UNSAFE

012120      000                 DRVSTA: .BYTE   0               ;DRIVE 0
012121      000                         .BYTE   0               ;DRIVE 1
012122      000                         .BYTE   0               ;DRIVE 2
012123      000                         .BYTE   0               ;DRIVE 3
012124      000                         .BYTE   0               ;DRIVE 4
012125      000                         .BYTE   0               ;DRIVE 5
012126      000                         .BYTE   0               ;DRIVE 6
012127      000                         .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                        ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                        ;DRVTYP=1 IF DRIVE IS RP04
                                        ;DRVTYP=2 IF DRIVE IS RP05
                                        ;DRVTYP=4 IF DRIVE IS RP06
                                        ;DRVTYP=-1 IF NOT RP04/5/6
```

```
2523  012130  000                 DRVTYP: .BYTE   0               ;DRIVE 0
2524  012131  000                         .BYTE   0               ;DRIVE 1
2525  012132  000                         .BYTE   0               ;DRIVE 2
2526  012133  000                         .BYTE   0               ;DRIVE 3
2527  012134  000                         .BYTE   0               ;DRIVE 4
2528  012135  000                         .BYTE   0               ;DRIVE 5
2529  012136  000                         .BYTE   0               ;DRIVE 6
2530  012137  000                         .BYTE   0               ;DRIVE 7
2531
2532                              ;TABLE OF DUAL PORT INITIALIZATION INDICATORS
2533                                      ;DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
2534                                      ;DPINT<0 IF INITIALIZATION IS IN PROGRESS
2535
2536  012140  000                 DPINT:  .BYTE   0               ;DRIVE 0
2537  012141  000                         .BYTE   0               ;DRIVE 1
2538  012142  000                         .BYTE   0               ;DRIVE 2
2539  012143  000                         .BYTE   0               ;DRIVE 3
2540  012144  000                         .BYTE   0               ;DRIVE 4
2541  012145  000                         .BYTE   0               ;DRIVE 5
2542  012146  000                         .BYTE   0               ;DRIVE 6
2543  012147  000                         .BYTE   0               ;DRIVE 7
2544
2545                              ;TABLE OF PENDING DUAL PORT REQUESTS
2546                                      ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
2547                                      ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
2548
2549  012150  000                 DPRQS:  .BYTE   0               ;DRIVE 0
2550  012151  000                         .BYTE   0               ;DRIVE 1
2551  012152  000                         .BYTE   0               ;DRIVE 2
2552  012153  000                         .BYTE   0               ;DRIVE 3
2553  012154  000                         .BYTE   0               ;DRIVE 4
2554  012155  000                         .BYTE   0               ;DRIVE 5
2555  012156  000                         .BYTE   0               ;DRIVE 6
2556  012157  000                         .BYTE   0               ;DRIVE 7
2557
2558                              ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
2559                                      ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
2560                                      ;"DPB" OF THE I/O OPERATION.
2561
2562  012160  000000              TRNSWT: .WORD   0
2563
2564                              ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
2565                                      ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
2566                                      ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
2567                                      ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
2568                                      ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
2569
2570  012162  000000              SRCHWT: .WORD   0
2571
2572                              ;RP04/5/6 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
2573                                      ;ACTDRV=0 IF DRIVER IS INACTIVE
2574                                      ;ACTDRV>0 IF DRIVER IS ACTIVE
2575
2576  012164  000                 ACTDRV: .BYTE   0
```

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2577
2578                                    ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
2579                                            ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
2590                                            ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
2581
2582  012165     000                    ACTSTR: .BYTE   0
2583
2584                                    ;UNLOAD FLAG (ULDFLG=8 BYTES)
2585                                            ;ULDFLG=0 IF NO UNLOAD COMMAND
2586                                            ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
2587                                            ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
2588
2589  012166     000                    ULDFLG: .BYTE   0               ;DRIVE 0
2590  012167     000                            .BYTE   0               ;DRIVE 1
2591  012170     000                            .BYTE   0               ;DRIVE 2
2592  012171     000                            .BYTE   0               ;DRIVE 3
2593  012172     000                            .BYTE   0               ;DRIVE 4
2594  012173     000                            .BYTE   0               ;DRIVE 5
2595  012174     000                            .BYTE   0               ;DRIVE 6
2596  012175     000                            .BYTE   0               ;DRIVE 7
2597
2598                                    ;LOOK AHEAD COUNT (LACNT=8 BYTES)
2599                                            ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
2600
2601  012176     000                    LACNT:  .BYTE   0               ;DRIVE 0
2602  012177     000                            .BYTE   0               ;DRIVE 1
2603  012200     000                            .BYTE   0               ;DRIVE 2
2604  012201     000                            .BYTE   0               ;DRIVE 3
2605  012202     000                            .BYTE   0               ;DRIVE 4
2606  012203     000                            .BYTE   0               ;DRIVE 5
2607  012204     000                            .BYTE   0               ;DRIVE 6
2608  012205     000                            .BYTE   0               ;DRIVE 7
2609
2610                                    ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
2611                                            ;SAVEFG <0 IF SAVE THE RH11/RP04/5/6 REGISTERS WHEN THE
2612                                            ;OPERATION IS COMPLETED AS PER (DPB+14).
2613                                            ;SAVEFG=0 IF SAVE THE RH11/RP04/5/6 REGISTERS, AS PER
2614                                            ;(DPB+14), AFTER AN ERROR.
2615
2616  012206  000000                    SAVEFG: .WORD   0
2617
2618                                    ;SEEK FLAG (SEEKFG=1 WORD)
2619                                            ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
2620                                            ;FOR A DATA TRANSFER START A SEARCH COMMAND
2621                                            ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
2622                                            ;DISREGARD THE WINDOW
2623
2624  012210  000000                    SEEKFG: .WORD   0
2625
2626                                    ;TIMEOUT TABLE (TIMER=8 WORDS)
2627                                            ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
2628
2629  012212  177777                    TIMER:  .WORD   -1      ;DRIVE 0
2630  012214  177777                            .WORD   -1      ;DRIVE 1
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2631  012216  177777                          .WORD   -1      ;DRIVE 2
2632  012220  177777                          .WORD   -1      ;DRIVE 3
2633  012222  177777                          .WORD   -1      ;DRIVE 4
2634  012224  177777                          .WORD   -1      ;DRIVE 5
2635  012226  177777                          .WORD   -1      ;DRIVE 6
2636  012230  177777                          .WORD   -1      ;DRIVE 7
2637
2638                                  ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
2639                                          ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
2640                                          ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
2641
2642  012232  177777                  DTUW:   .WORD   -1
2643
2644                                  ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
2645                                          ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
2646                                          ;ATTENTION BIT
2647
2648  012234  001                     ATABIT: .BYTE   1       ;DRIVE 0
2649  012235  002                             .BYTE   2       ;DRIVE 1
2650  012236  004                             .BYTE   4       ;DRIVE 2
2651  012237  010                             .BYTE   10      ;DRIVE 3
2652  012240  020                             .BYTE   20      ;DRIVE 4
2653  012241  040                             .BYTE   40      ;DRIVE 5
2654  012242  100                             .BYTE   100     ;DRIVE 6
2655  012243  200                             .BYTE   200     ;DRIVE 7
2656
2657                                  ;RP04/5/6 TO RH11 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
2658                                  ;CALLING IT FATAL (MCPEMX=1 WORD)
2659
2660  012244  000003                  MCPEMX: .WORD   3
2661
2662                                  ;STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04/5/6),
2663                                  ;RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5)).
2664
2665  012246  176700                  RPADR:  .WORD   176700
2666  012250  000254  000240          RPVEC:  .WORD   254,5*32.
2667
2668                                  ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
2669
2670  012254  000004                  MXLACT: .WORD   4
2671                                  ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
2672
2673  012256  001000                  MXDLTA: .WORD   8.*64.
2674                                  ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
2675
2676  012260  000200                  MNDLTA: .WORD   2*64.
2677                                  ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
2678
2679  012262  000005                  MXWNDW: .WORD   5
2680
2681                                  ;DEFINITIONS OF THE RH11/RP04/5/6 ADDRESS INDEXES
2682
2683          000000                  RPCS1=0                         ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
2684          000002                  RPWC=2                          ;WORD COUNT REGISTER (NOT A DRIVE REG)
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                    000004          RPBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
                    000006          RPDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
                    000010          RPCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
                    000012          RPDS1=12                ;DRIVE STATUS REGISTER (DRIVE REG 01)
                    000014          RPER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
                    000016          RPAS=16                 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
                    000020          RPLA=20                 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
                    000022          RPDB=22                 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
                    000024          RPMR=24                 ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
                    000026          RPDT=26                 ;DRIVE TYPE REGISTER (DRIVE REG. 06)
                    000030          RPSN=30                 ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
                    000032          RPOF=32                 ;OFFSET REGISTER (DRIVE REG. 11)
                    000034          RPCA=34                 ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
                    000036          RPCC=36                 ;CURRENT CYLINDER ADDRESS REGISTER (DRIVE REG. 13)
                    000040          RPER2=40                ;ERROR REGISTER #2 (DRIVE REG. 14)
                    000042          RPER3=42                ;ERROR REGISTER #3 (DRIVE REG. 15)
                    000044          RPEC1=44                ;ECC POSITION REGISTER (DRIVE REG. 16)
                    000046          RPEC2=46                ;ECC PATTERN REGISTER (DRIVE REG.  17)

                                    ;RH11/RP04/5/6 DRIVER INITIALIZATION CODE
                                            ;THIS ROUTINE WILL DETERMINE WHICH RP04/5/6 DRIVES ARE
                                            ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
                                            ;TO THE PROPER STATE FOR EACH DRIVE.
                                            ;NOTE: THIS ROUTINE CALLS DRVINT
                                    ;
                                    ;CALL
                                    ;
                                    ;       JSR     PC,RPINIT
                                    ;       RETURN
                                    ;
                                    ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                    ;
012264  104412                      RPINIT: SAVREG                  ;SAVE R0 - R5
012266  013746  177776                      MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
012272  012737  000240  177776              MOV     #<5*32.>,@#PS   ;CHANGE THE PRIORITY TO 5
012300  004737  020250                      JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
012304  012701  012100                      MOV     #RPERRS,R1      ;FIRST ADDRESS TO BE CLEARED
012310  012702  012210                      MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
012314  005021                      1$:     CLR     (R1)+           ;CLEAR
012316  020102                              CMP     R1,R2           ;ARE WE DONE?
012320  101775                              BLOS    1$              ;BRANCH IF NO
012322  012702  012232                      MOV     #DTUW,R2        ;LAST ADDRESS
012326  012721  177777              2$:     MOV     #-1,(R1)+       ;INITIALIZE
012332  020102                              CMP     R1,R2           ;DONE?
012334  101774                              BLOS    2$              ;LOOP IF NO
012336  005037  012120                      CLR     DRVSTA          ;SET ALL DRIVES TO OFFLINE
012342  005037  012122                      CLR     DRVSTA+2
012346  005037  012124                      CLR     DRVSTA+4
012352  005037  012126                      CLR     DRVSTA+6
012356  013703  012250                      MOV     RPVEC,R3        ;SETUP THE RH11/RP04/5/6 VECTOR
012362  012723  015130                      MOV     #ISR,(R3)+
012366  013713  012252                      MOV     RPVEC+2,(R3)
012372  013704  012246                      MOV     RPADR,R4        ;FIRST ADDRESS OF RH11 RP04
012376  012764  000040  000010              MOV     #BIT05,RPCS2(R4)  ;MASSBUS INIT
```

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                                                    CLR     R1              ;START WITH DRIVE 0
012436  004037  012476            3$:               JSR     R0,DRVINT       ;INIT THE DRIVE
012412  000401                                      BR      4$              ;'DVA' NOT SET OR PARITY ERROR
012414  000402                                      BR      5$              ;NORMAL RETURN
012416  105061  012120            4$:               CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
012422  005201                    5$:               INC     R1              ;GO TO NEXT DRIVE
012424  042701  177770                              BIC     #^C7,R1         ;MASK OUT UNUSED BITS
012430  001366                                      BNE     3$              ;BR IF MORE DRIVES TO GO
012432  012701  000007                              MOV     #7,R1           ;START WITH DRIVE 7
012436  005037  177776                              CLR     @#PS            ;CLEAR THE PROCESSOR STATUS
012442  105761  012140            6$:               TSTB    DPINT(R1)       ;WAITING FOR DRIVE TO SWITCH PORTS ?
012446  001405                                      BEQ     8$              ;BR NOT WAITING
012450  004737  017704                              JSR     PC,SET.IE       ;SET INTERRUPT
012454  105761  012140            7$:               TSTB    DPINT(R1)       ;DRIVE SWITCHED PORTS ?
012460  001375                                      BNE     7$              ;BR IF NOT
012462  005301                    8$:               DEC     R1              ;GO TO THE NEXT DRIVE
012464  100366                                      BPL     6$              ;CHECK NEXT DRIVE
012466  012637  177776                              MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
012472  104413                                      RESREG                  ;RESTORE R0 - R5
012474  000207                                      RTS     PC              ;BYE-BYE

                                        ;DRIVE INITILIZATION ROUTINE
                                                ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
                                                ;AN RP04/5/6. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
                                                ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
                                                ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE.
                                                ;DRVSTA IS SET TO THE PROPER CONDITION.
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       MOV     RPADR,R4        ;UNIBUS ADDRESS OF RH11 RP04/5/6  RPCS1
                                        ;       JSR     R0,DRVINT       ;CALLED BY A JSR
                                        ;       RETURN1                 ;ERROR OCCURRED (PARITY)
                                        ;       RETURN2                 ;NORMAL RETURN
                                        ;

012476  010546                    DRVINT: MOV     R5,-(SP)        ;SAVE R5
012500  105061  012120                    CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
012504  105061  012130                    CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
012510  105061  012166                    CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
012514  010164  000010                    MOV     R1,RPCS2,R4)    ;SELECT A DRIVE
012520  112764  000111  000000            MOVB    #111,RPCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
012526  032764  010000  000010            BIT     #BIT12,RPCS2(R4) ;NONEXISTENT DRIVE?
012534  001403                            BEQ     1$              ;NO---BRANCH
012536  004737  017704                    JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
012542  000520                            BR      6$              ;LEAVE THIS ROUTINE
012544  105061  012120            1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
012550  032764  004000  000000            BIT     #BIT11,RPCS1(R4)  ;SEE IF DRIVE AVAILABLE
012556  001514                            BEQ     7$              ;BR IF DRIVE NOT AVAILABLE
012560  004037  017214                    JSR     R0,RD.RP        ;READ THE DRIVE TYPE REG.
012564  000026                            RPDT
012566  013030                            8$                      ;ERROR RETURN ADDRESS
012570  012605                            MOV     (SP)+,R5        ;PLT DRIVE TYPE IN R5
012572  112761  000001  012130            MOVB    #1,DRVTYP(R1)   ;SET RP04 INDICATOR
012600  022705  020020                    CMP     #20020,R5       ;IS IT A SINGLE PORT RP04?
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 2793  012604  001431                        BEQ     2$                ;BRANCH IF YES
 2794  012606  022705  024020                CMP     #24020,R5         ;IS IT A DUAL PORT RPC4?
 2795  012612  001426                        BEQ     2$                ;BR IF YES
 2796  012614  112761  000002  012130        MOVB    #2,DRVTYP(R1)     ;SET RP05 INDICATOR
 2797  012622  022705  020021                CMP     #20021,R5         ;SINGLE PORT RP05 ?
 2798  012626  001420                        BEQ     2$                ;BR IF YES
 2799  012630  022705  024021                CMP     #24021,R5         ;DUAL PORT RP05 ?
 2800  012634  001415                        BEQ     2$                ;BR IF YES
 2801  012636  112761  000004  012130        MOVB    #4,DRVTYP(R1)     ;SET RP06 INDICATOR
 2802  012644  022705  020022                CMP     #20022,R5         ;SINGLE PORT RP06 ?
 2803  012650  001407                        BEQ     2$                ;BR IF YES
 2804  012652  022705  024022                CMP     #24022,R5         ;DUAL PORT RP06 ?
 2805  012656  001404                        BEQ     2$                ;BR IF YES
 2806  012660  112761  177777  012130        MOVB    #-1,DRVTYP(R1)    ;SET INDICATOR TO 'OTHER'
 2807  012666  000446                        BR      6$                ;EXIT
 2808  012670  012746  000121        2$:     MOV     #121,-(SP)        ;DO A "READ-IN PRESET"
 2809  012674  004037  017374                JSR     R0,WRT.RP
 2810  012700  000000                        RPDS1
 2811  012702  013030                        8$
 2812  012704  012746  010000                MOV     #BIT12,-(SP)      ;SET FMT22=1
 2813  012710  004037  017374                JSR     R0,WRT.RP
 2814  012714  000032                        RPDF
 2815  012716  013030                        8$
 2816  012720  004037  017214                JSR     R0,RD.RF          ;READ RPDS1
 2817  012724  000012                        RPDS1
 2818  012726  013030                        8$
 2819  012730  012605                        MOV     (SP)+,R5          ;AND SAVE IT IN R5
 2820  012732  100015                        BPL     4$                ;BRANCH IF ATA=0
 2821  012734  116164  012234  000016        MOVB    ATABIT(R1),RPAS(R4) ;CLEAR ATTENTION BIT
 2822  012742  004037  017214                JSR     R0,RD.RP          ;FIND OUT WHY ATA=1
 2823  012746  000014                        RPER1
 2824  012750  013030                        8$
 2825  012752  006126                        ROL     (SP)+             ;IS IT UNSAFE?
 2826  012754  100004                        BPL     4$                ;BR IF NOT
 2827  012756  112761  177777  012120        MOVB    #-1,DRVSTA(R1)    ;SET UNSAFE INDICATOR
 2828  012764  000407                        BR      6$                ;EXIT
 2829  012766  005105                4$:     COM     R5                ;CHECK MOL, DPR, DRY, AND VV
 2830  012770  042705  167077                BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
 2831  012774  001003                        BNE     6$                ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
 2832  012776  112761  000001  012120        MOVB    #1,DRVSTA(R1)     ;SET DRIVE STATUS TO ONLINE
 2833  013004  005720                6$:     TST     (R0)+             ;STEP OVER THE ERROR RETURN
 2834  013006  000410                        BR      8$                ;EXIT
 2835  013010  006301                7$:     ASL     R1                ;CHANGE INDEX TO ADDRESS WORDS
 2836  013012  012761  003720  012212        MOV     #2000.,TIMER(R1)  ;START 2 SEC TIMER
 2837  013020  006201                        ASR     R1                ;RESTORE R1
 2838  013022  112761  177777  012140        MOVB    #-1,DPINT(R1)     ;SET PORT INITIALIZE INIDICATOR
 2839  013030  012605                8$:     MOV     (SP)+,R5          ;RESTORE R5
 2840  013032  000200                        RTS     R0                ;EXIT
 2841:
 2842:                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
 2843:                                  ;
 2844:                                  ;CALL
 2845:                                  ;
 2846:                                  ;       JSR     R0,3*RPC4         ;CALL THE RPC4,5,6 DRIVER
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                                        ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
                                        ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
                                        ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
                                                                        ;IS AN ERROR CONDITION

