RM03

RM03 PERFORMANCE EX.

MD-11-DZRMB-A

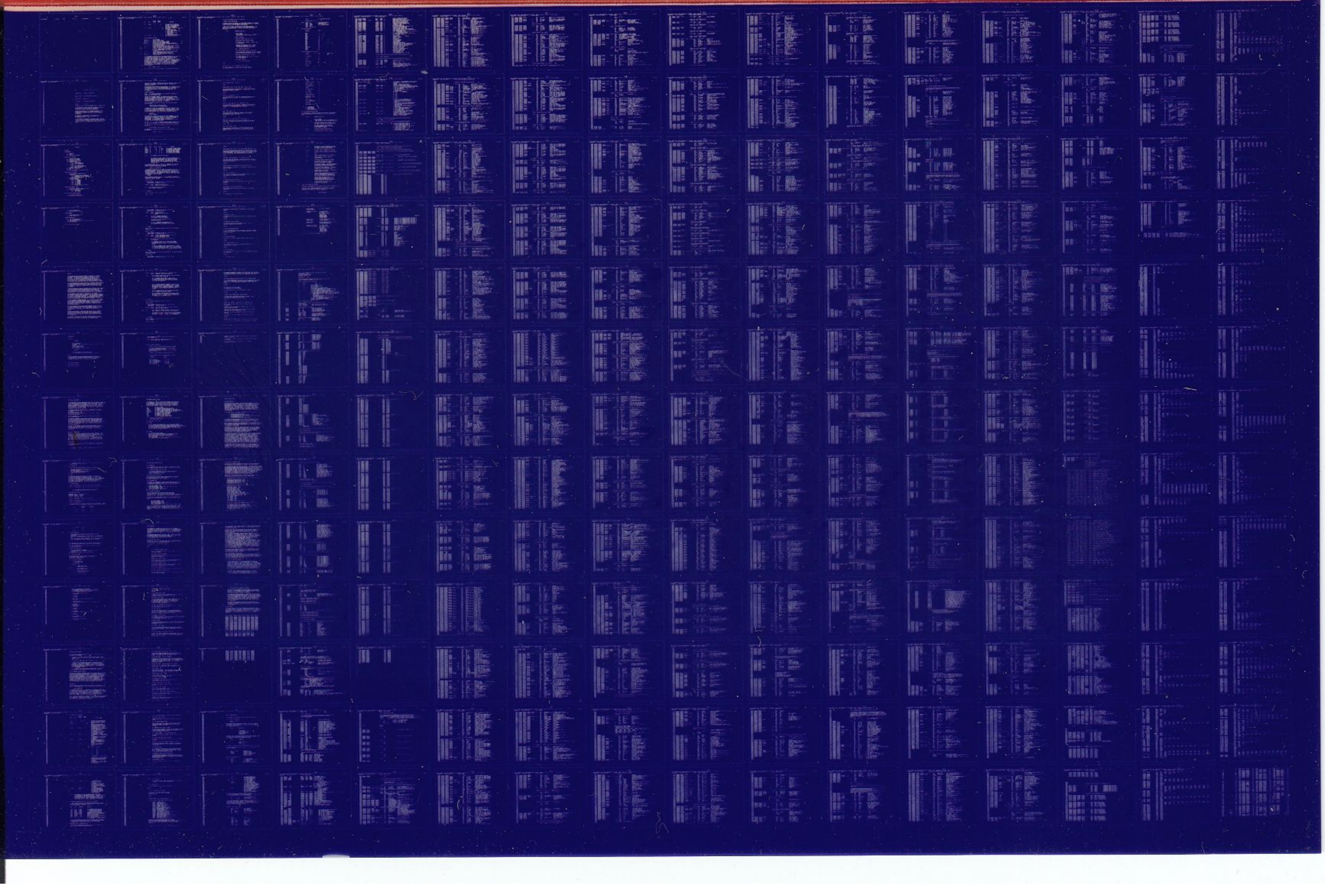
EP-DZRMB-A-DL-A

FICHE 1 OF 2

OCT 1977

digital

MADE IN USA



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

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

PRODUCT NAME: RM03 PERFORMANCE EXERCISER

DATE CREATED: AUGUST 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: C. CHEN

CONTENTS

1. ABSTRACT

THE RM03 PERFORMANCE EXERCISER PROGRAM IS DESIGNED TO PERFORM AN INTERACTIVE TEST ON RM03 DISK DRIVES CONNECTED TO A MASSBUS SUBSYSTEM. THE DRIVES MAY BE CONTROLLED BY EITHER AN RH11 OR AN RH70. IN ADDITION TO PERFORMING AN INTERACTIVE TEST OF THE DISK DRIVES ON THE SUBSYSTEM, THE PROGRAM IS INTENDED TO BE USED TO VERIFY THAT THE DRIVES UNDER TEST ARE PERFORMING TO THEIR DATA ERROR RATE AND SEEK ERROR RATE (SEE ERROR RATE SPECIFICATIONS).

THE RM03 PERFORMANCE EXERCISER PROGRAM WILL EXERCISE DRIVES CONNECTED AS EITHER SINGLE OR DUAL PORT UNITS. DUAL PORT DRIVES ARE TESTED BY LOADING AND RUNNING THE PROGRAM FROM BOTH CONTROLLING SYSTEMS. THE PROGRAM WILL EXERCISE A MIXED SYSTEM OF DUAL PORT AND SINGLE PORT DRIVES.

TO OBTAIN INTERACTIVE TESTING, OPERATIONS ON THE DRIVES ARE OVERLAPPED (OTHER DRIVES ARE PERFORMING SEEK/SEARCH OPERATIONS WHILE ONE DRIVE IS PERFORMING A DATA TRANSFER OR WRITE CHECK OPERATION). OPERATIONS AMONG THE DRIVES ARE OPTIMIZED SO THAT A HIGH SUBSYSTEM DATA TRANSFER RATE OR A HIGH POSITIONING OPERATION RATE IS MAINTAINED.

THE PERFORMANCE OF EACH DRIVE IS MONITORED BY THE PROGRAM. IF A DRIVE EXCEEDS A PRESET NUMBER OF ERRORS IN ANY OF SEVERAL CATEGORIES, THAT DRIVE IS AUTOMATICALLY DEASSIGNED. (THE OPERATOR MAY OVERRIDE THE AUTOMATIC DEASSIGNMENT FEATURE.) THE PROGRAM REPORTS PERFORMANCE STATISTICS FOR EACH DRIVE BEING EXERCISED ON REQUEST FROM THE OPERATOR OR AUTOMATICALLY AT AN INTERVAL DETERMINED BY THE OPERATOR.

ALL DATA TRANSFER COMMANDS ARE USED (I.E., WRITE DATA, WRITE HEADER & DATA, READ DATA, AND READ HEADER & DATA) AS WELL AS WRITE CHECK DATA AND WRITE CHECK HEADER & DATA COMMANDS. RECALIBRATE AND READ-IN PRESET COMMANDS ARE USED AT STARTUP AND DRIVE INITIALIZATION. RECALIBRATE, OFFSET, AND RETURN-TO-CENTERLINE COMMANDS ARE USED DURING ERROR RECOVERY.

THE DATA TRANSFER COMMANDS ARE SELECTED RANDOMLY EXCEPT FOR THE WRITE CHECK COMMANDS. THE WRITE CHECK COMMANDS ARE USED TO VERIFY A PREVIOUS WRITE OPERATION. THUS, WHEN A WRITE COMMAND IS SELECTED, THE DATA WRITTEN IS VERIFIED BY THE APPROPRIATE WRITE CHECK COMMAND.

