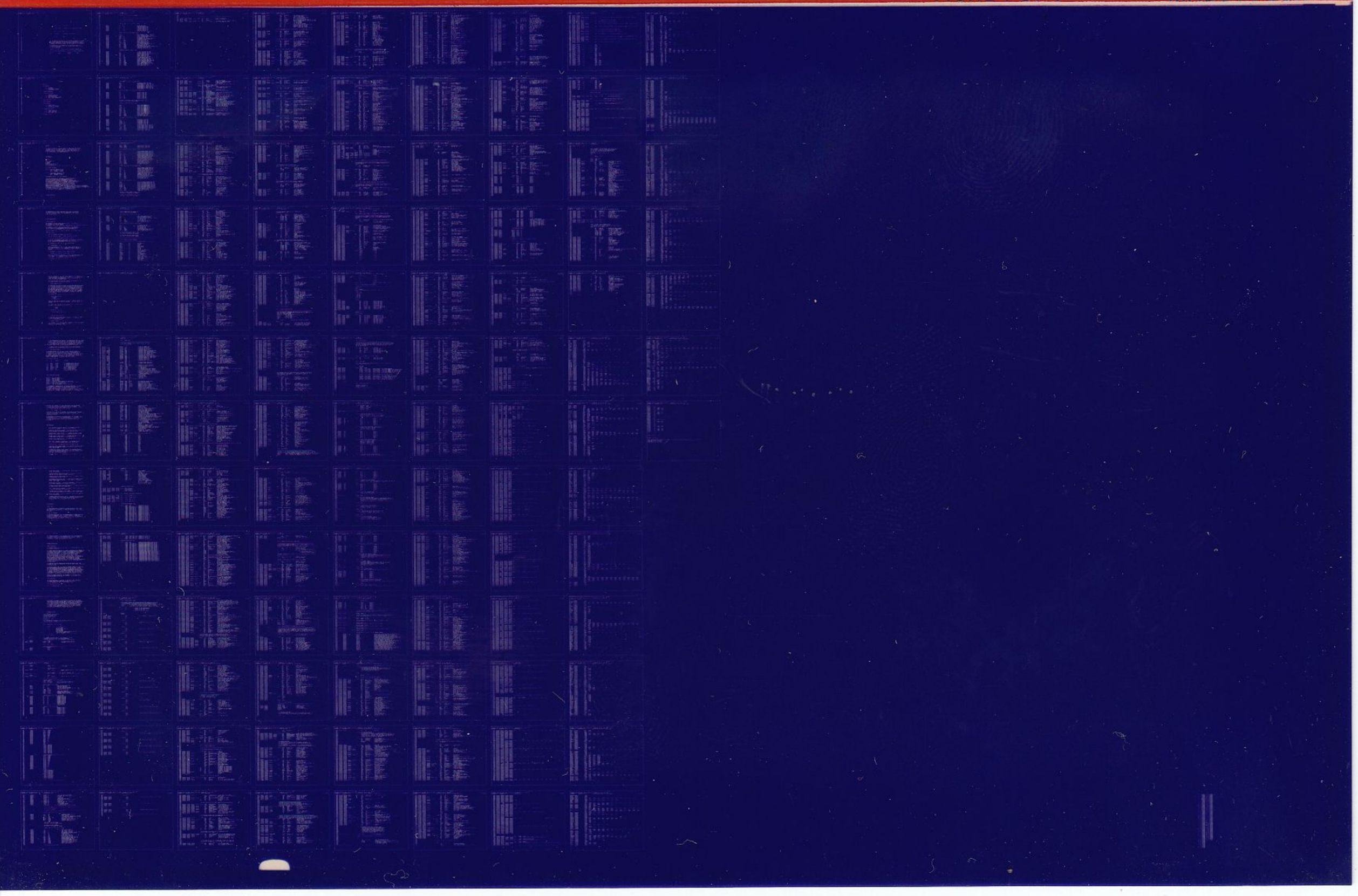
RP04/5/6

RP04/5/6 FMTR
CZRJBD0

AH-9187D-MC

FICHE 1 OF 1

SEP 1979
digital
MADE IN USA



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8                                                   I D E N T I F I C A T I O N
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12                                      PRODUCT CODE:   AC-9185D-MC
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15                                      PRODUCT NAME:   CZRJBD0 RP04/5/6 FORMATTER PROGRAM
16
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18                                      PRODUCT DATE:   MAY, 1979
19
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21                                      MAINTAINER:     DIAGNOSTIC ENGINEERING
22
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24                                      AUTHOR:         C. HESS
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28
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CONTENTS

1. ABSTRACT

THE RP04/5/6 FORMATTER PROGRAM FORMATS THE DISK PACK AND PERFORMS
A CURSORY CHECK OF THE PACK'S SURFACE. THE PROGRAM ALLOWS THE
OPERATOR TO SPECIFY ADDRESS LIMITS, PATTERNS, AND EITHER 16 BIT OR
18 BIT FORMAT MODE. THE PROGRAM VERIFIES EACH TRACK WRITTEN
AS WELL AS VERIFYING THE FORMAT OPERATION.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
8K MEMORY
TELETYPE
PROGRAM LOAD DEVICE
KW11-L OR KW11-P CLOCK
RH11 OR RH70 WITH 1 - 8 RP04, RP05, RP06 DISK DRIVES

2.2 PRELIMINARY PROGRAMS

RP04/5/6 DISKLESS CONTROLLER TEST
        PART 1 (MAINDEC-11-DZRJG)
        PART 2 (MAINDEC-11-DZRJH)

RP04/5/6 FUNCTIONAL CONTROLLER TEST
        PART 1 (MAINDEC-11-DZRJI)
        PART 2 (MAINDEC-11-DZRJJ)

2.3 PROGRAMMABLE DRIVES (DUAL PORT ENABLED)

THIS REV INCORPORATES A SAFEGUARD TO PREVENT INADVERTENT
CORRUPTION OF DISK PACKS IN PROGRAMMABLE DRIVES.
THIS IS A POTENTIAL HAZARD IN RUNNING THIS PROGRAM IN A
MULTIPROCESSOR SYSTEM. FOR THE STANDARD STARTING ADDRESS OF 200
THE PROGRAM HAS BEEN MODIFIED TO PREVENT INITIALIZING DRIVES
FOUND TO BE PROGRAMMABLE. THIS MODIFICATION APPLIES
ONLY TO THE FIELD ENVIRONMENT (XXDP CHAIN, STANDALONE)
WHERE LOCATION 42 DOES NOT EQUAL LOCATION 46. FOR THE
MANUFACTURING ENVIRONMENT (WHERE LOCATION 42 EQUALS LOCATION 46) PROGRAMMABLE
DRIVES WILL NOT BE INHIBITED. IF THE OPERATOR DESIRES TO RUN THIS PROGRAM USING
PROGRAMMABLE DRIVES IN A FIELD ENVIRONMENT USE STARTING ADDRESS 220, WHERE 220 I
THE SAME AS 200 WITHOUT INHIBITING PROGRAMMABLE DRIVES.
SEE SECTION 4.1 FOR A SUMMARY OF ALL STARTING ADDRESSES.

3. LOADING PROCEDURES

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

4. STARTING PROCEDURES

4.1 STARTING ADDRESSES

THE PROGRAM IS STARTED FROM LOCATION 200(8) IF THE ADDRESS OF THE RH11 OR RH70 WILL NOT BE CHANGED
PROGRAMMABLE DRIVES ARE INHIBITED, STANDALONE AND XXDP CHAIN-SEE SECTION 2.3

THE PROGRAM IS STARTED FROM LOCATION 204(8) IF THE ADDRESS OF THE RH11 OR RH70 IS TO BE CHANGED FROM THE PRELOADED VALUE. (SEE SECTION 4.3) PROGRAMMABLE DRIVES ARE NOT INHIBITED.

STARTING ADDRESS 220 IS THE SAME AS 200 BUT WITH NO INHIBITIONS.

4.2 OPERATION ACTION

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

2. LOAD THE STARTING ADDRESS - 200(8) OR 204(8) OR 220(8).

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

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

4. THE PROGRAM WILL THEN TYPE THE FOLLOWING MESSAGE:

   'PROGRAM MODE (C OR F):'

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

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

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

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

6. THE PROGRAM WILL THEN ASK FOR A DRIVE:

   'DRIVE: '

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

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

    'ENTER ADDRESS LIMITS: '

THE PREVIOUSLY SELECTED OR DEFAULT VALUES FOR BEGINNING CYLINDER
AND TRACK AND FOR ENDING CYLINDER AND TRACK WILL BE TYPED OUT.
IF A 'CARRIAGE RETURN' IS TYPED AS A RESPONSE, THE PRESENT VALUE
WILL BE USED; IF A 'PERIOD' IS TYPED, THE PROGRAM WILL BYPASS
THE REMAINING ENTRIES AND WILL USE THEIR PRESENT VALUES. NOTE
THAT THE CYLINDER AND TRACK VALUES ARE D E C I M A L NUMBERS.
THE ADDRESS SPECIFIED BY THE BEGINNING CYLINDER AND TRACK MUST
BE LESS THAN THE ADDRESS SPECIFIED BY THE ENDING CYLINDER AND
TRACK ADDRESS.

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

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

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

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

        165555
        133333

8. THE PROGRAM WILL THEN TYPE:

    'STARTING FORMAT ON DRIVE N'

OR

    'STARTING CHECK ON DRIVE N'

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

    'PRESENT ADDRESS IS: CXXX TXX'

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

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

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

4.3 RH11 - RH70 UNIBUS ADDRESS

THE PROGRAM ASSUMES THAT THE RH11 OR RH70 ADDRESSES START AT 176700 AND THAT THE VECTOR ADDRESS IS 254. THESE ADDRESSES MAY BE CHANGED WHEN THE PROGRAM IS STARTED FROM LOCATION 204(8). IF THE RH11 - RH70 IS NOT AT THE DEFAULT ADDRESS, THE PROGRAM MUST BE STARTED FROM 204(8) INITIALLY AS THE PROGRAM GOES THROUGH THE ADDRESS CHANGE ROUTINE AT INITIAL START ONLY. ENTER THE RH11 RH70 ADDRESS IN RESPONSE TO THE REQUEST FROM THE PROGRAM.

4.4 OTHER UNIBUS ADDRESSES

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

5. SWITCH REGISTER SETTINGS

SW<15>=1...HALT ON ERROR
SW<13>=1...INHIBIT ERROR TYPEOUTS
SW<10>=1...BELL ON ERROR
SW<09>=1...LOOP ON ERROR
SW<07>=1...PRINT SOFT ERROR REPORTS AS THEY OCCUR
SW<02>=1...DON'T DISPLAY SYSTEM STATUS AFTER INITIAL START
SW<01>=1...LOOP ON THE CURRENT TRACK
SW<00>=1...LOOP THE PROGRAM ON THE SELECTED DRIVE

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/34) THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE 'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL

RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM
IS AT A HIGHER PRIORITY PROCESSING AN RP04/5/6 INTERRUPT. THE
'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE
TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN   NEW ='

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

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

6. ERROR MESSAGES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. 'HARDWARE ERROR DURING WRITE CHECK' - AN ERROR THAT WAS NEITHER A DATA ERROR, WRITE CHECK ERROR, NOR CONTROLLER ERROR OCCURRED DURING A WRITE CHECK. THESE ERRORS COULD BE ONE OF THE FOLLOWING: 'OPI', 'DTE', 'HCRC', 'HCE', OR 'FER'.

7. MISCELLANEOUS

7.1 FORMAT TIME

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

7.2 HALTING THE PROGRAM

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

7.3 SURFACE VERIFICATION

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

8. PROGRAM DESCRIPTION

8.1 FORMAT OPERATION

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

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

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

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

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

8.2 CHECK OPERATION

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

8.3 POSITIONER VERIFICATION

AFTER THE PROGRAM COMPLETES THE FORMAT OPERATION, THE

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



                                9.      PROGRAM LISTING
                                        ---------------
                                        @
                                .TITLE  CZRJBD0, RP04/5/6 FMTR
                                ;*COPYRIGHT (C) 1976,1978
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY C. HESS
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*

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

                                .SBTTL  TRAP CATCHER

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

                                .SBTTL  ACT11 HOOKS

                                ;;******************************************************************
                                ;HOOKS REQUIRED BY ACT11
        000200                          $SVPC=.                 ;SAVE PC
        000046                          .=46
000046  005422                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
        000052                          .=52
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```
                                        .WORD   20000           ;;2)SET LOC.52 TO 20000
                                        .=$SVPC                 ;; RESTORE PC

                                .SBTTL  STARTING ADDRESS = 200
                                        .=200
000200  000137  002132                  JMP     BEGIN1          ;NORMAL STARTING ADDRESS (INHIBIT PROGRAMMABLE DRIVES
                                                                ;SEE SEC 2.3)

                                .SBTTL  STARTING ADDRESS TO CHANGE THE RH11 ADDRESS = 204
000204  000137  002114                  JMP     BEGIN           ;CHANGE THE RH11 ADDRESS (NO INHIBITIONS)

                                        .=220
000220  000137  002100                  JMP     BEGIN3          ;SAME AS 200 WITH NO INHIBITIONS

                                .SBTTL  BASIC DEFINITIONS

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

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

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

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

                                ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
```

```
                        100000          SW15=   100000
                        040000          SW14=   40000
                        020000          SW13=   20000
                        010000          SW12=   10000
                        004000          SW11=   4000
                        002000          SW10=   2000
                        001000          SW09=   1000
                        000400          SW08=   400
                        000200          SW07=   200
                        000100          SW06=   100
                        000040          SW05=   40
                        000020          SW04=   20
                        000010          SW03=   10
                        000004          SW02=   4
                        000002          SW01=   2
                        000001          SW00=   1
                                        .EQUIV  SW09,SW9
                                        .EQUIV  SW08,SW8
                                        .EQUIV  SW07,SW7
                                        .EQUIV  SW06,SW6
                                        .EQUIV  SW05,SW5
                                        .EQUIV  SW04,SW4
                                        .EQUIV  SW03,SW3
                                        .EQUIV  SW02,SW2
                                        .EQUIV  SW01,SW1
                                        .EQUIV  SW00,SW0

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

                                        ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
```

```
        000004          ERRVEC= 4                     ;;TIME OUT AND OTHER ERRORS
        000010          RESVEC= 10                    ;;RESERVED AND ILLEGAL INSTRUCTIONS
        000014          TBITVEC=14                    ;;'T'' BIT
        000014          TRTVEC= 14                    ;;TRACE TRAP
        000014          BPTVEC= 14                    ;;BREAKPOINT TRAP (BPT)
        000020          IOTVEC= 20                    ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
        000024          PWRVEC= 24                    ;;POWER FAIL
        000030          EMTVEC= 30                    ;;EMULATOR TRAP (EMT) **ERROR**
        000034          TRAPVEC=34                    ;;'TRAP'' TRAP
        000060          TKVEC=  60                    ;;TTY KEYBOARD VECTOR
        000064          TPVEC=  64                    ;;TTY PRINTER VECTOR
        000240          PIRQVEC=240                   ;;PROGRAM INTERRUPT REQUEST VECTOR

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

                        .SBTTL  RH11 REGISTERS

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

                        ;CONTROL AND STATUS REGISTER 1 (RPCS1)

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

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

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

                        ;CONTROL AND STATUS REGISTER 2 (RPCS2)

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

                        ;DATA BUFFER REGISTER (RPDB)
```

```
                        ;(EACH BIT IS CALLED BY BIT NUMBER)


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

                        .SBTTL  RP04/5/6 REGISTERS

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

                        ;CONTROL AND STATUS 1 REGISTER. (#00)

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

                        ;DRIVE STATUS REGISTER (RPDS1) (#01)

                        ;DF5=   1               DRIVE FORWARD 5''/SEC.  (BIT #0)
000002                  DFF20=  2               ;DRIVE FORWARD 20''/SEC.  (BIT #1)
000004                  DIGB=   4               ;DRIVE TO INNER GUARD BAND (BIT #2)
000010                  GRV=    10              ;GO REVERSE (BIT #3)
000020                  DL64=   20              ;DIFFERENCE LESS THAN 64 (BIT #4)
000040                  DE1=    40              ;DIFFERENCE EQUALS 1 (BIT #5)
000100                  VV=     100             ;VOLUME VALID (BIT #6)
000200                  DRY=    200             ;DRIVE READY (BIT #7)
000400                  DPR=    400             ;DRIVE PRESENT (BIT #8)
001000                  PGM=    1000            ;PROGRAMABLE (BIT #9)
002000                  LST=    2000            ;LAST SECTOR TRANSFERRED (BIT #10)
004000                  WRL=    4000            ;WRITE LOCK (BIT #11)
010000                  MOL=    10000           ;MEDIUM ON-LINE (BIT #12)
020000                  PIP=    20000           ;POSITIONING OPERATION IN PROGRESS (BIT #13)
040000                  ERR=    40000           ;COMPOSITE ERROR (BIT #14)
100000                  ATA=    100000          ;ATTENTION ACTIVE (BIT #15)

                        ;ERROR REGISTER #01 (RPER1) (#02)

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

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                                ;MAINTAINABILITY REGISTER (RPMR)(#03)

000001                          DMD=    1               ;DIAGINOSTIC MODE (BIT #0)
000002                          MCLK=   2               ;MAINTAINABILITY CLOCK (BIT #1)
000004                          MINX=   4               ;MAINTAINABILITY INDEX (BIT #2)
000010                          MSTCK=  10              ;MAINTAINABILITY SECTOR CLOCK (BIT #3)
000020                          MRD=    20              ;MAINTAINABILITY READ (BIT #4)
000040                          MWR=    40              ;MAINTAINABILITY WRITE (BIT #5)
000200                          DTSY=   200             ;MAINTAINABILITY SYNC DETECTED (BIT #7)

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

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

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

                                ;DRIVE TYPE REGISTER (RPDT) (#06)

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

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

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

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

                000001          WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
                000002          CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
                000004          WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
                000010          CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
                000020          MSE=    20              ;MOTOR SEQUENCE ERROR (BIT #4)
                000040          TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
                000100          TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
                000200          FEN=    200             ;FAILSAFE ENABLED (BIT #7)
                000400          WRU=    400             ;WRITE READY UNSAFE (BIT #8)
                001000          MHS=    1000            ;MULTIPLE HEAD SELECT (BIT #9)
                002000          NHS=    2000            ;NO HEAD SELECTION (BIT #10)
                004000          IXE=    4000            ;INDEX ERROR (BIT #11)
                010000          VU30=   10000           ;30VOLT UNSAFE (BIT #12)
                020000          PLU=    20000           ;PLO UNSAFE (BIT #13)
                100000          ACU=    100000          ;AC UNSAFE (BIT #15)

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

                000001          WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
                000002          CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
                000004          WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
                000010          CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
                000020          RAW=    20              ;READ AND WRITE (BIT #4)
                000040          TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
                000100          TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
                000200          ABS=    200             ;ABNORMAL STOP (BIT #7)
                000400          WRU=    400             ;WRITE READY UNSAFE (BIT #8)
                001000          MHS=    1000            ;MUTLTIPLE HEAD SELECT (BIT #9)
                002000          NHS=    2000            ;NO HEAD SELECTION (BIT #10)
                004000          IXE=    4000            ;INDEX ERROR (BIT #11)
                020000          PLU=    20000           ;PLO UNSAFE (BIT #12)

                                ;OFFSET REGISTER (RPOF) (#11)

                000001          OF25=   1               ;OFFSET 25 MICRO INCHES (BIT #0)
                000002          OF50=   2               ;OFFSET 50 MICRO INCHES (BIT #1)
                000004          OF100=  4               ;OFFSET 100 MICRO INCHES (BIT #2)
                000010          OF200=  10              ;OFFSET 200 MICRO INCHES (BIT #3)
                000020          OF400=  20              ;OFFSET 400 MICRO INCHES (BIT #4)
                000040          OF800=  40              ;OFFSET 800 MICRO INCHES (BIT #5)
                000200          OFREV=  200             ;OFFSET NEGATIVE (REVERSE) (BIT #5)
                002000          HCI=    2000            ;HEADER COMPARE INHIBIT (BIT #10)
                004000          ECI=    4000            ;ERROR CORRECTION CODE INHIBIT (BIT #11)
                010000          FMT22=  10000           ;FORMAT BIT (BIT #12

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

                                ;CURRENT CYLINDER ADDRESS (RPCC) (#13)
                                ;(EACH BIT IS CALLED BY BIT NUMBER)
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                                ;SERIAL NUMBER REGISTER (RPSN) (#14)
                                ;(EACH IS CALLED BY BIT NUMBER)

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

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

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

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

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

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

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

                                .SBTTL  RP04/5/6 DRIVER COMMANDS

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

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

```
                                                                F 2
   922
   923
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                                .SBTTL  COMMON TAGS

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

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102  000             $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114  000             $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115  001             $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134  000             $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135  000             $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000             $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002             $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012             $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED'
001157  000             $TPFLG: .BYTE   0               ;;'TERMINAL AVAILABLE' FLAG (BIT<07>=0=YES)
001160  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001162  177607  000377    $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001166  077             $QUES:  .ASCII  /?/             ;;QUESTION MARK
001167  015             $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001170  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
                        000015  CR      =       15
                        000012  LF      =       12
001172  176700          $RPADR: .WORD   176700          ;RH11/RP04/5/6 UNIBUS ADDRESS
001174  000254          $RPVEC: .WORD   254             ;RH11 INTERRUPT VECTOR
001176  172540          $LKCSR: .WORD   172540          ;ADDRESS OF KW11-P CSR
001200  172542          $LKCSB: .WORD   172542          ;ADDRESS OF KW11-P COUNTER BUFFER
001202  000104  000106  $LPVEC: .WORD   104,106         ;ADDRESS OF KW11-P VECTOR
001206  177546          $LKS:   .WORD   177546          ;ADDRESS OF KW11-L CONTROL REGISTER
001210  000100  000102  $LLVEC: .WORD   100,102         ;ADDRESS OF KW11-L VECTOR
001214  000000          DRIVE:  .WORD   0               ;CONTAINS DRIVE NUMBER SELECTED
001216  000000          SOFSW:  .WORD   0               ;CONTENTS ARE FOR SOFTWARE DECISIONS
001220  000000          MODE:   .WORD   0               ;'FORMAT & VERIFY' OR 'CHECK' MODE INDICATOR
001222  000632          ENDCYL: .WORD   410.            ;ENDING CYLINDER
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001224  000000          BEGCYL: .WORD   0               ;STARTING CYLINDER
001226  000022          ENDTRK: .WORD   18.             ;ENDING TRACK
001230  000000          BEGTRK: .WORD   0               ;STARTING TRACK
001232  000000          TTRKS:  .WORD   0               ;TOTAL # OF TRACKS TO BE FORMATTED
001234  000000          TTRKSC: .WORD   0               ;TOTAL # OF TRACKS COUNTER
001236  000000          TRKCNT: .WORD   0               ;COUNTS TRKS FROM 0-18 PER CYL
001240  000000          PATSEL: .WORD   0               ;CONTAINS PATTERN SELECTED
001242  000000          PATA:   .WORD   0               ;1ST WORD OF PATTERN
001244  000000          PATB:   .WORD   0               ;2ND WORD OF PATTERN
001246  000000          CYLCK:  .WORD   0               ;STORE CYLINDER ADDRESS FOR FORMAT VERIFICATION
001250  000000          RETRY:  .WORD   0               ;MAINTAINS # OF WRITE RETRIES MADE
001252  000000          SAVSEC: .WORD   0               ;CONTAINS LAST BAD SECTOR ON FORMAT
001254  000000          SAVWC:  .WORD   0               ;CONTAINS WC FOR REMAINING SECTORS ON ERROR
001256  000000          WC:     .WORD   0               ;20 OR 22 SECTOR TRACK SIZE (IN WORDS)
001260  000000          MWC:    .WORD   0               ;2'S COMPLEMENT OF 'WC'
001262  000000          HEDERR: .WORD   0               ;POSITIONING ERROR DURING FORMAT INDICATOR
001264  000000          SEC20:  .WORD   0               ;20 OR 22 SECTOR MODE INDICATOR
                                                        ;0 = 20 SECTOR MODE
                                                        ;1'S = 22 SECTOR MODE
001266  000000          MAXSEC: .WORD   0               ;MAXIMUM SECTOR ADDRESS (FOR EITHER 20 OR 22 SECTOR
                                                        ;FORMAT)
001270  000000          DS.CYL: .WORD   0               ;ADDRESS OF CURRENT CYLINDER
001272  000000          DS.TRK: .WORD   0               ;ADDRESS OF CURRENT TRACK
001274  000000          DDRIVE: .WORD   0               ;DRIVE NUMBER OF 'DRIVER' ERROR MESSAGES
001276  000000          ATTN:   .WORD   0               ;ATTENTION REGISTER IMAGE FOR 'DRIVER'
                                                        ;ERROR MESSAGES
001300  000000          CNTLC:  .WORD   0               ;ADDRESS OF '^C' RETURN
001302  000000          CHGADR: .WORD   0               ;'CHANGE RH11 ADDRESS' FLAG
001304  000000          EFLG:   .WORD   0               ;'ERROR DURING WRITE CHECK' FLAG

                        ;RH11/RP04/5/6 REGISTERS STORED HERE AFTER AN OPERATION

001306  000000          RP.REG: .WORD   0               ;RPCS1
001310  000000                  .WORD   0               ;RPWC
001312  000000                  .WORD   0               ;RPBA
001314  000000                  .WORD   0               ;RPDA
001316  000000                  .WORD   0               ;RPCS2
001320  000000                  .WORD   0               ;RPDS1
001322  000000                  .WORD   0               ;RPER1
001324  000000                  .WORD   0               ;RPAS
001326  000000                  .WORD   0               ;RPLA
001330  000000                  .WORD   0               ;RPDB
001332  000000                  .WORD   0               ;RPMR
001334  000000                  .WORD   0               ;RPDT
001336  000000                  .WORD   0               ;RPSN
001340  000000                  .WORD   0               ;RPOF
001342  000000                  .WORD   0               ;RPCA
001344  000000                  .WORD   0               ;RPCC
001346  000000                  .WORD   0               ;RPER2
001350  000000                  .WORD   0               ;RPER3
001352  000000                  .WORD   0               ;RPEC1
001354  000000                  .WORD   0               ;RPEC2


                        ;DATA/PARAMETER BLOCK - USED FOR ALL DRIVE OPERATION
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1036  001356   000                    FMTDPB: .BYTE   0               ;DRIVE NUMBER
1037  001357   000                            .BYTE   0               ;OFFSET VALUE OR FMT22,ECI, AND HCI
1038  001360   000                            .BYTE   0               ;COMMAND
1039  001361   000                            .BYTE   0               ;PSEL AND A17 AND A16
1040  001362  000000                          .WORD   0               ;WORD COUNT (NEG)
1041  001364  000000                          .WORD   0               ;BUFFER ADDRESS
1042  001366   000                            .BYTE   0               ;SECTOR ADDRESS
1043  001367   000                            .BYTE   0               ;TRACK ADDRESS
1044  001370  000000                          .WORD   0               ;CYLINDER ADDRESS
1045  001372  001306                          .WORD   RP.REG          ;ERROR TABLE POINTER
1046  001374  000000                          .WORD   0               ;STATUS-ERROR INDICATOR
1047                                                                  ;BIT 15 = 1: ERROR OCCURRED
1048                                                                  ;BIT 07 = 1: DONE
1049                                                                  ;BIT 14-10 AND BIT 06-03
1050                                                                  ;INDICATE TYPE OF ERROR
1051
1052
1053                                  ;PARAMETER POINTER TABLE
1054
1055  001376  001430  000000  001224  TABLE:  PAR1,0,BEGCYL
1056  001404  001443  000022  001230          PAR2,18.,BEGTRK
1057  001412  001456  000000  001222          PAR3,0,ENDCYL
1058  001420  001467  000022  001226          PAR4,18.,ENDTRK,0
1059  001426  000000
1060
1061                                  ;ASCII MESSAGES FOR ADDRESS PARAMETERS
1062
1063  001430  052123  051101  020124  PAR1:   .ASCIZ  @START CYL @
1064  001436  054503  020114     000
1065  001443     123  040524  052122  PAR2:   .ASCIZ  @START TRK @
1066  001450  052040  045522  000040
1067  001456  047105  020104  054503  PAR3:   .ASCIZ  @END CYL @
1068  001464  020114     000
1069  001467     105  042116  052040  PAR4:   .ASCIZ  @END TRK @
1070  001474  045522  000040
1071
1072                                  ;SECTOR BUFFER ADDRESS TABLE
1073
1074  001500  025574                  ADRTBL: .WORD   BUFP             ;ADDRESS OF SECTOR 0
1075  001502  026604                          .WORD   BUFP+<520.*1.>  ;ADDRESS OF SECTOR 1
1076  001504  027614                          .WORD   BUFP+<520.*2.>  ;ADDRESS OF SECTOR 2
1077  001506  030624                          .WORD   BUFP+<520.*3.>  ;ADDRESS OF SECTOR 3
1078  001510  031634                          .WORD   BUFP+<520.*4.>  ;ADDRESS OF SECTOR 4
1079  001512  032644                          .WORD   BUFP+<520.*5.>  ;ADDRESS OF SECTOR 5
1080  001514  033654                          .WORD   BUFP+<520.*6.>  ;ADDRESS OF SECTOR 6
1081  001516  034664                          .WORD   BUFP+<520.*7.>  ;ADDRESS OF SECTOR 7
1082  001520  035674                          .WORD   BUFP+<520.*8.>  ;ADDRESS OF SECTOR 8
1083  001522  036704                          .WORD   BUFP+<520.*9.>  ;ADDRESS OF SECTOR 9
1084  001524  037714                          .WORD   BUFP+<520.*10.> ;ADDRESS OF SECTOR 10
1085  001526  040724                          .WORD   BUFP+<520.*11.> ;ADDRESS OF SECTOR 11
1086  001530  041734                          .WORD   BUFP+<520.*12.> ;ADDRESS OF SECTOR 12
1087  001532  042744                          .WORD   BUFP+<520.*13.> ;ADDRESS OF SECTOR 13
1088  001534  043754                          .WORD   BUFP+<520.*14.> ;ADDRESS OF SECTOR 14
1089  001536  044764                          .WORD   BUFP+<520.*15.> ;ADDRESS OF SECTOR 15
1090  001540  045774                          .WORD   BUFP+<520.*16.> ;ADDRESS OF SECTOR 16
1091  001542  047004                          .WORD   BUFP+<520.*17.> ;ADDRESS OF SECTOR 17
```

```
1092  001544  050014                  .WORD   BUFP+<520.*18.> ;ADDRESS OF SECTOR 18
1093  001546  051024                  .WORD   BUFP+<520.*19.> ;ADDRESS OF SECTOR 19
1094  001550  052034                  .WORD   BUFP+<520.*20.> ;ADDRESS OF SECTOR 20
1095  001552  053044                  .WORD   BUFP+<520.*21.> ;ADDRESS OF SECTOR 21
1096
1097                          ;REMAINING WORD COUNT TABLE
1098
1099  001554  000404          WCTBL:  .WORD   260.             ;REMAINING WORD COUNT AFTER SECTOR 0
1100  001556  001010                  .WORD   260.+<260.*1.>   ;REMAINING WORD COUNT AFTER SECTOR 1
1101  001560  001414                  .WORD   260.+<260.*2.>   ;REMAINING WORD COUNT AFTER SECTOR 2
1102  001562  002020                  .WORD   260.+<260.*3.>   ;REMAINING WORD COUNT AFTER SECTOR 3
1103  001564  002424                  .WORD   260.+<260.*4.>   ;REMAINING WORD COUNT AFTER SECTOR 4
1104  001566  003030                  .WORD   260.+<260.*5.>   ;REMAINING WORD COUNT AFTER SECTOR 5
1105  001570  003434                  .WORD   260.+<260.*6.>   ;REMAINING WORD COUNT AFTER SECTOR 6
1106  001572  004040                  .WORD   260.+<260.*7.>   ;REMAINING WORD COUNT AFTER SECTOR 7
1107  001574  004444                  .WORD   260.+<260.*8.>   ;REMAINING WORD COUNT AFTER SECTOR 8
1108  001576  005050                  .WORD   260.+<260.*9.>   ;REMAINING WORD COUNT AFTER SECTOR 9
1109  001600  005454                  .WORD   260.+<260.*10.>  ;REMAINING WORD COUNT AFTER SECTOR 10
1110  001602  006060                  .WORD   260.+<260.*11.>  ;REMAINING WORD COUNT AFTER SECTOR 11
1111  001604  006464                  .WORD   260.+<260.*12.>  ;REMAINING WORD COUNT AFTER SECTOR 12
1112  001606  007070                  .WORD   260.+<260.*13.>  ;REMAINING WORD COUNT AFTER SECTOR 13
1113  001610  007474                  .WORD   260.+<260.*14.>  ;REMAINING WORD COUNT AFTER SECTOR 14
1114  001612  010100                  .WORD   260.+<260.*15.>  ;REMAINING WORD COUNT AFTER SECTOR 15
1115  001614  010504                  .WORD   260.+<260.*16.>  ;REMAINING WORD COUNT AFTER SECTOR 16
1116  001616  011110                  .WORD   260.+<260.*17.>  ;REMAINING WORD COUNT AFTER SECTOR 17
1117  001620  011514                  .WORD   260.+<260.*18.>  ;REMAINING WORD COUNT AFTER SECTOR 18
1118  001622  012120                  .WORD   260.+<260.*19.>  ;REMAINING WORD COUNT AFTER SECTOR 19
1119  001624  012524                  .WORD   260.+<260.*20.>  ;REMAINING WORD COUNT AFTER SECTOR 20
1120  001626  013130                  .WORD   260.+<260.*21.>  ;REMAINING WORD COUNT AFTER SECTOR 21
1121
1122                          .EVEN
1123
```

```
                                .SBTTL  ERROR POINTER TABLE

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

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

001630                          $ERRTB:
                                ;ERROR 1

001630  022512                          EM1                     ;RH11 INTERRUPT OCCURRED (RPAS=0)
001632  023674                          DH1
001634  025146                          DT1
001636  025460                          DF1

                                ;ERROR 2

001640  022553                          EM2                     ;UNEXPECTED ATTENTION OCCURRED
001642  023701                          DH2
001644  025150                          DT2
001646  025464                          DF2

                                ;ERROR 3

001650  022611                          EM3                     ;MASSBUS PARITY ERROR (MCPE=1)
001652  023756                          DH3
001654  025164                          DT3
001656  025470                          DF3

                                ;ERROR 4

001660  022647                          EM4                     ;MASSBUS PARITY ERROR (PAR=1)
001662  024004                          DH4
001664  025172                          DT4
001666  025474                          DF4

                                ;ERROR 5

001670  022704                          EM5                     ;ADDRESS PLUG CHANGE BIT SET
001672  023701                          DH2
001674  025150                          DT2
001676  025464                          DF2

                                ;ERROR 6

001700  022740                          EM6                     ;RH11 DIDN'T RESPOND TO ADDRESSING
001702  024043                          DH6
001704  025202                          DT6
001706  025460                          DF1
```

```
1180
1181                                    ;ERROR 7
1182
1183  001710  000000                            0                       ;UNUSED
1184  001712  000000                            0
1185  001714  000000                            0
1186  001716  000000                            0
1187
1188                                    ;ERROR 10
1189
1190  001720  023002                          EM10                      ;DRIVE OFFLINE
1191  001722  024056                          DH10
1192  001724  025204                          DT10
1193  001726  025500                          DF10
1194
1195                                    ;ERROR 11
1196
1197  001730  023020                          EM11                      ;PERSISTENT DRIVE UNSAFE ERROR
1198  001732  024056                          DH10
1199  001734  025204                          DT10
1200  001736  025500                          DF10
1201
1202                                    ;ERROR 12
1203
1204  001740  023056                          EM12                      ;UNCORRECTABLE MASSBUS PARITY ERROR
1205  001742  024056                          DH10
1206  001744  025204                          DT10
1207  001746  025500                          DF10
1208
1209                                    ;ERROR 13
1210
1211  001750  023121                          EM13                      ;SOFTWARE TIMEOUT
1212  001752  024056                          DH10
1213  001754  025204                          DT10
1214  001756  025500                          DF10
1215
1216                                    ;ERROR 14
1217
1218  001760  023142                          EM14                      ;DRIVE UNSAFE ERROR
1219  001762  024056                          DH10
1220  001764  025204                          DT10
1221  001766  025500                          DF10
1222
1223                                    ;ERROR 15
1224
1225  001770  023165                          EM15                      ;CONTROLLER/DRIVE ERROR DURING WRITE
1226  001772  024056                          DH10
1227  001774  025204                          DT10
1228  001776  025500                          DF10
1229
1230                                    ;ERROR 16
1231
1232  002000  023231                          EM16                      ;CONTROLLER/DRIVE ERROR DURING WRITE CHECK
1233  002002  024056                          DH10
1234  002004  025204                          DT10
1235  002006  025500                          DF10
```

```
1236
1237                                    ;ERROR 17
1238
1239  002010  023303                            EM17                    ;RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE
1240  002012  024326                            DH17
1241  002014  025260                            DT17
1242  002016  025514                            DF17
1243
1244                                    ;ERROR 20
1245
1246  002020  023361                            EM20                    ;DATA ERROR DURING WRITE CHECK
1247  002022  024375                            DH20
1248  002024  025272                            DT20
1249  002026  025520                            DF20
1250
1251                                    ;ERROR 21
1252
1253  002030  023417                            EM21                    ;CONTROLLER/DRIVE ERROR VERIFYING HEADERS
1254  002032  024056                            DH10
1255  002034  025204                            DT10
1256  002036  025500                            DF10
1257
1258                                    ;ERROR 22
1259
1260  002040  023470                            EM22                    ;'HCE' ERROR VERIFYING HEADERS
1261  002042  024056                            DH10
1262  002044  025204                            DT10
1263  002046  025500                            DF10
1264
```

```
1265                                    ;ERROR 23
1266
1267   002050  023537                           EM23                    ;CYLINDER FIELD IN HEADER IS NOT CORRECT
1268   002052  024674                           DH23
1269   002054  025354                           DT23
1270   002056  025540                           DF23
1271
1272                                    ;ERROR 24
1273
1274   002060  023607                           EM24                    ;WRITE CHECK ERROR
1275   002062  024772                           DH24
1276   002064  025372                           DT24
1277   002066  025544                           DF24
1278
1279                                    ;ERROR 25
1280
1281   002070  023631                           EM25                    ;HARDWARE ERROR DURING WRITE CHECK
1282   002072  024375                           DH20
1283   002074  025272                           DT20
1284   002076  025520                           DF20
1285
1286                                    ;;*****************************************************************
1287
1288                                    .SBTTL  MAIN PROGRAM
```

```
 1289
 1290                                   ;;*****************************************************************
 1291
 1292  002100  005037  001302          BEGIN3: CLR     CHGADR          ;CLEAR THE INDICATOR
 1293  002104  012737  000001  013310          MOV     #1,     TSTPGM  ;ENABLE PROGRAMMABLE DRIVES
 1294  002112  000413                          BR      BEGIN2
 1295  002114  012737  177777  001302  BEGIN:  MOV     #-1,CHGADR      ;SET CHANGE 'RH11 BUS ADDRESS' INDICATOR
 1296  002122  012737  000001  013310          MOV     #1,     TSTPGM  ;ENABLE PROGRAMMABLE DRIVES
```

```
 1297  002130  000404                          BR      BEGIN2          ;START THE PROGRAM
 1298  002132  005037  001302          BEGIN1: CLR     CHGADR          ;CLEAR THE 'CHANGE RH11 ADDRESS' INDICATOR
 1299  002136  005037  013310                  CLR     TSTPGM          ;DISABLE PROGRAMMABLE DRIVES
 1300  002142  000005                  BEGIN2: RESET                   ;CLEAR THE BUS
 1301  002144  005037  001304                  CLR     EFLG            ;CLEAR ERROR DURING WRITE CHECK FLAG
 1302                                  .SBTTL  INITIALIZE THE COMMON TAGS
 1303                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
 1304  002150  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
 1305  002154  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
 1306  002156  022706  001140                  CMP     #SWR,R6 ;;DONE?
 1307  002162  001374                          BNE     .-6             ;;LOOP BACK IF NO
 1308  002164  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
 1309                                  ;;INITIALIZE A FEW VECTORS
 1310  002170  012737  007064  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
 1311  002176  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
 1312  002204  012737  012242  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
 1313  002212  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
 1314  002220  005037  001160                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
 1315  002224  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
 1316                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
 1317                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
 1318  002232  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
 1319  002236  012737  002272  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
 1320  002244  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
 1321  002252  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
 1322  002260  022777  177777  176652          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
 1323  002266  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
 1324                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
 1325  002270  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
 1326  002272  012716  002300          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
 1327  002276  000002                          RTI
 1328  002300  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
 1329  002306  012737  000174  001142          MOV     #DISPREG,DISPLAY
 1330  002314  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
 1331
 1332  002320  000005                          RESET                   ;CLEAR WORLD
 1333  002322  012737  000240  000036          MOV     #PR5,@#TRAPVEC+2  ;CHANGE TRAP PRIORITY BACK TO 5
 1334  002330  012737  000240  000032          MOV     #PR5,@#EMTVEC+2 ;CHANGE EMT PRIORITY BACK TO 5
 1335  002336  012737  002132  001300          MOV     #BEGIN1,CNTLC   ;'CONTROL C' ADDRESS
```

```
 1336  002344  005227  177777                    INC     #-1             ;FIRST START ?
 1337  002350  001025                            BNE     1$              ;BR IF NOT
 1338  002352  023737  000042  000046            CMP     @#42,@#46       ;ACT11 AUTOMATIC MODE?
 1339  002360  001004                            BNE     4$              ;BRANCH IF NO
 1340  002362  012737  000001  013310            MOV     #1,     TSTPGM  ;ENABLE PROGRAMMABLE DRIVES
 1341  002370  000402                            BR      5$
 1342  002372  104401  025574          4$:       TYPE    ,TITLE          ;TYPE THE PROGRAM'S TITLE
 1343  002376  005737  013310          5$:       TST     TSTPGM          ;CAN WE USE PROGRAMMABLE DRIVES?
 1344  002402  001402                            BEQ     6$              ;BRANCH IF NO
 1345  002404  104401  021010                    TYPE    ,USE            ;TYPE MSG
 1346  002410                          6$:
 1347  002410  122737  000011  000041            CMPB    #11,41          ;LOADED FROM AN RP04/5/6 ?
 1348  002416  001002                            BNE     1$              ;BR IF NOT
 1349  002420  104401  025651                    TYPE    ,LOADRV         ;INSTRUCT OPERATOR TO REMOVE 'XXDP'
 1350                                                                    ;PACK FROM DRIVE 0
 1351  002424  004737  010432          1$:       JSR     PC,$TKINT       ;TURN ON THE KEYBOARD INTERRUPT
 1352                                  .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
 1353  002430  005737  000042                    TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
 1354  002434  001006                            BNE     67$             ;;BRANCH IF YES
 1355  002436  023727  001140  000176            CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
 1356  002444  001005                            BNE     68$             ;;BRANCH IF NO
 1357  002446  104406                            GTSWR                   ;;GET SOFT-SWR SETTINGS
 1358  002450  000403                            BR      68$
 1359  002452  112737  000001  001134  67$:      MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
 1360  002460                          68$:
 1361  002460  005227  177777                    INC     #-1             ;CHECK FOR FIRST START
 1362  002464  001010                            BNE     SETVEC          ;BR IF NOT
 1363  002466  004737  026076                    JSR     PC,BUSADR       ;CHECK THE RH11 ADDRESS
 1364  002472  013737  001172  012474            MOV     $RPADR,RPADR    ;RH11 ADDRESS
 1365  002500  013737  001174  012476            MOV     $RPVEC,RPVEC    ;RH11 VECTOR ADDRESS
 1366
 1367                                  ;DISPLAY DRIVE STATUS AND SET UP THE OTHER UNITS THE
 1368                                  ;       PROGRAM WILL USE
 1369
 1370  002506  004737  006170          SETVEC: JSR     PC,ST.CLK       ;START THE CLOCK
 1371  002512  004737  012512                  JSR     PC,RPINIT       ;INITIALIZE THE RP04/5/6 DRIVER
 1372  002516  012737  177777  012434          MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
 1373  002524  005227  177777                  INC     #-1             ;SEE IF FIRST START
 1374  002530  001404                          BEQ     11$             ;BR IF YES
 1375  002532  032777  000004  176400          BIT     #SW02,@SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
 1376  002540  001105                          BNE     10$             ;BR IF NOT
 1377  002542  012737  000340  177776  11$:    MOV     #PR7,PS         ;SET PRIORITY TO 7
 1378  002550  005004                          CLR     R4              ;DRIVE TABLE POINTER
 1379  002552  104401  001167                  TYPE    ,$CRLF          ;CR-LF
 1380  002556  104401  021240                  TYPE    ,SYSTAT         ;TYPE STATUS HEADING
 1381  002562                          1$:
 1382  002562  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
 1383                                                                  ;;TYPE DRIVE NUMBER
 1384  002564  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 1385  002566     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
 1386  002567     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 1387  002570  104401  021303                  TYPE    ,LIN4SP         ;SPACES
 1388  002574  105764  012346                  TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
 1389  002600  100425                          BMI     4$              ;BR IF UNSAFE
 1390  002602  001027                          BNE     5$              ;BR IF ONLINE
 1391  002604  105764  012356                  TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
```

```
1392  002610  001404                          BEQ     2$              ;BR IF NONEXISTENT
1393  002612  100006                          BPL     3$              ;BR IF OFFLINE
1394  002614  104401  021153                  TYPE    ,NOTRP          ;DRIVE NOT AN RP04/5/6
1395  002620  000447                          BR      9$              ;CHECK NEXT DRIVE
1396  002622  104401  021174          2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
1397  002626  000444                          BR      9$              ;CHECK NEXT DRIVE
1398  002630  132764  000010  012356  3$:     BITB    #BIT03, DRVTYP(R4)      ;DRIVE PROGRAMMABLE?
1399  002636  001403                          BEQ     12$             ;BRANCH IF NO
1400  002640  104401  021065                  TYPE    ,NOUSE          ;PRINT MSG
1401  002644  000410                          BR      6$              ;PRINT DRIVE TYPE
1402  002646  104401  021132          12$:    TYPE    ,UNTOFF         ;DRIVE OFFLINE
1403  002652  000405                          BR      6$              ;PRINT DRIVE TYPE
1404  002654  104401  021211          4$:     TYPE    ,NOTSAF         ;DRIVE UNSAFE
1405  002660  000402                          BR      6$              ;PRINT DRIVE TYPE
1406  002662  104401  021143          5$:     TYPE    ,UNTON          ;DRIVE ONLINE
1407  002666  104401  021305          6$:     TYPE    ,LINSP          ;SPACES
1408  002672  012737  021221  002736          MOV     #RP04B,8$       ;ADDRESS OF RP04 MESSAGE
1409  002700  132764  000001  012356          BITB    #BIT00,DRVTYP(R4)  ;RP04 ?
1410  002706  001012                          BNE     7$              ;BR IF YES
1411  002710  012737  021226  002736          MOV     #RP05,8$        ;ADDRESS OF RP05 MESSAGE
1412  002716  132764  000002  012356          BITB    #BIT01,DRVTYP(R4)  ;RP05 ?
1413  002724  001003                          BNE     7$              ;BR IF YES
1414  002726  012737  021233  002736          MOV     #RP06,8$        ;ADDRESS OF RP06 MESSAGE
1415  002734  104401                  7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
1416  002736  000000                  8$:     .WORD   0               ;MESSAGE ADDRESS HERE
1417  002740  104401  001167          9$:     TYPE    ,$CRLF          ;CR-LF
1418  002744  005204                          INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
1419  002746  020427  000010                  CMP     R4,#8.          ;FINISHED ?
1420  002752  001303                          BNE     1$              ;BR IF NOT
1421  002754  104401  001167          10$:    TYPE    ,$CRLF          ;CR-LF
1422
1423
1424                                  ;SEE WHICH MODE THE PROGRAM IS TO BE RUN IN.
1425                                  ;MODES ARE: 'FORMAT & VERIFY' OR 'CHECK FORMAT'
1426
1427  002760  005037  001220          M1:     CLR     MODE            ;SET MODE TO 'CHECK FORMAT'
1428  002764  104401  021521                  TYPE    ,MMODE          ;TYPE 'PROGRAM MODE'
1429  002770  104411                          RDLIN                   ;READ THE KEYBOARD
1430  002772  012601                          MOV     (SP)+,R1        ;GET ADDRESS OF INPUT
1431  002774  105711                          TSTB    (R1)            ;'CR' ENTERED (DEFAULT)
1432  002776  001414                          BEQ     2$              ;BR IF YES
1433  003000  122711  000103                  CMPB    #'C,(R1)        ;'CHECK' ?
1434  003004  001406                          BEQ     1$              ;BR IF YES
1435  003006  122711  000106                  CMPB    #'F,(R1)        ;'FORMAT' ?
1436  003012  001411                          BEQ     3$              ;BR IF YES
1437  003014  104401  001166                  TYPE    ,$QUES          ;NO CORRECT ENTRY
1438  003020  000757                          BR      M1              ;TRY AGAIN
1439  003022  104401  021574          1$:     TYPE    ,MHECK          ;TYPE REST OF 'CHECK'
1440  003026  000410                          BR      M1A             ;GET STARTING ADDRESS
1441  003030  104401  021553          2$:     TYPE    ,MFORMT         ;TYPE DEFAULT MESSAGE
1442  003034  000402                          BR      4$              ;SET UP MODE
1443  003036  104401  021607          3$:     TYPE    ,MORMAT         ;TYPE REST OF 'FORMAT'
1444  003042  012737  177777  001220  4$:     MOV     #-1,MODE        ;SET MODE TO 'FORMAT & VERIFY'
1445
1446                                  ;FIND OUT IF FORMAT IS TO BE IN 20 OR 22 SECTOR MODE
1447
```

```
1448  003050  104401  021627          M1A:    TYPE    ,MSIZE          ;TYPE FORMAT MODE REQUEST
1449  003054  104411                  RDLIN                           ;READ THE KEYBOARD
1450  003056  012601                  MOV     (SP)+,R1                ;ADDRESS OF ENTRY
1451  003060  122711  000131          CMPB    #'Y,(R1)                ;IS ENTRY A 'Y' ?
1452  003064  001410                  BEQ     1$                      ;BR IF IT IS
1453  003066  122711  000116          CMPB    #'N,(R1)                ;IS ENTRY A 'N' ?
1454  003072  001424                  BEQ     2$                      ;BR IF IT IS
1455  003074  105711                  TSTB    (R1)                    ;DEFAULT MODE ?
1456  003076  001403                  BEQ     1$                      ;BR IF IT IS
1457  003100  104401  001166          TYPE    ,$QUES                  ;TYPE '?'
1458  003104  000761                  BR      M1A                     ;TRY AGAIN
1459  003106  104401  021700          1$:     TYPE    ,MSEC22         ;TYPEOUT MODE SELECTED
1460  003112  012737  013130  001256  MOV     #<260.*22.>,WC  ;TRACK SIZE IN 22 SECTOR MODE
1461  003120  012737  164650  001260  MOV     #-<260.*22.>,MWC  ;2'S COMPLEMENT WORD COUNT
1462  003126  012737  177777  001264  MOV     #-1,SEC20               ;22 SECTOR INDICATOR
1463  003134  012737  000025  001266  MOV     #21.,MAXSEC             ;MAX SECTOR ADDRESS IN 22 SECTOR MODE
1464  003142  000415                  BR      M1B                     ;CONTINUE
1465  003144  104401  021757          2$:     TYPE    ,MSEC20         ;TYPE OUT 20 SECTOR MODE SELECTED
1466  003150  012737  012120  001256  MOV     #<260.*20.>,WC  ;TRACK SIZE IN 20 SECTOR MODE
1467  003156  012737  165660  001260  MOV     #-<260.*20.>,MWC  ;2'S COMPLEMENT WORD COUNT
1468  003164  005037  001264          CLR     SEC20                   ;20 SECTOR INDICATOR
1469  003170  012737  000023  001266  MOV     #19.,MAXSEC             ;MAX SECTOR ADDRESS IN 20 SECTOR MODE
1470  003176  005037  001230          M1B:    CLR     BEGTRK          ;CLEAR STARTING TRACK ADDRESS
1471  003202  005037  001224          CLR     BEGCYL                  ;CLEAR BEGINNING CYLINDER ADDRESS
1472  003206  012737  000022  001226  MOV     #18.,ENDTRK             ;SETUP END TRACK ADDRESS
1473  003214  012737  000002  001240  MOV     #2,PATSEL               ;SETUP FOR WORST CASE PATTERN
1474  003222  112737  177777  001356  MOVB    #-1,FMTDPB              ;SETUP INVALID DRIVE NUMBER
1475  003230  000400                  BR      M0                      ;BRANCH TO START
1476
1477                                  ;GO FIND OUT WHAT DRIVE
1478
1479  003232  012737  006344  001300  MC:     MOV     #0ENTER,CNTLC   ;CONTROL C ABORT ENTRANCE
1480  003240  005037  001112          CLR     $ERTTL                  ;CLEAR THE ERROR ACCUMULATOR
1481  003244  004737  010432          JSR     PC,$TKINT               ;INITIALIZE THE TTY KEYBOARD
1482  003250  104401  021257          TYPE    ,MUNIT                  ;ASK FOR DRIVE NUMBER
1483  003254  104411                  RDLIN                           ;READ THE KEYBOARD
1484  003256  012601                  MOV     (SP)+,R1                ;ADDRESS OF ENTRY
1485  003260  004537  006654          JSR     R5,CK.CHR               ;CHECK ONE CHARACTER
1486  003264  003312                  3$                              ;ILLEGAL CHARACTER
1487  003266  003300                  2$                              ;CARRIAGE RETURN
1488  003270  003312                  3$                              ;''
1489  003272  003300                  2$                              ;,,''
1490  003274  003320                  4$                              ;.
1491  003276  003312                  3$                              ;DIGIT 0-7
1492  003300  005037  001214          2$:     CLR     DRIVE           ;DIGIT 8-9
1493  003304  104401  021301          TYPE    ,MDRVD                  ;SELECT DRIVE ZERO
1494  003310  000413                  BR      5$                      ;GO TYPE DEFAULT DRIVE NUMBER
1495  003312  104401  001166          3$:     TYPE    ,$QUES          ;GO SEE IF DRIVE ZERO IS THERE
1496  003316  000745                  BR      MC                      ;TYPE '?'
1497  003320  010237  001214          4$:     MOV     R2,DRIVE        ;ASK FOR DRIVE NUMBER AGAIN
1498  003324  005702                  TST     R2                      ;SAVE DRIVE NUMBER
1499  003326  001004                  BNE     5$                      ;SEE IF DRIVE 0
1500  003330  122737  000011  000041  CMPB    #11,41                  ;BR IF NOT
1501  003336  001431                  BEQ     7$                      ;PROGRAM LOADED FROM AN RP04/5/6 ?
1502  003340  004737  006170          5$:     JSR     PC,ST.CLK       ;BR IF IT WAS, CAN'T FORMAT THE DRIVE
1503  003344  004737  012512          JSR     PC,RPINIT               ;START THE CLOCK
                                                                      ;GO SEE WHAT DRIVES ARE AVAILABLE
```

