RP04

DISK PACK FORMATTER

MD-11-DZRPL-B

EP-DZRPL-B-DL-A

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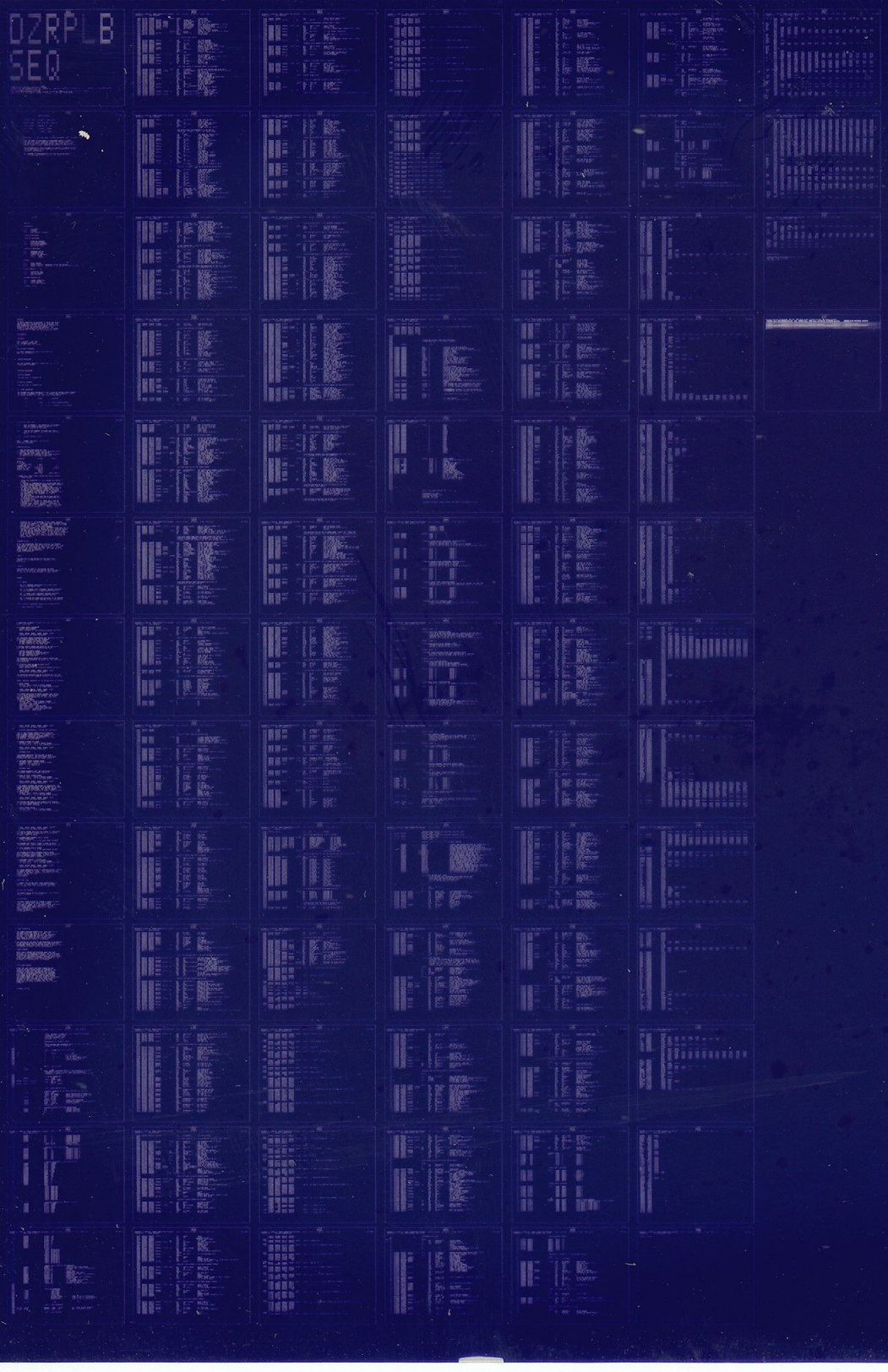
Made In U.S.A.



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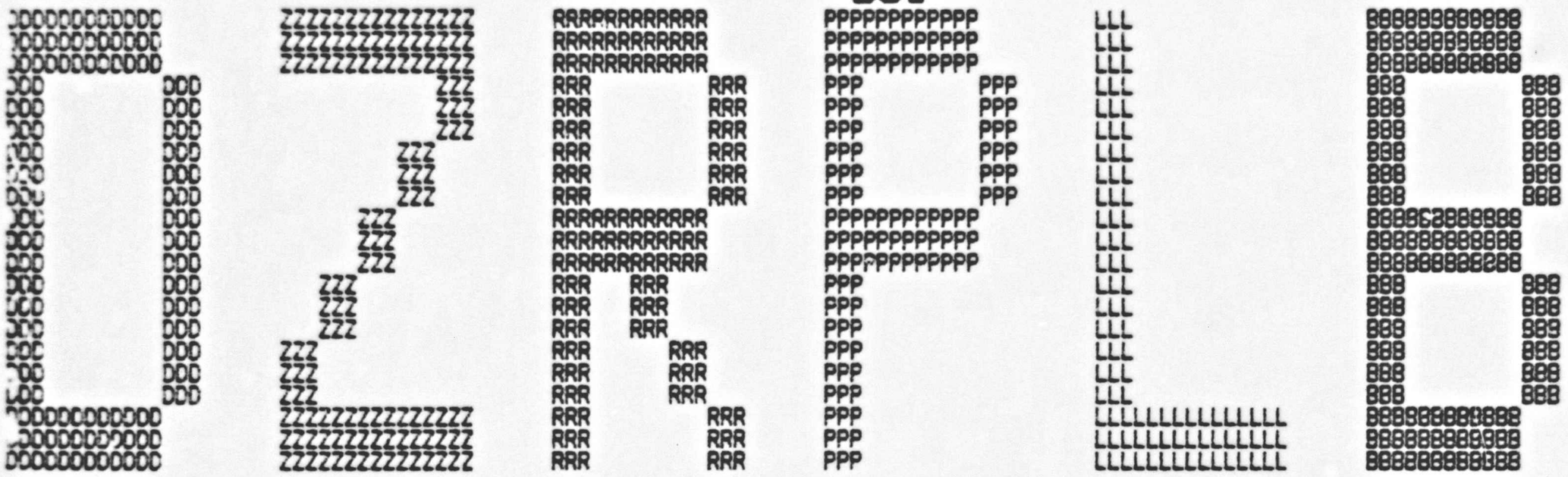

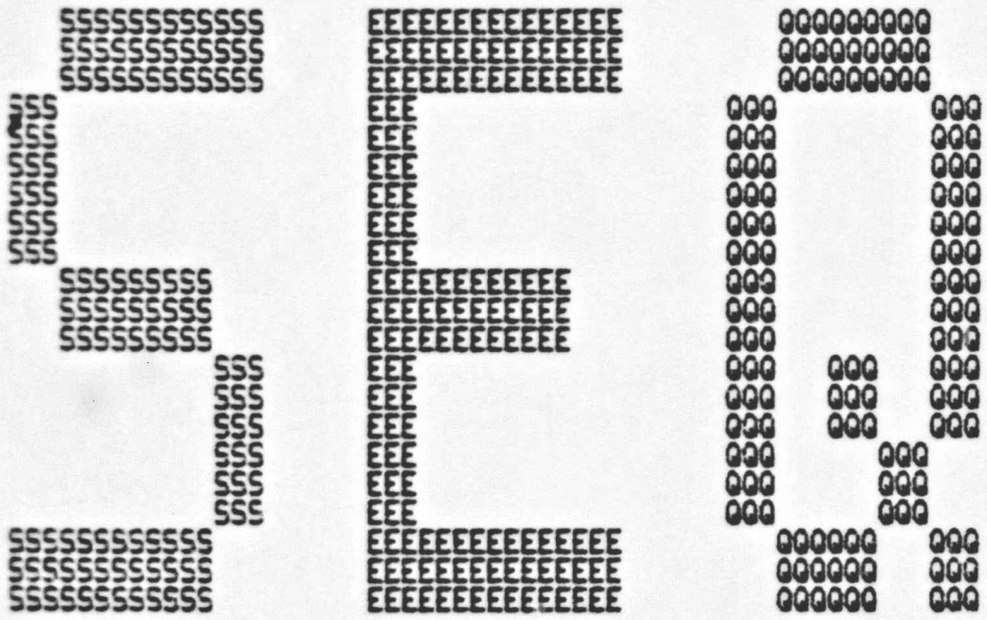

```
LPTSPL Version 101(2111) Running on MTA260
 *START* User WELLINGHAM,A[1,2] Job  DZRPLB Seq. 1899 Date 13-Feb-76 17:50:34 Monitor     RZ231D KL10 SYS#1026 *START*
Request created: 13-Feb-76 17:37:34
File: WHTN:DZRPLB.SEQ<055>[404,3722] Created: 13-Feb-76 15:08:16 Printed: 13-Feb-76 17:50:35
QUEUE Switches:  /FILE:ASCII /COPIES:1 /SPACING:1 /LIMIT:182 /FORMS:NORMAL
```

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZRPL-B-D

PRODUCT NAME: RP04 DISK PACK FORMATTER

DATE CREATED: FEBRUARY 21, 1975

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: R. MOORE/C. HESS

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E01

1.0 ABSTRACT

THE RP04 FORMATTER IS DESIGNED TO WRITE AND VERIFY HEADER AND DATA INFORMATION ON ALL POSSIBLE DISK PACK ADDRESSES WITH THE INTENTION OF TESTING THE RETENTIVITY OF THE RECORDING SURFACES. THE FORMAT IS MAINTAINED ON A BASIS OF 411 CYLINDERS, 19 TRACKS PER CYLINDER AND 22 SECTORS PER TRACK.

2.0 REQUIRMENTS

2.1 EQUIPMENT

PDP-11 SYSTEM (12K CORE)
RH11 MASSBUS CONTROLLER
ONE OR MORE RP04 DISK DRIVES

2.3 PRELIMINARY PROGRAMS

ALL RP04 DIAGNOSTICS SHOULD HAVE PREVIOUSLY BEEN RUN SUCCESSFULLY.

3.0 LOADING PROCEDURE

USE THE STANDARD ABSOLUTE LOADER FROM THE 12K OR HIGHER BANK OF MEMORY.

4.0 STARTING PROCEDURE

4.1 STARTING ADDRESS

LOAD AND START AT ADDRESS 200

4.2 RESTARTING ADDRESS

LOAD AND START AT ADDRESS 204

4.3 RH11/RP04 ADDRESSES

THE PROGRAM HAS BEEN ASSEMBLED TO USE 176700 AS THE RH11/RP04 ADDRESS; THE VECTOR IS ASSUMED TO BE 254. TO CHANGE THESE ADDRESSES, ENTER THE PROPER ADDRESS INTO THE LOCATION(S) GIVEN BELOW.

LOCN	VALUE	FUNCTION
1100	176700	RH11/RP04 UNIBUS ADDRESS
1102	254	RH11 INTERRUPT VECTOR ADDRESS

4.4 SWITCH SETTINGS (SW=1)

SW15 HALT ON ERROR--- THE OPERATION IN PROGRESS WHEN THE ERROR OCCURED IS POINTED TO BY THE PC LOCATED ON THE STACK.

SW14 LOOP ON THE CURRENT CYLINDER AND TRACK--- ALLOWS THE USER TO LOCK ON A FAILING TRACK ETC..

SW13 INHIBIT ERROR TYPEOUT

SW0 FORMAT (OR CHECK) CONTINUOUSLY

5.0 OPERATING PROCEDURE

5.1 OPERATOR ACTION

1. TURN THE SELECTED DRIVE ON LINE.
2. DISABLE THE WRITE PROTECT ON THE SELECTED DRIVE.
3. WAIT FOR THE READY LIGHT INDICATION.
4. THE OPERATOR WILL RESPOND TO THE TYPED REQUESTS BY INPUTTING THE FOLLOWING PARAMETERS:

PARAMETER	VALUES	DEFAULT
DRIVE #	0-7	0
22 SECTOR (18 BIT) MODE	Y OR N	Y
PROGRAM MODE	F OR C	F
STARTING CYL,TRK	0-410,0-18	0,0 *
ENDING CYL,TRK	0-410,0-18	410,18 *
SELECT PATTERN	ZERO'S	
	ONE'S	
	WORST CASE	WORST CASE *

* NORMAL FULL PACK FORMAT OPERATIONS SHOULD DEFAULT TO THESE VALUES.

1. TYPING THE CHARACTER 'D' WILL ASSUME THE DEFAULT VALUES.
2. A 'CONTROL C' COMBINATION WILL RETURN USER BACK TO THE DRIVE NUMBER REQUEST DURING THE INPUT REQUESTS.
3. A RUBOUT WILL RETYPE THE CURRENT LINE.
4. THE INPUT FOR PARTIAL PACK FORMATS MUST HAVE THE CYL AND TRK SEPARATED BY A COMMA AND THE LINE TERMINATED WITH A CARRIAGE RETURN. THE ENDING CYL,TRK ADDRESS MUST BE EQUAL TO OR GREATER THAN THE STARTING CYL,TRK ADDRESS. ALL LIMITS ARE INCLUSIVE.
5. THE DATA PATTERN TO BE WRITTEN ON EACH SECTOR IS SELECTED BY TYPING THE DIGIT ASSOCIATED WITH THE PATTERN TYPED.
6. THE PROGRAM MAY BE RUN IN 'READ ONLY' MODE BY ENTERING A 'C' (CHECK) IN THE RESPONSE TO THE 'PROGRAM MODE' REQUEST MESSAGE. THE NORMAL OR DEFAULT MODE IS 'F' (FORMAT & VERIFY); THIS MODE IS SELECTED BY ENTERING A 'D' (DEFAULT) OR BY

ENTERING AN 'F' IN RESPONSE TO THE 'MODE' REQUEST.

7. STARTING AND ENDING CYLINDER AND TRACK ADDRESS ENTRIES MUST BE IN FORMAT 'CCC,TT' WHERE 'CCC' IS THE CYLINDER ADDRESS AND 'TT' IS THE TRACK ADDRESS.
8. ALL ENTRIES EXCEPT THE 'SELECT PATTERN' ENTRY AND THE 'D' (DEFAULT) ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN.
9. THE PACK MAY BE FORMATTED IN 22 SECTOR (16 BIT) MODE OR IN 20 SECTOR (18 BIT) MODE. IF THE PACK IS FORMATTED IN 20 SECTOR MODE, BITS 16 & 17 OF EACH WORD WILL BE ZERO. ALL OF THE PDP-11 RP04 DIAGNOSTICS REQUIRE 22 SECTOR FORMATS.

5.2 PROGRAM ACTION

AFTER THE PARAMETERS HAVE BEEN INPUTTED THE PROGRAM WILL FORMAT OR CHECK WITHIN THE LIMITS SPECIFIED. UPON COMPLETION OF THE FORMAT OR CHECK (SW0 = 0), 'FORMAT COMPLETE' OR 'CHECK COMPLETE' WILL BE TYPED AND A NEW DRIVE NUMBER WILL BE REQUESTED.

5.3 SUBROUTINE ABSTRACTS

5.3.1 'RP04'

THIS ROUTINE IS THE DRIVER FOR THE RP04 DISK SYSTEM. IT IS ENTERED UPON ALL REQUESTS TO THE RP04 DRIVE.

5.3.2 'DRINIT'

THIS ROUTINE IS USED TO INITIALIZE THE RP04 DRIVER. AT THE EXIT OF THIS ROUTINE THE AVAILABILITY OF EACH DRIVE HAS BEEN RECORDED IN TABLE DRVSTA.

6.0 ERRORS

6.1 ENTRY ERRORS

1. THE '??' MESSAGE IDENTIFIES AN ILLEGAL INPUT CHARACTER HAS BEEN TYPED.
2. THE '?? CYLINDER LIMIT EXCEEDED' MESSAGE INDICATES THE USER REQUESTED A CYLINDER GREATER THAN 410.
3. THE '?? TRACK LIMIT EXCEEDED' MESSAGE INDICATES THE USER REQUESTED A TRACK GREATER THAN 18.
4. THE '?? ENDING DSK ADRS MUST BE EQUAL TO OR GREATER THAN THE STARTING ADRS' MESSAGE IS SELF-EXPLANATORY.

6.2 ERROR TYPEOUTS- REPORTED WITHIN THE DRIVER ROUTINE

#1 ILLEGAL SUBSYSTEM INTERRUPT

A SUBSYSTEM INTERRUPT OCCURED, BUT THE 'SC' BIT IN
RHCS1 IS NOT SET.

#2 ILLEGAL DRIVE INTERRUPT
DRIVE= DRIVE NUMBER
RHAS= CONTENTS OF THE ATTENTION SUMMARY REGISTER

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

THE INDICATED DRIVE INTERRUPTED BUT THE DRIVE REGISTERS
DO NOT SHOW A REASON FOR THE INTERRUPT.
#3 MASSBUS CONTROL BUS PARITY ERROR
RD.ADR= ADDRESS OF THE REGISTER READ
RD.WRD= CONTENTS OF THE WORD READ

A CONTROL PARITY ERROR WAS DETECTED BY THE CONTROL
UNIT WHEN THE INDICATED REGISTER WAS READ.

#4 CONTROL BUS PARITY ERROR
WRT.AD= ADDRESS OF REGISTER WRITTEN
WRT.WD= CONTENTS OF WORD WRITTEN
RD.WRD= WORD READ BACK

THE ADDRESSED DRIVE DETECTED A PARITY ERROR WHEN
THE CONTROLLER ATTEMPTED TO WRITE INTO THE INDICATED
DRIVE REGISTER.

#5 ATTENTION FROM AN UNAVAILABLE DRIVE
DRIVE= DRIVE NUMBER
RHAS= CONTENTS OF THE ATTENTION SUMMARY REGISTER

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

THE ATTENTION REGISTER HAS AN ATTENTION BIT SET FOR
A DRIVE WHICH IS NOT CURRENTLY ACTIVE IN AN OPERATION.

6.3 ERROR TYPEOUTS- REPORTED AT THE RETURN FROM THE DRIVER

#1 WRITE ERROR
DRIVE=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK WHERE ERROR OCCURED

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

THIS ERROR INDICATES AN ERROR OCCURED WHEN TRYING
TO DO A WRITE HEADER & DATA COMMAND. THE PROGRAM
WILL NOT ADVANCE BEYOND THE CYL,TRK TYPED UNTIL
THE ERROR DISOLVES.
#2 WRITE CHECK ERROR
DRIVE=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - DISK ADDRESS OF BAD SECTOR
SECTOR=XX - BAD SECTOR
GOOD DATA=XXXXXX - DATA IN CORE
BAD DATA=XXXXXX - DATA READ FROM DISK
RHEC1=XXXXXX - LOCATION OF ERROR BURST
RHEC2=XXXXXX - ERROR BURST

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

RETRIES UNSUCCESSFUL - SECTOR NOT ACCEPTABLE

THIS IS THE TYPICAL ERROR TPYEOUT EXPECTED
WHEN A FORMAT ERROR OCCURES. IT SUGGESTS THAT THE
DISK SURFACE SPECIFIED IS QUESTIONABLE. IF
THE MESSAGE 'RETRIES UNSUCCESSFUL' IS TYPED,
THE PACK IS NOT ACCEPTABLE.

#3 HEADER COMPARE NOT MADE
DRIVE#=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK COMPARSION ATTEMPTED

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

REFORMAT PACK

THIS ERROR INDICATES THE FAILURE TO READ A
HEADER SUCCESSFULLY. THE POSITIONER COULD HAVE
ADVANCED TOO FAR DURING THE FORMAT OPERATION.

#4 SOFTWARE HEADER COMPARE ERROR
DRIVE#=X SN=X - DRIVE & SERIAL NUMBER
EXPECTED- CYL,TRK=XXX,XX
READ - CYL,TRK=XXX,XX

REFORMAT PACK

THIS ERROR SUGGESTS THAT THE POSITIONER FAILED
TO ADVANCE DURING THE FORMAT OPERATION.

#5 READ OR WRITE UNSAFE ERROR
DRIVE=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK WHEN UNSAFE OCCURED

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

IF AN UNSAFE OCCURES THE FORMAT IS TERMINATED. THE
FORMAT SHOULD BE RESTARTED AT OR BEFORE THE CYLINDER
WHERE THE UNSAFE DEVELOPED. THE TYPE OF UNSAFE
IS INDICATED BY THE CONTENTS OF RHER1, RHER2 OR RHER3.

#6 DRIVE ERROR
DRIVE=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK WHEN ERROR OCCURED

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

TWO RETRIES ARE MADE ON THE CURRENT DISK ADDRESS
IF THE DRIVE ERROR REMAINS THE FORMAT IS TERMINATED,
IF NOT THE FORMAT CONTINUES.

#7 DRIVE UNSAFE ERROR
DRIVE=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK WHEN UNSAFE OCCURED

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

IF A DRIVE UNSAFE DEVELOPS THE FORMAT IS TERMINATED.
THE TYPE OF UNSAFE IS INDICATED BY THE CONTENTS
OF RHER1, RHER2 OR RHER3.

#8 UNCORRECTABLE MASSBUS PARITY ERROR
FORMAT TERMINATED
CYL,TRK=XXX,XX - CYL & TRK WHEN ERROR OCURRED

THE PROGRAM HAS TRIED 3 TIMES TO READ OR WRITE
A REGISTER AND A PARITY ERROR HAS OCCURED EACH TIME.

#9 FATAL MASSBUS PARITY ERROR
CYL,TRK=XXX,XX - CYL & TRK WHEN ERROR OCCURED

THE PROGRAM DETECTED A MASSBUS PARITY ERROR
WHILE ISSUING A 'DRIVE CLEAR' TO RESET A PREVIOUSLY
DETECTED MASSBUS PARITY ERROR. THE PROGRAM WILL
HALT AFTER THE ERROR IS REPORTED.

#10 SOFTWARE TIMEOUT - SYSTEM HUNG
DRIVE#=X SN=X - DRIVE & SERIAL NUMBER
CYL,TRK=XXX,XX - CYL & TRK WHEN OPERATION TIMED OUT

RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3
CONTENTS OF THE ABOVE REGISTERS

IF A DISK OPERATION FAILS TO COMPLETE WITHIN 1 SECOND
THE ABOVE MESSAGE IS TYPED. THIS INDICATION ONLY
OCCURES IF THE PDP11 SYSTEM IS EQUIPPED WITH EITHER
A KW11-L OR KW11-P CLOCK.

7.0 MISCELLANEOUS

7.1 EXECUTION TIME

TO FORMAT THE ENTIRE DISK TAKES APPROXIMATELY 9
MINUTES. IT TAKES ABOUT 1.2 SECONDS TO FORMAT
ONE CYLINDER PLUS 7 MS FOR EACH CYLINDER SEEK.

7.2 HALTING THE PROGRAM

THE FORMAT SHOULD NOT BE INTERRUPTED ONCE UNDERWAY
UNLESS A REFORMAT IS TO FOLLOW.

7.3 DATA PATTERN

THE WORST CASE PATTERN OF 165555 & 133333 IS MORE
LIKELY TO CREATE DATA CHECK (DCK) ERRORS
THAN ONES OR ZEROS. IF A SUCCESSFUL PASS WITH ZEROS
IS ACHIEVED WHERE WORST CASE FAILS THEN THE
RP04 DIAGNOSTICS SHOULD BE RUN TO VERIFY THE
DRIVES RELIABILITY.

8.0 PROGRAM DESCRIPTION

8.1 FORMAT OPERATION

THE FORMAT PROGRAM FORMATS THE DISK PACK ON THE
ASSIGNED DRIVE ONE TRACK AT A TIME. THE
THE DATA FIELDS ARE WRITTEN WITH THE SELECTED
PATTERN. KEY WORDS ARE WRITTEN WITH ZERO'S.
EACH TRACK IS VERIFIED WITH A WRITE CHECK
ORDER IMMEDIATELY AFTER IT IS WRITTEN.

THE PORTION OF THE PACK TO BE FORMATTED IS DETERMINED
BY THE BEGINNING AND THE ENDING CYLINDER AND TRACK
ADDRESSES; THESE LIMITS ARE INCLUSIVE. A SINGLE TRACK IS
THE SMALLEST ELEMENT THAT MAY BE FORMATTED.

8.2 FORMAT ERRORS

WRITE CHECK ERRORS ARE REPORTED WHEN THEY ARE
DETECTED. IF AN ERROR IS DETECTED, THE SECTOR MUST
BE REWRITTEN AND VERIFIED CORRECTLY TWO SUCCESSIVE
TIMES TO BE CONSIDERED USEABLE. SECTORS WHICH CANNOT
BE WRITTEN CORRECTLY TWICE AFTER AN ERROR WILL BE
DECLARED NOT ACCEPTABLE BY THE PROGRAM.

8.3 POSITIONER ERRORS

AFTER THE LAST TRACK HAS BEEN FORMATTED AND
VERIFIED AN ADDITIONAL CHECK IS PERFORMED. THE
HEADER OF TRACK ZERO AND SECTOR ZERO OF EACH
CYLINDER IS READ AND COMPARED BY THE SOFTWARE.
THIS CHECK IS PERFORMED TO ISOLATE A POSSIBLE
POSITIONER ERROR THAT MAY HAVE OCCURED DURING
THE FORMAT OPERATION. TWO SUCH CASES OF POSITIONER
MALFUNCTION ARE: FAILURE OF THE POSITIONER TO
ADVANCE TO THE NEXT CYLINDER, AND THE CASE
WHERE THE POSITIONER ADVANCES PAST THE CYLINDER
DESIRED.