DEPENDING UPON WHETHER PROGRAM HAS BEEN LOADED VIA APT AUTOMATIC MODE OR APT DUMP MODE WILL DETERMINE WHETHER; PROGRAM/OPERATOR COMMUNICATIONS ARE THROUGH THE KEYBOARD, DYNAMIC PROGRAM OPTIONS ARE SELECTED VIA SWITCH REGISTER SETTINGS AND ERRORS ARE REPORTED ON THE TELETYPE.

ALL COMMANDS, DATA PATTERNS, AND DATA BUFFER SIZES ARE SELECTED RANDOMLY BY THE PROGRAM. ADDITIONALLY THE ADDRESSES (EG, CYLINDER, TRACK, AND SECTOR) FOR EACH OPERATION ARE SELECTED RANDOMLY.

2. REQUIREMENTS

2.1 EQUIPMENT

REQUIRED

PDP-11 PROCESSOR
16K MEMORY (20K IF THE PROGRAM IS INCLUDED IN AN 'XXDP' CHAIN
TELETYPE
PROGRAM LOADING DEVICE
KW11-L OR KW11-P CLOCK
RH11 OR RH70 WITH 1 RM03 DISK DRIVE

OPTIONAL

ADDITIONAL MEMORY TO A MAXIMUM OF 28K
1 TO 7 ADDITIONAL RM03'S ON THE SAME RH11 OR RH70

2.2 MEDIA

THE RM03 PERFORMANCE EXERCISER PROGRAM REQUIRES FORMATTED DISK PACKS GENERATED BY THE RM03 FORMATTER PROGRAM (MD-11-DZRMA-A). THE PACKS MUST BE FORMATTED IN 32 SECTOR (16 BIT) MODE;THE ALTERNATE (30 SECTOR - 18 BIT) MODE IS NOT SUPPORTTED.

2.3 PRELIMINARY PROGRAMS

RM03 DISKLESS DIAGNOSTIC

RM03 FUNCTIONAL TEST

3. OPERATING THE PROGRAM

3.1 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 BE INCLUDED IN AN 'XXDP' CHAIN. IF THE PROGRAM IS BEING RUN ON A PROCESSOR WITH 16K, THE 'XXDP' LOADER WILL NOT BE PRESERVED. THE PROGRAM MUST BE RUN ON A SYSTEM WITH 20K OR MORE TO PRESERVE THE 'XXDP' LOADER. THE 'ABSOLUTE' LOADER WILL BE PRESERVED IN A 16K SYSTEM, HOWEVER.

3.2 THE PROGRAM STARTS AT LOCATION 200(8). PARAMETERS NOT INCLUDED IN THE TELETYPE DIAGLOGUE GROUP MUST BE CHANGED BEFORE THE PROGRAM IS STARTED.
THE PROGRAM PERFORMS "TEST"
OPERATION TO ALL DRIVES UNDER TESTING AT THE 200(8) STARTING LOCATION AUTOMATICALLY.

3.3 START THE PROGRAM AT LOCATION 204(8) IF THE RH11 OR THE RH70 IS NOT AT ADDRESS 176700.

3.4 PROVIDED THE PROGRAM HAS BEEN LOADED AND STARTED VIA THE APT DUMP MODE OR THE DIAGNOSTIC IS RUNNING IN STAND ALONE PROCESSOR/DRIVE OPERATIONS ARE INITIATED AND CONTROLLED BY KEYBOARD COMMANDS AND SWITCH REGISTER SWITCH SETTINGS. IF THIS IS THE PROGRAM'S FIRST START, THE STATUS OF THE DRIVES ON THE SELECTED MASSBUS SUBSYSTEM WILL BE TYPED OUT. ON SUBSEQUENT STARTS, THIS TYPEOUT MAY BE INHIBITED BY SETTING SW<02>= 1.

HOWEVER, IF THE PROGRAM IS LOADED VIA APT SCRIPT MODE ALL SETUP AND SWITCH REGISTER SETTINGS WILL BE PROVIDED THROUGH THE APT E TABLE. TYPEOUTS FROM THE USER DIAGNOSTIC MAY OR MAYNOT BE INHIBITED DEPENDING UPON WHETHER OR NOT THE APPROPRIATE BIT IN THE E TABLE HAS BEEN SET.

3.5 PASS/TEST TERMINATION

A PASS IS DETERMINED BY EITHER BITS READ OR SEEKS PERFORMED. THE NUMBER OF BITS OR SEEKS REQUIRED FOR A PASS IS DERIVED FROM EITHER THE SOFT ERROR RATE SPECIFICATION OR THE SEEK ERROR RATE SPECIFICATION. THE SPECIFICATIONS FOR THE RM03'S SPECIFY NO MORE THAN 1 SOFT ERROR (NON-PACK RELATED) IN 1 X 10↑9 BITS READ OR NO MORE THAN 1 SEEK ERROR IN 1 X 10↑6 SEEKS. THE NUMBER OF BITS OR SEEKS DETERMINING A PASS WERE SELECTED TO PROVIDE A 90% CONFIDENCE LEVEL THAT THE DRIVE IS PERFORMING TO THE APPLICABLE SPECIFICATION.

3.5.1 PASS TERMINATION

END OF PASS FOR A SINGLE DRIVE MAY BE DETERMINED BY EITHER OF THE FOLLOWING CONDITIONS. THE END OF PASS CONDITION USED IS DETERMINED BY PARAMETER 'ENDING'.

A. IF PARAMETER 'ENDING' IS 1, END OF PASS OCCURS WHEN THE DRIVE HAS READ 1.875 X 10↑8 WORDS (3 X 10↑9 BITS).

B. IF PARAMETER 'ENDING' IS 0, END OF PASS OCCURS WHEN THE DRIVE HAS PERFORMED 3 X 10↑6 SEEKS.

3.5.2 TEST TERMINATION

THE TEST FOR A DRIVE IS TERMINATED (SW<04> = 0) WHEN:

A. THE DRIVE HAS COMPLETED THE NUMBER OF PASSES SPECIFIED IN PARAMETER 'PASSES'.
B. THE TOTAL ERRORS ACCUMULATED EXCEED 100.
C. A FATAL ERROR OCCURS: EM12 OR EM14.
D. OPERATOR DEASSIGNS THE DRIVE

3.6 RUN TIME

THE EXERCISER PROGRAM MAY BE RUN IN TWO MODES. THE MODE IS DETERMINED BY THE VALUE IN PARAMETER 'SIZE'. IF 'SIZE' IS ONE SECTOR, THE PROGRAM RUNS IN A SEEK HEAVY MODE; IF 'SIZE' APPROACHES 1/2 TRACK IN SIZE (4096 DECIMAL) THE PROGRAM RUNS IN A DATA TRANSFER HEAVY MODE. THE PROGRAM RUN TIME VARIES GREATLY DEPENDING ON THE OPERATION MODE SELECTED, THE MEMORY AVAILABLE OVER 16K, THE READ/WRITE RATIO PARAMETER - 'RATIO', AND BY SWITCHES 0, 1, & 2.

3.6.1 DATA TRANSFER MODE

1 DRIVE - APPROXIMATELY 3.6 HRS (TO REACH 1.875 X 10↑8 WORDS)
TO
8 DRIVES - APPROXIMATELY 16 HRS (FOR ALL DRIVES TO REACH 1.875 X 10↑8 WORDS)

IF THE PROGRAM IS RUN WITH BOTH SW<00> AND SW<01> SET, THE RUN TIMES SHOULD BE ABOUT 20% FASTER.