013034  013746  177776          RPC4:   MOV     @#PS,-(SP)              ;SAVE THE CALLING STATUS
013040  013737  012252  177776          MOV     RPVEC+2,@#PS            ;DON'T ALLOW ANY RPC4/5/6 INTERRUPTS
013046  112737  000001  012164          MOVB    #1,ACTDRV               ;SET "ACTIVE DRIVER" FLAG
013054  104412                          SAVREG                          ;SAVE R0 - R5
013056  011002                          MOV     (R0),R2                 ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
013060  005062  000016                  CLR     16(R2)                  ;CLEAR THE STATUS/ERROR INDICATOR
013064  111201                          MOVB    (R2),R1                 ;PICKUP THE DRIVE NUMBER
013066  013704  012246                  MOV     RPADR,R4                ;UNIBUS ADDRESS OF RPCS1
013072  105761  012120                  TSTB    DRVSTA(R1)              ;CHECK DRIVES STATUS
013076  003014                          BGT     1$                      ;BRANCH IF ONLINE
013100  105761  012165                  TSTB    ULDFLG(R1)              ;UNLOAD COMMAND IN QUEUE?
013104  001036                          BNE     3$                      ;BRANCH IF YES
013106  105761  012140                  TSTB    DPINT(R1)               ;TRYING TO INIT THE DRIVE
013112  001042                          BNE     5$                      ;BR IF YES
013114  004037  012476                  JSR     R0,DRVINT               ;GO INIT. THE DRIVE
013120  000434                          BR      4$                      ;ERROR RETURN
013122  105761  012120                  TSTB    DRVSTA(R1)              ;IS DRIVE STATUS ONLINE?
013126  003445                          BLE     6$                      ;BR IF NOT
013130  105761  012150          1$:     TSTB    DPRQS(R1)               ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
013134  001031                          BNE     5$                      ;BR IF YES
013136  010164  000010                  MOV     R1,RPCS2(R4)            ;SELECT THE DRIVE
013142  004037  020346                  JSR     R0,DRVQUE               ;PUT THIS REQUEST IN QUEUE
013146  000460                          BR      9$                      ;QUEUE IS FULL
013150  122762  000103  000002          CMPB    #103,2(R2)              ;IS THIS REQ. FOR AN UNLOAD?
013156  001003                          BNE     2$                      ;BR IF NO
013160  112761  177777  012166          MOVB    #-1,ULDFLG(R1)          ;SET THE "UNLOAD IN QUEUE" FLAG
013166  105761  012110          2$:     TSTB    DRVACT(R1)              ;IS THIS DRIVE ACTIVE?
013172  001043                          BNE     8$                      ;BR IF YES
013174  004737  013326                  JSR     PC,OPT                  ;CALL THE OPTIMIZER
013200  000440                          BR      8$
013202  012762  120000  000016  3$:     MOV     #BIT15!BIT13,16(R2)     ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
013210  000434                          BR      8$                      ;EXIT
013212  004737  014436          4$:     JSR     PC,CIT                  ;GO HANDLE THE PARITY ERROR
013216  000431                          BR      8$
013220  004037  020346          5$:     JSR     R0,DRVQUE               ;PUT REQUEST IN QUEUE
013224  000431                          BR      9$                      ;QUEUE IS FULL
013226  032714  000100                  BIT     #BIT06,(R4)             ;IS 'IE' SET ALREADY ?
013232  001023                          BNE     9$                      ;BR IF IT IS
013234  004737  017704                  JSR     PC,SET.IE               ;SET INTERRUPT
013240  000420                          BR      8$                      ;RETURN, REQUEST IN QUEUE
013242  105761  012120          6$:     TSTB    DRVSTA(R1)              ;SEE IF DRIVE OFFLINE OR UNSAFE
013246  002412                          BLT     7$                      ;BR IF UNSAFE
013250  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)     ;SET OFFLINE ERROR INDICATOR
013256  105761  012130                  TSTB    DRVTYP(R1)              ;SEE IF OFFLINE OR NONEXISTENT
013262  001007                          BNE     8$                      ;BR IF OFFLINE
013264  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)     ;REPORT DRIVE NONEXISTENT
013272  000403                          BR      8$                      ;GO TO EXIT
013274  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2)     ;DRIVE IS UNSAFE
013302  104413                  8$:     RESREG                          ;RESTORE R0 - R5
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 2901  013304  005720                        TST     (R0)+           ;SETUP FOR NORMAL RETURN
 2902  013306  000401                        BR      10$             ;FINISH UP, THEN EXIT
 2903  013310  104413                9$:     RESREG                  ;RESTORE R0 - R5
 2904  013312  005720                10$:    TST     (R0)+           ;CORRECT THE RETURN ADDRESS
 2905  013314  105037  012164              CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
 2906  013320  012637  177776              MOV     (SP)+,@#PS      ;RETURN "PS" TO USER LEVEL
 2907  013324  000200                        RTS     R0              ;RETURN TO CALLER
 2908
 2909                                ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
 2910                                ;
 2911                                ;CALL
 2912                                ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 2913                                ;       JSR     PC,OPT          ;SETUP A COMMAND
 2914                                ;
 2915  013326  104412                OPT:    SAVREG                  ;SAVE R0 - R5
 2916  013330  013746  177776              MOV     @#PS,-(SP)      ;SAVE PROC. STATUS
 2917  013334  146137  012234  012162        BICB    ATABIT(R1),SRCHWT       ;CLEAR "SEARCH WAIT" KEY
 2918  013342  004737  020422              JSR     PC,GETREQ       ;GET "DPB" POINTER OF REQUEST
 2919  013346  005702                        TST     R2              ;IS THERE A REQUEST IN QUEUE?
 2920  013350  001505                        BEQ     7$              ;NO--BRANCH TO EXIT
 2921  013352  032764  010000  000012        BIT     #BIT12,RPDS1(R4)  ;IS MOL STILL SET ?
 2922  013360  001404                        BEQ     9$              ;BR IF NOT
 2923  013362  032764  000100  000012        BIT     #BIT6,RPDS1(R4)  ;IS VV SET ?
 2924  013370  001003                        BNE     10$             ;BR IF IT IS
 2925  013372  004037  012476          9$:   JSR     R0,DRVINT       ;SEE IF DRIVE STILL ONLINE ?
 2926  013376  000470                        BR      6$              ;PARITY OR 'DVA' NOT SET
 2927  013400  105761  012120          10$:  TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
 2928  013404  003014                        BGT     1$              ;YES--BRANCH
 2929  013406  004737  020444              JSR     PC,POPQUE       ;NO--REMOVE REQUEST FROM QUEUE
 2930  013412  012762  140000  000016        MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE STATUS ERROR INDICATOR
 2931  013420  105761  012120              TSTB    DRVSTA(R1)      ;IS DRIVE UNSAFE ?
 2932  013424  100064                        BPL     8$              ;BR TO EXIT IF NOT
 2933  013426  012762  110000  000016        MOV     #BIT15!BIT12,16(R2)  ;SET UNSAFE STATUS ERROR INDICATOR
 2934  013434  000460                        BR      9$              ;BRANCH TO EXIT
 2935  013436  012746  000111          1$:   MOV     #111,-(SP)      ;LOAD COMMAND ONTO THE STACK
 2936  013442  004037  017374              JSR     R0,WRT.RP       ;LOAD THE REGISTER
 2937  013446  000000                        RPCS1                   ;REGISTER INCREMENT
 2938  013450  013560                        6$                      ;ERROR RETURN ADDRESS
 2939  013452  032714  004000              BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
 2940  013456  001427                        BEQ     5$              ;BR IF NOT
 2941  013460  122762  000150  000002        CMPB    #150,2(R2)      ;IS THE REQUEST FOR I O?
 2942  013466  002403                        BLT     2$              ;YES--BRANCH
 2943  013470  004737  014022              JSR     PC,CI4          ;CALL THE COMMAND INITIATOR
 2944  013474  000440                        BR      8$              ;BRANCH TO EXIT
 2945  013476  005737  012232          2$:   TST     DTUW            ;DATA TRANSFER UNDERWAY?
 2946  013502  002012                        BGE     4$              ;YES--GO START A SEARCH
 2947  013504  005737  012210              TST     SEEKFG          ;DO IMPLIED SEEKS?
 2948  013510  100404                        BMI     3$              ;YES---BRANCH
 2949  013512  004037  014772              JSR     R0,LA           ;NO--DO LOOK AHEAD
 2950  013516  000427                        BR      8$              ;RETURN HERE ON A PARITY ERROR
 2951  013520  000403                        BR      4$              ;GO START A SEARCH
 2952  013522  004737  013606          3$:   JSR     PC,CI1          ;START A DATA TRANSFER
 2953  013526  000423                        BR      8$
 2954  013530  004737  013714          4$:   JSR     PC,CI3          ;START A SEARCH
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 2955  013534  000420                        BR      8$                      ;GO TO THE EXIT
 2956  013536  112761  177777  012150  5$:   MOVB    #-1,DPRQS(R1)           ;SET PORT REQUEST INDICATOR
 2957  013544  010103                        MOV     R1,R3                   ;SET UP TO ADDRESS WORDS
 2958  013546  006303                        ASL     R3                      ;CONVERT TO WORD INDEX
 2959  013550  012763  023420  012212        MOV     #10000.,TIMER(R3)       ;START 10 SEC TIMER
 2960  013556  000402                        BR      7$                      ;EXIT
 2961  013560  004737  014436          6$:   JSR     PC,CI7                  ;PROCESS THE PARITY ERROR
 2962  013564  032714  000100          7$:   BIT     #BIT06,(R4)             ;SEE IF 'IE' ALREADY SET
 2963  013570  001002                        BNE     8$                      ;BR IF SET
 2964  013572  004737  017704                JSR     PC,SET.IE               ;SET "IE" WITHOUT A "TRE"
 2965  013576  012637  177776          8$:   MOV     (SP)+,@#PS              ;RESTORE PROC. STATUS
 2966  013602  104413                        RESREG                          ;RESTORE R0 - R5
 2967  013604  000207                        RTS     PC
 2968
 2969                                  ;COMMAND INITIATOR
 2970                                  ;
 2971                                  ;CALL
 2972                                  ;       MOV     #DRVNUM,R1              ;DRIVE NUMBER
 2973                                  ;       MOV     #DPB,R2                 ;ADDRESS OF DPB
 2974                                  ;       JSR     PC,CI?                  ;CI?= CI1,CI3, OR CI4
 2975                                  ;                                       ;WHERE:
 2976                                  ;                                       ;CI1=DATA TRANSFER
 2977                                  ;                                       ;CI2=SEARCH REQUESTED BY DATA XFER
 2978                                  ;                                       ;CI4=NOT DATA TRANSFER
 2979
 2980  013606  004737  020444          CI1:   JSR     PC,POPQUE               ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
 2981  013612  010237  012160                 MOV     R2,TRNSWT               ;PUT REQ. IN TRANSFER WAIT QUEUE
 2982  013616  010203                        MOV     R2,R3                   ;DPB ADDRESS TO R3
 2983  013620  013704  012246                MOV     RPADR,R4                ;RPCS1 ADDRESS
 2984  013624  010164  000010                MOV     R1,RPCS2(R4)            ;SELECT DRIVE
 2985  013630  062703  000004                ADD     #4,R3                   ;DESIRED WORD COUNT
 2986  013634  062704  000002                ADD     #2,R4                   ;RPWC ADDRESS
 2987  013640  012324                        MOV     (R3)+,(R4)+             ;LOAD WORD COUNT
 2988  013642  012324                        MOV     (R3)+,(R4)+             ;LOAD BUFFER ADDRESS
 2989  013644  012346                        MOV     (R3)+,-(SP)             ;LOAD SECTOR AND TRACK
 2990  013646  004037  017374                JSR     R0,WRT.RP               ;CALL THE LOAD(WRITE) ROUTINE
 2991  013652  000006                        RPDA                            ;INDEX OF REGISTER TO LOAD
 2992  013654  014436                        CI7                             ;ERROR RETURN ADDRESS
 2993  013656  012346                        MOV     (R3)+,-(SP)             ;LOAD CYLINDER ADDRESS
 2994  013660  004037  017374                JSR     R0,WRT.RP
 2995  013664  000034                        RPCA
 2996  013666  014436                        CI7
 2997  013670  016246  000002                MOV     2(R2),-(SP)             ;LOAD "COMMAND+30", "A17&A16", AND "FSEL"
 2998  013674  004037  017374                JSR     R0,WRT.RP
 2999  013700  000000                        RPCS1:
 3000  013702  014436                        CI7
 3001  013704  010137  012232                MOV     R1,DTUW                 ;SET "DATA TRANSFER UNDERWAY"
 3002  013710  000137  014400                JMP     CI5
 3003  013714  013704  012246          CI3:   MOV     RPADR,R4                ;RPCS1 ADDRESS
 3004  013720  010164  000010                MOV     R1,RPCS2(R4)            ;SELECT DRIVE
 3005  013724  016246  000012                MOV     12(R2),-(SP)            ;DESIRED CYLINDER ADDRESS
 3006  013730  004037  017374                JSR     R0,WRT.RP
 3007  013734  000034                        RPCA
 3008  013736  014436                        CI7
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 3009  013740  116203  000010                MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
 3010  013744  163703  012262                SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
 3011  013750  002002                       BGE     1$
 3012  013752  062703  000026                ADD     #22.,R3
 3013  013756  010346              1$:       MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
 3014  013760  116266  000011  000001       MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
 3015  013766  004037  017374                JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
 3016  013772  000006                       RPDA
 3017  013774  014436                       CI7
 3018  013776  012746  000131                MOV     #131,-(SP)      ;START A SEARCH
 3019  014002  004037  017374                JSR     R0,WRT.RP
 3020  014006  000000                       RPCS1
 3021  014010  014436                       CI7
 3022  014012  156137  012234  012152       BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
 3023  014020  000567                       BR      CI5
 3024  014022  013704  012246        CI4:  MOV     RPADR,R4        ;RPCS1 ADDRESS
 3025  014026  010164  000010                MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 3026  014032  116203  000002                MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
 3027  014036  122703  000131                CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
 3028  014042  001007                       BNE     1$              ;BRANCH IF NO
 3029  014044  016246  000010                MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
 3030  014050  004037  017374                JSR     R0,WRT.RP
 3031  014054  000006                       RPDA
 3032  014056  014436                       CI7
 3033  014060  000403                       BR      2$              ;GO LOAD CYLINDER
 3034  014062  122703  000105        1$:   CMPB    #105,R3         ;IS IT A SEEK COMMAND
 3035  014066  001007                       BNE     3$              ;BRANCH IF NO
 3036  014070  016246  000012        2$:   MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
 3037  014074  004037  017374                JSR     R0,WRT.RP
 3038  014100  000034                       RPCA
 3039  014102  014436                       CI7
 3040  014104  000546                       BR      CI6
 3041  014106  122703  000115        3$:   CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
 3042  014112  001013                       BNE     4$              ;BR IF NO
 3043  014114  004037  017214                JSR     R0,RD.RP        ;MERGE THE OFFSET VALUE INTO RPOF
 3044  014120  000032                       RPOF                    ;BUT DON'T CHANGE THE UPPER
 3045  014122  014436                       CI7
 3046  014124  116216  000001                MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
 3047  014130  004037  017374                JSR     R0,WRT.RP       ;REGISTER (RPOF)
 3048  014134  000032                       RPOF
 3049  014136  014436                       CI7
 3050  014140  000530                       BR      CI6             ;GO START THE COMMAND
 3051  014142  122703  000107        4$:   CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
 3052  014146  001525                       BEQ     CI6             ;BRANCH IF YES
 3053  014150  122703  000117                CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
 3054  014154  001522                       BEQ     CI6             ;BRANCH IF YES
 3055  014156  122703  000103                CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
 3056  014162  001016                       BNE     5$              ;BRANCH IF NO
 3057  014164  112761  000001  012110       MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
 3058  014172  105061  012120                CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
 3059  014176  112761  000001  012166       MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
 3060  014204  010346                       MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
 3061  014206  004037  017374                JSR     R0,WRT.RP
 3062  014212  000030                       RPCS1
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 3063  014214  014436                          CI7
 3064  014216  000207                          RTS     PC                      ;RETURN TO USER
 3065  014220  122703  000143          5$:     CMPB    #143,R3                 ;IS IT A "SET FORMAT" COMMAND?
 3066  014224  001014                          BNE     6$                      ;BRANCH IF NO
 3067  014226  004037  017214                  JSR     R0,RD.RP                ;READ THE OFFSET REGISTER
 3068  014232  000032                          RPOF
 3069  014234  014436                          CI7
 3070  014236  116266  000001  000001          MOVB    1(R2),1(SP)             ;COMBINE "FMT22", "ECI", AND "HCI"
 3071  014244  004037  017374                  JSR     R0,WRT.RP               ;LOAD "FMT22", "ECI", AND/OR "HCI".
 3072  014250  000032                          RPOF
 3073  014252  014436                          CI7
 3074  014254  000436                          BR      12$
 3075  014256  122703  000141          6$:     CMPB    #141,R3                 ;IS IT A "GET REGISTER" COMMAND?
 3076  014262  001023                          BNE     10$                     ;BRANCH IF NO
 3077  014264  016203  000006          7$:     MOV     6(R2),R3                ;POINTS TO 1ST ADDRESS OF WHERE
 3078                                                                          ;TO PUT THE REGISTER(S)
 3079  014270  116237  000010  014306          MOVB    10(R2),9$               ;INIT. THE INDEX FOR THE FIRST REG
 3080  014276  116205  000011                  MOVB    11(R2),R5               ;INDEX OF LAST REG. TO MOVE
 3081  014302  004037  017214          8$:     JSR     R0,RD.RP                ;READ RP04/5/6 REGISTER
 3082  014306  000000          9$:     RPCS1                                   ;INDEX OF REG. TO READ
 3083  014310  014436                          CI7
 3084  014312  012623                          MOV     (SP)+,(R3)+             ;GET THE CONTENTS OF RH11 RP04-5 6 REG.
 3085  014314  023705  014306                  CMP     9$,R5                   ;LAST REG. BEEN READ?
 3086  014320  001414                          BEQ     12$                     ;GET OUT IF YES
 3087  014322  062737  000002  014306          ADD     #2,9$                   ;INCREASE THE INDEX BY 2
 3088  014330  000764                          BR      8$                      ;LOOP--MORE TO READ
 3089  014332  122703  000145          10$:    CMPB    #145,R3                 ;IS IT A "SELECT DRIVE" COMMAND?
 3090  014336  001405                          BEQ     12$                     ;BRANCH IF YES
 3091  014340  010346                  11$:    MOV     R3,-(SP)                ;LOAD THE COMMAND
 3092  014342  004037  017374                  JSR     R0,WRT.RP
 3093  014346  000000                          RPCS1
 3094  014350  014436                          CI7
 3095  014352  004737  020444          12$:    JSR     PC,POPQUE               ;REMOVE REQ. FROM QUEUE
 3096  014356  052762  000200  000016          BIS     #BIT07,16(R2)           ;SET THE "DONE" BIT
 3097  014364  005737  012206                  TST     SAVEFG                  ;SAVE THE RH11/RP04/5/6 REGISTERS?
 3098  014370  100002                          BPL     13$                     ;BRANCH IF NO
 3099  014372  004737  017566                  JSR     PC,SVRH11               ;YES--GO SAVE THE REGISTERS
 3100  014376  000207                  13$:    RTS     PC                      ;RETURN TO USER
 3101  014400  006301                  CI5:    ASL     R1
 3102  014402  012761  001750  012212          MOV     #1000.,TIMER(R1)        ;SET A ONE SECOND TIMER
 3103  014410  006201                          ASR     R1
 3104  014412  112761  000001  012110          MOVB    #1,DRVACT(R1)           ;SET THE DRIVE ACTIVE
 3105  014420  000207                          RTS     PC                      ;RETURN TO THE USER
 3106  014422  010346                  CI6:    MOV     R3,-(SP)                ;LOAD THE COMMAND
 3107  014424  004037  017374                  JSR     R0,WRT.RP
 3108  014430  000000                          RPCS1
 3109  014432  014436                          CI7
 3110  014434  000761                          BR      CI5
 3111  014436  032764  010000  000010  CI7:    BIT     #BIT12,RPCS2(R4)        ;DRIVE NON-EXISTENT ?
 3112  014444  001034                          BNE     CI8                     ;BR IF YES
 3113  014446  005702                  1$:     TST     R2                      ;ANYTHING IN QUEUE ?
 3114  014450  001405                          BEQ     CI7B                    ;BR IF NOT
 3115  014452  012762  104000  000016          MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
 3116  014460  004737  017566                  JSR     PC,SVRH11               ;GO SAVE THE RH11 RP04 5 6 REGISTERS
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 3117  014464  012746  000111          CI7B:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
 3118  014470  004037  017374                  JSR     R0,WRT.RP
 3119  014474  000000                          RPCS1
 3120  014476  014536                          CI8
 3121  014500  004737  020326                  JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
 3122  014504  105061  012166                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
 3123  014510  105061  012110                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
 3124  014514  020137  012232                  CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
 3125  014520  001005                          BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
 3126  014522  005037  012160                  CLR     TRNSWT
 3127  014526  012737  177777  012232          MOV     #-1,DTJW
 3128  014534  000207                  1$:     RTS     PC
 3129  014536  104412                  CI8:    SAVREG                  ;SAVE R0 - R5
 3130  014540  032764  010000  000010          BIT     #BIT12,RPCS2(R4)  ;IS 'NED' SET ?
 3131  014546  001002                          BNE     1$              ;BR IF YES
 3132  014550  005001                          CLR     R1
 3133  014552  005003                          CLR     R3
 3134  014554  105761  012110          1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
 3135  014560  001443                          BEQ     5$              ;BRANCH IF NO
 3136  014562  013702  012160                  MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
 3137  014566  020137  012232                  CMP     R1,DTJW         ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
 3138  014572  001402                          BEQ     2$              ;BRANCH IF YES
 3139  014574  004737  020422                  JSR     PC,GETREQ       ;GET THE DPB POINTER
 3140  014600  005702                  2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
 3141  014602  001415                          BEQ     4$              ;BR IF NOT
 3142  014604  032764  010000  000010          BIT     #BIT12,RPCS2(R4)  ;'NED' SET ?
 3143  014612  001404                          BEQ     3$              ;BR IF NOT
 3144  014614  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;SET 'DRIVE NON-EXISTENT' INDICATOR
 3145  014622  000405                          BR      4$              ;CONTINUE
 3146  014624  012762  102000  000016  3$:     MOV     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
 3147  014632  004737  017566                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