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1504  003350  012737  177777  012434          MOV     #-1,SAVEFG      ;SAVE THE REGISTERS
1505  003356  012737  177777  012436          MOV     #-1,SEEKFG      ;SET 'NO OPTIMIZATION' FLAG
1506  003364  005037  177776                  CLR     PS              ;SET PRIORITY BACK TO ZERO
1507  003370  105762  012346                  TSTB    DRVSTA(R2)      ;LOOK AT DRIVE STATUS
1508  003374  003015                          BGT     8$              ;BRANCH IF ONLINE
1509  003376  001403                          BEQ     6$              ;BR IF DRIVE NOT AVAILABLE
1510  003400  104401  021467                  TYPE    ,MUSDR          ;'DRIVE UNSAFE'
1511  003404  000712                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
1512  003406  105762  012356          6$:     TSTB    DRVTYP(R2)      ;A DRIVE PRESENT?
1513  003412  001003                          BNE     7$              ;BR IF SO
1514  003414  104401  021362                  TYPE    ,MDRNP          ;TYPE 'DRIVE NOT PRESENT'
1515  003420  000704                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
1516  003422  104401  021407          7$:     TYPE    ,MER11          ;'DRIVE NOT AVAILABLE'
1517  003426  000701                          BR      M0              ;GO GET DRIVE NUMBER AGAIN
1518  003430  123737  001214  001356  8$:     CMPB    DRIVE,FMTDPB    ;SAME DRIVE AS LAST TIME ?
1519  003436  001430                          BEQ     M2              ;BR IF IT IS
1520  003440  113737  001214  001356          MOVB    DRIVE,FMTDPB    ;SETUP DRIVE ADDRESS
1521  003446  012737  000632  001222          MOV     #410.,ENDCYL    ;SETUP FOR RP04/5
1522  003454  132762  000003  012356          BITB    #BIT00!BIT01,DRVTYP(R2)  ;SEE IF DRIVE RP04/5
1523  003462  001003                          BNE     9$              ;BR IF EITHER
1524  003464  012737  001456  001222          MOV     #814.,ENDCYL    ;SETUP ENDING CYLINDER FOR RP06
1525  003472  005037  001230          9$:     CLR     BEGTRK          ;CLEAR STARTING TRACK ADDRESS
1526  003476  005037  001224                  CLR     BEGCYL          ;CLEAR STARTING CYLINDER ADDRESS
1527  003502  013737  001222  001400          MOV     ENDCYL,TABLE+2  ;ENTRY LIMIT FOR BEGINNING CYLINDER
1528  003510  013737  001222  001414          MOV     ENDCYL,TABLE+16 ;ENTRY LIMIT FOR END CYLINDER
1529  003516  000400                          BR      M2              ;GET ADDRESS LIMITS FROM THE OPERATOR
1530
1531                                  ;GET ADDRESS LIMITS
1532
1533  003520  104401  021310          M2:     TYPE    ,ENTADR         ;'ENTER ADDRESS LIMITS'
1534  003524  004737  006464                  JSR     PC,PARENT       ;GET THE ADDRESS LIMITS
1535  003530  023737  001222  001224          CMP     ENDCYL,BEGCYL   ;SEE IF ENDING CYLINDER EQ TO GT THAN BEGINNING
1536  003536  101010                          BHI     M4              ;BR IF HIGHER
1537  003540  103404                          BLO     3$              ;BR IF LESS
1538  003542  023737  001226  001230  2$:     CMP     ENDTRK,BEGTRK   ;SEE IF ENDING TRACK EQ OR GT THAN BEGINNING
1539  003550  103003                          BHIS    M4              ;BR IF YES
1540  003552  104401  022056          3$:     TYPE    ,MADRER         ;INVALID ADDRESS ENTERED
1541  003556  000760                          BR      M2              ;TRY AGAIN
1542
1543                                  ;GO GET DATA PATTERN FOR FORMAT
1544
1545  003560  104401  022160          M4:     TYPE    ,MSELP          ;GO TYPE 'SELECT PATTERN'
1546  003564  104411                          RDLIN                   ;READ THE KEYBOARD
1547  003566  012601                          MOV     (SP)+,R1        ;ENTRY ADDRESS
1548  003570  004537  006654                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
1549  003574  003630                          3$                      ;ILLEGAL CHARACTER
1550  003576  003610                          1$                      ;CARRIAGE RETURN
1551  003600  003630                          3$                      ;' '
1552  003602  003610                          1$                      ;','
1553  003604  003622                          2$                      ;'.'
1554  003606  003630                          3$                      ;DIGIT 0-7
1555  003610  104401  022260          1$:     TYPE    ,MPATD          ;DIGIT 8-9
1556  003614  012702  000002                  MOV     #2,R2           ;TYPE DEFAULT PATTERN
1557  003620  000406                          BR      4$              ;WORST CASE PATTERN
1558  003622  020227  000002          2$:     CMP     R2,#2           ;GO SAVE PATTERN
1559  003626  101403                          BLOS    4$              ;IS # LARGER THAN 2
                                                                    ;BRANCH IF NOT
```

GET VALUE FOR SOFTWARE SWITCH REGISTER SEQ 0033

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1560  003630  104401  001166          3$:     TYPE    ,$QUES          ;TYPE '?'
1561  003634  000751                  BR      M4              ;RETYPE LINE
1562  003636  010237  001240          4$:     MOV     R2,PATSEL       ;SAVE PATTERN SELECTED
1563
1564                                  ;GO TYPE 'STARTING FORMAT ON DRIVE N'
1565
1566  003642  012737  006364  001300  M5:     MOV     #TYPADR,CNTLC   ;CHANGE ^C ENTRANCE
1567  003650  005737  001220          TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
1568  003654  001403                  BEQ     1$              ;BR IF 'CHECK' MODE
1569  003656  104401  022273          TYPE    ,MSFOU          ;TYPE 'STARTING FORMAT ON DRIVE N'
1570  003662  000402                  BR      2$
1571  003664  104401  022330          1$:     TYPE    ,MSCHK          ;TYPE 'STARTING CHECK ON DRIVE N'
1572  003670                          2$:
1573  003670  013746  001214          MOV     DRIVE,-(SP)     ;;SAVE DRIVE FOR TYPEOUT
1574                                                          ;;TYPE DRIVE NUMBER
1575  003674  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
1576  003676     001                  .BYTE   1               ;;TYPE 1 DIGIT(S)
1577  003677     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
1578  003700  104401  001167          TYPE    ,$CRLF          ;CR-LF
1579
1580                                  ;SETUP TOTAL TRACK COUNT FOR FORMAT
1581
1582  003704  023737  001222  001224  CKADRS: CMP     ENDCYL,BEGCYL   ;STARTING AND ENDING CYLINDERS THE SAME ?
1583  003712  001011                  BNE     1$              ;BRANCH IF BEGCYL NOT EQUAL TO ENDCYL
1584  003714  013737  001226  001232          MOV     ENDTRK,TTRKS    ;END TRACK ADDRESS
1585  003722  163737  001230  001232          SUB     BEGTRK,TTRKS    ;SUBTRACT THE STARTING TRACK ADDRESS
1586  003730  005237  001232                  INC     TTRKS           ;MAKE THE NUMBER OF TRACKS INCLUSIVE
1587  003734  000427                  BR      SETPAT          ;SETUP THE DATA PATTERN
1588  003736  013702  001222          1$:     MOV     ENDCYL,R2       ;ENDING CYLINDER
1589  003742  163702  001224          SUB     BEGCYL,R2       ;SUBTRACT THE STARTING CYLINDER
1590  003746  013737  001226  001232          MOV     ENDTRK,TTRKS    ;CALCULATE THE RESIDUAL TRACKS
1591  003754  163737  001230  001232          SUB     BEGTRK,TTRKS    ;SUBTRACT THE STARTING TRACK
1592  003762  100004                  BPL     2$              ;BR IF ENDING TRACK GREATER
1593  003764  062737  000023  001232          ADD     #19.,TTRKS      ;CORRECT THE VALUE
1594  003772  005302                  DEC     R2              ;COUNT THE PARTIAL TRACK
1595  003774  005237  001232          2$:     INC     TTRKS           ;MAKE THE NUMBER INCLUSIVE
1596  004000  005302                  3$:     DEC     R2              ;DECREMENT THE CYLINDER COUNT
1597  004002  100404                  BMI     SETPAT          ;BR IF DONE
1598  004004  062737  000023  001232          ADD     #19.,TTRKS      ;ADD CYLINDER WORTH OF TRACKS
1599  004012  000772                  BR      3$              ;CONTINUE
1600
1601                                  ;THIS CODE SETS UP THE SELECTED DATA PATTERN TO BE WRITTEN ON EACH SECTOR IMAGE
1602
1603  004014  005037  001242          SETPAT: CLR     PATA            ;CLEAR DATA PATTERN A
1604  004020  005037  001244          CLR     PATB            ;CLEAR DATA PATTERN B
1605  004024  005737  001240          TST     PATSEL          ;SEE IF PATTERN OF ONES
1606  004030  001416                  BEQ     1$              ;BR IF SO
1607  004032  005137  001242          COM     PATA            ;SET PATA TO ONES
1608  004036  005137  001244          COM     PATB            ;SET PATB TO ONES
1609  004042  022737  000001  001240          CMP     #1,PATSEL       ;SEE IF PATTERN OF ZEROS
1610  004050  001406                  BEQ     1$              ;BRANCH IF SO
1611  004052  012737  165555  001242          MOV     #165555,PATA    ;SET UP WORST CASE
1612  004060  012737  133333  001244          MOV     #133333,PATB    ;SET UP WORST CASE
1613  004066  013703  001256          1$:     MOV     WC,R3           ;SET UP COUNTER
1614  004072  012700  025574          MOV     #BUFP,R0        ;SET UP MEMORY POINTER
1615  004076  013701  001242          MOV     PATA,R1         ;SET UP PATTERN IN R1
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1616  004102  013702  001244            MOV     PATB,R2          ;SET UP PATTERN IN R2
1617  004106  010120            2$:     MOV     R1,(R0)+         ;MOV 1ST PAT INTO MEM
1618  004110  010220                    MOV     R2,(R0)+         ;MOV 2ND PAT INTO MEM
1619  004112  005303                    DEC     R3               ;KEEP COUNT
1620  004114  005303                    DEC     R3               ;KEEP COUNT
1621  004116  001373                    BNE     2$               ;DO IT AGAIN IF R3 NOT 0
1622
1623                              ;THIS CODE SETS UP FOR THE ACTUAL FORMAT
1624
1625  004120  004737  005630    WRTRK:  JSR     PC,SETTBL        ;GO SET UP DRIVER TABLE
1626  004124  004737  006030            JSR     PC,SETHDR        ;GO INITIALIZE HEADERS IN THE SECTOR BUFFER IN CORE
1627  004130  112737  000020  001357    MOVB    #20,FMTDPB+1     ;LOAD FMT22 BIT
1628  004136  005737  001264            TST     SEC20            ;18 BIT MODE ?
1629  004142  001002                    BNE     1$               ;BR IF NOT
1630  004144  105037  001357            CLRB    FMTDPB+1         ;CLEAR THE FMT22 BIT
1631  004150  112737  000143  001360 1$:  MOVB   #SETFMT,FMTDPB+2  ;'LOAD FORMAT' COMMAND
1632  004156  004037  013312    2$:     JSR     R0,RP04          ;START THE COMMAND
1633  004162  001356                    FMTDPB                   ;DPB ADDRESS
1634  004164  000774                    BR      2$               ;QUEUE FULL RETURN
1635  004166  005737  001374    3$:     TST     FMTDPB+16        ;LOOK FOR DONE
1636  004172  001775                    BEQ     3$               ;LOOP UNTIL FINISHED
1637  004174  005037  001216    WRTRK1: CLR     SOFSW            ;CLEAR ERROR COUNTER
1638  004200  005037  001250            CLR     RETRY            ;ZERO THE RETRY COUNTER
1639  004204  005037  001304            CLR     EFLG             ;CLEAR ERROR DURING WRITE CHECK FLAG
1640  004210  105037  001366            CLRB    FMTDPB+10        ;RESTORE SECTOR
1641  004214  013737  001260  001362    MOV     MWC,FMTDPB+4     ;RESTORE WC
1642  004222  012737  025574  001364    MOV     #BUFP,FMTDPB+6   ;RESTORE BA
1643  004230  005737  001220            TST     MODE             ;'FORMAT' OR 'CHECK' MODE ?
1644  004234  001450                    BEQ     CKTRK            ;BR IF 'CHECK' MODE
1645  004236  112737  000163  001360 WRTRK2: MOVB  #WRTHD,FMTDPB+2  ;SET WRITE HEADER & DATA COMMAND IN TBL
1646  004244  012737  004244  001110    MOV     #.,$LPERR        ;SETUP LOOP ON ERROR ADDRESS
1647  004252  012706  001100            MOV     #STACK,SP        ;LOAD STACK POINTER
1648  004256  004037  013312    1$:     JSR     R0,RP04          ;GO FORMAT A TRACK
1649  004262  001356                    FMTDPB                   ;ADRS OF PARAMETERS - TBL
1650  004264  000774                    BR      1$               ;WAIT FOR QUEUE IF FULL
1651  004266  005737  001374    2$:     TST     FMTDPB+16        ;WAIT FOR COMMAND TO COMPLETE
1652  004272  001775                    BEQ     2$               ;BRANCH IF NOT DONE
1653  004274  100024                    BPL     4$               ;BRANCH IF NO ERROR
1654  004276  012737  004324  001160    MOV     #3$,$ESCAPE      ;;ESCAPE TO 3$ ON ERROR
1655  004304  004737  005462            JSR     PC,ERINDX        ;SEE WHICH ERROR
1656  004310  104010                    ERROR   10               ;DRIVE OFFLINE
1657  004312  104011                    ERROR   11               ;PERSISTENT DRIVE UNSAFE ERROR
1658  004314  104012                    ERROR   12               ;UNCORRECTABLE MASSBUS PARITY ERROR
1659  004316  104013                    ERROR   13               ;SOFTWARE TIMEOUT
1660  004320  104014                    ERROR   14               ;DRIVE UNSAFE ERROR
1661  004322  104015                    ERROR   15               ;DRIVE/CONTROLLER ERROR DURING WRITE
1662  004324  004737  005562    3$:     JSR     PC,LOP.CK        ;LOOP ON THE ERROR ?
1663  004330  022737  000003  001250    CMP     #3,RETRY         ;ERROR RETRY LIMIT ?
1664  004336  001403                    BEQ     4$               ;BR IF REACHED
1665  004340  005237  001250            INC     RETRY            ;COUNT THE ERROR
1666  004344  000744                    BR      1$               ;TRY AGAIN
1667  004346  005037  001160    4$:     CLR     $ESCAPE          ;CLEAR ERROR ESCAPE ADDRESS
1668  004352  005037  001250            CLR     RETRY            ;CLEAR THE RETRY COUNTER
1669
1670                              ;CHECK THE TRACK JUST WRITTEN
1671
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1672  004356  112737  000153  001360  CKTRK:  MOVB    #WCKHD,FMTDPB+2 ;SET WRITE CHECK HEADER & DATA COMMAND IN TBL
1673  004364  012737  004364  001110          MOV     #.,$LPERR       ;SETUP LOOP ON ERROR ADDRESS
1674  004372  012706  001100                  MOV     #STACK,SP       ;LOAD STACK POINTER
1675  004376  004037  013312          1$:     JSR     R0,RP04         ;GO CHECK THE TRACK JUST FORMATTED
1676  004402  001356                          FMTDPB                  ;ADRS OF PARAMETERS - TBL
1677  004404  000774                          BR      1$              ;WAIT FOR QUEUE IF FULL
1678  004406  005737  001374          2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
1679  004412  001775                          BEQ     2$              ;BRANCH IF NOT DONE
1680  004414  100147                          BPL     8$              ;BRANCH IF NO ERROR
1681  004416  113737  001314  001252        MOVB    RP.REG+RPDA,SAVSEC  ;GET THE SECTOR ADDRESS
1682  004424  001005                          BNE     3$              ;BRANCH IF NOT SECTOR 0
1683  004426  013737  001266  001252        MOV     MAXSEC,SAVSEC   ;RESTORE TO LAST SECTOR +1
1684  004434  005237  001252                  INC     SAVSEC          ;INCREMENT TO LAST SECTOR +1
1685  004440  005337  001252          3$:     DEC     SAVSEC          ;ADJUST SECTOR TO THE ONE THAT FAILED
1686  004444  012737  005010  001160        MOV     #10$,$ESCAPE    ;;ESCAPE TO 10$ ON ERROR
1687  004452  004737  005462                  JSR     PC,ERINDX       ;SEE WHICH ERROR
1688  004456  104010                          ERROR   10              ;DRIVE OFFLINE
1689  004460  104011                          ERROR   11              ;PERSISTENT DRIVE UNSAFE ERROR
1690  004462  104012                          ERROR   12              ;UNCORRECTABLE MASSBUS PARITY ERROR
1691  004464  104013                          ERROR   13              ;SOFTWARE TIMEOUT
1692  004466  104014                          ERROR   14              ;DRIVE UNSAFE ERROR
1693  004470  032737  040000  001316        BIT     #WCE,RP.REG+RPCS2  ;WRITE CHECK ERROR ?
1694  004476  001005                          BNE     4$              ;BR IF SET
1695  004500  033727  001322                  BIT     RP.REG+RPER1,(PC)+  ;CHECK FOR DATA ERRORS
1696  004504  130620                          .WORD   DCK!OPI!DTE!HCRC!HCE!FER  ;DATA ERROR BITS
1697  004506  001001                          BNE     4$              ;BR IF SET
1698  004510  104016                          ERROR   16              ;CONTROLLER/DRIVE ERROR DURING WRITE CHECK
1699  004512  005737  001220          4$:     TST     MODE            ;FORMAT OR CHECK MODE ?
1700  004516  001416                          BEQ     5$              ;BR IF CHECK
1701  004520  005737  001216                  TST     SOFSW           ;RETRYING THE SECTOR ?
1702  004524  001413                          BEQ     5$              ;BR IF NOT
1703  004526  012737  005034  001160        MOV     #11$,$ESCAPE    ;;ESCAPE TO 11$ ON ERROR
1704  004534  005737  001304                  TST     EFLG            ;ERROR DURING WRITE CHECK REPORTED ?
1705  004540  001402                          BEQ     21$             ;NO,  INCREMENT ERROR COUNT
1706  004542  005337  001112                  DEC     $ERTTL          ;YES, DECREMENT REPORTED ERROR COUNT
1707  004546  005037  001304          21$:    CLR     EFLG            ;CLEAR ERROR DURING WRITE CHECK FLAG
1708  004552  104017                          ERROR   17              ;SECTOR NOT ACCEPTABLE
1709  004554  005037  001160          5$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
1710  004560  005737  001322                  TST     RP.REG+RPER1    ;DATA CHECK ERROR ?
1711  004564  100011                          BPL     23$             ;NO, CHECK OTHER ERRORS
1712  004566  032777  000200  174344        BIT     #BIT7,@SWR      ;INHIBIT SOFT ERROR REPORTS ?
1713  004574  001426                          BEQ     7$              ;YES, SKIP ERROR REPORT
1714  004576  012737  000001  001304        MOV     #1,EFLG         ;SET ERROR DURING WRITE CHECK FLAG
1715  004604  104020                          ERROR   20              ;DATA ERROR DURING WRITE CHECK
1716  004606  000421                          BR      7$              ;CONTINUE
1717  004610  032737  040000  001316  23$:   BIT     #WCE,RP.REG+RPCS2       ;WRITE CHECK ERROR ?
1718  004616  001411                          BEQ     24$             ;NO, MUST BE HARDWARE ERROR
1719  004620  032777  000200  174312        BIT     #BIT7,@SWR      ;INHIBIT SOFT ERROR REPORTS ?
1720  004626  001411                          BEQ     7$              ;YES, SKIP ERROR REPORT
1721  004630  012737  000001  001304        MOV     #1,EFLG         ;SET ERROR DURING WRITE CHECK FLAG
1722  004636  104024                          ERROR   24              ;WRITE CHECK ERROR
1723  004640  000404                          BR      7$              ;CONTINUE
1724  004642  012737  000001  001304  24$:   MOV     #1,EFLG         ;SET ERROR DURING WRITE CHECK FLAG
1725  004650  104025                          ERROR   25              ;HARDWARE ERROR DURING WRITE CHECK
1726  004652  013701  001252          7$:     MOV     SAVSEC,R1       ;FAILING SECTOR ADDRESS
1727  004656  113737  001252  001366        MOVB    SAVSEC,FMTDPB+10  ;SECTOR ADDRESS
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1728  004664  006301                        ASL     R1                      ;SETUP INDEX TO ADDRESS WORDS
1729  004666  016137  001500  001364        MOV     ADRTBL(R1),FMTDPB+6  ;BUFFER ADDRESS FOR FAILING SECTOR
1730  004674  013746  001260                MOV     MWC,-(SP)               ;GET MAXIMUM WORD COUNT VALUE (2'S COMP)
1731  004700  066116  001554                ADD     WCTBL(R1),(SP)   ;ADD WORD COUNT THROUGH FAILING SECTOR
1732  004704  012637  001254                MOV     (SP)+,SAVWC     ;STORE WORD COUNT FOR REMAINDER OF TRACK
1733  004710  005737  001220                TST     MODE                    ;FORMAT OR CHECK MODE ?
1734  004714  001421                        BEQ     9$                      ;BR IF CHECK
1735  004716  012737  177374  001362        MOV     #-260.,FMTDPB+4 ;WORD COUNT FOR 1 SECTOR
1736  004724  005237  001216                INC     SOFSW                   ;INDICATE THAT A RETRY IS IN PROGRESS
1737  004730  000137  004236                JMP     WRTRK2                  ;REFORMAT ERROR SECTOR
1738  004734  005737  001216        8$:     TST     SOFSW                   ;RETRY IN PROGRESS ?
1739  004740  001435                        BEQ     11$                     ;BR IF NOT
1740  004742  022737  000002  001216        CMP     #2,SOFSW                ;SEE IF LAST RETRY
1741  004750  001403                        BEQ     9$                      ;BR IF IT IS
1742  004752  005237  001216                INC     SOFSW                   ;INCREMENT RETRY COUNT
1743  004756  000607                        BR      1$                      ;READ AGAIN
1744  004760  123737  001266  001366  9$:   CMPB    MAXSEC,FMTDPB+10  ;SEE IF LAST SECTOR ON THE TRACK
1745  004766  001422                        BEQ     11$                     ;BR IF IT IS
1746  004770  004737  006002                JSR     PC,SCAWC                ;SETUP TO CHECK REMAINING SECTORS ON THE TRACK
1747  004774  005037  001216                CLR     SOFSW                   ;CLEAR RETRY COUNTER
1748  005000  005037  001304                CLR     EFLG                    ;CLEAR ERROR DURING WRITE CHECK FLAG
1749  005004  000137  004376                JMP     1$                      ;FINISH CHECKING THE TRACK
1750  005010  004737  005562        10$:    JSR     PC,LOP.CK               ;CHECK FOR LOOP ON ERROR
1751  005014  022737  000003  001250        CMP     #3,RETRY                ;ERROR RETRY REACHED ?
1752  005022  001404                        BEQ     11$                     ;BR IF IT IS
1753  005024  005237  001250                INC     RETRY                   ;COUNT THE RETRY
1754  005030  000137  004376                JMP     1$                      ;DO THE WRITE CHECK AGAIN
1755  005034  005037  001160        11$:    CLR     $ESCAPE                 ;CLEAR THE ERROR RETURN ESCAPE ADDRESS
1756  005040  005037  001250                CLR     RETRY                   ;CLEAR THE RETRY COUNTER
1757  005044  005037  001304                CLR     EFLG                    ;CLEAR ERROR DURING WRITE CHECK FLAG
1758  005050  032777  000002  174062        BIT     #BIT1,@SWR              ;LOOP ON CURRENT TRACK ?
1759  005056  001402                        BEQ     12$                     ;BR IF NOT
1760  005060  000137  004174                JMP     WRTRK1                  ;START AGAIN ON THE SAME TRACK
1761  005064  004737  005720        12$:    JSR     PC,TRKTST               ;GET UPDATED TRACK AND CYLINDER ADDRESSES
1762  005070  000402                        BR      HDREAD                  ;RETURN HERE IF DONE - DO QUICK CHECK OF DISK
1763  005072  000137  004174                JMP     WRTRK1                  ;CONTINUE WITH THE FORMAT
1764
1765                                ;THIS CODE MAKES SURE EACH CYLINDER FORMATTED CONTAINS THE
1766                                ;PROPER CYLINDER ADDRESS. THE PROGRAM IS LOOKING FOR
1767                                ;POSSIBLE POSITIONER ERRORS THAT MAY HAVE OCCURRED DURING THE FORMAT.
1768
1769  005076  005037  001262        HDREAD: CLR     HEDERR                  ;CLEAR HEADER CHECK ERROR INDICATOR
1770  005102  004737  005630                JSR     PC,SETTBL               ;GO SET UP DRIVER TABLE
1771  005106  004737  006030                JSR     PC,SETHDR               ;GO SET UP HEADERS IN CORE
1772  005112  013737  001224  001246        MOV     BEGCYL,CYLCK    ;USE 'BEGCYL' FOR FORMAT VERIFICATION
1773  005120  012737  177774  001362        MOV     #-4,FMTDPB+4    ;SET UP WORD COUNT
1774  005126  012737  025564  001364        MOV     #RBUF,FMTDPB+6  ;SET UP BUFFER ADRS
1775  005134  005037  001366                CLR     FMTDPB+10               ;CLEAR THE SECTOR & TRACK ADDRESS FIELD
1776  005140  013737  001224  001370        MOV     BEGCYL,FMTDPB+12  ;SETUP THE CYLINDER FIELD
1777  005146  112737  000173  001360        MOVB    #RDHD,FMTDPB+2  ;SET UP READ HEADER & DATA COMMAND
1778  005154  012737  005154  001110        MOV     #.,$LPERR               ;SETUP LOOP ON ERROR ADDRESS
1779  005162  012706  001100                MOV     #STACK,SP               ;LOAD STACK POINTER
1780  005166  004037  013312        1$:     JSR     R0,RP04                 ;GO READ HEADER
```

```
1781  005172  001356                        FMTDPB                  ;ADRS OF PARAMETER TBL
1782  005174  000774                        BR      1$              ;WAIT IF QUEUE IS FULL
1783  005176  005737  001374        2$:     TST     FMTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
1784  005202  001775                        BEQ     2$              ;BRANCH IF NOT DONE
1785  005204  100024                        BPL     4$              ;BR IF NOT ERROR
1786  005206  012737  005270  001160        MOV     #5$,$ESCAPE     ;;ESCAPE TO 5$ ON ERROR
1787  005214  004737  005462                JSR     PC,ERINDX       ;SEE WHICH ERROR
1788  005220  104010                        ERROR   10              ;DRIVE OFFLINE
1789  005222  104011                        ERROR   11              ;PERSISTENT DRIVE UNSAFE ERROR
1790  005224  104012                        ERROR   12              ;UNCORRECTABLE MASSBUS PARITY ERROR
1791  005226  104013                        ERROR   13              ;SOFTWARE TIMEOUT
1792  005230  104014                        ERROR   14              ;DRIVE UNSAFE ERROR
1793  005232  032737  177577  001374        BIT     #^C<HCE>,FMTDPB+16  ;IS ONLY ERROR A HEADER COMPARE ERROR ?
1794  005240  001401                        BEQ     3$              ;BR IF YES
1795  005242  104021                        ERROR   21              ;CONTROLLER/DRIVE ERROR VERIFYING HEADERS
1796  005244  005037  001160        3$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
1797  005250  104022                        ERROR   22              ;HEADER COMPARE ERROR VERIFYING HEADERS
1798  005252  004737  005562                JSR     PC,LOP.CK       ;CHECK FOR LOOP ON ERROR
1799  005256  023737  025564  025574  4$:   CMP     RBUF,BUFP       ;SEE IF CYL READ EQUALS CYL EXPECTED
1800  005264  001403                        BEQ     6$              ;BR IF CYL CORRECT
1801  005266  104023                        ERROR   23              ;CYLINDER NOT CORRECT
1802  005270  004737  005562        5$:     JSR     PC,LOP.CK       ;CHECK FOR LOOP ON ERROR
1803  005274  023737  001222  001246  6$:   CMP     ENDCYL,CYLCK    ;SEE IF LAST CYLINDER
1804  005302  001002                        BNE     7$              ;BR IF NOT FINISHED
1805  005304  000137  005326                JMP     $EOP            ;END OF FORMAT
1806  005310  005237  001246        7$:     INC     CYLCK           ;INCREMENT CYLINDER ADDRESS BEING CHECKED
1807  005314  004737  006110                JSR     PC,UPDACY       ;SET UP FOR NEXT CYL
1808  005320  005237  001370                INC     FMTDPB+12       ;ADVANCE TO NEXT CYL #
1809  005324  000720                        BR      1$              ;GO READ NEXT HEADER
1810
1811                                  .SBTTL  END OF PASS ROUTINE
1812
1813                                  ;;**********************************************************************
1814                                  ;*INCREMENT THE PASS NUMBER ($PASS)
1815                                  ;*IF THERES A MONITOR GO TO IT
1816                                  ;*IF THERE ISN'T JUMP TO DONE
1817
1818  005326                          $EOP:
1819  005326  005737  001220                TST     MODE            ;'FORMAT' OR 'CHECK' MODE ?
1820  005332  001403                        BEQ     3$              ;BR IF 'CHECK'
1821  005334  104401  022364                TYPE    ,MFCMPT         ;'FORMAT COMPLETE'
1822  005340  000402                        BR      4$              ;FINISH THE END MESSAGE
1823  005342  104401  022411        3$:     TYPE    ,MCCMPT         ;'CHECK COMPLETE'
1824  005346  104401  022435        4$:     TYPE    ,NUMERR         ;'TOTAL ERRORS DETECTED: '
1825  005352  013746  001112                MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
1826  005356  104405                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
1827  005360  104401  001167                TYPE    ,$CRLF          ;CR-LF
1828  005364  005237  001100                INC     $PASS           ;;INCREMENT THE PASS NUMBER
1829  005370  042737  100000  001100        BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
1830  005376  005327                        DEC     (PC)+           ;;LOOP?
1831  005400  000001          $EOPCT: .WORD 1
1832  005402  003013                        BGT     $DOAGN          ;;YES
1833  005404  012737                        MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
1834  005406  000001          $ENDCT: .WORD 1
1835  005410  005400                        $EOPCT
1836  005412  013700  000042  $GET42: MOV   @#42,R0                ;;GET MONITOR ADDRESS
```

```
 1837  005416  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 1838  005420  000005                          RESET                   ;;CLEAR THE WORLD
 1839  005422  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 1840  005424  000240                          NOP                     ;;SAVE ROOM
 1841  005426  000240                          NOP                     ;;FOR
 1842  005430  000240                          NOP                     ;;ACT11
 1843  005432                          $DOAGN:
 1844  005432  000137                          JMP     @(PC)+          ;;RETURN
 1845  005434  005436                  $RTNAD: .WORD   DONE
 1846  005436  032777  000001  173474  DONE:   BIT     #SW0,@SWR       ;SEE IF SWR 0 SET
 1847  005444  001002                          BNE     1$              ;BR IF SET
 1848  005446  000137  003232                  JMP     M0              ;ASK FOR NEXT DRIVE
 1849  005452  012706  001100          1$:     MOV     #STACK,SP       ;RESET STACK POINTER
 1850  005456  000137  003642                  JMP     M5              ;DO THE FORMAT OR CHECK AGAIN
 1851
 1852                                  ;;**************************************************************************
 1853
 1854                                  .SBTTL  SUPPORT SUBROUTINES
 1855
 1856                                  ;;**************************************************************************
 1857
 1858                                  ;THIS ROUTINE DETERMINES THE ERROR TYPE
 1859
 1860  005462  010146                  ERINDX: MOV     R1,-(SP)        ;STORE R1
 1861  005464  005001                          CLR     R1              ;CLEAR R1
 1862  005466  033727  001374                  BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
 1863  005472  060006                          .WORD   BIT14!BIT13!BIT2!BIT1  ;DRIVE OFFLINE
 1864  005474  001025                          BNE     5$              ;BR IF OFFLINE
 1865  005476  033727  001374                  BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
 1866  005502  010000                          .WORD   BIT12           ;DRIVE PERSISTENTLY UNSAFE
 1867  005504  001020                          BNE     4$              ;BR IF UNSAFE
 1868  005506  033727  001374                  BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
 1869  005512  006000                          .WORD   BIT11!BIT10     ;UNCORRECTABLE MASSBUS PARITY ERROR ?
 1870  005514  001013                          BNE     3$              ;BR IF PARITY ERROR
 1871  005516  033727  001374                  BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
 1872  005522  001400                          .WORD   BIT09!BIT08     ;SOFTWARE TIMEOUT ?
 1873  005524  001006                          BNE     2$              ;BR IF YES
 1874  005526  033727  001374                  BIT     FMTDPB+16,(PC)+ ;CHECK ERROR TYPE
 1875  005532  000020                          .WORD   BIT04           ;DRIVE UNSAFE ERROR ?
 1876  005534  001001                          BNE     1$              ;BR IF YES
 1877  005536  005201                          INC     R1              ;INCREMENT THE RETURN INDEX
 1878  005540  005201                  1$:     INC     R1              ;INCREMENT THE RETURN INDEX
 1879  005542  005201                  2$:     INC     R1              ;INCREMENT THE RETURN INDEX
 1880  005544  005201                  3$:     INC     R1              ;INCREMENT THE RETURN INDEX
 1881  005546  005201                  4$:     INC     R1              ;INCREMENT THE RETURN INDEX
 1882  005550  006301                  5$:     ASL     R1              ;DOUBLE THE INCREMENT
 1883  005552  060166  000002                  ADD     R1,2(SP)        ;DEVELOP THE RETURN ADDRESS
 1884  005556  012601                          MOV     (SP)+,R1        ;RESTORE R1
 1885  005560  000207                          RTS     PC              ;RETURN
 1886
 1887                                  ;ROUTINE TO CHECK FOR LOOP ON ERROR
 1888
 1889  005562  032777  001000  173350  LOP.CK: BIT     #SW09,@SWR      ;LOOP ON ERROR ?
 1890  005570  001402                          BEQ     1$              ;BR IF NOT
 1891  005572  000177  173312                  JMP     @$LPERR         ;GO TO THE LOOP ON ERROR ADDRESS
 1892  005576  005037  001160          1$:     CLR     $ESCAPE         ;CLEAR THE ERROR ESCAPE ADDRESS
```