3.6.2 SEEK VERIFICATION MODE

PARAMETER 'SIZE' = 1 SECTOR (256 WORDS)
PARAMETER 'MAXTRK' = 'MINTRK'
PARAMETER 'MAXSEC' = 'MINSEC'
SW<00> = 1 (READ ONLY MODE)

1 DRIVE - APPROXIMATELY 25 HRS (3 X 10↑6 SEEKS)
TO
8 DRIVES - APPROXIMATELY 40 HRS (3 X 10↑6 SEEKS FOR ALL DRIVES)

3.7 UNIBUS & VECTOR ADDRESSES

THE PROGRAM ASSUMES THE FOLLOWING UNIBUS AND VECTOR ADDRESSES. (REFER TO SECTION 4.2.2 FOR THE LOCATIONS AT WHICH TO CHANGE THESE ADDRESSES.)

UNIT	UNIBUS ADDRESS	VECTOR ADDRESS
RH11 OR RH70	176700	254
TTY PRINTER	177564	NOT USED

TTY KEYBOARD	177560	60
KW11-L	177546	100
KW11-P	172542	104

3.8 DUAL PORT OPERATION

A. LOAD THE RM03 PERFORMANCE EXERCISER PROGRAM INTO BOTH PROCESSORS.
B. SWITCH THE 'CONTROLLER SELECT' SWITCH TO 'A/B' ON EACH DRIVE WHICH IS TO BE TESTED AS A DUAL PORT DRIVE; CYCLE THE DRIVES UP.
C. START THE PROGRAM IN EACH PROCESSOR. RUN THE PROGRAM AS THOUGH EACH PROCESSOR WERE RUNNING INDEPENDENTLY OF THE OTHER.

3.9 APT

THIS PROGRAM IS APT COMPATIBLE TO THE EXTENT THAT APT HOOKS WILL BE IN THE PROGRAM AND WILL WORK THRU THE 'OPTION INTERFACE'.

FOR OTHER INTERFACES,APT MAY ONLY LOAD AND START THE PROGRAM.
I.E. LOAD AND DUMP MODE.

AUTOMATIC MODE (MONITOR)

1. THE INPUT DIALOGUE IS BYPASSED.
2. THE BUSS ADDRESS AND CONTROLLER INTERRUPT VECTOR IS DEFAULTED.

DUMP MODE: INPUT DIALOGUE AFTER PROGRAM STARTS

3.10 APT ETABLE DEFINITIONS

THE FOLLOWING DEFINITIONS ARE VALID FOR SPECIFYING APT ENVIRONMENTAL TABLE (ETABLE) ENTRIES,VIA RUNNING THE APT UTILITY PROGRAM "TSP":

1. SOFTWARE ENVIRONMENT:

   = 1 IF APT SCRIPT MODE
   = 0 IF STANDLONE MODE

2. ENVIRONMENT MODE:

   BIT 7 = 1 ETABLE DOES SIZING
         = 0 PROGRAM DOES SIZING

   BIT 6 = 1 SPOOL MESSAGES TO APT IF SCRIPT MODE
         = 0 DON'T SPOOL TO APT

   BIT 5 = 1 SUPPRESS CONSOLE OUTPUT
         = 0 ALLOW CONSOLE OUTPUT

   BIT 4 TO BIT 0 ARE NOT USED

```
                        3.   SWITCH 1 (SOFTWARE SWITCH REGISTER)
                             IF ENVIRONMENT MODE BIT 7 (SIZING BIT ) IS SET TO 1,
                             THE SOFTWARE SWITCH REGISTER WILL BE USED, INSTEAD
                             OF THE HARDWARE CONSOLE SWITCH REGISTER.

                        4.   SWITCH 2 (USER SWITCH REGISTER)
                                NOT USED

                        5.   CPU OPTIONS
                                NOT USED

                        6.   MEMORY TYPES 1-4 AND MAX MEMORY ADDRESSES
                                NOT USED

                        7.   INTERRUPT VECTOR 1:
                                USED WHEN ENVIRONMENT MODE BIT 7 = 1;DEFAULT = 254

                        8.   BUS PRIORITY 1:
                                NOT USED.
                        9.  INTERRUPT VECTOR 2:
                                NOT USED

                        10. BUS PRIORITY 2:
                                NOT USED

                        11. BASE ADDRESS:
                                USED WHEN ENVIRONMENT MODE BIT 7 = 1;DEFAULT = 176700

                        12. DEVICE MAP:
                                NOT USED

                        13. CONTROLLER DESCRIPTOR WORDS:
                                NOT USED

                        14. CONTROLLER DESCRIPTOR WORDS:
                                NOT USED
```

4. CONTROLLING THE PROGRAM

THE FOLLOWING KEYBOARD CONVENTIONS ARE USED BY THE KEYBOARD ENTRY ROUTINES IN THE PROGRAM:

A. TO DELETE AN INCORRECT CHARACTER FROM AN ENTRY STRING, TYPE A 'RUBOUT' ('RO'). TYPING A 'RO' WILL DELETE SUCESSIVE CHARACTERS FROM THE INPUT.

B. TO DELETE AN ENTIRE LINE, TYPE A 'CONTROL U' ('↑U').

C. AN ENTRY MUST BE TERMINATED BY EITHER A 'CARRIAGE RETURN' OR A 'PERIOD'. THE 'PERIOD' TERMINATION IS RECOGNIZED BY THE PROGRAM AS A DEFAULT ENTRY REQUEST. WHEN A LINE IS TERMINATED BY A 'PERIOD' INSTEAD OF A 'CARRIAGE RETURN', THE PROGRAM WILL ACCEPT THE ENTERED VALUE AND WILL DEFAULT TO THE PRELOADED VALUES FOR ANY REMAINING ENTRIES.

D. IF A 'CONTROL C' IS TYPED DURING KEYBOARD ENTRY, THE PROGRAM WILL RETURN TO THE BEGINNING OF THE GROUP BEING ENTERED.

4.1 DATE & OPERATOR IDENTIFICATION

ASSUMING THE DIAGNOSTIC HAS BEEN LOADED BY ANY OTHER MODE OTHER THAN THE APT SCRIPT MODE THE PROGRAM WHEN IT IS INITIALLY STARTED, WILL ASK FOR DATE AND OPERATOR I.D. ENTRIES. (THE REQUEST FOR THESE ENTRIES OCCURS ONLY WHEN THE PROGRAM IS FIRST STARTED AND WILL NOT APPEAR WHEN THE PROGRAM IS RESTARTED.) THESE ENTRIES ARE OPTIONAL AND MAY BE BYPASSED BY ENTERING A 'CARRIAGE RETURN' IN RESPONSE TO THE REQUEST. THE PROGRAM DOES NOT EDIT OR CHECK EITHER ENTRY. UP TO 8 CHARACTERS OF DATE INFORMATION AND UP TO 6 CHARACTERS OF OPERATOR IDENTIFICATION MAY BE ENTERED. BOTH THE DATE AND THE OPERATOR I.D. WILL BE TYPED WHEN THE 'SA' COMMAND IS PREFORMED (SEE SECTION 4.4.3).

4.2 PARAMETERS

WHEN THE PROGRAM IS STARTED FROM LOCATION 204, THE OPERATOR WILL BE ASKED TO ENTER PARAMETERS. THE FOLLOWING MESSAGE WILL BE DISPLAYED:

ENTER PARAMETERS:

THE OPERATOR MUST ENTER A 'Y' TERMINATED BY A CARRIAGE RETURN ‹CR› IF PARAMETER ENTRIES ARE TO BE MADE. ANY OTHER CHARACTER IS ACCEPTED AS A 'NO' ENTRY. THE PROGRAM WILL IDENTIFY THE PARAMETER BY THE NAME GIVEN BELOW, DISPLAY THE CURRENT VALUE OF THE PARAMETER AND WAIT FOR THE ENTRY. THE PROGRAM WILL TYPE 'INVALID ENTRY' IF THE ENTRY IS NOT CORRECT AND WAIT FOR A CORRECT ENTRY TO BE TYPED.