 3148  014636  012763  177777  012212  4$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 3149  014644  105061  012110                  CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
 3150  014650  020137  012232                  CMP     R1,DTUW         ;IS THIS DRIVE SETUP FOR A TRANSFER
 3151  014654  001005                          BNE     5$              ;BR IF NOT
 3152  014656  012737  177777  012232          MOV     #-1,DTUW        ;RESET THE INDICATOR
 3153  014664  005037  012160                  CLR     TRNSWT          ;CLEAR THE TRANSFER QUEUE
 3154  014670  105061  012166          5$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
 3155  014674  032764  010000  000010          BIT     #BIT12,RPCS2(R4)  ;'NED' SET ?
 3156  014702  001021                          BNE     6$              ;BR IF YES
 3157  014704  005201                          INC     R1              ;MOVE TO THE NEXT DRIVE
 3158  014706  062703  000002                  ADD     #2,R3
 3159  014712  042701  177770                  BIC     #^C7,R1
 3160  014716  001316                          BNE     1$              ;BRANCH IF MORE DRIVES
 3161  014720  012737  177777  012232          MOV     #-1,DTJW        ;NO DATA TRANSFERS UNDERWAY
 3162  014726  005037  012160                  CLR     TRNSWT          ;CLEAR THE 'TRANSFER WAIT' QUEUE
 3163  014732  004737  020250                  JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
 3164  014736  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ;DO A MASSBUS INIT.
 3165  014744  000406                          BR      7$              ;CONTINUE
 3166  014746  004737  020326          6$:     JSR     PC,EMPTYQ       ;CLEAR THE DRIVE'S QUEUE
 3167  014752  105061  012120                  CLRB    DRVSTA(R1)      ;SET DRIVE TO OFFLINE
 3168  014756  105061  012130                  CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
 3169  014762  004737  017704          7$:     JSR     PC,SET.IE       ;SET "IE" WITHOUT "TRE"
 3170  014766  104413                          RESREG                  ;RESTORE R0 - R5
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3171  014770  000207                          RTS     PC          ;RETURN
3172
3173                                  ;LOOK AHEAD ROUTINE
3174                                  ;
3175                                  ;CALL
3176                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
3177                                  ;       MOV     #DPB,R2         ;POINT TO DPB
3178                                  ;       JSR     R0,LA           ;GO CHECK THE WINDOW
3179                                  ;       RETURN1                 ;ERROR RETURN
3180                                  ;       RETURN2                 ;START A SEARCH
3181                                  ;       RETURN3                 ;START A DATA TRANSFER
3182
3183  014772  013704  012246          LA:     MOV     RPADR,R4        ;GET RPCS1'S ADDRESS
3184  014776  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3185  015002  004037  017214                  JSR     R0,RD.RP        ;READ CURRENT CYLINDER
3186  015006  000036                          RPCC
3187  015010  015122                          4$                      ;ERROR RETURN ADDRESS
3188  015012  022662  000012                  CMP     (SP)+,12(R2)    ;IS CURRENT CYLINDER=DESIRED
3189                                                                  ;CYLINDER?
3190  015016  001037                          BNE     3$              ;EXIT IF NO
3191  015020  105261  012176                  INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
3192  015024  126137  012176  012254          CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
3193  015032  003026                          BGT     2$              ;BRANCH IF YES
3194  015034  116203  000010                  MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
3195  015040  000303                          SWAB    R3              ;MULT. BY 64--ALIGN WITH
3196  015042  006203                          ASR     R3              ;LOOK AHEAD REGISTER
3197  015044  006203                          ASR     R3
3198  015046  012737  000340  177776          MOV     #340,@#PS       ;PRIORITY LEVEL "7"
3199  015054  004037  017214                  JSR     R0,RD.RP        ;READ LOOK AHEAD REGISTER
3200  015060  000020                          RPLA
3201  015062  015122                          4$
3202  015064  162603                          SUB     (SP)+,R3        ;CALCULATE THE DELTA
3203  015066  002002                          BGE     1$
3204  015070  062703  002600                  ADD     #(22.*64.),R3   ;MAKE THE DELTA POSITIVE
3205  015074  023703  012256          1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
3206  015100  002406                          BLT     3$              ;IF IT IS WITHIN THE
3207  015102  023703  012260                  CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
3208  015106  002003                          BGE     3$              ;THE LOOK AHEAD COUNT
3209  015110  105061  012176          2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
3210  015114  005720                          TST     (R0)+
3211  015116  005720                  3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
3212  015120  000402                          BR      5$              ;EXIT
3213  015122  004737  014436          4$:     JSR     PC,CI7          ;PROCESS THE ERROR
3214  015126  000200                  5$:     RTS     R0              ;RETURN
3215
3216                                  ;INTERRUPT SERVICE ROUTINE
3217
3218  015130  112737  000001  012164  ISR:    MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
3219  015136  104412                          SAVREG                  ;SAVE R0 - R5
3220  015140  013704  012246                  MOV     RPADR,R4        ;ADDRESS OF RHSCS1
3221  015144  013701  012232                  MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
3222  015150  002403                          BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
3223  015152  004737  015174                  JSR     PC,TD           ;CALL TRANSFER DONE
3224  015156  000402                          BR      2$              ;EXIT
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3225  015160  004737  015334          1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
3226  015164  104413                  2$:     RESREG                  ;RESTORE R0 - R5
3227  015166  105037  012164                  CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
3228  015172  000002                          RTI                     ;RETURN
3229
3230                                  ;TRANSFER DONE ROUTINE
3231
3232  015174  105061  012110          TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
3233  015200  012737  177777  012232          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
3234  015206  006301                          ASL     R1
3235  015210  012761  177777  012212          MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
3236  015216  006201                          ASR     R1
3237  015220  013702  012160                  MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
3238  015224  005037  012160                  CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
3239  015230  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET DONE
3240  015236  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
3241  015242  004037  017214                  JSR     R0,RD.RP        ;TRANSFER ERROR(TRE=1)?
3242  015246  000000                          RPCS1
3243  015250  014436                          CI7
3244  015252  006126                          ROL     (SP)+
3245  015254  100413                          BMI     3$              ;BR IF YES
3246  015256  005737  012206                  TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
3247  015262  100002                          BPL     1$              ;BRANCH IF NO
3248  015264  004737  017566                  JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
3249  015270  004737  013326          1$:     JSR     PC,OPT          ;CALL OPTIMIZER
3250  015274  000417                          BR      SC              ;CHECK OTHER DRIVES
3251  015276  012714  000113          2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
3252  015302  000414                          BR      SC              ;CHECK FOR OTHER DRIVES
3253  015304  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
3254  015312  004737  020326                  JSR     PC,EMPTYQ       ;EMPTY THE "DRIVE'S WAIT" QUEUE
3255  015316  004737  017566                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
3256  015322  012714  040111                  MOV     #40111,(R4)     ;ISSUE A "DRIVE CLEAR"
3257  015326  012714  000113                  MOV     #113,(R4)       ;ISSUE A RELEASE TO THE DRIVE
3258  015332  000400                          BR      SC              ;CHECK FOR OTHER DRIVES
3259
3260                                  ;SPECIAL CONDITION ROUTINE
3261
3262  015334  116403  000016          SC:     MOVB    RPAS(R4),R3     ;READ "RPAS"
3263  015340  001014                          BNE     2$              ;BRANCH IF ANY 'ATA' BITS SET
3264  015342  004037  017214                  JSR     R0,RD.RP        ;READ CONTROL AND STATUS REGISTER
3265  015346  000000                          RPCS1
3266  015350  014536                          CI8
3267  015352  106126                          ROLB    (SP)+           ;IS "IE"=1?
3268  015354  100405                          BMI     1$              ;YES, NO DRIVES TO CHECK
3269  015356  004037  020506                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
3270  015362  104001                          ERROR   1               ;REPORT AN ILLEGAL INTERRUPT
3271  015364  004737  017704                  JSR     PC,SET.IE       ;SET INTERRUPT ENABLE
3272  015370  000207          1$:     RTS     PC                      ;RETURN
3273  015372  005046          2$:     CLR     -(SP)                   ;PROCESS ALL DRIVES THAT HAVE
3274  015374  110316                          MOVB    R3,(SP)         ;AN "ATA"=1
3275  015376  012703  000001                  MOV     #1,R3
3276  015402  005001                          CLR     R1
3277  015404  030316          SC3:    BIT     R3,(SP)         ;ATA=1?
3278  015406  001005                          BNE     SC5             ;YES--BRANCH
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3279  015410  005201                    SC4:    INC     R1              ;MOVE TO THE NEXT DRIVE
3280  015412  106303                            ASLB    R3
3281  015414  001373                            BNE     SC3             ;BRANCH IF MORE TO CHECK?
3282  015416  005726                            TST     (SP)+           ;CLEAN OFF THE STACK
3283  015420  000207                            RTS     PC              ;RETURN TO USER
3284  015422  105761  012140          SC5:    TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
3285  015426  001402                            BEQ     1$              ;BR IF NOT
3286  015430  000137  016326                    JMP     SC13            ;PROCESS THE DRIVE
3287  015434  105761  012150          1$:     TSTB    DPRQS(R1)       ;PORT REQUEST OUTSTANDING ?
3288  015440  001402                            BEQ     2$              ;BR IF NOT
3289  015442  000137  016326                    JMP     SC13            ;START THE OUTSTANDING COMMAND
3290  015446  105761  012120          2$:     TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
3291  015452  003025                            BGT     5$              ;BRANCH IF ONLINE
3292  015454  105761  012166                    TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
3293  015460  003422                            BLE     5$              ;BRANCH IF NOT
3294  015462  004737  020422                    JSR     PC,GETREQ       ;GET DPB POINTER
3295  015466  004737  017566                    JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
3296  015472  004737  016256                    JSR     PC,SC12         ;SAVE RPDS1, RPER1, RPER2, AND RPER3
3297                                                                    ;ALSO DO A DRIVE INIT (DRVINT)
3298  015476  105761  012120                    TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
3299  015502  003416                            BLE     6$              ;NO---BRANCH
3300  015504  032737  040000  012100          BIT     #BIT14,RPERRS   ;WAS THERE AN ERROR?
3301  015512  001002                            BNE     3$              ;BR IF ERROR
3302  015514  000137  016166                    JMP     SC11            ;NO ERROR
3303  015520  013705  012102          3$:     MOV     RPERRS+2,R5     ;YES -- PICKUP RPER1 AND
3304  015524  000502                            BR      SC6A            ;GO PROCESS THE ERROR
3305  015526  105761  012110          5$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
3306  015532  001033                            BNE     SC6             ;BR IF EITHER
3307  015534  004737  016256                    JSR     PC,SC12         ;SAVE RPDS1, RPER1, RPER2, AND RPER3
3308                                                                    ;ALSO DO A DRVINT
3309  015540  105761  012140          6$:     TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE ?
3310  015544  001321                            BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
3311  015546  105761  012120                    TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
3312  015552  100412                            BMI     7$              ;BR IF UNSAFE
3313  015554  032737  020000  012106          BIT     #BIT13,RPERRS+6 ;ADDRESS PLUG CHANGED ?
3314  015562  001013                            BNE     8$              ;BR IF YES
3315  015564  012746  000113                    MOV     #113,-(SP)      ;RELEASE COMMAND
3316  015570  004037  017374                    JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
3317  015574  000000                            RPCS1                   ;REGISTER INDEX
3318  015576  016136                            SC8                     ;PARITY EXIT ADDRESS
3319  015600  011605                    7$:     MOV     (SP),R5         ;PICKUP (RPAS) BEFORE THE ERROR CALL
3320  015602  004037  020506                    JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
3321  015606  104002                            ERROR   2               ;REPORT THE UNEXPECTED ATTENTION
3322  015610  000677                            BR      SC4             ;GO CHECK FOR MORE ATA'S
3323  015612                            8$:
3324  015612  004037  020506                    JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
3325  015616  104005                            ERROR   5               ;REPORT THE ADDRESS PLUG CHANGE
3326  015620  000673                            BR      SC4             ;CHECK FOR MORE DRIVES
3327  015622  006301                    SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
3328  015624  012761  177777  012212          MOV     #-1,TIMER(R1)   ;STOP THE TIMER
3329  015632  006201                            ASR     R1              ;RESTORE THE DRIVE ADDRESS
3330  015634  004737  020422                    JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
3331  015640  010164  000010                    MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3332  015644  004037  017214                    JSR     R0,RD.RP        ;READ THE RP04'S STATUS REG.
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3333  015650  000012                          RPDS1
3334  015652  016136                          SC8
3335  015654  011605                          MOV     (SP),R5         ;AND PUT IT IN R5
3336  015656  006126                          ROL     (SP)+           ;WAS THERE AN ERROR?
3337  015660  100407                          BMI     1$              ;BR IF ERROR
3338  015662  105761  012110                  TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
3339  015666  003137                          BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
3340  015670  052762  100210  000016          BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
3341  015676  000470                          BR      SC7
3342  015700  004037  017214          1$:     JSR     R0,RD.RP        ;READ ERROR REGISTER #1
3343  015704  000014                          RPER1
3344  015706  016136                          SC8
3345  015710  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
3346  015712  004737  017566                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
3347  015716  012746  000111                  MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
3348  015722  004037  017374                  JSR     R0,WRT.RP
3349  015726  000000                          RPCS1   .
3350  015730  016136                          SC8
3351  015732  006105                  SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
3352  015734  100406                          BMI     1$              ;BRANCH IF YES
3353  015736  005702                          TST     R2              ;ANYTHING IN QUEUE ?
3354  015740  001447                          BEQ     SC7             ;BR IF NOT
3355  015742  052762  100240  000016          BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
3356  015750  000443                          BR      SC7
3357  015752  004037  017214          1$:     JSR     R0,RD.RP        ;READ DRIVE STATUS REG. #1
3358  015756  000012                          RPDS1
3359  015760  016136                          SC8
3360  015762  011605                          MOV     (SP),R5         ;SAVE RPDS1 IN R5
3361  015764  006126                          ROL     (SP)+           ;"ERR"=1?
3362  015766  100011                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
3363  015770  112761  177777  012120          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
3364  015776  004737  017566                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
3365  016002  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
3366  016010  000423                          BR      SC7
3367  016012  032705  010000          2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
3368  016016  001015                          BNE     3$              ;BR IF YES
3369  016020  112761  177777  012110          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
3370  016026  112761  000001  012120          MOVB    #1,DRVSTA(R1)   ;ONLINE
3371  016034  006301                          ASL     R1
3372  016036  012761  072460  012212          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
3373  016044  006201                          ASR     R1
3374  016046  000137  015410                  JMP     SC4
3375  016052  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
3376  016060  105061  012110          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
3377  016064  004737  020326                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
3378  016070  105761  012166                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS OR QUEUE?
3379  016074  003002                          BGT     1$              ;BR IF NOT
3380  016076  105061  012166                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
3381  016102  116164  012234  000016  1$:     MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
3382  016110  105761  012120                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
3383  016114  100406                          BMI     2$              ;BR IF IT IS
3384  016116  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
3385  016122  004037  017374                  JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
3386  016126  000000                          RPCS1                   ;REGISTER INDEX
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3387  016130  016136                        SC8                     ;PARITY EXIT ADDRESS
3388  016132  000137  015410          2$:   JMP     SC4               ;CHECK FOR MORE DRIVES
3389  016136  105761  012110          SC8:  TSTB    DRVACT(R1)        ;IS DRIVE IDLE?
3390  016142  001405                        BEQ     1$                ;YES--BRANCH
3391  016144  004737  020422                JSR     PC,GETREQ         ;GET DPB POINTER
3392  016150  004737  014436                JSR     PC,CI7            ;PROCESS THE PARITY ERROR
3393  016154  000402                        BR      2$                ;CONTINUE
3394  016156  004737  014464          1$:   JSR     PC,CI7B           ;PROCESS THE UNCORRECTABLE PARITY ERROR
3395  016162  000137  015410          2$:   JMP     SC4               ;CHECK MORE DRIVES
3396  016166  105761  012166          SC11: TSTB    ULDFLG(R1)        ;"UNLOAD IN PROGRESS"?
3397  016172  003402                        BLE     1$                ;BRANCH IF NO
3398  016174  105061  012166                CLRB    ULDFLG(R1)        ;CLEAR UNLOAD FLAG
3399  016200  105061  012110          1$:   CLRB    DRVACT(R1)        ;SET DRIVE IDLE
3400  016204  136137  012234  012162        BITB    ATABIT(R1),SRCHWT ;DOING A SEARCH OPERATION FOR
3401                                                                  ;AN I/O COMMAND?
3402  016212  001012                        BNE     2$                ;BRANCH IF YES
3403  016214  004737  020444                JSR     PC,POPQUE         ;REMOVE REQUEST FROM QUEUE
3404  016220  052762  000200  000016        BIS     #BIT07,16(R2)     ;SET "DONE" BIT
3405  016226  005737  012206                TST     SAVEFG            ;SAVE THE REGISTERS?
3406  016232  100002                        BPL     2$                ;BRANCH IF NO
3407  016234  004737  017566                JSR     PC,SVRH11         ;YES--SAVE ALL OF THE RH11/RP04/5/6 REG'S
3408  016240  116164  012234  000016  2$:   MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
3409  016246  004737  013326                JSR     PC,OPT            ;START A REQUEST
3410  016252  000137  015410                JMP     SC4               ;CHECK FOR MORE DRIVES
3411  016256  010164  000010          SC12: MOV     R1,RPCS2(R4)      ;SELECT DRIVE
3412  016262  016437  000012  012100        MOV     RPDS1(R4),RPERRS        ;SAVE THE FOUR REGISTERS THAT
3413  016270  016437  000014  012102        MOV     RPER1(R4),RPERRS+2      ;WILL TELL US SOMETHING
3414  016276  016437  000040  012104        MOV     RPER2(R4),RPERRS+4
3415  016304  016437  000042  012106        MOV     RPER3(R4),RPERRS+6
3416  016312  004037  012476                JSR     R0,DRVINT         ;INIT. THE STATE OF THE DRIVE
3417  016316  000401                        BR      1$                ;TAKE ERROR EXIT
3418  016320  000207  . . .                 RTS     PC                ;RETURN
3419  016322  005726                  1$:   TST     (SP)+             ;POP PC OFF OF THE STACK
3420  016324  000704                        BR      SC8               ;PROCESS THE PARITY ERROR
3421  016326  006301                  SC13: ASL     R1                ;SETUP TO ADDRESS WORDS
3422  016330  012761  177777  012212        MOV     #-1,TIMER(R1)     ;STOP THE TIMER
3423  016336  006201                        ASR     R1                ;
3424  016340  010164  000010                MOV     R1,RPCS2(R4)      ;SELECT THE DRIVE
3425  016344  116164  012234  000016        MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR THE ATTENTION BIT
3426  016352  032714  004000                BIT     #BIT11,(R4)       ;DRIVE AVAILABLE ?
3427  016356  001006                        BNE     1$                ;BR IF AVAILABLE
3428  016360  006301                        ASL     R1
3429  016362  012761  023420  012212        MOV     #10000.,TIMER(R1)  ;START 10 SEC TIMER AGAIN
3430  016370  006201                        ASR     R1
3431  016372  000433                        BR      3$                ;EXIT
3432  016374  105761  012140          1$:   TSTB    DPINT(R1)         ;INITIALIZING THE DRIVE ?
3433  016400  001424                        BEQ     2$                ;BR IF NOT
3434  016402  105061  012140                CLRB    DPINT(R1)         ;CLEAR THE INIT INDICATOR
3435  016406  004037  012476                JSR     R0,DRVINT         ;GO INIT THE DRIVE
3436  016412  000240                        NOP                       ;DUMMY PARITY ERROR RETURN
3437  016414  105761  012120                TSTB    DRVSTA(R1)        ;DRIVE ONLINE ?
3438  016420  003014                        BGT     2$                ;BR IF YES -- START ORDER
3439  016422  005702                        TST     R2                ;QUEUE ENTRY FOR THE DRIVE
3440  016424  001416                        BEQ     3$                ;BR IF NOT
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                016426  004737  020422                  JSR     PC,GETREQ       ;GET DPB ADDRESS
                016432  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM USER THAT DRIVE OFFLINE
                016440  004737  017566                  JSR     PC,SVRH11       ;SAVE THE REGISTERS
                016444  004737  020326                  JSR     PC,EMPTYQ       ;EMPTY THE REQUEST QUEUE
                016450  000404                          BR      3$
                016452  105061  012150          2$:     CLRB    DPRQS(R1)       ;CLEAR THE PORT REQUEST INDICATOR
                016456  004737  013326                  JSR     PC,OPT          ;START THE PENDING REQUEST
                016462  000137  015410          3$:     JMP     SCH             ;PROCESS OTHER DRIVES