9.0 PROGRAM LISTING

```
                                .TITLE  MAINDEC-11-DZRPL-B  "RP04 FORMATTTER PROGRAM"
                                ;*COPYRIGHT (C) 1974,1975
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY R. MOORE/C. HESS
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-A2).
                                ;*

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON THE CURRENT TRACK
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*         0            LOOP THE PROGRAM


                                .SBTTL  TRAP CATCHER

                                        .=0
000000                          ;*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

                                ;*STARTING ADDRESSES
000200                                  .=200
                                ;*200 = NORMAL START
000200  000137  001104                  JMP     BEGIN
                                ;*204 = RESTART
000204  000137  001156                  JMP     RESTRT


                                .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
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          SWR=    177570          ;;SWITCH REGISTER
177570                          DISPLAY=SWR

                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
```

```
(1)             000003                  R3=     %3              ;;GENERAL REGISTER
(1)             000004                  R4=     %4              ;;GENERAL REGISTER
(1)             000005                  R5=     %5              ;;GENERAL REGISTER
(1)             000006                  R6=     %6              ;;GENERAL REGISTER
(1)             000007                  R7=     %7              ;;GENERAL REGISTER
(1)                                     .EQUIV  R6,SP           ;;STACK POINTER
(1)                                     .EQUIV  R7,PC           ;;PROGRAM COUNTER
(1)
(1)                                     ;*PRIORITY LEVEL DEFINITIONS
(1)             000000                  PR0=    0               ;;PRIORITY LEVEL 0
(1)             000040                  PR1=    40              ;;PRIORITY LEVEL 1
(1)             000100                  PR2=    100             ;;PRIORITY LEVEL 2
(1)             000140                  PR3=    140             ;;PRIORITY LEVEL 3
(1)             000200                  PR4=    200             ;;PRIORITY LEVEL 4
(1)             000240                  PR5=    240             ;;PRIORITY LEVEL 5
(1)             000300                  RP6=    300             ;;PRIORITY LEVEL 6
(1)             000340                  PR7=    340             ;;PRIORITY LEVEL 7
(1)
(1)                                     ;*"SWITCH REGISTER" SWITCH DEFINITIONS
(1)             100000                  SW15=   100000
(1)             040000                  SW14=   40000
(1)             020000                  SW13=   20000
(1)             010000                  SW12=   10000
(1)             004000                  SW11=   4000
(1)             002000                  SW10=   2000
(1)             001000                  SW09=   1000
(1)             000400                  SW08=   400
(1)             000200                  SW07=   200
(1)             000100                  SW06=   100
(1)             000040                  SW05=   40
(1)             000020                  SW04=   20
(1)             000010                  SW03=   10
(1)             000004                  SW02=   4
(1)             000002                  SW01=   2
(1)             000001                  SW00=   1
(1)                                     .EQUIV  SW09,SW9
(1)                                     .EQUIV  SW08,SW8
(1)                                     .EQUIV  SW07,SW7
(1)                                     .EQUIV  SW06,SW6
(1)                                     .EQUIV  SW05,SW5
(1)                                     .EQUIV  SW04,SW4
(1)                                     .EQUIV  SW03,SW3
(1)                                     .EQUIV  SW02,SW2
(1)                                     .EQUIV  SW01,SW1
(1)                                     .EQUIV  SW00,SW0
(1)
(1)                                     ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
(1)             100000                  BIT15=  100000
(1)             040000                  BIT14=  40000
(1)             020000                  BIT13=  20000
(1)             010000                  BIT12=  10000
(1)             004000                  BIT11=  4000
(1)             002000                  BIT10=  2000
(1)             001000                  BIT09=  1000
```

```
(1)             000400                  BIT08=  400
(1)             000200                  BIT07=  200
(1)             000100                  BIT06=  100
(1)             000040                  BIT05=  40
(1)             000020                  BIT04=  20
(1)             000010                  BIT03=  10
(1)             000004                  BIT02=  4
(1)             000002                  BIT01=  2
(1)             000001                  BIT00=  1
(1)                                     .EQUIV  BIT09,BIT9
(1)                                     .EQUIV  BIT08,BIT8
(1)                                     .EQUIV  BIT07,BIT7
(1)                                     .EQUIV  BIT06,BIT6
(1)                                     .EQUIV  BIT05,BIT5
(1)                                     .EQUIV  BIT04,BIT4
(1)                                     .EQUIV  BIT03,BIT3
(1)                                     .EQUIV  BIT02,BIT2
(1)                                     .EQUIV  BIT01,BIT1
(1)                                     .EQUIV  BIT00,BIT0
(1)
(1)                                     ;*BASIC "CPU" TRAP VECTOR ADDRESSES
(1)             000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
(1)             000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
(1)             000014                  TBITVEC=14              ;;"T" BIT
(1)             000014                  TRTVEC= 14              ;;TRACE TRAP
(1)             000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
(1)             000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
(1)             000024                  PWRVEC= 24              ;;POWER FAIL
(1)             000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
(1)             000034                  TRAPVEC=34              ;;"TRAP" TRAP
(1)             000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
(1)             000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
(1)             000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
4943
4944
4945
4946                                    ;REGISTER ADDRESSES
4947                    177560                  TKS=177560
4948                    177562                  TKB=177562
4949                    177564                  TPS=177564
4950                    177566                  TPB=177566
4951                    172540                  $LKCSR=172540           ;ADRS OF KW11-P STATUS REG
4952                    172542                  $LKCSB=172542           ;ADRS OF KW11-P COUNTER BUFFER
4953                    177546                  $LKS=177546             ;ADRS OF KW11-L STATUS REG
4954
4955                    001100                  .=1100
4956
4957                                    .SBTTL  RP04 ADDRESSES
4958
4959    001100  176700                  $RPADR: .WORD   176700          ;RH11/RP04 UNIBUS ADDRESS
4960    001102  000254                  $RPVEC: .WORD   254             ;RH11 INTERRUPT VECTOR
4965
4966                                    .SBTTL  MAIN PROGRAM
4967
```

```
 4968  001104  000005                    BEGIN:  RESET                   ;CLEAR WORLD
 4969  001106  012706  001100                    MOV     #STACK,SP       ;SET UP STACK
 4970  001112  012737  003116  000030            MOV     #EMTHND,@#30    ;SET UP EMT ADRS
 4971  001120  012737  000340  000032            MOV     #340,@#32       ;SET PS TO 7
 4972  001126  013737  001100  013070            MOV     $RPADR,RPADR    ;MOVE RH11/RP04 ADDRESSES TO VECTOR
 4973  001134  013737  001102  013072            MOV     $RPVEC,RPVEC    ;RH11 VECTOR ADDRESS
 4974  001142  012737  000240  001156            MOV     #240,RESTRT     ;ALLOW RESTARTS AFTER INITIAL START
 4975  001150  004537  005166                    JSR     R5,TYPOUT       ;GO TYPE MESSAGE
 4976  001154  007466                            MTITLE                  ;ADRS OF 'TITLE' MESSAGE
 4977  001156  000752                    RESTRT: BR      BEGIN           ;CHANGE TO 'NOP' AFTER INITIAL START
 4978  001160  012706  001100                    MOV     #STACK,SP       ;SET UP STACK
 4979  001164  000005                            RESET                   ;CLEAR WORLD
 4980
 4981                                            ;GO FIND OUT WHAT DRIVE
 4982
 4983  001166  004537  005166            M0:     JSR     R5,TYPOUT       ;GO TYPE MESSAGE
 4984  001172  007546                            MUNIT                   ;ADRS OF MESSAGE
 4985  001174  004737  005242                    JSR     PC,TTI          ;GO WAIT FOR DRIVE #
 4986  001200  022700  000104                    CMP     #104,R0         ;IS IT THE DEFAULT CHAR?
 4987  001204  001006                            BNE     1$              ;BRANCH IF NOT THE DEFAULT CHAR
 4988  001206  005037  012540                    CLR     USEL            ;SELECT DRIVE ZERO
 4989  001212  004537  005166                    JSR     R5,TYPOUT       ;GO TYPE DEFAULT DRIVE NO.
 4990  001216  007561                            MDRVD                   ;ADRS OF MSG
 4991  001220  000413                            BR      GSEL            ;GO SEE IF DRIVE ZERO IS THERE
 4992
 4993  001222  004737  005314            1$:     JSR     PC,NUMTST       ;IS IT A DIGIT?
 4994  001226  000757                            BR      M0              ;RETURN HERE IF DRIVE # NOT A DIGIT
 4995  001230  022700  000007                    CMP     #7,R0           ;IS IT LESS THAN 7?
 4996  001234  103003                            BCC     2$              ;YES - GO SELECT DRIVE
 4997  001236  004737  005406                    JSR     PC,QUES         ;TYPE ??
 4998  001242  000751                            BR      M0              ;RETYPE LINE
 4999  001244  010037  012540            2$:     MOV     R0,USEL         ;SAVE IN USEL
 5000
 5001                                            ;THIS CODE CHECKS IF REQUIRED DRIVE IS AVAILABLE
 5002
 5003  001250  004737  013106            GSEL:   JSR     PC,RPINIT       ;GO SEE WHAT DRIVES ARE AVAILABLE
 5004  001254  012737  177777  013032            MOV     #177777,SEEKFG  ;SET TO -1 IF NO OPTIMIZATION IN DRIVER
 5005  001262  013700  012540                    MOV     USEL,R0         ;GET DRIVE NO.
 5006  001266  105760  012752                    TSTB    DRVSTA(R0)      ;LOOK AT DRIVE STATUS
 5008  001272  003035                            BGT     M1              ;BRANCH IF ONLINE
 5012  001274  002404                            BLT     1$              ;BRANCH IF UNSAFE OR NONEXISTENT
 5013  001276  004537  005166                    JSR     R5,TYPOUT       ;TYPE 'DRIVE OFFLINE'
 5014  001302  007577                            MOFFLN                  ;ADRS OF MESSAGE
 5015  001304  000730                            BR      M0              ;GO GET DRIVE # AGAIN
 5016  001306  006300                    1$:     ASL     R0              ;R0 INTO WORD INDEX
 5017  001310  005760  012762                    TST     DRVTYP(R0)      ;A DRIVE PRESENT?
 5018  001314  001004                            BNE     2$              ;BR IF SO
 5019  001316  004537  005166                    JSR     R5,TYPOUT       ;TYPE 'DRIVE NOT PRESENT'
 5020  001322  007621                            MDRNP                   ;ADRS OF MSG
 5021  001324  000720                            BR      M0              ;GO GET DRIVE NO. AGAIN
 5022  001326  022760  020020  012762  2$:     CMP     #20020,DRVTYP(R0)       ;SINGLE PORT?
 5023  001334  001410                            BEQ     3$              ;BR IF UNSAFE SINGLE PORT
 5024  001336  022760  024020  012762            CMP     #24020,DRVTYP(R0)       ;DUAL PORT?
 5025  001344  001404                            BEQ     3$              ;BR IF UNSAFE DUAL PORT
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5026  001346  004537  005166            JSR     R5,TYPOUT       ;TYPE 'NOT AN RPO4'
5027  001352  007646                    MNRPO4                  ;ADRS OF MSG
5028  001354  000704                    BR      M0              ;GO GET DRIVE NO. AGAIN
5029  001356  004537  005166    3$:     JSR     R5,TYPOUT       ;TYPE 'RPO4 UNSAFE'
5030  001362  007673                    MUSDR                   ;ADRS OF MSG
5031  001364  000700                    BR      M0              ;GO GET DRIVE NO. AGAIN
5032
5056                                    ;SEE WHICH MODE THE PROGRAM IS TO BE RUN IN.
5057                                    ;MODES ARE: 'FORMAT & VERIFY' OR 'CHECK FORMAT'
5058
5059  001366  005037  012544    M1:     CLR     MODE            ;SET MODE TO 'CHECK FORMAT'
5060  001372  004537  005166            JSR     R5,TYPOUT       ;TYPE 'PROGRAM MODE'
5061  001376  007725                    MMODE                   ;ADDR OF MSG
5062  001400  004737  005242            JSR     PC,TTI          ;WAIT FOR ENTRY
5063  001404  022700  000104            CMP     #'D,R0          ;'D' (DEFAULT) ENTERED ?
5064  001410  001415                    BEQ     2$              ;BR IF DEFAULT
5065  001412  022700  000103            CMP     #'C,R0          ;CHECK FORMAT MODE ?
5066  001416  001406                    BEQ     1$              ;BR IF CHECK ONLY
5067  001420  022700  000106            CMP     #'F,R0          ;FORMAT & VERIFY ?
5068  001424  001413                    BEQ     3$              ;BR IF YES
5069  001426  004737  005406            JSR     PC,QUES         ;TYPE '??'
5070  001432  000755                    BR      M1              ;TRY AGAIN
5071  001434  004537  005166    1$:     JSR     R5,TYPOUT       ;TYPE REST OF 'CHECK'
5072  001440  010004                    MHECK                   ;ADDR OF MSG
5073  001442  000412                    BR      M1A             ;GET STARTING ADDRESS
5074  001444  004537  005166    2$:     JSR     R5,TYPOUT       ;TYPE DEFAULT MESSAGE
5075  001450  007761                    MFORMT                  ;ADDR OF MSG
5076  001452  000403                    BR      4$              ;SET UP MODE
5077  001454  004537  005166    3$:     JSR     R5,TYPOUT       ;TYPE REST OF 'FORMAT'
5078  001460  010016                    MORMAT                  ;ADDR OF MSG
5079  001462  012737  177777  012544  4$:     MOV     #-1,MODE        ;SET MODE TO 'FORMAT & VERIFY'
5080
5081                                    ;FIND OUT IF FORMAT IS TO BE IN 20 OR 22 SECTOR MODE
5082
5083  001470  004537  005166    M1A:    JSR     R5,TYPOUT       ;TYPE FORMAT MODE REQUEST
5084  001474  010035                    MSIZE                   ;ADDRESS OF MESSAGE
5085  001476  004737  005242            JSR     PC,TTI          ;WAIT FOR INPUT
5086  001502  022700  000131            CMP     #'Y,R0          ;IS ENTRY A 'Y' ?
5087  001506  001411                    BEQ     1$              ;BR IF IT IS
5088  001510  022700  000116            CMP     #'N,R0          ;IS ENTRY A 'N' ?
5089  001514  001431                    BEQ     2$              ;BR IF IT IS
5090  001516  022700  000104            CMP     #'D,R0          ;IS ENTRY A 'D' ?
5091  001522  001403                    BEQ     1$              ;BR IF IT IS
5092  001524  004737  005406            JSR     PC,QUES         ;TYPE '??' - INVALID INPUT
5093  001530  000757                    BR      M1A             ;TRY AGAIN
5094  001532  004537  005166    1$:     JSR     R5,TYPOUT       ;TYPEOUT MODE SELECTED
5095  001536  010106                    MSEC22                  ;ADDRESS OF MESSAGE
5096  001540  012737  013130  012602    MOV     #<260.*22.>,WC  ;TRACK SIZE IN 22 SECTOR MODE
5097  001546  012737  164650  012604    MOV     #-<260.*22.>,MWC  ;2'S COMPLEMENT WORD COUNT
5098  001554  012737  177777  012610    MOV     #-1,SEC20       ;22 SECTOR INDICATOR
5099  001562  012737  000025  012612    MOV     #21.,MAXSEC     ;MAX SECTOR ADDRESS IN 22 SECTOR MODE
5100  001570  112737  000020  012713    MOVB    #20,FMTDPB+1    ;LOAD FMT22 BIT
5101  001576  000420                    BR      3$              ;LOAD FORMAT BIT
5102  001600  004537  005166    2$:     JSR     R5,TYPOUT       ;TYPE OUT 20 SECTOR MODE SELECTED
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5103  001604  010165                          MSEC20                  ;ADDRESS OF MESSAGE
5104  001606  012737  012120  012602          MOV     #<260.*20.>,WC  ;TRACK SIZE IN 20 SECTOR MODE
5105  001614  012737  165660  012604          MOV     #-<260.*20.>,MWC  ;2'S COMPLEMENT WORD COUNT
5106  001622  005037  012610                  CLR     SEC20           ;20 SECTOR INDICATOR
5107  001626  012737  000023  012612          MOV     #19.,MAXSEC     ;MAX SECTOR ADDRESS IN 20 SECTOR MODE
5108  001634  105037  012713                  CLRB    FMTDPB+1        ;CLEAR THE FMT22 BIT
5109  001640  113737  012540  012712  3$:     MOVB    USEL,FMTDPB     ;LOAD DRIVE NUMBER
5110  001646  112737  000143  012714          MOVB    #143,FMTDPB+2   ;'SET FORMAT' COMMAND
5111  001654  004037  013476                  JSR     R0,RP04         ;GO TO THE DRIVER TO EXECUTE THE COMMAND
5112  001660  012712                          FMTDPB                  ;DPB ADDRESS
5113  001662  000766                          BR      3$              ;QUEUE FULL RETURN - RETRY THE COMMAND
5114  001664  005737  012730          4$:     TST     FMTDPB+16       ;CHECK STATUS WORD
5115  001670  001775                          BEQ     4$              ;BR IF NOT FINISHED
5116  001672  100762                          BMI     3$              ;BR IF ERROR IN SET FORMAT
5117  001674  000400                          BR      M2
5118
5119                                          ;GO GET PARAMETERS - STARTING CYL & TRK
5120                                          ;AND ENDING CYL & TRK
5121
5122  001676  004537  005166          M2:     JSR     R5,TYPOUT       ;GO TYPE MESSAGE 'STARTING CYL,TRK='
5123  001702  010244                          MMINCT                  ;ADRS OF MESSAGE
5124  001704  012737  000001  012542          MOV     #1,SOFSW        ;SET UP SOFSW TO INDICATE STARTING INPUT
5125  001712  004737  005446                  JSR     PC,GETDAT       ;GO GET STARTING CYL & TRK
5126  001716  000767                          BR      M2              ;RETURN HERE IF ERROR OR RUBOUT
5127  001720  005037  012542                  CLR     SOFSW           ;SET UP SOFSW TO INDICATE ENDING INPUT
5128  001724  004537  005166          M3:     JSR     R5,TYPOUT       ;GO TYPE MESSAGE 'ENDING CYL,TRK='
5129  001730  010277                          MMAXCT                  ;ADRS OF MESSAGE
5130  001732  004737  005446                  JSR     PC,GETDAT       ;GO GET ENDING CYL & TRK
5131  001736  000772                          BR      M3              ;RETURN HERE IF ERROR OR RUBOUT
5132
5133                                          ;THIS CODE CHECKS THE ORDER AND MAGNITUDE OF THE CYL & TRK ADRS
5134                                          ;INPUTTED BY THE TTY. ALSO ESTABLISHES THE TOTAL TRK COUNT
5135
5136  001740  013700  012546          CKADRS: MOV     ECYL,R0         ;SET R0 WITH ECYL
5137  001744  163700  012550                  SUB     SCYL,R0         ;SEE IF END CYL IS SMALLER THAN START CYL
5138  001750  103004                          BCC     1$              ;BRANCH IF NOT
5139  001752  004537  005166                  JSR     R5,TYPOUT       ;TYPE IMPROPER DSK ADRS
5140  001756  010423                          MADRER                  ;ADRS OF MESSAGE
5141  001760  000746                          BR      M2              ;RETYPE REQUEST - INPUT CYL NOT IN PROPER FORM
5142  001762  001014                  1$:     BNE     3$              ;BRANCH IF SCYL NOT EQUAL TO ECYL
5143  001764  013700  012552                  MOV     ETRK,R0         ;SET UP R0 WITH ETRK
5144  001770  163700  012554                  SUB     STRK,R0         ;SEE IF END TRK IS SMALLER THAN START TRK
5145  001774  103004                          BCC     2$              ;BRANCH IF NOT
5146  001776  004537  005166                  JSR     R5,TYPOUT       ;TYPE IMPROPER DSK ADRS
5147  002002  010423                          MADRER                  ;ADRS OF MESSAGE
5148  002004  000734                          BR      M2              ;RETYPE REQUEST - INPUT TRK NOT IN PROPER FORM
5149  002006  010037  012556          2$:     MOV     R0,TTRKS        ;SAVE # OF TRACKS
5150  002012  000417                          BR      M4              ;GO GET DATA PATTERN
5151  002014  005037  012556          3$:     CLR     TTRKS           ;CLEAR TOTAL TRACK LOC
5152  002020  062737  000023  012556  4$:     ADD     #23,TTRKS       ;ADD CYLINDER WORTH OF TRACKS
5153  002026  005300                          DEC     R0              ;MAINTAIN CONTROL
5154  002030  001373                          BNE     4$              ;BRANCH IF CYL DIFF NOT 0
5155  002032  013700  012554                  MOV     STRK,R0         ;PUT STRK IN R0
5156  002036  005400                          NEG     R0              ;MAKE TWO'S COMP
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5157  002040  060037  012556                ADD     R0,TTRKS        ;SUB PARTICAL TRK
5158  002044  063737  012552  012556        ADD     ETRK,TTRKS      ;ADD IN END TRACKS
5159
5160                                          ;GO GET DATA PATTERN FOR FORMAT
5161
5162  002052  004537  005166          M4:   JSR     R5,TYPOUT       ;GO TYPE 'SELECT PATTERN'
5163  002056  010530                        MSELP                   ;ADRS OF MESSAGE
5164  002060  004737  005242                JSR     PC,TTI          ;GO GET REPLY
5165  002064  022700  000104                CMP     #104,R0         ;IS IT THE DEFAULT CHAR?
5166  002070  001006                        BNE     1$              ;BRANCH IF NOT
5167  002072  004537  005166                JSR     R5,TYPOUT       ;TYPE DEFAULT PATTERN
5168  002076  010632                        MPATD                   ;ADRS OF MSG
5169  002100  012700  000002                MOV     #2,R0           ;SELECT PATTERN OF WORST CASE
5170  002104  000411                        BR      2$              ;GO SAVE PATTERN
5171  002106  004737  005314          1$:   JSR     PC,NUMTST       ;SEE IF A NUMBER
5172  002112  000757                        BR      M4              ;BRANCH IF NOT
5173  002114  020027  000003                CMP     R0,#3           ;IS # LARGER THAN 2
5174  002120  103403                        BCS     2$              ;BRANCH IF NOT
5175  002122  004737  005406                JSR     PC,QUES         ;TYPE ??
5176  002126  000751                        BR      M4              ;RETYPE LINE
5177  002130  010037  012564          2$:   MOV     R0,PSEL         ;SAVE PATTERN SELECTED
5178  002134  004537  005166                JSR     R5,TYPOUT       ;TYPE 'SELECTED'
5179  002140  007713                        MSELD                   ;ADRS OF MESSAGE
5180
5181                                          ;GO TYPE 'STARTING FORMAT ON DRIVE # X'
5182
5183  002142  005737  012544          M5:   TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
5184  002146  001404                        BEQ     1$              ;BR IF 'CHECK' MODE
5185  002150  004537  005166                JSR     R5,TYPOUT       ;TYPE 'STARTING FORMAT ON DRIVE #'
5186  002154  010646                        MSFOU                   ;ADRS OF MESSAGE
5187  002156  000403                        BR      2$
5188  002160  004537  005166          1$:   JSR     R5,TYPOUT       ;TYPE 'STARTING CHECK ON DRIVE #'
5189  002164  010704                        MSCHK                   ;ADDR OF MSG
5190  002166  004737  005350          2$:   JSR     PC,UASM         ;GO PRINT DRIVE # IN USEL
5191
5192
5193                                          ;THIS CODE SETS UP THE SELECTED DATA PATTERN TO BE WRITTEN ON EACH SECTOR IMAGE
5194
5195  002172  005037  012566          STUFP: CLR    PATA            ;CLEAR DATA PATTERN A
5196  002176  005037  012570                 CLR    PATB            ;CLEAR DATA PATTERN B
5197  002202  005737  012564                 TST    PSEL            ;SEE IF PATTERN OF ONES
5198  002206  001416                        BEQ     STUF            ;BR IF SO
5199  002210  005137  012566                COM     PATA            ;SET PATA TO ONES
5200  002214  005137  012570                COM     PATB            ;SET PATB TO ONES
5201  002220  022737  000001  012564        CMP     #1,PSEL         ;SEE IF PATTERN OF ZEROS
5202  002226  001406                        BEQ     STUF            ;BRANCH IF SO
5203  002230  012737  165555  012566        MOV     #165555,PATA    ;SET UP WORST CASE
5204  002236  012737  133333  012570        MOV     #133333,PATB    ;SET UP WORST CASE
5205
5206                                          ;THIS CODE DUMP THE SELECT DATA PATTERN IN THE DATA BUFFER IN CORE
5207
5208  002244  013703  012602          STUF: MOV     WC,R3           ;SET UP COUNTER
5209  002250  012700  020300                MOV     #BUFP,R0        ;SET UP MEMORY POINTER
5210  002254  013701  012566                MOV     PATA,R1         ;SET UP PATTERN IN R1
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5211  002260  013702  012570                MOV     PATB,R2         ;SET UP PATTERN IN R2
5212  002264  010120                1$:     MOV     R1,(R0)+        ;MOV 1ST PAT INTO MEM
5213  002266  010220                        MOV     R2,(R0)+        ;MOV 2ND PAT INTO MEM
5214  002270  005303                        DEC     R3              ;KEEP COUNT
5215  002272  005303                        DEC     R3              ;KEEP COUNT
5216  002274  001373                        BNE     1$              ;DO IT AGAIN IF R3 NOT 0
5217
5218                                        ;THIS CODE SETS UP FOR THE ACTUAL FORMAT
5219
5220  002276  004737  006016        WRHDR1: JSR     PC,SETTBL       ;GO SET UP DRIVER TABLE
5221  002302  004737  006320                JSR     PC,SETHDR       ;GO INITIALIZE HEADERS IN THE SECTOR BUFFER IN CORE
5222  002306  004737  007340                JSR     PC,CKCLK        ;GO START UP THE CLOCK IF AVAILABLE
5232  002312  005037  012542        WRHDR2: CLR     SOFSW           ;CLEAR ERROR COUNTER
5233  002316  005037  012574                CLR     RETRY           ;ZERO THE RETRY COUNTER
5234  002322  105037  012722                CLRB    FMTDPB+10       ;RESTORE SECTOR
5235  002326  013737  012604  012716        MOV     MWC,FMTDPB+4    ;RESTORE WC
5236  002334  012737  020300  012720        MOV     #BUFP,FMTDPB+6  ;RESTORE CA
5237  002342  005737  012544                TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
5238  002346  001416                        BEQ     CKHDR           ;BR IF 'CHECK' MODE
5239  002350  112737  000163  012714 WRHDR:  MOVB    #163,FMTDPB+2   ;SET WRITE HEADER & DATA COMMAND IN TBL
5240  002356  004037  013476        1$:     JSR     R0,RP04         ;GO FORMAT A TRACK
5241  002362  012712                        FMTDPB                  ;ADRS OF PARAMETERS - TBL
5242  002364  000774                        BR      1$              ;WAIT FOR QUEUE IF FULL
5243  002366  005737  012730        2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
5244  002372  001775                        BEQ     2$              ;BRANCH IF NOT DONE
5245  002374  100003                        BPL     CKHDR           ;BRANCH IF NO ERROR
5246  002376  004737  003716                JSR     PC,ER           ;GO RESOLVE ERROR
5247  002402  000762                        BR      WRHDR           ;GO TRY AGAIN
5248
5249                                        ;THE CODE SETS UP FOR THE FORMAT CHECK
5250
5251  002404  112737  000153  012714 CKHDR:  MOVB    #153,FMTDPB+2   ;SET WRITE CHECK HEADER & DATA COMMAND IN TBL
5252  002412  004037  013476        1$:     JSR     R0,RP04         ;GO CHECK THE TRK JUST FORMATTED
5253  002416  012712                        FMTDPB                  ;ADRS OF PARAMETERS - TBL
5254  002420  000774                        BR      1$              ;WAIT FOR QUEUE IF FULL
5255  002422  005737  012730        2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
5256  002426  001775                        BEQ     2$              ;BRANCH IF NOT DONE
5257  002430  100006                        BPL     GOOD            ;BRANCH IF NO ERROR
5258  002432  004737  003716                JSR     PC,ER           ;GO RESOLVE ERROR
5259  002436  005737  012544                TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
5260  002442  001760                        BEQ     CKHDR           ;BR IF 'CHECK' MODE
5261  002444  000741                        BR      WRHDR           ;ER-REFORMAT SECTOR
5262  002446  005737  012542        GOOD:   TST     SOFSW           ;SEE IF RETRY
5263  002452  001421                        BEQ     LOOPTS          ;BRANCH IF NOT
5264  002454  022737  000002  012542        CMP     #2,SOFSW        ;SEE IF LAST RETRY
5265  002462  001012                        BNE     1$              ;BRANCH IF NOT
5266  002464  123737  012612  012722        CMPB    MAXSEC,FMTDP3+10  ;SEE IF LAST SECTOR IN TRK
5267  002472  001411                        BEQ     LOOPTS          ;BRANCH IF SO
5268  002474  004737  006260                JSR     PC,SCAWC        ;GO SET UP TBL FOR REMAINING SECTORS
5269  002500  005737  012544                TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
5270  002504  001737                        BEQ     CKHDR           ;BR IF 'CHECK' MODE
5271  002506  000720                        BR      WRHDR           ;GO FINISH FORMATTING TRK
5272  002510  005237  012542        1$:     INC     SOFSW           ;RECORD GOOD RETRY
5273  002514  000715                        BR      WRHDR           ;TRY ONCE MORE
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5274  002516  032737  040000  177570  LOOPTS: BIT     #BIT14,@#SWR    ;SEE IF LOOP ON CURRENT TRK
5275  002524  001401                          BEQ     NXTRK           ;BRANCH IF NOT
5276  002526  000671                          BR      WRHDR2          ;REPEAT SAME TRACK
5277  002530  004737  006166          NXTRK:  JSR     PC,TRKTST       ;GOOD FORMAT-GO SEE IF DONE-IF NOT, SET UP NEXT
5279  002534  000401                          BR      ENDCK           ;RETURN HERE IF DONE - GO DO QUICK CK
5283  002536  000665                          BR      WRHDR2          ;NOT DONE - GO WRITE NEXT TRACK
5289
5290                                          ;THIS CODE MAKES SURE EACH CYLINDER FORMATTED CONTAINS THE
5291                                          ;PROPER CYLINDER ADDRESS. THE PROGRAM IS LOOKING FOR
5292                                          ;POSSIBLE POSITIONER ERRORS THAT MAY HAVE OCCURED DURING THE FORMAT.
5293
5294  002540  005037  012606          ENDCK:  CLR     HEDERR          ;CLEAR HEADER CHECK ERROR INDICATOR
5295  002544  004737  006016                  JSR     PC,SETTBL       ;GO SET UP DRIVER TABLE
5296  002550  004737  006320                  JSR     PC,SETHDR       ;GO SET UP HEADERS IN CORE
5297  002554  013737  012550  012572          MOV     SCYL,TEMP       ;PUT SCYL IN TEMP
5298  002562  012737  177776  012716          MOV     #-2,FMTDPB+4    ;SET UP WORD COUNT
5299  002570  012737  012622  012720          MOV     #RBUF,FMTDPB+6  ;SET UP BUFFER ADRS
5300  002576  005037  012722                  CLR     FMTDPB+10       ;CLEAR THE SECTOR & TRACK ADDRESS FIELD
5301  002602  013737  012550  012724          MOV     SCYL,FMTDPB+12  ;SETUP THE CYLINDER FIELD
5306  002610  112737  000173  012714          MOVB    #173,FMTDPB+2   ;SET UP READ HEADER & DATA COMMAND
5307  002616  004037  013476          HDREAD: JSR     R0,RP04         ;GO READ HEADER
5308  002622  012712                          FMTDPB                  ;ADRS OF PARAMETER TBL
5309  002624  000774                          BR      HDREAD          ;WAIT IF QUEUE IS FULL
5310  002626  005737  012730          1$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
5311  002632  001775                          BEQ     1$              ;BRANCH IF NOT DONE
5312  002634  100003                          BPL     HDRCK           ;BRANCH IF DONE
5313  002636  004737  003716                  JSR     PC,ER           ;GO RESOLVE ERROR
5314  002642  000406                          BR      HDRCK1          ;BYPASS THE COMPARSION
5315  002644  023737  012622  020300  HDRCK:  CMP     RBUF,BUFP       ;SEE IF CYL READ EQUALS CYL EXPECTED
5316  002652  001402                          BEQ     .+6             ;BR IF CYL CORRECT
5317  002654  004737  002706                  JSR     PC,CMPER        ;REPORT INCORRECT CYLINDER
5318  002660  023737  012546  012572  HDRCK1: CMP     ECYL,TEMP       ;SEE IF LAST CYL
5319  002666  001453                          BEQ     DONE            ;BRANCH IF ALL DONE
5320  002670  005237  012572                  INC     TEMP            ;RECORD CYL CHECKED
5321  002674  004737  006374                  JSR     PC,UPDACY       ;SET UP FOR NEXT CYL
5322  002700  005237  012724                  INC     FMTDPB+12       ;ADVANCE TO NEXT CYL #
5323  002704  000744                          BR      HDREAD          ;GO READ NEXT HEADER
5324
5325                                          ;THIS CODE REPORTS THAT THE HEADER READ DOES NOT
5326                                          ;COMPARE WITH THE ONE EXPECTED.
5327
5328  002706  032737  020000  177570  CMPER:  BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5329  002714  001037                          BNE     1$              ;BRANCH IF SO
5330  002716  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE SOFT HEADER COMPARE ERROR
5331  002722  012474                          MHDCMP
5332  002724  004737  006662                  JSR     PC,DRSN         ;GO TYPE DRIVE# & SN
5333  002730  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE EXPECTED
5334  002734  012444                          MEXPED
5335  002736  004737  006744                  JSR     PC,CYLTK        ;GO TYPE CYL,TRK EXPECTED
5336  002742  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE READ
5337  002746  012460                          MREAD
5338  002750  042737  010000  012622          BIC     #10000,RBUF     ;DUMP FMT22
5339  002756  113737  012625  012614          MOVB    RBUF+3,LOCTRK   ;TRACK FROM HEADER
5340  002764  013737  012622  012616          MOV     RBUF,LOCCYL     ;CYLINDER FROM HEADER
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```
5341  002772  004737  006760                    JSR     PC,CYLTRK       ;GO TYPE CYL-TRK READ
5342  002776  012737  177777  012606            MOV     #-1,HEDERR      ;SET THE CYLINDER ERROR INDICATOR
5343  003004  005737  177570                    TST     @#SWR           ;HALT?
5344  003010  100001                            BPL     1$              ;BRANCH IF NOT
5345  003012  000000                            HALT                    ;ERROR- SOFTWARE HEADER COMPARE ERROR
5346  003014  000207                    1$:     RTS     PC              ;RETURN
5347
5348                                            ;END OF FORMAT (OR CHECK) ROUTINE
5349
5351  003016  005737  012606            DONE:   TST     HEDERR          ;CYLINDER ERROR ?
5357  003022  001404                            BEQ     1$              ;BR IF NOT
5358  003024  004537  005166                    JSR     R5,TYPOUT       ;TYPEOUT 'REFORMAT MESSAGE'
5359  003030  012332                            MBDFMT                  ;MESSAGE ADDRESS
5360  003032  000412                            BR      3$
5361  003034  005737  012544            1$:     TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
5362  003040  001404                            BEQ     2$              ;BR IF 'CHECK' MODE
5363  003042  004537  005166                    JSR     R5,TYPOUT       ;GO TYPE MESSAGE 'FORMAT COMPLETE'
5364  003046  010752                            MFCMPT                  ;ADRS OF MESSAGE
5365  003050  000403                            BR      3$
5366  003052  004537  005166            2$:     JSR     R5,TYPOUT       ;TYPE 'END OF CHECK' MESSAGE
5367  003056  010777                            MCCMPT                  ;ADDR OF MSG
5368  003060  032737  000001  177570    3$:     BIT     #SWO,SWR        ;SEE IF SWR 0 SET
5369  003066  001002                            BNE     .+6             ;BR IF SET
5370  003070  000137  001156                    JMP     RESTRT          ;ASK FOR NEXT DRIVE
5371  003074  012706  001100                    MOV     #STACK,SP       ;RESET STACK POINTER
5372  003100  000137  002142                    JMP     M5              ;DO THE FORMAT OR CHECK AGAIN
5373
5374                                            ;THIS CODE SERVICES A CLOCK INTERRUPT EVERY 16MS
5375
5376  003104  012746  000020            CLOCK:  MOV     #16.,-(SP)      ;PUT MILLISECONDS ON THE STACK
5377  003110  004037  016436                    JSR     R0,RPTMR        ;GO REPORT TIME
5378  003114  000002                            RTI                     ;RETURN AND CONTINUE
5379
5380                                            ;THIS IS THE EMT ERROR HANDLER-SELECTS ADRS OF ERROR HANDLER
5381
5382                                                                    ;SAVE THE REGISTERS
5383  003116  010137  003162            EMTHND: MOV     R1,SAVR         ;DRIVE NUMBER
5384  003122  010337  003164                    MOV     R3,SAVR+2       ;ATA BIT
5385  003126  010437  003166                    MOV     R4,SAVR+4       ;RHCS1 ADDRESS
5386  003132  010537  003170                    MOV     R5,SAVR+6       ;MOL STATE (BIT 4)
5387  003136  010037  003172                    MOV     R0,SAVR+10      ;SAVE UNKNOWN
5388  003142  010237  003174                    MOV     R2,SAVR+12      ;SAVE UNKNOWN
5389  003146  011600                            MOV     (SP),R0         ;GET EMT PC
5390  003150  014000                            MOV     -(R0),R0        ;GET EMT CALL INSTR
5391  003152  006300                            ASL     R0              ;TIMES 2
5392  003154  016000  173174                    MOV     EMTTBL-10002(R0),R0 ;DEVELOP EMT ADDRESS
5393  003160  000110                            JMP     (R0)            ;GO TO ERROR REPORT ROUTINE
5394
5395                                            ;SAVE REGS 1,3,4,& 5 HERE AFTER DRIVER ERRORS 1->5
5396
5397  003162  000000            SAVR:   0                               ;R1
5398  003164  000000                    0                               ;R3
5399  003166  000000                    0                               ;R4
5400  003170  000000                    0                               ;R5
```

```
5401  003172  000000                          0                       ;R0
5402  003174  000000                          0                       ;R2
5403
5404                                          ;TABLE OF ERROR HANDLERS-DRIVER LEVEL
5405
5406  003176  003210                  EMTTBL: ER1                     ;ILLEGAL SUBSYSTEM INTERRUPT
5407  003200  003244                          ER2                     ;ILLEGAL DRIVE INTERRUPT
5408  003202  003354                          ER3                     ;MASSBUS CONTROL BUS PARITY ERROR
5409  003204  003460                          ER4                     ;CONTROL BUS PARITY ERROR
5410  003206  003606                          ER5                     ;ATTENTION FROM AN UNAVAILABLE DRIVE
5411
5412                                          ;HANDLES ILLEGAL SUBSYSTEM INTERRUPT
5413
5414  003210  032737  020000  177570  ER1:    BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5415  003216  001003                          BNE     1$              ;BRANCH IF SO
5416  003220  004537  005166                  JSR     R5,TYPOUT       ;TYPE ILLEGAL SUBSYSTEM INTERRUPT
5417  003224  011023                          MER1
5418  003226  005737  177570          1$:     TST     @#SWR           ;HALT?
5419  003232  100001                          BPL     2$              ;BRANCH IF NOT
5420  003234  000000                          HALT                    ;ERROR- ILLEGAL SUBSYSTEM INTERRUPT
5421  003236  004737  007270          2$:     JSR     PC,RESREG       ;RESTORE R0-R5
5422  003242  000002                          RTI                     ;RETURN TO DRIVER
5423
5424                                          ;HANDLES ILLEGAL DRIVE INTERRUPT
5425
5426  003244  032737  020000  177570  ER2:    BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5427  003252  001031                          BNE     1$              ;BRANCH IF SO
5428  003254  004537  005166                  JSR     R5,TYPOUT       ;TYPE ILLEGAL DRIVE INTERRUPT
5429  003260  011065                          MER2
5430  003262  004537  005166                  JSR     R5,TYPOUT       ;TYPE DRIVE
5431  003266  011762                          MDRV
5432  003270  013703  003162                  MOV     SAVR,R3         ;GET DRIVE #
5433  003274  004737  006724                  JSR     PC,TDRNUM       ;GO TYPE DRIVE #
5434  003300  004737  005376                  JSR     PC,CRLF         ;SET MARGIN
5435  003304  004537  005166                  JSR     R5,TYPOUT       ;TYPE RHAS
5436  003310  011771                          MAS
5437  003312  013703  003170                  MOV     SAVR+6,R3       ;GET RHAS
5438  003316  004737  006604                  JSR     PC,OCTYP        ;GO TYPE IT
5439  003322  004737  005376                  JSR     PC,CRLF         ;SET UP MARGIN
5440  003326  004737  007064                  JSR     PC,SETREG       ;GO PREPARE FOR TYPE
5441  003332  004737  007150                  JSR     PC,RHREGS       ;GO TYPE REGISTERS
5442  003336  005737  177570          1$:     TST     @#SWR           ;HALT?
5443  003342  100001                          BPL     2$              ;BRANCH IF NOT
5444  003344  000000                          HALT                    ;ERROR- ILLEGAL DRIVE INTERRUPT
5445  003346  004737  007270          2$:     JSR     PC,RESREG       ;RESTORE R0-R5
5446  003352  000002                          RTI                     ;RETURN TO DRIVER
5447
5448                                          ;HANDLES MASSBUS CONTROL BUS PARITY ERRORS
5449
5450  003354  032737  020000  177570  ER3:    BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5451  003362  001027                          BNE     1$              ;BRANCH IF SO
5452  003364  004537  005166                  JSR     R5,TYPOUT       ;TYPE MASSBUS CONTROL BUS PARITY ERROR
5453  003370  011123                          MER3
5454  003372  004737  005376                  JSR     PC,CRLF         ;SET MARGIN
```

```
5455  003376  004537  005166                    JSR     R5,TYPOUT       ;TYPE RD.ADR
5456  003402  012000                            MRDADR
5457  003404  013703  017062                    MOV     RD.ADR,R3       ;GET ADRS
5458  003410  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5459  003414  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5460  003420  004537  005166                    JSR     R5,TYPOUT       ;TYPE RD.WRD
5461  003424  012010                            MRDWRD
5462  003426  013703  017064                    MOV     RD.WRD,R3       ;GET WRD
5463  003432  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5464  003436  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5465  003442  005737  177570          1$:       TST     @#SWR           ;HALT?
5466  003446  100001                            BPL     2$              ;BRANCH IF NOT
5467  003450  000000                            HALT                    ;ERROR- MASSBUS CONTROL BUS PARITY ERROR
5468  003452  004737  007270          2$:       JSR     PC,RESREG       ;RESTORE R0-R5
5469  003456  000002                            RTI                     ;RETURN TO DRIVER
5470
5471                                            ;HANDLES CONTROL BUS PARITY ERRORS
5472
5473  003460  032737  020000  177570  ER4:      BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5474  003466  001040                            BNE     1$              ;BRANCH IF SO
5475  003470  004537  005166                    JSR     R5,TYPOUT       ;TYPE CONTROL BUS PARITY ERROR
5476  003474  011172                            MER4
5477  003476  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5478  003502  004537  005166                    JSR     R5,TYPOUT       ;TYPE WRT.AD
5479  003506  012020                            MWRTAD
5480  003510  013703  017264                    MOV     WRT.AD,R3       ;GET ADRS
5481  003514  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5482  003520  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5483  003524  004537  005166                    JSR     R5,TYPOUT       ;TYPE WRT.WD
5484  003530  012030                            MWRTWD
5485  003532  013703  017262                    MOV     WRT.WD,R3       ;GET WRD
5486  003536  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5487  003542  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5488  003546  004537  005166                    JSR     R5,TYPOUT       ;TYPE RD.WRD
5489  003552  012010                            MRDWRD
5490  003554  013703  017064                    MOV     RD.WRD,R3       ;GET WRD
5491  003560  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5492  003564  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5493  003570  005737  177570          1$:       TST     @#SWR           ;HALT?
5494  003574  100001                            BPL     2$              ;BRANCH IF NOT
5495  003576  000000                            HALT                    ;ERROR- CONTROL BUS PARITY ERROR
5496  003600  004737  007270          2$:       JSR     PC,RESREG       ;RESTORE R0-R5
5497  003604  000002                            RTI                     ;RETURN TO DRIVER
5498
5499                                            ;HANDLES ATTENTION FROM AN UNAVAILABLE DRIVE
5500
5501  003606  032737  020000  177570  ER5:      BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5502  003614  001031                            BNE     1$              ;BRANCH IF SO
5503  003616  004537  005166                    JSR     R5,TYPOUT       ;TYPE ATTENTION FROM AN UNAVAILABLE DRIVE
5504  003622  011231                            MER5
5505  003624  004537  005166                    JSR     R5,TYPOUT       ;TYPE DRIVE
5506  003630  011762                            MDRV
5507  003632  013703  003162                    MOV     SAVR,R3         ;GET DRIVE #
5508  003636  004737  006724                    JSR     PC,TDRNUM       ;TYPE IT
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5509  003642  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5510  003646  004537  005166                    JSR     R5,TYPOUT       ;TYPE RHAS
5511  003652  011771                            MAS
5512  003654  013703  003170                    MOV     SAVR+6,R3       ;GET RHAS
5513  003660  004737  006604                    JSR     PC,OCTYP        ;TYPE IT
5514  003664  004737  005376                    JSR     PC,CRLF         ;SET MARGIN
5515  003670  004737  007064                    JSR     PC,SETREG       ;GO PREPARE FOR TYPE
5516  003674  004737  007150                    JSR     PC,RHREGS       ;GO TYPE REGISTERS
5517  003700  005737  177570          1$:       TST     @#SWR           ;HALT?
5518  003704  100001                            BPL     2$              ;BRANCH IF NOT
5519  003706  000000                            HALT                    ;ERROR- ATTENTION FROM AN UNAVAILABLE DRIVE
5520  003710  004737  007270          2$:       JSR     PC,RESREG       ;RESTORE R0-R5
5521  003714  000002                            RTI                     ;RETURN TO DRIVER
5522
5523
5524                                            ;THIS CODE DECIDES WHAT TO DO WITH AN ERROR AT THE USER LEVEL
5525
5526  003716  032737  000200  012730  ER:       BIT     #BIT7,FMTDPB+16 ;DID THE COMMAND TERMINATE
5527  003724  001402                            BEQ     1$              ;BRANCH IF FATAL ERROR
5528  003726  000137  004002                    JMP     ER6             ;GO DETERMINE WHAT KIND OF DATA ERROR
5529  003732  032737  070000  012730  1$:       BIT     #70000,FMTDPB+16        ;SEE WHICH FATAL ERROR
5530  003740  001402                            BEQ     2$              ;BRANCH IF A PARITY ERROR
5531  003742  000137  004776                    JMP     ER7             ;GO REPORT DRIVE UNSAFE
5532  003746  032737  004000  012730  2$:       BIT     #BIT11,FMTDPB+16        ;CHECK CONDITION OF PARITY ERROR
5533  003754  001402                            BEQ     3$              ;BRANCH IF FATAL MASSBUS PARITY ERROR
5534  003756  000137  005042                    JMP     ER8             ;GO REPORT UNCORRECTABLE MASSBUS PARITY ER
5535  003762  032737  002000  012730  3$:       BIT     #BIT10,FMTDPB+16        ;CHECK FOR FATAL PARITY ERROR
5536  003770  001402                            BEQ     4$              ;BR IF NOT
5537  003772  000137  005106                    JMP     ER9             ;GO REPORT FATAL MASSBUS PARITY ERROR
5538  003776  000137  005136          4$:       JMP     ER10            ;MUST BE SOFTWARE TIMEOUT
5539
5540                                            ;HANDLES THE DATA ERROR INDICATIONS
5541
5542  004002  032737  000070  012730  ER6:      BIT     #70,FMTDPB+16   ;SEE IF A DATA ERROR
5543  004010  001402                            BEQ     1$              ;BRANCH IF SO
5544  004012  000137  004506                    JMP     ER6A            ;GO REPORT ERROR OTHER THAN DATA
5545  004016  122737  000173  012714  1$:       CMPB    #173,FMTDPB+2   ;SEE IF DOING A READ HEADER
5546  004024  001002                            BNE     2$              ;BRANCH IF NOT
5547  004026  000137  004742                    JMP     ER6D            ;GO REPORT ERROR ON READ HEADER
5548  004032  122737  000163  012714  2$:       CMPB    #163,FMTDPB+2   ;SEE IF DOING A WRITE HEADER
5549  004040  001002                            BNE     3$              ;BRANCH IF NOT
5550  004042  000137  004706                    JMP     ER6C            ;GO REPORT ERROR ON WRITE HEADER
5551  004046  005737  012542          3$:       TST     SOFSW           ;IS THIS A RETRY?
5552  004052  001002                            BNE     4$              ;BRANCH IF SO
5553  004054  000137  004140                    JMP     ERROR6          ;GO REPORT ERROR ON WRITE CHECK HEADER
5554  004060  032737  020000  177570  4$:       BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5555  004066  001006                            BNE     5$              ;BRANCH IF SO
5556  004070  004537  005166                    JSR     R5,TYPOUT       ;GO TYPE RETRIES UNSUCCESSFUL
5557  004074  012415                            MRETNS
5558  004076  004537  005166                    JSR     R5,TYPOUT       ;GO TYPE SECTOR NOT ACCEPTABLE
5559  004102  012254                            MUNCOR
5560  004104  005737  177570          5$:       TST     @#SWR           ;HALT?
5561  004110  100001                            BPL     6$              ;BRANCH IF NOT
5562  004112  000000                            HALT                    ;ERROR- SECTOR FAILS TO FORMAT AFTER 1 OR 2 RETRIES
```