NOTE: WHEN THE DIAGNOSTIC IS LOADED VIA APT SCRIPT MODE ALL PARAMETERS ARE LOADED FROM THE APT SYSTEM E TABLE. THIS INCLUDES THE SOFTWARE SWITCH REGISTER. THEREFORE A WORST CASE CONDITION WILL BE SET IN THE E TABLE FOR NORMAL AUTOMATIC OPERATION.

4.2.1 KEYBOARD ENTRY PARAMETERS

NAME	BASE	DEFAULT VALUE	VALUE RANGE	FUNCTION
SIZE	10	(SEE NOTE)		CONTROLS THE MAXIMUM BUFFER SIZE USED FOR DATA TRANSFERS
PASSES	10	1	1 - 999	NUMBER OF PASSES TO END OF TEST.
MINUTE	10	5	0 - 256	DETERMINES THE INTERVAL (IN MINUTES) BETWEEN AUTOMATIC PERFORMANCE SUMMARY TYPEOUTS
				ERRORS PRINTED OUT IF SW<07>=0
RANDOM	8	000000	0 OR 1	IF PARAMETER = 0, THE DATA TRANSFER WORD COUNT IS RANDOMLY SELECTED BETWEEN 4 AND THE VALUE IN 'SIZE'. IF PARAMETER = 1, THE DATA TRANSFER WORD COUNT WILL BE THE VALUE IN 'MAXDL'
ENDING	8	000001	0 OR 1	IF PARAMETER = 1, END OF PASS DETERMINED BY THE 'WORDS READ' COUNT. IF PARAMETER = 0, END OF PASS IS DETERMINED BY THE NUMBER OF SEEKS.
FORMAT	8	000001	0 OR 1	IF PARAMETER = 0; DO NOT PERFORM WRITE HEADER & DATA ORDERS; IF PARAMETER > 0, PERFORM WRITE HEADER & DATA ORDERS
RATIO	8	000003	0 - 7	CONTROLS THE APPROXIMATE RATIO OF READ TO WRITE ORDERS.

VALUE	R/W RATIO
0	15/1
1	7/1
2	6/2
3	5/3
4	4/4
5	3/5
6	2/6
7	1/7

MESSAGE	8	000001	0 OR 1	IF PARAMETER = 1, DO NOT PRINT ERROR MESSAGES FOR DATA ERRORS OCCURING AT LOCATIONS DEFINED BY THE OPERATOR AS BAD PACK LOCATION. IF PARAMETER = 0, PRINT ERROR MESSAGES ASSOCIATED WITH BAD PACK LOCATIONS.

PATTERN 10	000000	0 - 15	IF PARAMETER=0,DATA PATTERN IS RANDOMLY SELECTED. IF PARAMETER>0,SPECIFIES ONE OF THE 15 PATTERNS. THE SELECTED DATA PATTERN IS POINTED BY THE PARAMETER "PATTERN".
HEADER 8	000001	0 OR 1	IF PARAMETER=0,RANDOM DATA BLOCK ADDRESS IS USED IN "TEST" COMMAND IF PARAMETER=1,SEQUENTIAL DATA BLOCK IS USED IN "TEST" COMMAND.

NOTE: THE PROGRAM WILL SELECT A MAXIMUM BUFFER SIZE WHICH IS DETERMINED BY THE MEMORY AVAILABLE. THE MAXIMUM BUFFER SIZE ASSIGNED BY THE PROGRAM IS 8192 (10) WORDS. THE OPERATOR MAY SPECIFIY ANY OTHER MAXIMUM SIZE AS LONG AS THE VALUE SPECIFIED IS AT LEAST 4 WORDS BUT NO LARGER THAN THE INITIAL VALUE OF 'MAXDL' DETERMINED BY THE PROGRAM.

4.2.2 PERIPHERAL ADDRESSES AND OTHER LOCATIONS OF INTEREST

TO ALTER THESE LOCATIONS, THE OPERATOR MUST MAKE MANUAL ENTRIES BEFORE THE PROGRAM IS STARTED. THE KEYBOARD ENTRY ROUTINE DOES NOT PROVIDE ACCESS TO THESE LOCATIONS.

LOC	TAG	CONTENTS	FUNCTION
1160	$TKS	177560	TTY KEYBOARD STATUS REGISTER
1162	$TKB	177562	TTY KEYBOARD BUFFER REGISTER
1164	$TPS	177564	TTY PRINTER STATUS REGISTER
1166	$TPB	177566	TTY PRINTER BUFFER REGISTER
1274	$LKCSR	172540	ADDRESS OF KW11-P STATUS REGISTER
1276	$LKCSB	172542	ADDRESS OF KW11-P COUNTER BUFFER
1300	$LPVEC	104	KW11-P VECTOR ADDRESS
1302	$LKS	177546	ADDRESS OF KW11-L STATUS REGISTER
1304	$LLVEC	100	KW11-L VECTOR ADDRESS
1312	HZ	74	74 (60 DECIMAL) IF SYSTEM IS 60 HZ; 62 (50 DECIMAL) IF SYSTEM IS 50 HZ.

THE RH11-RH70 ADDRESS AND VECTOR MAY BE CHANGED WHEN THE PROGRAM IS STARTED FROM LOCATION 204(8) OR IF THE PROGRAM DOES NOT RECEIVE A RESPONSE WHEN IT ACCESSES THE DEFAULT RH11-RH70 ADDRESS.

4.2.3 PARAMETERS FOR THE FIRST OPERATION

THE FOLLOWING PARAMETERS ARE USED FOR THE INITIAL OPERATION (IN ADDITION TO THE 'MINIMUM' ADDRESS VALUES).

LOC	TAG	INITIAL VALUE	VALUE RANGE	FUNCTION
1514	BEGPAT	10	1 - 15	THE CODE FOR THE STARTING PATTERN. (IF A WRITE ORDER OR A WRITE CHECK ORDER IS SPECIFIED IN 'BEGCOD')
1516	BEGCOD	5	0 - 5	THE INITIAL COMMAND FOR EACH DRIVE EXERCISED. 0 = WRITE CHECK DATA 1 = WRITE CHECK HEADER & DATA 2 = WRITE DATA 3 = WRITE HEADER & DATA 4 = READ DATA 5 = READ HEADER & DATA
1520	BEGSIZ	402	2 - SIZE	THE BUFFER SIZE FOR THE FIRST DATA TRANSFER OPERATION.

4.3 SWITCH REGISTER SETTINGS

SW <15>	= 1	HALT ON ERROR
SW <13>	= 1	INHIBIT ERROR TYPEOUT
SW <10>	= 1	RING THE TELETYPE BELL IF ERROR
SW <7>	= 1	DISPLAY ALL DATA COMPARE ERRORS
SW <6>	= 1	DO NOT ALTER THE CURRENT OPERATION PARAMETERS
SW <5>	= 1	PARTIAL REGISTER DISPLAY IF ERROR; DO NOT DISPLAY ECC CORRECTION RESULTS
SW <4>	= 1	INHIBIT MAXIMUM ERROR COUNT CHECK; DO NOT DEASSIGN DRIVES WHEN NORMAL END OF TEST REACHED.
SW <3>	= 1	DISPLAY THE SECTOR IN ERROR (BEFORE RETRY ATTEMPTS) IF 'DCK', 'DTE', OR 'WCF' ERRORS OR AFTER THE 28TH RETRY IF UNCORRECTABLE 'DCK' ERROR. IF DATA COMPARE ERRORS & SW<7> SET, DISPLAY REST OF BUFFER
SW <2>	= 1	INHIBIT SUBSYSTEM STATUS TYPEOUT DURING STARTUP. INHIBIT PERFORMANCE SUMMARY TYPEOUTS.
SW <1>	= 1	INHIBIT DATA COMPARSION AFTER READ ORDERS
SW <0>	= 1	READ ONLY MODE

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 IN KEYBOARD ENTRY MODE, OR IS AT A HIGHER PRIORITY PROCESSING AN RM03 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 SETTINGS 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.