                                                ;RP04/5/6 TIMER ROUTINE
                                                ;CALL
                                                ;       MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
                                                ;       JSR     PC,RPTMR        ;CALL RP04/5/6 TIME ROUTINE

                016466  005737  012164          RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
                016472  001030                          BNE     4$              ;IF NON ZERO EXIT
                016474  112737  000001  012165          MOVB    #1,ACTSTR       ;SET "ACTSTR"
                016502  104412                          SAVREG                  ;SAVE R0 - R5
                016504  005001                          CLR     R1              ;START WITH DRIVE 0
                016506  005003                          CLR     R3
                016510  005763  012212          1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
                016514  002407                          BLT     2$              ;BRANCH IF NO
                016516  166663  000002  012212          SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
                016524  003003                          BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
                016526  004737  016560                  JSR     PC,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
                016532  000405                          BR      3$              ;GO TO THE EXIT
                016534  005201          2$:     INC     R1              ;MOVE TO NEXT DRIVE
                016536  005723                          TST     (R3)+
                016540  022701  000010                  CMP     #8.,R1          ;OUT OF DRIVES?
                016544  003361                          BGT     1$              ;BRANCH IF NO
                016546  104413          3$:     RESREG                  ;RESTORE R0 - R5
                016550  105037  012165                  CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
                016554  012616          4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
                016556  000207                          RTS     PC              ;RETURN

                                                ;SOFTWARE TIMEOUT ROUTINE
                                                ;
                                                ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
                                                ;       OR GREATER
                                                ;
                                                ;CALL:  STO
                                                ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                                ;       JSR     PC,STO          ;CALL
                                                ;       RETURN