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1893  005602  033727  001374                BIT     FMTDPB+16,(PC)+  ;CHECK FOR 'FATAL' ERROR
1894  005606  072002                        .WORD   BIT14!BIT13!BIT12!BIT10!BIT01  ;'FATAL' ERROR BITS
1895  005610  001004                        BNE     2$               ;BR IF NOT
1896  005612  032737  004000  001322        BIT     #WLE,RP.REG+RPER1  ;WRITE LOCK ERROR ?
1897  005620  001402                        BEQ     3$               ;BR IF NOT
1898  005622  000137  005326        2$:     JMP     $EOP             ;TERMINATE THE FORMAT
1899  005626  000207                3$:     RTS     PC               ;RETURN
1900
1901                                ;THIS ROUTINE SETS UP THE INPUT TABLE FOR THE DRIVER ROUTINE
1902
1903  005630  113737  001214  001356  SETTBL: MOVB    DRIVE,FMTDPB     ;SET UP DRIVE #
1904  005636  105037  001361                CLRB    FMTDPB+3         ;CLEAR HIGH ORDER ADRS BITS
1905  005642  013737  001260  001362        MOV     MWC,FMTDPB+4     ;LOAD UP WORD COUNT
1906  005650  012737  025574  001364        MOV     #BUFP,FMTDPB+6   ;LOAD UP CURRENT ADRS
1907  005656  105037  001366                CLRB    FMTDPB+10        ;SET SECTOR TO ZERO
1908  005662  113737  001230  001367        MOVB    BEGTRK,FMTDPB+11  ;SET UP STARTING TRK ADRS
1909  005670  013737  001224  001370        MOV     BEGCYL,FMTDPB+12  ;SET UP STARTING CYL
1910  005676  005037  001374                CLR     FMTDPB+16        ;CLEAR RP04 STATUS
1911  005702  013737  001230  001236        MOV     BEGTRK,TRKCNT    ;SET UP PARTIAL CYL TRACK COUNT
1912  005710  013737  001232  001234        MOV     TTRKS,TTRKSC     ;SET UP TOTAL TRACKS COUNTER
1913  005716  000207                        RTS     PC               ;RETURN FROM SETUP
1914
1915                                ;THIS ROUTINE CONTROLS THE DISK ADDRESSING AND TOTAL TRK COUNT
1916                                ;IT IS ENTERED AFTER EVERY TRK OPERATION
1917
1918  005720  005337  001234        TRKTST: DEC     TTRKSC           ;SEE IF LAST TRACK
1919  005724  001425                        BEQ     3$               ;BRANCH IF LAST TRACK
1920  005726  022737  000022  001236        CMP     #18.,TRKCNT      ;IS THIS THE LAST TRACK IN THE CYLINDER ?
1921  005734  001407                        BEQ     1$               ;BRANCH IF SO
1922  005736  005237  001236                INC     TRKCNT           ;COUNT UP TRACK WITHIN CYLINDER
1923  005742  105237  001367                INCB    FMTDPB+11        ;INCREMENT TRACK NUMBER
1924  005746  004737  006140                JSR     PC,UPDATK        ;UPDATE TRACK ADDRESS IN BUFFER
1925  005752  000410                        BR      2$               ;EXIT
1926  005754  005037  001236        1$:     CLR     TRKCNT           ;CLEAR TRACK COUNT FOR NEXT CYLINDER
1927  005760  105037  001367                CLRB    FMTDPB+11        ;RESET TRACK ADDRESS TO 0
1928  005764  005237  001370                INC     FMTDPB+12        ;UPDATE CYLINDER NUMBER
1929  005770  004737  006110                JSR     PC,UPDACY        ;UPDATE CYLINDER NUMBER IN BUFFER
1930  005774  062716  000002        2$:     ADD     #2,(SP)          ;ADD TWO TO RETURN ADRS
1931  006000  000207                3$:     RTS     PC               ;RETURN
1932
1933                                ;THIS ROUTINE SETS UP WC & BA FOR REMAINING SECTORS
1934                                ;AFTER A WRITE CHECK ERROR
1935
1936  006002  013737  001254  001362  SCAWC:  MOV     SAVWC,FMTDPB+4   ;SET UP WC FOR REMAINING SECTORS
1937  006010  062737  001010  001364        ADD     #520.,FMTDPB+6   ;SET UP BA FOR REMAINING SECTORS
1938  006016  005237  001366                INC     FMTDPB+10        ;ADVANCE TO NEXT SECTOR IN TBL
1939  006022  005037  001216                CLR     SOFSW            ;RESET RETRY COUNTER
1940  006026  000207                        RTS     PC               ;RETURN TO COMPLETE TRK FORMAT
1941
1942
1943                                ;THIS ROUTINE SETS UP THE CYLINDER ADRS, FORMAT BIT, TRACK AND
1944                                ;SECTOR ADRS IN MEMORY WITH THE STARTING CYL - TRK INFORMATION
1945
1946  006030  013701  001266        SETHDR: MOV     MAXSEC,R1        ;SET UP SECTOR COUNT
1947  006034  012700  025574                MOV     #BUFP,R0         ;SET UP HEADER POINTER IN R0
1948  006040  013702  001224                MOV     BEGCYL,R2        ;PUT STARTING CYL # IN R2
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 1949  006044  013703  001230                MOV     BEGTRK,R3       ;PUT STARTING TRK # IN R3
 1950  006050  000303                        SWAB    R3              ;JUSTIFY TRACK ADRS
 1951  006052  005737  001264                TST     SEC20           ;SEE IF 20 OR 22 SECTOR MODE
 1952  006056  001402                        BEQ     1$              ;BR IF 20 SECTOR MODE
 1953  006060  052702  010000                BIS     #10000,R2       ;SET THE 22 SECTOR FORMAT BIT
 1954  006064  010220              1$:       MOV     R2,(R0)+        ;WRITE IN HEADER AREA OF CORE THE CYL ADRS
 1955  006066  010320                        MOV     R3,(R0)+        ;WRITE IN HEADER AREA OF CORE THE TRK ADRS
 1956  006070  005020                        CLR     (R0)+           ;CLR 1ST KEYWORD
 1957  006072  005010                        CLR     (R0)            ;CLR 2ND KEYWORD
 1958  006074  062700  001002                ADD     #514.,R0        ;SET UP FOR NEXT HEADER
 1959  006100  005203                        INC     R3              ;UPDATE SECTOR ADRS FOR NEXT HEADER
 1960  006102  005301                        DEC     R1              ;MAINTAIN COUNT OF SECTORS
 1961  006104  002367                        BGE     1$              ;BRANCH IF NOT LAST SECTOR
 1962  006106  000207                        RTS     PC              ;EXIT - HEADERS ARE LOADED INTO CORE
 1963
 1964                                  ;THIS ROUTINE UPDATES THE CYLINDER ADRS OF THE HEADER WORDS IN CORE
 1965
 1966  006110  013701  001266        UPDACY: MOV     MAXSEC,R1       ;SET UP SECTOR COUNT
 1967  006114  012700  025574                MOV     #BUFP,R0        ;SET UP HEADER POINTER IN R0
 1968  006120  005220              1$:       INC     (R0)+           ;INCREMENT FOR NEXT CYLINDER
 1969  006122  042710  177400                BIC     #177400,(R0)    ;RESET TRK ADRS TO 0
 1970  006126  062700  001006                ADD     #518.,R0        ;SET UP FOR NEXT HEADER
 1971  006132  005301                        DEC     R1              ;COUNT SECTORS
 1972  006134  002371                        BGE     1$              ;BRANCH IF NOT LAST SECTOR
 1973  006136  000207                        RTS     PC              ;EXIT
 1974
 1975                                  ;THIS ROUTINE UPDATES THE TRACK ADRS OF THE HEADER WORDS IN CORE
 1976
 1977  006140  013701  001266        UPDATK: MOV     MAXSEC,R1       ;SET UP SECTOR COUNT
 1978  006144  012700  025574                MOV     #BUFP,R0        ;SET UP HEADER POINTER IN R0
 1979  006150  005720                        TST     (R0)+           ;POINT HEADER POINTER TO TRK - SEC ADRS
 1980  006152  062710  000400              1$:       ADD     #400,(R0)       ;INDEX TRK ADRS
 1981  006156  062700  001010                ADD     #520.,R0        ;SET UP FOR NEXT HEADER
 1982  006162  005301                        DEC     R1              ;COUNT SECTORS
 1983  006164  002372                        BGE     1$              ;BRANCH IF NOT LAST SECTOR
 1984  006166  000207                        RTS     PC              ;EXIT
 1985
 1986                                  ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
 1987
 1988  006170  012737  006246  000004  ST.CLK: MOV     #STCLK1,@#ERRVEC  ;SET UP VECTOR FOR P CLK
 1989  006176  005037  000006                CLR     @#ERRVEC+2      ;NEW PSW
 1990  006202  005777  172770                TST     @$LKCSR         ;CHECK FOR KW11-P
 1991  006206  013746  001202                MOV     $LPVEC,-(SP)    ;VECTOR ADDRESS
 1992  006212  012776  006332  000000        MOV     #CLOCK,@(SP)    ;SET UP KW11-P VECTOR
 1993  006220  062716  000002                ADD     #2,(SP)         ;POINT TO PSW
 1994  006224  012736  000300                MOV     #PR6,@(SP)+     ;PSW - PRI 6
 1995  006230  012777  177777  172742        MOV     #-1,@$LKCSB     ;LOAD COUNTER BUFFER
 1996  006236  012777  000135  172732        MOV     #135,@$LKCSR    ;SET CLK - CNT UP
 1997  006244  000426                        BR      STCLK3
 1998  006246  062706  000004      STCLK1:   ADD     #4,SP           ;RESTORE THE STACK POINTER
 1999  006252  012737  006316  000004        MOV     #STCLK2,@#ERRVEC        ;CHANGE ERROR VECTOR
 2000  006260  005777  172722                TST     @$LKS           ;LOOK FOR KW11-L
 2001  006264  013746  001210                MOV     $LLVEC,-(SP)    ;KW11-L VECTOR ADDRESS
 2002  006270  012776  006332  000000        MOV     #CLOCK,@(SP)    ;SET UP KW11-L VECTOR
 2003  006276  062716  000002                ADD     #2,(SP)         ;INCREMENT VECTOR ADDRESS
 2004  006302  012736  000300                MOV     #PR6,@(SP)+     ;PSW - PRI 6
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2005  006306  012777  000100  172672          MOV     #100,@$LKS      ;SET KW11-L INTERRUPT ENABLE
2006  006314  000402                          BR      STCLK3
2007  006316  062706  000004          STCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
2008  006322  012737  000006  000004  STCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
2009  006330  000207                          RTS     PC
2010
2011                                  ;THIS CODE SERVICES A CLOCK INTERRUPT EVERY 16MS
2012
2013  006332  012746  000020          CLOCK:  MOV     #16.,-(SP)      ;PUT MILLISECONDS ON THE STACK
2014  006336  004737  016744                  JSR     PC,RPTMR        ;GO REPORT TIME
2015  006342  000002                          RTI                     ;RETURN AND CONTINUE
2016
2017                                  ;ROUTINE TO INTERCEPT 'CONTROL C' TYPED DURING PARAMETER ENTRY TIME
2018
2019  006344  012706  001100          OENTER: MOV     #STACK,SP       ;INITIALIZE THE STACK
2020  006350  005737  012406          1$:     TST     TRNSWT          ;ALL ACTIVITY STOPPED ?
2021  006354  001375                          BNE     1$              ;BR IF NOT
2022  006356  000005                          RESET                   ;CLEAR THE BUS
2023  006360  000137  003176                  JMP     M1B             ;START AGAIN WITH DRIVE SELECTION
2024
2025                                  ;ROUTINE TO TYPE THE PRESENT DISK ADDRESS.  ENTERED BY TYPING 'CONTROL C'
2026
2027  006364  005037  177776          TYPADR: CLR     PSW             ;SET PROCESSOR TO PRIORITY 0
2028  006370  012737  006344  001300          MOV     #OENTER,CNTLC   ;CHANGE 'CONTROL C' RETURN ADDRESS
2029  006376  104401  022465                  TYPE    ,ADDRIS         ;'PRESENT ADDRESS IS: '
2030  006402  104401  021275                  TYPE    ,C              ;'C'
2031  006406  013746  001370                  MOV     FMTDPB+12,-(SP) ;PUT THE CYLINDER ADDRESS ON THE STACK
2032  006412  004737  011716                  JSR     PC,$SB2D        ;CONVERT IT TO DECIMAL
2033  006416  004737  011656                  JSR     PC,$SUPRS       ;TYPE IT
2034  006422  104401  021305                  TYPE    ,LINSP          ;SPACES
2035  006426  104401  021277                  TYPE    ,T              ;'T'
2036  006432  005046                          CLR     -(SP)           ;CLEAR THE STACK
2037  006434  113716  001367                  MOVB    FMTDPB+11,(SP)  ;PUT THE TRACK ADDRESS ON THE STACK
2038  006440  004737  011716                  JSR     PC,$SB2D        ;CONVERT IT TO DECIMAL
2039  006444  004737  011656                  JSR     PC,$SUPRS       ;TYPE IT
2040  006450  104401  001167                  TYPE    ,$CRLF          ;CR-LF
2041  006454  012737  006364  001300          MOV     #TYPADR,CNTLC   ;RESTORE ENTRANCE TO THIS ROUTINE
2042  006462  000002                          RTI                     ;RETURN
2043
2044                                  ;PARAMETER ENTRY ROUTINE
2045                                  ;CALL
2046                                  ;       MOV     #ADR,R3         ;PARAMETER TABLE ADDRESS
2047                                  ;       JSR     PC,PARENT       ;GET THE PARAMETERS
2048
2049  006464  010346          PARENT: MOV     R3,-(SP)        ;SAVE R3
2050  006466  012703  001376          MOV     #TABLE,R3       ;PARAMETER TABLE ADDRESS
2051  006472  012337  006502  1$:     MOV     (R3)+,3$        ;ADDRESS OF PARAMETER NAME
2052  006476  001436                  BEQ     9$              ;BR IF AT END OF TABLE
2053  006500  104401                  TYPE                    ;TYPE THE PARAMETER NAME
2054  006502  000000          3$:     .WORD   0               ;ADDRESS OF PARAMETER NAME TEXT
2055  006504  012302                  MOV     (R3)+,R2        ;MAXIMUM PARAMETER VALUE
2056  006506  012305                  MOV     (R3)+,R5        ;ADDRESS OF PARAMETER
2057  006510  011546                  MOV     (R5),-(SP)      ;CURRENT VALUE OF PARAMETER
2058  006512  104405                  TYPDS                   ;TYPE THE CURRENT VALUE OF THE PARAMETER
2059  006514  104401  021271          TYPE    ,SLASH          ;' /'
2060  006520  104411                  RDLIN                   ;READ THE KEYBOARD
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2061  006522  012601                        MOV     (SP)+,R1        ;INPUT ASCII STRING ADDRESS
2062  006524  004537  006726                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
2063  006530  006472                        1$                      ;CARRIAGE RETURN ONLY ENTERED
2064  006532  006574                        9$                      ;PERIOD ONLY ENTERED
2065  006534  006550                        6$                      ;ILLEGAL INPUT
2066  006536  006544                        5$                      ;TERMINATED WITH A CARRIAGE RETURN
2067  006540  006550                        6$                      ;TERMINATED WITH A ''''
2068  006542  006562                        7$                      ;TERMINATED WITH A ','
2069  006544  010215              5$:       MOV     R2,(R5)         ;MOVE NEW VALUE TO PARAMETER LOCATION
2070  006546  000751                        BR      1$              ;GET MORE PARAMETERS
2071  006550  104401  022036        6$:     TYPE    ,BADENT         ;'BAD ENTRY'
2072  006554  162703  000006              SUB     #6,R3           ;DECREMENT THE TABLE POINTER
2073  006560  000744                        BR      1$              ;TRY AGAIN
2074  006562  010215              7$:       MOV     R2,(R5)         ;NEW VALUE
2075  006564  000403                        BR      9$              ;EXIT
2076  006566  012703  001376        8$:     MOV     #TABLE,R3       ;RELOAD THE PARAMETER TABLE ADDRESS
2077  006572  000737                        BR      1$              ;TRY AGAIN
2078  006574  012603              9$:       MOV     (SP)+,R3        ;RESTORE R3
2079  006576  000207                        RTS     PC              ;RETURN
2080
2081
2082                                  ;THIS ROUTINE IS USED TO CHECK IF AN
2083                                  ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
2084                                  ;CALL
2085                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
2086                                  ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
2087                                  ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
2088                                  ;       RETURN2                 ;CHARACTER IS IN R2 AS A
2089                                  ;                               ;OCTAL DIGIT
2090
2091  006600  121127  000060        CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
2092  006604  103407                        BLO     1$              ;YES -- BRANCH
2093  006606  121127  000067              CMPB    (R1),#'7        ;GREATER THAN SEVEN?
2094  006612  101004                        BHI     1$              ;YES -- BRANCH
2095  006614  111102                        MOVB    (R1),R2         ;GET THE CHARACTER
2096  006616  042702  177770              BIC     #^C7,R2         ;STRIP AWAY THE ASCII
2097  006622  005725                        TST     (R5)+           ;ADJUST FOR RETURN
2098  006624  000205              1$:       RTS     R5              ;RETURN
2099
2100                                  ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
2101                                  ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
2102                                  ;CALL
2103                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
2104                                  ;       JSR     R5,CK.DEC       ;CHECK THE CHARACTER
2105                                  ;       RETURN1                 ;NOT BETWEEN 0 AND 9
2106                                  ;       RETURN2                 ;BETWEEN 0 AND 9
2107                                  ;                               ;R2 = DIGIT
2108
2109  006626  121127  000060        CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
2110  006632  103407                        BLO     1$              ;YES -- BRANCH
2111  006634  121127  000071              CMPB    (R1),#'9        ;GREATER THAN NINE?
2112  006640  101004                        BHI     1$              ;YES -- BRANCH
2113  006642  111102                        MOVB    (R1),R2         ;GET THE CHARACTER
2114  006644  042702  000060              BIC     #'0,R2          ;STRIP AWAY THE ASCII
2115  006650  005725                        TST     (R5)+           ;ADJUST FOR RETURN
2116  006652  000205              1$:       RTS     R5              ;RETURN
```

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

006654  105711          CK.CHR: TSTB    (R1)            ;''CARRIAGE RETURN''?
006656  001417                  BEQ     3$              ;YES -- BRANCH
006660  121127  000054          CMPB    (R1),#',        ;''COMMA''?
006664  001413                  BEQ     2$              ;YES -- BRANCH
006666  121127  000056          CMPB    (R1),#'.        ;''PERIOD''?
006672  001407                  BEQ     1$              ;YES -- BRANCH
006674  004537  006626          JSR     R5,CK.DEC       ;''DIGIT''?
006700  000410                  BR      4$              ;NO -- BRANCH
006702  004537  006600          JSR     R5,CK.OCT       ;OCTAL ?
006706  005725                  TST     (R5)+           ;DIGIT BETWEEN 8-9
006710  005725                  TST     (R5)+           ;DIGIT BETWEEN 0-7
006712  005725          1$:     TST     (R5)+           ;PERIOD
006714  005725          2$:     TST     (R5)+           ;COMMA
006716  005725          3$:     TST     (R5)+           ;CARRIAGE RETURN
006720  005201                  INC     R1              ;MOVE POINTER TO NEXT CHARACTER
006722  011505          4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
006724  000205                  RTS     R5              ;RETURN

                                ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
                                ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
                                ;       JSR     R5,CK.DIG       ;CHECK DIGITS
                                ;       RETURN  ADR1            ;''CR'' ONLY ENTERED -- R2=0
                                ;       RETURN  ADR2            ;''PERIOD'' ONLY ENTERED -- R2=0
                                ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
                                ;       RETURN  ADR4            ;''CR'' -- R2 = NUMBER
                                ;       RETURN  ADR5            ;''COMMA'' -- R2 = NUMBER
                                ;       RETURN  ADR6            ;''PERIOD'' -- R2 = NUMBER

006726  010446          CK.DIG: MOV     R4,-(SP)        ;SAVE R4
006730  010346                  MOV     R3,-(SP)        ;SAVE R3
006732  010246                  MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
006734  005002                  CLR     R2              ;START WITH 0
006736  005003                  CLR     R3
006740  005004                  CLR     R4
006742  004537  006654          JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
006746  007042                  6$                      ;ILLEGAL CHARACTER
006750  007050                  9$                      ;CARRIAGE RETURN
006752  007042                  6$                      ;''''
006754  007044                  7$                      ;''.''
```

```
                                                1$                      ;DIGIT 0-7
                                                1$                      ;DIGIT 8-9
000004                          1$:     ADD     #4,R5                   ;STEP RETURN POINTER PAST ''CR'' & ''PERIOD'' RETURNS
                                2$:     ASL     R3                      ;INPUT NUMBER *2
                                        MOV     R3,-(SP)                ;SAVE *2
                                        ASL     R3                      ;*4
                                        ASL     R3                      ;*8
                                        ADD     (SP)+,R3                ;(*2)+(*8) = *10
                                        ADD     R2,R3                   ;UPDATE THE INPUT NUMBER
006654                                  JSR     R5,CK.CHR               ;CHECK ONE CHARACTER
                                        8$                              ;ILLEGAL CHARACTER
                                        5$                              ;CARRIAGE RETURN
                                        4$                              ;''
                                        3$                              ;..''
                                        2$                              ;.
                                        2$                              ;DIGIT 0-7
                                        2$                              ;DIGIT 8-9
                                3$:     TSTB    (R1)                    ;DOES A ''CR'' FOLLOW THE ''PERIOD''
                                        BNE     8$                      ;BR IF NOT
                                        TST     (R4)+                   ;INCREMENT THE RETURN
                                4$:     TST     (R4)+                   ;INCREMENT THE RETURN
                                5$:     TST     (R4)+                   ;INCREMENT THE RETURN
                                        CMP     R3,(SP)                 ;CHECK THE MAGNITUDE OF THE NUMBER
                                        BHI     9$                      ;BR IF ENTERED NUMBER TOO LARGE
                                        BR      8$                      ;BYPASS INCREMENT
                                6$:     TST     (R5)+                   ;INCREMENT RETURN PAST INVALID RETURN
                                7$:     TST     (R5)+                   ;INCREMENT RETURN
                                8$:     ADD     R4,R5                   ;SETUP RETURN POINTER
                                9$:     MOV     R3,R2                   ;ENTERED VALUE
                                        TST     (SP)+                   ;CLEAN MAX. SIZE OFF OF STACK
                                        MOV     (SP)+,R3                ;RESTORE R3
                                        MOV     (SP)+,R4                ;RESTORE R4
                                        MOV     (R5),R5                 ;GET RETURN ADDRESS
                                        RTS     R5                      ;RETURN

                                .SBTTL  MACRO ROUTINES


                                .SBTTL  ERROR HANDLER ROUTINE

                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                ;*AND GO TO TYPERR ON ERROR
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW15=1         HALT ON ERROR
                                ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                ;*SW10=1         BELL ON ERROR
                                ;*SW09=1         LOOP ON ERROR
                                ;*CALL
                                ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

007064                          $ERROR:
007064  104407                          CKSWR                           ;;TEST FOR CHANGE IN SOFT-SWR
007066  010137  001274                  MOV     R1,DDRIVE               ;DRIVE ADDRESS IF DRIVE ERROR CALL
007072  010337  001276                  MOV     R3,ATTN                 ;ATTENTION REGISTER CONTENTS
007076  013737  001370  001270          MOV     FMTDPB+12,DS.CYL  ;CURRENT CYLINDER ADDRESS
```

```
2229  007104  113737  001367  001272          MOVB    FMTDPB+11,DS.TRK  ;REQUESTED TRACK ADDRESS
2230  007112  005737  001312                  TST     RP.REG+RPBA       ;NON-ZERO BUFFER ADDRESS ?
2231  007116  001406                          BEQ     7$                ;BR IF NO BUFFER ADDRESS
2232  007120  013746  001312                  MOV     RP.REG+RPBA,-(SP) ;BUFFER ADDRESS
2233  007124  162716  000002                  SUB     #2,(SP)           ;DECREMENT THE ADDRESS
2234  007130  013637  001124                  MOV     @(SP)+,$GDDAT     ;GET THE BUFFER WORD WHICH DIDN'T COMPARE
2235  007134  105237  001103          7$:     INCB    $ERFLG            ;;SET THE ERROR FLAG
2236  007140  001775                          BEQ     7$                ;;DON'T LET THE FLAG GO TO ZERO
2237  007142  013777  001102  171772          MOV     $TSTNM,@DISPLAY   ;;DISPLAY TEST NUMBER AND ERROR FLAG
2238  007150  032777  002000  171762          BIT     #BIT10,@SWR       ;;BELL ON ERROR?
2239  007156  001402                          BEQ     1$                ;;NO - SKIP
2240  007160  104401  001162                  TYPE    ,$BELL            ;;RING BELL
2241  007164  005237  001112          1$:     INC     $ERTTL            ;;COUNT THE NUMBER OF ERRORS
2242  007170  011637  001116                  MOV     (SP),$ERRPC       ;;GET ADDRESS OF ERROR INSTRUCTION
2243  007174  162737  000002  001116          SUB     #2,$ERRPC
2244  007202  117737  171710  001114          MOVB    @$ERRPC,$ITEMB    ;;STRIP AND SAVE THE ERROR ITEM CODE
2245  007210  032777  020000  171722          BIT     #BIT13,@SWR       ;;SKIP TYPEOUT IF SET
2246  007216  001004                          BNE     20$               ;;SKIP TYPEOUTS
2247  007220  004737  007272                  JSR     PC,TYPERR         ;;GO TO USER ERROR ROUTINE
2248  007224  104401  001167                  TYPE    ,$CRLF
2249  007230                          20$:
2250  007230  005777  171704          2$:     TST     @SWR              ;;HALT ON ERROR
2251  007234  100002                          BPL     3$                ;;SKIP IF CONTINUE
2252  007236  000000                          HALT                      ;;HALT ON ERROR!
2253  007240  104407                          CKSWR                     ;;TEST FOR CHANGE IN SOFT-SWR
2254  007242  032777  001000  171670  3$:     BIT     #BIT09,@SWR       ;;LOOP ON ERROR SWITCH SET?
2255  007250  001402                          BEQ     4$                ;;BR IF NO
2256  007252  013716  001110                  MOV     $LPERR,(SP)       ;;FUDGE RETURN FOR LOOPING
2257  007256  005737  001160          4$:     TST     $ESCAPE           ;;CHECK FOR AN ESCAPE ADDRESS
2258  007262  001402                          BEQ     5$                ;;BR IF NONE
2259  007264  013716  001160                  MOV     $ESCAPE,(SP)      ;;FUDGE RETURN ADDRESS FOR ESCAPE
2260  007270                          5$:
2261  007270  000002                          RTI                       ;;RETURN
2262
2263
2264                                  ;THIS ROUTINE USES THE ''ITEM CONTROL BYTE'' ($ITEMB) TO DETERMINE
2265                                  ;WHICH ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE 'ERROR
2266                                  ;TABLE'' ($ERRTB), AND REPORTS THE APPROPIATE INFORMATION
2267                                  ;CONCERNING THE ERROR.
2268
2269  007272  104412          TYPERR: SAVREG                            ;SAVE R0-R5
2270  007274  005000                  CLR     R0                        ;CLEAR R0 FOR ERROR NUMBER
2271  007276  113700  001114          MOVB    $ITEMB,R0                 ;ERROR NUMBER
2272  007302  005300                  DEC     R0                        ;FORM INDEX FOR ERROR TABLE
2273  007304  006300                  ASL     R0
2274  007306  006300                  ASL     R0
2275  007310  006300                  ASL     R0
2276  007312  062700  001630  1$:     ADD     #$ERRTB,R0                ;FORM ADDRESS
2277  007316  012037  007332          MOV     (R0)+,2$                  ;GET ERROR MESSAGE (EM) POINTER
2278  007322  001404                  BEQ     3$                        ;BRANCH IF THERE ISN'T ONE
2279  007324  104401  001167          TYPE    ,$CRLF                    ;''CARRIAGE RETURN - LINE FEED
2280  007330  104401                  TYPE
2281  007332  000000          2$:     .WORD   0                         ;''EM'' POINTER GOES HERE
2282  007334  012037  007350  3$:     MOV     (R0)+,4$                  ;PICK UP DATA HEADER (DH) POINTER
2283  007340  001404                  BEQ     5$                        ;BRANCH IF NONE
2284  007342  104401  001167          TYPE    ,$CRLF                    ;CARRIAGE RETURN-LINE FEED
```

```
                                        TYPE
                                4$:     .WORD   0               ;'DH' POINTER GOES HERE
                                5$:     MOV     (R0)+,R1        ;PICKUP DATA TABLE (DT) POINTER
                                        BEQ     20$             ;BRANCH IF NONE
                                        CLR     R5              ;SET INDENT SWITCH
                                        MOV     (R0)+,R0        ;DATA FORMAT (DF) POINTER
                                        MOV     (R0)+,R2        ;NUMBER OF DH'S TO TYPE
                                        BEQ     17$             ;BRANCH IF DH NUMBER IS 0
                                        COM     R5              ;NO INDENT
001167                                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
                                10$:    MOVB    (R0)+,R3        ;NUMBER OF DATA WORDS TO TYPE
                                        MOVB    (R0)+,R4        ;AND HOW TO TYPE THEM
                                11$:    ROR     R4              ;OCTAL OR DECIMAL?
                                        BCS     12$             ;DECIMAL--BRANCH
                                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        BR      13$
                                12$:
                                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
                                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                13$:    DEC     R3              ;MORE NUMBERS TO TYPE?
                                        BEQ     14$             ;NO--BRANCH
021305                                  TYPE    ,LINSP          ;YES--TYPE SEPERATORS
                                        BR      11$             ;LOOP
                                14$:    DEC     R2              ;MORE DH'S?
                                        BLE     20$             ;NO--BRANCH
001167                                  TYPE    ,$CRLF          ;YES--START A NEW LINE
000002                                  TST     2(R0)           ;ONLY A 'DH' IN THIS REQUEST ?
                                        BEQ     15$             ;BR IF YES - BYPASS THE INDENT
                                        COM     R5              ;INDENT?
                                        BNE     15$             ;NO--BRANCH
021305                                  TYPE    ,LINSP          ;YES--TYPE SPACES
007464                          15$:    MOV     (R0)+,16$       ;GET NEXT DH
                                        TYPE                    ;AND TYPE IT
                                16$:    .WORD   0               ;DH POINTER GOES HERE
                                        TST     (R0)            ;TYPE A 'DT' ?
                                        BNE     21$             ;BR IF A 'DT'
000004                                  ADD     #4,R0           ;INCREMENT THE 'DF' POINTER
                                        BR      14$             ;SEE IF END OF 'DF' BLOCK
001167                          21$:    TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
                                        TST     R5              ;INDENT?
                                        BNE     10$             ;NO--BRANCH
021305                          17$:    TYPE    ,LINSP          ;YES--TYPE SPACES
                                        BR      10$             ;LOOP
                                20$:    RESREG                  ;RESTORE R0-R5
                                        RTS     PC              ;RETURN

                                .SBTTL  TYPE ROUTINE

                                ;;******************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
```

```
2341                                    ;*CALL:
2342                                    ;*1) USING A TRAP INSTRUCTION
2343                                    ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
2344                                    ;*OR
2345                                    ;*      TYPE
2346                                    ;*      MESADR
2347                                    ;*
2348
2349  007522  105737  001157      $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
2350  007526  100002                  BPL     1$              ;;BR IF YES
2351  007530  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
2352  007532  000407                  BR      3$              ;;LEAVE
2353  007534  010046              1$: MOV     R0,-(SP)        ;;SAVE R0
2354  007536  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
2355  007542  112046              2$: MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
2356  007544  001005                  BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
2357  007546  005726                  TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
2358  007550  012600             60$: MOV     (SP)+,R0        ;;RESTORE R0
2359  007552  062716  000002      3$: ADD     #2,(SP)         ;;ADJUST RETURN PC
2360  007556  000002                  RTI                     ;;RETURN
2361  007560  122716  000011      4$: CMPB    #HT,(SP)        ;;BRANCH IF <HT>
2362  007564  001430                  BEQ     8$
2363  007566  122716  000200          CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
2364  007572  001006                  BNE     5$
2365  007574  005726                  TST     (SP)+           ;;POP  <CR><LF> EQUIV
2366  007576  104401                  TYPE                    ;;TYPE A CR AND LF
2367  007600  001167                  $CRLF
2368  007602  105037  007736          CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
2369  007606  000755                  BR      2$              ;;GET NEXT CHARACTER
2370  007610  004737  007672      5$: JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
2371  007614  123726  001156      6$: CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
2372  007620  001350                  BNE     2$              ;;IF NO GO GET NEXT CHAR.
2373  007622  013746  001154          MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
2374                                                          ;;AND THE NULL CHAR.
2375  007626  105366  000001      7$: DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
2376  007632  002770                  BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
2377  007634  004737  007672          JSR     PC,$TYPEC       ;;GO TYPE A NULL
2378  007640  105337  007736          DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
2379  007644  000770                  BR      7$              ;;LOOP
2380
2381                                    ;HORIZONTAL TAB PROCESSOR
2382
2383  007646  112716  000040      8$: MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
2384  007652  004737  007672      9$: JSR     PC,$TYPEC       ;;TYPE A SPACE
2385  007656  132737  000007  007736  BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
2386  007664  001372                  BNE     9$              ;;TAB STOP
2387  007666  005726                  TST     (SP)+           ;;POP SPACE OFF STACK
2388  007670  000724                  BR      2$              ;;GET NEXT CHARACTER
2389  007672  105777  171252  $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
2390  007676  100375                  BPL     $TYPEC
2391  007700  116677  000002  171244  MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
2392  007706  122766  000015  000002  CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
2393  007714  001003                  BNE     1$              ;;BRANCH IF NO
2394  007716  105037  007736          CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
2395  007722  000406                  BR      $TYPEX          ;;EXIT
2396  007724  122766  000012  000002  1$: CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
```

```
2397  007732  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
2398  007734  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
2399  007736  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
2400  007740  000207                  $TYPEX: RTS     PC
2401
2402
2403                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
2404
2405                                  ;;**************************************************************
2406                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
2407                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
2408                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
2409                                  ;*CALL:
2410                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2411                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
2412                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
2413                                  ;*      .BYTE   M               ;;M=1 OR 0
2414                                  ;*                                      ;;1=TYPE LEADING ZEROS
2415                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
2416                                  ;*
2417                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
2418                                  ;*$TYPOS OR $TYPOC
2419                                  ;*CALL:
2420                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2421                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
2422                                  ;*
2423                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
2424                                  ;*CALL:
2425                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2426                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
2427
2428  007742  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
2429  007746  116637  000001  010165          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
2430  007754  112637  010167                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
2431  007760  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
2432  007764  000406                          BR      $TYPON
2433  007766  112737  000001  010165  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
2434  007774  112737  000006  010167          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
2435  010002  112737  000005  010164  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
2436  010010  010346                          MOV     R3,-(SP)        ;;SAVE R3
2437  010012  010446                          MOV     R4,-(SP)        ;;SAVE R4
2438  010014  010546                          MOV     R5,-(SP)        ;;SAVE R5
2439  010016  113704  010167                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
2440  010022  005404                          NEG     R4
2441  010024  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
2442  010030  110437  010166                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
2443  010034  113704  010165                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
2444  010040  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
2445  010044  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
2446  010046  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
2447  010050  000404                          BR      3$              ;;GO DO MSB
2448  010052  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
2449  010054  006105                          ROL     R5
2450  010056  006105                          ROL     R5
2451  010060  010503                          MOV     R5,R3
2452  010062  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
```

```
2453  010064  105337  010166                DECB    $OMODE          ;;TYPE THIS DIGIT?
2454  010070  100016                      BPL     7$              ;;BR IF NO
2455  010072  042703  177770              BIC     #177770,R3      ;;GET RID OF JUNK
2456  010076  001002                      BNE     4$              ;;TEST FOR 0
2457  010100  005704                      TST     R4              ;;SUPPRESS THIS 0?
2458  010102  001403                      BEQ     5$              ;;BR IF YES
2459  010104  005204              4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
2460  010106  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
2461  010112  052703  000040      5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
2462  010116  110337  010162              MOVB    R3,8$           ;;SAVE FOR TYPING
2463  010122  104401  010162              TYPE    ,8$             ;;GO TYPE THIS DIGIT
2464  010126  105337  010164      7$:     DECB    $OCNT           ;;COUNT BY 1
2465  010132  003347                      BGT     2$              ;;BR IF MORE TO DO
2466  010134  002402                      BLT     6$              ;;BR IF DONE
2467  010136  005204                      INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
2468  010140  000744                      BR      2$              ;;GO DO THE LAST DIGIT
2469  010142  012605              6$:     MOV     (SP)+,R5        ;;RESTORE R5
2470  010144  012604                      MOV     (SP)+,R4        ;;RESTORE R4
2471  010146  012603                      MOV     (SP)+,R3        ;;RESTORE R3
2472  010150  016666  000002  000004      MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
2473  010156  012616                      MOV     (SP)+,(SP)
2474  010160  000002                      RTI                     ;;RETURN
2475  010162     000              8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
2476  010163     000                      .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
2477  010164     000              $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
2478  010165     000              $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
2479  010166  000000              $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
2480
2481                                      .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
2482
2483                                      ;;**********************************************************************
2484                                      ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
2485                                      ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
2486                                      ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
2487                                      ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
2488                                      ;*REPLACED WITH SPACES.
2489                                      ;*CALL:
2490                                      ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
2491                                      ;*      TYPDS                   ;;GO TO THE ROUTINE
2492
2493  010170                      $TYPDS:
2494  010170  010046                      MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2495  010172  010146                      MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2496  010174  010246                      MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2497  010176  010346                      MOV     R3,-(SP)        ;;PUSH R3 ON STACK
2498  010200  010546                      MOV     R5,-(SP)        ;;PUSH R5 ON STACK
2499  010202  012746  020200              MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
2500  010206  016605  000020              MOV     20(SP),R5       ;;GET THE INPUT NUMBER
2501  010212  100004                      BPL     1$              ;;BR IF INPUT IS POS.
2502  010214  005405                      NEG     R5              ;;MAKE THE BINARY NUMBER POS.
2503  010216  112766  000055  000001      MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
2504  010224  005000              1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
2505  010226  012703  010404              MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
2506  010232  112723  000040              MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
2507  010236  005002              2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
2508  010240  016001  010374              MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
```