4.4 KEYBOARD COMMANDS

NOTE: ALL KEYBOARD COMMANDS WILL BE DISABLED IF DIAGNOSTIC IS RUNNING IN THE APT SCRIPT MODE.

THROUGH THE KEYBOARD COMMANDS, THE OPERATOR MAY ASSIGN DRIVES FOR TEST ('T' COMMAND), WRITE AND CHECK DATA PACKS ('W' COMMAND), PERFORM WRITE DATA AND FOLLOWED BY TEST ('WT' COMMAND), PERFORM A SEQUENTIAL READ OF A PACK ('R' COMMAND), REQUEST A DRIVE PERFORMANCE SUMMARY ('S' COMMAND), OR DEASSIGN A DRIVE WHICH IS BEING TESTED, READING, OR WRITING ('D' COMMAND).

AFTER THE PROGRAM HAS BEEN INITIALIZED, THE FOLLOWING MESSAGE WILL BE TYPED:

```
'PROGRAM INITIALIZATION COMPLETE
'TYPE A CONTROL C TO ENTER COMMANDS'
```

KEYBOARD ENTRIES WILL NOT BE RECOGNIZED UNTIL THE OPERATOR TYPES A 'CONTROL C'. WHEN THE PROGRAM SEES A 'CONTROL C' ENTRY, IT WILL SUSPEND THE SCHEDULING OF FURTHER DEVICE OPERATIONS AND WAIT UNTIL ALL OUTSTANDING ORDERS HAVE TERMINATED. THE PROGRAM WILL ENTER COMMAND ENTRY MODE AND TYPE THE FOLLOWING PROMPTING MESSAGE:

```
'HH:MM:SS
'ENTER COMMANDS:'
```

THE PROGRAM WILL THEN ACCEPT ANY OF THE VALID COMMANDS. AT THE COMPLETION OF A COMMAND, THE PROGRAM WILL EXIT COMMAND MODE; THE OPERATOR MUST TYPE ANOTHER 'CONTROL C' TO RETURN THE PROGRAM TO COMMAND MODE. IF THE COMMAND ENTERED SPECIFIED AN 'A' DRIVE NUMBER, THE PROGRAM WILL REMAIN IN COMMAND MODE UNTIL ALL AVAILABLE DRIVES HAVE BEEN PROCESSED.

THE 'WT', 'T', 'W', AND 'R' COMMANDS REQUIRE ADDRESS LIMITS, DRIVE I.D, AND BAD LOCATION ADDRESS ENTRIES FOR THE DRIVE BEING REFERENCED.

THE PROGRAM WILL FIRST ASK FOR ADDRESS LIMITS WITH THE FOLLOWING TYPEOUT:

```
'ENTER ADDRESS LIMITS FOR DRV #N / RM03
```

THE PROGRAM WILL REQUEST VALUES FOR THE FOLLOWING ADDRESS LIMIT PARAMETERS.

```
                DEFAULT   VALUE
```

NAME	BASE	VALUE	RANGE	FUNCTION
MINCYL	10	0	0 - 822	THE MINIMUM CYLINDER ADDRESS
MAXCYL	10	822	0 - 822	THE MAXIMUM CYLINDER ADDRESS
MINTRK	10	0	0 - 4	THE MINIMUM TRACK ADDRESS
MAXTRK	10	4	0 - 4	THE MAXIMUM TRACK ADDRESS
MINSEC	10	0	0 - 31	THE MINIMUM SECTOR ADDRESS
MAXSEC	10	31	0 - 31	THE MAXIMUM SECTOR ADDRESS

NOTE: 1. THE ADDRESS LIMITS ARE IN DECIMAL

2. THE MINIMUM CYLINDER, TRACK, OR SECTOR ADDRESS MAY BE SPECIFIED AS BEING LARGER THAN THE MAXIMUM ADDRESS. WHEN THESE VALUES ARE INVERTED, THE PROGRAM WILL SELECT ADDRESSES BETWEEN THE 'MIN' ADDRESS AND THE UPPER PHYSICAL LIMIT FOR THAT ADDRESS AND BETWEEN '0' AND THE VALUE IN 'MAX'.

EACH COMMAND, EXCEPT THE 'S' AND THE 'D' COMMANDS, WILL ASK FOR A DRIVE IDENTIFICATION ENTRY. THE DRIVE IDENTIFICATION ENTRY REQUEST IS MADE BY THE FOLLOWING MESSAGE:

'ENTER I.D. FOR DRV #N:'

THE OPERATOR MAY ENTER AN I.D. NUMBER FOR THE DRIVE OF UP TO 6 CHARACTERS IN LENGTH. THIS I.D. WILL BE DISPLAYED, ALONG WITH THE DATE AND OPERATOR I.D. ENTRIES (SEE SECTION 4.1), WHEN THE 'SA' COMMAND IS EXECUTED. THE OPERATOR MAY ENTER ANY CHARACTER STRING, TERMINATED BY A 'CARRIAGE RETURN', OR A 'PERIOD' ONLY (NULL ENTRY) IN RESPONSE TO THE I.D. REQUEST.

4.4.1 'T' COMMAND

USED TO ASSIGN A DRIVE(S) FOR TEST. THIS COMMAND IS REQUIRED TO PERFORM THE TEST OF THE DRIVE(S). THE OTHER COMMANDS ARE CONVIENCE COMMANDS OR SUPPORT COMMANDS.

FORMAT: TN<CR>

N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE TERMINIATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: T0<CR> - ASSIGN DRIVE 0 FOR TEST
TA<CR> - ASSIGN ALL AVAILABLE DRIVES FOR TEST

NOTE: DRIVE OPERATION BEGINS IMMEDIATELY AFTER COMMAND IS ENTERED.

4.4.2 'D' COMMAND

USED TO DEASSIGN A DRIVE(S) BEING EXERCISED.