                016560  010146          STO:    MOV     R1,-(SP)        ;SAVE R1
                016562  010346                  MOV     R3,-(SP)        ;SAVE R3
                016564  013704  012246          MOV     RPADR,R4        ;GET ADDRESS OF "RPCS1"
                016570  010164  000010          MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
                016574  004037  017214          JSR     R0,RD.RP        ;READ "DRIVE STATUS REG"
                016600  000012                  RPDS1
                016602  017102                  STO5
                016604  105726                  TSTB    (SP)+           ;IS "DRY"=1?
                016606  100477                  BMI     STO2            ;BR IF YES
```

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 3495  016610  105761  012140          ST01:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
 3496  016614  001074                  BNE     ST02            ;BR IF YES
 3497  016616  105761  012150          TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 3498  016622  001071                  BNE     ST02            ;BR IF YES
 3499  016624  013702  012160          MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
 3500  016630  020137  012232          CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
 3501  016634  001402                  BEQ     1$              ;BRANCH IF YES
 3502  016636  004737  020422          JSR     PC,GETREQ       ;GET DPB ADDRESS
 3503  016642  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
 3504  016650  004737  017566          JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
 3505  016654  012764  000040  000010  MOV     #BIT05,RPCS2(R4) ;"INIT" THE MASS BUS
 3506  016662  105061  012110          CLRB    DRVACT(R1)      ;DRIVE IS IDLE
 3507  016666  105061  012166          CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
 3508  016672  005001                  CLR     R1              ;START WITH DRIVE 0
 3509  016674  005003                  CLR     R3
 3510  016676  004037  012476          2$:     JSR     R0,DRVINT       ;INIT. THIS DRIVE
 3511  016702  000477                  BR      ST05            ;PARITY ERROR RETURN
 3512  016704  105761  012110          TSTB    DRVACT(R1)      ;DRIVE IDLE BEFORE THE INIT.?
 3513  016710  001414                  BEQ     4$              ;YES--BRANCH
 3514  016712  013702  012160          MOV     TRNSWT,R2       ;GET TRANSFER WAIT QUEUE
 3515  016716  023701  012232          CMP     DTUW,R1         ;WAS THERE I/O ON THIS DRIVE?
 3516  016722  001402                  BEQ     3$              ;YES--BRANCH
 3517  016724  004737  020422          JSR     PC,GETREQ       ;GET THE DPB POINTER FROM QUEUE
 3518  016730  052762  100400  000016  3$:     BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT.
 3519  016736  105061  012110          CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE TO IDLE
 3520  016742  105061  012166          4$:     CLRB    ULDFLG(R1)      ;NO UNLOAD
 3521  016746  012763  177777  012212  MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 3522  016754  005723                  TST     (R3)+           ;UPDATE THE INDEX
 3523  016756  005201                  INC     R1              ;INCREMENT THE DRIVE NUMBER
 3524  016760  022701  000010          CMP     #8.,R1          ;LAST DRIVE BEEN CHECKED?
 3525  016764  003344                  BGT     2$              ;NO--LOOP
 3526  016766  012737  177777  012232  MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
 3527  016774  005037  012160          CLR     TRNSWT          ;CLEAR TRANSFER WAIT QUEJE
 3528  017000  004737  020250          JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
 3529  017004  000500                  BR      ST09            ;EXIT
 3530  017006  116405  000016          ST02:   MOVB    RPAS(R4),R5     ;READ ATTENTION REG
 3531  017012  136105  012234          BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
 3532  017016  001017                  BNE     ST03            ;YES--BRANCH
 3533  017020  105761  012140          TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
 3534  017024  001031                  BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
 3535  017026  105761  012150          TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 3536  017032  001045                  BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
 3537  017034  020137  012232          CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
 3538  017040  001263                  BNE     ST01            ;BR IF NO
 3539  017042  004037  017214          JSR     R0,RD.RP        ;YES--CHECK "RDY"
 3540  017046  000000                  RPCS1
 3541  017050  017102                  ST05
 3542  017052  105726                  TSTB    (SP)+
 3543  017054  100255                  BPL     ST01            ;BR IF "RDY"=0
 3544  017056  105761  012140          ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
 3545  017062  001003                  BNE     1$              ;BR IF INIT PENDING
 3546  017064  105761  012150          TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
 3547  017070  001446                  BEQ     ST09            ;BR IF NOT
 3548  017072  012763  177777  012212  1$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
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 3549  017100  000442                          BR      ST09            ;EXIT
 3550  017102  004737  014536          ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
 3551  017106  000437                          BR      ST09
 3552  017110  105061  012140          ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
 3553  017114  105061  012120                  CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
 3554  017120  012763  177777  012212          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 3555  017126  004737  020422                  JSR     PC,GETREQ       ;GET THE DPB ADDRESS
 3556  017132  005702                          TST     R2              ;REQUEST IN QUEUE ?
 3557  017134  001424                          BEQ     ST09            ;BR IF NOT
 3558  017136  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
 3559  017144  000414                          BR      ST08            ;FINISH
 3560  017146  012763  177777  012212  ST07:   MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 3561  017154  105061  012150                  CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
 3562  017160  004737  020422                  JSR     PC,GETREQ       ;GET DPB ADDRESS
 3563  017164  005702                          TST     R2              ;QUEUE ENTRY FOR DRIVE ?
 3564  017166  001407                          BEQ     ST09            ;BR IF NONE
 3565  017170  012762  100004  000016          MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
 3566  017176  004737  020326          ST08:   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
 3567  017202  004737  017566                  JSR     PC,SVRH11       ;SAVE THE REGISTERS
 3568  017206  012603                  ST09:   MOV     (SP)+,R3        ;RESTORE R3
 3569  017210  012601                          MOV     (SP)+,R1        ;RESTORE R1
 3570  017212  000207                          RTS     PC              ;RETURN
 3571:
 3572:                                  ;ROUTINE TO READ A RH11/RPC4/5/6 REGISTER
 3573:                                  ;
 3574:                                  ;CALL
 3575:                                  ;       JSR     R0,RD.RP        ;GO READ A REGISTER
 3576:                                  ;       INDEX                   ;REG. INDEX FROM BASE
 3577:                                  ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
 3578:                                  ;                               ;AT THIS ADDRESS
 3579:                                  ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
 3580:                                  ;
 3581  017214  013737  012244  017362  RD.RP:   MOV     MCPEMX,RD.RP2   ;MAX. RETRYS ALLOWED
 3582  017222  011646                          MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
 3583  017224  013737  012246  017240          MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
 3584  017232  062037  017240                  ADD     @R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
 3585  017236  013727                  RD.RP1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RPC4
 3586  017240  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
 3587  017242  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
 3588  017244  013766  017242  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
 3589  017252  013746  012246                  MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
 3590  017256  062716  000010                  ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
 3591  017262  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
 3592  017266  001037                          BNE     RD.RP3          ;BR IF DRIVE NON-EXISTENT
 3593  017270  017746  172752                  MOV     @RPADR,-(SP)    ;READ RPCS1
 3594  017274  032716  020000                  BIT     #BIT13,(SP)     ;DID MCPE SET?
 3595  017300  001002                          BNE     1$              ;BRANCH IF YES
 3596  017302  022620                          CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
 3597  017304  000432                          BR      RD.RP4          ;EXIT
 3598  017306                          1$:
 3599  017306  004037  020506                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN 'ESCAPE'
 3600  017312  104003                          ERROR   3               ;REPORT "MCPE" ERROR
 3601  017314  005737  012232                  TST     DTUW            ;DATA TRANSFER UNDERWAY?
 3602  017320  100425                          BMI     2$              ;NO--BRANCH
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 3603  017322  032716  040000                BIT     #BIT14,(SP)     ;NO--"TRE"=1?
 3604  017326  001402                        BEQ     2$              ;NO--BRANCH
 3605  017330  005726                        TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
 3606  017332  000415                        BR      RD.RP3          ;TAKE THE FATAL ERROR EXIT
 3607  017334  052716  040000          2$:   BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
 3608  017340  000316                        SWAB    (SP)            ;POSITION BEFORE WRITING
 3609  017342  013737  012246  017356        MOV     RPADR,3$        ;FORM ADDRESS OF HIGH BYTE
 3610  017350  005237  017356                INC     3$
 3611  017354  112637                        MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RPCS1
 3612  017356  000000                3$:     .WORD   0               ;ADDRESS STORAGE
 3613  017360  005337                        DEC     (PC)+           ;EXCEEDED MAX. RETRYS
 3614  017362  000003                RD.RP2: .WORD   3
 3615  017364  002324                        BGE     RD.RP1          ;BRANCH IF NO
 3616  017366  011000                RD.RP3: MOV     (R0),R0         ;FATAL ERROR EXIT
 3617  017370  012616                        MOV     (SP)+,(SP)
 3618  017372  000200                RD.RP4: RTS     R0
 3619
 3620                                        ;ROUTINE TO WRITE A REGISTER
 3621                                        ;
 3622                                        ;CALL
 3623                                        ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
 3624                                        ;       JSR     R0,WRT.RP       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
 3625                                        ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
 3626                                        ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
 3627                                        ;       RETURN                  ;ERROR FREE RETURN
 3628
 3629  017374  013737  012244  017550  WRT.RP: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
 3630  017402  016637  000002  017462          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
 3631  017410  012616                        MOV     (SP)+,(SP)      ;ADJUST THE STACK
 3632  017412  012037  017464                MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
 3633  017416  001015                        BNE     1$              ;BRANCH IF NOT RPCS1
 3634  017420  122737  000150  017462        CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
 3635  017426  002411                        BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
 3636  017430  004037  017214                JSR     R0,RD.RP        ;NO---COMBINE A16&A17, & PSEL WITH
 3637  017434  000000                        RPCS1                   ;THE COMMAND BEFORE SENDING IT TO
 3638  017436  017556                        WRT.R3                  ;THE RH11/RPC4
 3639  017440  000316                        SWAB    (SP)
 3640  017442  042716  177770                BIC     #^C7,(SP)
 3641  017446  112637  017463                MOVB    (SP)+,WRT.WD+1
 3642  017452  063737  012246  017464  1$:   ADD     RPADR,WRT.AD    ;FORM THE ADDRESS OF THE DES. REG.
 3643  017460  012737                WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
 3644  017462  000000                WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
 3645  017464  000000                WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
 3646  017466  013746  012246                MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
 3647  017472  062716  000010                ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
 3648  017476  032736  010000                BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
 3649  017502  001025                        BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
 3650  017504  004037  017214                JSR     R0,RD.RP        ;CHECK FOR PARITY ERROR ON WRITE
 3651  017510  000014                        RPER1
 3652  017512  017556                        WRT.R3
 3653  017514  032726  000010                BIT     #BIT03,(SP)+
 3654  017520  001420                        BEQ     WRT.R4          ;BRANCH IF "PAR=0"
 3655  017522  016037  177776  017534        MOV     -2(R0),1$       ;PICKUP THE INDEX
 3656  017530  004037  017214                JSR     R0,RD.RP        ;READ THE REG.
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 3657  017534  000000                    1$:     .WORD   0               ;REG. INDEX
 3658  017536  017556                            WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
 3659  017540  004037  020506                    JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN 'ESCAPE'
 3660  017544  104004                            ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
 3661  017546  005327                            DEC     (PC)+           ;DECREMENT THE ERROR COUNT
 3662  017550  000003                    WRT.R2: .WORD   3               ;RETRY COUNTER
 3663  017552  002342                            BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
 3664  017554  005726                            TST     (SP)+           ;CLEAN OFF THE STACK
 3665  017556  011000                    WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
 3666  017560  000401                            BR      WRT.R5          ;EXIT
 3667  017562  005720                    WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
 3668  017564  000200                    WRT.R5: RTS     R0
 3669
 3670                                    ;ROUTINE TO SAVE THE RH11 RP04/5/6 REGISTERS AS PER DPB+14
 3671                                    ;
 3672                                    ;CALL
 3673                                    ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
 3674                                    ;       JSR     PC,SVRH11       ;SAVE THE DRIVES REG'S
 3675
 3676  017566  104412                    SVRH11: SAVREG                  ;SAVE R0 - R5
 3677  017570  005702                            TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
 3678  017572  001430                            BEQ     4$              ;BR IF NONE
 3679  017574  013704  012246                    MOV     RPADR,R4
 3680  017600  111264  000013                    MOVB    (R2),RPCS2(R4)  ;SELECT DRIVE
 3681  017604  016203  000014                    MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
 3682  017610  001433                            BEQ     6$              ;EXIT IF NO ADDRESS
 3683  017612  005037  017646                    CLR     3$              ;COUNTER $ POINTER
 3684  017616  023727  017646  000022    1$:     CMP     3$,#RPDB        ;REACHED THE BUFFER REGISTER ?
 3685  017624  001006                            BNE     2$              ;BR IF NOT
 3686  017626  032764  000200  000010            BIT     #BIT7,RPCS2(R4) ;'OR' SET ?
 3687  017634  001002                            BNE     2$              ;BR IF SET
 3688  017636  005023                            CLR     (R3)+           ;STORE RPDB AS ZEROES
 3689  017640  000405                            BR      4$              ;CONTINUE
 3690  017642  004037  017214            2$:     JSR     R0,RD.RP        ;READ THE SELECTED REGISTER
 3691  017646  000000                    3$:     .WORD   0               ;REGISTER INDEX
 3692  017650  017674                            5$                      ;ERROR RETURN ADDRESS
 3693  017652  012623                            MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
 3694  017654  023727  017646  000046    4$:     CMP     3$,#RPECS       ;REACHED THE END ?
 3695  017662  001406                            BEQ     6$              ;BR IF YES
 3696  017664  062737  000002  017646            ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
 3697  017672  000751                            BR      1$              ;CONTINUE READING THE REGISTERS
 3698  017674  004737  014436            5$:     JSR     PC,CIT          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 3699  017700  104413                    6$:     RESREG                  ;RESTORE R0 - R5
 3700  017702  000207                            RTS     PC              ;RETURN
 3701
 3702                                    ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
 3703                                    ;CALL
 3704                                    ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 3705                                    ;       JSR     PC,SET.IE       ;SET "IE"
 3706                                    ;       RETURN
 3707
 3708  017704  010446                    SET.IE: MOV     R4,-(SP)        ;SAVE R4
 3709  017706  013704  012246                    MOV     RPADR,R4        ;PICKUP ADDRESS OF RPCS1
 3710  017712  010164  000010                    MOV     R1,RPCS2(R4)    ;SELECT DRIVE
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 3711  017716  011446                        MOV     (R4),-(SP)      ;READ RPCS1
 3712  017720  052716  040000                BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
 3713  017724  000316                        SWAB    (SP)            ;ADJUST FOR DATO
 3714  017726  112714  000100                MOVB    #BIT06,(R4)     ;SET "IE"
 3715  017732  032764  010000  000010        BIT     #BIT12,RPCS2(R4) ;IS "NED"=1?
 3716  017740  001002                        BNE     1$              ;YES--CLEAR "TRE"
 3717  017742  005726                        TST     (SP)+           ;CLEAN OFF THE STACK
 3718  017744  000402                        BR      2$
 3719  017746  112664  000001        1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 3720  017752  012604                2$:     MOV     (SP)+,R4        ;RESTORE R4
 3721  017754  000207                        RTS     PC              ;RETURN TO CALLER
 3722
 3723                                ;QUEUE COUNT
 3724  017756      000               QCNT:   .BYTE   0               ;DRIVE 0
 3725  017757      000                       .BYTE   0               ;DRIVE 1
 3726  017760      000                       .BYTE   0               ;DRIVE 2
 3727  017761      000                       .BYTE   0               ;DRIVE 3
 3728  017762      000                       .BYTE   0               ;DRIVE 4
 3729  017763      000                       .BYTE   0               ;DRIVE 5
 3730  017764      000                       .BYTE   0               ;DRIVE 6
 3731  017765      000                       .BYTE   0               ;DRIVE 7
 3732
 3733                                ;QUEUE INPUT POINTERS
 3734
 3735  017766  020050                QINPT:  .WORD   QDRV0           ;DRIVE 0
 3736  017770  020070                        .WORD   QDRV1           ;DRIVE 1
 3737  017772  020110                        .WORD   QDRV2           ;DRIVE 2
 3738  017774  020130                        .WORD   QDRV3           ;DRIVE 3
 3739  017776  020150                        .WORD   QDRV4           ;DRIVE 4
 3740  020000  020170                        .WORD   QDRV5           ;DRIVE 5
 3741  020002  020210                        .WORD   QDRV6           ;DRIVE 6