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5563  004114  022737  000025  012576  6$:     CMP     #25,SAVSEC      ;IS THIS THE LAST SECTOR IN THE TRK?
5564  004122  001403                          BEQ     7$              ;BRANCH IF SO
5565  004124  004737  006260                  JSR     PC,SCAWC        ;GO SET UP TBL FOR REMAINING SECTORS
5566  004130  000207                          RTS     PC              ;GO TRY NEXT SECTOR
5567  004132  005726                  7$:     TST     (SP)+           ;RESTORE SP
5568  004134  000137  002516                  JMP     LOOPTS          ;TRY NEXT TRK
5569
5570                                          ;HANDLES A DATA ERROR ON A WRITE CHECK COMMAND
5571
5572  004140  005237  012542          ERROR6: INC     SOFSW           ;RECORD DATA ERROR
5573  004144  013704  012650                  MOV     SAVREG+6,R4     ;GO GET RHDA
5574  004150  042704  177740                  BIC     #177740,R4      ;SAVE ONLY THE BAD SECTOR + 1
5575  004154  001002                          BNE     1$              ;BRANCH IF NOT ZERO
5576  004156  012704  000026                  MOV     #26,R4          ;RESTORE TO LAST SECTOR +1
5577  004162  005304                  1$:     DEC     R4              ;ADJUST SECTOR TO THE ONE THAT FAILED
5578  004164  010437  012576                  MOV     R4,SAVSEC       ;SAVE IT
5579  004170  032737  020000  177570          BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5580  004176  001076                          BNE     SETCA           ;BRANCH IF SO
5581  004200  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE WRITE CHECK ERROR
5582  004204  011303                          MER6
5583  004206  004737  006662                  JSR     PC,DRSN         ;GO TYPE DR & SN
5587  004212  004737  006744                  JSR     PC,CYLTK        ;GO TYPE CYL & TRK
5588  004216  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE SECTOR=
5589  004222  012057                          MSTOR
5590  004224  005000                          CLR     R0              ;CLR TENS DIGIT
5591  004226  013703  012576                  MOV     SAVSEC,R3       ;GET SECTOR #
5592  004232  162703  000012          2$:     SUB     #12,R3          ;SEE HOW MANY TENS
5593  004236  100402                          BMI     3$              ;BRANCH IF TOO SMALL
5594  004240  005200                          INC     R0              ;RECORD TEN
5595  004242  000773                          BR      2$              ;SUBTRACT AGAIN
5596  004244  062703  000012          3$:     ADD     #12,R3          ;MAKE SECTOR POSITIVE AGAIN
5597  004250  062700  000260                  ADD     #260,R0         ;SET UP FOR PRINT
5598  004254  004737  005204                  JSR     PC,TTO          ;GO PRINT IT
5599  004260  010300                          MOV     R3,R0           ;MOVE LSD INTO R0
5600  004262  062700  000260                  ADD     #260,R0         ;SET UP FOR PRINT
5601  004266  004737  005204                  JSR     PC,TTO          ;GO PRINT LSD
5602  004272  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE GOOD DATA
5603  004276  012104                          MGDATA
5604  004300  013703  012646                  MOV     SAVREG+4,R3     ;GET ADRS OF FAILURE
5605  004304  162703  000002                  SUB     #2,R3           ;BACK IT OFF BY TWO
5606  004310  011303                          MOV     (R3),R3         ;GET THE DATA WORD
5607  004312  004737  006604                  JSR     PC,OCTYP        ;GO TYPE IT
5608  004316  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE BAD DATA
5609  004322  012067                          MBDATA
5610  004324  013703  012664                  MOV     SAVREG+22,R3    ;GET BAD DATA AT RHDB
5611  004330  004737  006604                  JSR     PC,OCTYP        ;GO TYPE IT
5612  004334  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE RHEC1=
5613  004340  012121                          MRHEC1
5614  004342  013703  012706                  MOV     SAVREG+44,R3    ;GO GET RHEC1
5615  004346  004737  006604                  JSR     PC,OCTYP        ;GO TYPE IT
5616  004352  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE RHEC2
5617  004356  012132                          MRHEC2
5618  004360  013703  012710                  MOV     SAVREG+46,R3    ;GET RHEC2
5619  004364  004737  006604                  JSR     PC,OCTYP        ;GO TYPE IT
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5620  004370  004737  007150                  JSR     PC,RHREGS       ;GO TYPE RH REGS
5621
5622                                          ;THIS CODE COMPUTES WC & CA FOR RETRIES ON WRITE CHECK ERRORS
5623
5624  004374  012700  020300          SETCA:  MOV     #BUFP,R0        ;GET STARTING ADRS OF BUFFER
5625  004400  013701  012576                  MOV     SAVSEC,R1       ;GET SECTOR
5626  004404  005701                  1$:     TST     R1              ;SEE IF ZERO
5627  004406  001404                          BEQ     2$              ;BRANCH IF SO
5628  004410  062700  001010                  ADD     #520.,R0        ;ADVANCE TO NEXT SECTOR
5629  004414  005301                          DEC     R1              ;KEEP COUNT
5630  004416  000772                          BR      1$              ;GO CHECK NEXT SECTOR
5631  004420  010037  012720          2$:     MOV     R0,FMTDPB+6     ;SET UP CA OF BAD SECTOR
5632  004424  013700  012604          SETWC:  MOV     MWC,R0          ;GET MAX WC
5633  004430  013701  012576                  MOV     SAVSEC,R1       ;GET SECTOR
5634  004434  005701                  1$:     TST     R1              ;SEE IF ZERO
5635  004436  001404                          BEQ     2$              ;BRANCH IF SO
5636  004440  062700  000404                  ADD     #260.,R0        ;ADVANCE TO NEXT SECTOR
5637  004444  005301                          DEC     R1              ;KEEP COUNT
5638  004446  000772                          BR      1$              ;GO CHECK NEXT SECTOR
5639  004450  062700  000404          2$:     ADD     #260.,R0        ;POINT WC TO NEXT SECTOR
5640  004454  010037  012600                  MOV     R0,SAVWC        ;SAVE WC OF REMAINING SECTORS
5641  004460  012737  177374  012716          MOV     #-260.,FMTDPB+4 ;SET UP WC FOR BAD SECTOR
5642  004466  113737  012576  012722          MOVB    SAVSEC,FMTDPB+10        ;SET UP SECTOR ADRS IN TBL
5643  004474  005737  177570                  TST     @#SWR           ;HALT?
5644  004500  100001                          BPL     3$              ;BRANCH IF NOT
5645  004502  000000                          HALT                    ;ERROR- DATA ERROR
5646  004504  000207                  3$:     RTS     PC              ;GO REFORMAT FAILING SECTOR
5647
5648                                          ;CHECK FOR READ OR WRITE UNSAFE ERROR
5649
5650  004506  032737  000020  012730  ER6A:   BIT     #20,FMTDPB+16   ;CHECK FOR AN UNSAFE
5651  004514  001422                          BEQ     ER6B            ;BRANCH IF NOT AN UNSAFE
5652  004516  032737  020000  177570          BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5653  004524  001010                          BNE     1$              ;BRANCH IF SO
5654  004526  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE READ OR WRITE UNSAFE ERROR
5655  004532  011332                          MER6A
5656  004534  004737  007322                  JSR     PC,TYPALL       ;GO TYPE DATA
5657  004540  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE REFORMAT PACK
5658  004544  012307                          MREFMT
5659  004546  005737  177570          1$:     TST     @#SWR           ;HALT?
5660  004552  100001                          BPL     2$              ;BRANCH IF NOT
5661  004554  000000                          HALT                    ;ERROR- READ OR WRITE UNSAFE OCCURED
5662  004556  000137  001156          2$:     JMP     RESTRT          ;GO GET NEXT DRIVE
5663
5664                                          ;INDICATE A DRIVE ERROR HAS OCCURED
5665
5666  004562  005737  012574          ER6B:   TST     RETRY           ;IS THIS A RETRY?
5667  004566  001020                          BNE     3$              ;BRANCH IF SO
5668  004570  032737  020000  177570          BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5669  004576  001005                          BNE     1$              ;BRANCH IF SO
5670  004600  004537  005166                  JSR     R5,TYPOUT       ;GO TYPE DRIVE ERROR
5671  004604  011372                          MER6B
5672  004606  004737  007322                  JSR     PC,TYPALL       ;GO TYPE DATA
5673  004612  005237  012574          1$:     INC     RETRY           ;RECORD ERROR
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5674  004616  005737  177570            TST     @#SWR           ;HALT?
5675  004622  100001                    BPL     2$              ;BRANCH IF NOT
5676  004624  000000                    HALT                    ;ERROR- DRIVE ERROR
5677  004626  000207            2$:     RTS     PC              ;TRY AGAIN
5678  004630  022737  000002  012574 3$: CMP     #2,RETRY        ;IS THIS THE LAST RETRY
5679  004636  001403                    BEQ     4$              ;BRANCH IF SO
5680  004640  005237  012574            INC     RETRY           ;RECORD RETRY
5681  004644  000207                    RTS     PC              ;TRY AGAIN
5682  004646  032737  020000  177570 4$: BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5683  004654  001006                    BNE     5$              ;BRANCH IF SO
5684  004656  004537  005166            JSR     R5,TYPOUT       ;GO TYPE RETRIES UNSUCCESSFUL
5685  004662  012415                    MREUNS
5686  004664  004537  005166            JSR     R5,TYPOUT       ;GO TYPE REFORMAT PACK
5687  004670  012307                    MREFMT
5688  004672  005737  177570        5$: TST     @#SWR           ;HALT?
5689  004676  100001                    BPL     6$              ;BRANCH IF NOT
5690  004700  000000                    HALT                    ;ERROR- DRIVE ERROR STILL THERE AFTER TWO RETRIES
5691  004702  000137  001156        6$: JMP     RESTRT          ;GO ASK FOR DRIVE
5692
5693                                    ;HANDLES A DATA ERROR ON THE WRITE HEADER COMMAND
5694
5695  004706  032737  020000  177570 ER6C: BIT    #BIT13,@#SWR    ;SKIP TYPEOUT?
5696  004714  001005                    BNE     1$              ;BRANCH IF SO
5697  004716  004537  005166            JSR     R5,TYPOUT       ;GO TYPE WRITE ERROR
5698  004722  011413                    MER6C
5699  004724  004737  007322            JSR     PC,TYPALL       ;GO TYPE DATA
5700  004730  005737  177570        1$: TST     @#SWR           ;HALT?
5701  004734  100001                    BPL     2$              ;BRANCH IF NOT
5702  004736  000000                    HALT                    ;ERROR- ERROR OCCURED ON WRITE COMMAND
5703  004740  000207            2$:     RTS     PC              ;TRY TO WRITE AGAIN
5704
5705                                    ;HANDLES A DATA ERROR ON THE READ HEADER COMMAND
5706
5707  004742  032737  020000  177570 ER6D: BIT    #BIT13,@#SWR    ;SKIP TYPEOUT?
5708  004750  001005                    BNE     1$              ;BRANCH IF SO
5709  004752  004537  005166            JSR     R5,TYPOUT       ;GO TYPE HEADER COMPARE NOT MADE
5710  004756  011434                    MER6D
5711  004760  004737  007322            JSR     PC,TYPALL       ;GO TYPE DATA
5712  004764  005737  177570        1$: TST     @#SWR           ;HALT?
5713  004770  100001                    BPL     2$              ;BRANCH IF NOT
5714  004772  000000                    HALT                    ;ERROR- HEADER COMPARE NOT MADE
5715  004774  000207            2$:     RTS     PC              ;RETURN
5716
5717                                    ;HANDLES THE DRIVE UNSAFE ERRORS
5718
5719  004776  032737  020000  177570 ER7: BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
5720  005004  001010                    BNE     1$              ;BRANCH IF SO
5721  005006  004537  005166            JSR     R5,TYPOUT       ;GO TYPE DRIVE UNSAFE
5722  005012  011556                    MER7
5723  005014  004737  007322            JSR     PC,TYPALL       ;GO TYPE DATA
5724  005020  004537  005166            JSR     R5,TYPOUT       ;GO TYPE FORMAT TERMINATED
5725  005024  012226                    MFTERM
5726  005026  005737  177570        1$: TST     @#SWR           ;HALT?
5727  005032  100001                    BPL     2$              ;BRANCH IF NOT
```

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                                        HALT                    ;ERROR- DRIVE UNSAFE ERROR
                                        JMP     RESTRT          ;GO GET NEXT DRIVE

                                ;HANDLES UNCORRECTABLE MASSBUS PARITY ERROR

                                ER8:    BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
                                        BNE     1$              ;BRANCH IF SO
                                        JSR     R5,TYPOUT       ;GO TYPE UNCORRECTABLE MASSBUS PARITY ERROR
                                        MER8
                                        JSR     R5,TYPOUT       ;GO TYPE FORMAT TERMINATED
                                        MFTERM
                                        JSR     PC,CYLTK        ;GO GIVE THEM CYL, TRK=XXX,XX
                                1$:     TST     @#SWR           ;HALT?
                                        BPL     2$              ;BRANCH IF NOT
                                        HALT                    ;ERROR- UNCORRECTABLE MASSBUS PARITY ERROR
                                2$:     JMP     RESTRT          ;GO GET NEXT DRIVE

                                ;HANDLES FATAL MASSBUS PARITY ERROR

                                ER9:    BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
                                        BNE     1$              ;BRANCH IF SO
                                        JSR     R5,TYPOUT       ;GO TYPE FATAL MASSBUS PARITY ERROR
                                        MER9
                                        JSR     PC,CYLTK        ;GO GIVE THEM CYL,TRK=XXX,XX
                                1$:     HALT                    ;FATAL MASSBUS PARITY ERROR
                                        JMP     RESTRT          ;RESTART PROGRAM


                                ;HANDLES A SOFTWARE TIMEOUT (HUNG RP04)

                                ER10:   BIT     #BIT13,@#SWR    ;SKIP TYPEOUT?
                                        BNE     1$              ;BR IF SO
                                        JSR     R5,TYPOUT       ;GO TYPE 'SOFTWARE TIMEOUT'
                                        MER10                   ;ADRS OF MSG
                                        JSR     PC,TYPALL       ;GO TYPE DATA
                                1$:     HALT                    ;SYSTEM HUNG - OPERATION FAILED TO COMPLETE
                                        JMP     RESTRT          ;GO RESTART PROGRAM

                                .SBTTL  SUPPORT SUBROUTINES


                                ;TYPES OUT CHARACTERS POINTED TO BY THE ADRS IN R1

                                TYPOUT: MOV     (R5)+,R1        ;SET UP ADRS OF MESSAGE
                                1$:     MOVB    (R1)+,R0        ;GET CHARACTER
                                        BEQ     2$              ;ARE WE DONE TYPING?
                                        JSR     PC,TTO          ;GO TYPE IT
                                        BR      1$              ;GET NEXT CHARACTER
                                2$:     RTS     R5              ;EXIT - DONE TYPING

                                ;DOES THE ACTUAL TYPING - TYPES THE NUMBER OF NULL CHARS SPECIFIED IN 'NULCNT'
```

```
5782  005204  010446                TTO:    MOV     R4,-(SP)        ;SAVE R4
5783  005206  013704  012620                MOV     NULCNT,R4       ;SET UP NULL COUNT
5784  005212  105737  177564          TTO1: TSTB    TPS             ;IS PRINTER AVAILABLE?
5785  005216  100375                        BPL     TTO1            ;NO - KEEP LOOPING
5786  005220  110037  177566                MOVB    R0,TPB          ;PRINT CHAR
5787  005224  022700  000015                CMP     #15,R0          ;IS IT A RETURN?
5788  005230  001002                        BNE     TTO2            ;BRANCH IF NOT
5789  005232  005304                        DEC     R4              ;KEEP TRACK OF NULL CHARS
5790  005234  001366                        BNE     TTO1            ;BRANCH IF MORE NULL CHARS
5791  005236  012604                TTO2:   MOV     (SP)+,R4        ;RESTORE R4
5792  005240  000207                        RTS     PC              ;EXIT FROM PRINTING
5793
5794                                        ;READS THE KEYBOARD AND CHECKS FOR 'CONTROL C'
5795
5796  005242  105737  177560          TTI:  TSTB    TKS             ;CHECK FOR CHAR
5797  005246  100375                        BPL     TTI             ;WAIT FOR CHAR
5798  005250  013700  177562                MOV     TKB,R0          ;PUT CHAR IN R0
5799  005254  020027  000215                CMP     R0,#215         ;DON'T PRINT A CR
5800  005260  001405                        BEQ     1$              ;SKIP OVER TYPE
5801  005262  020027  000212                CMP     R0,#212         ;DON'T PRINT A LF
5802  005266  001402                        BEQ     1$              ;SKIP OVER TYPE
5803  005270  004737  005204                JSR     PC,TTO          ;ECHO CHAR TYPED
5804  005274  042700  000200          1$:   BIC     #200,R0         ;GET RID OF BIT 7
5805  005300  022700  000003                CMP     #3,R0           ;IS CHAR IN R0 A CNTRL C?
5806  005304  001002                        BNE     CTRLR           ;NO - SKIP OVER JUMP
5807  005306  000137  001156                JMP     RESTRT          ;YES - GO TO START OF PROGRAM
5808  005312  000207                CTRLR:  RTS     PC              ;RETURN TO MAIN PROGRAM
5809
5810                                        ;TESTS THAT A INPUT CHARACTER WAS A NUMBER
5811
5812  005314  020027  000060          NUMTST: CMP     R0,#60          ;IS ASCII SMALLER THAN 60?
5813  005320  100410                        BMI     TYPER           ;YES - GO TO TYPER
5814  005322  020027  000072                CMP     R0,#72          ;IS ASCII LARGER THAN 71?
5815  005326  100005                        BPL     TYPER           ;YES - GO TO TYPER
5816  005330  042700  177760                BIC     #177760,R0      ;GET RID OF ASCII
5817  005334  062716  000002                ADD     #2,(SP) ;ADD TWO TO RETURN ADRS
5818  005340  000207                        RTS     PC              ;RETURN - GOOD NUMBER
5819  005342  004737  005406          TYPER: JSR     PC,QUES         ;GO TYPE ??
5820  005346  000207                        RTS     PC              ;RETURN TO MAIN PROGRAM
5821
5822                                        ;PRINTS OUT THE DRIVE SELECTED NUMBER
5823
5824  005350  013700  012540          UASM: MOV     USEL,R0         ;GET DRIVE SELECTED
5825  005354  062700  000260                ADD     #260,R0         ;MAKE IT ASCII
5826  005360  004737  005204                JSR     PC,TTO          ;GO PRINT IT
5827  005364  012700  000240                MOV     #240,R0         ;PROVIDE SPACE
5828  005370  004737  005204                JSR     PC,TTO          ;GO PRINT IT
5829  005374  000207                        RTS     PC              ;RETURN
5830
5831                                        ;THIS ROUTINE DOES A CARRIAGE RETURN AND LINE FEED
5832
5833  005376  004537  005166          CRLF: JSR     R5,TYPOUT       ;PRINT LF + CR
5834  005402  007574                        MCRLF
5835  005404  000207                        RTS     PC              ;RETURN
```