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2509  010244  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
2510  010246  002402                          BLT     4$              ;;BR IF DONE
2511  010250  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
2512  010252  000774                          BR      3$
2513  010254  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
2514  010256  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
2515  010260  001002                          BNE     5$              ;;FALL THROUGH IF 0
2516  010262  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
2517  010264  100407                          BMI     7$              ;;BR IF YES
2518  010266  106316                  5$:     ASLB    (SP)            ;;MSD?
2519  010270  103003                          BCC     6$              ;;BR IF NO
2520  010272  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
2521  010300  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
2522  010304  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
2523  010310  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
2524  010312  005720                          TST     (R0)+           ;;JUST INCREMENTING
2525  010314  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
2526  010320  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
2527  010322  003002                          BGT     8$              ;;GO TO EXIT
2528  010324  010502                          MOV     R5,R2           ;;GET THE LSD
2529  010326  000764                          BR      6$              ;;GO CHANGE TO ASCII
2530  010330  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
2531  010332  100003                          BPL     9$              ;;BR IF NO
2532  010334  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
2533  010342  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
2534  010344  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
2535  010346  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
2536  010350  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
2537  010352  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
2538  010354  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
2539  010356  104401  010404                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
2540  010362  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
2541  010370  012616                          MOV     (SP)+,(SP)
2542  010372  000002                          RTI                     ;;RETURN TO USER
2543  010374  023420                  $DTBL:  10000.
2544  010376  001750                          1000.
2545  010400  000144                          100.
2546  010402  000012                          10.
2547  010404  000004                  $DBLK:  .BLKW   4
2548
2549                                  .SBTTL  TTY INPUT ROUTINE
2550
2551                                  ;;**********************************************************************
2552                                  .ENABL  LSB
2553  010414  000000                  $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
2554  010416  000000                  $TKQIN: .WORD   0               ;;INPUT POINTER
2555  010420  000000                  $TKQOUT: .WORD  0               ;;OUTPUT POINTER
2556  010422  000007                  $TKQSRT: .BLKB  7               ;;TTY KEYBOARD QUEUE
2557          010431                  $TKQEND=.
2558          010432                  .EVEN
2559
2560                                  ;*TK INITIALIZE ROUTINE
2561                                  ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
2562                                  ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
2563                                  ;
2564                                  ;*CALL:
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```
2565                                    ;*      JSR     PC,$TKINT
2566                                    ;*      RETURN
2567                                    ;
2568  010432  005037  010414            $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
2569  010436  012737  010422  010416            MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
2570  010444  013737  010416  010420            MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
2571  010452  012737  010502  000060            MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
2572  010460  012737  000200  000062            MOV     #200,@#TKVEC+2  ;;'BR' LEVEL 4
2573  010466  005777  170454                    TST     @$TKB           ;;CLEAR DONE FLAG
2574  010472  012777  000100  170444            MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
2575  010500  000207                            RTS     PC              ;;RETURN TO CALLER
2576
2577                                    ;*TK SERVICE ROUTINE
2578                                    ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
2579                                    ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
2580                                    ;*IT IN THE QUEUE.
2581                                    ;*IF THE CHARACTER IS A ''CONTROL-C'' (^C) $TKINT IS CALLED AND
2582                                    ;*UPON RETURN EXIT IS MADE TO THE ''CONTROL-C'' RESTART ADDRESS (@CNTLC)
2583                                    ;
2584  010502  117746  170440            $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
2585  010506  042716  177600                    BIC     #^C177,(SP)     ;;STRIP THE JUNK
2586  010512  021627  000003                    CMP     (SP),#3         ;;IS IT A CONTROL C?
2587  010516  001007                            BNE     1$              ;;BRANCH IF NO
2588  010520  104401  011615                    TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
2589  010524  004737  010432                    JSR     PC,$TKINT       ;;INIT THE KEYBOARD
2590  010530  005726                            TST     (SP)+           ;;CLEAN UP STACK
2591  010532  000177  170542                    JMP     @CNTLC          ;;CONTROL C RESTART
2592  010536  021627  000007            1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
2593  010542  001004                            BNE     2$              ;;BRANCH IF NO
2594  010544  022737  000176  001140            CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
2595  010552  001500                            BEQ     6$              ;;GO TO SWR CHANGE
2596
2597  010554                            2$:
2598  010554  022737  000007  010414            CMP     #7,$TKCNT       ;;IS THE QUEUE FULL?
2599  010562  001004                            BNE     3$              ;;BRANCH IF NO
2600  010564  104401  001162                    TYPE    ,$BELL          ;;RING THE TTY BELL
2601  010570  005726                            TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
2602  010572  000451                            BR      5$              ;;EXIT
2603  010574  021627  000023            3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
2604  010600  001021                            BNE     32$             ;;BRANCH IF NO
2605  010602  005077  170336                    CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
2606  010606  005726                            TST     (SP)+           ;;CLEAN CHAR OFF STACK
2607  010610  105777  170330            31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
2608  010614  100375                            BPL     31$             ;;LOOP UNTIL ITS THERE
2609  010616  117746  170324                    MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
2610  010622  042716  177600                    BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
2611  010626  022627  000021                    CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
2612  010632  001366                            BNE     31$             ;;BRANCH IF NO
2613  010634  012777  000100  170302            MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
2614  010642  000002                            RTI                     ;;RETURN
2615  010644  005237  010414            32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
2616  010650  021627  000140                    CMP     (SP),#140       ;;IS IT UPPER CASE?
2617  010654  002405                            BLT     4$              ;;BRANCH IF YES
2618  010656  021627  000175                    CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
2619  010662  003002                            BGT     4$              ;;BRANCH IF YES
2620  010664  042716  000040                    BIC     #40,(SP)        ;;MAKE IT UPPER CASE
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2621  010670  112677  177522          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
2622  010674  005237  010416                  INC     $TKQIN          ;;UPDATE THE POINTER
2623  010700  023727  010416  010431          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
2624  010706  001003                          BNE     5$              ;;BRANCH IF NO
2625  010710  012737  010422  010416          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
2626  010716  000002                  5$:     RTI                     ;;RETURN
2627
2628                                  ;;**********************************************************************
2629                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
2630                                  ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
2631                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
2632                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
2633  010720  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
2634  010726  001124                          BNE     15$             ;;EXIT IF NOT
2635  010730  105777  170210                  TSTB    @$TKS           ;;IS A CHAR WAITING?
2636  010734  100121                          BPL     15$             ;;IF NOT, EXIT
2637  010736  117746  170204                  MOVB    @$TKB,-(SP)     ;;YES
2638  010742  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
2639  010746  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
2640  010752  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
2641                                                                  ;;AND EXIT
2642
2643                                  ;;**********************************************************************
2644                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
2645                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
2646                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
2647  010754  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
2648  010762  001674                          BEQ     2$              ;;BRANCH IF YES
2649  010764  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
2650  010766  004737  010432                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
2651  010772  005077  170146                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
2652  010776  112737  000001  001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
2653
2654  011004  104401  011627                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
2655  011010  104401  011634          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
2656  011014  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
2657  011020  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2658  011022  104401  011645                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
2659  011026  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
2660  011030  005046                          CLR     -(SP)           ;;THE NEW SWR
2661  011032  105777  170106          7$:     TSTB    @$TKS           ;;CHAR THERE?
2662  011036  100375                          BPL     7$              ;;IF NOT TRY AGAIN
2663
2664  011040  117746  170102                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
2665  011044  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
2666
2667  011050  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
2668  011054  001015                          BNE     9$              ;;BRANCH IF NOT
2669  011056  104401  011615                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
2670  011062  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
2671  011066  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
2672  011074  001003                          BNE     8$              ;;BRANCH IF NO
2673  011076  012777  000100  170040          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
2674  011104  000177  170170          8$:     JMP     @CNTLC          ;;CONTROL-C RESTART
2675
2676
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2677  011110  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
2678  011114  001005                          BNE     10$             ;;BRANCH IF NOT
2679  011116  104401  011622                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
2680  011122  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
2681  011126  000737                          BR      19$             ;;LET'S TRY IT AGAIN
2682
2683
2684  011130  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
2685  011134  001022                          BNE     16$             ;;BRANCH IF NO
2686  011136  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
2687  011142  001403                          BEQ     11$             ;;BRANCH IF YES
2688  011144  016677  000002  167766        MOV     2(SP),@SWR      ;;SAVE NEW SWR
2689  011152  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
2690  011156  104401  001167          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
2691  011162  123727  001135  000001        CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
2692  011170  001003                          BNE     15$             ;;BRANCH IF NOT
2693  011172  012777  000100  167744        MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
2694  011200  000002          15$:    RTI                             ;;RETURN
2695  011202  004737  007672          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
2696  011206  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
2697  011212  002420                          BLT     18$             ;;BRANCH IF YES
2698  011214  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
2699  011220  003015                          BGT     18$             ;;BRANCH IF YES
2700  011222  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
2701  011226  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
2702  011232  001403                          BEQ     17$             ;;BRANCH IF YES
2703  011234  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
2704  011236  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
2705  011240  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
2706  011242  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
2707  011246  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
2708  011252  000667                          BR      7$              ;;GET THE NEXT ONE
2709  011254  104401  001166          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
2710  011260  000720                          BR      20$             ;;SIMULATE CONTROL-U
2711                                  .DSABL  LSB
2712
2713
2714                                  ;;**********************************************************************
2715                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
2716                                  ;*CALL:
2717                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
2718                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
2719                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
2720                                  ;
2721
2722  011262  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
2723  011264  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
2724  011272  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
2725  011276  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
2726  011300  012746  011306                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
2727  011304  000002                          RTI                     ;;POP NEW PC AND PS
2728  011306                          64$:
2729  011306  005737  010414          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
2730  011312  001775                          BEQ     1$
2731  011314  005337  010414                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
2732  011320  117766  177074  000004        MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
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 2733  011326  005237  010420                        INC     $TKQOUT          ;;UPDATE THE POINTER
 2734  011332  023727  010420  010431                CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
 2735  011340  001003                                BNE     2$               ;;BRANCH IF NO
 2736  011342  012737  010422  010420                MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
 2737  011350  000002                        2$:     RTI                      ;;RETURN
 2738                                         ;;*****************************************************************
 2739                                         ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
 2740                                         ;*CALL:
 2741                                         ;*      RDLIN                    ;;INPUT A STRING FROM THE TTY
 2742                                         ;*      RETURN HERE              ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
 2743                                         ;*                               ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
 2744
 2745  011352  010346                        $RDLIN: MOV     R3,-(SP)         ;;SAVE R3
 2746  011354  005046                                CLR     -(SP)            ;;CLEAR THE RUBOUT KEY
 2747  011356  012703  011606                1$:     MOV     #$TTYIN,R3       ;;GET ADDRESS
 2748  011362  022703  011615                2$:     CMP     #$TTYIN+7,R3     ;;BUFFER FULL?
 2749  011366  101456                                BLOS    4$               ;;BR IF YES
 2750  011370  104410                                RDCHR                    ;;GO READ ONE CHARACTER FROM THE TTY
 2751  011372  112613                                MOVB    (SP)+,(R3)       ;;GET CHARACTER
 2752  011374  122713  000177                10$:    CMPB    #177,(R3)        ;;IS IT A RUBOUT
 2753  011400  001022                                BNE     5$               ;;BR IF NO
 2754  011402  005716                                TST     (SP)             ;;IS THIS THE FIRST RUBOUT?
 2755  011404  001007                                BNE     6$               ;;BR IF NO
 2756  011406  112737  000134  011604                MOVB    #'\,9$           ;;TYPE A BACK SLASH
 2757  011414  104401  011604                        TYPE    ,9$
 2758  011420  012716  177777                        MOV     #-1,(SP)         ;;SET THE RUBOUT KEY
 2759  011424  005303                        6$:     DEC     R3               ;;BACKUP BY ONE
 2760  011426  020327  011606                        CMP     R3,#$TTYIN       ;;STACK EMPTY?
 2761  011432  103434                                BLO     4$               ;;BR IF YES
 2762  011434  111337  011604                        MOVB    (R3),9$          ;;SETUP TO TYPEOUT THE DELETED CHAR.
 2763  011440  104401  011604                        TYPE    ,9$              ;;GO TYPE
 2764  011444  000746                                BR      2$               ;;GO READ ANOTHER CHAR.
 2765  011446  005716                        5$:     TST     (SP)             ;;RUBOUT KEY SET?
 2766  011450  001406                                BEQ     7$               ;;BR IF NO
 2767  011452  112737  000134  011604                MOVB    #'\,9$           ;;TYPE A BACK SLASH
 2768  011460  104401  011604                        TYPE    ,9$
 2769  011464  005016                                CLR     (SP)             ;;CLEAR THE RUBOUT KEY
 2770  011466  122713  000025                7$:     CMPB    #25,(R3)         ;;IS CHARACTER A CTRL U?
 2771  011472  001003                                BNE     8$               ;;BR IF NO
 2772  011474  104401  011622                        TYPE    ,$CNTLU          ;;TYPE A CONTROL 'U''
 2773  011500  000726                                BR      1$               ;;GO START OVER
 2774  011502  122713  000022                8$:     CMPB    #22,(R3)         ;;IS CHARACTER A ''^R''?
 2775  011506  001011                                BNE     3$               ;;BRANCH IF NO
 2776  011510  105013                                CLRB    (R3)             ;;CLEAR THE CHARACTER
 2777  011512  104401  001167                        TYPE    ,$CRLF           ;;TYPE A ''CR'' & ''LF''
 2778  011516  104401  011606                        TYPE    ,$TTYIN          ;;TYPE THE INPUT STRING
 2779  011522  000717                                BR      2$               ;;GO PICKUP ANOTHER CHACTER
 2780  011524  104401  001166                4$:     TYPE    ,$QUES           ;;TYPE A '?'
 2781  011530  000712                                BR      1$               ;;CLEAR THE BUFFER AND LOOP
 2782  011532  111337  011604                3$:     MOVB    (R3),9$          ;;ECHO THE CHARACTER
 2783  011536  104401  011604                        TYPE    ,9$
 2784  011542  122723  000015                        CMPB    #15,(R3)+        ;;CHECK FOR RETURN
 2785  011546  001305                                BNE     2$               ;;LOOP IF NOT RETURN
 2786  011550  105063  177777                        CLRB    -1(R3)           ;;CLEAR RETURN (THE 15)
 2787  011554  104401  001170                        TYPE    ,$LF             ;;TYPE A LINE FEED
 2788  011560  005726                                TST     (SP)+            ;;CLEAN RUBOUT KEY FROM THE STACK
```

```
2789  011562  012603                          MOV     (SP)+,R3        ;;RESTORE R3
2790  011564  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
2791  011566  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
2792  011574  012766  011606  000004          MOV     #$TTYIN,4(SP)
2793  011602  000002                          RTI                     ;;RETURN
2794  011604     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
2795  011605     000                          .BYTE   0               ;;TERMINATOR
2796  011606  000007                  $TTYIN: .BLKB   7               ;;RESERVE 7 BYTES FOR TTY INPUT
2797  011615     136  006503  000012  $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL ''C''
2798  011622  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL ''U''
2799  011627     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL ''G''
2800  011634  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
2801  011642  020075     000
2802  011645     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
2803  011652  036440  000040
2804
2805                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
2806
2807                                  ;;**************************************************************
2808                                  ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
2809                                  ;*LEADING NUMBERS.
2810                                  ;*CALL
2811                                  ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
2812                                  ;*      JSR     PC,@#$SUPRS
2813
2814
2815  011656  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
2816  011660  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
2817  011664  105710                  1$:     TSTB    (R0)            ;;TERMINATEOR?
2818  011666  001403                          BEQ     2$              ;;BR IF YES
2819  011670  122720  000060                  CMPB    #'0,(R0)+       ;;IS THIS AN ASCII ''0'' ?
2820  011674  001773                          BEQ     1$              ;;BR IF YES
2821  011676  005300                  2$:     DEC     R0              ;;BACKUP BY ''1''
2822  011700  010037  011706                  MOV     R0,3$           ;;SAVE FOR TYPING
2823  011704  104401                          TYPE                    ;;GO TYPE
2824  011706  000000                  3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
2825  011710  012600                          MOV     (SP)+,R0        ;;RESTORE R0
2826  011712  012616                          MOV     (SP)+,(SP)      ;;RESTORE THE STACK
2827  011714  000207                          RTS     PC              ;;RETURN
2828
2829                                  .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
2830
2831                                  ;;**************************************************************
2832                                  ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
2833                                  ;*UNSIGNED DECIMAL ASCIZ NUMBER.
2834                                  ;*CALL
2835                                  ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
2836                                  ;*      JSR     PC,@#$SB2D      ;;CALL
2837                                  ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
2838
2839
2840  011716  016637  000002  011746  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
2841  011724  012746  011746                  MOV     #1$,-(SP)       ;;SET POINTER
2842  011730  004737  011752                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
2843  011734  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
2844  011740  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
```

```
                                        RTS     PC              ;;RETURN
011746  000000  000000          1$:   .WORD   0,0

                              .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

                              ;;*****************************************************************
                              ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                              ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                              ;*POSITIVE.
                              ;*CALL
                              ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                              ;*      JSR     PC,@#$DB2D
                              ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                                              ;;IS ON THE STACK

011752  104412          $DB2D:  SAVREG                          ;;SAVE REGISTERS
011754  016602  000002          MOV     2(SP),R2                ;;PICKUP THE DATA POINTER
011760  012700  012132          MOV     #$DECVL,R0              ;;GET ADDRESS OF "$DECVL" STRING
011764  010066  000002          MOV     R0,2(SP)                ;;PUT ADDRESS OF ASCIZ STRING ON STACK
011770  012201                  MOV     (R2)+,R1                ;;PICKUP THE BINARY NUMBER
011772  012202                  MOV     (R2)+,R2
011774  012737  000012  012050  MOV     #10.,4$                 ;;SET UP TO DO 10 CONVERSIONS
012002  012704  012062          MOV     #$TNPWR,R4              ;;ADDRESS OF TEN POWER
012006  012705  012064          MOV     #$TNPWR+2,R5
012012  005003          1$:     CLR     R3                      ;;CLEAR PARTIAL
012014  161401          2$:     SUB     (R4),R1                 ;;SUBTRACT TEN POWER
012016  005602                  SBC     R2
012020  161502                  SUB     (R5),R2
012022  002402                  BLT     3$                      ;;BR IF TEN POWER TO LARGE
012024  005203                  INC     R3                      ;;ADD 1 TO PARTIAL
012026  000772                  BR      2$                      ;;LOOP
012030  062401          3$:     ADD     (R4)+,R1                ;;RESTORE SUBTRACTED VALUE
012032  005502                  ADC     R2
012034  062402                  ADD     (R4)+,R2
012036  022525                  CMP     (R5)+,(R5)+             ;;MOVE TO NEXT TEN POWER
012040  052703  000060          BIS     #'0,R3                  ;;CHANGE PARTIAL TO ASCII
012044  110320                  MOVB    R3,(R0)+                ;;SAVE IT
012046  005327                  DEC     (PC)+                   ;;DONE?
012050  000000          4$:     .WORD   0
012052  001357                  BNE     1$                      ;;BR IF NO
012054  105020                  CLRB    (R0)+                   ;;TERMINATOR
012056  104413                  RESREG                          ;;RESTORE REGISTERS
012060  000207                  RTS     PC                      ;;RETURN
012062  145000          $TNPWR: 145000                          ;;1.0E09
012064  035632                  35632
012066  160400                  160400                          ;;1.0E08
012070  002765                  2765
012072  113200                  113200                          ;;1.0E07
012074  000230                  230
012076  041100                  041100                          ;;1.0E06
012100  000017                  17
012102  103240                  103240                          ;;1.0E05
012104  000001                  1
012106  023420                  23420                           ;;1.0E04
012110  000000                  0
```

```
 2901  012112  001750                        1750                    ;;1.0E03
 2902  012114  000000                        0
 2903  012116  000144                        144                     ;;1.0E02
 2904  012120  000000                        0
 2905  012122  000012                        12                      ;;1.0E01
 2906  012124  000000                        0
 2907  012126  000001                        1                       ;;1.0E00
 2908  012130  000000                        0
 2909  012132  000014              $DECVL: .BLKB   12.               ;;RESERVE STORAGE FOR ASCIZ STRING
 2910
 2911                              .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
 2912
 2913                              ;;*****************************************************************
 2914                              ;*SAVE R0-R5
 2915                              ;*CALL:
 2916                              ;*      SAVREG
 2917                              ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
 2918                              ;*
 2919                              ;*TOP---(+16)
 2920                              ;* +2---(+18)
 2921                              ;* +4---R5
 2922                              ;* +6---R4
 2923                              ;* +8---R3
 2924                              ;*+10---R2
 2925                              ;*+12---R1
 2926                              ;*+14---R0
 2927
 2928  012146              $SAVREG:
 2929  012146  010046              MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 2930  012150  010146              MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 2931  012152  010246              MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 2932  012154  010346              MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 2933  012156  010446              MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 2934  012160  010546              MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 2935  012162  016646  000022      MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
 2936  012166  016646  000022      MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
 2937  012172  016646  000022      MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
 2938  012176  016646  000022      MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
 2939  012202  000002              RTI
 2940
 2941                              ;*RESTORE R0-R5
 2942                              ;*CALL:
 2943                              ;*      RESREG
 2944  012204              $RESREG:
 2945  012204  012666  000022      MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
 2946  012210  012666  000022      MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
 2947  012214  012666  000022      MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
 2948  012220  012666  000022      MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
 2949  012224  012605              MOV     (SP)+,R5        ;;POP STACK INTO R5
 2950  012226  012604              MOV     (SP)+,R4        ;;POP STACK INTO R4
 2951  012230  012603              MOV     (SP)+,R3        ;;POP STACK INTO R3
 2952  012232  012602              MOV     (SP)+,R2        ;;POP STACK INTO R2
 2953  012234  012601              MOV     (SP)+,R1        ;;POP STACK INTO R1
 2954  012236  012600              MOV     (SP)+,R0        ;;POP STACK INTO R0
 2955  012240  000002              RTI
 2956
```

```
                                        .SBTTL  TRAP DECODER

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

012242  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
012244  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
012250  005740                          TST     -(R0)           ;;BACKUP BY 2
012252  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
012254  006300                          ASL     R0              ;;POSITION FOR INDEXING
012256  016000  012276                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
012262  000200                          RTS     R0              ;;GO TO ROUTINE

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

012264  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
012266  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
012274  000002                          RTI                     ;;RESTORE THE PSW

                                        .SBTTL  TRAP TABLE

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

                                        ;       ROUTINE
                                        ;       -------
012276  012264                  $TRPAD: .WORD   $TRAP2
012300  007522                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
012302  007766                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
012304  007742                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
012306  010002                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
012310  010170                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

012312  011010                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

012314  010720                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
012316  011262                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
012320  011352                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
012322  012146                          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
012324  012204                          $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE


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

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

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

012326  000000  000000  000000  RPERRS: .WORD   0,0,0,0
012334  000000

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

012336      000                 DRVACT: .BYTE   0               ;DRIVE 0
012337      000                         .BYTE   0               ;DRIVE 1
012340      000                         .BYTE   0               ;DRIVE 2
012341      000                         .BYTE   0               ;DRIVE 3
012342      000                         .BYTE   0               ;DRIVE 4
012343      000                         .BYTE   0               ;DRIVE 5
012344      000                         .BYTE   0               ;DRIVE 6
012345      000                         .BYTE   0               ;DRIVE 7

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

012346      000                 DRVSTA: .BYTE   0               ;DRIVE 0
012347      000                         .BYTE   0               ;DRIVE 1
012350      000                         .BYTE   0               ;DRIVE 2
012351      000                         .BYTE   0               ;DRIVE 3
012352      000                         .BYTE   0               ;DRIVE 4
012353      000                         .BYTE   0               ;DRIVE 5
012354      000                         .BYTE   0               ;DRIVE 6
012355      000                         .BYTE   0               ;DRIVE 7

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

012356      000                 DRVTYP: .BYTE   0               ;DRIVE 0
012357      000                         .BYTE   0               ;DRIVE 1
012360      000                         .BYTE   0               ;DRIVE 2
012361      000                         .BYTE   0               ;DRIVE 3
012362      000                         .BYTE   0               ;DRIVE 4
012363      000                         .BYTE   0               ;DRIVE 5
012364      000                         .BYTE   0               ;DRIVE 6
012365      000                         .BYTE   0               ;DRIVE 7

                                        ;TABLE OF DUAL PORT INITIALIZATION INDICATORS
                                                ;DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
                                                ;DPINT<0 IF INITIALIZATION IS IN PROGRESS
```

```
3069
3070  012366  000                 DPINT:  .BYTE   0               ;DRIVE 0
3071  012367  000                         .BYTE   0               ;DRIVE 1
3072  012370  000                         .BYTE   0               ;DRIVE 2
3073  012371  000                         .BYTE   0               ;DRIVE 3
3074  012372  000                         .BYTE   0               ;DRIVE 4
3075  012373  000                         .BYTE   0               ;DRIVE 5
3076  012374  000                         .BYTE   0               ;DRIVE 6
3077  012375  000                         .BYTE   0               ;DRIVE 7
3078
3079                              ;TABLE OF PENDING DUAL PORT REQUESTS
3080                                      ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
3081                                      ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
3082
3083  012376  000                 DPRQS:  .BYTE   0               ;DRIVE 0
3084  012377  000                         .BYTE   0               ;DRIVE 1
3085  012400  000                         .BYTE   0               ;DRIVE 2
3086  012401  000                         .BYTE   0               ;DRIVE 3
3087  012402  000                         .BYTE   0               ;DRIVE 4
3088  012403  000                         .BYTE   0               ;DRIVE 5
3089  012404  000                         .BYTE   0               ;DRIVE 6
3090  012405  000                         .BYTE   0               ;DRIVE 7
3091
3092                              ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
3093                                      ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
3094                                      ;''DPB'' OF THE I/O OPERATION.
3095
3096  012406  000000              TRNSWT: .WORD   0
3097
3098                              ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
3099                                      ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
3100                                      ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
3101                                      ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
3102                                      ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
3103
3104  012410  000000              SRCHWT: .WORD   0
3105
3106
3107                              ;RP04/5/6 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
3108                                      ;ACTDRV=0 IF DRIVER IS INACTIVE
3109                                      ;ACTDRV>0 IF DRIVER IS ACTIVE
3110
3111  012412  000                 ACTDRV: .BYTE   0
3112
3113                              ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
3114                                      ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
3115                                      ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
3116
3117  012413  000                 ACTSTR: .BYTE   0
3118
3119                              ;UNLOAD FLAG (ULDFLG=8 BYTES)
3120                                      ;ULDFLG=0 IF NO UNLOAD COMMAND
3121                                      ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
3122                                      ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
3123
3124  012414  000                 ULDFLG: .BYTE   0               ;DRIVE 0
```

```
3125  012415  000                     .BYTE   0               ;DRIVE 1
3126  012416  000                     .BYTE   0               ;DRIVE 2
3127  012417  000                     .BYTE   0               ;DRIVE 3
3128  012420  000                     .BYTE   0               ;DRIVE 4
3129  012421  000                     .BYTE   0               ;DRIVE 5
3130  012422  000                     .BYTE   0               ;DRIVE 6
3131  012423  000                     .BYTE   0               ;DRIVE 7
3132
3133                          ;LOOK AHEAD COUNT (LACNT=8 BYTES)
3134                                  ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
3135
3136  012424  000             LACNT:  .BYTE   0               ;DRIVE 0
3137  012425  000                     .BYTE   0               ;DRIVE 1
3138  012426  000                     .BYTE   0               ;DRIVE 2
3139  012427  000                     .BYTE   0               ;DRIVE 3
3140  012430  000                     .BYTE   0               ;DRIVE 4
3141  012431  000                     .BYTE   0               ;DRIVE 5
3142  012432  000                     .BYTE   0               ;DRIVE 6
3143  012433  000                     .BYTE   0               ;DRIVE 7
3144
3145                          ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
3146                                  ;SAVEFG <0 IF SAVE THE RH11/RP04/5/6 REGISTERS WHEN THE
3147                                  ;OPERATION IS COMPLETED AS PER (DPB+14).
3148                                  ;SAVEFG=0 IF SAVE THE RH11/RP04/5/6 REGISTERS, AS PER
3149                                  ;(DPB+14), AFTER AN ERROR.
3150
3151  012434  000000          SAVEFG: .WORD   0
3152
3153                          ;SEEK FLAG (SEEKFG=1 WORD)
3154                                  ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
3155                                  ;FOR A DATA TRANSFER START A SEARCH COMMAND
3156                                  ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
3157                                  ;DISREGARD THE WINDOW
3158
3159  012436  000000          SEEKFG: .WORD   0
3160
3161                          ;TIMEOUT TABLE (TIMER=8 WORDS)
3162                                  ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
3163
3164  012440  177777          TIMER:  .WORD   -1      ;DRIVE 0
3165  012442  177777                  .WORD   -1      ;DRIVE 1
3166  012444  177777                  .WORD   -1      ;DRIVE 2
3167  012446  177777                  .WORD   -1      ;DRIVE 3
3168  012450  177777                  .WORD   -1      ;DRIVE 4
3169  012452  177777                  .WORD   -1      ;DRIVE 5
3170  012454  177777                  .WORD   -1      ;DRIVE 6
3171  012456  177777                  .WORD   -1      ;DRIVE 7
3172
3173                          ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
3174                                  ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
3175                                  ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
3176
3177  012460  177777          DTUW:   .WORD   -1
3178
3179                          ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
3180                                  ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
```

```
                                        ;ATTENTION BIT

012462  001                     ATABIT: .BYTE   1       ;DRIVE 0
012463  002                             .BYTE   2       ;DRIVE 1
012464  004                             .BYTE   4       ;DRIVE 2
012465  010                             .BYTE   10      ;DRIVE 3
012466  020                             .BYTE   20      ;DRIVE 4
012467  040                             .BYTE   40      ;DRIVE 5
012470  100                             .BYTE   100     ;DRIVE 6
012471  200                             .BYTE   200     ;DRIVE 7

                                        ;RP04/5/6 TO RH11 'MASSBUS CONTROL BUS PARITY ERRORS'' (MCPE) ALLOWED BEFORE
                                        ;CALLING IT FATAL (MCPEMX=1 WORD)

012472  000003                  MCPEMX: .WORD   3

                                        ;STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04/5/6),
                                        ;RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5)).