 3742  020004  020230                        .WORD   QDRV7           ;DRIVE 7
 3743
 3744                                ;QUEUE OUTPUT POINTERS
 3745
 3746  020006  020050                QOUTPT: .WORD   QDRV0           ;DRIVE 0
 3747  020010  020070                        .WORD   QDRV1           ;DRIVE 1
 3748  020012  020110                        .WORD   QDRV2           ;DRIVE 2
 3749  020014  020130                        .WORD   QDRV3           ;DRIVE 3
 3750  020016  020150                        .WORD   QDRV4           ;DRIVE 4
 3751  020020  020170                        .WORD   QDRV5           ;DRIVE 5
 3752  020022  020210                        .WORD   QDRV6           ;DRIVE 6
 3753  020024  020230                        .WORD   QDRV7           ;DRIVE 7
 3754
 3755  020026  020050                QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
 3756  020030  020070                QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 3757  020032  020110                        .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
 3758  020034  020130                        .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
 3759  020036  020150                        .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
 3760  020040  020170                        .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
 3761  020042  020210                        .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
 3762  020044  020230                        .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
 3763  020046  020250                        .WORD   QTERM           ;STOP DRIVE 7
 3764
```

```
                                        ;DRIVE REQUEST QUEUES
                                        ;
020050  000010                  QDRV0:  .BLKW   10
020070  000010                  QDRV1:  .BLKW   10
020110  000010                  QDRV2:  .BLKW   10
020130  000010                  QDRV3:  .BLKW   10
020150  000010                  QDRV4:  .BLKW   10
020170  000010                  QDRV5:  .BLKW   10
020210  000010                  QDRV6:  .BLKW   10
020230  000010                  QDRV7:  .BLKW   10
        020250                  QTERM=.
                                        ;
                                        ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
                                        ;
                                        ;CALL
                                        ;       JSR     PC,CLRQUE
                                        ;
020250  104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
020252  012702  017756                  MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
020256  005022                          CLR     (R2)+           ;DRIVES 0 & 1
020260  005022                          CLR     (R2)+           ;DRIVES 2 & 3
020262  005022                          CLR     (R2)+           ;DRIVES 4 & 5
020264  005022                          CLR     (R2)+           ;DRIVES 6 & 7
020266  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING
020272  012701  020026                  MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
020276  012122                  1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
020300  005303                          DEC     R3
020302  001375                          BNE     1$
020304  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
020310  012701  020026                  MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
020314  012122                  2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
020316  005303                          DEC     R3
020320  001375                          BNE     2$
020322  104413                          RESREG                  ;RESTORE R0 - R5
020324  000207                          RTS     PC
                                        ;
                                        ;EMPTY THE QUEUE SPECIFIED BY R1
                                        ;
                                        ;CALL
                                        ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,EMPTYQ
                                        ;
020326  105061  017756          EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
020332  006301                          ASL     R1
020334  016161  017766  020006          MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
020342  006201                          ASR     R1
020344  000207                          RTS     PC
                                        ;
                                        ;ROUTINE TO PUT A REQUEST IN QUEUE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
                                        ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
```

```
3819                                    ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
3820                                    ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
3821
3822  020346  122761  000010  017756  DRVQUE: CMPB    #10.QCNT(R1)        ;IS QUEUE FULL?
3823  020354  001421                          BEQ     2$                  ;BR IF YES-TAKE RETURN1
3824  020356  105261  017756                  INCB    QCNT(R1)            ;INCREMENT QUEUE COUNT
3825  020362  006301                          ASL     R1
3826  020364  010271  017766                  MOV     R2,@QINPT(R1)       ;PUT THIS REQUEST IN QUEUE
3827  020370  062761  000002  017766          ADD     #2,QINPT(R1)        ;UPDATE THE QUEUE POINTER
3828  020376  026161  017766  020030          CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
3829  020404  001003                          BNE     1$                  ;BRANCH IF NO
3830  020406  016161  020026  017756          MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
3831  020414  006201                  1$:     ASR     R1
3832  020416  005720                          TST     (R0)+               ;TAKE RETURN 2
3833  020420  000200                  2$:     RTS     R0                  ;RETURN TO USER
3834
3835                                    ;ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUEUE
3836                                    ;
3837                                    ;CALL
3838                                    ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
3839                                    ;       JSR     PC,GETREQ           ;GO GET THE REQUEST
3840                                    ;       RETURN                      ;R2="DPB" ADDRESS OF THE REQUEST
3841                                    ;                                   ;R2=0 IF NO REQUEST IN QUEUE
3842
3843  020422  005002                  GETREQ: CLR     R2
3844  020424  105761  017756                  TSTB    QCNT(R1)            ;IS THERE ANY REQUEST IN QUEUE?
3845  020430  001404                          BEQ     2$                  ;NO---BRANCH
3846  020432  006301                  1$:     ASL     R1
3847  020434  017102  020036                  MOV     @QOUTPT(R1),R2      ;PICKUP "DPB" POINTER FOR THIS DRIVE
3848  020440  006201                          ASR     R1
3849  020442  000207                  2$:     RTS     PC                  ;RETURN TO USER
3850
3851                                    ;ROUTINE TO "POP" THE REQUEST FROM QUEUE
3852                                    ;
3853                                    ;CALL
3854                                    ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
3855                                    ;       JSR     PC,POPQUE           ;CALL TO REMOVE REQUEST
3856                                    ;       RETURN                      ;R2=ADDRESS OF DPB REMOVED
3857
3858  020444  105361  017756          POPQUE: DECB    QCNT(R1)            ;DECREMENT QUEUE COUNT
3859  020450  006301                          ASL     R1
3860  020452  017102  020036                  MOV     @QOUTPT(R1),R2      ;GET THE "DPB" POINTER
3861  020456  062761  000002  020006          ADD     #2,QOUTPT(R1)       ;UPDATE THE QUEUE POINTER
3862  020464  026161  020006  020030          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
3863  020472  001003                          BNE     1$                  ;NO--BRANCH TO EXIT
3864  020474  016161  020026  020006          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
3865  020502  006201                  1$:     ASR     R1
3866  020504  000207                          RTS     PC                  ;RETURN TO USER
3867
3868                                    ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
3869                                    ;REPORTS AN ERROR DIRECTLY.
3870                                    ;
3871                                    ;CALL
3872                                    ;       JSR     R0,ES.SAV
```

```
                                        ;       ERROR   N               ;;THE ERROR CALL
                                        ;       RETURN                  ;THE RETURN IS PAST THE ERROR CALL

020506  012037  020522               ES.SAV: MOV     (R0)+,1$        ;GET THE ERROR CALL
020512  013746  001160                       MOV     $ESCAPE,-(SP)   ;SAVE THE ADDRESS IN '$ESCAPE'
020516  005037  001160                       CLR     $ESCAPE         ;CLEAR THE ESCAPE RETURN
020522  000000                       1$:     .WORD   0               ;THE ERROR CALL IS MOVED HERE
020524  012637  001160                       MOV     (SP)+,$ESCAPE   ;RESTORE THE ESCAPE ADDRESS
020530  000200                               RTS     R0              ;RETURN


                                        ;;**************************************************************

                                        .SBTTL  TELETYPE MESSAGES

020532  047440  043106  044514       UNTOFF: .ASCIZ  / OFFLINE/
020540  042516     000
020543     040  047117  044514       UNTON:  .ASCIZ  / ONLINE/
020550  042516     000
020553     040  047516  020124       NOTRP:  .ASCIZ  @ NOT AN RP04/5/6@
020560  047101  051040  030120
020566  027464  027465  000066
020574  047040  052117  050040       NOTPRS: .ASCIZ  / NOT PRESENT/
020602  042522  042523  052116
020610     000
020611     040  047125  040523       NOTSAF: .ASCIZ  / UNSAFE/
020616  042506     000
020621     122  030120  000064       RP04B:  .ASCIZ  /RP04/
020626  050122  032460     000       RP05:   .ASCIZ  /RP05/
020633     122  030120  000066       RP06:   .ASCIZ  /RP06/
020640  047125  052111  051440       SYSTAT: .ASCIZ  /UNIT STATUS/<CR><LF><LF>
020646  040524  052524  006523
020654  005012     000
020657     015  042012  044522       MUNIT:  .ASCIZ  <CR><LF>/DRIVE: /
020664  042526  020072     000
020671     040  020057     000       SLASH:  .ASCIZ  @ / @
020675     103     000               C:      .ASCIZ  /C/
020677     124     000               T:      .ASCIZ  /T/
020701     060     000               MDRVD:  .ASCIZ  /0/
020703     040     040               LIN4SP: .ASCII  /  /
020705     040  000040               LINSP:  .ASCIZ  /  /
020710  047105  042524  020122       ENTADR: .ASCIZ  /ENTER ADDRESS LIMITS:/<CR><LF>
020716  042101  051104  051505
020724  020123  044514  044515
020732  051524  006472  000012
020740  820040  051104  053111       MOFFLN: .ASCIZ  /  DRIVE OFFLINE/<CR><LF>
020746  020105  043117  046106
020754  047111  006505  000012
020762  042040  044522  042526       MDRNP:  .ASCIZ  / DRIVE NOT PRESENT/<CR><LF>
020770  047040  052117  050040
020776  042522  042523  052116
021004  005015     000
021007     040  051104  053111       MER11:  .ASCIZ  / DRIVE NOT AVAILABLE/<CR><LF>
021014  020105  047516  020124
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3927  021022  053101  044501  040514
3928  021030  046102  006505  000012
3929  021036  042040  044522  042526  MNRPO4: .ASCIZ  ? DRIVE NOT AN RP04/5/6?<CR><LF>
3930  021044  047040  052117  040440
3931  021052  020116  050122  032060
3932  021060  032457  033057  005015
3933  021066     000
3934  021067     040  051104  053111  MUSDR:  .ASCIZ  / DRIVE UNSAFE/<CR><LF>
3935  021074  020105  047125  040523
3936  021102  042506  005015     000
3937  021107     040  042523  042514  MSELD:  .ASCIZ  / SELECTED/
3938  021114  052103  042105     000
3939  021121     015  050012  047522  MMODE:  .ASCIZ  <CR><LF>/PROGRAM MODE (C OR F): /
3940  021126  051107  046501  046440
3941  021134  042117  020105  041450
3942  021142  047440  020122  024506
3943  021150  020072     000
3944  021153     040  047506  046522  MFORMT: .ASCIZ  / FORMAT & VERIFY/
3945  021160  052101  023040  053040
3946  021166  051105  043111  000131
3947  021174  044103  041505  020113  MHECK:  .ASCIZ  /CHECK ONLY/
3948  021202  047117  054514     000
3949  021207     106  051117  040515  MORMAT: .ASCIZ  /FORMAT & VERIFY/
3950  021214  020124  020046  042526
3951  021222  044522  054506     000
3952  021227     015  005012  050117  MSIZE:  .ASCIZ  <CR><LF><LF>/OPERATE IN 22 SECTOR MODE (Y OR N) ? /
3953  021234  051105  052101  020105
3954  021242  047111  031040  020062
3955  021250  042523  052103  051117
3956  021256  046440  042117  020105
3957  021264  054450  047440  020122
3958  021272  024516  037440  000040
3959  021300  050117  051105  052101  MSEC22: .ASCIZ  /OPERATION WILL BE IN 22 SECTOR (16 BIT) MODE/<CR><LF>
3960  021306  047511  020116  044527
3961  021314  046114  041040  020105
3962  021322  047111  031040  020062
3963  021330  042523  052103  051117
3964  021336  024040  033061  041040
3965  021344  052111  020051  047515
3966  021352  042504  005015     000
3967  021357     117  042520  040522  MSEC20: .ASCIZ  /OPERATION WILL BE IN 20 SECTOR (18 BIT) MODE/<CR><LF>
3968  021364  044524  047117  053440
3969  021372  046111  020114  042502
3970  021400  044440  020116  030062
3971  021406  051440  041505  047524
3972  021414  020122  030450  020070
3973  021422  044502  024524  046440
3974  021430  042117  006505  000012
3975  021436  047111  040526  044514  BADENT: .ASCIZ  /INVALID ENTRY/<CR><LF>
3976  021444  020104  047105  051124
3977  021452  006531  000012
3978  021456  047105  044504  043516  MADRER: .ASCII  /ENDING DSK ADRS MUST BE EQUAL TO OR GREATER/<CR><LF>
3979  021464  042040  045523  040440
3980  021472  051104  020123  052515
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 3981  021500  052123  041040  020105
 3982  021506  050505  040525  020114
 3983  021514  047524  047440  020122
 3984  021522  051107  040505  042524
 3985  021530  006522     012
 3986  021533     124  040510  020116          .ASCIZ  /THAN STARTING ADRS/<CR><LF>
 3987  021540  052123  051101  044524
 3988  021546  043516  040440  051104
 3989  021554  006523  000012
 3990  021560  042523  042514  052103  MSELP:  .ASCII  /SELECT DATA PATTERN/<CR><LF>
 3991  021566  042040  052101  020101
 3992  021574  040520  052124  051105
 3993  021602  006516     012
 3994  021605     040  030050  020051          .ASCII  / (0) ZERO'S/<CR><LF>
 3995  021612  042532  047522  051447
 3996  021620  005015
 3997  021622  024040  024461  047440          .ASCII  / (1) ONE'S/<CR><LF>
 3998  021630  042516  051447  005015
 3999  021636  024040  024462  053440          .ASCIZ  / (2) WORST CASE: /
 4000  021644  051117  052123  041440
 4001  021652  051501  035105  000040
 4002
 4003  021660  047527  051522  020124  MPATD:  .ASCIZ  /WORST CASE/
 4004  021666  040503  042523     000
 4005  021673     015  005012  052123  MSFOU:  .ASCIZ  <CR><LF><LF>/STARTING FORMAT ON DRIVE /
 4006  021700  051101  044524  043516
 4007  021706  043040  051117  040515
 4008  021714  020124  047117  042040
 4009  021722  044522  042526  000040
 4010  021730  005015  051412  040524  MSCHK:  .ASCIZ  <CR><LF><LF>/STARTING CHECK ON DRIVE /
 4011  021736  052122  047111  020107
 4012  021744  044103  041505  020113
 4013  021752  047117  042040  044522
 4014  021760  042526  000040
 4015  021764  005015  043012  051117  MFCMPT: .ASCIZ  <CR><LF><LF>/FORMAT COMPLETE, /
 4016  021772  040515  020124  047503
 4017  022000  050115  042514  042524
 4018  022006  020054     000
 4019  022011     015  005012  044103  MCCMPT: .ASCIZ  <CR><LF><LF>/CHECK COMPLETE, /
 4020  022016  041505  020113  047503
 4021  022024  050115  042514  042524
 4022  022032  020054     000
 4023  022035     124  052117  046101  NUMERR: .ASCIZ  /TOTAL ERRORS DETECTED: /
 4024  022042  042440  051122  051117
 4025  022050  020123  042504  042524
 4026  022056  052103  042105  020072
 4027  022064     000
 4028  022065     120  042522  042523  ADDRIS: .ASCIZ  /PRESENT ADDRESS IS: /
 4029  022072  052116  040440  042104
 4030  022100  042522  051523  044440
 4031  022106  035123  000040
 4032
 4033                                  ;;*****************************************************************
 4034
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                                        .SBTTL  ERROR MESSAGES
                                        ;;*****************************************************************
022112 044122 030461 044440  EM1:     .ASCIZ  /RH11 INTERRUPT OCCURRED (RPAS=0)/
022120 052116 051105 052522
022126 052120 047440 041503
022134 051125 042522 020104
022142 051050 040520 036523
022150 024460    000
022153    125 042516 050130  EM2:     .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
022160 041505 042524 020104
022166 052101 042524 052116
022174 047511 020116 041517
022202 052503 051122 042105
022210    000
022211    115 051501 041123  EM3:     .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
022216 051525 050040 051101
022224 052111 020131 051105
022232 047522 020122 046450
022240 050103 036505 024461
022246    000
022247    115 051501 041123  EM4:     .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)/
022254 051525 050040 051101
022262 052111 020131 051105
022270 047522 020122 050050
022276 051101 030475 000051
022304 042101 051104 051505  EM5:     .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
022312 020123 046120 043525
022320 041440 040510 043516
022326 020105 044502 020124
022334 042523 000124
022340 044122 030461 042040  EM6:     .ASCIZ  /RH11 DIDN'T RESPOND TO ADDRESSING/
022346 042111 023516 020124
022354 042522 050123 047117
022362 020104 047524 040440
022370 042104 042522 051523
022376 047111 000107
022402 051104 053111 020105  EM10:    .ASCIZ  /DRIVE OFFLINE/
022410 043117 046106 047111
022416 000105
022420 042520 051522 051511  EM11:    .ASCIZ  /PERSISTENT DRIVE UNSAFE ERROR/
022426 042524 052116 042040
022434 044522 042526 052440
022442 051516 043101 020105
022450 051105 047522 000122
022456 047125 047503 051122  EM12:    .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR
022464 041505 040524 046102
022472 020105 040515 051523
022500 052502 020123 040520
022506 044522 054524 042440
022514 051122 051117    000
022521    123 043117 053524  EM13:    .ASCIZ  /SOFTWARE TIMEOUT/
022526 051101 020105 044524
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 4089  022534  042515  052517  000124
 4090  022542  051104  053111  020105  EM14:   .ASCIZ  /DRIVE UNSAFE ERROR/
 4091  022550  047125  040523  042506
 4092  022556  042440  051122  051117
 4093  022564     000
 4094  022565     103  047117  051124  EM15:   .ASCIZ  @CONTROLLER/DRIVE ERROR DURING WRITE@
 4095  022572  046117  042514  027522
 4096  022600  051104  053111  020105
 4097  022606  051105  047522  020122
 4098  022614  052504  044522  043516
 4099  022622  053440  044522  042524
 4100  022630     000
 4101  022631     103  047117  051124  EM16:   .ASCIZ  @CONTROLLER/DRIVE ERROR DURING WRITE CHECK@
 4102  022636  046117  042514  027522
 4103  022644  051104  053111  020105
 4104  022652  051105  047522  020122
 4105  022660  052504  044522  043516
 4106  022666  053440  044522  042524
 4107  022674  041440  042510  045503
 4108  022702     000
 4109  022703     122  052105  044522  EM17:   .ASCIZ  @RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE@
 4110  022710  051505  047040  052117
 4111  022716  051440  041525  051505
 4112  022724  043123  046125  026440
 4113  022732  051440  041505  047524
 4114  022740  020122  047516  020124
 4115  022746  041501  042503  052120
 4116  022754  041101  042514     000
 4117  022761     104  052101  020101  EM20:   .ASCIZ  @DATA ERROR DURING WRITE CHECK@
 4118  022766  051105  047522  020122
 4119  022774  052504  044522  043516
 4120  023002  053440  044522  042524
 4121  023010  041440  042510  045503
 4122  023016     000
 4123  023017     103  047117  051124  EM21:   .ASCIZ  @CONTROLLER/DRIVE ERROR VERIFYING HEADERS@
 4124  023024  046117  042514  027522
 4125  023032  051104  053111  020105
 4126  023040  051105  047522  020122
 4127  023046  042526  044522  054506
 4128  023054  047111  020107  042510
 4129  023062  042101  051105  000123
 4130  023070  042510  042101  051105  EM22:   .ASCIZ  @HEADER COMPARE ERROR VERIFYING HEADERS@
 4131  023076  041440  046517  040520
 4132  023104  042522  042440  051122
 4133  023112  051117  053040  051105
 4134  023120  043111  044531  043516
 4135  023126  044040  040505  042504
 4136  023134  051522     000
 4137  023137     103  046131  047111  EM23:   .ASCIZ  @CYLINDER FIELD IN HEADER IS NOT CORRECT@
 4138  023144  042504  020122  044506
 4139  023152  046105  020104  047111
 4140  023160  044040  040505  042504
 4141  023166  020122  051511  047040
 4142  023174  052117  041440  051117
```