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5836
5837                                        ;THIS ROUTINE PRINTS ?? ON IMPROPER KEYBOARD INPUTS
5838
5839  005406  004537  005166    QUES:   JSR     R5,TYPOUT       ;GO TYPE MESSAGE
5840  005412  007567                    MQUES                   ;ADRS OF MESSAGE
5841  005414  000207                    RTS     PC              ;RETURN  TO MAIN PROGRAM
5842
5843                                        ;THIS ROUTINE SETS UP THE TTY INPUT BUFFER AND COUNTER
5844
5845  005416  012703  012634    SETPC:  MOV     #CPTR,R3        ;PUT CHAR PTR IN R3
5846  005422  010204                    MOV     R2,R4           ;PUT CHAR COUNT IN R4
5847  005424  000207                    RTS     PC              ;RETURN
5848
5849                                        ;THIS ROUTINE CLEARS THE TTY INPUT BUFFER
5850
5851  005426  004737  005416    CLRBUF: JSR     PC,SETPC        ;GO SET UP POINTER + COUNT
5852  005432  005023            1$:     CLR     (R3)+           ;MOVE 0'S THRU R3 R4 TIMES
5853  005434  005304                    DEC     R4              ;KEEP COUNT
5854  005436  001375                    BNE     1$              ;DONE IF R4 EQ 0
5855  005440  004737  005416            JSR     PC,SETPC        ;SET UP POINTER + COUNT AGAIN
5856  005444  000207                    RTS     PC              ;EXIT
5857
5858                                        ;THIS ROUTINE READS & CHECKS THE CYL & TRK INPUT FROM THE TTY
5859
5860  005446  012702  000004    GETDAT: MOV     #4,R2           ;SET UP MAX # OF DIGITS EXPECTED
5861  005452  004737  005426            JSR     PC,CLRBUF       ;GO CLEAR DIGIT BUFFER
5862  005456  004737  005242            JSR     PC,TTI          ;GO GET CHAR
5863  005462  022700  000104            CMP     #104,R0         ;IS IT THE DEFAULT CHAR?
5864  005466  001031                    BNE     4$              ;BRANCH IF NOT
5865  005470  005737  012542            TST     SOFSW           ;IS THIS STARTING OR ENDING CYL?
5866  005474  001410                    BEQ     1$              ;BRANCH IF ENDING CYL
5867  005476  005037  012550            CLR     SCYL            ;SET STARTING CYL TO 0
5868  005502  005037  012554            CLR     STRK            ;SET STARTING TRK TO 0
5869  005506  004537  005166            JSR     R5,TYPOUT       ;INDICATE DEFAULT VALUES
5870  005512  010272                    MCYTK0                  ;ADRS OF MSG
5871  005514  000411                    BR      2$              ;GO SET UP RETURN
5872  005516  012737  000632  012546  1$:     MOV     #410.,ECYL      ;SET ENDING CYL TO 410
5873  005524  012737  000022  012552          MOV     #18.,ETRK       ;SET ENDING TRK TO 18
5874  005532  004537  005166            JSR     R5,TYPOUT       ;INDICATE DEFAULT VALUES
5875  005536  010324                    MCYTK1                  ;ADRS OF MSG
5876  005540  062716  000002    2$:     ADD     #2,(SP) ;ADD TWO TO RETURN ADRS
5877  005544  000207                    RTS     PC              ;RETURN FROM DEFAULT COND.
5878  005546  004737  005242    3$:     JSR     PC,TTI          ;GO GET NEXT CHAR FOR CYLINDER
5879  005552  022700  000177    4$:     CMP     #177,R0         ;IS IT A RUBOUT?
5880  005556  001001                    BNE     5$              ;BRANCH IF NOT A RUBOUT
5881  005560  000207                    RTS     PC              ;GO RETYPE LINE
5882  005562  022700  000054    5$:     CMP     #54,R0          ;IS IT THE SEPERATOR?
5883  005566  001024                    BNE     8$              ;BRANCH IF NOT A COMMA
5884  005570  004737  006120            JSR     PC,DECBIN       ;CONVERT CYL # TO BINARY
5885  005574  023727  012572  000633    CMP     TEMP,#411.      ;SEE IF CYL REQUEST IS GREATER THAN 410
5886  005602  103404                    BCS     6$              ;BRANCH IF WITHIN LIMITS
5887  005604  004537  005166            JSR     R5,TYPOUT       ;TYPE LIMIT EXCEEDED
5888  005610  010334                    MCLIMT                  ;ADRS OF MESSAGE
5889  005612  000207                    RTS     PC              ;RETURN TO RETYPE LINE
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5890  005614  005737  012542          6$:   TST     SOFSW           ;IS THIS THE STARTING OR ENDING CYL?
5891  005620  001403                        BEQ     7$              ;BRANCH IF ENDING CYL
5892  005622  013737  012572  012550        MOV     TEMP,SCYL       ;SAVE TEMP AT STARTING CYL
5893  005630  013737  012572  012546  7$:   MOV     TEMP,ECYL       ;SAVE TEMP AT ENDING CYL
5894  005636  000412                        BR      10$             ;GO GET TRK ADRS
5895  005640  004737  005314          8$:   JSR     PC,NUMTST       ;SEE IF A NUMBER
5896  005644  000207                        RTS     PC              ;RETURN - BAD TYPE
5897  005646  005304                        DEC     R4              ;KEEP COUNT OF DIGITS COMING IN
5898  005650  001003                        BNE     9$              ;BRANCH IF NOT THE 4TH
5899  005652  004737  005406                JSR     PC,QUES         ;NO COMMA AFTER 3 DIGITS - TYPE ??
5900  005656  000207                        RTS     PC              ;RETURN - NUMBER TOO BIG
5901  005660  010023          9$:   MOV     R0,(R3)+        ;SAVE DIGIT IN BUFFER
5902  005662  000731                        BR      3$              ;GET NEXT CHAR
5903  005664  012702  000003          10$:  MOV     #3,R2           ;SET UP MAX # OF DIGITS EXPECTED
5904  005670  004737  005426                JSR     PC,CLRBUF       ;GO CLEAR DIGIT BUFFER
5905  005674  004737  005242          11$:  JSR     PC,TTI          ;GO GET NEXT CHAR
5906  005700  022700  000177                CMP     #177,R0         ;IS IT A RUBOUT?
5907  005704  001001                        BNE     12$             ;BRANCH IF NOT A RUBOUT
5908  005706  000207                        RTS     PC              ;GO RETYPE LINE
5909  005710  022700  000015          12$:  CMP     #15,R0          ;IS IT A TERMINATOR?
5910  005714  001026                        BNE     15$             ;BRANCH IF NOT A CR
5911  005716  004737  006120                JSR     PC,DECBIN       ;CONVERT TRK # TO BINARY
5912  005722  023727  012572  000023        CMP     TEMP,#19.       ;SEE IF TRK REQUEST IS GREATER THAN 18
5913  005730  103404                        BCS     13$             ;BRANCH IF WITHIN LIMITS
5914  005732  004537  005166                JSR     R5,TYPOUT       ;TYPE LIMIT EXCEEDED
5915  005736  010371                        MTLIMT                  ;ADRS OF MESSAGE
5916  005740  000207                        RTS     PC              ;RETURN - TRK ADRS TO LARGE
5917  005742  005737  012542          13$:  TST     SOFSW           ;IS THIS THE STARTING OR ENDING TRK?
5918  005746  001403                        BEQ     14$             ;BRANCH IF ENDING TRK
5919  005750  013737  012572  012554        MOV     TEMP,STRK       ;SAVE TEMP AT STARTING TRK
5920  005756  013737  012572  012552  14$:  MOV .   TEMP,ETRK       ;SAVE TEMP AT ENDING TRK
5921  005764  062716  000002                ADD     #2,(SP) ;ADD TWO TO RETURN ADRS
5922  005770  000207                        RTS     PC              ;RETURN - CYL & TRK ADRS ARE SAVED
5923  005772  004737  005314          15$:  JSR     PC,NUMTST       ;SEE IF A NUMBER
5924  005776  000207                        RTS     PC              ;RETURN - BAD TYPE
5925  006000  005304                        DEC     R4              ;KEEP COUNT OF DIGITS COMING IN
5926  006002  001003                        BNE     16$             ;BRANCH IF NOT THE 3RD
5927  006004  004737  005406                JSR     PC,QUES         ;NO CR AFTER 2 DIGITS - TYPE ??
5928  006010  000207                        RTS     PC              ;RETURN - NUMBER TOO BIG
5929  006012  010023          16$:  MOV     R0,(R3)+        ;SAVE DIGIT IN BUFFER
5930  006014  000727                        BR      11$             ;GET NEXT CHAR
5931
5932                                        ;THIS ROUTINE SETS UP THE INPUT TABLE FOR THE DRIVER ROUTINE
5933
5934  006016  113737  012540  012712  SETTBL: MOVB    USEL,FMTDPB     ;SET UP DRIVE #
5935  006024  105037  012715                CLRB    FMTDPB+3        ;CLEAR HIGH ORDER ADRS BITS
5936  006030  013737  012604  012716        MOV     MWC,FMTDPB+4    ;LOAD UP WORD COUNT
5937  006036  012737  020300  012720        MOV     #BUFP,FMTDPB+6  ;LOAD UP CURRENT ADRS
5938  006044  105037  012722                CLRB    FMTDPB+10       ;SET SECTOR TO ZERO
5939  006050  113737  012554  012723        MOVB    STRK,FMTDPB+11  ;SET UP STARTING TRK ADRS
5940  006056  013737  012550  012724        MOV     SCYL,FMTDPB+12  ;SET UP STARTING CYL
5941  006064  012737  012642  012726        MOV     #SAVREG,FMTDPB+14       ;LOCATE POINTER TO 'RH' REGS
5942  006072  005037  012730                CLR     FMTDPB+16       ;CLEAR RP04 STATUS
5943  006076  000240                        NOP
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5944  006100  000240                        NOP
5945  006102  013737  012554  012562        MOV     STRK,TRKCNT     ;SET UP PARTIAL CYL TRACK COUNT
5946  006110  013737  012556  012560        MOV     TTRKS,TTRKSC    ;SET UP TOTAL TRACKS COUNTER
5947  006116  000207                        RTS     PC              ;RETURN FROM SETUP
5948
5949                                        ;THIS ROUTINE CONVERTS THE CYL OR TRK ADRS TO OCTAL
5950
5951  006120  014337  012572        DECBIN: MOV     -(R3),TEMP      ;SET UP ONES DIGIT
5952  006124  014300                        MOV     -(R3),R0        ;PUT TENS DIGIT IN R0
5953  006126  162700  000001        ADD10:  SUB     #1,R0           ;SEE HOW MANY 10'S
5954  006132  103404                        BCS     MSD             ;GO TRY HUNDREDS
5955  006134  062737  000012  012572        ADD     #12,TEMP        ;RECORD 10
5956  006142  000771                        BR      ADD10           ;TRY AGAIN
5957  006144  014300                MSD:    MOV     -(R3),R0        ;PUT HUNDREDS DIGIT IN R0
5958  006146  162700  000001        ADD100: SUB     #1,R0           ;SEE HOW MANY 100'S
5959  006152  103404                        BCS     DTBDNE          ;EXIT IF DONE
5960  006154  062737  000144  012572        ADD     #144,TEMP       ;RECORD 100
5961  006162  000771                        BR      ADD100          ;TRY AGAIN
5962  006164  000207                DTBDNE: RTS     PC              ;EXIT
5963
5964                                        ;THIS ROUTINE CONTROLS THE DISK ADDRESSING AND TOTAL TRK COUNT
5965                                        ;IT IS ENTERED AFTER EVERY TRK OPERATION
5966
5968  006166  005737  012560        TRKTST: TST     TTRKSC          ;SEE IF LAST TRK
5969  006172  001001                        BNE     1$              ;BRANCH IF NOT LAST TRK
5970  006174  000207                        RTS     PC              ;RETURN LAST TRK OF OPERATION
5971  006176  005337  012560        1$:     DEC     TTRKSC          ;COUNT TRK JUST COMPLETED
5972  006202  105237  012723                INCB    FMTDPB+11       ;ADVANCE TRK #
5973  006206  022737  000022  012562        CMP     #22,TRKCNT      ;IS THIS THE LAST TRK IN CYL?
5974  006214  001403                        BEQ     2$              ;BRANCH IF SO
5975  006216  005237  012562                INC     TRKCNT          ;COUNT UP TRK WITHIN CYLS
5976  006222  000411                        BR      3$              ;BRANCH TO SET UP RETURN
5977  006224  005037  012562        2$:     CLR     TRKCNT          ;INITIALIZE TRKCNT FOR NEXT CYL
5978  006230  105037  012723                CLRB    FMTDPB+11       ;RESET TRK ADRS TO 0
5979  006234  005237  012724                INC     FMTDPB+12       ;UPDATE CYLINDER #
5980  006240  004737  006374                JSR     PC,UPDACY       ;UPDATE CYLINDER # IN MEM TABLE
5981  006244  000402                        BR      4$              ;GO TO RETURN SETUP
5982  006246  004737  006420        3$:     JSR     PC,UPDATK       ;UPDATE TRACK # IN MEM TABLE
5983  006252  062716  000002        4$:     ADD     #2,(SP) ;ADD TWO TO RETURN ADRS
5984  006256  000207                        RTS     PC              ;EXITS HERE IF NOT LAST TRACK
6019
6020                                        ;THIS ROUTINE SETS UP WC & CA FOR REMAINING SECTORS
6021                                        ;AFTER A WRITE CHECK ERROR
6022
6023  006260  013737  012600  012716  SCAWC: MOV     SAVWC,FMTDPB+4  ;SET UP WC FOR REMAINING SECTORS
6024  006266  062737  001010  012720        ADD     #520.,FMTDPB+6  ;SET UP CA FOR REMAINING SECTORS
6025  006274  005237  012722                INC     FMTDPB+10       ;ADVANCE TO NEXT SECTOR IN TBL
6026  006300  005037  012542                CLR     SOFSW           ;RESET RETRY COUNTER
6027  006304  000207                        RTS     PC              ;RETURN TO COMPLETE TRK FORMAT
6028
6029
6030                                        ;THIS ROUTINE INITIALIZES THE SECTOR COUNT AND HEADER POINTER
6031                                        ;FOR THE HEADER & DATA BUFFER IN MEMORY
6032
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6033  006306  013701  012612          SECCNT: MOV     MAXSEC,R1       ;SET UP SECTOR COUNT
6034  006312  012700  020300                  MOV     #BUFP,R0        ;SET UP HEADER POINTER IN R0
6035  006316  000207                          RTS     PC              ;RETURN
6036
6037                                          ;THIS ROUTINE SETS UP THE CYLINDER ADRS, FORMAT BIT, TRACK AND
6038                                          ;SECTOR ADRS IN MEMORY WITH THE STARTING CYL - TRK INFORMATION
6039
6040  006320  004737  006306          SETHDR: JSR     PC,SECCNT       ;SET UP SECTOR COUNT AND HEADER POINTER
6041  006324  013702  012550                  MOV     SCYL,R2         ;PUT STARTING CYL # IN R2
6042  006330  013703  012554                  MOV     STRK,R3         ;PUT STARTING TRK # IN R3
6043  006334  000303                          SWAB    R3              ;JUSTIFY TRACK ADRS
6044  006336  005737  012610                  TST     SEC20           ;SEE IF 20 OR 22 SECTOR MODE
6045  006342  001402                          BEQ     1$              ;BR IF 20 SECTOR MODE
6046  006344  052702  010000                  BIS     #10000,R2       ;SET THE 22 SECTOR FORMAT BIT
6047  006350  010220          1$:             MOV     R2,(R0)+        ;WRITE IN HEADER AREA OF CORE THE CYL ADRS
6048  006352  010320                          MOV     R3,(R0)+        ;WRITE IN HEADER AREA OF CORE THE TRK ADRS
6049  006354  005020                          CLR     (R0)+           ;CLR 1ST KEYWORD
6050  006356  005010                          CLR     (R0)            ;CLR 2ND KEYWORD
6051  006360  062700  001002                  ADD     #514.,R0        ;SET UP FOR NEXT HEADER
6052  006364  005203                          INC     R3              ;UPDATE SECTOR ADRS FOR NEXT HEADER
6053  006366  005301                          DEC     R1              ;MAINTAIN COUNT OF SECTORS
6054  006370  002367                          BGE     1$              ;BRANCH IF NOT LAST SECTOR
6055  006372  000207                          RTS     PC              ;EXIT - HEADERS ARE LOADED INTO CORE
6056
6057                                          ;THIS ROUTINE UPDATES THE CYLINDER ADRS OF THE HEADER WORDS IN CORE
6058
6059  006374  004737  006306          UPDACY: JSR     PC,SECCNT       ;SET UP SECTOR COUNT AND HEADER POINTER
6060  006400  005220          1$:             INC     (R0)+           ;INCREMENT FOR NEXT CYLINDER
6061  006402  042710  177400                  BIC     #177400,(R0)    ;RESET TRK ADRS TO 0
6062  006406  062700  001006                  ADD     #518.,R0        ;SET UP FOR NEXT HEADER
6063  006412  005301                          DEC     R1              ;COUNT SECTORS
6064  006414  002371                          BGE     1$              ;BRANCH IF NOT LAST SECTOR
6065  006416  000207                          RTS     PC              ;EXIT
6066
6067                                          ;THIS ROUTINE UPDATES THE TRACK ADRS OF THE HEADER WORDS IN CORE
6068
6069  006420  004737  006306          UPDATK: JSR     PC,SECCNT       ;SET UP SECTOR COUNT AND HEADER POINTER
6070  006424  005720                          TST     (R0)+           ;POINT HEADER POINTER TO TRK - SEC ADRS
6071  006426  062710  000400          1$:     ADD     #400,(R0)       ;INDEX TRK ADRS
6072  006432  062700  001010                  ADD     #520.,R0        ;SET UP FOR NEXT HEADER
6073  006436  005301                          DEC     R1              ;COUNT SECTORS
6074  006440  002372                          BGE     1$              ;BRANCH IF NOT LAST SECTOR
6075  006442  000207                          RTS     PC              ;EXIT
6076
6077                                          ;THIS ROUTINE CONVERTS FAILING CYL & TRK ADRS TO DECIMAL FOR TYPE
6078
6079  006444  012702  010741          BINDEC: MOV     #MCYLTK,R2      ;ESTABLISH POINTER FOR CYL & TRK TYPE
6080  006450  013700  012616                  MOV     LOCCYL,R0       ;GO GET BINARY CYL ADRS
6081  006454  005001                          CLR     R1              ;RESET WEIGHT COUNT
6082  006456  012703  000144                  MOV     #144,R3         ;SET UP WEIGHT
6083  006462  162700  000144          1$:     SUB     #144,R0         ;SUBTRACT 100 DEC
6084  006466  100402                          BMI     2$              ;BRANCH IF # NOT LARGE ENOUGH
6085  006470  005201                          INC     R1              ;RECORD EACH 100 DEC
6086  006472  000773                          BR      1$              ;SUB AGAIN
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6087  006474  004737  006572          2$:     JSR     PC,MKDIG        ;GO MAKE ASCII DIGIT & STORE
6088  006500  005001                          CLR     R1              ;RESET WEIGHT COUNT
6089  006502  012703  000012                  MOV     #12,R3          ;SET UP WEIGHT
6090  006506  162700  000012          3$:     SUB     #12,R0          ;SUBTRACT 10 DEC
6091  006512  100402                          BMI     4$              ;BRANCH IF # NOT LARGE ENOUGH
6092  006514  005201                          INC     R1              ;RECORD EACH 10 DEC
6093  006516  000773                          BR      3$              ;SUB AGAIN
6094  006520  004737  006572          4$:     JSR     PC,MKDIG        ;GO MAKE ASCII DIGIT & STORE
6095  006524  062700  000260                  ADD     #260,R0         ;MAKE LSD ASCII DIGIT
6096  006530  110022                          MOVB    R0,(R2)+        ;AND STORE IT AWAY
6097  006532  112722  000254                  MOVB    #254,(R2)+      ;STORE A COMMA AS A SEPARATOR
6098  006536  113700  012614                  MOVB    LOCTRK,R0       ;LOAD R0 WITH CURRENT TRK ADRS
6099  006542  005001                          CLR     R1              ;RESET WEIGHT COUNT
6100  006544  162700  000012          5$:     SUB     #12,R0          ;SUBTRACT 10 DEC
6101  006550  100402                          BMI     6$              ;BRANCH IF # NOT LARGE ENOUGH
6102  006552  005201                          INC     R1              ;RECORD EACH 10 DEC
6103  006554  000773                          BR      5$              ;SUB AGAIN
6104  006556  004737  006572          6$:     JSR     PC,MKDIG        ;GO MAKE ASCII DIGIT & STORE
6105  006562  062700  000260                  ADD     #260,R0         ;MAKE LSD ASCII DIGIT
6106  006566  110022                          MOVB    R0,(R2)+        ;STORE LSD OF TRK
6107  006570  000207                          RTS     PC              ;GO RETURN AND TYPE BAD CYL & TRK
6108
6109                                          ;THIS ROUTINE STORES THE FAILING CYL & TRK ADRS IN MCYLTK
6110
6111  006572  062701  000260          MKDIG:  ADD     #260,R1         ;MAKE ASCII DIGIT
6112  006576  110122                          MOVB    R1,(R2)+        ;PUSH DIGIT INTO MCYLTK
6113  006600  060300                          ADD     R3,R0           ;MAKE # POS AGAIN
6114  006602  000207                          RTS     PC              ;RETURN TO SET UP NEXT DIGIT
6115
6116                                          ;THIS ROUTINE CONVERTS BINARY TO OCTAL FOR TYPE-R3 HAS #
6117
6118  006604  012702  000006          OCTYP:  MOV     #6,R2           ;SET UP DIGIT COUNTER
6119  006610  006103                          ROL     R3              ;ADJUST FOR FIRST TYPE
6120  006612  006103                          ROL     R3              ;
6121  006614  010300                          MOV     R3,R0           ;SEND TO TYPE REG
6122  006616  042700  177776                  BIC     #177776,R0      ;CLEAR OUT GARBAGE
6123  006622  000405                          BR      CHOP            ;GO MAKE DIGIT
6124  006624  006103                  NXD:    ROL     R3              ;ADJUST FOR NEXT TYPE
6125  006626  006103                          ROL     R3              ;
6126  006630  006103                          ROL     R3              ;
6127  006632  006103                          ROL     R3              ;
6128  006634  010300                          MOV     R3,R0           ;SEND TO TYPE REG
6129  006636  006003                  CHOP:   ROR     R3              ;SAVE CARRY
6130  006640  042700  177770                  BIC     #177770,R0      ;CLEAR OUT GARBAGE
6131  006644  062700  000260                  ADD     #260,R0         ;MAKE A DIGIT
6132  006650  004737  005204          TYOCT:  JSR     PC,TTO          ;TYPE IT
6133  006654  005302                          DEC     R2              ;IS IT THE LAST?
6134  006656  001362                          BNE     NXD             ;BRANCH IF SO
6135  006660  000207                          RTS     PC              ;DONE TYPING-RETURN
6136
6137                                          ;THIS ROUTINE TYPES THE DRIVE# AND S/N
6138
6139  006662  004537  005166          DRSN:   JSR     R5,TYPOUT       ;GO TYPE DRIVE=
6140  006666  011762                          MDRV
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                                        MOV     SAVREG+10,R3    ;GET DRIVE # FROM RHCS2
                                        JSR     PC,TDRNUM       ;GO TYPE DRIVE #
                                        JSR     R5,TYPOUT       ;TYPE SN=
                                        MSN
                                        MOV     SAVREG+30,R3    ;GET DRIVE SN
                                        JSR     PC,DECTYP       ;GO TYPE IT
                                        JSR     PC,CRLF         ;SET UP MARGIN
                                        RTS     PC              ;RETURN TO ER HANDLER

                                        ;THIS ROUTINE TYPES THE FAILING DRIVE #

                                TDRNUM: BIC     #177770,R3      ;CLEAR JUNK
                                        MOV     R3,R0           ;PLACE DIGIT IN OUTPUT REG
                                        ADD     #260,R0         ;MAKE ASCII
                                        JSR     PC,TTO          ;GO TYPE IT
                                        RTS     PC              ;RETURN

                                        ;THIS ROUTINE TYPES THE CYL,TRK=XXX,XX

                                CYLTK:  MOVB    FMTDPB+11,LOCTRK  ;TRACK ADDRESS
                                        MOV     FMTDPB+12,LOCCYL  ;CYLINDER ADDRESS
                                CYLTRK: JSR     R5,TYPOUT       ;GO TYPE CYL,TRK=
                                        MHCYTK
                                        JSR     PC,TCYLTK       ;GO CONVERT AND TYPE CYL+TRK
                                        RTS     PC              ;RETURN TO ER HANDLER

                                        ;THIS ROUTINE ASSEMBLES & TYPES THE FAILING CYL & TRK ADRS

                                TCYLTK: JSR     PC,BINDEC       ;GO CONVERT BIN TO DEC
                                        JSR     R5,TYPOUT       ;TYPE FAILING CYL,TRK
                                        MCYLTK                  ;ADRS OF MESSAGE WITH FAILING CYL-TRK
                                        RTS     PC              ;RETURN

                                        ;THIS ROUTINE TYPES TWO SPACES

                                TSPACE: JSR     R5,TYPOUT       ;GO TYPE TWO SPACES
                                        MSPACE
                                        RTS     PC              ;RETURN

                                        ;THIS ROUTINE TYPES OUT DECIMAL # IN R3

                                DECTYP: MOV     #4,R1           ;SET UP DIGIT COUNT
                                NXDD:   ROL     R3              ;SET UP DIGIT
                                        ROL     R3
                                        ROL     R3
                                        ROL     R3
                                        ROL     R3
                                        MOV     R3,R0           ;SET UP TYPE REG
                                        ROR     R3              ;SAVE CARRY
                                        BIC     #177760,R0      ;GET RID OF JUNK
                                        ADD     #260,R0         ;MAKE ASCII
                                        JSR     PC,TTO          ;GO TYPE IT
                                        DEC     R1              ;SEE IF LAST DIGIT
                                        BNE     NXDD            ;BRANCH IF NOT
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                                                RTS     PC              ;RETURN
                                                ;SETS UP RH REGS FOR THE 'RHREG' ROUTINE
007064  013737  012732  012654  SETREG:       MOV     RPERRS,SAVREG+12        ;SET UP RHDS1
007072  013737  012734  012656                 MOV     RPERRS+2,SAVREG+14      ;SET UP RHER1
007100  013737  012736  012702                 MOV     RPERRS+4,SAVREG+40      ;SET UP RHER2
007106  013737  012740  012704                 MOV     RPERRS+6,SAVREG+42      ;SET UP RHER3
007114  017737  174046  012642                 MOV     @SAVR+4,SAVREG          ;SET UP RHCS1
007122  013737  013070  007146                 MOV     RPADR,IRHCS2            ;GET RP04 BASE ADRS
007130  062737  000010  007146                 ADD     #10,IRHCS2              ;POINT TO RHCS2 ADRS
007136  017737  000004  012652                 MOV     @IRHCS2,SAVREG+10       ;GET RHCS2
007144  000207                                 RTS     PC                      ;RETURN
007146  000000                       IRHCS2:   0                               ;CONTAINS RHCS2 ADRS
                                                ;THIS ROUTINE TYPES OUT THE CS1,CS2,DS1,ER1,ER2+ER3 REGISTERS
007150  004537  005166                 RHREGS: JSR     R5,TYPOUT       ;GO TYPE THE RH HEADER
007154  012143                                 MREGHD
007156  013703  012642                         MOV     SAVREG,R3       ;GET RHCS1
007162  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007166  004737  007010                         JSR     PC,TSPACE       ;SPACE NX TYPE
007172  013703  012652                         MOV     SAVREG+10,R3    ;GET RHCS2
007176  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007202  004737  007010                         JSR     PC,TSPACE       ;SPACE NX TYPE
007206  013703  012654                         MOV     SAVREG+12,R3    ;GET RHDS1
007212  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007216  004737  007010                         JSR     PC,TSPACE       ;SPACE NX TYPE
007222  013703  012656                         MOV     SAVREG+14,R3    ;GET RHER1
007226  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007232  004737  007010                         JSR     PC,TSPACE       ;SPACE NX TYPE
007236  013703  012702                         MOV     SAVREG+40,R3    ;GET RHER2
007242  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007246  004737  007010                         JSR     PC,TSPACE       ;SPACE NX TYPE
007252  013703  012704                         MOV     SAVREG+42,R3    ;GET RHER3
007256  004737  006604                         JSR     PC,OCTYP        ;TYPE IT
007262  004737  005376                         JSR     PC,CRLF         ;SET MARGIN
007266  000207                                 RTS     PC              ;RETURN TO ER HANDLER
                                                ;THIS ROUTINE RESTORES R0-R5 WHEN RETURNING TO THE DRIVER
007270  013701  003162             RESREG:     MOV     SAVR,R1         ;RESTORE R0
007274  013703  003164                         MOV     SAVR+2,R3       ;RESTORE R3
007300  013704  003166                         MOV     SAVR+4,R4       ;RESTORE R4
007304  013705  003170                         MOV     SAVR+6,R5       ;RESTORE R5
007310  013700  003172                         MOV     SAVR+10,R0      ;RESTORE R0
007314  013702  003174                         MOV     SAVR+12,R2      ;RESTORE R2
007320  000207                                 RTS     PC              ;RETURN TO DRIVER
                                                ;THIS ROUTINE TYPES THE DRIVE #, SERIAL NUMBER AND
                                                ;THE CONTENTS OF THE RH11-RP04 REGISTERS
007322  004737  006662             TYPALL:     JSR     PC,DRSN         ;GO TYPE DRIVE # AND SN
007326  004737  006744                         JSR     PC,CYLTK        ;GO TYPE CYL,TRK=XXX,XX
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6252  007332  004737  007150                    JSR     PC,RHREGS       ;GO TYPE RH REGS
6253  007336  000207                            RTS     PC              ;EXIT
6254
6255                                            ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
6256
6257  007340  012737  007410  000004  CKCLK:    MOV     #CKCLK1,@#ERRVEC        ;SET UP VECTOR FOR P CLK
6258  007346  005037  000006                    CLR     @#ERRVEC+2      ;NEW PSW
6259  007352  005777  163162                    TST     @$LKCSR         ;CHECK FOR KW11-P
6260  007356  012737  003104  000104            MOV     #CLOCK,104      ;SET UP KW11-P VECTOR
6261  007364  012737  000300  000106            MOV     #300,106        ;PSW - PRI 6
6262  007372  012777  177777  163142            MOV     #-1,@$LKCSB     ;LOAD COUNTER BUFFER
6263  007400  012777  000135  163132            MOV     #135,@$LKCSR    ;SET CLK - CNT UP
6264  007406  000423                            BR      CKCLK3
6265  007410  062706  000004           CKCLK1:  ADD     #4,SP           ;RESTORE THE STACK POINTER
6266  007414  012737  007452  000004            MOV     #CKCLK2,@#ERRVEC        ;CHANGE ERROR VECTOR
6267  007422  005777  170120                    TST     @$LKS           ;LOOK FOR KW11-L
6268  007426  012737  003104  000100            MOV     #CLOCK,100      ;SET UP KW11-L VECTOR
6269  007434  012737  000300  000102            MOV     #300,102        ;PSW - PRI 6
6270  007442  012777  000100  170076            MOV     #100,@$LKS      ;SET KW11-L INTERRUPT ENABLE
6271  007450  000402                            BR      CKCLK3
6272  007452  062706  000004           CKCLK2:  ADD     #4,SP           ;RESTORE THE STACK POINTER
6273  007456  012737  000006  000004  CKCLK3:  MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
6274  007464  000207                            RTS     PC
6275
6366  007466  005015  050122  032060  MTITLE:  .ASCII  <15><12>/RP04 FORMATTER PROGRAM/<15><12>
      007474  043040  051117  040515
      007502  052124  051105  050040
      007510  047522  051107  046501
      007516  005015
6367  007520  040515  047111  042504           .ASCIZ  /MAINDEC-11-DZRPL-B/<15><12><12>
      007526  026503  030461  042055
      007534  051132  046120  041055
      007542  005015  000012
6368
6369  007546  005015  051104  053111  MUNIT:   .ASCIZ  <15><12>/DRIVE # /
      007554  020105  020043     000
6370
6371  007561     075  000060          MDRVD:   .ASCIZ  /=0/
6372
6373  007564  020040     000          MSPACE:  .ASCIZ  /  /
6374
6375  007567     077  006477  000012  MQUES:   .ASCIZ  /??/<15><12>
6376  007574  005015     000          MCRLF:   .ASCIZ  <15><12>
6377
6378  007577     040  042040  044522  MOFFLN:  .ASCIZ  /  DRIVE OFFLINE/<15><12>
      007604  042526  047440  043106
      007612  044514  042516  005015
      007620     000
6379
6380  007621     040  051104  053111  MDRNP:   .ASCIZ  / DRIVE NOT PRESENT/<15><12>
      007626  020105  047516  020124
      007634  051120  051505  047105
      007642  006524  000012
6381
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6382  007646  042040  044522  042526  MNRP04: .ASCIZ  / DRIVE NOT AN RP04/<15><12>
      007654  047040  052117  040440
      007662  020116  050122  032060
      007670  005015     000
6383
6384  007673     040  051104  053111  MUSDR:  .ASCIZ  / DRIVE UNSAFE/<15><12>
      007700  020105  047125  040523
      007706  042506  005015     000
6385
6386  007713     040  042523  042514  MSELD:  .ASCIZ  / SELECTED/
      007720  052103  042105     000
6387
6394  007725     015  005012  051120  MMODE:  .ASCIZ  <15><12><12>/PROGRAM MODE (C OR F) = /
      007732  043517  040522  020115
      007740  047515  042504  024040
      007746  020103  051117  043040
      007754  020051  020075     000
6395
6396  007761     040  020075  047506  MFORMT: .ASCIZ  / = FORMAT & VERIFY/
      007766  046522  052101  023040
      007774  053040  051105  043111
      010002  000131
6397
6398  010004  042510  045503  047440  MHECK:  .ASCIZ  /HECK ONLY/
      010012  046116  000131
6399
6400  010016  051117  040515  020124  MORMAT: .ASCIZ  /ORMAT & VERIFY/
      010024  020046  042526  044522
      010032  054506     000
6401
6402  010035     015  005012  050117  MSIZE:  .ASCIZ  <15><12><12>/OPERATE IN 22 SECTOR MODE (Y OR N) ? /
      010042  051105  052101  020105
      010050  047111  031040  020062
      010056  042523  052103  051117
      010064  046440  042117  020105
      010072  054450  047440  020122
      010100  024516  037440  000040
6403
6404  010106  005015  050117  051105  MSEC22: .ASCIZ  <15><12>/OPERATION WILL BE IN 22 SECTOR (16 BIT) MODE/
      010114  052101  047511  020116
      010122  044527  046114  041040
      010130  020105  047111  031040
      010136  020062  042523  052103
      010144  051117  024040  033061
      010152  041040  052111  020051
      010160  047515  042504     000
6405
6406  010165     015  047412  042520  MSEC20: .ASCIZ  <15><12>/OPERATION WILL BE IN 20 SECTOR (18 BIT) MODE/
      010172  040522  044524  047117
      010200  053440  046111  020114
      010206  042502  044440  020116
      010214  030062  051440  041505
      010222  047524  020122  030450
      010230  020070  044502  024524
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                010236  046440  042117  000105
 6407
 6408   010244  005015  051412  040524  MMINCT: .ASCIZ  <15><12><12>/STARTING CYL,TRK= /
        010252  052122  047111  020107
        010260  054503  026114  051124
        010266  036513  000040
 6409
 6410   010272  030075  030054     000  MCYTK0: .ASCIZ  /=0,0/
 6411
 6412   010277     015  042412  042116  MMAXCT: .ASCIZ  <15><12>/ENDING   CYL,TRK= /
        010304  047111  020107  020040
        010312  054503  026114  051124
        010320  036513  000040
 6413
 6414   010324  032075  030061  030454  MCYTK1: .ASCIZ  /=410,18/
        010332  000070
 6415
 6416   010334  037477  041440  046131  MCLIMT: .ASCIZ  /?? CYLINDER LIMIT EXCEEDED/<15><12>
        010342  047111  042504  020122
        010350  044514  044515  020124
        010356  054105  042503  042105
        010364  042105  005015     000
 6417
 6418   010371     077  020077  051124  MTLIMT: .ASCIZ  /?? TRACK LIMIT EXCEEDED/<15><12>
        010376  041501  020113  044514
        010404  044515  020124  054105
        010412  042503  042105  042105
        010420  005015     000
 6419
 6420   010423     077  020077  047105  MADRER: .ASCII  /?? ENDING DSK ADRS MUST/<15><12>
        010430  044504  043516  042040
        010436  045523  040440  051104
        010444  020123  052515  052123
        010452  005015
 6421   010454  042502  042440  052521          .ASCIZ  /BE EQUAL TO OR GREATER THAN STARTING ADRS/<15><12>
        010462  046101  052040  020117
        010470  051117  043440  042522
        010476  052101  051105  052040
        010504  040510  020116  052123
        010512  051101  044524  043516
        010520  040440  051104  006523
        010526  000012
 6422
 6423   010530  005015  051412  046105  MSELP:  .ASCII  <15><12><12>/SELECT DATA PATTERN:/<15><12>
        010536  041505  020124  040504
        010544  040524  050040  052101
        010552  042524  047122  006472
        010560     012
 6424   010561     050  024460  055040          .ASCII  /(0) ZERO'S/<15><12>
        010566  051105  023517  006523
        010574     012
 6425   010575     050  024461  047440          .ASCII  /(1) ONE'S/<15><12>
        010602  042516  051447  005015
 6426   010610  031050  020051  047527          .ASCIZ  /(2) WORST CASE/<15><12><12>
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        010616  051522  020124  040503
        010624  042523  005015  000012
6427
6428    010632  053475  051117  052123  MPATD:  .ASCIZ  /=WORST CASE/
        010640  041440  051501  000105
6429
6430    010646  005015  051412  040524  MSFOU:  .ASCIZ  <15><12><12>/STARTING FORMAT ON DRIVE #/
        010654  052122  047111  020107
        010662  047506  046522  052101
        010670  047440  020116  051104
        010676  053111  020105  000043
6431
6432    010704  005015  051412  040524  MSCHK:  .ASCIZ  <15><12><12>/STARTING CHECK ON DRIVE #/
        010712  052122  047111  020107
        010720  044103  041505  020113
        010726  047117  042040  044522
        010734  042526  021440     000
6433
6434    010741     060  030060  030054  MCYLTK: .ASCIZ  /000,00/<15><12>
        010746  006460  000012
6435
6436    010752  005015  043012  051117  MFCMPT: .ASCIZ  <15><12><12>/FORMAT COMPLETE/<15><12>
        010760  040515  020124  047503
        010766  050115  042514  042524
        010774  005015     000
6437
6438    010777     015  005012  044103  MCCMPT: .ASCIZ  <15><12><12>/CHECK COMPLETE/<15><12>
        011004  041505  020113  047503
        011012  050115  042514  042524
        011020  005015     000
6439
6440    011023     015  005012  046111  MER1:   .ASCIZ  <15><12><12>/ILLEGAL SUBSYSTEM INTERRUPT/<15><12><12>
        011030  042514  040507  020114
        011036  052523  051502  051531
        011044  042524  020115  047111
        011052  042524  051122  050125
        011060  006524  005012     000
6441
6442    011065     015  005012  046111  MER2:   .ASCIZ  <15><12><12>/ILLEGAL DRIVE INTERRUPT/<15><12><12>
        011072  042514  040507  020114
        011100  051104  053111  020105
        011106  047111  042524  051122
        011114  050125  006524  005012
        011122     000
6443
6444    011123     015  005012  040515  MER3:   .ASCIZ  <15><12><12>/MASSBUS CONTROL BUS PARITY ERROR/<15><12><12>
        011130  051523  052502  020123
        011136  047503  052116  047522
        011144  020114  052502  020123
        011152  040520  044522  054524
        011160  042440  051122  051117
        011166  005015  000012
6445
6446    011172  005015  041412  047117  MER4:   .ASCIZ  <15><12><12>/CONTROL BUS PARITY ERROR/<15><12><12>
```