012474  176700                  RPADR:  .WORD   176700
012476  000254  000240          RPVEC:  .WORD   254,5*32.

                                        ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)

012502  000004                  MXLACT: .WORD   4
                                        ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)

012504  001000                  MXDLTA: .WORD   8.*64.
                                        ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)

012506  000200                  MNDLTA: .WORD   2*64.
                                        ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)

012510  000005                  MXWNDW: .WORD   5

                                        ;DEFINITIONS OF THE RH11/RP04/5/6 ADDRESS INDEXES

000000                          RPCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
000002                          RPWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
000004                          RPBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
000006                          RPDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
000010                          RPCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
000012                          RPDS1=12                ;DRIVE STATUS REGISTER (DRIVE REG 01)
000014                          RPER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
000016                          RPAS=16                 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
000020                          RPLA=20                 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
000022                          RPDB=22                 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
000024                          RPMR=24                 ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
000026                          RPDT=26                 ;DRIVE TYPE REGISTER (DRIVE REG. 06)
000030                          RPSN=30                 ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
000032                          RPOF=32                 ;OFFSET REGISTER (DRIVE REG. 11)
000034                          RPCA=34                 ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
000036                          RPCC=36                 ;CURRENT CYLINDER ADDRESS REGISTER (DRIVE REG. 13)
000040                          RPER2=40                ;ERROR REGISTER #2 (DRIVE REG. 14)
000042                          RPER3=42                ;ERROR REGISTER #3 (DRIVE REG. 15)
000044                          RPEC1=44                ;ECC POSITION REGISTER (DRIVE REG. 16)
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                000046                  RPEC2=46                        ;ECC PATTERN REGISTER (DRIVE REG.  17)

                                        ;RH11/RP04/5/6 DRIVER INITIALIZATION CODE
                                                ;THIS ROUTINE WILL DETERMINE WHICH RP04/5/6 DRIVES ARE
                                                ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
                                                ;TO THE PROPER STATE FOR EACH DRIVE.
                                                ;NOTE: THIS ROUTINE CALLS DRVINT
                                        ;
                                        ;CALL
                                        ;
                                        ;       JSR     PC,RPINIT
                                        ;       RETURN
                                        ;
                                        ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                        ;
012512  104412                  RPINIT: SAVREG                          ;SAVE R0 - R5
012514  013746  177776                  MOV     @#PS,-(SP)              ;SAVE THE PRESENT PROCESSOR STATUS
012520  012737  000240  177776          MOV     #<5*32.>,@#PS           ;CHANGE THE PRIORITY TO 5
012526  004737  020526                  JSR     PC,CLRQUE               ;CLEAR ALL REQUEST QUEUES
012532  012701  012326                  MOV     #RPERRS,R1              ;FIRST ADDRESS TO BE CLEARED
012536  012702  012436                  MOV     #SEEKFG,R2              ;LAST ADDRESS TO BE CLEARED
012542  005021                  1$:     CLR     (R1)+                   ;CLEAR
012544  020102                          CMP     R1,R2                   ;ARE WE DONE?
012546  101775                          BLOS    1$                      ;BRANCH IF NO
012550  012702  012460                  MOV     #DTUW,R2                ;LAST ADDRESS
012554  012721  177777          2$:     MOV     #-1,(R1)+               ;INITIALIZE
012560  020102                          CMP     R1,R2                   ;DONE?
012562  101774                          BLOS    2$                      ;LOOP IF NO
012564  005037  012346                  CLR     DRVSTA                  ;SET ALL DRIVES TO OFFLINE
012570  005037  012350                  CLR     DRVSTA+2
012574  005037  012352                  CLR     DRVSTA+4
012600  005037  012354                  CLR     DRVSTA+6
012604  013703  012476                  MOV     RPVEC,R3                ;SETUP THE RH11/RP04/5/6 VECTOR
012610  012723  015406                  MOV     #ISR,(R3)+
012614  013713  012500                  MOV     RPVEC+2,(R3)
012620  013704  012474                  MOV     RPADR,R4                ;FIRST ADDRESS OF RH11/RP04
012624  012764  000040  000010          MOV     #BIT05,RPCS2(R4)        ;MASSBUS INIT
012632  005001                          CLR     R1                      ;START WITH DRIVE 0
012634  004037  012724          3$:     JSR     R0,DRVINT               ;INIT THE DRIVE
012640  000401                          BR      4$                      ;'DVA' NOT SET OR PARITY ERROR
012642  000402                          BR      5$                      ;NORMAL RETURN
012644  105061  012346          4$:     CLRB    DRVSTA(R1)              ;SET DRIVE STATUS TO OFFLINE
012650  005201                  5$:     INC     R1                      ;GO TO NEXT DRIVE
012652  042701  177770                  BIC     #^C7,R1                 ;MASK OUT UNUSED BITS
012656  001366                          BNE     3$                      ;BR IF MORE DRIVES TO GO
012660  012701  000007                  MOV     #7,R1                   ;START WITH DRIVE 7
012664  005037  177776                  CLR     @#PS                    ;CLEAR THE PROCESSOR STATUS
012670  105761  012366          6$:     TSTB    DPINT(R1)               ;WAITING FOR DRIVE TO SWITCH PORTS ?
012674  001405                          BEQ     8$                      ;BR NOT WAITING
012676  004737  020162                  JSR     PC,SET.IE               ;SET INTERRUPT
012702  105761  012366          7$:     TSTB    DPINT(R1)               ;DRIVE SWITCHED PORTS ?
012706  001375                          BNE     7$                      ;BR IF NOT
012710  005301                  8$:     DEC     R1                      ;GO TO THE NEXT DRIVE
012712  100366                          BPL     6$                      ;CHECK NEXT DRIVE
012714  012637  177776                  MOV     (SP)+,@#PS              ;RESTORE THE PROCESSOR STATUS
012720  104413                          RESREG                          ;RESTORE R0 - R5
```

```
3293  012722  000207                          RTS     PC              ;BYE-BYE
3294
3295                                  ;DRIVE INITILIZATION ROUTINE
3296                                          ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
3297                                          ;AN RP04/5/6. IF IT IS, A 'READ-IN PRESET' IS ISSUED AND FMT22
3298                                          ;IS SET TO A '1'. THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
3299                                          ;INSURE THEY ARE ALL ON A '1'. AND DEPENDING ON THEIR STATE,
3300                                          ;DRVSTA IS SET TO THE PROPER CONDITION.
3301                                  ;CALL
3302                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
3303                                  ;       MOV     RPADR,R4        ;UNIBUS ADDRESS OF RH11/RP04/5/6 (RPCS1)
3304                                  ;       JSR     R0,DRVINT       ;CALLED BY A JSR
3305                                  ;       RETURN1                 ;ERROR OCCURRED (PARITY)
3306                                  ;       RETURN2                 ;NORMAL RETURN
3307                                  ;
3308
3309  012724  010546                  DRVINT: MOV     R5,-(SP)        ;SAVE R5
3310  012726  105061  012346                  CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
3311  012732  105061  012356                  CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
3312  012736  105061  012414                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
3313  012742  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT A DRIVE
3314  012746  112764  000111  000000          MOVB    #111,RPCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
3315  012754  032764  010000  000010          BIT     #BIT12,RPCS2(R4) ;NONEXISTENT DRIVE?
3316  012762  001403                          BEQ     1$              ;NO---BRANCH
3317  012764  004737  020162                  JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
3318  012770  000533                          BR      6$              ;LEAVE THIS ROUTINE
3319  012772  105061  012346          1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
3320  012776  032764  004000  000000          BIT     #BIT11,RPCS1(R4)  ;SEE IF DRIVE AVAILABLE
3321  013004  001527                          BEQ     7$              ;BR IF DRIVE NOT AVAILABLE
3322  013006  004037  017472                  JSR     R0,RD.RP        ;READ THE DRIVE TYPE REG.
3323  013012  000026                          RPDT
3324  013014  013304                          8$                      ;ERROR RETURN ADDRESS
3325  013016  012605                          MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
3326  013020  112761  000001  012356          MOVB    #1,DRVTYP(R1)   ;SET RP04 INDICATOR
3327  013026  022705  020020                  CMP     #20020,R5       ;IS IT A SINGLE PORT RP04?
3328  013032  001431                          BEQ     2$              ;BRANCH IF YES
3329  013034  022705  024020                  CMP     #24020,R5       ;IS IT A DUAL PORT RP04?
3330  013040  001426                          BEQ     2$              ;BR IF YES
3331  013042  112761  000002  012356          MOVB    #2,DRVTYP(R1)   ;SET RP05 INDICATOR
3332  013050  022705  020021                  CMP     #20021,R5       ;SINGLE PORT RP05 ?
3333  013054  001420                          BEQ     2$              ;BR IF YES
3334  013056  022705  024021                  CMP     #24021,R5       ;DUAL PORT RP05 ?
3335  013062  001415                          BEQ     2$              ;BR IF YES
3336  013064  112761  000004  012356          MOVB    #4,DRVTYP(R1)   ;SET RP06 INDICATOR
3337  013072  022705  020022                  CMP     #20022,R5       ;SINGLE PORT RP06 ?
3338  013076  001407                          BEQ     2$              ;BR IF YES
3339  013100  022705  024022                  CMP     #24022,R5       ;DUAL PORT RP06 ?
3340  013104  001404                          BEQ     2$              ;BR IF YES
3341  013106  112761  177777  012356          MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
3342  013114  000461                          BR      6$              ;EXIT
3343  013116  005737  013310          2$:     TST     TSTPGM          ;INHIBIT PROGRAMMABLE DRIVE?
3344  013122  001010                          BNE     9$              ;BRANCH IF NO
3345  013124  032764  001000  000012          BIT     #BIT09, RPDS1(R4);IS DRIVE PROGRAMMABLE?
3346  013132  001404                          BEQ     9$              ;BRANCH IF NO
3347  013134  152761  000010  012356          BISB    #BIT03, DRVTYP(R1);SET INDICATOR
3348  013142  000446                          BR      6$              ;EXIT
```

```
 3349  013144  012746  000121          9$:     MOV     #121,-(SP)      ;DO A 'READ-IN PRESET'
 3350  013150  004037  017652                  JSR     R0,WRT.RP
 3351  013154  000000                          RPCS1
 3352  013156  013304                          8$
 3353  013160  012746  010000                  MOV     #BIT12,-(SP)    ;SET FMT22=1
 3354  013164  004037  017652                  JSR     R0,WRT.RP
 3355  013170  000032                          RPOF
 3356  013172  013304                          8$
 3357  013174  004037  017472                  JSR     R0,RD.RP        ;READ RPDS1
 3358  013200  000012                          RPDS1
 3359  013202  013304                          8$
 3360  013204  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
 3361  013206  100015                          BPL     4$              ;BRANCH IF ATA=0
 3362  013210  116164  012462  000016          MOVB    ATABIT(R1),RPAS(R4) ;CLEAR ATTENTION BIT
 3363  013216  004037  017472                  JSR     R0,RD.RP        ;FIND OUT WHY ATA=1
 3364  013222  000014                          RPER1
 3365  013224  013304                          8$
 3366  013226  006126                          ROL     (SP)+           ;IS IT UNSAFE?
 3367  013230  100004                          BPL     4$              ;BR IF NOT
 3368  013232  112761  177777  012346          MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
 3369  013240  000407                          BR      6$              ;EXIT
 3370  013242  005105                  4$:     COM     R5              ;CHECK MOL, DPR, DRY, AND VV
 3371  013244  042705  167077                  BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
 3372  013250  001003                          BNE     6$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
 3373  013252  112761  000001  012346          MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
 3374  013260  005720                  6$:     TST     (R0)+           ;STEP OVER THE ERROR RETURN
 3375  013262  000410                          BR      8$              ;EXIT
 3376  013264  006301                  7$:     ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
 3377  013266  012761  003720  012440          MOV     #2000.,TIMER(R1)  ;START 2 SEC TIMER
 3378  013274  006201                          ASR     R1              ;RESTORE R1
 3379  013276  105161  012366                  COMB    DPINT(R1)       ;SET PORT INITIALIZE INIDICATOR
 3380  013302  005720                          TST     (R0)+
 3381  013304  012605                  8$:     MOV     (SP)+,R5        ;RESTORE R5
 3382  013306  000200                          RTS     R0              ;EXIT
 3383
 3384                                  ;TEST PROGRAMMABLE DRIVE FLAG (TSTPGM=1 WORD)
 3385                                          ;THE FLAG WILL BE SET BY THE PROGRAM UNDER
 3386                                          ;MANUFACTURING CONDITIONS (ACT,APT) AND
 3387                                          ;CLEARED UNDER FIELD CONDITIONS(XXDP CHAIN,
 3388                                          ;STANDALONE) WITH STARTING ADDRESS 200.
 3389                                          ;THE FLAG WILL BE SET UNDER ALL CONDITIONS
 3390                                          ;WITH STARTING ADDRESS 220.
 3391
 3392  013310  000000                  TSTPGM: .WORD   0               ;=1 TEST PROGRAMMABLE DRIVE
 3393
 3394                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
 3395                                  ;
 3396                                  ;CALL
 3397                                  ;
 3398                                  ;       JSR     R0,@#RP04       ;CALL THE RP04/5/6 DRIVER
 3399                                  ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
 3400                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
 3401                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
 3402                                                                  ;IS AN ERROR CONDITION
 3403
 3404  013312  013746  177776          RP04:   MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
```

```
3405  013316  013737  012500  177776          MOV     RPVEC+2,@#PS    ;DON'T ALLOW ANY RP04/5/6 INTERRUPTS
3406  013324  112737  000001  012412          MOVB    #1,ACTDRV       ;SET ''ACTIVE DRIVER'' FLAG
3407  013332  104412                          SAVREG                  ;SAVE R0 - R5
3408  013334  011002                          MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
3409  013336  005062  000016                  CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
3410  013342  111201                          MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
3411  013344  013704  012474                  MOV     RPADR,R4        ;UNIBUS ADDRESS OF RPCS1
3412  013350  105761  012346                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
3413  013354  003014                          BGT     1$              ;BRANCH IF ONLINE
3414  013356  105761  012414                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
3415  013362  001036                          BNE     3$              ;BRANCH IF YES
3416  013364  105761  012366                  TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
3417  013370  001042                          BNE     5$              ;BR IF YES
3418  013372  004037  012724                  JSR     R0,DRVINT       ;GO INIT. THE DRIVE
3419  013376  000434                          BR      4$              ;ERROR RETURN
3420  013400  105761  012346                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
3421  013404  003445                          BLE     6$              ;BR IF NOT
3422  013406  105761  012376          1$:     TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
3423  013412  001031                          BNE     5$              ;BR IF YES
3424  013414  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
3425  013420  004037  020624                  JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
3426  013424  000460                          BR      9$              ;QUEUE IS FULL
3427  013426  122762  000103  000002          CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
3428  013434  001003                          BNE     2$              ;BR IF NO
3429  013436  112761  177777  012414          MOVB    #-1,ULDFLG(R1)  ;SET THE ''UNLOAD IN QUEUE'' FLAG
3430  013444  105761  012336          2$:     TSTB    DRVACT(R1)      ;IS THIS DRIVE ACTIVE?
3431  013450  001043                          BNE     8$              ;BR IF YES
3432  013452  004737  013604                  JSR     PC,OPT          ;CALL THE OPTIMIZER
3433  013456  000440                          BR      8$
3434  013460  012762  120000  000016  3$:     MOV     #BIT15!BIT13,16(R2) ;SET THE ''UNLOAD IN QUEUE'' ERROR FLAG
3435  013466  000434                          BR      8$              ;EXIT
3436  013470  004737  014714          4$:     JSR     PC,CI7          ;GO HANDLE THE PARITY ERROR
3437  013474  000431                          BR      8$
3438  013476  004037  020624          5$:     JSR     R0,DRVQUE       ;PUT REQUEST IN QUEUE
3439  013502  000431                          BR      9$              ;QUEUE IS FULL
3440  013504  032714  000100                  BIT     #BIT06,(R4)     ;IS 'IE' SET ALREADY ?
3441  013510  001023                          BNE     8$              ;BR IF IT IS
3442  013512  004737  020162                  JSR     PC,SET.IE       ;SET INTERRUPT
3443  013516  000420                          BR      8$              ;RETURN, REQUEST IN QUEUE
3444  013520  105761  012346          6$:     TSTB    DRVSTA(R1)      ;SEE IF DRIVE OFFLINE OR UNSAFE
3445  013524  002412                          BLT     7$              ;BR IF UNSAFE
3446  013526  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE ERROR INDICATOR
3447  013534  105761  012356                  TSTB    DRVTYP(R1)      ;SEE IF OFFLINE OR NONEXISTENT
3448  013540  001007                          BNE     8$              ;BR IF OFFLINE
3449  013542  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;REPORT DRIVE NONEXISTENT
3450  013550  000403                          BR      8$              ;GO TO EXIT
3451  013552  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2)  ;DRIVE IS UNSAFE
3452  013560  104413                  8$:     RESREG                  ;RESTORE R0 - R5
3453  013562  005720                          TST     (R0)+           ;SETUP FOR NORMAL RETURN
3454  013564  000401                          BR      10$             ;FINISH UP, THEN EXIT
3455  013566  104413                  9$:     RESREG                  ;RESTORE R0 - R5
3456  013570  005720                  10$:    TST     (R0)+           ;CORRECT THE RETURN ADDRESS
3457  013572  105037  012412                  CLRB    ACTDRV          ;CLEAR ''ACTIVE DRIVER'' FLAG
3458  013576  012637  177776                  MOV     (SP)+,@#PS      ;RETURN 'PS'' TO USER LEVEL
3459  013602  000200                          RTS     R0              ;RETURN TO CALLER
3460
```