FORMAT: DN<CR>

```
761                                     N = DRIVE NUMBER.  MAY BE 0 TO 7 OR 'A'.  ENTRY MUST BE
762                                         TERMINIATED BY A CARRIAGE RETURN <CR>.
763
764                                     EXAMPLE:  D0<CR> - DEASSIGN DRIVE 0
765                                               DA<CR> - DEASSIGN ALL DRIVES BEING
766                                                        TESTED.
767
768                                     NOTES:  1. IF THE 'D' COMMAND REFERENCES A
769                                                DRIVE NOT ASSIGNED THE PROGRAM
770                                                WILL TYPEOUT '?DRIVE NOT ASSIGNED'
771
772                                             2. THE DRIVES WILL BE DEASSIGNED AS THEIR
773                                                OPERATIONS COMPLETE.
774
775                                             3. IF 'DA' IS USED,ALL DRIVES BEING TESTED
776                                                WILL BE DEASSIGNED; THE MESSAGE IN (1) WILL
777                                                BE DISPLAYED FOR ALL DRIVES NOT BEING TESTED.
778
779
780                             4.4.3   'S' COMMAND
781
782                                     USED TO REQUEST A PERFORMANCE SUMMARY TYPEOUT FOR THE REFERENCED
783                                     DRIVE(S).
784
785                                     FORMAT:  SN<CR>
786
787                                     N = DRIVE NUMBER.  MAY BE 0 TO 7 OR 'A'.  ENTRY MUST BE
788                                         TERMINIATED BY A CARRIAGE RETURN <CR>.
789
790                                     EXAMPLE:  S0<CR> - TYPEOUT PERFORMANCE SUMMARY FOR DRIVE 0
791                                               SA<CR> - TYPEOUT PERFORMANCE SUMMARY
792                                                        FOR ALL DRIVES BEING TESTED.
793
794                                     NOTES:  1. IF 'SA' IS USED ONLY DRIVES BEING TESTED WILL
795                                                BE DISPLAYED.
796
797                                             2.  IF PARAMETER 'MINUTE' IS NOT ZERO, THE PROGRAM
798                                                 WILL AUTOMATICALLY DISPLAY A PERFORMANCE SUMMARY
799                                                 FOR EACH DRIVE BEING TESTED AT A RATE DETERMINED BY
800                                                 'MINUTE'.
801
802                                             3.  IF THE 'SA' COMMAND IS USED, THE PROGRAM WILL TYPEOUT
803                                                 THE OPERATOR ENTERED DATE, OPERATOR I.D., AND THE DRIVE
804                                                 I.D. FOR EACH DRIVE BEING TESTED.  THE DATE AND OPERATOR
805                                                 I.D. WILL NOT BE TYPED OUT IF NO DRIVES ARE BEING TESTED.
806
807                         4.4.4   'W' COMMAND
808
809                                 USED TO WRITE A DATA PACK WITH DATA ACCEPTABLE TO THE RM03 PERFORMANCE
810                                  EXERCISER PROGRAM.
811
812                                 FORMAT: WN<CR>
813
814                                 N = DRIVE NUMBER.  MAY BE 0 TO 7 OR 'A'.  ENTRY MUST BE
815                                     TERMINATED BY A CARRIAGE RETURN <CR>.
816
```

EXAMPLE: WA<CR> - WRITE DATA PACKS ON ALL AVAILABLE DRIVES.
WO<CR> - GENERATE A DATA PACK ON DRIVE 0.

NOTES: 1. DATA PATTERNS GENERATED BY THE RM03 FORMATTER PROGRAM (MD-11-DZRMA-A) ARE COMPATIBLE.

2. THE 'W' COMMAND MUST BE USED TO WRITE A NEW PACK UNDER TEST BEFORE OTHER COMMANDS ARE ISSUED; IF THE DISK PACK HAS BEEN WRITTEN BY ANY PROGRAM OTHER THAN THE FORMATTER.

3. THE 'W' COMMAND PERFORMS A SEQUENTIAL WRITE OF THE PACK USING A 'WRITE DATA' COMMAND. THE DATA PATTERN USED FOR EACH WRITE IS SELECTED RANDOMLY. HOWEVER, THE OPERATION OF THE COMMAND IS SEQUENTIAL, BEGINNING AT 'MINCYL', 'MINTRK' AND CONTINUING TO 'MAXCYL', 'MAXTRK'.

4. THE 'W' COMMAND DOES NOT WRITE HEADERS AND ASSUMES THAT THE FORMAT OF THE PACK IS GOOD.

5. THE 'W' COMMAND CANNOT BE STARTED IF SWITCH 0 (READ ONLY MODE) IS SET. IF SWITCH 0 IS SET DURING THE OPERATION OF THE 'W' COMMAND, THE DRIVE PERFORMING THE 'W' COMMAND WILL IGNORE THE SWITCH.

4.4.5 'R' COMMAND

USED TO PERFORM A SEQUENTIAL READ OF THE PACK.

FORMAT: RN<CR>

N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: RA<CR> - READ THE PACKS ON ALL OF THE ONLINE DRIVES.
RO<CR> - READ THE PACK ON DRIVE 0.

NOTES: 1. THE PROGRAM WILL PERFORM A NORMAL CHECK OF ALL DATA READ. HOWEVER, ALL OPERATIONS WILL BE SEQUENTIAL.

2. THE PROGRAM WILL READ THE PACK STARTING AT THE ADDRESS SPECIFIED BY 'MINCYL', 'MINTRK' TO THE ADDRESS SPECIFIED BY 'MAXCYL', 'MAXTRK'. THE READ WILL BE SEQUENTIAL.

4.4.6 'WT' COMMAND

USED TO PERFORM A SEQUENTIAL WRITE PACK AND FOLLOWED BY A"TEST" COMMAND

FORMAT: WTN<CR>

N= DRIVE NUMBER 0 TO 7 OR "A". ENTRY MUST BE TERMINATED BY A
CARRIAGE RETURN <CR>.

EXAMPLE: WTA<CR> -WRITE ALL PACKS AND TEST ALL PACKS
WT0<CR>-WRITE PACK 0 AND TEST PACK 0

4.4.7 GENERAL COMMAND INFORMATION

A. CONTROL-C MUST BE ENTERED BEFORE ISSUING ANY COMMAND.

B. T,R,W AND WT COMMANDS ARE EXCLUSIVE TO ONE ANOTHER ON THE SAME DRIVE UNDER TESTING.
D COMMAND MUST BE ENTERED IN ORDER TO SWITCH COMMANDS AMONG T,R,W AND WT .

C. S COMMAND CAN BE ENTERED ANY TIME DURING THE TEST.

D. THE ERROR RESPONSES FROM THE PROGRAM ARE AS FOLLOWS

RESPONSE	COMMAND(S)
?UNIT N OFFLINE	T, W, R,WT
?UNIT N NOT ASSIGNED	D, S
?UNIT N ALREADY ASSIGNED	T, W, R,WT
?UNIT N NOT PRESENT	T, W, R,WT
?UNIT N UNSAFE	T, W, R,WT
?UNIT N NOT AN RM03	T, W, R,WT

5. PERFORMANCE SUMMARY TYPEOUT

5.1 THE PROGRAM WILL DISPLAY A PERFORMANCE SUMMARY FOR THE DRIVES BEING EXERCISED. THIS SUMMARY WILL BE DISPLAYED AUTOMATICALLY IF THE PARAMETER 'INTRVL' IS NOT ZERO OR CAN BE DISPLAYED ON REQUEST BY THE OPERATOR THROUGH THE USE OF THE 'S' COMMAND. THE PERFORMANCE SUMMARY TYPEOUT CONTAINS THE FOLLOWING FIELDS:

'DRV'	THE DRIVE NUMBER
'PASS'	THE PRESENT PASS COUNT FOR THE DRIVE
'ORDERS'	THE NUMBER OF ORDERS PERFORMED BY THE DRIVE
'SEEKS'	THE NUMBER OF SEEK OPERATIONS THE DRIVE PERFORMED
'WRDS XFER'	THE TOTAL NUMBER OF WORDS WRITTEN AND READ BY THE DRIVE
'WRDS READ'	THE TOTAL NUMBER OF WORDS READ BY THE DRIVE
'SOFT'	THE NUMBER OF SOFT DATA ERRORS
'HARD'	THE NUMBER OF HARD DATA ERRORS
'SKI'	THE NUMBER OF 'SKI' ERRORS
'MISP'	THE NUMBER OF POSITIONING ERRORS
'OTHER'	THE TOTAL ERRORS OF OTHER TYPES

NOTE: ERRORS EM1, EM2, EM3, EM4, EM5, & EM10 ARE NOT INCLUDED IN THE 'OTHER' ERROR TOTAL.