```
                011200  051124  046117  041040
                011206  051525  050040  051101
                011214  052111  020131  051105
                011222  047522  006522  005012
                011230     000
 6447
 6448  011231     015  005012  052101  MER5:   .ASCIZ  <15><12><12>/ATTENTION FROM AN UNAVAILABLE DRIVE/<15><12><12>
       011236  042524  052116  047511
       011244  020116  051106  046517
       011252  040440  020116  047125
       011260  053101  044501  040514
       011266  046102  020105  051104
       011274  053111  006505  005012
       011302     000
 6449
 6450  011303     015  005012  051127  MER6:   .ASCIZ  <15><12><12>/WRITE CHECK ERROR/<15><12>
       011310  052111  020105  044103
       011316  041505  020113  051105
       011324  047522  006522  000012
 6451
 6452  011332  005015  051012  040505  MER6A:  .ASCIZ  <15><12><12>/READ OR WRITE UNSAFE ERROR/<15><12>
       011340  020104  051117  053440
       011346  044522  042524  052440
       011354  051516  043101  020105
       011362  051105  047522  006522
       011370  000012
 6453
 6454  011372  005015  042012  044522  MER6B:  .ASCIZ  <15><12><12>/DRIVE ERROR/<15><12>
       011400  042526  042440  051122
       011406  051117  005015     000
 6455
 6456  011413     015  005012  051127  MER6C:  .ASCIZ  <15><12><12>/WRITE ERROR/<15><12>
       011420  052111  020105  051105
       011426  047522  006522  000012
 6457
 6458  011434  005015  042012  051511  MER6D:  .ASCII  <15><12><12>/DISK ERROR TRYING TO PERFORM HEADER COMPARE/<15><12>
       011442  020113  051105  047522
       011450  020122  051124  044531
       011456  043516  052040  020117
       011464  042520  043122  051117
       011472  020115  042510  042101
       011500  051105  041440  046517
       011506  040520  042522  005015
 6459  011514  047520  044523  044524          .ASCIZ  /POSITIONING CHECK NOT PERFORMED/<15><12>
       011522  047117  047111  020107
       011530  044103  041505  020113
       011536  047516  020124  042520
       011544  043122  051117  042515
       011552  006504  000012
 6460
 6461  011556  005015  042012  044522  MER7:   .ASCIZ  <15><12><12>/DRIVE UNSAFE ERROR/<15><12>
       011564  042526  052440  051516
       011572  043101  020105  051105
       011600  047522  006522  000012
```

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6462
6463  011606  005015  052412  041516  MER8:   .ASCIZ  <15><12><12>/UNCORRECTABLE MASSBUS PARITY ERROR/<15><12>
      011614  051117  042522  052103
      011622  041101  042514  046440
      011630  051501  041123  051525
      011636  050040  051101  052111
      011644  020131  051105  047522
      011652  006522  000012
6464
6465  011656  005015  043012  052101  MER9:   .ASCIZ  <15><12><12>/FATAL MASSBUS PARITY ERROR/<15><12>
      011664  046101  046440  051501
      011672  041123  051525  050040
      011700  051101  052111  020131
      011706  051105  047522  006522
      011714  000012
6466
6467  011716  006415  051412  043117  MER10:  .ASCIZ  <15><15><12>/SOFTWARE TIMEOUT - SYSTEM HUNG/<15><12>
      011724  053524  051101  020105
      011732  044524  042515  052517
      011740  020124  020055  054523
      011746  052123  046505  044040
      011754  047125  006507  000012
6468
6469  011762  051104  053111  036505  MDRV:   .ASCIZ  /DRIVE=/
      011770     000
6470
6471  011771     122  040510  036523  MAS:    .ASCIZ  /RHAS= /
      011776  000040
6472
6473  012000  042122  040456  051104  MRDADR: .ASCIZ  /RD.ADR=/
      012006  000075
6474
6475  012010  042122  053456  042122  MRDWRD: .ASCIZ  /RD.WRD=/
      012016  000075
6476
6477  012020  051127  027124  042101  MWRTAD: .ASCIZ  /WRT.AD=/
      012026  000075
6478
6479  012030  051127  027124  042127  MWRTWD: .ASCIZ  /WRT.WD=/
      012036  000075
6480
6481  012040  020040  047123  000075  MSN:    .ASCIZ  /  SN=/
6482
6483  012046  054503  026114  051124  MHCYTK: .ASCIZ  /CYL,TRK=/
      012054  036513     000
6484
6485  012057     123  041505  047524  MSTOR:  .ASCIZ  /SECTOR=/
      012064  036522     000
6486
6487  012067     015  041012  042101  MBDATA: .ASCIZ  <15><12>/BAD  DATA=/
      012074  020040  040504  040524
      012102  000075
6488
6489  012104  005015  047507  042117  MGDATA: .ASCIZ  <15><12>/GOOD DATA=/
```

```
        012112  042040  052101  036501
        012120     000
 6490
 6491   012121     015  051012  042510  MRHEC1: .ASCIZ  <15><12>/RHEC1=/
        012126  030503  000075
 6492
 6493   012132  005015  044122  041505  MRHEC2: .ASCIZ  <15><12>/RHEC2=/
        012140  036462     000
 6494
 6495   012143     015  020012  044122  MREGHD: .ASCIZ  <15><12>/ RHCS1   RHCS2   RHDS1   RHER1   RHER2   RHER3/<15><12>
        012150  051503  020061  020040
        012156  044122  051503  020062
        012164  020040  044122  051504
        012172  020061  020040  044122
        012200  051105  020061  020040
        012206  044122  051105  020062
        012214  020040  044122  051105
        012222  006463  000012
 6496
 6497   012226  005015  047506  046522  MFTERM: .ASCIZ  <15><12>/FORMAT TERMINATED/<15><12>
        012234  052101  052040  051105
        012242  044515  040516  042524
        012250  006504  000012
 6498
 6499   012254  026440  051440  041505  MUNCOR: .ASCIZ  / - SECTOR NOT ACCEPTABLE/<15><12>
        012262  047524  020122  047516
        012270  020124  041501  042503
        012276  052120  041101  042514
        012304  005015     000
 6500
 6501   012307     015  005012  042522  MREFMT: .ASCIZ  <15><12><12>/REFORMAT PACK/<15><12>
        012314  047506  046522  052101
        012322  050040  041501  006513
        012330  000012
 6502
 6503   012332  005015  050012  051517  MBDFMT: .ASCIZ  <15><12><12>/POSITIONING ERROR DURING FORMAT - REFORMAT PACK/
        012340  052111  047511  044516
        012346  043516  042440  051122
        012354  051117  042040  051125
        012362  047111  020107  047506
        012370  046522  052101  026440
        012376  051040  043105  051117
        012404  040515  020124  040520
        012412  045503     000
 6504
 6505   012415     015  051012  052105  MREUNS: .ASCIZ  <15><12>/RETRIES UNSUCCESSFUL/
        012422  044522  051505  052440
        012430  051516  041525  042503
        012436  051523  052506  000114
 6506
 6507   012444  054105  042520  052103  MEXPED: .ASCIZ  /EXPECTED - /
        012452  042105  026440  000040
 6508
 6509   012460  042522  042101  020040  MREAD:  .ASCIZ  /READ     - /
```

```
        012466  020040  026440  000040
 6510
 6511   012474  005015  051412  043117  MHDCMP: .ASCIZ  <15><12><12>/SOFTWARE HEADER COMPARE ERROR/<15><12>
        012502  053524  051101  020105
        012510  042510  042101  051105
        012516  041440  046517  040520
        012524  042522  042440  051122
        012532  051117  005015     000
 6512
 6525
 6526
 6527                                   ;LISTED BELOW ARE LOCATIONS CONTAINING
 6528                                   ;PARAMETERS USED BY THE FORMAT OPERATION
 6529
 6530            012540                         .EVEN
 6531
 6532   012540   000000                 USEL:   0               ;CONTAINS # OF UNIT SELECTED
 6533   012542   000000                 SOFSW:  0               ;CONTENTS ARE FOR SOFTWARE DECISIONS
 6534   012544   000000                 MODE:   0               ;'FORMAT & VERIFY' OR 'CHECK' MODE INDICATOR
 6535   012546   000000                 ECYL:   0               ;ENDING CILINDER
 6536   012550   000000                 SCYL:   0               ;STARTING CYLINDER
 6537   012552   000000                 ETRK:   0               ;ENDING TRACK
 6538   012554   000000                 STRK:   0               ;STARTING TRACK
 6539   012556   000000                 TTRKS:  0               ;TOTAL # OF TRACKS TO BE FORMATTED
 6540   012560   000000                 TTRKSC: 0               ;TOTAL # OF TRACKS COUNTER
 6541   012562   000000                 TRKCNT: 0               ;COUNTS TRKS FROM 0-18 PER CYL
 6542   012564   000000                 PSEL:   0               ;CONTAINS PATTERN SELECTED
 6543   012566   000000                 PATA:   0               ;PATTERN TO BE WRITTEN ON DISK
 6544   012570   000000                 PATB:   0               ;DITTO
 6545   012572   000000                 TEMP:   0               ;UTILITY STORAGE
 6546   012574   000000                 RETRY:  0               ;MAINTAINS # OF RETRIES MADE
 6547   012576   000000                 SAVSEC: 0               ;CONTAINS LAST BAD SECTOR ON FORMAT
 6548   012600   000000                 SAVWC:  0               ;CONTAINS WC FOR REMAINING SECTORS ON ERROR
 6549   012602   000000                 WC:     0               ;20 OR 22 SECTOR TRACK SIZE (IN WORDS)
 6550   012604   000000                 MWC:    0               ;2'S COMPLEMENT OF 'WC'
 6551   012606   000000                 HEDERR: 0               ;POSITIONING ERROR DURING FORMAT INDICATOR
 6552   012610   000000                 SEC20:  0               ;20 OR 22 SECTOR MODE INDICATOR
 6553                                                           ;0 = 20 SECTOR MODE
 6554                                                           ;1'S = 22 SECTOR MODE
 6555   012612   000000                 MAXSEC: 0               ;MAXIMUM SECTOR ADDRESS (FOR EITHER 20 OR 22 SECTOR
 6556                                                           ;FORMAT)
 6563   012614   000000                 LOCTRK: 0               ;TEMP STORAGE FOR TRACK CONVERSION FOR TYPEOUT
 6564   012616   000000                 LOCCYL: 0               ;TEMP STORAGE FOR CYL CONVERSION FOR TYPEOUT
 6565   012620   000001                 NULCNT: 1               ;NULL (FILLER) CHARACTER COUNT FOR TYPEOUTS
 6566
 6567   012622   000000                 RBUF:   0               ;THIS LOCATION CONTAINS CYL ADRS ON HEADER CK
 6568   012624   000000                         0               ;THIS LOCATION CONTAINS TRK-SEC ADRS ON HEADER CK
 6569
 6570   012626   000000                 CPTR3:  0               ;LEAVE SPACE FOR LEADING ZEROS
 6571   012630   000000                 CPTR2:  0
 6572   012632   000000                 CPTR1:  0
 6573   012634   000000                 CPTR:   0               ;TTY INPUT BUFFER
 6574            012642                         .=.+4           ;MOVE POINTER TO END OF BUFFER
 6575
```

```
6576  012642  000000                SAVREG: 0               ;RHCS1
6577  012644  000000                        0               ;RHWC
6578  012646  000000                        0               ;RHBA
6579  012650  000000                        0               ;RHDA
6580  012652  000000                        0               ;RHCS2
6581  012654  000000                        0               ;RHDS1
6582  012656  000000                        0               ;RHER1
6583  012660  000000                        0               ;RHAS
6584  012662  000000                        0               ;RHLA
6585  012664  000000                        0               ;RHDB
6586  012666  000000                        0               ;RHMR
6587  012670  000000                        0               ;RHDT
6588  012672  000000                        0               ;RHSN
6589  012674  000000                        0               ;RHOF
6590  012676  000000                        0               ;RHCA
6591  012700  000000                        0               ;RHCC
6592  012702  000000                        0               ;RHER2
6593  012704  000000                        0               ;RHER3
6594  012706  000000                        0               ;RHEC1
6595  012710  000000                        0               ;RHEC2
6596
6597
6598
6599  012712     000          FMTDPB: .BYTE   0       ;DRIVE NUMBER
6600  012713     000                  .BYTE   0       ;OFFSET VALUE OR FMT22,ECI, AND HCI
6601  012714     000                  .BYTE   0       ;COMMAND
6602  012715     000                  .BYTE   0       ;PSEL AND A17 AND A16
6603  012716  000000                  .WORD   0       ;WORD COUNT (NEG)
6604  012720  000000                  .WORD   0       ;BUFFER ADDRESS
6605  012722     000                  .BYTE   0       ;SECTOR ADDRESS
6606  012723     000                  .BYTE   0       ;TRACK ADDRESS
6607  012724  000000                  .WORD   0       ;CYLINDER ADDRESS
6608  012726  000000                  .WORD   0       ;ERROR TABLE POINTER
6609  012730  000000                  .WORD   0       ;STATUS-ERROR INDICATOR
6610                                                  ;BIT 15 = 1: ERROR OCCURED
6611                                                  ;BIT 07 = 1: DONE
6612                                                  ;BIT 14-10 AND BIT 06-03
6613                                                  ;INDICATE TYPE OF ERROR
6614
6615
6616
6617
6618
6619
6620
 (1)                    .SBTTL  RH11/RP04 DRIVER (REV. 0.9)
 (1)
 (1)                    ;*COPYRIGHT (C) 1974
 (1)                    ;*DIGITAL EQUIPMENT CORP.
 (1)                    ;*MAYNARD, MA 01754
 (1)                    ;*AUTHOR: JIM LACEY
 (1)
 (1)
 (1)                    ;*STORAGE FOR RHDS1, RHER1, RHER2, AND RHER3 ON AN ERROR "2" OR "5"
```

```
(1)                                     ;*RPERRS   = RHDS1
(1)                                     ;*RPERRS+2 = RHER1
(1)                                     ;*RPERRS+4 = RHER2
(1)                                     ;*RPERRS+6 = RHER3
(1)
(1)  012732  000000             RPERRS: .WORD   0
(1)  012734  000000                     .WORD   0
(1)  012736  000000                     .WORD   0
(1)  012740  000000                     .WORD   0
(1)
(1)                             ;*TABLE OF DRIVE ACTIVE INDICATORS (DRVACT=8 BYTES)
(1)                                     ;*DRVACT=0 IMPLIES DRIVE IS IDLE
(1)                                     ;*DRVACT>0 IMPLIES DRIVE IS ACTIVE WITH A COMMAND
(1)                                     ;*DRVACT<0 IMPLIES DRIVE IS ACTIVE WITH AN ERROR RECOVERY OPERATION
(1)
(1)  012742      000            DRVACT: .BYTE   0               ;DRIVE 0
(1)  012743      000                    .BYTE   0               ;DRIVE 1
(1)  012744      000                    .BYTE   0               ;DRIVE 2
(1)  012745      000                    .BYTE   0               ;DRIVE 3
(1)  012746      000                    .BYTE   0               ;DRIVE 4
(1)  012747      000                    .BYTE   0               ;DRIVE 5
(1)  012750      000                    .BYTE   0               ;DRIVE 6
(1)  012751      000                    .BYTE   0               ;DRIVE 7
(1)
(1)                             ;*TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
(1)                                     ;*DRVSTA=0 IMPLIES DRIVE IS OFFLINE
(1)                                     ;*DRVSTA>0 IMPLIES DRIVE IS ONLINE
(1)                                     ;*DRVSTA<0 IMPLIES DRIVE IS UNSAFE OR NONEXISTENT
(1)
(1)  012752      000            DRVSTA: .BYTE   0               ;DRIVE 0
(1)  012753      000                    .BYTE   0               ;DRIVE 1
(1)  012754      000                    .BYTE   0               ;DRIVE 2
(1)  012755      000                    .BYTE   0               ;DRIVE 3
(1)  012756      000                    .BYTE   0               ;DRIVE 4
(1)  012757      000                    .BYTE   0               ;DRIVE 5
(1)  012760      000                    .BYTE   0               ;DRIVE 6
(1)  012761      000                    .BYTE   0               ;DRIVE 7
(1)
(1)                             ;*TABLE OF DRIVE TYPES (DRVTYP=8 WORDS)
(1)                                     ;*DRVTYP WILL CONTAIN THE DRIVE TYPE OF ALL ONLINE, OFFLINE, AND
(1)                                     ;*UNSAFE DRIVES. IF A DRIVE IS NONEXISTENT DRVTYP WILL BE ZERO.
(1)
(1)  012762  000000             DRVTYP: .WORD   0               ;DRIVE 0
(1)  012764  000000                     .WORD   0               ;DRIVE 1
(1)  012766  000000                     .WORD   0               ;DRIVE 2
(1)  012770  000000                     .WORD   0               ;DRIVE 3
(1)  012772  000000                     .WORD   0               ;DRIVE 4
(1)  012774  000000                     .WORD   0               ;DRIVE 5
(1)  012776  000000                     .WORD   0               ;DRIVE 6
(1)  013000  000000                     .WORD   0               ;DRIVE 7
(1)
(1)                             ;*TRANSFER WAIT FLAG (TRNSWT=1 WORD)
(1)                                     ;*THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
(1)                                     ;*"DPB" OF THE I/O OPERATION.
```

```
(1)
(1)  013002  000000                    TRNSWT: .WORD   0
(1)
(1)                                     ;*SEARCH WAIT KEYS (SRCHWT=1 WORD)
(1)                                             ;*THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
(1)                                             ;*THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
(1)                                             ;*REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
(1)                                             ;*EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
(1)
(1)  013004  000000                    SRCHWT: .WORD   0
(1)
(1)                                     ;*RP04 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
(1)                                             ;*ACTDRV=0 IMPLIES DRIVER IS INACTIVE
(1)                                             ;*ACTDRV>0 IMPLIES DRIVER IS ACTIVE
(1)
(1)  013006     000                     ACTDRV: .BYTE   0
(1)
(1)                                     ;*SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
(1)                                             ;*ACTSTR=0 IMPLIES SOFTWARE TIMER ROUTINE IS INACTIVE
(1)                                             ;*ACTSTR>0 IMPLIES SOFTWARE TIMER ROUTINE IS ACTIVE
(1)
(1)  013007     000                     ACTSTR: .BYTE   0
(1)
(1)                                     ;*UNLOAD FLAG (ULDFLG=8 BYTES)
(1)                                             ;*ULDFLG=0 IMPLIES NO UNLOAD COMMAND
(1)                                             ;*ULDFLG>0 IMPLIES UNLOAD COMMAND IN PROGRESS
(1)                                             ;*ULDFLG<0 IMPLIES UNLOAD COMMAND IN WAIT QUEUE
(1)
(1)  013010     000                     ULDFLG: .BYTE   0               ;DRIVE 0
(1)  013011     000                             .BYTE   0               ;DRIVE 1
(1)  013012     000                             .BYTE   0               ;DRIVE 2
(1)  013013     000                             .BYTE   0               ;DRIVE 3
(1)  013014     000                             .BYTE   0               ;DRIVE 4
(1)  013015     000                             .BYTE   0               ;DRIVE 5
(1)  013016     000                             .BYTE   0               ;DRIVE 6
(1)  013017     000                             .BYTE   0               ;DRIVE 7
(1)
(1)                                     ;*LOOK AHEAD COUNT (LACNT=8 BYTES)
(1)                                             ;*LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
(1)
(1)  013020     000                     LACNT:  .BYTE   0               ;DRIVE 0
(1)  013021     000                             .BYTE   0               ;DRIVE 1
(1)  013022     000                             .BYTE   0               ;DRIVE 2
(1)  013023     000                             .BYTE   0               ;DRIVE 3
(1)  013024     000                             .BYTE   0               ;DRIVE 4
(1)  013025     000                             .BYTE   0               ;DRIVE 5
(1)  013026     000                             .BYTE   0               ;DRIVE 6
(1)  013027     000                             .BYTE   0               ;DRIVE 7
(1)
(1)                                     ;*SAVE REGISTERS FLAG (SAVEFG =1 WORD)
(1)                                             ;*SAVEFG <0 IMPLIES SAVE THE RH11/RP04 REGISTERS WHEN THE
(1)                                             ;*OPERATION IS COMPLETED AS PER (DPB+14).
(1)                                             ;*SAVEFG=0 IMPLIES SAVE THE RH11/RP04 REGISTERS, AS PER
(1)                                             ;*(DPB+14), AFTER AN ERROR.
```

```
(1)
(1)  013030  000000                    SAVEFG: .WORD   0
(1)
(1)                                     ;*SEEK FLAG (SEEKFG=1 WORD)
(1)                                             ;*SEEKFG=0 IMPLIES WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
(1)                                             ;*FOR A DATA TRANSFER START A SEARCH COMMAND
(1)                                             ;*SEEKFG<0 IMPLIES DATA TRANSFER WILL DO IMPLIED SEEKS,
(1)                                             ;*DISREGARD THE WINDOW
(1)
(1)  013032  000000                    SEEKFG: .WORD   0
(1)
(1)                                     ;*TIMEOUT TABLE (TIMER=8 WORDS)
(1)                                             ;*THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
(1)
(1)  013034  177777                    TIMER:  .WORD   -1      ;DRIVE 0
(1)  013036  177777                            .WORD   -1      ;DRIVE 1
(1)  013040  177777                            .WORD   -1      ;DRIVE 2
(1)  013042  177777                            .WORD   -1      ;DRIVE 3
(1)  013044  177777                            .WORD   -1      ;DRIVE 4
(1)  013046  177777                            .WORD   -1      ;DRIVE 5
(1)  013050  177777                            .WORD   -1      ;DRIVE 6
(1)  013052  177777                            .WORD   -1      ;DRIVE 7
(1)
(1)                                     ;*DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
(1)                                             ;*DTUW<0 IMPLIES NO DATA TRANSFER UNDERWAY
(1)                                             ;*DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
(1)
(1)  013054  177777                    DTUW:   .WORD   -1
(1)
(1)                                     ;*ATTENTION BITS TABLE (ATABIT=8 BYTES)
(1)                                             ;*THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
(1)                                             ;*ATTENTION BIT
(1)
(1)  013056     001                     ATABIT: .BYTE   1       ;DRIVE 0
(1)  013057     002                             .BYTE   2       ;DRIVE 1
(1)  013060     004                             .BYTE   4       ;DRIVE 2
(1)  013061     010                             .BYTE   10      ;DRIVE 3
(1)  013062     020                             .BYTE   20      ;DRIVE 4
(1)  013063     040                             .BYTE   40      ;DRIVE 5
(1)  013064     100                             .BYTE   100     ;DRIVE 6
(1)  013065     200                             .BYTE   200     ;DRIVE 7
(1)
(1)                                     ;*RP04 TO RH11 "MASS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
(1)                                     ;*CALLING IT FATAL (MCPEMX=1 WORD)
(1)
(1)  013066  000003                    MCPEMX: .WORD   3
(1)
(1)                                     ;*STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04),
(1)                                     ;*RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5)).
(1)  013070  176700                    RPADR:  .WORD   176700
(1)  013072  000254  000240            RPVEC:  .WORD   254,5*32.
(1)
(1)                                     ;*MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
(1)  013076  000004                    MXLACT: .WORD   4
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(1)
(1)  013100  001000                ;*MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
(1)                                 MXDLTA: .WORD   8.*64.
(1)                                 ;*MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
(1)  013102  000200                MNDLTA: .WORD   2*64.
(1)                                 ;*MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
(1)  013104  000005                MXWNDW: .WORD   5
(1)
(1)                                 ;*DEFINITIONS OF THE RH11/RP04 ADDRESS INDEXES
(1)
(1)          000000                RHCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
(1)          000002                RHWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
(1)          000004                RHBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
(1)          000006                RHDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
(1)          000010                RHCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
(1)          000012                RHDS1=12                ;DRIVE STATUS REGISTER (DRIVE REG 01)
(1)          000014                RHER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
(1)          000016                RHAS=16                 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
(1)          000020                RHLA=20                 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
(1)          000022                RHDB=22                 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
(1)          000024                RHMR=24                 ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
(1)          000026                RHDT=26                 ;DRIVE TYPE REGISTER (DRIVE REG. 06)
(1)          000030                RHSN=30                 ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
(1)          000032                RHOF=32                 ;OFFSET REGISTER (DRIVE REG. 11)
(1)          000034                RHCA=34                 ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
(1)          000036                RHCC=36                 ;CURRENT CYLINDER ADDRESS REGISTER (DRIVE REG. 13)
(1)          000040                RHER2=40                ;ERROR REGISTER #2 (DRIVE REG. 14)
(1)          000042                RHER3=42                ;ERROR REGISTER #3 (DRIVE REG. 15)
(1)          000044                RHEC1=44                ;ECC POSITION REGISTER (DRIVE REG. 16)
(1)          000046                RHEC2=46                ;ECC PATTERN REGISTER (DRIVE REG.  17)
(1)
(1)                                 ;*RH11/RP04 DRIVER INIT. CODE
(1)                                         ;*THIS ROUTINE WILL DETERMINE WHICH RP04 DRIVES ARE
(1)                                         ;*AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
(1)                                         ;*TO THE PROPER STATE FOR EACH DRIVE.
(1)                                         ;*NOTE: THIS ROUTINE CALLS DRVINT
(1)                                 ;
(1)                                 ;*CALL
(1)                                 ;
(1)                                 ;*      JSR     PC,RPINIT
(1)                                 ;*      RETURN
(1)                                 ;
(1)  013106  013746  177776         RPINIT: MOV     @#PS,-(SP)      ;SAVE PROCESSOR STATUS
(1)  013112  013737  013074  177776         MOV     RPVEC+2,@#PS    ;SET PROCESSOR STATUS TO RH11/RP04 LEVEL
(1)  013120  004037  020236                 JSR     R0,SAVR15       ;GO SAVE R1-R5
(1)  013124  004737  017774                 JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
(1)  013130  012701  012732                 MOV     #RPERRS,R1      ;FIRST ADDRESS TO BE CLEARED
(1)  013134  012702  013032                 MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
(1)  013140  005021                 1$:     CLR     (R1)+           ;CLEAR
(1)  013142  020102                         CMP     R1,R2           ;ARE WE DONE?
(1)  013144  101775                         BLOS    1$              ;BRANCH IF NO
(1)  013146  012702  013054                 MOV     #DTUW,R2        ;LAST ADDRESS
(1)  013152  012721  177777         2$:     MOV     #-1,(R1)+       ;INITIALIZE
(1)  013156  020102                         CMP     R1,R2           ;DONE?
(1)  013160  101774                         BLOS    2$              ;LOOP IF NO
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(1)  013162  005001                        CLR     R1              ;DRIVE NUMBER WILL BE IN R1
(1)  013164  013704  013070                MOV     RPADR,R4        ;FIRST ADDRESS OF RH11/RPO4
(1)  013170  012764  000040  000010        MOV     #BITO5,RHCS2(R4)        ;MASSBUS INIT.
(1)  013176  004037  013250          3$:   JSR     R0,DRVINT       ;GO INIT. A DRIVE
(1)  013202  000417                        BR      7$
(1)  013204  005201                  4$:   INC     R1              ;MOVE TO THE NEXT DRIVE
(1)  013206  042701  177770                BIC     #^C7,R1         ;DON'T LET THE DRIVE NUMBER GET TO BIG
(1)  013212  001371                        BNE     3$              ;BRANCH IF MORE DRIVES TO INIT.
(1)  013214  013703  013072                MOV     RPVEC,R3        ;SETUP THE RH11/RPO4 VECTOR
(1)  013220  012723  015260                MOV     #ISR,(R3)+
(1)  013224  013713  013074                MOV     RPVEC+2,(R3)
(1)  013230  004037  020256                JSR     R0,GETR15       ;RESTORE R1-R5
(1)  013234  012637  177776                MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
(1)  013240  000207                        RTS     PC              ;BYE-BYE
(1)  013242  105061  012752          7$:   CLRB    DRVSTA(R1)      ;SET THE DRIVE STATUS TO OFFLINE
(1)  013246  000756                        BR      4$              ;GO DO THE NEXT DRIVE
(1)
(1)                                  ;*DRIVE INIT. ROUTINE
(1)                                  ;*THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
(1)                                  ;*AN RPO4. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
(1)                                  ;*IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
(1)                                  ;*INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
(1)                                  ;*DRVSTA IS SET TO THE PROPER CONDITION.
(1)                                  ;*CALL
(1)                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
(1)                                  ;*      MOV     RPADR,R4        ;UNIBUS ADDRESS OF RH11/RPO4 (RHCS1)
(1)                                  ;*      JSR     R0,DRVINT       ;CALLED BY A JSR
(1)                                  ;*      RETURN1                 ;ERROR OCCURRED (PARITY)
(1)                                  ;*      RETURN2                 ;NORMAL RETURN
(1)                                  ;
(1)  013250  004037  020236          DRVINT: JSR     R0,SAVR15       ;SAVE R1-R5
(1)  013254  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT A DRIVE
(1)  013260  010103                          MOV     R1,R3           ;COPY THE DRIVE NUMBER INTO
(1)  013262  006303                          ASL     R3              ;R3 AND POSITION IT FOR TABLE INDEXING
(1)  013264  112761  177777  012752          MOVB    #-1,DRVSTA(R1)  ;START DRIVE STATUS AS NONEXISTENT
(1)  013272  005063  012762                  CLR     DRVTYP(R3)      ;CLEAR THE DRIVE TYPE INDICATOR
(1)  013276  112777  000111  177564          MOVB    #111,@RPADR     ;DO A "DRIVE CLEAR" COMMAND
(1)  013304  032764  010000  000010          BIT     #BIT12,RHCS2(R4) ;NONEXISTENT DRIVE?
(1)  013312  001403                          BEQ     1$              ;NO---BRANCH
(1)  013314  004737  017430                  JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
(1)  013320  000462                          BR      6$              ;LEAVE THIS ROUTINE
(1)  013322  004037  017036          1$:     JSR     R0,RD.RP        ;READ THE DRIVE TYPE REG.
(1)  013326  000026                          RHDT
(1)  013330  013470                          7$                      ;ERROR RETURN ADDRESS
(1)  013332  012605                          MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
(1)  013334  010563  012762                  MOV     R5,DRVTYP(R3)   ;SAVE THE DRIVE TYPE
(1)  013340  022705  020020                  CMP     #20020,R5       ;IS IT A SINGLE PORT RPO4?
(1)  013344  001403                          BEQ     2$              ;BRANCH IF YES
(1)  013346  022705  024020                  CMP     #24020,R5       ;IS IT A DUAL PORT RPO4?
(1)  013352  001043                          BNE     5$              ;BRANCH IF NO
(1)  013354  012746  000121          2$:     MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
(1)  013360  004037  017174                  JSR     R0,WRT.RP
(1)  013364  000000                          RHCS1
(1)  013366  013470                          7$
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(1)  013370  012746  010000                    MOV     #BIT12,-(SP)     ;SET FMT22=1
(1)  013374  004037  017174                    JSR     R0,WRT.RP
(1)  013400  000032                            RHOF
(1)  013402  013470                            7$
(1)  013404  004037  017036                    JSR     R0,RD.RP         ;READ RHDS1
(1)  013410  000012                            RHDS1
(1)  013412  013470                            7$
(1)  013414  012605                            MOV     (SP)+,R5         ;AND SAVE IT IN R5
(1)  013416  100011                            BPL     4$               ;BRANCH IF ATA=0
(1)  013420  116164  013056  000016            MOVB    ATABIT(R1),RHAS(R4) ;CLEAR ATTENTION BIT
(1)  013426  004037  017036                    JSR     R0,RD.RP         ;FIND OUT WHY ATA=1
(1)  013432  000014                            RHER1
(1)  013434  013470                            7$
(1)  013436  006126                            ROL     (SP)+            ;IS IT UNSAFE?
(1)  013440  100412                            BMI     6$               ;BRANCH IF YES
(1)  013442  005105                    4$:     COM     R5               ;CHECK MOL, DPR, DRY, AND VV
(1)  013444  042705  167077                    BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
(1)  013450  001004                            BNE     5$               ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
(1)  013452  112761  000001  012752            MOVB    #1,DRVSTA(R1)    ;SET DRIVE STATUS TO ONLINE
(1)  013460  000402                            BR      6$
(1)  013462  105061  012752            5$:     CLRB    DRVSTA(R1)       ;DRIVE STATUS = OFFLINE
(1)  013466  005720                    6$:     TST     (R0)+            ;STEP OVER THE ERROR RETURN
(1)  013470  004037  020256            7$:     JSR     R0,GETR15        ;RESTORE R1-R5
(1)  013474  000200                            RTS     R0               ;RETURN
(1)
(1)                                     ;*REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;
(1)                                     ;*      JSR     R0,@#RP04        ;CALL THE RP04 DRIVER
(1)                                     ;*      PNTADR                   ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
(1)                                     ;*      RETURN1                  ;RETURN HERE IF QUEUE IS FULL
(1)                                     ;*      RETURN2                  ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
(1)                                     ;                                ;IS AN ERROR CONDITION
(1)
(1)  013476  013746  177776            RP04:   MOV     @#PS,-(SP)       ;SAVE THE CALLING STATUS
(1)  013502  013737  013074  177776            MOV     RPVEC+2,@#PS     ;DON'T ALLOW ANY RP04 INTERRUPTS
(1)  013510  112737  000001  013006            MOVB    #1,ACTDRV        ;SET "ACTIVE DRIVER" FLAG
(1)  013516  004037  020236                    JSR     R0,SAVR15        ;SAVE R1-R5
(1)  013522  012002                            MOV     (R0)+,R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
(1)  013524  005062  000016                    CLR     16(R2)           ;CLEAR THE STATUS/ERROR INDICATOR
(1)  013530  111201                            MOVB    (R2),R1          ;PICKUP THE DRIVE NUMBER
(1)  013532  105761  012752                    TSTB    DRVSTA(R1)       ;CHECK DRIVES STATUS
(1)  013536  003017                            BGT     1$               ;BRANCH IF ONLINE
(1)  013540  105761  013010                    TSTB    ULDFLG(R1)       ;UNLOAD COMMAND IN QUEUE?
(1)  013544  001034                            BNE     3$               ;BRANCH IF YES
(1)  013546  013704  013070                    MOV     RPADR,R4         ;UNIBUS ADDRESS OF RHCS1
(1)  013552  004037  013250                    JSR     R0,DRVINT        ;GO INIT. THE DRIVE
(1)  013556  000442                            BR      6$               ;ERROR RETURN
(1)  013560  105761  012752                    TSTB    DRVSTA(R1)       ;IS DRIVE STATUS ONLINE?
(1)  013564  003004                            BGT     1$               ;BRANCH IF YES
(1)  013566  052762  140000  000016            BIS     #BIT15!BIT14,16(R2) ;ERROR--DRIVE IS OFFLINE OR NONEXISTENT
(1)  013574  000423                            BR      4$               ;GO TO EXIT
(1)  013576  004037  020076            1$:     JSR     R0,DRVQUE        ;PUT THIS REQUEST IN QUEUE
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(1)  013602  000421                          BR      5$                      ;QUEUE IS FULL
(1)  013604  122762  000103  000002          CMPB    #103,2(R2)              ;IS THIS REQ. FOR AN UNLOAD?
(1)  013612  001003                          BNE     2$                      ;BR IF NO
(1)  013614  112761  177777  013010          MOVB    #-1,ULDFLG(R1)          ;SET THE "UNLOAD IN QUEUE" FLAG
(1)  013622  105761  012742          2$:     TSTB    DRVACT(R1)              ;IS THIS DRIVE ACTIVE?
(1)  013626  001006                          BNE     4$                      ;BR IS YES
(1)  013630  004737  013672                  JSR     PC,OPT                  ;CALL THE OPTIMIZER
(1)  013634  000403                          BR      4$
(1)  013636  052762  120000  000016  3$:     BIS     #BIT15!BIT13,16(R2)     ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
(1)  013644  005720                  4$:     TST     (R0)+
(1)  013646  004037  020256          5$:     JSR     R0,GETR15               ;RESTORE R1-R5
(1)  013652  105037  013006                  CLRB    ACTDRV                  ;CLEAR "ACTIVE DRIVER" FLAG
(1)  013656  012637  177776                  MOV     (SP)+,@#PS              ;RETURN "PS" TO USER LEVEL
(1)  013662  000200                          RTS     R0                      ;RETURN TO CALLER
(1)  013664  004737  014674          6$:     JSR     PC,CI7                  ;GO HANDLE THE PARITY ERROR
(1)  013670  000765                          BR      4$
(1)
(1)                                  ;*OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
(1)                                  ;
(1)                                  ;*CALL
(1)                                  ;*      MOV     #DRVNUM,R1              ;DRIVE NUMBER TO R1
(1)                                  ;*      JSR     PC,OPT                  ;SETUP A COMMAND
(1)                                  ;
(1)  013672  004037  020236          OPT:    JSR     R0,SAVR15               ;SAVE R1-R5
(1)  013676  013746  177776                  MOV     @#PS,-(SP)              ;SAVE PROC. STATUS
(1)  013702  146137  013056  013004          BICB    ATABIT(R1),SRCHWT       ;CLEAR "SEARCH WAIT" KEY
(1)  013710  004737  020152                  JSR     PC,GETREQ               ;GET "DPB" POINTER OF REQUEST
(1)  013714  005702                          TST     R2                      ;IS THERE A REQUEST IN QUEUE?
(1)  013716  001444                          BEQ     6$                      ;NO--BRANCH TO EXIT
(1)  013720  105761  012752                  TSTB    DRVSTA(R1)              ;IS DRIVE ONLINE?
(1)  013724  003006                          BGT     1$                      ;YES--BRANCH
(1)  013726  004737  020174                  JSR     PC,POPQUE               ;NO--REMOVE REQUEST FROM QUEUE
(1)  013732  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)     ;SET ERROR BIT OF STATUS/ERROR INDICATOR
(1)  013740  000426                          BR      5$                      ;BRANCH TO EXIT
(1)  013742  122762  000150  000002  1$:     CMPB    #150,2(R2)              ;IS THE REQUEST FOR I/O?
(1)  013750  002403                          BLT     2$                      ;YES--BRANCH
(1)  013752  004737  014252                  JSR     PC,CI4                  ;CALL THE COMMAND INITIATOR
(1)  013756  000417                          BR      5$                      ;BRANCH TO EXIT
(1)  013760  005737  013054          2$:     TST     DTUW                    ;DATA TRANSFER UNDERWAY?
(1)  013764  002012                          BGE     4$                      ;YES--GO START A SEARCH
(1)  013766  005737  013032                  TST     SEEKFG                  ;DO IMPLIED SEEKS?
(1)  013772  100404                          BMI     3$                      ;YES---BRANCH
(1)  013774  004037  015122                  JSR     R0,LA                   ;NO--DO LOOK AHEAD
(1)  014000  000406                          BR      5$                      ;RETURN HERE ON A PARITY ERROR
(1)  014002  000403                          BR      4$                      ;GO START A SEARCH
(1)  014004  004737  014036          3$:     JSR     PC,CI1                  ;START A DATA TRANSFER
(1)  014010  000402                          BR      5$
(1)  014012  004737  014144          4$:     JSR     PC,CI3                  ;START A SEARCH
(1)  014016  012637  177776          5$:     MOV     (SP)+,@#PS              ;RESTORE PROC. STATUS
(1)  014022  004037  020256                  JSR     R0,GETR15               ;RESTORE R1-R5
(1)  014026  000207                          RTS     PC
(1)  014030  004737  017430          6$:     JSR     PC,SET.IE               ;SET "IE" WITHOUT A "TRE"
(1)  014034  000770                          BR      5$                      ;EXIT THE ROUTINE
(1)
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(1)                                     ;*COMMAND INITIATOR
(1)                                     ;*
(1)                                     ;*CALL
(1)                                     ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
(1)                                     ;*      MOV     #DPB,R2         ;ADDRESS OF DPB
(1)                                     ;*      JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
(1)                                     ;*                              ;WHERE:
(1)                                     ;*                              ;CI1=DATA TRANSFER
(1)                                     ;*                              ;CI2=SEARCH REQUESTED BY DATA XFER
(1)                                     ;*                              ;CI4=NOT DATA TRANSFER
(1)
(1)  014036  004737  020174     CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
(1)  014042  010237  013002             MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
(1)  014046  010203             CI2:    MOV     R2,R3           ;DPB ADDRESS TO R3
(1)  014050  013704  013070             MOV     RPADR,R4        ;RHCS1 ADDRESS
(1)  014054  010164  000010             MOV     R1,RHCS2(R4)    ;SELECT DRIVE
(1)  014060  062703  000004             ADD     #4,R3           ;DESIRED WORD COUNT
(1)  014064  062704  000002             ADD     #2,R4           ;RHWC ADDRESS
(1)  014070  012324                     MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