```
                                        ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,OPT          ;SETUP A COMMAND
                                        ;
013604  104412                  OPT:   SAVREG                          ;SAVE R0 - R5
013606  013746  177776                  MOV     @#PS,-(SP)             ;SAVE PROC. STATUS
013612  146137  012462  012410          BICB    ATABIT(R1),SRCHWT      ;CLEAR ''SEARCH WAIT'' KEY
013620  004737  020700                  JSR     PC,GETREQ              ;GET ''DPB'' POINTER OF REQUEST
013624  005702                          TST     R2                     ;IS THERE A REQUEST IN QUEUE?
013626  001505                          BEQ     7$                     ;NO--BRANCH TO EXIT
013630  032764  004000  000000          BIT     #BIT11,RPCS1(R4)       ;IS DVA SET?
013636  001407                          BEQ     10$                    ;BRANCH IF NOT
013640  032764  000100  000012          BIT     #BIT6,RPDS1(R4)        ;IS VV SET ?
013646  001003                          BNE     10$                    ;BR IF IT IS
013650  004037  012724          9$:     JSR     R0,DRVINT              ;SEE IF DRIVE STILL ONLINE ?
013654  000470                          BR      6$                     ;PARITY OR 'DVA' NOT SET
013656  105761  012346          10$:    TSTB    DRVSTA(R1)             ;IS DRIVE ONLINE?
013662  003014                          BGT     1$                     ;YES--BRANCH
013664  004737  020722                  JSR     PC,POPQUE              ;NO--REMOVE REQUEST FROM QUEUE
013670  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)    ;SET OFFLINE STATUS/ERROR INDICATOR
013676  105761  012346                  TSTB    DRVSTA(R1)             ;IS DRIVE UNSAFE ?
013702  100064                          BPL     8$                     ;BR TO EXIT IF NOT
013704  012762  110000  000016          MOV     #BIT15!BIT12,16(R2)    ;SET UNSAFE STATUS/ERROR INDICATOR
013712  000460                          BR      8$                     ;BRANCH TO EXIT
013714  012746  000111          1$:     MOV     #111,-(SP)             ;LOAD COMMAND ONTO THE STACK
013720  004037  017652                  JSR     R0,WRT.RP              ;LOAD THE REGISTER
013724  000000                          RPCS1                          ;REGISTER INCREMENT
013726  014036                          6$                             ;ERROR RETURN ADDRESS
013730  032714  004000                  BIT     #BIT11,(R4)            ;DRIVE AVAILABLE ?
013734  001427                          BEQ     5$                     ;BR IF NOT
013736  122762  000150  000002          CMPB    #150,2(R2)             ;IS THE REQUEST FOR I/O?
013744  002403                          BLT     2$                     ;YES--BRANCH
013746  004737  014300                  JSR     PC,CI4                 ;CALL THE COMMAND INITIATOR
013752  000440                          BR      8$                     ;BRANCH TO EXIT
013754  005737  012460          2$:     TST     DTUW                   ;DATA TRANSFER UNDERWAY?
013760  002012                          BGE     4$                     ;YES--GO START A SEARCH
013762  005737  012436                  TST     SEEKFG                 ;DO IMPLIED SEEKS?
013766  100404                          BMI     3$                     ;YES---BRANCH
013770  004037  015250                  JSR     R0,LA                  ;NO--DO LOOK AHEAD
013774  000427                          BR      8$                     ;RETURN HERE ON A PARITY ERROR
013776  000403                          BR      4$                     ;GO START A SEARCH
014000  004737  014064          3$:     JSR     PC,CI1                 ;START A DATA TRANSFER
014004  000423                          BR      8$
014006  004737  014172          4$:     JSR     PC,CI3                 ;START A SEARCH
014012  000420                          BR      8$                     ;GO TO THE EXIT
014014  112761  177777  012376  5$:     MOVB    #-1,DPRQS(R1)          ;SET PORT REQUEST INDICATOR
014022  010103                          MOV     R1,R3                  ;SET UP TO ADDRESS WORDS
014024  006303                          ASL     R3                     ;CONVERT TO WORD INDEX
014026  012763  023420  012440          MOV     #10000.,TIMER(R3)      ;START 10 SEC TIMER
014034  000402                          BR      7$                     ;EXIT
014036  004737  014714          6$:     JSR     PC,CI7                 ;PROCESS THE PARITY ERROR
014042  032714  000100          7$:     BIT     #BIT06,(R4)            ;SEE IF 'IE' ALREADY SET
014046  001002                          BNE     8$                     ;BR IF SET
014050  004737  020162                  JSR     PC,SET.IE              ;SET ''IE'' WITHOUT A ''TRE''
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3517  014054  012637  177776          8$:     MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
3518  014060  104413                          RESREG                  ;RESTORE R0 - R5
3519  014062  000207                          RTS     PC
3520
3521                                  ;COMMAND INITIATOR
3522                                  ;
3523                                  ;CALL
3524                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
3525                                  ;       MOV     #DPB,R2         ;ADDRESS OF DPB
3526                                  ;       JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
3527                                  ;                               ;WHERE:
3528                                  ;                               ;CI1=DATA TRANSFER
3529                                  ;                               ;CI2=SEARCH REQUESTED BY DATA XFER
3530                                  ;                               ;CI4=NOT DATA TRANSFER
3531
3532  014064  004737  020722          CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM ''DRIVES WAIT'' QUEUE
3533  014070  010237  012406                  MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
3534  014074  010203                          MOV     R2,R3           ;DPB ADDRESS TO R3
3535  014076  013704  012474                  MOV     RPADR,R4        ;RPCS1 ADDRESS
3536  014102  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3537  014106  062703  000004                  ADD     #4,R3           ;DESIRED WORD COUNT
3538  014112  062704  000002                  ADD     #2,R4           ;RPWC ADDRESS
3539  014116  012324                          MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
3540  014120  012324                          MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
3541  014122  012346                          MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
3542  014124  004037  017652                  JSR     R0,WRT.RP       ;CALL THE LOAD(WRITE) ROUTINE
3543  014130  000006                          RPDA                    ;INDEX OF REGISTER TO LOAD
3544  014132  014714                          CI7                     ;ERROR RETURN ADDRESS
3545  014134  012346                          MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
3546  014136  004037  017652                  JSR     R0,WRT.RP
3547  014142  000034                          RPCA
3548  014144  014714                          CI7
3549  014146  016246  000002                  MOV     2(R2),-(SP)     ;LOAD ''COMMAND+GO'', ''A17&A16'', AND ''PSEL''
3550  014152  004037  017652                  JSR     R0,WRT.RP
3551  014156  000000                          RPCS1
3552  014160  014714                          CI7
3553  014162  010137  012460                  MOV     R1,DTUW         ;SET ''DATA TRANSFER UNDERWAY''
3554  014166  000137  014656                  JMP     CI5
3555  014172  013704  012474          CI3:    MOV     RPADR,R4        ;RPCS1 ADDRESS
3556  014176  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3557  014202  016246  000012                  MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
3558  014206  004037  017652                  JSR     R0,WRT.RP
3559  014212  000034                          RPCA
3560  014214  014714                          CI7
3561  014216  116203  000010                  MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
3562  014222  163703  012510                  SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
3563  014226  002002                          BGE     1$
3564  014230  062703  000026                  ADD     #22.,R3
3565  014234  010346          1$:             MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
3566  014236  116266  000011  000001          MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
3567  014244  004037  017652                  JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
3568  014250  000006                          RPDA
3569  014252  014714                          CI7
3570  014254  012746  000131                  MOV     #131,-(SP)      ;START A SEARCH
3571  014260  004037  017652                  JSR     R0,WRT.RP
3572  014264  000000                          RPCS1
```

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3573  014266  014714                          CI7
3574  014270  156137  012462  012410          BISB    ATABIT(R1),SRCHWT       ;SET ''SEARCH WAIT'' KEY
3575  014276  000567                          BR      CI5
3576  014300  013704  012474          CI4:    MOV     RPADR,R4        ;RPCS1 ADDRESS
3577  014304  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3578  014310  116203  000002                  MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
3579  014314  122703  000131                  CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
3580  014320  001007                          BNE     1$              ;BRANCH IF NO
3581  014322  016246  000010                  MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
3582  014326  004037  017652                  JSR     R0,WRT.RP
3583  014332  000006                          RPDA
3584  014334  014714                          CI7
3585  014336  000403                          BR      2$              ;GO LOAD CYLINDER
3586  014340  122703  000105          1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
3587  014344  001007                          BNE     3$              ;BRANCH IF NO
3588  014346  016246  000012          2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
3589  014352  004037  017652                  JSR     R0,WRT.RP
3590  014356  000034                          RPCA
3591  014360  014714                          CI7
3592  014362  000546                          BR      CI6
3593  014364  122703  000115          3$:     CMPB    #115,R3         ;IS IT AN ''OFFSET'' COMMAND?
3594  014370  001013                          BNE     4$              ;BR IF NO
3595  014372  004037  017472                  JSR     R0,RD.RP        ;MERGE THE OFFSET VALUE INTO RPOF
3596  014376  000032                          RPOF                    ;BUT DON'T CHANGE THE UPPER
3597  014400  014714                          CI7
3598  014402  116216  000001                  MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
3599  014406  004037  017652                  JSR     R0,WRT.RP       ;REGISTER (RPOF)
3600  014412  000032                          RPOF
3601  014414  014714                          CI7
3602  014416  000530                          BR      CI6             ;GO START THE COMMAND
3603  014420  122703  000107          4$:     CMPB    #107,R3         ;IS IT A ''RECALIBRATE'' COMMAND?
3604  014424  001525                          BEQ     CI6             ;BRANCH IF YES
3605  014426  122703  000117                  CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
3606  014432  001522                          BEQ     CI6             ;BRANCH IF YES
3607  014434  122703  000103                  CMPB    #103,R3         ;IS IT AN ''UNLOAD'' COMMAND?
3608  014440  001016                          BNE     5$              ;BRANCH IF NO
3609  014442  112761  000001  012336          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
3610  014450  105061  012346                  CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
3611  014454  112761  000001  012414          MOVB    #1,ULDFLG(R1)   ;SET ''UNLOAD IN PROGRESS'' FLAG
3612  014462  010346                          MOV     R3,-(SP)        ;START THE ''UNLOAD'' COMMAND
3613  014464  004037  017652                  JSR     R0,WRT.RP
3614  014470  000000                          RPCS1
3615  014472  014714                          CI7
3616  014474  000207                          RTS     PC              ;RETURN TO USER
3617  014476  122703  000143          5$:     CMPB    #143,R3         ;IS IT A ''SET FORMAT'' COMMAND?
3618  014502  001014                          BNE     6$              ;BRANCH IF NO
3619  014504  004037  017472                  JSR     R0,RD.RP        ;READ THE OFFSET REGISTER
3620  014510  000032                          RPOF
3621  014512  014714                          CI7
3622  014514  116266  000001  000001          MOVB    1(R2),1(SP)     ;COMBINE ''FMT22'',''ECI'', AND ''HCI''
3623  014522  004037  017652                  JSR     R0,WRT.RP       ;LOAD ''FMT22'', ''ECI'', AND/OR ''HCI''.
3624  014526  000032                          RPOF
3625  014530  014714                          CI7
3626  014532  000436                          BR      12$
3627  014534  122703  000141          6$:     CMPB    #141,R3         ;IS IT A ''GET REGISTER'' COMMAND?
3628  014540  001023                          BNE     10$             ;BRANCH IF NO
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3629  014542  016203  000006          7$:     MOV     6(R2),R3        ;POINTS TO 1ST ADDRESS OF WHERE
3630                                                                    ;TO PUT THE REGISTER(S)
3631  014546  116237  000010  014564          MOVB    10(R2),9$       ;INIT. THE INDEX FOR THE FIRST REG.
3632  014554  116205  000011                  MOVB    11(R2),R5       ;INDEX OF LAST REG. TO MOVE
3633  014560  004037  017472          8$:     JSR     R0,RD.RP        ;READ RP04/5/6 REGISTER
3634  014564  000000                  9$:     RPCS1                   ;INDEX OF REG. TO READ
3635  014566  014714                          CI7
3636  014570  012623                          MOV     (SP)+,(R3)+     ;GET THE CONTENTS OF RH11/RP04/5/6 REG.
3637  014572  023705  014564                  CMP     9$,R5           ;LAST REG. BEEN READ?
3638  014576  001414                          BEQ     12$             ;GET OUT IF YES
3639  014600  062737  000002  014564          ADD     #2,9$           ;INCREASE THE INDEX BY 2
3640  014606  000764                          BR      8$              ;LOOP--MORE TO READ
3641  014610  122703  000145          10$:    CMPB    #145,R3         ;IS IT A "SELECT DRIVE" COMMAND?
3642  014614  001405                          BEQ     12$             ;BRANCH IF YES
3643  014616  010346                  11$:    MOV     R3,-(SP)        ;LOAD THE COMMAND
3644  014620  004037  017652                  JSR     R0,WRT.RP
3645  014624  000000                          RPCS1
3646  014626  014714                          CI7
3647  014630  004737  020722          12$:    JSR     PC,POPQUE       ;REMOVE REQ. FROM QUEUE
3648  014634  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET THE "DONE" BIT
3649  014642  005737  012434                  TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
3650  014646  100002                          BPL     13$             ;BRANCH IF NO
3651  014650  004737  020044                  JSR     PC,SVRH11       ;YES--GO SAVE THE REGISTERS
3652  014654  000207                  13$:    RTS     PC              ;RETURN TO USER
3653  014656  006301                  CI5:    ASL     R1
3654  014660  012761  001750  012440          MOV     #1000.,TIMER(R1)        ;SET A ONE SECOND TIMER
3655  014666  006201                          ASR     R1
3656  014670  112761  000001  012336          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE
3657  014676  000207                          RTS     PC              ;RETURN TO THE USER
3658  014700  010346                  CI6:    MOV     R3,-(SP)        ;LOAD THE COMMAND
3659  014702  004037  017652                  JSR     R0,WRT.RP
3660  014706  000000                          RPCS1
3661  014710  014714                          CI7
3662  014712  000761                          BR      CI5
3663  014714  032764  010000  000010  CI7:    BIT     #BIT12,RPCS2(R4)  ;DRIVE NON-EXISTENT ?
3664  014722  001034                          BNE     CI8             ;BR IF YES
3665  014724  005702                  1$:     TST     R2              ;ANYTHING IN QUEUE ?
3666  014726  001405                          BEQ     CI7B            ;BR IF NOT
3667  014730  012762  104000  000016          MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
3668  014736  004737  020044                  JSR     PC,SVRH11       ;GO SAVE THE RH11/RP04/5/6 REGISTERS
3669  014742  012746  000111          CI7B:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
3670  014746  004037  017652                  JSR     R0,WRT.RP
3671  014752  000000                          RPCS1
3672  014754  015014                          CI8
3673  014756  004737  020604                  JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
3674  014762  105061  012414                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
3675  014766  105061  012336                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
3676  014772  020137  012460                  CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
3677  014776  001005                          BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
3678  015000  005037  012406                  CLR     TRNSWT
3679  015004  012737  177777  012460          MOV     #-1,DTUW
3680  015012  000207                  1$:     RTS     PC
3681  015014  104412                  CI8:    SAVREG                  ;SAVE R0 - R5
3682  015016  032764  010000  000010          BIT     #BIT12,RPCS2(R4)  ;IS 'NED' SET ?
3683  015024  001002                          BNE     1$              ;BR IF YES
3684  015026  005001                          CLR     R1
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3685  015030  005003                          CLR     R3
3686  015032  105761  012336          1$:     TSTB    DRVACT(R1)          ;DRIVE ACTIVE?
3687  015036  001443                          BEQ     5$                  ;BRANCH IF NO
3688  015040  013702  012406                  MOV     TRNSWT,R2           ;GET THE ''TRANSFER WAIT'' QUEUE
3689  015044  020137  012460                  CMP     R1,DTUW             ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
3690  015050  001402                          BEQ     2$                  ;BRANCH IF YES
3691  015052  004737  020700                  JSR     PC,GETREQ           ;GET THE DPB POINTER
3692  015056  005702                  2$:     TST     R2                  ;QUEUE ENTRY FOR DRIVE ?
3693  015060  001415                          BEQ     4$                  ;BR IF NOT
3694  015062  032764  010000  000010          BIT     #BIT12,RPCS2(R4)    ;'NED' SET ?
3695  015070  001404                          BEQ     3$                  ;BR IF NOT
3696  015072  012762  100002  000016          MOV     #BIT15!BIT01,16(R2) ;SET 'DRIVE NON-EXISTENT' INDICATOR
3697  015100  000405                          BR      4$                  ;CONTINUE
3698  015102  012762  102000  000016  3$:     MOV     #BIT15!BIT10,16(R2) ;SET 'NON-CLEARABLE PARITY'' ERROR INDICATOR
3699  015110  004737  020044                  JSR     PC,SVRH11           ;SAVE RH11/RP04/5/6 REGISTERS
3700  015114  012763  177777  012440  4$:     MOV     #-1,TIMER(R3)       ;STOP THE TIMER
3701  015122  105061  012336                  CLRB    DRVACT(R1)          ;SET ''DRIVE ACTIVE'' TO IDLE
3702  015126  020137  012460                  CMP     R1,DTUW             ;IS THIS DRIVE SETUP FOR A TRANSFER
3703  015132  001005                          BNE     5$                  ;BR IF NOT
3704  015134  012737  177777  012460          MOV     #-1,DTUW            ;RESET THE INDICATOR
3705  015142  005037  012406                  CLR     TRNSWT              ;CLEAR THE TRANSFER QUEUE
3706  015146  105061  012414          5$:     CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
3707  015152  032764  010000  000010          BIT     #BIT12,RPCS2(R4)    ;'NED' SET ?
3708  015160  001021                          BNE     6$                  ;BR IF YES
3709  015162  005201                          INC     R1                  ;MOVE TO THE NEXT DRIVE
3710  015164  062703  000002                  ADD     #2,R3
3711  015170  042701  177770                  BIC     #^C7,R1
3712  015174  001316                          BNE     1$                  ;BRANCH IF MORE DRIVES
3713  015176  012737  177777  012460          MOV     #-1,DTUW            ;NO DATA TRANSFERS UNDERWAY
3714  015204  005037  012406                  CLR     TRNSWT              ;CLEAR THE 'TRANSFER WAIT' QUEUE
3715  015210  004737  020526                  JSR     PC,CLRQUE           ;CLEAR ALL OF THE REQUEST QUEUES
3716  015214  012764  000040  000010          MOV     #BIT05,RPCS2(R4)    ;DO A MASSBUS INIT.
3717  015222  000406                          BR      7$                  ;CONTINUE
3718  015224  004737  020604          6$:     JSR     PC,EMPTYQ           ;CLEAR THE DRIVE'S QUEUE
3719  015230  105061  012346                  CLRB    DRVSTA(R1)          ;SET DRIVE TO OFFLINE
3720  015234  105061  012356                  CLRB    DRVTYP(R1)          ;CLEAR THE DRIVE TYPE INDICATOR
3721  015240  004737  020162          7$:     JSR     PC,SET.IE           ;SET ''IE'' WITHOUT ''TRE''
3722  015244  104413                          RESREG                      ;RESTORE R0 - R5
3723  015246  000207                          RTS     PC                  ;RETURN
3724
3725                                  ;LOOK AHEAD ROUTINE
3726                                  ;
3727                                  ;CALL
3728                                  ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER
3729                                  ;       MOV     #DPB,R2             ;POINT TO DPB
3730                                  ;       JSR     R0,LA               ;GO CHECK THE WINDOW
3731                                  ;       RETURN1                     ;ERROR RETURN
3732                                  ;       RETURN2                     ;START A SEARCH
3733                                  ;       RETURN3                     ;START A DATA TRANSFER
3734
3735  015250  013704  012474          LA:     MOV     RPADR,R4            ;GET RPCS1'S ADDRESS
3736  015254  010164  000010                  MOV     R1,RPCS2(R4)        ;SELECT DRIVE
3737  015260  004037  017472                  JSR     R0,RD.RP            ;READ CURRENT CYLINDER
3738  015264  000036                          RPCC
3739  015266  015400                          4$                          ;ERROR RETURN ADDRESS
3740  015270  022662  000012                  CMP     (SP)+,12(R2)        ;IS CURRENT CYLINDER=DESIRED
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3741
3742  015274  001037                        BNE     3$                ;CYLINDER?
3743  015276  105261  012424                INCB    LACNT(R1)         ;EXIT IF NO
3744  015302  126137  012424  012502        CMPB    LACNT(R1),MXLACT  ;INCREMENT THE LOOK AHEAD COUNT
3745  015310  003026                        BGT     2$                ;EXCEED MAX?
3746  015312  116203  000010                MOVB    10(R2),R3         ;BRANCH IF YES
3747  015316  000303                        SWAB    R3                ;GET DESIRED SECTOR ADDRESS AND
3748  015320  006203                        ASR     R3                ;MULT. BY 64--ALIGN WITH
3749  015322  006203                        ASR     R3                ;LOOK AHEAD REGISTER
3750  015324  012737  000340  177776        MOV     #340,@#PS         ;PRIORITY LEVEL '7'
3751  015332  004037  017472                JSR     R0,RD.RP          ;READ LOOK AHEAD REGISTER
3752  015336  000020                        RPLA
3753  015340  015400                        4$
3754  015342  162603                        SUB     (SP)+,R3          ;CALCULATE THE DELTA
3755  015344  002002                        BGE     1$
3756  015346  062703  002600                ADD     #<22.*64.>,R3     ;MAKE THE DELTA POSITIVE
3757  015352  023703  012504        1$:     CMP     MXDLTA,R3         ;CHECK THE DELTA TO SEE
3758  015356  002406                        BLT     3$                ;IF IT IS WITHIN THE
3759  015360  023703  012506                CMP     MNDLTA,R3         ;WINDOW---IF YES, ZERO
3760  015364  002003                        BGE     3$                ;THE LOOK AHEAD COUNT
3761  015366  105061  012424        2$:     CLRB    LACNT(R1)         ;AND TAKE THE I/O EXIT
3762  015372  005720                        TST     (R0)+
3763  015374  005720                3$:     TST     (R0)+             ;ADJUST THE RETURN ADDRESS
3764  015376  000402                        BR      5$                ;EXIT
3765  015400  004737  014714        4$:     JSR     PC,CI7            ;PROCESS THE ERROR
3766  015404  000200                5$:     RTS     R0                ;RETURN
3767
3768                                ;INTERRUPT SERVICE ROUTINE
3769
3770  015406  112737  000001  012412  ISR:  MOVB    #1,ACTDRV         ;SET ''ACTIVE DRIVER'' FLAG
3771  015414  104412                        SAVREG                    ;SAVE R0 - R5
3772  015416  013704  012474                MOV     RPADR,R4          ;ADDRESS OF RHSCS1
3773  015422  013701  012460                MOV     DTUW,R1           ;GET ''DATA TRANSFER UNDERWAY'' INDICATOR
3774  015426  002403                        BLT     1$                ;BRANCH IF NO DATA TRANSFER UNDERWAY
3775  015430  004737  015452                JSR     PC,TD             ;CALL TRANSFER DONE
3776  015434  000402                        BR      2$                ;EXIT
3777  015436  004737  015612        1$:     JSR     PC,SC             ;CALL SPECIAL CONDITIONS
3778  015442  104413                2$:     RESREG                    ;RESTORE R0 - R5
3779  015444  105037  012412                CLRB    ACTDRV            ;CLEAR ''ACTIVE DRIVER'' FLAG
3780  015450  000002                        RTI                       ;RETURN
3781
3782                                ;TRANSFER DONE ROUTINE
3783
3784  015452  105061  012336        TD:     CLRB    DRVACT(R1)        ;SET DRIVE ACTIVE INDICATOR TO IDLE
3785  015456  012737  177777  012460        MOV     #-1,DTUW          ;NO DATA TRANSFERS UNDERWAY
3786  015464  006301                        ASL     R1
3787  015466  012761  177777  012440        MOV     #-1,TIMER(R1)     ;CANCEL TIMEOUT
3788  015474  006201                        ASR     R1
3789  015476  013702  012406                MOV     TRNSWT,R2         ;GET ''DPB'' ADDRESS FROM THE
3790  015502  005037  012406                CLR     TRNSWT            ;TRANSFER WAIT QUEUE--CLEAR QUEUE
3791  015506  052762  000200  000016        BIS     #BIT07,16(R2)     ;SET DONE
3792  015514  010164  000010                MOV     R1,RPCS2(R4)      ;SELECT THE DRIVE
3793  015520  004037  017472                JSR     R0,RD.RP          ;TRANSFER ERROR(TRE=1)?
3794  015524  000000                        RPCS1
3795  015526  014714                        CI7
3796  015530  006126                        ROL     (SP)+
```

```
 3797  015532  100413                          BMI     3$              ;BR IF YES
 3798  015534  005737  012434                  TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
 3799  015540  100002                          BPL     1$              ;BRANCH IF NO
 3800  015542  004737  020044                  JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
 3801  015546  004737  013604          1$:     JSR     PC,OPT          ;CALL OPTIMIZER
 3802  015552  000417                          BR      SC              ;CHECK OTHER DRIVES
 3803  015554  012714  000113          2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
 3804  015560  000414                          BR      SC              ;CHECK FOR OTHER DRIVES
 3805  015562  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
 3806  015570  004737  020604                  JSR     PC,EMPTYQ       ;EMPTY THE 'DRIVE'S WAIT' QUEUE
 3807  015574  004737  020044                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
 3808  015600  012714  040111                  MOV     #40111,(R4)     ;ISSUE A 'DRIVE CLEAR'
 3809  015604  012714  000113                  MOV     #113,(R4)       ;ISSUE A RELEASE TO THE DRIVE
 3810  015610  000400                          BR      SC              ;CHECK FOR OTHER DRIVES
 3811
 3812                                  ;SPECIAL CONDITION ROUTINE
 3813
 3814  015612  116403  000016          SC:     MOVB    RPAS(R4),R3     ;READ 'RPAS'
 3815  015616  001014                          BNE     2$              ;BRANCH IF ANY 'ATA' BITS SET
 3816  015620  004037  017472                  JSR     R0,RD.RP        ;READ CONTROL AND STATUS REGISTER
 3817  015624  000000                          RPCS1
 3818  015626  015014                          CI8
 3819  015630  106126                          ROLB    (SP)+           ;IS 'IE'=1?
 3820  015632  100405                          BMI     1$              ;YES, NO DRIVES TO CHECK
 3821  015634  004037  020764                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
 3822  015640  104001                          ERROR   1               ;REPORT AN ILLEGAL INTERRUPT
 3823  015642  004737  020162                  JSR     PC,SET.IE       ;SET INTERRUPT ENABLE
 3824  015646  000207          1$:     RTS     PC              ;RETURN
 3825  015650  005046          2$:     CLR     -(SP)           ;PROCESS ALL DRIVES THAT HAVE
 3826  015652  110316                  MOVB    R3,(SP)         ;AN 'ATA'=1
 3827  015654  012703  000001          MOV     #1,R3
 3828  015660  005001                  CLR     R1
 3829  015662  030316          SC3:    BIT     R3,(SP)         ;ATA=1?
 3830  015664  001005                  BNE     SC5             ;YES--BRANCH
 3831  015666  005201          SC4:    INC     R1              ;MOVE TO THE NEXT DRIVE
 3832  015670  106303                  ASLB    R3
 3833  015672  001373                  BNE     SC3             ;BRANCH IF MORE TO CHECK?
 3834  015674  005726                  TST     (SP)+           ;CLEAN OFF THE STACK
 3835  015676  000207                  RTS     PC              ;RETURN TO USER
 3836  015700  105761  012366          SC5:    TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
 3837  015704  001402                  BEQ     1$              ;BR IF NOT
 3838  015706  000137  016604                  JMP     SC13            ;PROCESS THE DRIVE
 3839  015712  105761  012376          1$:     TSTB    DPRQS(R1)       ;PORT REQUEST OUTSTANDING ?
 3840  015716  001402                  BEQ     2$              ;BR IF NOT
 3841  015720  000137  016604                  JMP     SC13            ;START THE OUTSTANDING COMMAND
 3842  015724  105761  012346          2$:     TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
 3843  015730  003025                  BGT     5$              ;BRANCH IF ONLINE
 3844  015732  105761  012414                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
 3845  015736  003422                  BLE     5$              ;BRANCH IF NOT
 3846  015740  004737  020700                  JSR     PC,GETREQ       ;GET DPB POINTER
 3847  015744  004737  020044                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
 3848  015750  004737  016534                  JSR     PC,SC12         ;SAVE RPDS1, RPER1, RPER2, AND RPER3
 3849                                                                  ;ALSO DO A DRIVE INIT (DRVINT)
 3850  015754  105761  012346                  TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
 3851  015760  003416                  BLE     6$              ;NO---BRANCH
 3852  015762  032737  040000  012326          BIT     #BIT14,RPERRS   ;WAS THERE AN ERROR?
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3853  015770  001002                        BNE     3$              ;BR IF ERROR
3854  015772  000137  016444                JMP     SC11            ;NO ERROR
3855  015776  013705  012330        3$:     MOV     RPERRS+2,R5     ;YES -- PICKUP RPER1 AND
3856  016002  000502                        BR      SC6A            ;GO PROCESS THE ERROR
3857  016004  105761  012336        5$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
3858  016010  001033                        BNE     SC6             ;BR IF EITHER
3859  016012  004737  016534                JSR     PC,SC12         ;SAVE RPDS1, RPER1, RPER2, AND RPER3
3860                                                                ;ALSO DO A DRVINT
3861  016016  105761  012366        6$:     TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE ?
3862  016022  001321                        BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
3863  016024  105761  012346                TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
3864  016030  100412                        BMI     7$              ;BR IF UNSAFE
3865  016032  032737  020000  012334        BIT     #BIT13,RPERRS+6 ;ADDRESS PLUG CHANGED ?
3866  016040  001013                        BNE     8$              ;BR IF YES
3867  016042  012746  000113                MOV     #113,-(SP)      ;RELEASE COMMAND
3868  016046  004037  017652                JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
3869  016052  000000                        RPCS1                   ;REGISTER INDEX
3870  016054  016414                        SC8                     ;PARITY EXIT ADDRESS
3871  016056  011605        7$:     MOV     (SP),R5         ;PICKUP (RPAS) BEFORE THE ERROR CALL
3872  016060  004037  020764                JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
3873  016064  104002                        ERROR   2               ;REPORT THE UNEXPECTED ATTENTION
3874  016066  000677                        BR      SC4             ;GO CHECK FOR MORE ATA'S
3875  016070                        8$:
3876  016070  004037  020764                JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
3877  016074  104005                        ERROR   5               ;REPORT THE ADDRESS PLUG CHANGE
3878  016076  000673                        BR      SC4             ;CHECK FOR MORE DRIVES
3879  016100  006301        SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
3880  016102  012761  177777  012440        MOV     #-1,TIMER(R1)   ;STOP THE TIMER
3881  016110  006201                        ASR     R1              ;RESTORE THE DRIVE ADDRESS
3882  016112  004737  020700                JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
3883  016116  010164  000010                MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3884  016122  004037  017472                JSR     R0,RD.RP        ;READ THE RP04'S STATUS REG.
3885  016126  000012                        RPDS1
3886  016130  016414                        SC8
3887  016132  011605                        MOV     (SP),R5         ;AND PUT IT IN R5
3888  016134  006126                        ROL     (SP)+           ;WAS THERE AN ERROR?
3889  016136  100407                        BMI     1$              ;BR IF ERROR
3890  016140  105761  012336                TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
3891  016144  003137                        BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
3892  016146  052762  100210  000016        BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
3893  016154  000470                        BR      SC7
3894  016156  004037  017472        1$:     JSR     R0,RD.RP        ;READ ERROR REGISTER #1
3895  016162  000014                        RPER1
3896  016164  016414                        SC8
3897  016166  012605                        MOV     (SP)+,R5        ;AND SAVE IT IN R5
3898  016170  004737  020044                JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
3899  016174  012746  000111                MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
3900  016200  004037  017652                JSR     R0,WRT.RP
3901  016204  000000                        RPCS1
3902  016206  016414                        SC8
3903  016210  006105        SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
3904  016212  100406                        BMI     1$              ;BRANCH IF YES
3905  016214  005702                        TST     R2              ;ANYTHING IN QUEUE ?
3906  016216  001447                        BEQ     SC7             ;BR IF NOT
3907  016220  052762  100240  000016        BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
3908  016226  000443                        BR      SC7
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3909  016230  004037  017472          1$:     JSR     R0,RD.RP        ;READ DRIVE STATUS REG. #1
3910  016234  000012                          RPDS1
3911  016236  016414                          SC8
3912  016240  011605                          MOV     (SP),R5         ;SAVE RPDS1 IN R5
3913  016242  006126                          ROL     (SP)+           ;'ERR'=1?
3914  016244  100011                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
3915  016246  112761  177777  012346          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
3916  016254  004737  020044                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
3917  016260  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
3918  016266  000423                          BR      SC7
3919  016270  032705  010000          2$:     BIT     #BIT12,R5       ;'MOL'' = 1 ?
3920  016274  001015                          BNE     3$              ;BR IF YES
3921  016276  112761  177777  012336          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
3922  016304  112761  000001  012346          MOVB    #1,DRVSTA(R1)   ;ONLINE
3923  016312  006301                          ASL     R1
3924  016314  012761  072460  012440          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
3925  016322  006201                          ASR     R1
3926  016324  000137  015666                  JMP     SC4
3927  016330  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
3928  016336  105061  012336          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
3929  016342  004737  020604                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
3930  016346  105761  012414                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS OR QUEUE?
3931  016352  003002                          BGT     1$              ;BR IF NOT
3932  016354  105061  012414                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
3933  016360  116164  012462  000016  1$:     MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
3934  016366  105761  012346                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
3935  016372  100406                          BMI     2$              ;BR IF IT IS
3936  016374  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
3937  016400  004037  017652                  JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
3938  016404  000000                          RPCS1                   ;REGISTER INDEX
3939  016406  016414                          SC8                     ;PARITY EXIT ADDRESS
3940  016410  000137  015666          2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
3941  016414  105761  012336          SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
3942  016420  001405                          BEQ     1$              ;YES--BRANCH
3943  016422  004737  020700                  JSR     PC,GETREQ       ;GET DPB POINTER
3944  016426  004737  014714                  JSR     PC,CI7          ;PROCESS THE PARITY ERROR
3945  016432  000402                          BR      2$              ;CONTINUE
3946  016434  004737  014742          1$:     JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
3947  016440  000137  015666          2$:     JMP     SC4             ;CHECK MORE DRIVES
3948  016444  105761  012414          SC11:   TSTB    ULDFLG(R1)      ;'UNLOAD IN PROGRESS''?
3949  016450  003402                          BLE     1$              ;BRANCH IF NO
3950  016452  105061  012414                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
3951  016456  105061  012336          1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
3952  016462  136137  012462  012410          BITB    ATABIT(R1),SRCHWT  ;DOING A SEARCH OPERATION FOR
3953                                                                  ;AN I/O COMMAND?
3954  016470  001012                          BNE     2$              ;BRANCH IF YES
3955  016472  004737  020722                  JSR     PC,POPQUE       ;REMOVE REQUEST FROM QUEUE
3956  016476  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET 'DONE'' BIT
3957  016504  005737  012434                  TST     SAVEFG          ;SAVE THE REGISTERS?
3958  016510  100002                          BPL     2$              ;BRANCH IF NO
3959  016512  004737  020044                  JSR     PC,SVRH11       ;YES--SAVE ALL OF THE RH11/RP04/5/6 REG'S
3960  016516  116164  012462  000016  2$:     MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
3961  016524  004737  013604                  JSR     PC,OPT          ;START A REQUEST
3962  016530  000137  015666                  JMP     SC4             ;CHECK FOR MORE DRIVES
3963  016534  010164  000010          SC12:   MOV     R1,RPCS2(R4)    ;SELECT DRIVE
3964  016540  016437  000012  012326          MOV     RPDS1(R4),RPERRS        ;SAVE THE FOUR REGISTERS THAT
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3965  016546  016437  000014  012330          MOV     RPER1(R4),RPERRS+2      ;WILL TELL US SOMETHING
3966  016554  016437  000040  012332          MOV     RPER2(R4),RPERRS+4
3967
3968  016562  016437  000042  012334          MOV     RPER3(R4),RPERRS+6
3969  016570  004037  012724                  JSR     R0,DRVINT               ;INIT. THE STATE OF THE DRIVE
3970  016574  000401                          BR      1$                      ;TAKE ERROR EXIT
3971  016576  000207                          RTS     PC                      ;RETURN
3972  016600  005726                  1$:     TST     (SP)+                   ;POP PC OFF OF THE STACK
3973  016602  000704                          BR      SC8                     ;PROCESS THE PARITY ERROR
3974  016604  006301                  SC13:   ASL     R1                      ;SETUP TO ADDRESS WORDS
3975  016606  012761  177777  012440          MOV     #-1,TIMER(R1)           ;STOP THE TIMER
3976  016614  006201                          ASR     R1                      ;
3977  016616  010164  000010                  MOV     R1,RPCS2(R4)            ;SELECT THE DRIVE
3978  016622  116164  012462  000016          MOVB    ATABIT(R1),RPAS(R4)     ;CLEAR THE ATTENTION BIT
3979  016630  032714  004000                  BIT     #BIT11,(R4)             ;DRIVE AVAILABLE ?
3980  016634  001006                          BNE     1$                      ;BR IF AVAILABLE
3981  016636  006301                          ASL     R1
3982
3983  016640  012761  023420  012440          MOV     #10000.,TIMER(R1)       ;START 10 SEC TIMER AGAIN
3984
3985  016646  006201                          ASR     R1
3986  016650  000433                          BR      3$                      ;EXIT
3987  016652  105761  012366          1$:     TSTB    DPINT(R1)               ;INITIALIZING THE DRIVE ?
3988  016656  001424                          BEQ     2$                      ;BR IF NOT
3989  016660  105061  012366                  CLRB    DPINT(R1)               ;CLEAR THE INIT INDICATOR
3990  016664  004037  012724                  JSR     R0,DRVINT               ;GO INIT THE DRIVE
3991  016670  000240                          NOP                             ;DUMMY PARITY ERROR RETURN
3992  016672  105761  012346                  TSTB    DRVSTA(R1)              ;DRIVE ONLINE ?
3993  016676  003014                          BGT     2$                      ;BR IF YES -- START ORDER
3994  016700  005702                          TST     R2                      ;QUEUE ENTRY FOR THE DRIVE
3995  016702  001416                          BEQ     3$                      ;BR IF NOT
3996  016704  004737  020700                  JSR     PC,GETREQ               ;GET DPB ADDRESS
3997  016710  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)     ;INFORM USER THAT DRIVE OFFLINE
3998  016716  004737  020044                  JSR     PC,SVRH11               ;SAVE THE REGISTERS
3999  016722  004737  020604                  JSR     PC,EMPTYQ               ;EMPTY THE REQUEST QUEUE
4000  016726  000404                          BR      3$
4001  016730  105061  012376          2$:     CLRB    DPRQS(R1)               ;CLEAR THE PORT REQUEST INDICATOR
4002  016734  004737  013604                  JSR     PC,OPT                  ;START THE PENDING REQUEST
4003  016740  000137  015666          3$:     JMP     SC4                     ;PROCESS OTHER DRIVES
4004
4005                                  ;RP04/5/6 TIMER ROUTINE
4006                                  ;CALL
4007                                  ;       MOV     #TIME,-(SP)             ;ELASPED TIME IN MILLISECONDS ON THE STACK
4008                                  ;       JSR     PC,RPTMR                ;CALL RP04/5/6 TIME ROUTINE
4009
4010  016744  005737  012412          RPTMR:  TST     ACTDRV                  ;CHECK ''ACTDRV & ACTSTR''
4011  016750  001030                          BNE     4$                      ;IF NON ZERO EXIT
4012  016752  112737  000001  012413          MOVB    #1,ACTSTR               ;SET ''ACTSTR''
4013  016760  104412                          SAVREG                          ;SAVE R0 - R5
4014  016762  005001                          CLR     R1                      ;START WITH DRIVE 0
4015  016764  005003                          CLR     R3
4016  016766  005763  012440          1$:     TST     TIMER(R3)               ;IS THE TIMER RUNNING?
4017  016772  002407                          BLT     2$                      ;BRANCH IF NO
4018  016774  166663  000002  012440          SUB     2(SP),TIMER(R3)         ;COUNT THE INTERVAL
4019  017002  003003                          BGT     2$                      ;BR IF NO SOFTWARE TIMEOUT
4020  017004  004737  017036                  JSR     PC,STO                  ;CALL SOFTWARE TIMEOUT ROUTINE
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                                        BR      3$              ;GO TO THE EXIT
                                2$:     INC     R1              ;MOVE TO NEXT DRIVE
                                        TST     (R3)+
                                        CMP     #8.,R1          ;OUT OF DRIVES?
                                        BGT     1$              ;BRANCH IF NO
                                3$:     RESREG                  ;RESTORE R0 - R5
                                        CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
                                4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
                                        RTS     PC              ;RETURN

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

                                STO:    MOV     R1,-(SP)        ;SAVE R1
                                        MOV     R3,-(SP)        ;SAVE R3
                                        MOV     RPADR,R4        ;GET ADDRESS OF ''RPCS1''
                                        MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
                                        JSR     R0,RD.RP        ;READ ''DRIVE STATUS REG''
                                        RPDS1
                                        STO5
                                        TSTB    (SP)+           ;IS ''DRY''=1?
                                        BMI     STO2            ;BR IF YES
                                STO1:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
                                        BNE     STO2            ;BR IF YES
                                        TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
                                        BNE     STO2            ;BR IF YES
                                        MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
                                        CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
                                        BEQ     1$              ;BRANCH IF YES
                                        JSR     PC,GETREQ       ;GET DPB ADDRESS
                                1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
                                        JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
                                        MOV     #BIT05,RPCS2(R4) ;''INIT'' THE MASS BUS
                                        CLRB    DRVACT(R1)      ;DRIVE IS IDLE
                                        CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
                                        CLR     R1              ;START WITH DRIVE 0
                                        CLR     R3
                                2$:     JSR     R0,DRVINT       ;INIT. THIS DRIVE
                                        BR      STO5            ;PARITY ERROR RETURN
                                        TSTB    DRVACT(R1)      ;DRIVE IDLE BEFORE THE INIT.?
                                        BEQ     4$              ;YES--BRANCH
                                        MOV     TRNSWT,R2       ;GET TRANSFER WAIT QUEUE
                                        CMP     DTUW,R1         ;WAS THERE I/O ON THIS DRIVE?
                                        BEQ     3$              ;YES--BRANCH
                                        JSR     PC,GETREQ       ;GET THE DPB POINTER FROM QUEUE
                                3$:     BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT.
                                        CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE TO IDLE
                                4$:     CLRB    ULDFLG(R1)      ;NO UNLOAD
                                        MOV     #-1,TIMER(R3)   ;STOP THE TIMER
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4077  017232  005723                          TST     (R3)+           ;UPDATE THE INDEX
4078  017234  005201                          INC     R1              ;INCREMENT THE DRIVE NUMBER
4079  017236  022701  000010                  CMP     #8.,R1          ;LAST DRIVE BEEN CHECKED?
4080  017242  003344                          BGT     2$              ;NO--LOOP
4081  017244  012737  177777  012460          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
4082  017252  005037  012406                  CLR     TRNSWT          ;CLEAR TRANSFER WAIT QUEUE
4083  017256  004737  020526                  JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
4084  017262  000500                          BR      ST09            ;EXIT
4085  017264  116405  000016          ST02:   MOVB    RPAS(R4),R5     ;READ ATTENTION REG
4086  017270  136105  012462                  BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
4087  017274  001017                          BNE     ST03            ;YES--BRANCH
4088  017276  105761  012366                  TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
4089  017302  001031                          BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
4090  017304  105761  012376                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
4091  017310  001045                          BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
4092  017312  020137  012460                  CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
4093  017316  001263                          BNE     ST01            ;BR IF NO
4094  017320  004037  017472                  JSR     R0,RD.RP        ;YES--CHECK 'RDY'
4095  017324  000000                          RPCS1
4096  017326  017360                          ST05
4097  017330  105726                          TSTB    (SP)+
4098  017332  100255                          BPL     ST01            ;BR IF 'RDY'=0
4099  017334  105761  012366          ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
4100  017340  001003                          BNE     1$              ;BR IF INIT PENDING
4101  017342  105761  012376                  TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
4102  017346  001446                          BEQ     ST09            ;BR IF NOT
4103  017350  012763  177777  012440  1$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
4104  017356  000442                          BR      ST09            ;EXIT
4105  017360  004737  015014          ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
4106  017364  000437                          BR      ST09
4107  017366  105061  012366          ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
4108  017372  105061  012346                  CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
4109  017376  012763  177777  012440          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
4110  017404  004737  020700                  JSR     PC,GETREQ       ;GET THE DPB ADDRESS
4111  017410  005702                          TST     R2              ;REQUEST IN QUEUE ?
4112  017412  001424                          BEQ     ST09            ;BR IF NOT
4113  017414  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
4114  017422  000414                          BR      ST08            ;FINISH
4115  017424  012763  177777  012440  ST07:   MOV     #-1,TIMER(R3)   ;STOP THE TIMER
4116  017432  105061  012376                  CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
4117  017436  004737  020700                  JSR     PC,GETREQ       ;GET DPB ADDRESS
4118  017442  005702                          TST     R2              ;QUEUE ENTRY FOR DRIVE ?
4119  017444  001407                          BEQ     ST09            ;BR IF NONE
4120  017446  012762  100004  000016          MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
4121  017454  004737  020604          ST08:   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
4122  017460  004737  020044                  JSR     PC,SVRH11       ;SAVE THE REGISTERS
4123  017464  012603                  ST09:   MOV     (SP)+,R3        ;RESTORE R3
4124  017466  012601                          MOV     (SP)+,R1        ;RESTORE R1
4125  017470  000207                          RTS     PC              ;RETURN
4126
4127                                  ;ROUTINE TO READ A RH11/RP04/5/6 REGISTER
4128                                  ;
4129                                  ;CALL
4130                                  ;       JSR     R0,RD.RP        ;GO READ A REGISTER
4131                                  ;       INDEX                   ;REG. INDEX FROM BASE
4132                                  ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
```

```
                                        ;
                                        ;       RETURN                          ;AT THIS ADDRESS
                                        ;                                       ;CONTENTS OF REG. IS ON THE STACK
                                        ;
017472  013737  012472  017640  RD.RP:  MOV     MCPEMX,RD.RP2   ;MAX. RETRYS ALLOWED
017500  011646                          MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
017502  013737  012474  017516          MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
017510  062037  017516                  ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
017514  013727                  RD.RP1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RP04
017516  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
017520  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
017522  013766  017520  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
017530  013746  012474                  MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
017534  062716  000010                  ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
017540  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
017544  001037                          BNE     RD.RP3          ;BR IF DRIVE NON-EXISTENT
017546  017746  172722                  MOV     @RPADR,-(SP)    ;READ RPCS1
017552  032716  020000                  BIT     #BIT13,(SP)     ;DID MCPE SET?
017556  001002                          BNE     1$              ;BRANCH IF YES
017560  022620                          CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
017562  000432                          BR      RD.RP4          ;EXIT
017564                          1$:
017564  004037  020764                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
017570  104003                          ERROR   3               ;REPORT ''MCPE'' ERROR
017572  005737  012460                  TST     DTUW            ;DATA TRANSFER UNDERWAY?
017576  100405                          BMI     2$              ;NO--BRANCH
017600  032716  040000                  BIT     #BIT14,(SP)     ;NO--''TRE''=1?
017604  001402                          BEQ     2$              ;NO--BRANCH
017606  005726                          TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
017610  000415                          BR      RD.RP3          ;TAKE THE FATAL ERROR EXIT
017612  052716  040000          2$:     BIS     #BIT14,(SP)     ;CLEAR ''MCPE'' BY SENDING A ''1'' TO ''TRE''
017616  000316                          SWAB    (SP)            ;POSITION BEFORE WRITING
017620  013737  012474  017634          MOV     RPADR,3$        ;FORM ADDRESS OF HIGH BYTE
017626  005237  017634                  INC     3$
017632  112637                          MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RPCS1
017634  000000                  3$:     .WORD   0               ;ADDRESS STORAGE
017636  005327                          DEC     (PC)+           ;EXCEEDED MAX. RETRYS
017640  000003                  RD.RP2: .WORD   3
017642  002324                          BGE     RD.RP1          ;BRANCH IF NO
017644  011000                  RD.RP3: MOV     (R0),R0         ;FATAL ERROR EXIT
017646  012616                          MOV     (SP)+,(SP)
017650  000200                  RD.RP4: RTS     R0

                                ;ROUTINE TO WRITE A REGISTER
                                ;
                                ;CALL
                                ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
                                ;       JSR     R0,WRT.RP       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
                                ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
                                ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
                                ;       RETURN                  ;ERROR FREE RETURN

017652  013737  012472  020026  WRT.RP: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
017660  016637  000002  017740          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
017666  012616                          MOV     (SP)+,(SP)      ;ADJUST THE STACK
017670  012037  017742                  MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
017674  001015                          BNE     1$              ;BRANCH IF NOT RPCS1
```

```
 4189  017676  122737  000150  017740          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
 4190  017704  002411                          BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
 4191  017706  004037  017472                  JSR     R0,RD.RP        ;NO---COMBINE A16&A17, & PSEL WITH
 4192  017712  000000                          RPCS1                   ;THE COMMAND BEFORE SENDING IT TO
 4193  017714  020034                          WRT.R3                  ;THE RH11/RP04
 4194  017716  000316                          SWAB    (SP)
 4195  017720  042716  177770                  BIC     #^C7,(SP)
 4196  017724  112637  017741                  MOVB    (SP)+,WRT.WD+1
 4197  017730  063737  012474  017742  1$:     ADD     RPADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
 4198  017736  012737                  WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
 4199  017740  000000                  WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
 4200  017742  000000                  WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
 4201  017744  013746  012474                  MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
 4202  017750  062716  000010                  ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
 4203  017754  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
 4204  017760  001025                          BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
 4205  017762  004037  017472                  JSR     R0,RD.RP        ;CHECK FOR PARITY ERROR ON WRITE
 4206  017766  000014                          RPER1
 4207  017770  020034                          WRT.R3
 4208  017772  032726  000010                  BIT     #BIT03,(SP)+
 4209  017776  001420                          BEQ     WRT.R4          ;BRANCH IF 'PAR=0'
 4210  020000  016037  177776  020012          MOV     -2(R0),1$       ;PICKUP THE INDEX
 4211  020006  004037  017472                  JSR     R0,RD.RP        ;READ THE REG.
 4212  020012  000000                  1$:     .WORD   0               ;REG. INDEX
 4213  020014  020034                          WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
 4214  020016  004037  020764                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
 4215  020022  104004                          ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
 4216  020024  005327                          DEC     (PC)+           ;DECREMENT THE ERROR COUNT
 4217  020026  000003                  WRT.R2: .WORD   3               ;RETRY COUNTER
 4218  020030  002342                          BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
 4219  020032  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 4220  020034  011000                  WRT.R3: MOV     (R0),R0         ;TAKE THE 'PARITY ON WRITE'' ERROR EXIT
 4221  020036  000401                          BR      WRT.R5          ;EXIT
 4222  020040  005720                  WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
 4223  020042  000200                  WRT.R5: RTS     R0
 4224
 4225                                  ;ROUTINE TO SAVE THE RH11/RP04/5/6 REGISTERS AS PER DPB+14
 4226                                  ;
 4227                                  ;CALL
 4228                                  ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
 4229                                  ;       JSR     PC,SVRH11       ;SAVE THE DRIVES REG'S
 4230
 4231  020044  104412                  SVRH11: SAVREG                  ;SAVE R0 - R5
 4232  020046  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
 4233  020050  001430                          BEQ     4$              ;BR IF NONE
 4234  020052  013704  012474                  MOV     RPADR,R4
 4235  020056  111264  000010                  MOVB    (R2),RPCS2(R4)  ;SELECT DRIVE
 4236  020062  016203  000014                  MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
 4237  020066  001433                          BEQ     6$              ;EXIT IF NO ADDRESS
 4238  020070  005037  020124                  CLR     3$              ;COUNTER & POINTER
 4239  020074  023727  020124  000022  1$:     CMP     3$,#RPDB        ;REACHED THE BUFFER REGISTER ?
 4240  020102  001006                          BNE     2$              ;BR IF NOT
 4241  020104  032764  000200  000010          BIT     #BIT07,RPCS2(R4)  ;'OR' SET ?
 4242  020112  001002                          BNE     2$              ;BR IF SET
 4243  020114  005023                          CLR     (R3)+           ;STORE RPDB AS ZEROES
 4244  020116  000405                          BR      4$              ;CONTINUE
```

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 4245  020120  004037  017472          2$:     JSR     R0,RD.RP        ;READ THE SELECTED REGISTER
 4246  020124  000000                  3$:     .WORD   0               ;REGISTER INDEX
 4247  020126  020152                          5$                      ;ERROR RETURN ADDRESS
 4248  020130  012623                          MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
 4249  020132  023727  020124  000046  4$:     CMP     3$,#RPEC2       ;REACHED THE END ?
 4250  020140  001406                          BEQ     6$              ;BR IF YES
 4251  020142  062737  000002  020124          ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
 4252  020150  000751                          BR      1$              ;CONTINUE READING THE REGISTERS
 4253  020152  004737  014714          5$:     JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 4254  020156  104413                  6$:     RESREG                  ;RESTORE R0 - R5
 4255  020160  000207                          RTS     PC              ;RETURN
 4256
 4257                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A ''TRE''
 4258                                  ;CALL
 4259                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 4260                                  ;       JSR     PC,SET.IE       ;SET ''IE''
 4261                                  ;       RETURN
 4262
 4263  020162  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
 4264  020164  013704  012474                  MOV     RPADR,R4        ;PICKUP ADDRESS OF RPCS1
 4265  020170  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 4266  020174  011446                          MOV     (R4),-(SP)      ;READ RPCS1
 4267  020176  052716  040000                  BIS     #BIT14,(SP)     ;SET THE ''TRE'' BIT OF THE WORD READ
 4268  020202  000316                          SWAB    (SP)            ;ADJUST FOR DATO
 4269  020204  112714  000100                  MOVB    #BIT06,(R4)     ;SET ''IE''
 4270  020210  032764  010000  000010          BIT     #BIT12,RPCS2(R4) ;IS ''NED''=1?
 4271  020216  001002                          BNE     1$              ;YES--CLEAR ''TRE''
 4272  020220  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 4273  020222  000402                          BR      2$
 4274  020224  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR ''TRE''
 4275  020230  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
 4276  020232  000207                          RTS     PC              ;RETURN TO CALLER
 4277
 4278                                  ;QUEUE COUNT
 4279  020234      000                 QCNT:   .BYTE   0               ;DRIVE 0
 4280  020235      000                         .BYTE   0               ;DRIVE 1
 4281  020236      000                         .BYTE   0               ;DRIVE 2
 4282  020237      000                         .BYTE   0               ;DRIVE 3
 4283  020240      000                         .BYTE   0               ;DRIVE 4
 4284  020241      000                         .BYTE   0               ;DRIVE 5
 4285  020242      000                         .BYTE   0               ;DRIVE 6
 4286  020243      000                         .BYTE   0               ;DRIVE 7
 4287
 4288                                  ;QUEUE INPUT POINTERS
 4289
 4290  020244  020326                  QINPT:  .WORD   QDRV0            ;DRIVE 0
 4291  020246  020346                          .WORD   QDRV1            ;DRIVE 1
 4292  020250  020366                          .WORD   QDRV2            ;DRIVE 2
 4293  020252  020406                          .WORD   QDRV3            ;DRIVE 3
 4294  020254  020426                          .WORD   QDRV4            ;DRIVE 4
 4295  020256  020446                          .WORD   QDRV5            ;DRIVE 5
 4296  020260  020466                          .WORD   QDRV6            ;DRIVE 6
 4297  020262  020506                          .WORD   QDRV7            ;DRIVE 7
 4298
 4299                                  ;QUEUE OUTPUT POINTERS
 4300
```

```
 4301   020264  020326                  QOUTPT: .WORD   QDRV0           ;DRIVE 0
 4302   020266  020346                          .WORD   QDRV1           ;DRIVE 1
 4303   020270  020366                          .WORD   QDRV2           ;DRIVE 2
 4304   020272  020406                          .WORD   QDRV3           ;DRIVE 3
 4305   020274  020426                          .WORD   QDRV4           ;DRIVE 4
 4306   020276  020446                          .WORD   QDRV5           ;DRIVE 5
 4307   020300  020466                          .WORD   QDRV6           ;DRIVE 6
 4308   020302  020506                          .WORD   QDRV7           ;DRIVE 7
 4309
 4310   020304  020326                  QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
 4311   020306  020346                  QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 4312   020310  020366                          .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
 4313   020312  020406                          .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
 4314   020314  020426                          .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
 4315   020316  020446                          .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
 4316   020320  020466                          .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
 4317   020322  020506                          .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
 4318   020324  020526                          .WORD   QTERM           ;STOP DRIVE 7
 4319
 4320                                  ;DRIVE REQUEST QUEUES
 4321
 4322   020326  000010                  QDRV0:  .BLKW   10
 4323   020346  000010                  QDRV1:  .BLKW   10
 4324   020366  000010                  QDRV2:  .BLKW   10
 4325   020406  000010                  QDRV3:  .BLKW   10
 4326   020426  000010                  QDRV4:  .BLKW   10
 4327   020446  000010                  QDRV5:  .BLKW   10
 4328   020466  000010                  QDRV6:  .BLKW   10
 4329   020506  000010                  QDRV7:  .BLKW   10
 4330           020526                  QTERM=.
 4331
 4332                                  ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
 4333                                  ;
 4334                                  ;CALL
 4335                                  ;       JSR     PC,CLRQUE
 4336
 4337   020526  104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
 4338   020530  012702  020234                 MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
 4339   020534  005022                         CLR     (R2)+           ;DRIVES 0 & 1
 4340   020536  005022                         CLR     (R2)+           ;DRIVES 2 & 3
 4341   020540  005022                         CLR     (R2)+           ;DRIVES 4 & 5
 4342   020542  005022                         CLR     (R2)+           ;DRIVES 6 & 7
 4343   020544  012703  000010                 MOV     #8.,R3          ;MOVE THE STARTING
 4344   020550  012701  020304                 MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
 4345   020554  012122                 1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
 4346   020556  005303                         DEC     R3
 4347   020560  001375                         BNE     1$
 4348   020562  012703  000010                 MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
 4349   020566  012701  020304                 MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
 4350   020572  012122                 2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
 4351   020574  005303                         DEC     R3
 4352   020576  001375                         BNE     2$
 4353   020600  104413                         RESREG                  ;RESTORE R0 - R5
 4354   020602  000207                         RTS     PC
 4355
 4356                                  ;EMPTY THE QUEUE SPECIFIED BY R1
```