5.2 SOFT/HARD ERROR DEFINITIONS

5.2.1 HARD ERRORS

A. A 'DTE' (DRIVE TIMING ERROR) OR A 'DCK' (DATA CHECK ERROR) WHICH OCCURS DURING A READ DATA OR A READ HEADER & DATA OPERATION AND IS NOT CORRECTABLE OR DOES NOT BECOME CORRECTABLE AFTER THE PROGRAM HAS PERFORMED THE COMPLETE RETRY SEQUENCE ON THE BAD SECTOR. THE RETRY SEQUENCE IS 16 RE-READS AT TRACK CENTER AND 2 ATTEMPTS BOTH AT POSITIVE AND NEGATIVE OFFSETS:

5.2.2 SOFT ERRORS

A. ECC CORRECTABLE 'DCK' ERRORS.
B. 'DCK' & 'ECH' ERRORS WHICH BECOME ECC CORRECTABLE DURING RETRY OR WHICH ARE READ CORRECTLY DURING RETRY.
C. HEADER READ ERRORS - READ DATA, READ HEADER & DATA, OR WRITE DATA ORDERS.
D. 'DTE' ERRORS WHICH ARE CORRECTED OR WHICH BECOME ECC CORRECTABLE 'DCK' ERROR DURING THE RETRY SEQUENCE.

6. DATA CHECKING & ERROR RECOVERY

6.1 DATA COMPARISON

DATA COMPARISON OCCURS AFTER EACH 'RDDAT' (READ DATA) OR 'RDHD' (READ HEADER AND DATA) OPERATION UNDER THE FOLLOWING CONDITIONS:

A. THE ORDER TERMINATED WITH NO ERROR.

B. THE OPERATION TERMINATED WITH 'DCK' SET AND THE ERROR IS ECC CORRECTABLE OR THE SECTOR IN ERROR IS READ CORRECTLY AFTER RETRY ATTEMPTS.

6.2 VERIFICATION OF DATA WRITTEN

DATA VERIFICATION IS DONE EITHER THROUGH READING THE WRITTEN DATA BACK AND MATCHING THE DATA WITH ONE OF THE 15 PATTERNS OR THROUGH ISSUING WRITE CHECK COMMANDS.

6.3 SECTOR REFORMATTING

THE PROGRAM WILL REFORMAT AN UNCORRECTABLE ERROR SECTOR IN THE FOLLOWING CASES (PARAMETER 'FORMAT' MUST BE SET AND SW<00> = 0). THIS PREVENTS THE SAME ERROR FROM BEING CONTINUOUSLY REPORTED.

A. DATA CHECK ERRORS - EM21
B. HEADER READ ERRORS - EM20, EM24, EM25, EM26, EM27
C. DRIVE TIMING ERRORS - EM31
D. OPERATION INCOMPLETE ERRORS - EM32
E. WRITE CHECK ERRORS - EM22, EM23

6.4 BAD TRACK/SECTOR FLAGGING

SINCE THE RM03 SUBSYSTEM HAS AN AUTOMATIC BAD TRACK HANDLING CAPABILTIY, THE MULTIDRIVE EXERCISER ALLOWS TO IDENTIFY UP TO 16 BAD TRACK/SECTOR LOCATIONS WHEN THE DRIVE IS ASSIGNED FOR TEST. (SEE SECTION 4.4 FOR ADDITIONAL INFORMATION.)

IF ONE OF THE FOLLOWING ERRORS OCCURS AT A LOCATION IDENTIFIED BY THE OPERATOR, THE PROGRAM WILL INHIBIT THE ERROR REPORT FOR THAT ERROR.

DATA CHECK ERRORS ('DCK')
WRITE CHECK ERRORS ('WCE')
OPERATION INCOMPLETE ERRORS ('OPI')
DRIVE TIMING ERRORS ('DTE')
HEADER READ ERRORS ('FER' & 'HCRC', 'HCE' & 'HCRC', 'HCRC')

OPTIONALLY, THE OPERATOR MAY REQUEST AN ERROR REPORT FOR FLAGGED AREAS. (PARAMETER 'NOTPRT' MUST BE SET TO 0 AT STARTUP.) THE PROGRAM WILL IDENTIFY ERROR MESSAGES ASSOCIATED WITH THE PACK; THESE ERRORS WILL NOT BE ADDED TO THE ERROR TOTALS MAINTAINED BY THE PROGRAM.

7. ERROR MESSAGES

DRIVE ERRORS ARE REPORTED ON THE TELETYPE OR (IF AVAILABLE) A LINE PRINTER. ALL ERROR CONDITIONS ARE REPORTED IN ERROR MESSAGES; THE PROGRAM CONTAINS NO CODED ERROR HALTS. IF THE PROGRAM HALTS (ASSUMING, OF COURSE, THAT SW<15> IS NOT SET), AN UNRECOVERABLE PROGRAM CONDITION HAS OCCURRED OR A CENTRAL PROCESSOR FAILURE HAS OCCURRED.

ERROR MESSAGES ARE MADE UP OF SEVERAL LINES. EACH TYPE OF ERROR HAS SEVERAL OPTIONAL LINES WHICH MAY APPEAR WITH IT. ALL OF THE POSSIBLE ERROR MESSAGE LINES WHICH MAY APPEAR ARE GIVEN IN THE SECTION DESCRIBING THE PARTICULAR ERROR HEADER.

7.1 ERROR DESCRIPTION LINES

MESSAGES EM1, EM2, EM3, EM4, EM5, EM10, EM11, & EM12 ARE ALWAYS DISPLAYED ON THE TTY. THE OTHER MESSAGES ARE DISPLAYED ON EITHER THE LINE PRINTER (IF AVAILABLE) OR THE TTY.

(THE MESSAGE TAGS ARE GIVEN FOR REFERENCE.)

MESSAGE TAG	TEXT
EM1	RH11 INTERRUPT OCCURRED (RMAS=0) THE RH11 INTERRUPTED AND THE ATTENTION SUMMARY REGISTER (RMAS) WAS CLEARED.
EM2	UNEXPECTED ATTENTION OCCURRED THE INDICATED DRIVE INTERRUPTED BUT THE DRIVE WAS NOT PERFORMING AN OPERATION.
EM3	MASSBUS PARITY ERROR (MCPE=1) THE RH11 DETECTED A CONTROL BUS PARITY ERROR WHEN READING THE INDICATED REGISTER FROM THE INDICATED DRIVE.
EM4	MASSBUS PARITY ERROR (PAR=1) THE INDICATED RM03 DETECTED A CONTROL BUS PARITY ERROR WHEN THE RH11 LOADED THE SPECIFIED REGISTER.
EM5	ADDRESS PLUG CHANGE BIT SET THE 'OPE' BIT WAS SET WHEN THE INDICATED DRIVE INTERRUPTED.
EM6	RH11 DIDN'T RESPOND TO ADDRESSING WHEN THE PROGRAM ADDRESSED THE RH11, NO RESPONSE WAS RECEIVED FROM THE INDICATED ADDRESS.