(1)  014072  012324                     MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
(1)  014074  012346                     MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
(1)  014076  004037  017174             JSR     R0,WRT.RP       ;CALL THE LOAD(WRITE) ROUTINE
(1)  014102  000006                     RHDA                    ;INDEX OF REGISTER TO LOAD
(1)  014104  014674                     CI7                     ;ERROR RETURN ADDRESS
(1)  014106  012346                     MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
(1)  014110  004037  017174             JSR     R0,WRT.RP
(1)  014114  000034                     RHCA
(1)  014116  014674                     CI7
(1)  014120  016246  000002             MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
(1)  014124  004037  017174             JSR     R0,WRT.RP
(1)  014130  000000                     RHCS1
(1)  014132  014674                     CI7
(1)  014134  010137  013054             MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
(1)  014140  000137  014630             JMP     CI$
(1)  014144  013704  013070     CI3:    MOV     RPADR,R4        ;RHCS1 ADDRESS
(1)  014150  010164  000010             MOV     R1,RHCS2(R4)    ;SELECT DRIVE
(1)  014154  016246  000012             MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
(1)  014160  004037  017174             JSR     R0,WRT.RP
(1)  014164  000034                     RHCA
(1)  014166  014674                     CI7
(1)  014170  116203  000010             MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
(1)  014174  163703  013104             SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
(1)  014200  002002                     BGE     1$
(1)  014202  062703  000026             ADD     #22.,R3
(1)  014206  010346             1$:    MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
(1)  014210  116266  000011  000001     MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
(1)  014216  004037  017174             JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
(1)  014222  000006                     RHDA
(1)  014224  014674                     CI7
(1)  014226  012746  000131             MOV     #131,-(SP)      ;START A SEARCH
(1)  014232  004037  017174             JSR     R0,WRT.RP
(1)  014236  000000                     RHCS1
(1)  014240  014674                     CI7
(1)  014242  156137  013056  013004     BISB    ATAEIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
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(1)  014250  000567                          BR      CI5
(1)  014252  013704  013070          CI4:    MOV     RPADR,R4        ;RHCS1 ADDRESS
(1)  014256  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
(1)  014262  116203  000002                  MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
(1)  014266  122703  000131                  CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
(1)  014272  001007                          BNE     1$              ;BRANCH IF NO
(1)  014274  016246  000010                  MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
(1)  014300  004037  017174                  JSR     R0,WRT.RP
(1)  014304  000006                          RHCA
(1)  014306  014674                          CI7
(1)  014310  000403                          BR      2$              ;GO LOAD CYLINDER
(1)  014312  122703  000105          1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
(1)  014316  001007                          BNE     3$              ;BRANCH IF NO
(1)  014320  016246  000012          2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
(1)  014324  004037  017174                  JSR     R0,WRT.RP
(1)  014330  000034                          RHCA
(1)  014332  014674                          CI7
(1)  014334  000546                          BR      CI6
(1)  014336  122703  000115          3$:     CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
(1)  014342  001013                          BNE     4$              ;BR IF NO
(1)  014344  004037  017036                  JSR     R0,RD.RP        ;MERGE THE OFFSET VALUE INTO RHOF
(1)  014350  000032                          RHOF                    ;BUT DON'T CHANGE THE UPPER
(1)  014352  014674                          CI7
(1)  014354  116216  000001                  MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
(1)  014360  004037  017174                  JSR     R0,WRT.RP       ;REGISTER (RHOF)
(1)  014364  000032                          RHOF
(1)  014366  014674                          CI7
(1)  014370  000530                          BR      CI6             ;GO START THE COMMAND
(1)  014372  122703  000107          4$:     CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
(1)  014376  001525                          BEQ     CI6             ;BRANCH IF YES
(1)  014400  122703  000117                  CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
(1)  014404  001522                          BEQ     CI6             ;BRANCH IF YES
(1)  014406  122703  000103                  CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
(1)  014412  001016                          BNE     5$              ;BRANCH IF NO
(1)  014414  112761  000001  012742          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
(1)  014422  105061  012752                  CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
(1)  014426  112761  000001  013010          MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
(1)  014434  010346                          MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
(1)  014436  004037  017174                  JSR     R0,WRT.RP
(1)  014442  000000                          RHCS1
(1)  014444  014674                          CI7
(1)  014446  000207                          RTS     PC              ;RETURN TO USER
(1)  014450  122703  000143          5$:     CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
(1)  014454  001014                          BNE     6$              ;BRANCH IF NO
(1)  014456  004037  017036                  JSR     R0,RD.RP        ;READ THE OFFSET REGISTER
(1)  014462  000032                          RHOF
(1)  014464  014674                          CI7
(1)  014466  116266  000001  000001          MOVB    1(R2),1(SP)     ;COMBINE "FMT22", "ECI", AND "HCI"
(1)  014474  004037  017174                  JSR     R0,WRT.RP       ;LOAD "FMT22", "ECI", AND/OR "HCI".
(1)  014500  000032                          RHOF
(1)  014502  014674                          CI7
(1)  014504  000436                          BR      12$
(1)  014506  122703  000141          6$:     CMPB    #141,R3         ;IS IT A "GET REGISTER" COMMAND?
(1)  014512  001023                          BNE     10$             ;BRANCH IF NO
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(1)  014514  016203  000006          7$:   MOV   6(R2),R3          ;POINTS TO 1ST ADDRESS OF WHERE
(1)                                                                ;TO PUT THE REGISTER(S)
(1)  014520  116237  000010  014536        MOVB  10(R2),9$         ;INIT. THE INDEX FOR THE FIRST REG.
(1)  014526  116205  000011                MOVB  11(R2),R5         ;INDEX OF LAST REG. TO MOVE
(1)  014532  004037  017036          8$:   JSR   R0,RD.RP          ;READ RP04 REGISTER
(1)  014536  000000                  9$:   RHCS1                   ;INDEX OF REG. TO READ
(1)  014540  014674                        CI7
(1)  014542  012623                        MOV   (SP)+,(R3)+       ;GET THE CONTENTS OF RH11/RP04 REG.
(1)  014544  023705  014536                CMP   9$,R5             ;LAST REG. BEEN READ?
(1)  014550  001414                        BEQ   12$               ;GET OUT IF YES
(1)  014552  062737  000002  014536        ADD   #2,9$             ;INCREASE THE INDEX BY 2
(1)  014560  000764                        BR    8$                ;LOOP--MORE TO READ
(1)  014562  122703  000145          10$:  CMPB  #145,R3           ;IS IT A "SELECT DRIVE" COMMAND?
(1)  014566  001405                        BEQ   12$               ;BRANCH IF YES
(1)  014570  010346                  11$:  MOV   R3,-(SP)          ;LOAD THE COMMAND
(1)  014572  004037  017174                JSR   R0,WRT.RP
(1)  014576  000000                        RHCS1
(1)  014600  014674                        CI7
(1)  014602  004737  020174          12$:  JSR   PC,POPQUE         ;REMOVE REQ. FROM QUEUE
(1)  014606  052762  000200  000016        BIS   #BIT07,16(R2)     ;SET THE "DONE" BIT
(1)  014614  005737  013030                TST   SAVEFG            ;SAVE THE RH11/RP04 REGISTERS?
(1)  014620  100002                        BPL   13$               ;BRANCH IF NO
(1)  014622  004737  017336                JSR   PC,SVRH11         ;YES--GO SAVE THE REGISTERS
(1)  014626  000207                  13$:  RTS   PC                ;RETURN TO USER
(1)  014630  006301                  CI5:  ASL   R1
(1)  014632  012761  001750  013034        MOV   #1000.,TIMER(R1)          ;SET A ONE SECOND TIMER
(1)  014640  006201                        ASR   R1
(1)  014642  112761  000001  012742        MOVB  #1,DRVACT(R1)     ;SET THE DRIVE ACTIVE
(1)  014650  000207                        RTS   PC                ;RETURN TO THE USER
(1)  014652  010346                  CI6:  MOV   R3,-(SP)          ;LOAD THE COMMAND
(1)  014654  004037  017174                JSR   R0,WRT.RP
(1)  014660  000000                        RHCS1
(1)  014662  014674                        CI7
(1)  014664  000761                        BR    CI5
(1)  014666  105761  012742          CI7A: TSTB  DRVACT(R1)                ;IS THE DRIVE ACTIVE?
(1)  014672  001405                        BEQ   CI7B                    ;BRANCH IF NO
(1)  014674  012762  104000  000016  CI7:  MOV   #BIT15!BIT11,16(R2)      ;SET "PARITY" ERROR INDICATOR
(1)  014702  004737  017336                JSR   PC,SVRH11         ;GO SAVE THE RH11/RP04 REGISTERS
(1)  014706  012746  000111          CI7B: MOV   #111,-(SP)        ;DO A "DRIVE CLEAR"
(1)  014712  004037  017174                JSR   R0,WRT.RP
(1)  014716  000000                        RHCS1
(1)  014720  014760                        CI8
(1)  014722  004737  020056                JSR   PC,EMPTYQ         ;EMPTY THE QUEUE
(1)  014726  105061  013010                CLRB  ULOFLG(R1)        ;CLEAR THE UNLOAD IN QUEUE FLAG
(1)  014732  105061  012742                CLRB  DRVACT(R1)        ;DRIVE IS IDLE
(1)  014736  020137  013054                CMP   R1,DTUW           ;IF THIS DRIVE HAD AN I/O REQUEST
(1)  014742  001005                        BNE   1$                ;IN PROGRESS CLEAR ALL OF THE FLAGS
(1)  014744  005037  013002                CLR   TRNSWT
(1)  014750  012737  177777  013054        MOV   #-1,DTUW
(1)  014756  000207                  1$:   RTS   PC
(1)  014760  004037  020236          CI8:  JSR   R0,SAVR15         ;SAVE R1-R5
(1)  014764  013704  013070                MOV   RPADR,R4          ;PICKUP THE ADDRESS OF THE FIRST REGISTER
(1)  014770  005001                        CLR   R1
(1)  014772  005003                        CLR   R3
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(1)  014774  105761  012742          1$:   TSTB    DRVACT(R1)          ;DRIVE ACTIVE?
(1)  015000  001421                        BEQ     3$                  ;BRANCH IF NO
(1)  015002  013702  013002                MOV     TRNSWT,R2           ;GET THE "TRANSFER WAIT" QUEUE
(1)  015006  020137  013054                CMP     R1,DTUW             ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
(1)  015012  001402                        BEQ     2$                  ;BRANCH IF YES
(1)  015014  004737  020152                JSR     PC,GETREQ           ;GET THE DPB POINTER
(1)  015020  004737  017336          2$:   JSR     PC,SVRH11           ;SAVE RH11/RP04 REGISTERS
(1)  015024  052762  102000  000016        BIS     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
(1)  015032  012763  177777  013034        MOV     #-1,TIMER(R3)       ;STOP THE TIMER
(1)  015040  105061  012742                CLRB    DRVACT(R1)          ;SET "DRIVE ACTIVE" TO IDLE
(1)  015044  105061  013010          3$:   CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
(1)  015050  005201                        INC     R1                  ;MOVE TO THE NEXT DRIVE
(1)  015052  062703  000002                ADD     #2,R3
(1)  015056  042701  177770                BIC     #^C7,R1
(1)  015062  001344                        BNE     1$                  ;BRANCH IF MORE DRIVES
(1)  015064  012737  177777  013054        MOV     #-1,DTUW            ;NO DATA TRANSFERS UNDERWAY
(1)  015072  005037  013002                CLR     TRNSWT              ;CLEAR THE "TRANSFER WAIT" QUEUE
(1)  015076  004737  017774                JSR     PC,CLRQUE           ;CLEAR ALL OF THE REQUEST QUEUES
(1)  015102  012764  000040  000010        MOV     #BIT05,RHCS2(R4)    ;DO A MASSBUS INIT.
(1)  015110  004737  017430                JSR     PC,SET.IE           ;SET "IE" WITHOUT "TRE"
(1)  015114  004037  020256                JSR     R0,GETR15           ;RESTORE THE REGISTERS
(1)  015120  000207                        RTS     PC                  ;RETURN
(1)
(1)                                  ;*LOOK AHEAD ROUTINE
(1)                                  ;
(1)                                  ;*CALL
(1)                                  ;*      MOV     #DRVNUM,R1          ;DRIVE NUMBER
(1)                                  ;*      MOV     #DPB,R2             ;POINT TO DPB
(1)                                  ;*      JSR     R0,LA               ;GO CHECK THE WINDOW
(1)                                  ;*      RETURN1                     ;ERROR RETURN
(1)                                  ;*      RETURN2                     ;START A SEARCH
(1)                                  ;*      RETURN3                     ;START A DATA TRANSFER
(1)
(1)  015122  013704  013070          LA:   MOV     RPADR,R4            ;GET RHCS1'S ADDRESS
(1)  015126  010164  000010                MOV     R1,RHCS2(R4)        ;SELECT DRIVE
(1)  015132  004037  017036                JSR     R0,RD.RP            ;READ CURRENT CYLINDER
(1)  015136  000036                        RHCC
(1)  015140  015252                        4$                          ;ERROR RETURN ADDRESS
(1)  015142  022662  000012                CMP     (SP)+,12(R2)        ;IS CURRENT CYLINDER=DESIRED
(1)                                                                    ;CYLINDER?
(1)  015146  001037                        BNE     3$                  ;EXIT IF NO
(1)  015150  105261  013020                INCB    LACNT(R1)           ;INCREMENT THE LOOK AHEAD COUNT
(1)  015154  126137  013020  013076        CMPB    LACNT(R1),MXLACT    ;EXCEED MAX?
(1)  015162  003026                        BGT     2$                  ;BRANCH IF YES
(1)  015164  116203  000010                MOVB    10(R2),R3           ;GET DESIRED SECTOR ADDRESS AND
(1)  015170  000303                        SWAB    R3                  ;MULT. BY 64--ALIGN WITH
(1)  015172  006203                        ASR     R3                  ;LOOK AHEAD REGISTER
(1)  015174  006203                        ASR     R3
(1)  015176  012737  000340  177776        MOV     #340,@#PS           ;PRIORITY LEVEL "7"
(1)  015204  004037  017036                JSR     R0,RD.RP            ;READ LOOK AHEAD REGISTER
(1)  015210  000020                        RHLA
(1)  015212  015252                        4$
(1)  015214  162603                        SUB     (SP)+,R3            ;CALCULATE THE DELTA
(1)  015216  002002                        BGE     1$
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(1)  015220  062703  002600                ADD     #<22.*64.>,R3   ;MAKE THE DELTA POSITIVE
(1)  015224  023703  013100          1$:   CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
(1)  015230  002406                        BLT     3$              ;IF IT IS WITHIN THE
(1)  015232  023703  013102                CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
(1)  015236  002003                        BGE     3$              ;THE LOOK AHEAD COUNT
(1)  015240  105061  013020          2$:   CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
(1)  015244  005720                        TST     (R0)+
(1)  015246  005720                3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
(1)  015250  000200                        RTS     R0
(1)  015252  004737  014674          4$:   JSR     PC,CI7          ;PROCESS THE ERROR
(1)  015256  000200                        RTS     R0              ;TAKE ERROR RETURN
(1)
(1)                                 ;*INTERRUPT SERVICE ROUTINE
(1)
(1)  015260  112737  000001  013006 ISR:    MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
(1)  015266  004037  020236                JSR     R0,SAVR15       ;SAVE R1-R5
(1)  015272  013704  013070                MOV     RPADR,R4        ;ADDRESS OF RHSCS1
(1)  015276  013701  013054                MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
(1)  015302  002403                        BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
(1)  015304  004737  015330                JSR     PC,TD           ;CALL TRANSFER DONE
(1)  015310  000402                        BR      2$              ;EXIT
(1)  015312  004737  015456          1$:   JSR     PC,SC           ;CALL SPECIAL CONDITIONS
(1)  015316  004037  020256          2$:   JSR     R0,GETR15       ;RESTORE R1-R5
(1)  015322  105037  013006                CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
(1)  015326  000002                        RTI                     ;RETURN
(1)
(1)                                 ;*TRANSFER DONE ROUTINE
(1)
(1)  015330  105061  012742          TD:   CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
(1)  015334  012737  177777  013054        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
(1)  015342  006301                        ASL     R1
(1)  015344  012761  177777  013034        MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
(1)  015352  006201                        ASR     R1
(1)  015354  013702  013002                MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
(1)  015360  005037  013002                CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
(1)  015364  052762  000200  000016        BIS     #BIT07,16(R2)   ;SET DONE
(1)  015372  010164  000010                MOV     R1,RHCS2(R4)    ;SELECT THE DRIVE
(1)  015376  004037  017036                JSR     R0,RD.RP        ;TRANSFER ERROR(TRE=1)?
(1)  015402  000000                        RHCS1
(1)  015404  014674                        CI7
(1)  015406  006126                        ROL     (SP)+
(1)  015410  100410                        BMI     2$              ;BR IF YES
(1)  015412  005737  013030                TST     SAVEFG          ;SAVE THE RH11/RP04 REGISTERS?
(1)  015416  100002                        BPL     1$              ;BRANCH IF NO
(1)  015420  004737  017336                JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
(1)  015424  004737  013672          1$:   JSR     PC,OPT          ;CALL OPTIMIZER
(1)  015430  000456                        BR      SC2             ;SPECIAL CONDITION (ENTRY #2)
(1)  015432  052762  100100  000016  2$:   BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
(1)  015440  004737  020056                JSR     PC,EMPTYQ       ;EMPTY THE "DRIVES WAIT" QUEUE
(1)  015444  004737  017336                JSR     PC,SVRH11       ;SAVE THE RH11/RP04 REGISTERS
(1)  015450  012714  040111                MOV     #40111,(R4)     ;ISSUE A "DRIVE CLEAR"
(1)  015454  000444                        BR      SC2             ;SPECIAL CONDITION (ENTRY #2)
(1)
(1)                                 ;*SPECIAL CONDITION ROUTINE
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(1)
(1)  015456  005001                SC:     CLR     R1              ;START WITH DRIVE 0
(1)  015460  012702  000001                MOV     #1,R2
(1)  015464  105761  012752          1$:   TSTB    DRVSTA(R1)      ;NONEXISTENT?
(1)  015470  002016                        BGE     2$              ;NO--BRANCH
(1)  015472  005201                        INC     R1              ;YES--MOVE TO THE NEXT DRIVE
(1)  015474  106302                        ASLB    R2              ;MORE DRIVES?
(1)  015476  103372                        BCC     1$              ;YES--BRANCH
(1)  015500  013746  013032                MOV     SEEKFG,-(SP)    ;SAVE THE "SEEK FLAG"
(1)  015504  013746  013030                MOV     SAVEFG,-(SP)    ;SAVE THE "SAVE FLAG"
(1)  015510  004737  013106                JSR     PC,RPINIT       ;GO INIT. THE SUBSYSTEM
(1)  015514  012637  013030                MOV     (SP)+,SAVEFG    ;RESTORE THE "SAVE FLAG"
(1)  015520  012637  013032                MOV     (SP)+,SEEKFG    ;RESTORE THE "SEEK FLAG"
(1)  015524  000405                        BR      SC1             ;TAKE ERROR EXIT
(1)  015526  010164  000010          2$:   MOV     R1,RHCS2(R4)    ;SELECT DRIVE
(1)  015532  116405  000001                MOVB    1(R4),R5        ;IS "SC"=1?
(1)  015536  100413                        BMI     SC2             ;BRANCH IF YES
(1)  015540  012701  000010          SC1:  MOV     #8.,R1          ;DO EIGHT DRIVES
(1)  015544  005301                  1$:   DEC     R1              ;NEXT DRIVE
(1)  015546  002743                        BLT     SC              ;BRANCH IF OUT OF DRIVES
(1)  015550  105761  012742                TSTB    DRVACT(R1)      ;IS THIS DRIVE IDLE?
(1)  015554  001373                        BNE     1$              ;BRANCH IF NO
(2)  015556  104001                        ERROR   1               ;REPORT THE ERROR
(1)  015560  004737  017430                JSR     PC,SET.IE       ;GO SET INTERRUPT ENABLE
(1)  015564  000207                        RTS     PC
(1)  015566  012701  000003          SC2:  MOV     #3,R1           ;READ RHAS UP TO THREE TIMES
(1)  015572  116403  000016          1$:   MOVB    RHAS(R4),R3     ;READ "RHAS"
(1)  015576  001011                        BNE     2$              ;BRANCH IF ANY ATA BITS = 1
(1)  015600  005301                        DEC     R1              ;COUNT THIS READ
(1)  015602  003373                        BGT     1$              ;LOOP IF MORE READS ALLOWED
(1)  015604  004037  017036                JSR     R0,RD.RP        ;READ CONTROL AND STATUS REGISTER
(1)  015610  000000                        RHCS1
(1)  015612  014760                        CI8
(1)  015614  106126                        ROLB    (SP)+           ;IS "IE"=1?
(1)  015616  100350                        BPL     SC1             ;NO--TAKE ERROR EXIT
(1)  015620  000207                        RTS     PC              ;YES--RETURN
(1)  015622  005046                  2$:   CLR     -(SP)           ;PROCESS ALL DRIVES THAT HAVE
(1)  015624  110316                        MOVB    R3,(SP)         ;AN "ATA"=1
(1)  015626  012703  000001                MOV     #1,R3
(1)  015632  005001                        CLR     R1
(1)  015634  030316                  SC4:  BIT     R3,(SP)         ;ATA=1?
(1)  015636  001005                        BNE     SC5             ;YES--BRANCH
(1)  015640  005201                  SC3:  INC     R1              ;MOVE TO THE NEXT DRIVE
(1)  015642  106303                        ASLB    R3
(1)  015644  001373                        BNE     SC4             ;BRANCH IF MORE TO CHECK?
(1)  015646  005726                        TST     (SP)+           ;CLEAN OFF THE STACK
(1)  015650  000207                        RTS     PC              ;RETURN TO USER
(1)  015652  023701  013054          SC5:  CMP     DTUW,R1         ;IS THIS DRIVE SETUP FOR I/O?
(1)  015656  001002                        BNE     1$              ;NO---BRANCH
(1)  015660  005726                        TST     (SP)+           ;YES---CLEAN OFF THE STACK (RHAS)
(1)  015662  000622                        BR      TD              ;BRANCH TO "TRANSFER DONE"
(1)  015664  105761  012752          1$:   TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
(1)  015670  003030                        BGT     SCL             ;BRANCH IF ONLINE
(1)  015672  105761  013010                TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
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(1)  015676  003420                          BLE     2$              ;BRANCH IF NO
(1)  015700  004737  020152                  JSR     PC,GETREQ       ;GET DPB POINTER
(1)  015704  004737  017336                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04 REGISTERS
(1)  015710  004737  016366                  JSR     PC,SC12         ;SAVE RHDS1, RHER1, RHER2, AND RHER3
(1)                                                                  ;ALSO DO A DRIVE INIT (DRVINT)
(1)  015714  105761  012752                  TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
(1)  015720  003411                          BLE     3$              ;NO---BRANCH
(1)  015722  032737  040000  012732          BIT     #BIT14,RPERRS   ;WAS THERE AN ERROR?
(1)  015730  001565                          BEQ     SC11            ;NO -- BRANCH
(1)  015732  013705  012734                  MOV     RPERRS+2,R5     ;YES -- PICKUP RHER1 AND
(1)  015736  000447                          BR      SC6A            ;GO PROCESS THE ERROR
(1)  015740  004737  016366          2$:     JSR     PC,SC12         ;SAVE RHDS1, RHER1, RHER2, AND RHER3
(1)                                                                  ;ALSO DO A DRVINT
(1)  015744  011605                  3$:     MOV     (SP),R5         ;PICKUP (RHAS) BEFORE THE ERROR CALL
(2)  015746  104005                          ERROR   5               ;REPORT THE ERROR
(1)  015750  000733                          BR      SC3             ;GO CHECK FOR MORE ATA'S
(1)  015752  006301                  SC6:    ASL     R1
(1)  015754  012761  177777  013034          MOV     #-1,TIMER(R1)   ;STOP THE TIMER
(1)  015762  006201                          ASR     R1
(1)  015764  004737  020152                  JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
(1)  015770  010364  000016                  MOV     R3,RHAS(R4)     ;CLEAR ATTENTION
(1)  015774  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
(1)  016000  004037  017036                  JSR     R0,RD.RP        ;READ THE RP04'S STATUS REG.
(1)  016004  000012                          RHDS1
(1)  016006  016224                          SC8
(1)  016010  011605                          MOV     (SP),R5         ;AND PUT IT IN R5
(1)  016012  006126                          ROL     (SP)+           ;WAS THERE AN ERROR?
(1)  016014  100115                          BPL     SC9             ;BR IF NO
(1)  016016  105761  012742                  TSTB    DRVACT(R1)      ;CHECK THE DRIVE ACTIVE INDICATOR
(1)  016022  001522                          BEQ     SC10            ;BRANCH IF IDLE
(1)  016024  004037  017036                  JSR     R0,RD.RP        ;READ ERROR REGISTER #1
(1)  016030  000014                          RHER1
(1)  016032  016224                          SC8
(1)  016034  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
(1)  016036  004737  017336                  JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
(1)  016042  012746  000111                  MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
(1)  016046  004037  017174                  JSR     R0,WRT.RP
(1)  016052  000000                          RHCS1
(1)  016054  016224                          SC8
(1)  016056  006105                  SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
(1)  016060  100404                          BMI     1$              ;BRANCH IF YES
(1)  016062  052762  100240  000016          BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
(1)  016070  000443                          BR      SC7
(1)  016072  004037  017036          1$:     JSR     R0,RD.RP        ;READ DRIVE STATUS REG. #1
(1)  016076  000012                          RHDS1
(1)  016100  016224                          SC8
(1)  016102  011605                          MOV     (SP),R5         ;SAVE RHDS1 IN R5
(1)  016104  006126                          ROL     (SP)+           ;"ERR"=1?
(1)  016106  100013                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
(1)  016110  112761  177777  012752          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
(1)  016116  004737  017336                  JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
(1)  016122  010364  000016                  MOV     R3,RHAS(R4)     ;CLEAR ATTENTION
(1)  016126  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
(1)  016134  000421                          BR      SC7
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(1)  016136  105705                    2$:    TSTB    R5                  ;"DRY" =1?
(1)  016140  100414                           BMI     3$                  ;BRANCH IF YES
(1)  016142  112761  177777  012742           MOVB    #-1,DRVACT(R1)      ;ACTIVE ERROR RECOVER
(1)  016150  112761  000001  012752           MOVB    #1,DRVSTA(R1)       ;ONLINE
(1)  016156  006301                           ASL     R1
(1)  016160  012761  072460  013034           MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
(1)  016166  006201                           ASR     R1
(1)  016170  000623                           BR      SC3
(1)  016172  052762  100220  000016  3$:      BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
(1)  016200  105061  012742              SC7: CLRB    DRVACT(R1)          ;DRIVE IS IDLE
(1)  016204  004737  020056                   JSR     PC,EMPTYQ           ;DUMP THE QUEUE
(1)  016210  105761  013010                   TSTB    ULDFLG(R1)          ;UNLOAD IN PROGRESS OR QUEUE?
(1)  016214  001611                           BEQ     SC3                 ;BR IF NO
(1)  016216  105061  013010                   CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
(1)  016222  000606                           BR      SC3
(1)  016224  005726                    SC8:   TST     (SP)+               ;REMOVE (RHAS) FROM THE STACK
(1)  016226  105761  012742                   TSTB    DRVACT(R1)          ;IS DRIVE IDLE?
(1)  016232  001404                           BEQ     1$                  ;YES--BRANCH
(1)  016234  004737  020152                   JSR     PC,GETREQ           ;GET DPB POINTER
(1)  016240  000137  014674                   JMP     CI7                 ;PROCESS THE PARITY ERROR
(1)  016244  000137  014706             1$:   JMP     CI7B                ;PROCESS THE PARITY ERROR
(1)  016250  105761  012742              SC9: TSTB    DRVACT(R1)          ;TEST DRIVE ACTIVE
(1)  016254  003013                           BGT     SC11                ;BRANCH IF DRIVE IS ACTIVE
(1)  016256  001404                           BEQ     SC10                ;BRANCH IF DRIVE IS IDLE
(1)  016260  052762  100210  000016           BIS     #BIT15!BIT07!BIT03,16(R2) ;INFORM USER OF ERROR RECOVER COMPLETION
(1)  016266  000744                           BR      SC7
(1)  016270  011605                    SC10:  MOV     (SP),R5 ;PUT (RHAS) IN R5
(1)  016272  004737  016366                   JSR     PC,SC12             ;SAVE RHDS1, RHER1, RHER2, AND RHER3
(2)  016276  104002                           ERROR   2                   ;REPORT THE ERROR
(1)  016300  000137  015640                   JMP     SC3                 ;GO CHECK FOR MORE ATA'S
(1)  016304  105761  013010              SC11: TSTB    ULDFLG(R1)          ;"UNLOAD IN PROGRESS"?
(1)  016310  003402                           BLE     1$                  ;BRANCH IF NO
(1)  016312  105061  013010                   CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
(1)  016316  105061  012742             1$:   CLRB    DRVACT(R1)          ;SET DRIVE IDLE
(1)  016322  136137  013056  013004           BITB    ATABIT(R1),SRCHWT           ;DOING A SEARCH OPERATION FOR
(1)                                                                       ;AN I/O COMMAND?
(1)  016330  001012                           BNE     2$                  ;BRANCH IF YES
(1)  016332  004737  020174                   JSR     PC,POPQUE           ;REMOVE REQUEST FROM QUEUE
(1)  016336  052762  000200  000016           BIS     #BIT07,16(R2)       ;SET "DONE" BIT
(1)  016344  005737  013030                   TST     SAVEFG              ;SAVE THE RH11/RP04 REGISTERS?
(1)  016350  100002                           BPL     2$                  ;BRANCH IF NO
(1)  016352  004737  017336                   JSR     PC,SVRH11           ;YES--SAVE ALL OF THE RH11/RP04 REG'S
(1)  016356  004737  013672             2$:   JSR     PC,OPT              ;START A REQUEST
(1)  016362  000137  015640                   JMP     SC3
(1)  016366  010164  000010              SC12: MOV     R1,RHCS2(R4)      ;SELECT DRIVE
(1)  016372  016437  000012  012732           MOV     RHDS1(R4),RPERRS          ;SAVE THE FOUR REGISTERS THAT
(1)  016400  016437  000014  012734           MOV     RHER1(R4),RPERRS+2        ;WILL TELL US SOMETHING
(1)  016406  016437  000040  012736           MOV     RHER2(R4),RPERRS+4
(1)  016414  016437  000042  012740           MOV     RHER3(R4),RPERRS+6
(1)  016422  004037  013250                   JSR     R0,DRVINT           ;INIT. THE STATE OF THE DRIVE
(1)  016426  000401                           BR      1$                  ;TAKE ERROR EXIT
(1)  016430  000207                           RTS     PC                  ;RETURN
(1)  016432  005726                    1$:    TST     (SP)+               ;POP PC OFF OF THE STACK
(1)  016434  000673                           BR      SC8                 ;PROCESS THE PARITY ERROR
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(1)
(1)                                     ;*RP04 TIMER ROUTINE
(1)                                     ;*CALL
(1)                                     ;*      MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
(1)                                     ;*      JSR     R0,RPTMR        ;CALL RP04 TIME ROUTINE
(1)
(1)  016436  005737  013006            RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
(1)  016442  001032                            BNE     4$              ;IF NON ZERO EXIT
(1)  016444  112737  000001  013007            MOVB    #1,ACTSTR       ;SET "ACTSTR"
(1)  016452  004037  020236                    JSR     R0,SAVR15       ;SAVE R1-R5
(1)  016456  005001                            CLR     R1              ;START WITH DRIVE 0
(1)  016460  005003                            CLR     R3
(1)  016462  005763  013034            1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
(1)  016466  002407                            BLT     2$              ;BRANCH IF NO
(1)  016470  166663  000016  013034            SUB     16(SP),TIMER(R3) ;COUNT THE INTERVAL
(1)  016476  003003                            BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
(1)  016500  004037  016534                    JSR     R0,ST0          ;CALL SOFTWARE TIMEOUT ROUTINE
(1)  016504  000405                            BR      3$              ;GO TO THE EXIT
(1)  016506  005201                    2$:     INC     R1              ;MOVE TO NEXT DRIVE
(1)  016510  005723                            TST     (R3)+
(1)  016512  022701  000010                    CMP     #8.,R1          ;OUT OF DRIVES?
(1)  016516  003361                            BGT     1$              ;BRANCH IF NO
(1)  016520  004037  020256            3$:     JSR     R0,GETR15       ;RESTORE R1-R5
(1)  016524  105037  013007                    CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
(1)  016530  012616                    4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
(1)  016532  000200                            RTS     R0              ;RETURN
(1)
(1)
(1)                                     ;*SOFTWARE TIMEOUT ROUTINE
(1)                                     ;*
(1)                                     ;*CALL: ST0
(1)                                     ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
(1)                                     ;*      JSR     R0,ST0          ;CALL--DRVACT MUST BE NONZERO
(1)                                     ;*      RETURN
(1)
(1)  016534  013746  177776            ST0:    MOV     @#PS,-(SP)      ;SAVE THE PROCESSOR STATUS
(1)  016540  013737  013074  177776            MOV     RPVEC+2,@#PS    ;SET THE "PS" TO RP04 BR LEVEL
(1)  016546  004037  020236                    JSR     R0,SAVR15       ;SAVE R1-R5
(1)  016552  013704  013070                    MOV     RPADR,R4        ;GET ADDRESS OF "RHCS1"
(1)  016556  010164  000010                    MOV     R1,RHCS2(R4)    ;SELECT THE DRIVE
(1)  016562  004037  017036                    JSR     R0,RD.RP        ;READ "DRIVE STATUS REG"
(1)  016566  000012                            RHDS1
(1)  016570  017030                            ST05
(1)  016572  105726                            TSTB    (SP)+           ;IS "DRY"=1?
(1)  016574  100471                            BMI     ST02            ;BR IF YES
(1)  016576  013702  013002            ST01:   MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
(1)  016602  020137  013054                    CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
(1)  016606  001402                            BEQ     1$              ;BRANCH IF YES
(1)  016610  004737  020152                    JSR     PC,GETREQ       ;GET DPB ADDRESS
(1)  016614  052762  101000  000016    1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
(1)  016622  004737  017336                    JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
(1)  016626  012764  000040  000010            MOV     #BIT05,RHCS2(R4) ;"INIT" THE MASS BUS
(1)  016634  105061  012742                    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
(1)  016640  105061  013010                    CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
(1)  016644  005001                            CLR     R1              ;START WITH DRIVE 0
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(1)  016646  005003                        CLR     R3
(1)  016650  004037  013250          2$:   JSR     R0,DRVINT       ;INIT. THIS DRIVE
(1)  016654  000465                        BR      ST05            ;PARITY ERROR RETURN
(1)  016656  105761  012742                TSTB    DRVACT(R1)      ;DRIVE IDLE BEFORE THE INIT.?
(1)  016662  001414                        BEQ     4$              ;YES--BRANCH
(1)  016664  013702  013002                MOV     TRNSWT,R2       ;GET TRANSFER WAIT QUEUE
(1)  016670  023701  013054                CMP     DTUW,R1         ;WAS THERE I/O ON THIS DRIVE?
(1)  016674  001402                        BEQ     3$              ;YES--BRANCH
(1)  016676  004737  020152                JSR     PC,GETREQ       ;GET THE DPB POINTER FROM QUEUE
(1)  016702  052762  100400  000016  3$:   BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT.
(1)  016710  105061  012742                CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE TO IDLE
(1)  016714  105061  013010          4$:   CLRB    ULDFLG(R1)      ;NO UNLOAD
(1)  016720  012763  177777  013034        MOV     #-1,TIMER(R3)   ;STOP THE TIMER
(1)  016726  005723                        TST     (R3)+           ;UPDATE THE INDEX
(1)  016730  005201                        INC     R1              ;INCREMENT THE DRIVE NUMBER
(1)  016732  022701  000010                CMP     #8.,R1          ;LAST DRIVE BEEN CHECKED?
(1)  016736  003344                        BGT     2$              ;NO--LOOP
(1)  016740  012737  177777  013054        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
(1)  016746  005037  013002                CLR     TRNSWT          ;CLEAR TRANSFER WAIT QUEUE
(1)  016752  004737  017774                JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
(1)  016756  000417                        BR      ST04            ;EXIT
(1)  016760  016405  000016          ST02: MOV     RHAS(R4),R5     ;IS ATTENTION FOR THIS
(1)  016764  136105  013056                BITB    ATABIT(R1),R5   ;DRIVE UP?
(1)  016770  001011                        BNE     ST03            ;YES--BRANCH
(1)  016772  020137  013054                CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
(1)  016776  001277                        BNE     ST01            ;BR IF NO
(1)  017000  004037  017036                JSR     R0,RD.RP        ;YES--CHECK "RDY"
(1)  017004  000000                        RHCS1
(1)  017006  017030                        ST05
(1)  017010  105726                        TSTB    (SP)+
(1)  017012  100271                        BPL     ST01            ;BR IF "RDY"=0
(1)  017014  005720                  ST03: TST     (R0)+           ;ADJUST FOR THE PROPER RETURN
(1)  017016  004037  020256          ST04: JSR     R0,GETR15       ;RESTORE R1-R5
(1)  017022  012637  177776                MOV     (SP)+,@#PS      ;RESTORE PROCESSOR STATUS
(1)  017026  000200                        RTS     R0              ;RETURN
(1)  017030  004737  014760          ST05: JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
(1)  017034  000770                        BR      ST04
(1)
(1)                                   ;*ROUTINE TO READ A RH11/RP04 REGISTER
(1)                                   ;
(1)                                   ;*CALL
(1)                                   ;*      JSR     R0,RD.RP        ;GO READ A REGISTER
(1)                                   ;*      INDEX                   ;REG. INDEX FROM BASE
(1)                                   ;*      ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
(1)                                   ;*                              ;AT THIS ADDRESS
(1)                                   ;*      RETURN                  ;CONTENTS OF REG. IS ON THE STACK
(1)                                   ;
(1)  017036  013737  013066  017162  RD.RP: MOV     MCPEMX,RD.RP2   ;MAX. RETRYS ALLOWED
(1)  017044  011646                        MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
(1)  017046  013737  013070  017062        MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
(1)  017054  062037  017062                ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
(1)  017060  013727                  RD.RP1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RP04
(1)  017062  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
(1)  017064  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
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(1)  017066  013766  017064  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
(1)  017074  017746  173770                  MOV     @RPADR,-(SP)    ;READ RHCS1
(1)  017100  032716  020000                  BIT     #BIT13,(SP)     ;DID MCPE SET?
(1)  017104  001002                          BNE     1$              ;BRANCH IF YES
(1)  017106  022620                          CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
(1)  017110  000200                          RTS     R0              ;RETURN IF NO
(2)  017112                          1$:
(2)  017112  104003                          ERROR   3               ;REPORT THE ERROR
(1)  017114  005737  013054                  TST     DTUW            ;DATA TRANSFER UNDERWAY?
(1)  017120  100405                          BMI     2$              ;NO--BRANCH
(1)  017122  032716  040000                  BIT     #BIT14,(SP)     ;NO--"TRE"=1?