```
                                        ;
                                        ;CALL
                                        ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,EMPTYQ
                                        
020604  105061  020234        EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
020610  006301                  ASL     R1
020612  016161  020244  020264        MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
020620  006201                  ASR     R1
020622  000207                  RTS     PC
                                        
                                        ;ROUTINE TO PUT A REQUEST IN QUEUE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
                                        ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
                                        ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
                                        ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
                                        
020624  122761  000010  020234  DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
020632  001421                  BEQ     2$              ;BR IF YES-TAKE RETURN1
020634  105261  020234          INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
020640  006301                  ASL     R1
020642  010271  020244          MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
020646  062761  000002  020244  ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
020654  026161  020244  020306  CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
020662  001003                  BNE     1$              ;BRANCH IF NO
020664  016161  020304  020244  MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
020672  006201          1$:     ASR     R1
020674  005720                  TST     (R0)+           ;TAKE RETURN 2
020676  000200          2$:     RTS     R0              ;RETURN TO USER
                                        
                                        ;ROUTINE TO GET THE ''DPB'' ADDRESS OF NEXT REQUEST IN QUEUE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,GETREQ       ;GO GET THE REQUEST
                                        ;       RETURN                  ;R2=''DPB'' ADDRESS OF THE REQUEST
                                        ;                               ;R2=0 IF NO REQUEST IN QUEUE
                                        
020700  005002          GETREQ: CLR     R2
020702  105761  020234          TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
020706  001404                  BEQ     2$              ;NO---BRANCH
020710  006301          1$:     ASL     R1
020712  017102  020264          MOV     @QOUTPT(R1),R2  ;PICKUP ''DPB'' POINTER FOR THIS DRIVE
020716  006201                  ASR     R1
020720  000207          2$:     RTS     PC              ;RETURN TO USER
                                        
                                        ;ROUTINE TO ''POP'' THE REQUEST FROM QUEUE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
                                        ;       RETURN                  ;R2=ADDRESS OF DPB REMOVED
```

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                                POPQUE: DECB    QCNT(R1)          ;DECREMENT QUEUE COUNT
                                        ASL     R1
                                        MOV     @QOUTPT(R1),R2    ;GET THE "DPB" POINTER
                                        ADD     #2,QOUTPT(R1)     ;UPDATE THE QUEUE POINTER
                                        CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
                                        BNE     1$                ;NO--BRANCH TO EXIT
                                        MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
                                1$:     ASR     R1
                                        RTS     PC                ;RETURN TO USER

                                ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
                                ;REPORTS AN ERROR DIRECTLY.
                                ;
                                ;CALL
                                ;       JSR     R0,ES.SAV
                                ;       ERROR   N                 ;;THE ERROR CALL
                                ;       RETURN                    ;THE RETURN IS PAST THE ERROR CALL

                                ES.SAV: MOV     (R0)+,1$          ;GET THE ERROR CALL
                                        MOV     $ESCAPE,-(SP)     ;SAVE THE ADDRESS IN '$ESCAPE'
                                        CLR     $ESCAPE           ;CLEAR THE ESCAPE RETURN
                                1$:     .WORD   0                 ;THE ERROR CALL IS MOVED HERE
                                        MOV     (SP)+,$ESCAPE     ;RESTORE THE ESCAPE ADDRESS
                                        RTS     R0                ;RETURN

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

                                .SBTTL  TELETYPE MESSAGES

021010 005015 040527 047122     USE:    .ASCIZ  <CR><LF>/WARNING: PROGRAMMABLE DRIVES MAY BE USED/<CR><LF>
021016 047111 035107 050040
021024 047522 051107 046501
021032 040515 046102 020105
021040 051104 053111 051505
021046 046440 054501 041040
021054 020105 051525 042105
021062 005015    000
021065    040 051120 043517     NOUSE:  .ASCIZ  / PROGRAMMABLE-DRIVE WILL NOT BE USED/
021072 040522 046515 041101
021100 042514 042055 044522
021106 042526 053440 046111
021114 020114 047516 020124
021122 042502 052440 042523
021130 000104
021132 047440 043106 044514     UNTOFF: .ASCIZ  / OFFLINE/
021140 042516    000
021143    040 047117 044514     UNTON:  .ASCIZ  / ONLINE/
021150 042516    000
021153    040 047516 020124     NOTRP:  .ASCIZ  @ NOT AN RP04/5/6@
021160 047101 051040 030120
021166 027464 027465 000066
021174 047040 052117 050040     NOTPRS: .ASCIZ  / NOT PRESENT/
021202 042522 042523 052116
021210    000
021211    040 047125 040523     NOTSAF: .ASCIZ  / UNSAFE/
```

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 4469  021216  042506     000
 4470  021221     122  030120  000064  RP04B:  .ASCIZ  /RP04/
 4471  021226  050122  032460     000  RP05:   .ASCIZ  /RP05/
 4472  021233     122  030120  000066  RP06:   .ASCIZ  /RP06/
 4473  021240  047125  052111  051440  SYSTAT: .ASCIZ  /UNIT STATUS/<CR><LF><LF>
 4474  021246  040524  052524  006523
 4475  021254  005012     000
 4476  021257     015  042012  044522  MUNIT:  .ASCIZ  <CR><LF>/DRIVE: /
 4477  021264  042526  020072     000
 4478  021271     040  020057     000  SLASH:  .ASCIZ  @ / @
 4479  021275     103     000          C:      .ASCIZ  /C/
 4480  021277     124     000          T:      .ASCIZ  /T/
 4481  021301     060     000          MDRVD:  .ASCIZ  /0/
 4482  021303     040     040          LIN4SP: .ASCII  /  /
 4483  021305     040  000040          LINSP:  .ASCIZ  /  /
 4484  021310  047105  042524  020122  ENTADR: .ASCIZ  /ENTER ADDRESS LIMITS:/<CR><LF>
 4485  021316  042101  051104  051505
 4486  021324  020123  044514  044515
 4487  021332  051524  006472  000012
 4488  021340  020040  051104  053111  MOFFLN: .ASCIZ  /  DRIVE OFFLINE/<CR><LF>
 4489  021346  020105  043117  046106
 4490  021354  047111  006505  000012
 4491  021362  042040  044522  042526  MDRNP:  .ASCIZ  / DRIVE NOT PRESENT/<CR><LF>
 4492  021370  047040  052117  050040
 4493  021376  042522  042523  052116
 4494  021404  005015     000
 4495  021407     040  051104  053111  MER11:  .ASCIZ  / DRIVE NOT AVAILABLE/<CR><LF>
 4496  021414  020105  047516  020124
 4497  021422  053101  044501  040514
 4498  021430  046102  006505  000012
 4499  021436  042040  044522  042526  MNRP04: .ASCIZ  @ DRIVE NOT AN RP04/5/6@<CR><LF>
 4500  021444  047040  052117  040440
 4501  021452  020116  050122  032060
 4502  021460  032457  033057  005015
 4503  021466     000
 4504  021467     040  051104  053111  MUSDR:  .ASCIZ  / DRIVE UNSAFE/<CR><LF>
 4505  021474  020105  047125  040523
 4506  021502  042506  005015     000
 4507  021507     040  042523  042514  MSELD:  .ASCIZ  / SELECTED/
 4508  021514  052103  042105     000
 4509  021521     015  050012  047522  MMODE:  .ASCIZ  <CR><LF>/PROGRAM MODE (C OR F): /
 4510  021526  051107  046501  046440
 4511  021534  042117  020105  041450
 4512  021542  047440  020122  024506
 4513  021550  020072     000
 4514  021553     040  047506  046522  MFORMT: .ASCIZ  / FORMAT & VERIFY/
 4515  021560  052101  023040  053040
 4516  021566  051105  043111  000131
 4517  021574  044103  041505  020113  MHECK:  .ASCIZ  /CHECK ONLY/
 4518  021602  047117  054514     000
 4519  021607     106  051117  040515  MORMAT: .ASCIZ  /FORMAT & VERIFY/
 4520  021614  020124  020046  042526
 4521  021622  044522  054506     000
 4522  021627     015  005012  050117  MSIZE:  .ASCIZ  <CR><LF><LF>/OPERATE IN 22 SECTOR MODE (Y OR N) ? /
 4523  021634  051105  052101  020105
 4524  021642  047111  031040  020062
```

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 4525  021650  042523  052103  051117
 4526  021656  046440  042117  020105
 4527  021664  054450  047440  020122
 4528  021672  024516  037440  000040
 4529  021700  050117  051105  052101  MSEC22: .ASCIZ  /OPERATION WILL BE IN 22 SECTOR (16 BIT) MODE/<CR><LF>
 4530  021706  047511  020116  044527
 4531  021714  046114  041040  020105
 4532  021722  047111  031040  020062
 4533  021730  042523  052103  051117
 4534  021736  024040  033061  041040
 4535  021744  052111  020051  047515
 4536  021752  042504  005015     000
 4537  021757     117  042520  040522  MSEC20: .ASCIZ  /OPERATION WILL BE IN 20 SECTOR (18 BIT) MODE/<CR><LF>
 4538  021764  044524  047117  053440
 4539  021772  046111  020114  042502
 4540  022000  044440  020116  030062
 4541  022006  051440  041505  047524
 4542  022014  020122  030450  020070
 4543  022022  044502  024524  046440
 4544  022030  042117  006505  000012
 4545  022036  047111  040526  044514  BADENT: .ASCIZ  /INVALID ENTRY/<CR><LF>
 4546  022044  020104  047105  051124
 4547  022052  006531  000012
 4548  022056  047105  044504  043516  MADRER: .ASCII  /ENDING DSK ADRS MUST BE EQUAL TO OR GREATER/<CR><LF>
 4549  022064  042040  045523  040440
 4550  022072  051104  020123  052515
 4551  022100  052123  041040  020105
 4552  022106  050505  040525  020114
 4553  022114  047524  047440  020122
 4554  022122  051107  040505  042524
 4555  022130  006522     012
 4556  022133     124  040510  020116          .ASCIZ  /THAN STARTING ADRS/<CR><LF>
 4557  022140  052123  051101  044524
 4558  022146  043516  040440  051104
 4559  022154  006523  000012
 4560  022160  042523  042514  052103  MSELP:  .ASCII  /SELECT DATA PATTERN/<CR><LF>
 4561  022166  042040  052101  020101
 4562  022174  040520  052124  051105
 4563  022202  006516     012
 4564  022205     040  030050  020051          .ASCII  / (0) ZERO'S/<CR><LF>
 4565  022212  042532  047522  051447
 4566  022220  005015
 4567  022222  024040  024461  047440          .ASCII  / (1) ONE'S/<CR><LF>
 4568  022230  042516  051447  005015
 4569  022236  024040  024462  053440          .ASCIZ  / (2) WORST CASE: /
 4570  022244  051117  052123  041440
 4571  022252  051501  035105  000040
 4572
 4573  022260  047527  051522  020124  MPATD:  .ASCIZ  /WORST CASE/
 4574  022266  040503  042523     000
 4575  022273     015  005012  052123  MSFOU:  .ASCIZ  <CR><LF><LF>/STARTING FORMAT ON DRIVE /
 4576  022300  051101  044524  043516
 4577  022306  043040  051117  040515
 4578  022314  020124  047117  042040
 4579  022322  044522  042526  000040
 4580  022330  005015  051412  040524  MSCHK:  .ASCIZ  <CR><LF><LF>/STARTING CHECK ON DRIVE /
```

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 4581  022336  052122  047111  020107
 4582  022344  044103  041505  020113
 4583  022352  047117  042040  044522
 4584  022360  042526  000040
 4585  022364  005015  043012  051117  MFCMPT: .ASCIZ  <CR><LF><LF>/FORMAT COMPLETE, /
 4586  022372  040515  020124  047503
 4587  022400  050115  042514  042524
 4588  022406  020054     000
 4589  022411     015  005012  044103  MCCMPT: .ASCIZ  <CR><LF><LF>/CHECK COMPLETE, /
 4590  022416  041505  020113  047503
 4591  022424  050115  042514  042524
 4592  022432  020054     000
 4593  022435     124  052117  046101  NUMERR: .ASCIZ  /TOTAL ERRORS DETECTED: /
 4594  022442  042440  051122  051117
 4595  022450  020123  042504  042524
 4596  022456  052103  042105  020072
 4597  022464     000
 4598  022465     120  042522  042523  ADDRIS: .ASCIZ  /PRESENT ADDRESS IS: /
 4599  022472  052116  040440  042104
 4600  022500  042522  051523  044440
 4601  022506  035123  000040
 4602
 4603                             ;;*****************************************************************
 4604
 4605                             .SBTTL  ERROR MESSAGES
 4606
 4607                             ;;*****************************************************************
 4608
 4609  022512  044122  030461  044440  EM1:    .ASCIZ  /RH11 INTERRUPT OCCURRED (RPAS=0)/
 4610  022520  052116  051105  052522
 4611  022526  052120  047440  041503
 4612  022534  051125  042522  020104
 4613  022542  051050  040520  036523
 4614  022550  024460     000
 4615  022553     125  042516  050130  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
 4616  022560  041505  042524  020104
 4617  022566  052101  042524  052116
 4618  022574  047511  020116  041517
 4619  022602  052503  051122  042105
 4620  022610     000
 4621  022611     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
 4622  022616  051525  050040  051101
 4623  022624  052111  020131  051105
 4624  022632  047522  020122  046450
 4625  022640  050103  036505  024461
 4626  022646     000
 4627  022647     115  051501  041123  EM4:    .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)/
 4628  022654  051525  050040  051101
 4629  022662  052111  020131  051105
 4630  022670  047522  020122  050050
 4631  022676  051101  030475  000051
 4632  022704  042101  051104  051505  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
 4633  022712  020123  046120  043525
 4634  022720  041440  040510  043516
 4635  022726  020105  044502  020124
 4636  022734  042523  000124
```

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 4637  022740  044122  030461  042040  EM6:    .ASCIZ  /RH11 DIDN'T RESPOND TO ADDRESSING/
 4638  022746  042111  023516  020124
 4639  022754  042522  050123  047117
 4640  022762  020104  047524  040440
 4641  022770  042104  042522  051523
 4642  022776  047111  000107
 4643  023002  051104  053111  020105  EM10:   .ASCIZ  /DRIVE OFFLINE/
 4644  023010  043117  046106  047111
 4645  023016  000105
 4646  023020  042520  051522  051511  EM11:   .ASCIZ  /PERSISTENT DRIVE UNSAFE ERROR/
 4647  023026  042524  052116  042040
 4648  023034  044522  042526  052440
 4649  023042  051516  043101  020105
 4650  023050  051105  047522  000122
 4651  023056  047125  047503  051122  EM12:   .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR/
 4652  023064  041505  040524  046102
 4653  023072  020105  040515  051523
 4654  023100  052502  020123  040520
 4655  023106  044522  054524  042440
 4656  023114  051122  051117     000
 4657  023121     123  043117  053524  EM13:   .ASCIZ  /SOFTWARE TIMEOUT/
 4658  023126  051101  020105  044524
 4659  023134  042515  052517  000124
 4660  023142  051104  053111  020105  EM14:   .ASCIZ  /DRIVE UNSAFE ERROR/
 4661  023150  047125  040523  042506
 4662  023156  042440  051122  051117
 4663  023164     000
 4664  023165     103  047117  051124  EM15:   .ASCIZ  @CONTROLLER/DRIVE ERROR DURING WRITE@
 4665  023172  046117  042514  027522
 4666  023200  051104  053111  020105
 4667  023206  051105  047522  020122
 4668  023214  052504  044522  043516
 4669  023222  053440  044522  042524
 4670  023230     000
 4671  023231     103  047117  051124  EM16:   .ASCIZ  @CONTROLLER/DRIVE ERROR DURING WRITE CHECK@
 4672  023236  046117  042514  027522
 4673  023244  051104  053111  020105
 4674  023252  051105  047522  020122
 4675  023260  052504  044522  043516
 4676  023266  053440  044522  042524
 4677  023274  041440  042510  045503
 4678  023302     000
 4679  023303     122  052105  044522  EM17:   .ASCIZ  @RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE@
 4680  023310  051505  047040  052117
 4681  023316  051440  041525  051505
 4682  023324  043123  046125  026440
 4683  023332  051440  041505  047524
 4684  023340  020122  047516  020124
 4685  023346  041501  042503  052120
 4686  023354  041101  042514     000
 4687  023361     104  052101  020101  EM20:   .ASCIZ  @DATA ERROR DURING WRITE CHECK@
 4688  023366  051105  047522  020122
 4689  023374  052504  044522  043516
 4690  023402  053440  044522  042524
 4691  023410  041440  042510  045503
 4692  023416     000
```

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 4693  023417     103  047117  051124  EM21:   .ASCIZ  @CONTROLLER/DRIVE ERROR VERIFYING HEADERS@
 4694  023424  046117  042514  027522
 4695  023432  051104  053111  020105
 4696  023440  051105  047522  020122
 4697  023446  042526  044522  054506
 4698  023454  047111  020107  042510
 4699  023462  042101  051105  000123
 4700  023470  042510  042101  051105  EM22:   .ASCIZ  @HEADER COMPARE ERROR VERIFYING HEADERS@
 4701  023476  041440  046517  040520
 4702  023504  042522  042440  051122
 4703  023512  051117  053040  051105
 4704  023520  043111  044531  043516
 4705  023526  044040  040505  042504
 4706  023534  051522     000
 4707  023537     103  046131  047111  EM23:   .ASCIZ  @CYLINDER FIELD IN HEADER IS NOT CORRECT@
 4708  023544  042504  020122  044506
 4709  023552  046105  020104  047111
 4710  023560  044040  040505  042504
 4711  023566  020122  051511  047040
 4712  023574  052117  041440  051117
 4713  023602  042522  052103     000
 4714  023607     127  044522  042524  EM24:   .ASCIZ  @WRITE CHECK ERROR@
 4715  023614  041440  042510  045503
 4716  023622  042440  051122  051117
 4717  023630     000
 4718  023631     110  051101  053504  EM25:   .ASCIZ  @HARDWARE ERROR DURING WRITE CHECK@
 4719  023636  051101  020105  051105
 4720  023644  047522  020122  052504
 4721  023652  044522  043516  053440
 4722  023660  044522  042524  041440
 4723  023666  042510  045503     000
 4724          023674                          .EVEN
 4725
 4726                                  ;;*****************************************************************
 4727
 4728  023674  050122  051501     000  DH1:    .ASCIZ  /RPAS/
 4729  023701     104  044522  042526  DH2:    .ASCIZ  /DRIVE   RPDS1   RPER1   RPER2   RPER3   RPAS/
 4730  023706  020040  051040  042120
 4731  023714  030523  020040  051040
 4732  023722  042520  030522  020040
 4733  023730  051040  042520  031122
 4734  023736  020040  051040  042520
 4735  023744  031522  020040  051040
 4736  023752  040520  000123
 4737  023756  051104  053111  020105  DH3:    .ASCIZ  /DRIVE   REG ADR  DATA/
 4738  023764  020040  042522  020107
 4739  023772  042101  020122  042040
 4740  024000  052101  000101
 4741  024004  051104  053111  020105  DH4:    .ASCIZ  /DRIVE   REG ADR    GOOD    BAD/
 4742  024012  020040  042522  020107
 4743  024020  042101  020122  020040
 4744  024026  043440  047517  020104
 4745  024034  020040  041040  042101
 4746  024042     000
 4747  024043     122  020110  042101  DH6:    .ASCIZ  /RH ADDRESS/
 4748  024050  051104  051505  000123
```

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 4749  024056  051104  053111  020105  DH10:   .ASCIZ  /DRIVE   ERR PC  RPCS1   RPCS2   RPDS1   RPER1   RPER2   RPER3/
 4750  024064  020040  051105  020122
 4751  024072  041520  020040  050122
 4752  024100  051503  020061  020040
 4753  024106  050122  051503  020062
 4754  024114  020040  050122  051504
 4755  024122  020061  020040  050122
 4756  024130  051105  020061  020040
 4757  024136  050122  051105  020062
 4758  024144  020040  050122  051105
 4759  024152  000063
 4760  024154  050122  041505  020061  DH10A:  .ASCIZ  /RPEC1   RPEC2   RPWC    RPBA    RPDA    RPAS    RPLA/
 4761  024162  020040  050122  041505
 4762  024170  020062  020040  050122
 4763  024176  041527  020040  020040
 4764  024204  050122  040502  020040
 4765  024212  020040  050122  040504
 4766  024220  020040  020040  050122
 4767  024226  051501  020040  020040
 4768  024234  050122  040514     000
 4769  024241     122  042120  020102  DH10B:  .ASCIZ  /RPDB    RPMR    RPDT    RPSN    RPOF    RPCA    RPCC/
 4770  024246  020040  051040  046520
 4771  024254  020122  020040  051040
 4772  024262  042120  020124  020040
 4773  024270  051040  051520  020116
 4774  024276  020040  051040  047520
 4775  024304  020106  020040  051040
 4776  024312  041520  020101  020040
 4777  024320  051040  041520  000103
 4778  024326  051104  053111  020105  DH17:   .ASCIZ  /DRIVE   ERR PC CYLINDER TRACK   SECTOR/
 4779  024334  020040  051105  020122
 4780  024342  041520  041440  046131
 4781  024350  047111  042504  020122
 4782  024356  051124  041501  020113
 4783  024364  020040  042523  052103
 4784  024372  051117     000
 4785  024375     104  044522  042526  DH20:   .ASCIZ  /DRIVE   ERR PC CYLINDER TRACK   SECTOR/
 4786  024402  020040  042440  051122
 4787  024410  050040  020103  054503
 4788  024416  044514  042116  051105
 4789  024424  052040  040522  045503
 4790  024432  020040  051440  041505
 4791  024440  047524  000122
 4792  024444  050122  051503  020061  DH20A:  .ASCIZ  /RPCS1   RPCS2   RPDS1   RPER1   RPER2   RPER3   RPEC1   RPEC2/
 4793  024452  020040  050122  051503
 4794  024460  020062  020040  050122
 4795  024466  051504  020061  020040
 4796  024474  050122  051105  020061
 4797  024502  020040  050122  051105
 4798  024510  020062  020040  050122
 4799  024516  051105  020063  020040
 4800  024524  050122  041505  020061
 4801  024532  020040  050122  041505
 4802  024540  000062
 4803  024542  050122  041527  020040  DH20B:  .ASCIZ  /RPWC    RPBA    RPDA    RPAS    RPLA    RPDB    RPMR    RPDT/
 4804  024550  020040  050122  040502
```

```
 4805  024556  020040  020040  050122
 4806  024564  040504  020040  020040
 4807  024572  050122  051501  020040
 4808  024600  020040  050122  040514
 4809  024606  020040  020040  050122
 4810  024614  041104  020040  020040
 4811  024622  050122  051115  020040
 4812  024630  020040  050122  052104
 4813  024636     000
 4814  024637     122  051520  020116  DH20C:  .ASCIZ  /RPSN    RPOF    RPCA    RPCC/
 4815  024644  020040  051040  047520
 4816  024652  020106  020040  051040
 4817  024660  041520  020101  020040
 4818  024666  051040  041520  000103
 4819  024674  020040  020040  020040  DH23:   .ASCII  /               EXPT'D/<CR><LF>
 4820  024702  020040  020040  020040
 4821  024710  020040  020040  054105
 4822  024716  052120  042047  005015
 4823  024724  051104  053111  020105          .ASCIZ  /DRIVE   ERR PC  CYLNDR  ACTUAL HEADER/
 4824  024732  020040  051105  020122
 4825  024740  041520  020040  054503
 4826  024746  047114  051104  020040
 4827  024754  041501  052524  046101
 4828  024762  044040  040505  042504
 4829  024770  000122
 4830  024772  020040  020040  020040  DH24:   .ASCII  /                                        MEMORY  DISK/<CR><LF>
 4831  025000  020040  020040  020040
 4832  025006  020040  020040  020040
 4833  025014  020040  020040  020040
 4834  025022  020040  020040  020040
 4835  025030  020040  020040  020040
 4836  025036  020040  020040  042515
 4837  025044  047515  054522  020040
 4838  025052  044504  045523  005015
 4839  025060  051104  053111  020105          .ASCIZ  /DRIVE   ERR PC  CYLNDR  TRACK   SECTOR  DATA    DATA/
 4840  025066  020040  051105  020122
 4841  025074  041520  020040  054503
 4842  025102  047114  051104  020040
 4843  025110  051124  041501  020113
 4844  025116  020040  042523  052103
 4845  025124  051117  020040  040504
 4846  025132  040524  020040  020040
 4847  025140  040504  040524     000
 4848
 4849
 4850  025146  001276                  DT1:    .WORD   ATTN
 4851  025150  001274  012326  012330  DT2:    .WORD   DDRIVE,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6,ATTN
 4852  025156  012332  012334  001276
 4853  025164  001274  017516  017520  DT3:    .WORD   DDRIVE,RD.ADR,RD.WRD
 4854  025172  001274  017742  017740  DT4:    .WORD   DDRIVE,WRT.AD,WRT.WD,RD.WRD
 4855  025200  017520
 4856  025202  001172                  DT6:    .WORD   $RPADR
 4857  025204  001214  001116  001306  DT10:   .WORD   DRIVE,$ERRPC,RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42
 4858  025212  001316  001320  001322
 4859  025220  001346  001350
 4860  025224  001352  001354  001310          .WORD   RP.REG+44,RP.REG+46,RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20
```

```
 4861  025232  001312  001314  001324
 4862  025240  001326
 4863  025242  001330  001332  001334          .WORD   RP.REG+22,RP.REG+24,RP.REG+26,RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4864  025250  001336  001340  001342
 4865  025256  001344
 4866  025260  001214  001116  001270  DT17:   .WORD   DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC
 4867  025266  001272  001252
 4868  025272  001214  001116  001270  DT20:   .WORD   DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC
 4869  025300  001272  001252
 4870  025304  001306  001316  001320          .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42,RP.REG+44,RP.RE
 4871  025312  001322  001346  001350
 4872  025320  001352  001354
 4873  025324  001310  001312  001314          .WORD   RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20,RP.REG+22,RP.REG+24,RP.RE
 4874  025332  001324  001326  001330
 4875  025340  001332  001334
 4876  025344  001336  001340  001342          .WORD   RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4877  025352  001344
 4878  025354  001214  001116  025574  DT23:   .WORD   DRIVE,$ERRPC,BUFP,RBUF,RBUF+2,RBUF+4,RBUF+6
 4879  025362  025564  025566  025570
 4880  025370  025572
 4881  025372  001214  001116  001270  DT24:   .WORD   DRIVE,$ERRPC,DS.CYL,DS.TRK,SAVSEC,$GDDAT,RP.REG+22
 4882  025400  001272  001252  001124
 4883  025406  001330
 4884  025410  001306  001316  001320          .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42,RP.REG+44,RP.RE
 4885  025416  001322  001346  001350
 4886  025424  001352  001354
 4887  025430  001310  001312  001314          .WORD   RP.REG+2,RP.REG+4,RP.REG+6,RP.REG+16,RP.REG+20,RP.REG+22,RP.REG+24,RP.RE
 4888  025436  001324  001326  001330
 4889  025444  001332  001334
 4890  025450  001336  001340  001342          .WORD   RP.REG+30,RP.REG+32,RP.REG+34,RP.REG+36
 4891  025456  001344
 4892
 4893  025460  000001                  DF1:    .WORD   1
 4894  025462     001      000                  .BYTE   1,0
 4895  025464  000001                  DF2:    .WORD   1
 4896  025466     006      000                  .BYTE   6,0
 4897  025470  000001                  DF3:    .WORD   1
 4898  025472     003      000                  .BYTE   3,0
 4899  025474  000001                  DF4:    .WORD   1
 4900  025476     004      000                  .BYTE   4,0
 4901  025500  000003                  DF10:   .WORD   3
 4902  025502     010      000                  .BYTE   8.,0
 4903  025504  024154                          .WORD   DH10A
 4904  025506     007      000                  .BYTE   7,0
 4905  025510  024241                          .WORD   DH10B
 4906  025512     007      000                  .BYTE   7,0
 4907  025514  000001                  DF17:   .WORD   1
 4908  025516     005      034                  .BYTE   5,34
 4909  025520  000004                  DF20:   .WORD   4
 4910  025522     005      034                  .BYTE   5,34
 4911  025524  024444                          .WORD   DH20A
 4912  025526     010      000                  .BYTE   8.,0
 4913  025530  024542                          .WORD   DH20B
 4914  025532     010      000                  .BYTE   8.,0
 4915  025534  024637                          .WORD   DH20C
 4916  025536     004      000                  .BYTE   4,0
```

```
 4917  025540  000001                  DF23:   .WORD   1
 4918  025542     007      000                 .BYTE   7,0
 4919  025544  000004                  DF24:   .WORD   4
 4920  025546     007      034                 .BYTE   7,34
 4921  025550  024444                          .WORD   DH20A
 4922  025552     010      000                 .BYTE   8.,0
 4923  025554  024542                          .WORD   DH20B
 4924  025556     010      000                 .BYTE   8.,0
 4925  025560  024637                          .WORD   DH20C
 4926  025562     004      000                 .BYTE   4,0
 4927
 4928                                  ;;*****************************************************************
 4929
 4930                                  ;BUFFER STARTS HERE
 4931
 4932                                  ;;*****************************************************************
 4933
 4934  025564  000000  000000  000000  RBUF:   .WORD   0,0,0,0          ;BUFFER FOR HEADER CHECK
 4935  025572  000000
 4936
 4937  025574                          BUFP:                   ;FORMAT AND CHECK BUFFER STARTS HERE
 4938
 4939  025574  005015  055012  026532  TITLE:  .ASCII  <CR><LF><LF>/ZZ-CZRJB-D/<CR><LF>
 4940  025602  055103  045122  026502
 4941  025610  006504     012
 4942  025613     122  030120  027464          .ASCIZ  @RP04/5/6 FORMATTER PROGRAM@<CR><LF><LF>
 4943  025620  027465  020066  047506
 4944  025626  046522  052101  042524
 4945  025634  020122  051120  043517
 4946  025642  040522  006515  005012
 4947  025650     000
 4948  025651     015  052012  020117  LOADRV: .ASCII  <CR><LF>/TO 'FORMAT' OR 'CHECK' DRIVE 0, REPLACE THE 'XXDP'/<CR><LF>
 4949  025656  043047  051117  040515
 4950  025664  023524  047440  020122
 4951  025672  041447  042510  045503
 4952  025700  020047  051104  053111
 4953  025706  020105  026060  051040
 4954  025714  050105  040514  042503
 4955  025722  052040  042510  023440
 4956  025730  054130  050104  006447
 4957  025736     012
 4958  025737     120  041501  020113          .ASCII  /PACK ON DRIVE 0 WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40,/<CR><LF>
 4959  025744  047117  042040  044522
 4960  025752  042526  030040  053440
 4961  025760  052111  020110  047101
 4962  025766  052117  042510  020122
 4963  025774  040520  045503  020054
 4964  026002  046103  040505  020122
 4965  026010  042515  047515  054522
 4966  026016  046040  041517  052101
 4967  026024  047511  020116  030064
 4968  026032  006454     012
 4969  026035     101  042116  051040          .ASCIZ  /AND RESTART THE PROGRAM/<CR><LF>
 4970  026042  051505  040524  052122
 4971  026050  052040  042510  050040
 4972  026056  047522  051107  046501
```

```
 4973  026064  005015      000
 4974
 4975
 4976                                .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH11
 4977                                ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
 4978                                ;OF THE RH11 IS SETUP FOR THE PROPER ADDRESS.
 4979                                ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 4980                                ;REQUIRED.
 4981                                ;NOTE: THIS ROUTINE DESTROYS R0-R4
 4982                                ;CALL
 4983                                ;
 4984                                ;       JSR     PC,BUSADR
 4985                                ;       RETURN
 4986
 4987  026070  177700                HIAD:   .WORD 177700
 4988  026072  000776                HIVEC:  .WORD 776
 4989  026074  000000                LIMIT:  .WORD
 4990  026076  005737  001302        BUSADR: TST     CHGADR          ;INPUT FROM TTY REQUESTED?
 4991  026102  001460                        BEQ     7$              ;NO--BRANCH
 4992  026104  005037  001302                CLR     CHGADR          ;YES--CLEAR THE REQUEST FLAG
 4993  026110  012700  001172        1$:     MOV     #$RPADR,R0      ;FIRST ADDRESS
 4994  026114  104401  026316                TYPE    ,MRPCS1         ;'RPCS1='
 4995  026120  012046                        MOV     (R0)+,-(SP)     ;PRESENT RPCS1 ADDRESS
 4996  026122  104402                        TYPOC                   ;TYPE IT
 4997  026124  104401  021305                TYPE    ,LINSP          ;2 SPACES
 4998  026130  104411                        RDLIN                   ;GET THE ENTRY
 4999  026132  012601                        MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
 5000  026134  013737  026070  026074        MOV     HIAD,LIMIT      ;THIS IS THE ADDRSS HIGH LIMIT
 5001  026142  004537  026340                JSR     R5,CK.NUM       ;CHECK THE NUMBER
 5002  026146  026166                        3$                      ;CARRIAGE RETURN ONLY ENTERED
 5003  026150  026244                        7$                      ;PERIOD ONLY ENTERED
 5004  026152  026110                        1$                      ;ILLEGAL INPUT
 5005  026154  026162                        2$                      ;TERMINATED WITH A CARRIAGE RETURN
 5006  026156  026110                        1$                      ;TERMINATED WITH A ','
 5007  026160  026240                        4$                      ;TERMINATED WITH A '.'
 5008  026162  010260  177776        2$:     MOV     R2,-2(R0)       ;SAVE NEW RPCS1
 5009  026166  104401  026327        3$:     TYPE    ,MRHVEC         ;'RHVEC='
 5010  026172  012700  001174                MOV     #$RPVEC,R0      ;FIRST VECTOR
 5011  026176  012046                        MOV     (R0)+,-(SP)     ;PRESENT RH11 VECTOR ADDRESS ON THE STACK
 5012  026200  104402                        TYPOC                   ;TYPE IT
 5013  026202  104401  021305                TYPE    ,LINSP          ;2 SPACES
 5014  026206  104411                        RDLIN                   ;READ THE ENTRY
 5015  026210  012601                        MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
 5016  026212  013737  026072  026074        MOV     HIVEC,LIMIT     ;VECTOR LIMIT
 5017  026220  004537  026340                JSR     R5,CK.NUM       ;CHECK THE NUMBER
 5018  026224  026244                        7$                      ;CARRIAGE RETURN ONLY ENTERED
 5019  026226  026244                        7$                      ;PERIOD ONLY ENTERED
 5020  026230  026166                        3$                      ;ILLEGAL INPUT
 5021  026232  026240                        4$                      ;TERMINATED WITH A CARRIAGE RETURN
 5022  026234  026166                        3$                      ;TERMINATED WITH A ','
 5023  026236  026240                        4$                      ;TERMINATED WITH A '.'
 5024  026240  010260  177776        4$:     MOV     R2,-2(R0)       ;SAVE INPUT
 5025  026244  013701  000004        7$:     MOV     ERRVEC,R1       ;SAVE THE ERROR VECTOR
 5026  026250  012737  026304  000004        MOV     #8$,ERRVEC      ;SETUP FOR TRAP
 5027  026256  005777  152710                TST     @$RPADR         ;CHECK FOR RH11
 5028  026262  010137  000004                MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
```

```
                        012700  001172          MOV     #$RPADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
                        012701  012474          MOV     #RPADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
                        012021                  MOV     (R0)+,(R1)+     ;BUS ADDRESS
                        012021                  MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
                        000207                  RTS     PC              ;RETURN
                        010137  000004  8$:     MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
                        022626                  CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
                        104006                  ERROR   6               ;REPORT THE ERROR
                        000675                  BR      1$              ;ASK FOR BUS ADDRESS

                050122  051503  020061  MRPCS1: .ASCIZ  @RPCS1 = @
                020075    000
                   122  053110  041505  MRHVEC: .ASCIZ  @RHVEC = @
                036440  000040

                                        .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
                                        ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
                                        ;AND FORMS AN OCTAL NUMBER IN R2
                                        ;CALL:
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                        ;       MOV     #NUM,R2         ;MAX SIZE OF INPUT NUMBER
                                        ;       JSR     R5,CK.NUM       ;GO FORM THE NUMBER
                                        ;       RETURN  ADR1            ;''CR'' ONLY ENTERED -- R2 = 0
                                        ;       RETURN  ADR2            ;''PERIOD'' ONLY ENTERED -- R2 = 0
                                        ;       RETURN  ADR3            ;ILLEGAL CHARACTER IN THE INPUT STRING
                                        ;       RETURN  ADR4            ;''CR'' ENTERED -- R2 = NUMBER
                                        ;       RETURN  ADR5            ;''COMMA'' -- R2 = NUMBER
                                        ;       RETURN  ADR6            ;''PERIOD'' -- R2 = NUMBER

                010446          CK.NUM: MOV     R4,-(SP)        ;SAVE R4
                010346                  MOV     R3,-(SP)        ;SAVE R3
                010246                  MOV     R2,-(SP)        ;SAVE R2
                005004                  CLR     R4              ;RETURN POINTER
                005003                  CLR     R3              ;START NUMBER AT ZERO
                005002                  CLR     R2              ;STORE RESULT
                004537  006654          JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
                026460                  6$                      ;ILLEGAL CHARACTER
                026464                  8$                      ;CARRIAGE RETURN
                026460                  6$                      ;''
                026462                  7$                      ;''
                026374                  1$                      ;DIGIT 0-7
                026460                  6$                      ;DIGIT 8-9
                062705  000004  1$:     ADD     #4,R5           ;INCREMENT RETURN PAST ''CR'' AND ''PERIOD'' ONLY RETURNS
                006303          2$:     ASL     R3              ;FOR THE OCTAL NUMBER IN R3
                103426                  BCS     6$              ;DON'T LET IT GET TO BIG
                006303                  ASL     R3
                103424                  BCS     6$
                006303                  ASL     R3
                103422                  BCS     6$
                060203                  ADD     R2,R3
                004537  006654          JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
                026464                  8$                      ;ILLEGAL CHARACTER
                026446                  5$                      ;CARRIAGE RETURN
                026444                  4$                      ;''
                026436                  3$                      ;''
                026400                  2$                      ;DIGIT 0-7
```

```
 5085  026434  026464                        8$                      ;DIGIT 8-9
 5086  026436  105711                3$:     TSTB    (R1)            ;DOES A ''CR'' FOLLOW THE 'PERIOD''
 5087  026440  001011                        BNE     8$              ;BR IF NOT
 5088  026442  005724                        TST     (R4)+           ;INCREMENT THE RETURN
 5089  026444  005724                4$:     TST     (R4)+           ;INCREMENT THE RETURN INDEX
 5090  026446  005724                5$:     TST     (R4)+           ;INCREMENT THE RETURN INDEX
 5091  026450  023703  026074               CMP     LIMIT,R3        ;INPUT VALUE TOO LARGE ?
 5092  026454  101003                        BHI     8$              ;BR IF IT IS
 5093  026456  000401                        BR      7$              ;BR IF NOT
 5094  026460  005725                6$:     TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
 5095  026462  005725                7$:     TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
 5096  026464  060405                8$:     ADD     R4,R5           ;SETUP FOR PROPER RETURN
 5097  026466  010302                        MOV     R3,R2           ;LOAD ENTERED VALUE
 5098  026470  005726                        TST     (SP)+           ;CLEAN OFF THE STACK
 5099  026472  012603                        MOV     (SP)+,R3        ;RESTORE R3
 5100  026474  012604                        MOV     (SP)+,R4        ;RESTORE R4
 5101  026476  011505                        MOV     (R5),R5         ;GET RETURN ADDRESS
 5102  026500  000205                        RTS     R5              ;RETURN
 5103
 5104
 5105
 5106          000001                .END
```

```
ABS    = 000200            841#
ACK    = 000123            911#
ACL    = 000040            875#    884#
ACTDRV  012412            3111#   3406*   3457*   3770*   3779*   4010
ACTSTR  012413            3117#   4012*   4027*
ACU    = 100000            830#
ADDRIS  022465            2029    4598#
ADRTBL  001500            1074#   1729
AOE    = 001000            747#
ATA    = 100000            734#
ATABIT  012462            3183#   3362    3469    3574    3933    3952    3960    3978    4086
ATTN    001276            1004#   2227*   4850    4851
AT0    = 000001            767#
AT1    = 000002            768#
AT2    = 000004            769#
AT3    = 000010            770#
AT4    = 000020            771#
AT5    = 000040            772#
AT6    = 000100            773#
AT7    = 000200            774#
A16    = 000400            665#
A17    = 001000            666#
BADENT  022036            2071    4545#
BAI    = 000010            683#
BEGCYL  001224             980#   1055    1471*   1526*   1535    1582    1589    1772    1776    1909    1948
BEGIN   002114             539    1295#
BEGIN1  002132             535    1298#   1335
BEGIN2  002142            1294    1297    1300#
BEGIN3  002100             542    1292#
BEGTRK  001230             982#   1056    1470*   1525*   1538    1585    1591    1908    1911    1949
BIT0   = 000001            639#
BIT00  = 000001            629#    639    1409    1522
BIT01  = 000002            628#    638    1412    1522    1894    3449    3696
BIT02  = 000004            627#    637
BIT03  = 000010            626#    636    1398    3347    3892    4208
BIT04  = 000020            625#    635    1875    3927
BIT05  = 000040            624#    634    3273    3716    3907    4060
BIT06  = 000100            623#    633    3371    3440    3514    3805    4269
BIT07  = 000200            622#    632    3371    3648    3791    3892    3907    3927    3956    4241
BIT08  = 000400            621#    631    1872    3371    4073
BIT09  = 001000            620#    630    1872    2254    3345    4058
BIT1   = 000002            638#   1758    1863
BIT10  = 002000            619#   1869    1894    2238    3698
BIT11  = 004000            618#   1869    3320    3473    3491    3667    3979
BIT12  = 010000            617#   1866    1894    3315    3353    3371    3451    3485    3663    3682    3694    3707    3917
                          3919    4146    4203    4270
BIT13  = 020000            616#   1863    1894    2245    3434    3865    4149
BIT14  = 040000            615#   1863    1894    3446    3482    3852    3997    4113    4158    4162    4267
BIT15  = 100000            614#   3434    3446    3449    3451    3482    3485    3667    3696    3698    3805    3892    3907
                          3917    3927    3997    4058    4073    4113    4120
BIT2   = 000004            637#   1863    4120
BIT3   = 000010            636#
BIT4   = 000020            635#
BIT5   = 000040            634#
BIT6   = 000100            633#   3475
BIT7   = 000200            632#   1712    1719
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```
BIT8  = 000400   631#
BIT9  = 001000   630#
BPTVEC= 000014   646#
BUFP    025574  1074  1075  1076  1077  1078  1079  1080  1081  1082  1083  1084  1085  1086
                1087  1088  1089  1090  1091  1092  1093  1094  1095  1614  1642  1799  1906
                1947  1967  1978  4878  4937#
BUSADR  026076  1363  4990#
C       021275  2030  4479#
CHGADR  001302  1007#  1292*  1295*  1298*  4990  4992*
CI1     014064  3504  3532#
CI3     014172  3506  3555#
CI4     014300  3495  3576#
CI5     014656  3554  3575  3653#  3662
CI6     014700  3592  3602  3604  3606  3658#
CI7     014714  3436  3513  3544  3548  3552  3560  3569  3573  3584  3591  3597  3601  3615
                3621  3625  3635  3646  3661  3663#  3765  3795  3944  4253
CI7B    014742  3666  3669#  3946
CI8     015014  3664  3672  3681#  3818  4105
CKADRS  003704  1582#
CKSWR = 104407  2225  2253  2996#
CKTRK   004356  1644  1672#
CK.CHR  006654  1485  1548  2131#  2168  2182  5064  5079
CK.DEC  006626  2109#  2137
CK.DIG  006726  2062  2162#
CK.NUM  026340  5001  5017  5058#
CK.OCT  006600  2091#  2139
CLOCK   006332  1992  2002  2013#
CLR   = 000040   685#
CLRQUE  020526  3255  3715  4083  4337#
CNTLC   001300  1006#  1335*  1479*  1566*  2028*  2041*  2591  2674
CR    = 000015   554#  967#  2392  2402  4443  4473  4476  4484  4488  4491  4495  4499  4504
                4509  4522  4529  4537  4545  4548  4556  4560  4564  4567  4575  4580  4585
                4589  4819  4830  4939  4942  4948  4958  4969
CRLF  = 000200   555#  2363  2402
CSF   = 000002   817#  835#
CSU   = 000010   819#  837#
CYLCK   001246  989#  1772*  1803  1806*
DCK   = 100000   753#  1696
DCL   = 000100   876#  885#
DCU   = 000001   882#
DDISP = 177570   561#  952  1321
DDRIVE  001274  1003#  2226*  4851  4853  4854
DE1   = 000040   724#
DFF20 = 000002   720#
DF1     025460  1144  1179  4893#
DF10    025500  1193  1200  1207  1214  1221  1228  1235  1256  1263  4901#
DF17    025514  1242  4907#
DF2     025464  1151  1172  4895#
DF20    025520  1249  1284  4909#
DF23    025540  1270  4917#
DF24    025544  1277  4919#
DF3     025470  1158  4897#
DF4     025474  1165  4899#
DH1     023674  1142  4728#
DH10    024056  1191  1198  1205  1212  1219  1226  1233  1254  1261  4749#
DH10A   024154  4760#  4903
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DH10B   024241          4769#   4905
DH17    024326          1240    4778#
DH2     023701          1149    1170    4729#
DH20    024375          1247    1282    4785#
DH20A   024444          4792#   4911    4921
DH20B   024542          4803#   4913    4923
DH20C   024637          4814#   4915    4925
DH23    024674          1268    4819#
DH24    024772          1275    4830#
DH3     023756          1156    4737#
DH4     024004          1163    4741#
DH6     024043          1177    4747#
DIGB  = 000004           721#
DISPLA  001142           952#   1321*   1329*   2237*
DISPRE  000174           519#   1329
DLT   = 100000           695#
DL64  = 000020           723#
DMD   = 000001           757#
DONE    005436          1845    1846#
DPINT   012366          3070#   3284    3287    3379*   3416    3836    3861    3987    3989*   4050    4088    4099    4107*
DPR   = 000400           727#
DPRQS   012376          3083#   3422    3508*   3839    4001*   4052    4090    4101    4116*
DRIVE   001214           976#   1492*   1497*   1518    1520    1573    1903    4857    4866    4868    4878    4881
DRQ   = 004000           790#
DRVACT  012336          3027#   3430    3609*   3656*   3675*   3686    3701*   3784*   3857    3890    3921*   3928*   3941
                        3951*   4061*   4067    4074*
DRVCLR= 000111           906#
DRVINT  012724          3275    3309#   3418    3477    3969    3990    4065
DRVQUE  020624          3425    3438    4377#
DRVSTA  012346          1388    1507    3041#   3265*   3266*   3267*   3268*   3278*   3310*   3319*   3368*   3373*   3412
                        3420    3444    3479    3483    3610*   3719*   3842    3850    3863    3915*   3922*   3934    3992
                        4108*
DRVTYP  012356          1391    1398    1409    1412    1512    1522    3057#   3311*   3326*   3331*   3336*   3341*   3347*
                        3447    3720*
DRY   = 000200           726#
DSWR  = 177570           560#    951    1320
DS.CYL  001270          1001#   2228*   4866    4868    4881
DS.TRK  001272          1002#   2229*   4866    4868    4881
DTE   = 010000           750#   1696
DTSY  = 000200           763#
DTUW    012460          3177#   3261    3497    3553*   3676    3679*   3689    3702    3704*   3713*   3773    3785*   4055
                        4070    4081*   4092    4156
DT00  = 000001           781#
DT01  = 000002           782#
DT02  = 000004           783#
DT03  = 000010           784#
DT04  = 000020           785#
DT05  = 000040           786#
DT06  = 000100           787#
DT07  = 000200           788#
DT08  = 000400           789#
DT1     025146          1143    4850#
DT10    025204          1192    1199    1206    1213    1220    1227    1234    1255    1262    4857#
DT17    025260          1241    4866#
DT2     025150          1150    1171    4851#
DT20    025272          1248    1283    4868#
```