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 4143  023202  042522  052103     000
 4144  023205     127  044522  042524  EM24:   .ASCIZ  /WRITE CHECK ERROR/
 4145  023214  041440  042510  046503
 4146  023222  042440  051122  051117
 4147  023230     000
 4148
 4149                              ;;*****************************************************************
 4150
 4151  023231     122  040520  000123  DH1:    .ASCIZ  /RPAS/
 4152  023236  051104  053111  020105  DH2:    .ASCIZ  /DRIVE   RPOS1   RPER1   RPER2   RPER3   RPAS/
 4153  023244  020040  050122  051504
 4154  023252  020061  020040  050122
 4155  023260  051105  020061  020040
 4156  023266  050122  051105  020062
 4157  023274  020040  050122  051105
 4158  023302  020063  020040  050122
 4159  023310  051501     000
 4160  023313     104  044522  042526  DH3:    .ASCIZ  /DRIVE   REG ADR  DATA/
 4161  023320  020040  051040  043505
 4162  023326  040440  051104  020040
 4163  023334  040504  040524     000
 4164  023341     104  044522  042526  DH4:    .ASCIZ   DRIVE   REG ADR    GOOD    BAD/
 4165  023346  020040  051040  043505
 4166  023354  040440  051104  020040
 4167  023362  020040  047507  042117
 4168  023370  020040  020040  040502
 4169  023376  000104
 4170  023400  044122  040440  042104  DH6:    .ASCIZ  /RH ADDRESS/
 4171  023406  042522  051523     000
 4172  023413     104  044522  042526  DH10:   .ASCIZ  /DRIVE   ERR PC  RPCS1   RPCS2   RPDS1   RPER1   RPER2   RPER3/
 4173  023420  020040  042440  051122
 4174  023426  050040  020103  051040
 4175  023434  041520  030523  020040
 4176  023442  051040  041520  031123
 4177  023450  020040  051040  042120
 4178  023456  030523  020040  051040
 4179  023464  042520  030522  020040
 4180  023472  051040  042520  031122
 4181  023500  020040  051040  042520
 4182  023506  031522     000
 4183  023511     122  042520  030503  DH10A:  .ASCIZ  /RPEC1   RPEC2   RPWC    RPBA    RPDA    RPAS    RPLA
 4184  023516  020040  051040  042520
 4185  023524  031103  020040  051040
 4186  023532  053520  020103  020040
 4187  023540  051040  041120  020101
 4188  023546  020040  051040  042120
 4189  023554  020101  020040  051040
 4190  023562  040520  020123  020040
 4191  023570  051040  046120  000101
 4192  023576  050122  041104  020040  DH10B:  .ASCIZ  /RPDB    RPMR    RPDT    RPSN    RPOF    RPCA    RPCC
 4193  023604  020040  050122  051115
 4194  023612  020040  020040  050122
 4195  023620  052104  020040  020040
 4196  023626  050122  047123  020040
```

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4197   023634  320040  050122  043117
4198   023642  020040  020040  050122
4199   023650  040503  020040  020040
4200   023656  050122  041503     000
4201   023663     104  044522  042526  DH1?:   .ASCIZ   DRIVE   ERR PC CYLINDER TRACK   SECTOR/
4202   023670  020040  042440  051122
4203   023676  050040  020103  054503
4204   023704  044514  042116  051105
4205   023712  052040  040522  045503
4206   023720  020040  051440  041505
4207   023726  047524  000122
4208   023732  051104  053111  020105  DH2C:   .ASCIZ   DRIVE   ERR PC CYLINDER TRACK   SECTOR/
4209   023740  020040  051105  020122
4210   023746  041520  041440  046131
4211   023754  047111  042504  020122
4212   023762  051124  041501  020113
4213   023770  020040  042523  052103
4214   023776  051117     000
4215   024001     122  041520  030523  DHECA:  .ASCIZ   RPCS1   RPCS2   RPDS1   RPER1   RPER2   RPER3   RPEC1   RPEC2/
4216   024006  020040  051040  041520
4217   024014  031123  020040  051040
4218   024022  042120  030523  020040
4219   024030  051040  042520  030522
4220   024036  020040  051040  042520
4221   024044  031122  020040  051040
4222   024052  042520  031522  020040
4223   024060  051040  042520  030503
4224   024066  020040  051040  042520
4225   024074  031103     000
4226   024077     122  053520  020103  DH2CB:  .ASCIZ   /RPWC   RPBA    RPCA    RPAS    RPLA    RPDB    RPMR    RPDT/
4227   024104  020040  051040  041120
4228   024112  020101  020040  051040
4229   024120  042120  020101  020040
4230   024126  051040  040520  020123
4231   024134  020040  051040  046120
4232   024142  020101  020040  051040
4233   024150  042120  020102  020040
4234   024156  051040  046520  020122
4235   024164  020040  051040  042120
4236   024172  000124
4237   024174  050122  047123  020040  DH2CC:  .ASCIZ   RPSN    RPOF    RPCA    RPCC
4238   024202  020040  050122  043117
4239   024210  020040  020040  050122
4240   024216  040503  020040  020040
4241   024224  050122  041503     000
4242   024231     040  020040  020040  DH23:   .ASCII                   EXPT'D:<CR><LF>
4243   024236  020040  020040  020040
4244   024244  020040  020040  042440
4245   024252  050130  023524  006504
4246   024260     012
4247   024261     104  044522  042526          .ASCIZ   DRIVE   ERR PC  CYLNDR  ACTUAL HEADER
4248   024266  020040  042440  051122
4249   024274  050040  020103  041440
4250   024302  046131  042116  020122
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 4251  024310  040440  052103  040525
 4252  024316  020114  042510  042101
 4253  024324  051105     000
 4254  024332     040  020040  020040  DH24:   .ASCII                                          MEMORY DISK//CR,/LF,
 4255  024334  020040  020040  020040
 4256  024342  020040  020040  020040
 4257  024350  020040  020040  020040
 4258  024356  020040  020040  020040
 4259  024364  020040  020040  020040
 4260  024372  020040  020040  046440
 4261  024400  046505  051117  020131
 4262  024406  042040  051511  006513
 4263  024414     012
 4264  024415     104  044522  042526          .ASCIZ  DRIVE   ERR PC  CYLNDR  TRACK   SECTOR  DATA    DATA/
 4265  024422  020040  042440  051122
 4266  024430  050040  020103  041440
 4267  024436  046131  042116  020122
 4268  024444  052040  040522  045503
 4269  024452  020040  051440  041505
 4270  024460  047524  020122  042040
 4271  024466  052101  020101  020040
 4272  024474  042040  052101  000101
 4273
 4274
 4275  024502  001276                  DT1:    .WORD   ATTN
 4276  024504  001274  012100  012102  DT2:    .WORD   DDRIVE,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6,ATTN
 4277  024512  012104  012106  001276
 4278  024520  001274  017240  017242  DT3:    .WORD   DDRIVE,RD.ADR,RD.WRD
 4279  024526  001274  017464  017462  DT4:    .WORD   DDRIVE,WRT.AD,WRT.WD,RD.WRD
 4280  024534  017242
 4281  024536  001172                  DT6:    .WORD   $RPADR
 4282  024540  001214  001116  001304  DT10:   .WORD   DRIVE,$ERRPC,RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42
 4283  024546  001314  001316  001320
 4284  024554  001344  001346
 4285  024560  001350  001352  001306          .WORD   RP.REG+44,RP.REG+46,RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20
 4286  024566  001310  001312  001322
 4287  024574  001324
 4288  024576  001326  001330  001332          .WORD   RP.REG+22,RP.REG+24,RP.REG+26,RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4289  024604  001334  001336  001340
 4290  024612  001342
 4291  024614  001214  001116  001270  DT17:   .WORD   DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC
 4292  024622  001272  001252
 4293  024626  001214  001116  001270  DT20:   .WORD   DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC
 4294  024634  001272  001252
 4295  024640  001304  001314  001316          .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42,RP.REG+44,RP.RE
 4296  024646  001320  001344  001346
 4297  024654  001350  001352
 4298  024660  001306  001310  001312          .WORD   RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20,RP.REG+22,RP.REG+24,RP.RE
 4299  024666  001322  001324  001326
 4300  024674  001330  001332
 4301  024700  001334  001336  001340          .WORD   RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4302  024706  001342
 4303  024710  001214  001116  025130  DT23:   .WORD   DRIVE,$ERRPC,BUFP,RBUF,RBUF+2,RBUF+4,RBUF+6
 4304  024716  025120  025122  025124
```

```
 4305  024724  025126
 4306  024726  001214  001116  001270  DT24:   .WORD  .DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC,$GDDAT,RP.REG+22
 4307  024734  001272  001252  001124
 4308  024742  001326
 4309  024744  001304  001314  001316          .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42,RP.REG+44,RP.RE
 4310  024752  001320  001344  001346
 4311  024760  001350  001352
 4312  024764  001306  001310  001312          .WORD   RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20,RP.REG+22,RP.REG+24,RP.RE
 4313  024772  001322  001324  001326
 4314  025000  001330  001332
 4315  025004  001334  001336  001340          .WORD   RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4316  025012  001342
 4317
 4318  025014  000001                  DF1:    .WORD   1
 4319  025016     001     000                  .BYTE   1,0
 4320  025020  000001                  DF2:    .WORD   1
 4321  025022     006     000                  .BYTE   6,0
 4322  025024  000001                  DF3:    .WORD   1
 4323  025026     003     000                  .BYTE   3,0
 4324  025030  000001                  DF4:    .WORD   1
 4325  025032     004     000                  .BYTE   4,0
 4326  025034  000003                  DF10:   .WORD   3
 4327  025036     010     000                  .BYTE   8.,0
 4328  025040  023511                          .WORD   DH10A
 4329  025042     007     000                  .BYTE   7,0
 4330  025044  023576                          .WORD   DH10B
 4331  025046     007     000                  .BYTE   7,0
 4332  025050  000001                  DF17:   .WORD   1
 4333  025052     005     034                  .BYTE   5,34
 4334  025054  000004                  DF20:   .WORD   4
 4335  025056     005     034                  .BYTE   5,34
 4336  025060  024001                          .WORD   DH20A
 4337  025062     010     000                  .BYTE   8.,0
 4338  025064  024077                          .WORD   DH20B
 4339  025066     010     000                  .BYTE   8.,0
 4340  025070  024174                          .WORD   DH20C
 4341  025072     004     000                  .BYTE   4,0
 4342  025074  000001                  DF23:   .WORD   1
 4343  025076     007     000                  .BYTE   7,0
 4344  025100  000004                  DF24:   .WORD   4
 4345  025102     007     034                  .BYTE   7,34
 4346  025104  024001                          .WORD   DH20A
 4347  025106     010     000                  .BYTE   8.,0
 4348  025110  024077                          .WORD   DH20B
 4349  025112     010     000                  .BYTE   8.,0
 4350  025114  024174                          .WORD   DH20C
 4351  025116     004     000                  .BYTE   4,0

                                 ;;*****************************************************************
                                 :BUFFER STARTS HERE
                                 ;;*****************************************************************
```

```
 4359  025120  000000  000000  000000  RSUF:   .WORD   0,0,0,0          ;BUFFER FOR HEADER CHECK
 4360  025126  000000
 4361
 4362  025130                          BUFP:                   ;FORMAT AND CHECK BUFFER STARTS HERE
 4363
 4364  025130  005015  046412  044501  TITLE:  .ASCII  <CR><LF><LF>/MAINDEC-11-DZRJB-A/<CR><LF>
 4365  025136  042116  041505  030455
 4366  025144  026461  055104  045122
 4367  025152  026502  006501     012
 4368  025155     122  030120  027464          .ASCIZ  /RP04 5/6 FORMATTER PROGRAM/<CR><LF><LF>
 4369  025164  027465  020066  047506
 4370  025172  046522  052101  042524
 4371  025200  020122  051120  043517
 4372  025206  040522  006515  005012
 4373  025214     000
 4374  025215     015  052012  020117  LOADRV: .ASCII  <CR><LF>/TO 'FORMAT' OR 'CHECK' DRIVE 0, REPLACE THE 'XXDP'/<CR><LF>
 4375  025222  043047  051111  040515
 4376  025230  023524  047440  020122
 4377  025236  041447  042510  045503
 4378  025244  020047  051104  053111
 4379  025252  020105  026060  051040
 4380  025260  050105  040514  042503
 4381  025266  052040  042510  023440
 4382  025274  054130  050104  006447
 4383  025302     012
 4384  025303     120  041501  020113          .ASCII   PACK ON DRIVE 0 WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40,/<CR><LF>
 4385  025310  047117  042040  044522
 4386  025316  042526  030040  053440
 4387  025324  052111  020110  047101
 4388  025332  052117  042510  020122
 4389  025340  040520  045503  020054
 4390  025346  046103  040505  020122
 4391  025354  042515  047515  054522
 4392  025362  046040  041517  052101
 4393  025370  047511  020116  030064
 4394  025376  006454     012
 4395  025401     101  042116  051040          .ASCII   AND RESTART THE PROGRAM/<CR><LF>
 4396  025406  051505  040524  052122
 4397  025414  052040  042510  050040
 4398  025422  047522  051107  046501
 4399  025430  005015     000
 4400
 4401
 4402                                  .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH11
 4403                                  ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
 4404                                  ;OF THE RH11 IS SETUP FOR THE PROPER ADDRESS.
 4405                                  ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 4406                                  ;REQUIRED.
 4407                                  ;NOTE: THIS ROUTINE DESTROYS R0-R4
 4408                                  ;CALL
 4409                                  ;
 4410                                  ;       JSR     PC,BUSADR
 4411                                  ;       RETURN
 4412
```

```
 4413  025434  005737  001302          BUSADR: TST     CHGADR          ;INPUT FROM TTY REQUESTED?
 4414  025440  001450                          BEQ     7$              ;NO--BRANCH
 4415  025442  005037  001302                  CLR     CHGADR          ;YES--CLEAR THE REQUEST FLAG
 4416  025446  012700  001172          1$:     MOV     #$RPADR,R0      ;FIRST ADDRESS
 4417  025452  104401  025634                  TYPE    ,MRPCS1         ;"RPCS1="
 4418  025456  012046                          MOV     (R0)+,-(SP)     ;PRESENT RPCS1 ADDRESS
 4419  025460  104402                          TYPOC                   ;TYPE IT
 4420  025462  104401  020705                  TYPE    ,LINSP          ;2 SPACES
 4421  025466  104411                          RDLIN                   ;GET THE ENTRY
 4422  025470  012601                          MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
 4423  025472  004537  025656                  JSR     R5,CK.NUM       ;CHECK THE NUMBER
 4424  025476  025516                          3$                      ;CARRIAGE RETURN ONLY ENTERED
 4425  025500  025562                          7$                      ;PERIOD ONLY ENTERED
 4426  025502  025446                          1$                      ;ILLEGAL INPUT
 4427  025504  025512                          2$                      ;TERMINATED WITH A CARRIAGE RETURN
 4428  025506  025446                          1$                      ;TERMINATED WITH A ","
 4429  025510  025556                          4$                      ;TERMINATED WITH A ":"
 4430  025512  010260  177776          2$:     MOV     R2,-2(R0)       ;SAVE NEW RPCS1
 4431  025516  104401  025645          3$:     TYPE    ,MRHVEC         ;"RHVEC="
 4432  025522  012046                          MOV     (R0)+,-(SP)     ;PRESENT RH11 VECTOR ADDRESS ON THE STACK
 4433  025524  104402                          TYPOC                   ;TYPE IT
 4434  025526  104401  020705                  TYPE    ,LINSP          ;2 SPACES
 4435  025532  104411                          RDLIN                   ;READ THE ENTRY
 4436  025534  012601                          MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
 4437  025536  004537  025656                  JSR     R5,CK.NUM       ;CHECK THE NUMBER
 4438  025542  025562                          7$                      ;CARRIAGE RETURN ONLY ENTERED
 4439  025544  025562                          7$                      ;PERIOD ONLY ENTERED
 4440  025546  025516                          3$                      ;ILLEGAL INPUT
 4441  025550  025556                          4$                      ;TERMINATED WITH A CARRIAGE RETURN
 4442  025552  025516                          3$                      ;TERMINATED WITH A ","
 4443  025554  025556                          4$                      ;TERMINATED WITH A ":"
 4444  025556  010260  177776          4$:     MOV     R2,-2(R0)               ;SAVE INPUT
 4445  025562  013701  000004          7$:     MOV     ERRVEC,R1       ;SAVE THE ERROR VECTOR
 4446  025566  012737  025622  000004          MOV     #8$,ERRVEC      ;SETUP FOR TRAP
 4447  025574  005777  153372                  TST     @$RPADR         ;CHECK FOR RH11
 4448  025600  010137  000004                  MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
 4449  025604  012700  001172                  MOV     #$RPADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
 4450  025610  012701  012246                  MOV     #RPADR,R1       ;FIRST ADDRESS OF WHERE TO PLT THEM
 4451  025614  012021                          MOV     (R0)+,(R1)+     ;BUS ADDRESS
 4452  025616  012021                          MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
 4453  025620  000207                          RTS     PC              ;RETURN
 4454  025622  010137  000004          8$:     MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
 4455  025626  022626                          CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
 4456  025630  104006                          ERROR   6               ;REPORT THE ERROR
 4457  025632  000705                          BR      1$              ;ASK FOR BUS ADDRESS
 4458
 4459  025634  050122  051503  020061  MRPCS1: .ASCIZ  @RPCS1 = @
 4460  025642  020075      000
 4461  025645      122  053110  041505  MRHVEC: .ASCIZ  @RHVEC = @
 4462  025652  036440  000040
 4463
 4464                                  .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
 4465                                  ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
 4466                                  ;AND FORMS AN OCTAL NUMBER IN R2
```

```
                                        ;CALL:
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                        ;       MOV     #NUM,R2         ;MAX SIZE OF INPUT NUMBER
                                        ;       JSR     R5,CK.NUM       ;GO FORM THE NUMBER
                                        ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2 = 0
                                        ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2 = 0