(1)  017126  001402                          BEQ     2$              ;NO--BRANCH
(1)  017130  005726                          TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
(1)  017132  000415                          BR      RD.RP3          ;TAKE THE FATAL ERROR EXIT
(1)  017134  052716  040000          2$:     BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
(1)  017140  000316                          SWAB    (SP)            ;POSITION BEFORE WRITING
(1)  017142  013737  013070  017156          MOV     RPADR,3$        ;FORM ADDRESS OF HIGH BYTE
(1)  017150  005237  017156                  INC     3$
(1)  017154  112637                          MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RHCS1
(1)  017156  000000          3$:     .WORD   0                       ;ADDRESS STORAGE
(1)  017160  005327                          DEC     (PC)+           ;EXCEEDED MAX. RETRYS
(1)  017162  000003          RD.RP2: .WORD   3
(1)  017164  002335                          BGE     RD.RP1          ;BRANCH IF NO
(1)  017166  011000          RD.RP3: MOV     (R0),R0                 ;FATAL ERROR EXIT
(1)  017170  012616                          MOV     (SP)+,(SP)
(1)  017172  000200                          RTS     R0
(1)
(1)                                  ;*ROUTINE TO WRITE A RH11/RP04 REGISTER
(1)                                  ;
(1)                                  ;*CALL
(1)                                  ;*      MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
(1)                                  ;*      JSR     R0,WRT.RP       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
(1)                                  ;*      INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
(1)                                  ;*      ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
(1)                                  ;*      RETURN                  ;ERROR FREE RETURN
(1)
(1)  017174  016637  000002  017262  WRT.RP: MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
(1)  017202  012616                          MOV     (SP)+,(SP)      ;ADJUST THE STACK
(1)  017204  012037  017264                  MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
(1)  017210  001020                          BNE     2$              ;BRANCH IF NOT RHCS1
(1)  017212  122737  000150  017262          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
(1)  017220  002414                          BLT     2$              ;YES--DON'T GET THE OLD A16&A17, & PSEL
(1)  017222  004037  017036                  JSR     R0,RD.RP        ;NO---COMBINE A16&A17, & PSEL WITH
(1)  017226  000000                          RHCS1                   ;THE COMMAND BEFORE SENDING IT TO
(1)  017230  017246                          1$                      ;THE RH11/RP04
(1)  017232  000316                          SWAB    (SP)
(1)  017234  042716  177770                  BIC     #^C7,(SP)
(1)  017240  112637  017263                  MOVB    (SP)+,WRT.WD+1
(1)  017244  000402                          BR      2$
(1)  017246  011000          1$:     MOV     (R0),R0                 ;TAKE THE ERROR EXIT
(1)  017250  000200                          RTS     R0
(1)  017252  063737  013070  017264  2$:     ADD     RPADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
(1)  017260  012737                          MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
(1)  017262  000000          WRT.WD: .WORD   0                       ;WORD TO WRITE GOES HERE
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(1)  017264  000000                    WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
(1)  017266  004037  017036                    JSR     R0,RD.RP        ;CHECK FOR PARITY ERROR ON WRITE
(1)  017272  000014                            RHER1
(1)  017274  017326                            2$
(1)  017276  032726  000010                    BIT     #BIT03,(SP)+
(1)  017302  001413                            BEQ     3$              ;BRANCH IF "PAR=0"
(1)  017304  016037  177776  017316            MOV     -2(R0),1$       ;PICKUP THE INDEX
(1)  017312  004037  017036                    JSR     R0,RD.RP        ;READ THE REG.
(1)  017316  000000                    1$:     .WORD   0               ;       REG. INDEX
(1)  017320  017326                            2$                      ;RETURN TO THIS ADDRESS ON ERROR
(2)  017322  104004                            ERROR   4               ;REPORT THE ERROR
(1)  017324  005726                            TST     (SP)+           ;CLEAN OFF THE STACK
(1)  017326  011000                    2$:     MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
(1)  017330  000200                            RTS     R0
(1)  017332  005720                    3$:     TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
(1)  017334  000200                            RTS     R0
(1)
(1)                                    ;*ROUTINE TO SAVE THE RH11/RP04 REGISTERS AS PER DPB+14
(1)                                    ;
(1)                                    ;*CALL
(1)                                    ;*      MOV     #DPBNUM,R2      ;DPB POINTER TO R2
(1)                                    ;*      JSR     PC,SVRH11       ;SAVE THE DRIVES REG'S
(1)
(1)  017336  004037  020236            SVRH11: JSR     R0,SAVR15       ;SAVE REG.'S R1-R5
(1)  017342  013704  013070                    MOV     RPADR,R4
(1)  017346  111264  000010                    MOVB    (R2),RHCS2(R4)  ;SELECT DRIVE
(1)  017352  016202  000014                    MOV     14(R2),R2       ;GET THE ERROR TABLE POINTER
(1)  017356  001421                            BEQ     4$              ;EXIT IF 0
(1)  017360  005003                            CLR     R3              ;COUNTER & POINTER
(1)  017362  012705  000022                    MOV     #RHDB,R5        ;PROBLEM REGISTER
(1)  017366  020305                    1$:     CMP     R3,R5           ;REACHED RHDB?
(1)  017370  001005                            BNE     2$              ;BR IF NO
(1)  017372  105764  000010                    TSTB    RHCS2(R4)       ;CHECK "OR"
(1)  017376  100402                            BMI     2$              ;BRANCH IF RHDB CAN BE READ
(1)  017400  005022                            CLR     (R2)+           ;ELSE SAVE IT AS 0'S
(1)  017402  000403                            BR      3$
(1)  017404  010446                    2$:     MOV     R4,-(SP)        ;FORM RH11/RP04 ADDRESS THAT IS
(1)  017406  060316                            ADD     R3,(SP)         ;TO BE READ
(1)  017410  013622                            MOV     @(SP)+,(R2)+    ;AND READ IT
(1)  017412  005723                    3$:     TST     (R3)+           ;MOVE TO NEXT REG INDEX
(1)  017414  020327  000046                    CMP     R3,#RHEC2       ;DONE?
(1)  017420  003762                            BLE     1$              ;BRANCH IF NO
(1)  017422  004037  020256            4$:     JSR     R0,GETR15       ;GET REGISTERS R1-R5
(1)  017426  000207                            RTS     PC              ;RETURN TO USER
(1)
(1)                                    ;*ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
(1)                                    ;*CALL
(1)                                    ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
(1)                                    ;*      JSR     PC,SET.IE       ;SET "IE"
(1)                                    ;*      RETURN
(1)
(1)  017430  010446                    SET.IE: MOV     R4,-(SP)        ;SAVE R4
(1)  017432  013704  013070                    MOV     RPADR,R4        ;PICKUP ADDRESS OF RHCS1
(1)  017436  010164  000010                    MOV     R1,RHCS2(R4)    ;SELECT DRIVE
```

```
(1)  017442  011446                        MOV     (R4),-(SP)        ;READ RHCS1
(1)  017444  052716  040000                BIS     #BIT14,(SP)       ;SET THE "TRE" BIT OF THE WORD READ
(1)  017450  000316                        SWAB    (SP)              ;ADJUST FOR DATO
(1)  017452  112714  000100                MOVB    #BIT06,(R4)       ;SET "IE"
(1)  017456  032764  010000  000010        BIT     #BIT12,RHCS2(R4)  ;IS "NED"=1?
(1)  017464  001002                        BNE     1$                ;YES--CLEAR "TRE"
(1)  017466  005726                        TST     (SP)+             ;CLEAN OFF THE STACK
(1)  017470  000402                        BR      2$
(1)  017472  112664  000001          1$:   MOVB    (SP)+,1(R4)       ;CLEAR "TRE"
(1)  017476  012604                  2$:   MOV     (SP)+,R4          ;RESTORE R4
(1)  017500  000207                        RTS     PC                ;RETURN TO CALLER
(1)
(1)                                  ;*QUEUE COUNT
(1)  017502      000                 QCNT:   .BYTE   0                 ;DRIVE 0
(1)  017503      000                         .BYTE   0                 ;DRIVE 1
(1)  017504      000                         .BYTE   0                 ;DRIVE 2
(1)  017505      000                         .BYTE   0                 ;DRIVE 3
(1)  017506      000                         .BYTE   0                 ;DRIVE 4
(1)  017507      000                         .BYTE   0                 ;DRIVE 5
(1)  017510      000                         .BYTE   0                 ;DRIVE 6
(1)  017511      000                         .BYTE   0                 ;DRIVE 7
(1)
(1)                                  ;QUEUE INPUT POINTERS
(1)
(1)  017512  017574                  QINPT:  .WORD   QDRV0             ;DRIVE 0
(1)  017514  017614                          .WORD   QDRV1             ;DRIVE 1
(1)  017516  017634                          .WORD   QDRV2             ;DRIVE 2
(1)  017520  017654                          .WORD   QDRV3             ;DRIVE 3
(1)  017522  017674                          .WORD   QDRV4             ;DRIVE 4
(1)  017524  017714                          .WORD   QDRV5             ;DRIVE 5
(1)  017526  017734                          .WORD   QDRV6             ;DRIVE 6
(1)  017530  017754                          .WORD   QDRV7             ;DRIVE 7
(1)
(1)                                  ;QUEUE OUTPUT POINTERS
(1)
(1)  017532  017574                  QOUTPT: .WORD   QDRV0             ;DRIVE 0
(1)  017534  017614                          .WORD   QDRV1             ;DRIVE 1
(1)  017536  017634                          .WORD   QDRV2             ;DRIVE 2
(1)  017540  017654                          .WORD   QDRV3             ;DRIVE 3
(1)  017542  017674                          .WORD   QDRV4             ;DRIVE 4
(1)  017544  017714                          .WORD   QDRV5             ;DRIVE 5
(1)  017546  017734                          .WORD   QDRV6             ;DRIVE 6
(1)  017550  017754                          .WORD   QDRV7             ;DRIVE 7
(1)
(1)  017552  017574                  QSTART: .WORD   QDRV0             ;DRIVE 0 START ADDRESS
(1)  017554  017614                  QSTOP:  .WORD   QDRV1             ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
(1)  017556  017634                          .WORD   QDRV2             ;STOP DRIVE 1--START DRIVE 2
(1)  017560  017654                          .WORD   QDRV3             ;STOP DRIVE 2--START DRIVE 3
(1)  017562  017674                          .WORD   QDRV4             ;STOP DRIVE 3--START DRIVE 4
(1)  017564  017714                          .WORD   QDRV5             ;STOP DRIVE 4--START DRIVE 5
(1)  017566  017734                          .WORD   QDRV6             ;STOP DRIVE 5--START DRIVE 6
(1)  017570  017754                          .WORD   QDRV7             ;STOP DRIVE 6--START DRIVE 7
(1)  017572  017774                          .WORD   QTERM             ;STOP DRIVE 7
(1)
```

```
(1)                                     ;DRIVE REQUEST QUEUES
(1)
(1)  017574  000010                     QDRV0:  .BLKW   10
(1)  017614  000010                     QDRV1:  .BLKW   10
(1)  017634  000010                     QDRV2:  .BLKW   10
(1)  017654  000010                     QDRV3:  .BLKW   10
(1)  017674  000010                     QDRV4:  .BLKW   10
(1)  017714  000010                     QDRV5:  .BLKW   10
(1)  017734  000010                     QDRV6:  .BLKW   10
(1)  017754  000010                     QDRV7:  .BLKW   10
(1)          017774                     QTERM=.
(1)
(1)                                     ;*ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;*      JSR     PC,CLRQUE
(1)
(1)  017774  004037  020236             CLRQUE: JSR     R0,SAVR15       ;SAVE R1-R5
(1)  020000  012702  017502                     MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
(1)  020004  005022                             CLR     (R2)+           ;DRIVES 0 & 1
(1)  020006  005022                             CLR     (R2)+           ;DRIVES 2 & 3
(1)  020010  005022                             CLR     (R2)+           ;DRIVES 4 & 5
(1)  020012  005022                             CLR     (R2)+           ;DRIVES 6 & 7
(1)  020014  012703  000010                     MOV     #8.,R3          ;MOVE THE STARTING
(1)  020020  012701  017552                     MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
(1)  020024  012122                     1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
(1)  020026  005303                             DEC     R3
(1)  020030  001375                             BNE     1$
(1)  020032  012703  000010                     MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
(1)  020036  012701  017552                     MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
(1)  020042  012122                     2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
(1)  020044  005303                             DEC     R3
(1)  020046  001375                             BNE     2$
(1)  020050  004037  020256                     JSR     R0,GETR15       ;RESTORE R1-R5
(1)  020054  000207                             RTS     PC
(1)
(1)                                     ;*EMPTY THE QUEUE SPECIFIED BY R1
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;*      MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
(1)                                     ;*      JSR     PC,EMPTYQ
(1)
(1)  020056  105061  017502             EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
(1)  020062  006301                             ASL     R1
(1)  020064  016161  017512  017532             MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
(1)  020072  006201                             ASR     R1
(1)  020074  000207                             RTS     PC
(1)
(1)                                     ;*ROUTINE TO PUT A REQUEST IN QUEUE
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
(1)                                     ;*      MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
(1)                                     ;*      JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
```

```
(1)                                     ;*      RETURN1                 ;RETURN HERE IF QUEUE IS FULL
(1)                                     ;*      RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
(1)
(1)  020076  122761  000010  017502  DRVQUE: CMPB    #10,QCNT(R1)        ;IS QUEUE FULL?
(1)  020104  001421                          BEQ     2$                  ;BR IF YES-TAKE RETURN1
(1)  020106  105261  017502                  INCB    QCNT(R1)            ;INCREMENT QUEUE COUNT
(1)  020112  006301                          ASL     R1
(1)  020114  010271  017512                  MOV     R2,@QINPT(R1)       ;PUT THIS REQUEST IN QUEUE
(1)  020120  062761  000002  017512          ADD     #2,QINPT(R1)        ;UPDATE THE QUEUE POINTER
(1)  020126  026161  017512  017554          CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
(1)  020134  001003                          BNE     1$                  ;BRANCH IF NO
(1)  020136  016161  017552  017512          MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
(1)  020144  006201                  1$:     ASR     R1
(1)  020146  005720                          TST     (R0)+               ;TAKE RETURN 2
(1)  020150  000200                  2$:     RTS     R0                  ;RETURN TO USER
(1)
(1)                                     ;*ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUEUE
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;*      MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
(1)                                     ;*      JSR     PC,GETREQ           ;GO GET THE REQUEST
(1)                                     ;*      RETURN                      ;R2="DPB" ADDRESS OF THE REQUEST
(1)                                     ;*                                  ;R2=0 IF NO REQUEST IN QUEUE
(1)
(1)  020152  005002                  GETREQ: CLR     R2
(1)  020154  105761  017502                  TSTB    QCNT(R1)            ;IS THERE ANY REQUEST IN QUEUE?
(1)  020160  001404                          BEQ     2$                  ;NO---BRANCH
(1)  020162  006301                  1$:     ASL     R1
(1)  020164  017102  017532                  MOV     @QOUTPT(R1),R2      ;PICKUP "DPB" POINTER FOR THIS DRIVE
(1)  020170  006201                          ASR     R1
(1)  020172  000207                  2$:     RTS     PC                  ;RETURN TO USER
(1)
(1)                                     ;*ROUTINE TO "POP" THE REQUEST FROM QUEUE
(1)                                     ;
(1)                                     ;*CALL
(1)                                     ;*      MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
(1)                                     ;*      JSR     PC,POPQUE           ;CALL TO REMOVE REQUEST
(1)                                     ;*      RETURN                      ;R2=ADDRESS OF DPB REMOVED
(1)
(1)  020174  105361  017502          POPQUE: DECB    QCNT(R1)            ;DECREMENT QUEUE COUNT
(1)  020200  006301                          ASL     R1
(1)  020202  017102  017532                  MOV     @QOUTPT(R1),R2      ;GET THE "DPB" POINTER
(1)  020206  062761  000002  017532          ADD     #2,QOUTPT(R1)       ;UPDATE THE QUEUE POINTER
(1)  020214  026161  017532  017554          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
(1)  020222  001003                          BNE     1$                  ;NO--BRANCH TO EXIT
(1)  020224  016161  017552  017532          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
(1)  020232  006201                  1$:     ASR     R1
(1)  020234  000207                          RTS     PC                  ;RETURN TO USER
(1)
(1)                                     ;*ROUTINES TO SAVE R0-R5 AND R1-R5
(1)                                     ;*
(1)                                     ;*CALL: SAVR05
(1)                                     ;*      JSR     R0,SAVR05
(1)                                     ;*      RETURN                      ;R0-R5 IS ON THE STACK
```

```
(1)                                     ;*
(1)                                     ;*CALL: SAVR15
(1)                                     ;*      JSR     R0,SAVR15
(1)                                     ;*      RETURN                  ;R1-R5 IS ON THE STACK
(1)                                     ;*
(1)                                     ;*UPON RETURN FROM SAVR05 AND SAVR15 THE STACK WILL LOOK LIKE:
(1)                                     ;*
(1)                                     ;*+12   R0
(1)                                     ;*+10   R1
(1)                                     ;*+06   R2
(1)                                     ;*+04   R3
(1)                                     ;*+02   R4
(1)                                     ;*TOP   R5
(1)
(1)  020236                             SAVR05:                         ;SAVE R0 BY THE JSR INST.
(1)  020236  010146                     SAVR15: MOV     R1,-(SP)        ;SAVE R1
(1)  020240  010246                             MOV     R2,-(SP)        ;SAVE R2
(1)  020242  010346                             MOV     R3,-(SP)        ;SAVE R3
(1)  020244  010446                             MOV     R4,-(SP)        ;SAVE R4
(1)  020246  010546                             MOV     R5,-(SP)        ;SAVE R5
(1)  020250  016646  000012                     MOV     12(SP),-(SP)    ;GET R0
(1)  020254  000200                             RTS     R0
(1)
(1)                                     ;*ROUTINES TO RESTORE R0-R5 AND R1-R5
(1)                                     ;*
(1)                                     ;*CALL: GETR05
(1)                                     ;*      JSR     R0,GETR05
(1)                                     ;*      RETURN                  ;R0-R5 HAVE BEEN RESTORED
(1)                                     ;*
(1)                                     ;*CALL: GETR15
(1)                                     ;*      JSR     R0,GETR15
(1)                                     ;*      RETURN                  ;R1-R5 HAVE BEEN RESTORED
(1)                                     ;
(1)  020256  011666  000014             GETR15: MOV     (SP),14(SP)     ;POSITION R0
(1)  020262  005726                     GETR05: TST     (SP)+           ;POP R0 OF THE JSR OFF OF THE STACK
(1)  020264  012605                             MOV     (SP)+,R5        ;RESTORE R5
(1)  020266  012604                             MOV     (SP)+,R4        ;RESTORE R4
(1)  020270  012603                             MOV     (SP)+,R3        ;RESTORE R3
(1)  020272  012602                             MOV     (SP)+,R2        ;RESTORE R2
(1)  020274  012601                             MOV     (SP)+,R1        ;RESTORE R1
(1)  020276  000200                             RTS     R0              ;RESTORE R0
(1)
6621
6622                                    ;THIS BUFFER CONTAINS HEADER/DATA INFORMATION WRITTEN ON CURRENT TRK
6623
6624  020300  000000                    BUFP:   0                       ;START OF BUFFER FOR FORMAT (26260 BYTES DEEP)
6625          000001                            .END
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
CLRBUF  005426          5851#   5861    5904
CLRQUE  017774          6620#
CMPER   002706          5317    5328#
CPTR    012634          5845    6573#
CPTR1   012632          6572#
CPTR2   012630          6571#
CPTR3   012626          6570#
CRLF    005376          5434    5439    5454    5459    5464    5477    5482    5487    5492    5509    5514    5833#   6147
                        6231
CTRLR   005312          5806    5808#
CYLTK   006744          5335    5587    5739    5751    6160#   6251
CYLTRK  006760          5341    6162#
DECBIN  006120          5884    5911    5951#
DECTYP  007020          6146    6182#
DISPLA= 177570          4942#
DONE    003016          5319    5351#
DRSN    006662          5332    5583    6139#   6247
DRVACT  012742          6620#*
DRVINT  013250          6620#
DRVQUE  020076          6620#
DRVSTA  012752          5006    6620#*
DRVTYP  012762          5017    5022    5024    6620#*
DTBDNE  006164          5959    5962#
DTUW    013054          6620#*
ECYL    012546          5136    5318    5872*   5893*   6535#
EMPTYQ  020056          6620#
EMTHND  003116          4970    5383#
EMTTBL  003176          5392    5406#
EMTVEC= 000030          4942#
ENDCK   002540          5279    5294#
ER      003716          5246    5258    5313    5526#
ERR   = ****** U        6620
ERROR6  004140          5553    5572#
ERRVEC= 000004          4942#   6257*   6258*   6266*   6273*
ER1     003210          5406    5414#
ER10    005136          5538    5759#
ER2     003244          5407    5426#
ER3     003354          5408    5450#
ER4     003460          5409    5473#
ER5     003606          5410    5501#
ER6     004002          5528    5542#
ER6A    004506          5544    5650#
ER6B    004562          5651    5666#
ER6C    004706          5550    5695#
ER6D    004742          5547    5707#
ER7     004776          5531    5719#
ER8     005042          5534    5733#
ER9     005106          5537    5747#
ETRK    012552          5143    5158    5873*   5920*   6537#
FMTDPB  012712          5100*   5108*   5109*   5110*   5112    5114    5234*   5235*   5236*   5239*   5241    5243    5251*
                        5253    5255    5266    5298*   5299*   5300*   5301*   5306*   5308    5310    5322*   5526    5529
                        5532    5535    5542    5545    5548    5631*   5641*   5642*   5650    5934*   5935*   5936*   5937*
                        5938*   5939*   5940*   5941*   5942*   5972*   5978*   5979*   6023*   6024*   6025*   6160    6161
                        6599#
```

```
GETDAT  005446          5125    5130    5860#
GETREQ  020152          6620#
GETROS  020262          6620#
GETRIS  020256          6620#
GNS   = ****** U        4933
GOOD    002446          5257    5262#
GSEL    001250          4991    5003#
HDRCK   002644          5312    5315#
HDRCK1  002660          5314    5318#
HDREAD  002616          5307#   5309    5323
HEDERR  012606          5294*   5342*   5351    6551#
IOTVEC= 000020          4942#
IRHCS2  007146          6204*   6205*   6206    6208#
ISR     015260          6620#
LA      015122          6620#
LACNT   013020          6620#*
LOCCYL  012616          5340*   6080    6161*   6564#
LOCTRK  012614          5339*   6098    6160*   6563#
LOOPTS  002516          5263    5267    5274#   5568
MADRER  010423          5140    5147    6420#
MAS     011771          5436    5511    6471#
MAXSEC  012612          5099*   5107*   5266    6033    6555#
MBDATA  012067          5609    6487#
MBDFMT  012332          5359    6503#
MCCMPT  010777          5367    6438#
MCLIMT  010334          5888    6416#
MCPEMX  013066          6620#
MCRLF   007574          5834    6376#
MCYLTK  010741          6079    6171    6434#
MCYTK0  010272          5870    6410#
MCYTK1  010324          5875    6414#
MDRNP   007621          5020    6380#
MDRV    011762          5431    5506    6140    6469#
MDRVD   007561          4990    6371#
MER1    011023          5417    6440#
MER10   011716          5762    6467#
MER2    011065          5429    6442#
MER3    011123          5453    6444#
MER4    011172          5476    6446#
MER5    011231          5504    6448#
MER6    011303          5582    6450#
MER6A   011332          5655    6452#
MER6B   011372          5671    6454#
MER6C   011413          5698    6456#
MER6D   011434          5710    6458#
MER7    011556          5722    6461#
MER8    011606          5736    6463#
MER9    011656          5750    6465#
MEXPED  012444          5334    6507#
MFCMPT  010752          5364    6436#
MFORMT  007761          5075    6396#
MFTERM  012226          5725    5738    6497#
MGDATA  012104          5603    6489#
MHCYTK  012046          6163    6483#
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
MHDCMP  012474           5331    6511#
MHECK   010004           5072    6398#
MKDIG   006572           6087    6094    6104    6111#
MMAXCT  010277           5129    6412#
MMINCT  010244           5123    6408#
MMODE   007725           5061    6394#
MNDLTA  013102           6620#
MNRP04  007646           5027    6382#
MODE    012544           5059*   5079*   5183    5237    5259    5269    5361    6534#
MOFFLN  007577           5014    6378#
MORMAT  010016           5078    6400#
MPATD   010632           5168    6428#
MQUES   007567           5840    6375#
MRDADR  012000           5456    6473#
MRDWRD  012010           5461    5489    6475#
MREAD   012460           5337    6509#
MREFMT  012307           5658    5687    6501#
MREGHD  012143           6213    6495#
MREUNS  012415           5557    5685    6505#
MRHEC1  012121           5613    6491#
MRHEC2  012132           5617    6493#
MSCHK   010704           5189    6432#
MSD     006144           5954    5957#
MSEC20  010165           5103    6406#
MSEC22  010106           5095    6404#
MSELD   007713           5179    6386#
MSELP   010530           5163    6423#
MSFOU   010646           5186    6430#
MSIZE   010035           5084    6402#
MSN     012040           6144    6481#
MSPACE  007564           6177    6373#
MSTOR   012057           5589    6485#
MTITLE  007466           4976    6366#
MTLIMT  010371           5915    6418#
MUNCOR  012254           5559    6499#
MUNIT   007546           4984    6369#
MUSDR   007673           5030    6384#
MWC     012604           5097*   5105*   5235    5632    5936    6550#
MWRTAD  012020           5479    6477#
MWRTWD  012030           5484    6479#
MXDLTA  013100           6620#
MXLACT  013076           6620#
MXWNDW  013104           6620#
M0      001166           4983#   4994    4998    5015    5021    5028    5031
M1      001366           5008    5059#   5070
M1A     001470           5073    5083#   5093
M2      001676           5117    5122#   5126    5141    5148
M3      001724           5128#   5131
M4      002052           5150    5162#   5172    5176
M5      002142           5183#   5372
NULCNT  012620           5783    6565#
NUMTST  005314           4993    5171    5812#   5895    5923
NXD     006624           6124#   6134
NXDD    007024           6183#   6194
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
NXTRK   002530          5275    5277#
OCTYP   006604          5438    5458    5463    5481    5486    5491    5513    5607    5611    5615    5619    6118#   6215
                        6218    6221    6224    6227    6230
OPT     013672          6620#
PACK  = ****** U        4961    5007    5033    5223    5278    5284    5302    5350    5584    5967    5986    6248    6276
                        6388    6513    6557
PATA    012566          5195*   5199*   5203*   5210    6543#
PATB    012570          5196*   5200*   5204*   5211    6544#
PC    =%000007          4942#   4985*   4993*   4997*   5003*   5062*   5069*   5085*   5092*   5125*   5130*   5164*   5171*
                        5175*   5190*   5220*   5221*   5222*   5246*   5258*   5268*   5277*   5295*   5296*   5313*   5317*
                        5321*   5332*   5335*   5341*   5346*   5421*   5433*   5434*   5438*   5439*   5440*   5441*   5445*
                        5454*   5458*   5459*   5463*   5464*   5468*   5477*   5481*   5482*   5486*   5487*   5491*   5492*
                        5496*   5508*   5509*   5513*   5514*   5515*   5516*   5520*   5565*   5566*   5583*   5587*   5598*
                        5601*   5607*   5611*   5615*   5619*   5620*   5646*   5656*   5672*   5677*   5681*   5699*   5703*
                        5711*   5715*   5723*   5739*   5751*   5763*   5775*   5792*   5803*   5808*   5818*   5819*   5820*
                        5826*   5828*   5829*   5835*   5841*   5847*   5851*   5855*   5856*   5861*   5862*   5877*   5878*
                        5881*   5884*   5889*   5895*   5896*   5899*   5900*   5904*   5905*   5908*   5911*   5916*   5922*
                        5923*   5924*   5927*   5928*   5947*   5962*   5970*   5980*   5982*   5984*   6027*   6035*   6040*
                        6055*   6059*   6065*   6069*   6075*   6087*   6094*   6104*   6107*   6114*   6132*   6135*   6142*
                        6146*   6147*   6148*   6155*   6156*   6164*   6165*   6169*   6172*   6178*   6192*   6195*   6207*
                        6215*   6216*   6218*   6219*   6221*   6222*   6224*   6225*   6227*   6228*   6230*   6231*   6232*
                        6242*   6247*   6251*   6252*   6253*   6274*   6620*
PIRQ  = 177772          4942#
PIRQVE= 000240          4942#
POPQUE  020174          6620#
PR0   = 000000          4942#
PR1   = 000040          4942#
PR2   = 000100          4942#
PR3   = 000140          4942#
PR4   = 000200          4942#
PR5   = 000240          4942#
PR7   = 000340          4942#
PS    = 177776          4942#   6620*
PSEL    012564          5177*   5197    5201    6542#
PSW   = 177776          4942#
PWRVEC= 000024          4942#
QCNT    017502          6620#*
QDRV0   017574          6620#
QDRV1   017614          6620#
QDRV2   017634          6620#
QDRV3   017654          6620#
QDRV4   017674          6620#
QDRV5   017714          6620#
QDRV6   017734          6620#
QDRV7   017754          6620#
QINPT   017512          6620#*
QOUTPT  017532          6620#*
QSTART  017552          6620#
QSTOP   017554          6620#
QTERM = 017774          6620#
QUES    005406          4997    5069    5092    5175    5819    5839#   5899    5927
RBUF    012622          5299    5315    5338*   5339    5340    6567#
RD.ADR  017062          5457    6620#*
RD.RP   017036          6620#
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
RD.RP1  017060          6620#
RD.RP2  017162          6620#*
RD.RP3  017166          6620#
RD.WRD  017064          5462    5490    6620#
RESREG  007270          5421    5445    5468    5496    5520    6236#
RESTRT  001156          4940    4974*   4977#   5370    5662    5691    5729    5743    5753    5765    5807
RESVEC= 000010          4942#
RETRY   012574          5233*   5666    5673*   5678    5680*   6546#
RHAS  = 000016          6620#*
RHBA  = 000004          6620#
RHCA  = 000034          6620#
RHCC  = 000036          6620#
RHCS1 = 000000          6620#
RHCS2 = 000010          6620#*
RHDA  = 000006          6620#
RHDB  = 000022          6620#
RHDS1 = 000012          6620#
RHDT  = 000026          6620#
RHEC1 = 000044          6620#
RHEC2 = 000046          6620#
RHER1 = 000014          6620#
RHER2 = 000040          6620#
RHER3 = 000042          6620#
RHLA  = 000020          6620#
RHMR  = 000024          6620#
RHOF  = 000032          6620#
RHREGS  007150          5441    5516    5620    6212#   6252
RHSN  = 000030          6620#
RHWC  = 000002          6620#
RPADR   013070          4972*   6204    6620#*
RPERRS  012732          6199    6200    6201    6202    6620#*
RPINIT  013106          5003    6620#
RPTMR   016436          5377    6620#
RPVEC   013072          4973*   6620#
RPO4    013476          5111    5240    5252    5307    6620#
RP6   = 000300          4942#
R0    =%000000          4942#   4986    4995    4999    5005*   5006    5016*   5017    5022    5024    5063    5065    5067
                        5086    5088    5090    5111*   5136*   5137*   5143*   5144*   5149    5153*   5155*   5156*   5157
                        5165    5169*   5173    5177    5209*   5212*   5213*   5240*   5252*   5307*   5377*   5387    5389*
                        5390*   5391*   5392*   5393    5590*   5594*   5597*   5599*   5600*   5624*   5628*   5631    5632*
                        5636*   5639*   5640    5773*   5786    5787    5798*   5799    5801    5804*   5805    5812    5814
                        5816*   5824*   5825*   5827*   5863    5879    5882    5901    5906    5909    5929    5952*   5953*
                        5957*   5958*   6034*   6047*   6048*   6049*   6050*   6051*   6060*   6061*   6062*   6070    6071*
                        6072*   6080*   6083*   6090*   6095*   6096    6098*   6100*   6105*   6106    6113*   6121*   6122*
                        6128*   6130*   6131*   6153*   6154*   6188*   6190*   6191*   6240*   6620*
R1    =%000001          4942#   5210*   5212    5383    5625*   5626    5629*   5633*   5634    5637*   5772*   5773    6033*
                        6053*   6063*   6073*   6081*   6085*   6088*   6092*   6099*   6102*   6111*   6112    6182*   6193*
                        6236*   6620*
R2    =%000002          4942#   5211*   5213    5388    5846    5860*   5903*   6041*   6046*   6047    6079*   6096*   6097*
                        6106*   6112*   6118*   6133*   6241*   6620*
R3    =%000003          4942#   5208*   5214*   5215*   5384    5432*   5437*   5457*   5462*   5480*   5485*   5490*   5507*
                        5512*   5591*   5592*   5596*   5599    5604*   5605*   5606*   5610*   5614*   5618*   5845*   5852*
                        5901*   5929*   5951    5952    5957    6042*   6043*   6048    6052*   6082*   6089*   6113    6119*
                        6120*   6121    6124*   6125*   6126*   6127*   6128    6129*   6141*   6145*   6152*   6153    6183*
```

```
                    6184*  6185*  6186*  6187*  6188   6189*  6214*  6217*  6220*  6223*  6226*  6229*  6237*
                    6620*
R4      =%000004    4942#  5385   5573*  5574*  5576*  5577*  5578   5782   5783*  5789*  5791*  5846*  5853*
                    5897*  5925*  6238*  6620*
R5      =%000005    4942#  4975*  4983*  4989*  5013*  5019*  5026*  5029*  5060*  5071*  5074*  5077*  5083*
                    5094*  5102*  5122*  5128*  5139*  5146*  5162*  5167*  5178*  5185*  5188*  5330*  5333*
                    5336*  5358*  5363*  5366*  5386   5416*  5428*  5430*  5435*  5452*  5455*  5460*  5475*
                    5478*  5483*  5488*  5503*  5505*  5510*  5556*  5558*  5581*  5588*  5602*  5608*  5612*
                    5616*  5654*  5657*  5670*  5684*  5686*  5697*  5709*  5721*  5724*  5735*  5737*  5749*
                    5761*  5772   5777*  5833*  5839*  5869*  5874*  5887*  5914*  6139*  6143*  6162*  6170*
                    6176*  6212*  6239*  6620*
R6      =%000006    4942#
R7      =%000007    4942#
SAVEFG  013030      6620#*
SAVR    003162      5383*  5384*  5385*  5386*  5387*  5388*  5397#  5432   5437   5507   5512   6203   6236
                    6237   6238   6239   6240   6241
SAVREG  012642      5573   5604   5610   5614   5618   5941   6141   6145   6199*  6200*  6201*  6202*  6203*
                    6206*  6214   6217   6220   6223   6226   6229   6576#
SAVR05  020236      6620#
SAVR15  020236      6620#
SAVSEC  012576      5563   5578*  5591   5625   5633   5642   6547#
SAVWC   012600      5640*  6023   6548#
SC      015456      6620#
SCAWC   006260      5268   5565   6023#
SCYL    012550      5137   5297   5301   5867*  5892*  5940   6041   6536#
SC1     015540      6620#
SC10    016270      6620#
SC11    016304      6620#
SC12    016366      6620#
SC2     015566      6620#
SC3     015640      6620#
SC4     015634      6620#
SC5     015652      6620#
SC6     015752      6620#
SC6A    016056      6620#
SC7     016200      6620#
SC8     016224      6620#
SC9     016250      6620#
SECCNT  006306      6033#  6040   6059   6069
SEC20   012610      5098*  5106*  6044   6552#
SEEKFG  013032      5004*  6620#*
SETCA   004374      5580   5624#
SETHDR  006320      5221   5296   6040#
SETPC   005416      5845#  5851   5855
SETREG  007064      5440   5515   6199#
SETTBL  006016      5220   5295   5934#
SETWC   004424      5632#
SET.IE  017430      6620#
SOFSW   012542      5124*  5127*  5232*  5262   5264   5272*  5551   5572*  5865   5890   5917   6026*  6533#
SP      =%000006    4942#  4969*  4978*  5371*  5376*  5389   5567   5782*  5791   5817*  5876*  5921*  5983*
                    6265*  6272*  6620*
SRCHWT  013004      6620#*
STACK = 001100      4942#  4969   4978   5371
STKLMT= 177774      4942#
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
ST0      016534          6620#
ST01     016576          6620#
ST02     016760          6620#
ST03     017014          6620#
ST04     017016          6620#
ST05     017030          6620#
STRK     012554          5144    5155    5868*   5919*   5939    5945    6042    6538#
STUF     002244          5198    5202    5208#
STUFP    002172          5195#
SVRH11   017336          6620#
SWR    = 177570          4942#   5274    5328    5343    5368    5414    5418    5426    5442    5450    5465    5473    5493
                         5501    5517    5554    5560    5579    5643    5652    5659    5668    5674    5682    5688    5695
                         5700    5707    5712    5719    5726    5733    5740    5747    5759
SW0    = 000001          4942#   5368
SW00   = 000001          4942#
SW01   = 000002          4942#
SW02   = 000004          4942#
SW03   = 000010          4942#
SW04   = 000020          4942#
SW05   = 000040          4942#
SW06   = 000100          4942#
SW07   = 000200          4942#
SW08   = 000400          4942#
SW09   = 001000          4942#
SW1    = 000002          4942#
SW10   = 002000          4942#
SW11   = 004000          4942#
SW12   = 010000          4942#
SW13   = 020000          4942#
SW14   = 040000          4942#
SW15   = 100000          4942#
SW2    = 000004          4942#
SW3    = 000010          4942#
SW4    = 000020          4942#
SW5    = 000040          4942#
SW6    = 000100          4942#
SW7    = 000200          4942#
SW8    = 000400          4942#
SW9    = 001000          4942#
TBITVE= 000014           4942#
TCYLTK   006774          6164    6169#
TD       015330          6620#
TDRNUM   006724          5433    5508    6142    6152#
TEMP     012572          5297*   5318    5320*   5885    5892    5893    5912    5919    5920    5951*   5955*   5960*   6545#
TIMER    013034          6620#*
TKB    = 177562          4948#   5798
TKS    = 177560          4947#   5796
TKVEC  = 000060          4942#
TPB    = 177566          4950#   5786*
TPS    = 177564          4949#   5784
TPVEC  = 000064          4942#
TRAPVE= 000034           4942#
TRKCNT   012562          5945*   5973    5975*   5977*   6541#
TRKTST   006166          5277    5968#
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
TRNSWT  013002          6620#*
TRTVEC= 000014          4942#
TSPACE  007010          6176#   6216    6219    6222    6225    6228
TTI     005242          4985    5062    5085    5164    5796#   5797    5862    5878    5905
TTO     005204          5598    5601    5775    5782#   5803    5826    5828    6132    6155    6192
TTO1    005212          5784#   5785    5790
TTO2    005236          5788    5791#
TTRKS   012556          5149*   5151*   5152*   5157*   5158*   5946    6539#
TTRKSC  012560          5946*   5968    5971*   6540#
TYOCT   006650          6132#
TYPALL  007322          5656    5672    5699    5711    5723    5763    6247#
TYPER   005342          5813    5815    5819#
TYPOUT  005166          4975    4983    4989    5013    5019    5026    5029    5060    5071    5074    5077    5083    5094
                        5102    5122    5128    5139    5146    5162    5167    5178    5185    5188    5330    5333    5336
                        5358    5363    5366    5416    5428    5430    5435    5452    5455    5460    5475    5478    5483
                        5488    5503    5505    5510    5556    5558    5581    5588    5602    5608    5612    5616    5654
                        5657    5670    5684    5686    5697    5709    5721    5724    5735    5737    5749    5761    5772#
                        5833    5839    5869    5874    5887    5914    6139    6143    6162    6170    6176    6212
UASM    005350          5190    5824#
ULDFLG  013010          6620#*
UPDACY  006374          5321    5980    6059#
UPDATK  006420          5982    6069#
USEL    012540          4988*   4999*   5005    5109    5824    5934    6532#
WC      012602          5096*   5104*   5208    6549#
WRHDR   002350          5239#   5247    5261    5271    5273
WRHDR1  002276          5220#
WRHDR2  002312          5232#   5276    5283
WRT.AD  017264          5480    6620#*
WRT.RP  017174          6620#
WRT.WD  017262          5485    6620#*
$HD   = 000000          4921
$LKCSB= 172542          4952#   6262*
$LKCSR= 172540          4951#   6259    6263*
$LKS  = 177546          4953#   6267    6270*
$RPADR  001100          4959#   4972
$RPVEC  001102          4960#   4973
$SWR  = 120000          4918#   4921
$TN   = 000000          4919#   4921
.     = 020302          4933#   4936#   4955#   5316    5369    6530#   6574#   6620#
```