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DT23    025354            1269    4878#
DT24    025372            1276    4881#
DT3     025164            1157    4853#
DT4     025172            1164    4854#
DT6     025202            1178    4856#
DVA   = 004000             715#
ECH   = 000100             744#
ECI   = 004000             858#
EFLG    001304            1008#   1301*   1639*   1704    1707*   1714*   1721*   1724*   1748*   1757*
EMPTYQ  020604            3673    3718    3806    3929    3999    4121    4362#
EMTVEC= 000030             649#   1310*   1311*   1334*
EM1     022512            1141    4609#
EM10    023002            1190    4643#
EM11    023020            1197    4646#
EM12    023056            1204    4651#
EM13    023121            1211    4657#
EM14    023142            1218    4660#
EM15    023165            1225    4664#
EM16    023231            1232    4671#
EM17    023303            1239    4679#
EM2     022553            1148    4615#
EM20    023361            1246    4687#
EM21    023417            1253    4693#
EM22    023470            1260    4700#
EM23    023537            1267    4707#
EM24    023607            1274    4714#
EM25    023631            1281    4718#
EM3     022611            1155    4621#
EM4     022647            1162    4627#
EM5     022704            1169    4632#
EM6     022740            1176    4637#
ENDCYL  001222             979#   1057    1521*   1524*   1527    1528    1535    1582    1588    1803
ENDTRK  001226             981#   1058    1472*   1538    1584    1590
ENTADR  021310            1533    4484#
ERINDX  005462            1655    1687    1787    1860#
ERR   = 040000             733#
ERRVEC= 000004             642#   1318    1319*   1330*   1988*   1989*   1999*   2008*   5025    5026*   5028*   5034*
ES.SAV  020764            3821    3872    3876    4154    4214    4431#
EXT1  = 000001             797#
EXT10 = 000010             800#
EXT2  = 000002             798#
EXT20 = 000020             801#
EXT4  = 000004             799#
EXT40 = 000040             802#
FEN   = 000200             823#
FER   = 000020             742#   1696
FMTDPB  001356            1036#   1474*   1518    1520*   1627*   1630*   1631*   1633    1635    1640*   1641*   1642*   1645*
                          1649    1651    1672*   1676    1678    1727*   1729*   1735*   1744    1773*   1774*   1775*   1776*
                          1777*   1781    1783    1793    1808*   1862    1865    1868    1871    1874    1893    1903*   1904*
                          1905*   1906*   1907*   1908*   1909*   1910*   1923*   1927*   1928*   1936*   1937*   1938*   2031
                          2037    2228    2229
FMT22 = 010000             859#
F1    = 000002             710#
F2    = 000004             711#
F3    = 000010             712#
F4    = 000020             713#
```

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F5     = 000040            714#
GETREG= 000141             913#
GETREQ  020700            3470    3691    3846    3882    3943    3996    4057    4072    4110    4117    4398#
GNS    = ****** U          518    2988    2989    2990    2991    2992    2994    2996    2997    2998    2999    3000
GO     = 000001            709#
GRV    = 000010            722#
GTSWR  = 104406           1357    2994#
HCE    = 000200            745#   1696    1793
HCI    = 002000            857#
HCRC   = 000400            746#   1696
HDREAD  005076            1762    1769#
HEDERR  001262             995#   1769*
HIAD    026070            4987#   5000
HIVEC   026072            4988#   5016
HT     = 000011            552#   2361    2402
IAE    = 002000            748#
IE     = 000100            663#
ILF    = 000001            738#
ILR    = 000002            739#
IOTVEC= 000020             647#
IR     = 000100            686#
ISR     015406            3270    3770#
IXE    = 004000            827#    845#
LA      015250            3501    3735#
LACNT   012424            3136#   3743*   3744    3761*
LF     = 000012             553#    968#   2396    2402    4443    4473    4476    4484    4488    4491    4495    4499    4504
                           4509    4522    4529    4537    4545    4548    4556    4560    4564    4567    4575    4580    4585
                           4589    4819    4830    4939    4942    4948    4958    4969
LIMIT   026074            4989#   5000*   5016*   5091
LINSP   021305            1407    2034    2307    2316    2327    4483#   4997    5013
LIN4SP  021303            1387    4482#
LOADRV  025651            1349    4948#
LOP.CK  005562            1662    1750    1798    1802    1889#
LST    = 002000            729#
MADRER  022056            1540    4548#
MAXSEC  001266             999#   1463*   1469*   1683    1744    1946    1966    1977
MCCMPT  022411            1823    4589#
MCLK   = 000002             758#
MCPE   = 020000             668#
MCPEMX  012472            3195#   4136    4184
MDRNP   021362            1514    4491#
MDRVD   021301            1493    4481#
MER11   021407            1516    4495#
MFCMPT  022364            1821    4585#
MFORMT  021553            1441    4514#
MHECK   021574            1439    4517#
MHS    = 001000             825#    843#
MINX   = 000004             759#
MMODE   021521            1428    4509#
MNDLTA  012506            3211#   3759
MNRP04  021436            4499#
MODE    001220             978#   1427*   1444*   1567    1643    1699    1733    1819
MOFFLN  021340            4488#
MOH    = 020000             791#
MOL    = 010000             731#
MORMAT  021607            1443    4519#
```

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MPATD    022260            1555    4573#
MPE    = 000400             688#
MRD    = 000020             761#
MRHVEC   026327            5009    5041#
MRPCS1   026316            4994    5039#
MSCHK    022330            1571    4580#
MSE    = 000020             820#
MSEC20   021757            1465    4537#
MSEC22   021700            1459    4529#
MSELD    021507            4507#
MSELP    022160            1545    4560#
MSFOU    022273            1569    4575#
MSIZE    021627            1448    4522#
MSTCK  = 000010             760#
MUNIT    021257            1482    4476#
MUSDR    021467            1510    4504#
MWC      001260             994#   1461*   1467*   1641    1730    1905
MWR    = 000040             762#
MXDLTA   012504            3208#   3757
MXF    = 001000             689#
MXLACT   012502            3205#   3744
MXWNDW   012510            3214#   3562
M0       003232            1475    1479#   1496    1511    1515    1517    1848
M1       002760            1427#   1438
M1A      003050            1440    1448#   1458
M1B      003176            1464    1470#   2023
M2       003520            1519    1529    1533#   1541
M4       003560            1536    1539    1545#   1561
M5       003642            1566#   1850
NBA    = 100000             793#
NED    = 010000             692#
NEM    = 004000             691#
NHS    = 002000             826#    844#
NOTPRS   021174            1396    4465#
NOTRP    021153            1394    4462#
NOTSAF   021211            1404    4468#
NOUSE    021065            1400    4451#
NUMERR   022435            1824    4593#
OCYL   = 100000             878#    888#
OENTER   006344            1479    2019#   2028
OFFSET= 000115              908#
OFREV  = 000200             856#
OF100  = 000004             852#
OF200  = 000010             853#
OF25   = 000001             850#
OF400  = 000020             854#
OF50   = 000002             851#
OF800  = 000040             855#
OPE    = 020000             886#
OPI    = 020000             751#   1696
OPT      013604            3432    3467#   3801    3961    4002
OR     = 000200             687#
PAR    = 000010             741#
PARENT   006464            1534    2049#
PAR1     001430            1055    1063#
PAR2     001443            1056    1065#
```

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PAR3     001456            1057    1067#
PAR4     001467            1058    1069#
PAT    = 000020             684#
PATA     001242             987#   1603*   1607*   1611*   1615
PATB     001244             988#   1604*   1608*   1612*   1616
PATSEL   001240             986#   1473*   1562*   1605    1609
PGE    = 002000             690#
PGM    = 001000             728#
PIP    = 020000             732#
PIRQ   = 177772             559#
PIRQVE= 000240              653#
PLU    = 020000             829#    846#
POPQUE   020722            3481    3532    3647    3955    4413#
PR0    = 000000             576#
PR1    = 000040             577#
PR2    = 000100             578#
PR3    = 000140             579#
PR4    = 000200             580#
PR5    = 000240             581#   1333    1334
PR6    = 000300             582#   1994    2004
PR7    = 000340             583#   1377
PS     = 177776             556#    557    1377*   1506*   3253    3254*   3283*   3291*   3404    3405*   3458*   3468    3517*
                           3750*
PSEL   = 002000             667#
PSU    = 000001             872#
PSW    = 177776             557#   2027*
PWRVEC= 000024              648#
QCNT     020234            4279#   4338    4362*   4377    4379*   4399    4413*
QDRV0    020326            4290    4301    4310    4322#
QDRV1    020346            4291    4302    4311    4323#
QDRV2    020366            4292    4303    4312    4324#
QDRV3    020406            4293    4304    4313    4325#
QDRV4    020426            4294    4305    4314    4326#
QDRV5    020446            4295    4306    4315    4327#
QDRV6    020466            4296    4307    4316    4328#
QDRV7    020506            4297    4308    4317    4329#
QINPT    020244            4290#   4364    4381*   4382*   4383    4385*
QOUTPT   020264            4301#   4364*   4402    4415    4416*   4417    4419*
QSTART   020304            4310#   4344    4349    4385    4419
QSTOP    020306            4311#   4383    4417
QTERM  = 020526            4318    4330#
RAW    = 000020             838#
RBUF     025564            1774    1799    4878    4934#
RDCHR  = 104410            2750    2997#
RDDAT  = 000171             920#
RDHD   = 000173             921#   1777
RDLIN  = 104411            1429    1449    1483    1546    2060    2998#   4998    5014
RDY    = 000200             664#
RD.ADR   017516            4138*   4139*   4141#   4853
RD.RP    017472            3322    3357    3363    3595    3619    3633    3737    3751    3793    3816    3884    3894    3909
                           4045    4094    4136#   4191    4205    4211    4245
RD.RP1   017514            4140#   4170
RD.RP2   017640            4136*   4169#
RD.RP3   017644            4147    4161    4171#
RD.RP4   017650            4152    4173#
RD.WRD   017520            4142#   4143    4853    4854
```

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READIN= 000121  910#
RECAL  = 000107  905#
RELSE  = 000113  907#
RESREG= 104413  2329  2887  3000#  3292  3452  3455  3518  3722  3778  4026  4254  4353
RESVEC= 000010  643#
RETRY   001250  990#  1638*  1663  1665*  1668*  1751  1753*  1756*
RMR    = 000004  740#
RNOP   = 000101  902#
RPADR   012474  1364*  3200#  3272  3411  3535  3555  3576  3735  3772  4043  4138  4144  4148
                4164  4197  4201  4234  4264  5030
RPAS   = 000016  3225#  3362*  3814  3933*  3960*  3978*  4085
RPBA   = 000004  2230  2232  3220#
RPCA   = 000034  3232#  3547  3559  3590
RPCC   = 000036  3233#  3738
RPCS1  = 000000  3218#  3314*  3320  3351  3473  3489  3551  3572  3614  3634  3645  3660  3671
                3794  3817  3869  3901  3938  4095  4192
RPCS2  = 000010  1693  1717  3222#  3273*  3313*  3315  3424*  3536*  3556*  3577*  3663  3682  3694
                3707  3716*  3736*  3792*  3883*  3963*  3977*  4044*  4060*  4145  4202  4235*  4241
                4265*  4270
RPDA   = 000006  1681  3221#  3543  3568  3583
RPDB   = 000022  3227#  4239
RPDS1  = 000012  3223#  3345  3358  3475  3885  3910  3964  4046
RPDT   = 000026  3229#  3323
RPEC1  = 000044  3236#
RPEC2  = 000046  3237#  4249
RPERRS  012326  3019#  3256  3852  3855  3865  3964*  3965*  3966*  3968*  4851
RPER1  = 000014  1695  1710  1896  3224#  3364  3895  3965  4206
RPER2  = 000040  3234#  3966
RPER3  = 000042  3235#  3968
RPINIT  012512  1371  1503  3252#
RPLA   = 000020  3226#  3752
RPMR   = 000024  3228#
RPOF   = 000032  3231#  3355  3596  3600  3620  3624
RPSN   = 000030  3230#
RPTMR   016744  2014  4010#
RPVEC   012476  1365*  3201#  3269  3271  3405
RPWC   = 000002  3219#
RP.REG  001306  1012#  1045  1681  1693  1695  1710  1717  1896  2230  2232  4857  4860  4863
                4870  4873  4876  4881  4884  4887  4890
RP04    013312  1632  1648  1675  1780  3404#
RP04B   021221  1408  4470#
RP05    021226  1411  4471#
RP06    021233  1414  4472#
RTC    = 000117  909#
SAVEFG  012434  1372*  1504*  3151#  3649  3798  3957
SAVREG= 104412  2269  2861  2999#  3252  3407  3467  3681  3771  4013  4231  4337
SAVSEC  001252  991#  1681*  1683*  1684*  1685*  1726  1727  4866  4868  4881
SAVWC   001254  992#  1732*  1936
SC      015612  3777  3802  3804  3810  3814#
SCAWC   006002  1746  1936#
SC1    = 000100  803#
SC10   = 001000  806#
SC11    016444  3854  3891  3948#
SC12    016534  3848  3859  3963#
SC13    016604  3838  3841  3974#
SC2    = 000200  804#
```

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SC20   = 002000   807#
SC3      015662  3829#  3833
SC4      015666  3831#  3862  3874  3878  3926  3940  3947  3962  4003
SC5      015700  3830   3836#
SC6      016100  3858   3879#
SC6A     016210  3856   3903#
SC7      016336  3893   3906  3908  3918  3928#
SC8      016414  3870   3886  3896  3902  3911  3939  3941#  3973
SEARCH=  000131   912#
SEC20    001264   996#  1462*  1468*  1628  1951
SEEK   = 000105   904#
SEEKFG   012436  1505*  3159#  3257  3499
SELDRV=  000145   915#
SETFMT=  000143   914#  1631
SETHDR   006030  1626   1771  1946#
SETPAT   004014  1587   1597  1603#
SETTBL   005630  1625   1770  1903#
SETVEC   002506  1362   1370#
SET.IE   020162  3286   3317  3442  3516  3721  3823  4263#
SKI    = 040000   877#   887#
SLASH    021271  2059   4478#
SOFSW    001216   977#  1637*  1701  1736*  1738  1740  1742*  1747*  1939*
SRCHWT   012410  3104#  3469*  3574*  3952
STACK  = 001100   547#  1308   1647  1674  1779  1849  2019
STCLK1   006246  1988   1998#
STCLK2   006316  1999   2007#
STCLK3   006322  1997   2006  2008#
STKLMT=  177774   558#
STO      017036  4020   4041#
STO1     017066  4050#  4093  4098
STO2     017264  4049   4051  4053  4085#
STO3     017334  4087   4099#
STO5     017360  4047   4066  4096  4105#
STO6     017366  4089   4107#
STO7     017424  4091   4115#
STO8     017454  4114   4121#
STO9     017464  4084   4102  4104  4106  4112  4119  4123#
ST.CLK   006170  1370   1502  1988#
SVRH11   020044  3651   3668  3699  3800  3807  3847  3898  3916  3959  3998  4059  4122  4231#
SWR      001140   951#  1306  1320*  1322  1328*  1355  1375  1712  1719  1758  1846  1889  2238
                 2245   2250  2254  2594  2633  2688*
SWREG    000176   520#  1328  1355  2594  2633  2656
SW0    = 000001   611#  1846
SW00   = 000001   601#   611
SW01   = 000002   600#   610
SW02   = 000004   599#   609  1375
SW03   = 000010   598#   608
SW04   = 000020   597#   607
SW05   = 000040   596#   606
SW06   = 000100   595#   605
SW07   = 000200   594#   604
SW08   = 000400   593#   603
SW09   = 001000   592#   602  1889
SW1    = 000002   610#
SW10   = 002000   591#
SW11   = 004000   590#
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SW12   = 010000            589#
SW13   = 020000            588#
SW14   = 040000            587#
SW15   = 100000            586#
SW2    = 000004            609#
SW3    = 000010            608#
SW4    = 000020            607#
SW5    = 000040            606#
SW6    = 000100            605#
SW7    = 000200            604#
SW8    = 000400            603#
SW9    = 001000            602#
SYSTAT   021240           1380    4473#
T        021277           2035    4480#
TABLE    001376           1055#   1527*   1528*   2050    2076
TAP    = 040000            792#
TBITVE= 000014             644#
TD       015452           3775    3784#
TDF    = 000040            821#    839#
TIMER    012440           3164#   3377*   3511*   3654*   3700*   3787*   3880*   3924*   3975*   3983*   4016    4018*   4076*
                          4103*   4109*   4115*
TITLE    025574           1342    4939#
TKVEC  = 000060            651#    2571*   2572*
TPVEC  = 000064            652#
TRAPVE= 000034             650#    1312*   1313*   1333*
TRE    = 040000            669#
TRKCNT   001236            985#    1911*   1920    1922*   1926*
TRKTST   005720           1761     1918#
TRK1   = 004000            808#
TRK10  = 040000            811#
TRK2   = 010000            809#
TRK20  = 100000            812#
TRK4   = 020000            810#
TRNSWT   012406           2020     3096#   3533*   3678*   3688    3705*   3714*   3789    3790*   4054    4069    4082*
TRTVEC= 000014             645#
TSTPGM   013310           1293*   1296*   1299*   1340*   1343    3343    3392#
TTRKS    001232            983#   1584*   1585*   1586*   1590*   1591*   1593*   1595*   1598*   1912
TTRKSC   001234            984#   1912*   1918*
TUF    = 000100            822#    840#
TYPADR   006364           1566     2027#   2041
TYPDS  = 104405           1826     2058    2304    2992#
TYPE   = 104401           1342     1345    1349    1379    1380    1387    1394    1396    1400    1402    1404    1406    1407
                          1415     1417    1421    1428    1437    1439    1441    1443    1448    1457    1459    1465    1482
                          1493     1495    1510    1514    1516    1533    1540    1545    1555    1560    1569    1571    1578
                          1821     1823    1824    1827    2029    2030    2034    2035    2040    2053    2059    2071    2240
                          2248     2279    2280    2284    2285    2294    2307    2311    2316    2318    2324    2327    2366
                          2463     2539    2588    2600    2654    2655    2658    2669    2679    2690    2709    2757    2763
                          2768     2772    2777    2778    2780    2783    2787    2823    2988#   4994    4997    5009    5013
TYPERR   007272           2247     2269#
TYPOC  = 104402           2300     2657    2989#   4996    5012
TYPON  = 104404           2991#
TYPOS  = 104403           1384     1575    2990#
ULDFLG   012414           3124#   3312*   3414    3429*   3611*   3674*   3706*   3844    3930    3932*   3948    3950*   4062*
                          4075*
UNLOAD= 000103             903#
UNS    = 040000            752#
```

```
UNTOFF  021132          1402    4458#
UNTON   021143          1406    4460#
UPDACY  006110          1807    1929    1966#
UPDATK  006140          1924    1977#
UPE     = 020000         693#
USE     021010          1345    4443#
US1     = 000001         680#
US2     = 000002         681#
US4     = 000004         682#
UWR     = 000010         874#
VUF     = 000002         873#
VU30    = 010000         828#
VV      = 000100         725#
WAO     = 000002         883#
WC      001256           993#   1460*   1466*   1613
WCE     = 040000         694#   1693    1717
WCF     = 000040         743#
WCKD    = 000151         916#
WCKHD   = 000153         917#   1672
WCTBL   001554          1099#   1731
WCU     = 000001         816#    834#
WLE     = 004000         749#   1896
WRL     = 004000         730#
WRTDAT= 000161           918#
WRTHD   = 000163         919#   1645
WRTRK   004120          1625#
WRTRK1  004174          1637#   1760    1763
WRTRK2  004236          1645#   1737
WRT.AD  017742          4187*   4197*   4200#   4854
WRT.RP  017652          3350    3354    3488    3542    3546    3550    3558    3567    3571    3582    3589    3599    3613
                        3623    3644    3659    3670    3868    3900    3937    4184#
WRT.R1  017736          4198#   4218
WRT.R2  020026          4184*   4217#
WRT.R3  020034          4193    4204    4207    4213    4220#
WRT.R4  020040          4209    4222#
WRT.R5  020042          4221    4223#
WRT.WD  017740          4185*   4189    4196*   4199#   4854
WRU     = 000400         824#    842#
WSU     = 000004         818#    836#
$AUTOB  001134           948#   1359*   2647    2804
$BDADR  001122           943#
$BDDAT  001126           945#
$BELL   001162           962#   2240    2262    2600    2797
$CHARC  007736          2368*   2378*   2385    2394*   2399#
$CKSWR  010720          2633#   2996
$CMTAG  001100           931#   1303    1304    1314
$CM3    = 000000         961#
$CNTLC  011615          2588    2669    2797#
$CNTLG  011627          2654    2799#
$CNTLU  011622          2679    2772    2798#
$CRLF   001167           964#   1379    1417    1421    1578    1827    2040    2248    2262    2279    2284    2294    2311
                        2324    2367    2402    2690    2777    2797
$DBLK   010404          2505    2539    2547#
$DB2D   011752          2842    2861#
$DECVL  012132          2863    2909#
$DOAGN  005432          1832    1837    1843#
```

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$DTBL   010374            2508    2543#
$ENDAD  005422             528    1839#
$ENDCT  005406            1834#
$EOP    005326            1805    1818#   1898
$EOPCT  005400            1831#   1835
$ERFLG  001103             934#   2235*   2262
$ERMAX  001115             940#   1315*
$ERROR  007064            1310    2224#
$ERRPC  001116             941#   2242*   2243*   2244    2262    4857    4866    4868    4878    4881
$ERRTB  001630            1138#   2276
$ERTTL  001112             938#   1480*   1706*   1825    2241*   2262
$ESCAP  001160             961#   1314*   1654*   1667*   1686*   1703*   1709*   1755*   1786*   1796*   1892*   2257    2259
                          2262    3821    3872    3876    4154    4214    4423    4432    4433*   4435*
$FILLC  001156             959#   2371    2402
$FILLS  001155             958#   2402
$GDADR  001120             942#
$GDDAT  001124             944#   2234*   4881
$GET42  005412            1836#
$GTSWR  011010            2655#   2994
$HD   = 000000             499
$ICNT   001104             935#
$INTAG  001135             949#   2652*   2671    2691    2804
$ITEMB  001114             939#   2244*   2262    2271
$LF     001170             965#   2262    2402    2787    2797
$LKCSB  001200             972#   1995*
$LKCSR  001176             971#   1990    1996*
$LKS    001206             974#   2000    2005*
$LLVEC  001210             975#   2001
$LPADR  001106             936#
$LPERR  001110             937#   1646*   1673*   1778*   1891    2256
$LPVEC  001202             973#   1991
$MAIL = ****** U          1332    1355    2250    2355
$MNEW   011645            2658    2802#
$MSWR   011634            2655    2800#
$NULL   001154             957#   2373    2402
$OCNT   010164            2435*   2464*   2477#
$OMODE  010166            2430*   2434*   2439    2442*   2453*   2479#
$PASS   001100             932#   1828*   1829*   1846
$QUES   001166             963#   1437    1457    1495    1560    2262    2402    2709    2780    2797
$RDCHR  011262            2722#   2997
$RDDEC= ****** U          2999
$RDLIN  011352            2745#   2998
$RDOCT= ****** U          2999
$RDSZ = 000007            2738#
$RESRE  012204            2944#   3000
$RPADR  001172             969#   1364    4856    4993    5027    5029
$RPVEC  001174             970#   1365    5010
$RTNAD  005434            1845#
$R2A  = ****** U          3001
$SAVRE  012146            2928#   2999
$SB2D   011716            2032    2038    2840#
$SETUP= 000106            1292#   1309    1310    1312    1314    1316    1352    1828    2225    2253    2261    2592    2597
                          2598    2628    2804
$STUP = 177777            1292#
$SUPRS  011656            2033    2039    2815#
$SVPC = 000200             526#    531
```

```
$SWR  = 123000          489#   499    504    505    506    507    508    961    962   1314   1815   1828   1838
                       1844   1846   2216   2217   2218   2219   2220   2238   2245   2250   2254   2262
$TKB    001146          954#  2552   2573   2584   2609   2637   2664
$TKCNT  010414         2553#  2568*  2598   2615*  2729   2731*
$TKINT  010432         1351   1481   2568#  2589   2650
$TKQEN= 010431         2557#  2623   2734
$TKQIN  010416         2554#  2569*  2570   2621*  2622*  2623   2625*
$TKQOU  010420         2555#  2570*  2732   2733*  2734   2736*
$TKQSR  010422         2556#  2569   2625   2736
$TKS    001144          953#  2552   2574*  2605*  2607   2613*  2635   2651*  2661   2673*  2693*
$TKSRV  010502         2571   2584#
$TN   = 000000          489#   499
$TNPWR  012062         2868   2869   2889#
$TPB    001152          956#  2391*  2402
$TPFLG  001157          960#  2349   2402
$TPS    001150          955#  2389   2402
$TRAP   012242         1312   2965#
$TRAP2  012264         2976#  2987
$TRP  = 000014         2980#  2989#  2990#  2991#  2992#  2993#  2994   2995#  2996   2997#  2998#  2999#  3000#
                       3001#
$TRPAD  012276         2970   2987#
$TSTNM  001102          933#  2237   2262
$TTYIN  011606         2747   2748   2760   2778   2792   2796#
$TYPBN= ****** U       2993
$TYPDS  010170         2493#  2992
$TYPE   007522         2349#  2980   2988
$TYPEC  007672         2370   2377   2384   2389#  2390   2695
$TYPEX  007740         2395   2397   2400#
$TYPOC  007766         2433#  2989
$TYPON  010002         2432   2435#  2991
$TYPOS  007742         2428#  2990
$$GET4= 000000         1838#
$OFILL  010165         2429*  2433*  2443   2478#
$40CAT= ****** U       2247
.     = 026502          514#   518#   526    527#   529#   531#   534#   541#   930#   966   1307   1646   1673
                       1778   1846   2262   2402   2547#  2552   2556#  2557   2558#  2796#  2797   2804   2909#
                       4322#  4323#  4324#  4325#  4326#  4327#  4328#  4329#  4330   4724#  4849#  4975#
```

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CKCHR     489#  1485  1548  2168  2182  5064  5079
CKDIG     489#  2062
CKNUM     489#  5001  5017
COMMEN      1#   654#
ENDCOM      1#   654#
ENDTYP   1811#  1819
ERRCAL   3002#  3821  3872  3875  4153  4214
ERRENT   2209#  2226
ERROR     548#  1656  1657  1658  1659  1660  1661  1688  1689  1690  1691  1692  1698  1708  1715
         1722  1725  1788  1789  1790  1791  1792  1795  1797  1801  3822  3873  3877  4155  4215
         5036
ESCAPE      1#   654#  1654  1686  1703  1786
GETPRI      1#   654#
GETSWR      1#   489#   654#  1352
LOOP      489#  1646  1673  1778
MORETA    924#   967
MULT        1#   654#
NEWTST      1#   654#
POP         1#   654#  2534  2949
PUSH        1#   654#  2493  2929
REPORT      1#   654#
RP04.D      1#  3002
SCOPE     549#
SETPRI      1#   654#  2725
SETTRA   2980#  2989  2990  2991  2992  2994  2996  2997  2998  2999  3000
SETUP       1#   654#  1302
SKIP        1#   654#
SLASH       1#   654#
SPACE     654#
STARS       1#   524   654#  655   659   701   705   896   900   926   966   1286  1290  1813  1852
         1856  2212  2334  2405  2483  2551  2628  2643  2714  2738  2807  2831  2850  2913  2959
         3011  4439  4603  4607  4726  4928  4932
SWRSU       1#   654#  1316#
TRMTRP   2980#
TYPBIN      1#   654#
TYPDEC      1#   654#  1825  2302
TYPNAM      1#   654#
TYPNUM      1#   654#
TYPOCS      1#   654#  1381  1572
TYPOCT      1#   654#  2299  2656
TYPTXT      1#   654#
$$CMRE    924#
$$CMTM    924#
$$ESCA      1#   654#
$$NEWT      1#   654#
$$SET    2980#  2989  2990  2991  2992  2994  2996  2997  2998  2999  3000
$$SKIP      1#   654#
.EQUAT      1#   489#   544
.HEADE      1#   489#
.KT11       1#
.SETUP      1#   489#  1292
.SWRHI      1#   489#   500
.SWRLO    508#   509   510
.$ACT1      1#   489#   522
.$APTB      1#
.$APTH      1#
```

```
.$APTY      1#
.$ASTA      1#
.$CATC      1#    489#    512
.$CMTA      1#    489#    924
.$DB2D      1#    489#   2848
.$DB2O      1#
.$DIV       1#
.$EOP       1#    489#   1811
.$ERRO      1#    489#   2210
.$ERRT      1#    489#
.$MULT      1#
.$POWE      1#
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
.$READ      1#    489#   2549
.$R2AZ      1#
.$SAVE      1#    489#   2911
.$SB2D      1#    489#   2829
.$SB2O      1#
.$SCOP      1#
.$SIZE      1#
.$SUPR      1#    489#   2805
.$TRAP      1#    489#   2957
.$TYPB      1#
.$TYPD      1#    489#   2481
.$TYPE      1#    489#   2332
.$TYPO      1#    489#   2403
.$40CA      1#
.1170       1#


. ABS.  026502     000


 ERRORS DETECTED:  0

 DSKZ:CZRJBD.BIN,DSKZ:CZRJBD.LST/CRF/SOL/NL:TOC:MD:MC:CND/LI:ME=CZRJBD.SML,CZRJBD.011,CZRJBD.P11
 RUN-TIME: 48 65 4 SECONDS
 RUN-TIME RATIO: 252/118=2.1
 CORE USED:  47K  (93 PAGES)
```