                                        ;       RETURN  ADR3            ;ILLEGAL CHARACTER IN THE INPUT STRING
                                        ;       RETURN  ADR4            ;"CR" ENTERED -- R2 = NUMBER
                                        ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
                                        ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
                                        ;
025556  010446                  CK.NUM: MOV     R4,-(SP)        ;SAVE R4
025560  010346                          MOV     R3,-(SP)        ;SAVE R3
025562  010246                          MOV     R2,-(SP)        ;SAVE R2
025564  005004                          CLR     R4              ;RETURN POINTER
025566  005003                          CLR     R3              ;START NUMBER AT ZERO
025570  005002                          CLR     R2              ;STORE RESULT
025572  004537  006426                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
025576  025774                          6$                      ;ILLEGAL CHARACTER
025700  026000                          8$                      ;CARRIAGE RETURN
025702  025774                          6$                      ;" "
025704  025776                          7$                      ;"."
025706  025712                          1$                      ;DIGIT 0-7
025710  025774                          6$                      ;DIGIT 8-9
025712  062705  000004          1$:     ADD     #4,R5           ;INCREMENT RETURN PAST "CR" AND "PERIOD" ONLY RETURNS
025716  006303                  2$:     ASL     R3              ;FOR THE OCTAL NUMBER IN R3
025720  103425                          BCS     6$              ;DON'T LET IT GET TO BIG
025722  006303                          ASL     R3
025724  103423                          BCS     6$
025726  006303                          ASL     R3
025730  103421                          BCS     6$
025732  060203                          ADD     R2,R3
025734  004537  006426                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
025740  026000                          8$                      ;ILLEGAL CHARACTER
025742  025764                          5$                      ;CARRIAGE RETURN
025744  025762                          4$                      ;" "
025746  025754                          3$                      ;"."
025750  025716                          2$                      ;DIGIT 0-7
025752  026000                          8$                      ;DIGIT 8-9
025754  105711                  3$:     TSTB    (R1)            ;DOES A "CR" FOLLOW THE "PERIOD"
025756  001010                          BNE     9$              ;BR IF NOT
025760  005724                          TST     (R4)+           ;INCREMENT THE RETURN
025762  005724                  4$:     TST     (R4)+           ;INCREMENT THE RETURN INDEX
025764  005724                  5$:     TST     (R4)+           ;INCREMENT THE RETURN INDEX
025766  020316                          CMP     R3,(SP)         ;INPUT VALUE TOO LARGE ?
025770  101003                          BHI     9$              ;BR IF IT IS
025772  000401                          BR      7$              ;BR IF NOT
025774  005725                  6$:     TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
025776  005725                  7$:     TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
026000  060405                  8$:     ADD     R4,R5           ;SETUP FOR PROPER RETURN
026002  010302                          MOV     R3,R2           ;LOAD ENTERED VALUE
026004  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
026006  012603                          MOV     (SP)+,R3        ;RESTORE R3
026010  012604                          MOV     (SP)+,R4        ;RESTORE R4
```

```
 4521  026012  011505                        MOV     (R5),R5         ;GET RETURN ADDRESS
 4522  026014  000205                        RTS     R5              ;RETURN
 4523
 4524
 4525
 4526          000001                .END
```

```
ABS    = 000200        ACK    = 000123        ACL    = 000040        ACTDRV  012164
ACTSTR  012165         ACU    = 100000        ADDRIS  022065        ADRTBL  001476
ADE    = 001000        ATA    = 100000        ATABIT  012234        ATTN    001276
AT0    = 000001        AT1    = 000002        AT2    = 000004        AT3    = 000010
AT4    = 000020        AT5    = 000040        AT6    = 000100        AT7    = 000200
A16    = 000400        A17    = 001000        BADENT  021436        BAI    = 000010
BEGCYL  001224         BEGIN   002066        BEGIN1  002076        BEGIN2  002102
BEGTRK  001230         BIT0   = 000001        BIT00  = 000001        BIT01  = 000002
BIT02  = 000004        BIT03  = 000010        BIT04  = 000020        BIT05  = 000040
BIT06  = 000100        BIT07  = 000200        BIT08  = 000400        BIT09  = 001000
BIT1   = 000002        BIT10  = 002000        BIT11  = 004000        BIT12  = 010000
BIT13  = 020000        BIT14  = 040000        BIT15  = 100000        BIT2   = 000004
BIT3   = 000010        BIT4   = 000020        BIT5   = 000040        BIT6   = 000100
BIT7   = 000200        BIT8   = 000400        BIT9   = 001000        BPTVEC= 000014
BUFP    025130         BUSADR  025434         C       020675         CHGADR  001302
CI1     013606         CI3     013714         CI4     014022         CI5     014400
CI6     014422         CI7     014436         CI7B    014464         CI8     014536
CKADRS  003570         CKSWR  = 104407        CKTRK   004236         CK.CHR  006426
CK.DEC  006400         CK.DIG  006500         CK.NUM  025656         CK.OCT  006352
CLOCK   006104         CLR    = 000040        CLRQUE  020250         CNTLC   001300
CR     = 000015        CRLF   = 000200        CSF    = 000002        CSU    = 000010
CYLCK   001246         DCK    = 100000        DCL    = 000100        DCU    = 000001
DDISP  = 177570        DDRIVE  001274         DE1    = 000040        DFF20  = 000002
DF1     025014         DF10    025034         DF17    025050         DF2     025020
DF20    025054         DF23    025074         DF24    025100         DF3     025024
DF4     025030         DH1     023231         DH10    023413         DH10A   023511
DH10B   023576         DH17    023663         DH2     023236         DH20    023732
DH20A   024001         DH20B   024077         DH20C   024174         DH23    024231
DH24    024327         DH3     023313         DH4     023341         DH6     023400
DIGB   = 000004        DISPLA  001142         DISPRE  000174         DLT    = 100000
DL64   = 000020        DMD    = 000001        DONE    005210         DPINT   012140
DPR    = 000400        DPRQS   012150         DRIVE   001214         DRQ    = 004000
DRVACT  012110         DRVCLR= 000111         DRVINT  012476         DRVQUE  020346
DRVSTA  012120         DRVTYP  012130         DRY    = 000200        DSWR   = 177570
DS.CYL  001270         DS.TRK  001272         DTE    = 010000        DTSY   = 000200
DTUW    012232         DT00   = 000001        DT01   = 000002        DT02   = 000004
DT03   = 000010        DT04   = 000020        DT05   = 000040        DT06   = 000100
DT07   = 000200        DT08   = 000400        DT1     024502         DT10    024540
DT17    024614         DT2     024504         DT20    024626         DT23    024710
DT24    024726         DT3     024520         DT4     024526         DT6     024536
DVA    = 004000        ECH    = 000100        ECI    = 004000        EMPTYQ  020326
EMTVEC= 000030         EM1     022112         EM10    022402         EM11    022420
EM12    022456         EM13    022521         EM14    022542         EM15    022565
EM16    022631         EM17    022703         EM2     022153         EM20    022761
EM21    023017         EM22    023070         EM23    023137         EM24    023207
EM3     022211         EM4     022247         EM5     022304         EM6     022340
ENDCYL  001222         ENDTRK  001226         ENTADR  020710         ERINDX  005234
ERR    = 040000        ERRVEC= 000004         ES.SAV  020506         EXT1   = 000001
EXT10  = 000010        EXT2   = 000002        EXT20  = 000020         EXT4   = 000004
EXT40  = 000040        FEN    = 000200        FER    = 000020         FMTDPB  001354
FMT22  = 010000        F1     = 000002        F2     = 000004         F3     = 000010
F4     = 000020        F5     = 000040        GETREG= 000141         GETREQ  020422
GO     = 000001        GRV    = 000010        GTSWR  = 104406         HCE    = 000200
HCI    = 002000        HCRC   = 000400        HDREAD  004650         HEDERR  001262
```

```
HT     = 000011          IAE    = 002000          IE     = 000100          ILF    = 000001
ILR    = 000002          IOTVEC= 000020           IR     = 000100          ISR      015130
IXE    = 004000          LA       014772          LACNT    012176          LF     = 000012
LINSP    020705          LIN4SP   020703          LOADRV   025215          LOP.CK   005334
LST    = 002000          MADRER   021456          MAXSEC   001266          MCCMPT   022011
MCLK   = 000002          MCPE   = 020000          MCPEMX   012244          MDRNP    020762
MDRVD    020701          MER11    021007          MFCMPT   021764          MFORMT   021153
MHECK    021174          MHS    = 001000          MINX   = 000004          MMODE    021121
MNDLTA   012260          MNRP04   021036          MODE     001220          MOFFLN   020740
MOH    = 020000          MOL    = 010000          MORMAT   021207          MPATD    021660
MPE    = 000400          MRD    = 000020          MRHVEC   025645          MRPCS1   025634
MSCHK    021730          MSE    = 000020          MSEC20   021357          MSEC22   021300
MSELD    021107          MSELP    021560          MSFOU    021673          MSIZE    021227
MSTCK  = 000010          MUNIT    020557          MUSDR    021067          MWC      001260
MWR    = 000040          MXDLTA   012256          MXF    = 001000          MXLACT   012254
MXWNDW   012262          M0       003116          M1       002644          M1A      002734
M1B      003062          M2       003404          M4       003444          M5       003526
NBA    = 100000          NED    = 010000          NEM    = 004000          NHS    = 002000
NOTPRS   020574          NOTRP    020553          NOTSAF   020611          NUMERR   022035
OCYL   = 100000          OENTER   006116          OFFSET= 000115           OFREV  = 000200
OF100  = 000004          OF200  = 000010          OF25   = 000001          OF400  = 000020
OF50   = 000002          OF800  = 000040          OPE    = 020000          OPI    = 020000
OFT      013326          OR     = 000200          PAR    = 000010          PARENT   006236
PAR1     001426          PAR2     001441          PAR3     001454          PAR4     001465
PAT    = 000020          PATA     001242          PATB     001244          PATSEL   001240
PC     =%000007          PGE    = 002000          PGM    = 001000          PIP    = 020000
PIRQ   = 177772          PIRQVE= 000240           PLU    = 020000          POPQUE   020444
PR0    = 000000          PR1    = 000040          PR2    = 000100          PR3    = 000140
PR4    = 000200          PR5    = 000240          PR6    = 000300          PR7    = 000340
PS     = 177776          PSEL   = 002000          PSW    = 000001          PSW    = 177776
PWRVEC= 000024           QCNT     017756          QDRV0    020050          QDRV1    020070
QDRV2    020110          QDRV3    020130          QDRV4    020150          QDRV5    020170
QDRV6    020210          QDRV7    020230          QINPT    017766          QOUTPT   020006
QSTART   020026          QSTOP    020030          Q^ERM  = 020250          RAW    = 000020
RBJF     025120          RDCHR  = 104410          RDDAT  = 000171          RDHD   = 000173
RDLIN  = 104411          RDY    = 000200          RD.ADR   017240          RD.RP    017214
RD.RP1   017236          RD.RP2   017362          RD.RP3   017366          RD.RP4   017372
RD.WRD   017242          READIN= 000121           RECAL  = 000107          RELSE  = 000113
RESREG= 104413           RESVEC= 000010           RETRY    001250          RMR    = 000004
RNOP   = 000101          RPADR    012246          RPAS   = 000016          RPBA   = 000004
RPCA   = 000034          RPCC   = 000036          RPCS1  = 000000          RPCS2  = 000010
RPDA   = 000006          RPDB   = 000022          RPDS1  = 000012          RPDT   = 000026
RPEC1  = 000044          RPEC2  = 000046          RPERRS   012100          RPER1  = 000014
RPER2  = 000040          RPER3  = 000042          RPINIT   012264          RPLA   = 000020
RPMR   = 000024          RPOF   = 000032          RPSN   = 000030          RPTMR    016466
RPVEC    012250          RPWC   = 000002          RP.REG   001304          RP04     013034
RP04B    020621          RP05     020626          RP06     020633          RTC    = 000117
R0     =%000000          R1     =%000001          R2     =%000002          R3     =%000003
R4     =%000004          R5     =%000005          R6     =%000006          R7     =%000007
SAVEFG   012206          SAVREG= 104412           SAVSEC   001252          SAVWC    001254
SC       015334          SCAWC    005554          SC1    = 000100          SC10   = 001000
SC11     016166          SC12     016256          SC13     016326          SC2    = 000200
SC20   = 002000          SC3      015404          SC4      015410          SC5      015422
SC6      015622          SC6A     015732          SC7      016060          SC8      016136
```

```
SEARCH= 000131          SEC20   001264          SEEK   = 000105          SEEKFG  012210
SELDRV= 000145          SETFMT= 000143          SETHDR  005602          SETPAT  003700
SETTBL  005402          SETVEC  002410          SET.IE  017704          SKI    = 040000
SLASH   020671          SOFSW   001216          SP     =%000006         SRCHWT  012162
STACK = 001100          STCLK1  006020          STCLK2  006070          STCLK3  006074
STKLMT= 177774          STO     016560          STO1    016610          STO2    017006
STO3    017056          STO5    017102          STO6    017110          STO7    017146
STO8    017176          STO9    017206          ST.CLK  005742          SVRH11  017566
SWR     001140          SWREG   000176          SW0    = 000001         SW00   = 000001
SW01   = 000002         SW02   = 000004         SW03   = 000010         SW04   = 000020
SW05   = 000040         SW06   = 000100         SW07   = 000200         SW08   = 000400
SW09   = 001000         SW1    = 000002         SW10   = 002000         SW11   = 004000
SW12   = 010000         SW13   = 020000         SW14   = 040000         SW15   = 100000
SW2    = 000004         SW3    = 000010         SW4    = 000020         SW5    = 000040
SW6    = 000100         SW7    = 000200         SW8    = 000400         SW9    = 001000
SYSTAT  020640          T       020677          TABLE   001374          TAP    = 040000
TBITVE= 000014          TD      015174          TDF    = 000040         TIMER   012212
TITLE   025130          TKVEC  = 000060         TPVEC  = 000064         TRAPVE= 000034
TRE    = 040000         TRKCNT  001236          TRKTST  005472          TRK1   = 004000
TRK10  = 040000         TRK2   = 010000         TRK20  = 100000         TRK4   = 020000
TRNSWT  012160          TRTVEC= 000014          TTRKS   001232          TTRKSC  001234
TUF    = 000100         TYPADR  006136          TYPDS  = 104405         TYPE   = 104401
TYPERR  007044          TYPOC  = 104402         TYPON  = 104404         TYPOS  = 104403
ULDFLG  012166          UNLOAD= 000103          UNS    = 040000         UNTOFF  020532
UNTON   020543          UPDACY  005662          UPDATK  005712          UPE    = 020000
US1    = 000001         US2    = 000002         US4    = 000004         UWR    = 000010
VUF    = 000002         VU30   = 010000         VV     = 000100         WA0    = 000002
WC      001256          WCE    = 040000         WCF    = 000040         WCKD   = 000151
WCKHD  = 000153         WCTBL   001552          WCU    = 000001         WLE    = 004000
WRL    = 004000         WRTDAT= 000161          WRTHD  = 000163         WRTRK   004004
WRTRK1  004060          WRTRK2  004116          WRT.AD  017464          WRT.RP  017374
WRT.R1  017460          WRT.R2  017550          WRT.R3  017556          WRT.R4  017562
WRT.R5  017564          WRT.WD  017462          WRU    = 000400         WSU    = 000004
$AUTOB  001134          $BDADR  001122          $BCDAT  001126          $BELL   001162
$CHARC  007510          $CKSWR  010472          $CMTAG  001100          $CM3   = 000000
$CNTLC  011367          $CNTLG  011401          $CNTLU  011374          $CRLF   001167
$DBLK   010156          $DB2D   011524          $DECVL  011704          $DOAGN  005204
$DTBL   010146          $ENDAD  005174          $ENDCT  005160          $ECP    005100
$EOPCT  005152          $ERFLG  001103          $ERMAX  001115          $ERROR  006636
$ERRPC  001116          $ERRTB  001626          $ERTTL  001112          $ESCAP  001160
$FILLC  001156          $FILLS  001155          $GDADR  001120          $GDDAT  001124
$GET42  005164          $GTSWR  010562          $HD    = 000000         $ICNT   001104
$INTAG  001135          $ITEMB  001114          $LF     001170          $LKCSB  001200
$LKCSR  001176          $LKS    001206          $LLVEC  001210          $LPADR  001106
$LPERR  001110          $LPVEC  001202          $MNEW   011417          $MSWR   011406
$NULL   001154          $OCNT   007736          $OMODE  007740          $PASS   001100
$QUES   001166          $RDCHR  011034          $RDLIN  011124          $RDSZ  = 000007
$RESRE  011756          $RPADR  001172          $RPVEC  001174          $RTNAD  005206
$SAVRE  011720          $SB2D   011470          $SETUP= 000106          $STUP  = 177777
$SUPRS  011430          $SVPC  = 000200         $SWR   = 123000         $TKB    001146
$TKCNT  010166          $TKINT  010204          $TKQEN= 010203          $TKQIN  010170
$TKQOU  010172          $TKQSR  010174          $TKS    001144          $TKSRV  010254
$TN    = 000000         $TNPWR  011634          $TPB    001152          $TPFLG  001157
$TPS    001150          $TRAP   012014          $TRAP2  012036          $TRP   = 000014
```

M08

DZRJB.013 SYMBOL TABLE

```
$TRPAD  012050          $TSTNM  001102          $TTYIN  011360          $TYPDS  007742
$TYPE   007274          $TYPEC  007444          $TYPEX  007512          $TYPOC  007540
$TYPON  007554          $TYPOS  007514          $$GET4= 000000          $OFILL  007737
.     = 026016
```

ERRORS DETECTED: 0

```
*DZRJBA,DZRJB SOL LI:ME NL:MC:MD:CND=RP0456.010,DZRJB.013
RUN-TIME:  72 48 0 SECONDS
CORE USED:  35K
```

Spooler running 13 Seconds, 86 KCS, 438 disk reads, 1 disk writes, 102 pages printed