DZRPLB.P11 CROSS REFERENCE TABLE

.$TYPO 2094#

DZRPLB.P11 CROSS REFERENCE TABLE

DZRPLB.P11 CROSS REFERENCE TABLE

```
                5074  5077  5083  5085  5092  5094  5102  5111  5122  5125  5128  5130  5139  5146  5162
                5164  5167  5171  5175  5178  5185  5188  5190  5220  5221  5222  5240  5246  5252  5258
                5268  5277  5295  5296  5307  5313  5317  5321  5330  5332  5333  5335  5336  5341  5358
                5363  5366  5377  5416  5421  5428  5430  5433  5434  5435  5438  5439  5440  5441  5445
                5452  5454  5455  5458  5459  5460  5463  5464  5468  5475  5477  5478  5481  5482  5483
                5486  5487  5488  5491  5492  5496  5503  5505  5508  5509  5510  5513  5514  5515  5516
                5520  5556  5558  5565  5581  5583  5587  5588  5598  5601  5602  5607  5608  5611  5612
                5615  5616  5619  5620  5654  5656  5657  5670  5672  5684  5686  5697  5699  5709  5711
                5721  5723  5724  5735  5737  5739  5749  5751  5761  5763  5775  5803  5819  5826  5828
                5833  5839  5851  5855  5861  5862  5869  5874  5878  5884  5887  5895  5899  5904  5905
                5911  5914  5923  5927  5980  5982  6040  6059  6069  6087  6094  6104  6132  6139  6142
                6143  6146  6147  6155  6162  6164  6169  6170  6176  6192  6212  6215  6216  6218  6219
                6221  6222  6224  6225  6227  6228  6230  6231  6247  6251  6252  6620
MOV             4969  4970  4971  4972  4973  4974  4978  4999  5004  5005  5079  5096  5097  5098  5099
                5104  5105  5107  5124  5136  5143  5149  5155  5169  5177  5203  5204  5208  5209  5210
                5211  5212  5213  5235  5236  5297  5298  5299  5301  5340  5342  5371  5376  5383  5384
                5385  5386  5387  5388  5389  5390  5392  5432  5437  5457  5462  5480  5485  5490  5507
                5512  5573  5576  5578  5591  5599  5604  5606  5610  5614  5618  5624  5625  5631  5632
                5633  5640  5641  5772  5782  5783  5791  5798  5824  5827  5845  5846  5860  5872  5873
                5892  5893  5901  5903  5919  5920  5929  5936  5937  5940  5941  5945  5946  5951  5952
                5957  6023  6033  6034  6041  6042  6047  6048  6079  6080  6082  6089  6118  6121  6128
                6141  6145  6153  6161  6182  6188  6199  6200  6201  6202  6203  6204  6206  6214  6217
                6220  6223  6226  6229  6236  6237  6238  6239  6240  6241  6257  6260  6261  6262  6263
                6266  6268  6269  6270  6273  6620
MOVB            5100  5109  5110  5239  5251  5306  5339  5642  5773  5786  5934  5939  6096  6097  6098
                6106  6112  6160  6620
NEG             5156
NOP             5943  5944
RESET           4968  4979
ROL             6119  6120  6124  6125  6126  6127  6183  6184  6185  6186  6187  6620
ROLB            6620
ROR             6129  6189
RTI             5378  5422  5446  5469  5497  5521  6620
RTS             5346  5566  5646  5677  5681  5703  5715  5777  5792  5808  5818  5820  5829  5835  5841
                5847  5856  5877  5881  5889  5896  5900  5908  5916  5922  5924  5928  5947  5962  5970
                5984  6027  6035  6055  6065  6075  6107  6114  6135  6148  6156  6165  6172  6178  6195
                6207  6232  6242  6253  6274  6620
SUB             5137  5144  5592  5605  5953  5958  6083  6090  6100  6620
SWAB            6043  6620
TST             5017  5114  5183  5197  5237  5243  5255  5259  5262  5269  5310  5343  5351  5361  5418
                5442  5465  5493  5517  5551  5560  5567  5626  5634  5643  5659  5666  5674  5688  5700
                5712  5726  5740  5865  5890  5917  5968  6044  6070  6259  6267  6620
TSTB            5006  5784  5796  6620
.ASCII          6366  6420  6423  6424  6425  6458
.ASCIZ          6367  6369  6371  6373  6375  6376  6378  6380  6382  6384  6386  6394  6396  6398  6400
                6402  6404  6406  6408  6410  6412  6414  6416  6418  6421  6426  6428  6430  6432  6434
                6436  6438  6440  6442  6444  6446  6448  6450  6452  6454  6456  6459  6461  6463  6465
                6467  6469  6471  6473  6475  6477  6479  6481  6483  6485  6487  6489  6491  6493  6495
                6497  6499  6501  6503  6505  6507  6509  6511
.BLKW           6620
.BYTE           6599  6600  6601  6602  6605  6606  6620
.ENABL             4  4916
.END            6625
.ENDC           4921  4933  4942  4964  5011  5055  5231  5282  5288  5305  5356  5586  5985  6018  6250
```

DZRPLB.P11 CROSS REFERENCE TABLE

```
        6365    6393    6524    6562    6620
.EQUIV  4942
.EVEN   6530
.IF     4921    4933    4942    4961    5007    5033    5223    5278    5284    5302    5350    5584    5967    5986    6248
        6276    6388    6513    6557    6620
.IFF    4942    5009    5280    5352
.IIF    4921    4933
.LIST      2    3664    4920    4933    4942
.MACRO    39      81     164     300     478     535     684     738     825     856     904     916     956     985    1018
       1031    1052    1065    1094    1140    1177    1224    1257    1287    1343    1351    1399    1575    1773    1928
       2016    2094    2191    2269    2354    2568    2660    2736    2837    2964    3021    3083    3201    3239    3303
       3401    3486    3525    3588    3626    3665    6620
.MCALL  4917    4942
.NLIST     1       3    4911    4915    4933    4942
.REPT   4933
.SBTTL  4923    4933    4942    4957    4966    5767    6620
.TITLE  4921
.WORD   4933    4959    4960    6603    6604    6607    6608    6609    6620
```

ERRORS DETECTED: 0

*DZRPLB,DZRPLB/CRF=SYSMAC.SMA,RP04.009,DZRPLB
RUN-TIME: 42 44 4 SECONDS
CORE USED: 32K

E07

Spooler runtime 2 Seconds, 32 KCS, 328 disk reads, 0 disk writes, 86 pages printed