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1103
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1111
1112
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1114
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1121
1122
1123
```

EM10 UNCORRECTABLE MASSBUS PARITY ERROR

THE PROGRAM HAS TRIED 3 TIMES TO READ OR WRITE THE INDICATED REGISTER.

EM11 FATAL MASSBUS PARITY ERROR

A CONTROL BUS PARITY ERROR OCCURRED WHEN THE RH11 ATTEMPTED TO PROCESS A PREVIOUS, DIFFERENT PARITY ERROR.

EM12 PERSISTENT DEVICE UNSAFE

THE DRIVE BECAME UNSAFE; DRIVE CLEAR TO THE DRIVE DID NOT CLEAR THE UNSAFE CONDITION. THE PROGRAM WILL AUTOMATICALLY DEASSIGN THE DRIVE. THE DRIVE CANNOT BE EXERCISED UNTIL THE UNSAFE CONDITION HAS BEEN CLEARED BY MANUAL INTERVENTION.

EM13 OPERATION NOT COMPLETED WITHIN TIME LIMIT

THE DRIVE DID NOT COMPLETE THE OPERATION WITHIN 1 SECOND AFTER THE OPERATION WAS INITIATED.

EM14 UNIT WENT OFFLINE

THE DRIVE WENT OFFLINE DURING THE INDICATED OPERATION. (THE 'MOL' BIT BECAME ZERO.) THE PROGRAM WILL AUTOMATICALLY DEASSIGN THE DRIVE. THE OPERATOR MUST REASSIGN THE DRIVE WITH THE 'T' COMMAND TO RE-INITIATE TESTING.

EM15 NO RESPONSE TO PORT REQUEST

THE PROGRAM IS TESTING A DUAL PORT DRIVE WHICH HAS NOT SWITCHED TO THE REQUESTING PORT WITHIN 10 SECONDS AFTER PORT REQUEST TO THE DRIVE FROM THE REPORTING PORT.

EM20 HEADER CRC ERROR

A HEADER CRC ERROR WAS DETECTED AT THE INDICATED DISK ADDRESS. THE CONTENTS OF THE HEADER ARE DISPLAYED. THE OPERATION WILL BE RETRIED 3 TIMES.

EM21 DATA CHECK ('DCK') ERROR

A DATA CHECK ERROR WAS DETECTED AT THE INDICATED SECTOR. THE FULL RETRY SEQUENCE (INCLUDING OFFSET) WILL BE INITIATED FOR THE SECTOR IN ERROR IF THE ECC HARD ERROR ('ECH) BIT IS SET.

EM22 WRITE CHECK ERROR - DATA CHECK ('DCK') SET

A WRITE CHECK ERROR OCCURRED AND THE DATA CHECK ('DCK') BIT WAS SET. IF 'ECH' IS NOT SET, THE OPERATION WILL BE RETRIED UP TO 3 TIMES; IF THE 'ECH' BIT IS SET, THE OPERATION WILL BE RETRIED UP TO 16 TIMES.

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EM23 WRITE CHECK ERROR - DATA CHECK ('DCK') NOT SET

A WRITE CHECK ERROR OCCURRED AND 'DCK' WAS NOT SET. THE WORDS WHICH CAUSED THE ERROR ARE DISPLAYED IN THE ERROR MESSAGE. THE OPERATION WILL BE RETRIED 3 TIMES.

EM24 HEADER READ ERROR - 'FMT' BIT DROPPED

A WRITE DATA, WRITE CHECK DATA, OR A READ DATA WAS BEING PERFORMED AND A 'FMT' ERROR OCCURRED. THE PROGRAM RE-READ THE HEADER OF THE ERROR SECTOR AND THE 'HCRC' BIT WAS SET. THE CONTENTS OF THE HEADER ARE DISPLAYED. THE OPERATION WILL BE RETRIED 3 TIMES.

EM25 HEADER READ ERROR - HEADER COMPARE ('HCE') ERROR

SIMILAR TO EM24, EXCEPT THAT THE 'HCE' ERROR BIT WAS SET INITIALLY. THE OPERATION WILL BE RETRIED 3 TIMES.

EM26 FORMAT ERROR ('FER')

FORMAT ERROR OCCURRED. WHEN THE HEADER WAS RE-READ, THE 'HCRC' BIT WAS NOT SET. THE CONTENTS OF THE HEADER ARE DISPLAYED. THE OPERATION WILL BE RETRIED 3 TIMES.

EM27 HEADER COMPARE ('HCE') ERROR

SIMILAR TO EM26 EXCEPT THAT THE 'HCE' BIT WAS SET INITIALLY. THE OPERATION WILL BE RETRIED 3 TIMES.

EM30 MISCELLANEOUS DRIVE ERROR

THIS MESSAGE IS GIVEN FOR THE FOLLOWING ERROR BITS:
 'AOE', 'RMR', 'ILF', OR 'ILR'

EM31 OPERATION INCOMPLETE ('OPI') ERROR

AN OPERATION INCOMPLETE ERROR OCCURRED AT THE INDICATED SECTOR.

EM32 DRIVE TIMING ('DTE') ERROR

DRIVE TIMING ERROR OCCURRED ON THE INDICATED SECTOR. THE OPERATION WILL BE RETRIED 3 TIMES.

EM33 PARITY ('PAR') ERROR AFTER OPERATION STARTED

THE 'PAR' BIT WAS SET WHEN THE OPERATION WAS COMPLETED. THE OPERATION WILL BE RETRIED 3 TIMES.

EM34 WRITE CLOCK FAILURE ('WCF')

A WRITE CLOCK FAILURE OCCURRED DURING THE OPERATION. THE OPERATION WILL BE RETRIED 3 TIMES.

EM35 INVALID ADDRESS ('IAE') ERROR

```
1180
1181                    AN INVALID ADDRESS ERROR OCCURRED DURING THE OPERATION.
1182
1183            EM36    WRITE LOCK ('WLE') ERROR
1184
1185                    A WRITE OPERATION WAS ATTEMPTED BUT THE DRIVE WAS WRITE
1186                    LOCKED.
1187
1188            EM40    RH11 OR UNIBUS TRANSFER ERROR
1189
1190                    'TRE' IS SET IN THE RH11 CONTROL REGISTER AND NO DRIVE
1191                    ERROR HAS OCCURRED.  THE OPERATION WILL BE RETRIED 3
1192                    TIMES IF THE ERROR WAS CAUSED BY 'DLT', 'UPE', 'MXF',
1193                    OR 'MDPE'.
1194
1195            EM41    BUS ADDRESS OR WORD COUNT INCORRECT
1196
1197                    NO DRIVE ERROR OCCURRED BUT EITHER THE BUS ADDRESS INDICATES
1198                    THAT AN INCORRECT NUMBER OF WORDS WERE TRANSFERED OR THE
1199                    WORD COUNT REGISTER IS NOT ZERO.
1200
1201            EM42    DATA COMPARE ERRORS - NO DRIVE ERROR DETECTED
1202
1203                    NO SUBSYSTEM ERROR WAS SIGNALED; HOWEVER, THE DATA DOES NOT
1204                    COMPARE.
1205
1206            EM43    CAN'T MATCH DATA READ WITH A PATTERN
1207
1208                    THE DATA IN THE BUFFER DOES NOT MATCH ANY OF THE STANDARD
1209                    PATTERNS.
1210
1211            EM44    ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11
1212
1213                    THE OPERATION COMPLETED NORMALLY; HOWEVER, THE PROGRAM
1214                    FOUND EITHER ERROR BITS IN THE RM03 SET OR ERROR BITS IN
1215                    THE RH11 SET.
1216
1217            EM45    ECC LOGIC FAILURE
1218
1219                    THE CONTENTS OF EITHER THE ECC POSITION REGISTER (RMEC1)
1220                    OR THE CONTENTS OF ECC PATTERN REGISTER (RMEC2) ARE NOT
1221                    VALID.  THE POSITION REIGSTER IS EITHER'0' OR > 40066 (8)
1222                    OR THE PATTERN REGISTER CONTAINS ZEROS.
1223
1224            EM46    BUS ADDRESS OR WORD COUNT NOT CONSISTENT
1225
1226                    THE PROGRAM WAS PROCESSING AN ERROR AND FOUND THAT THE
1227                    NUMBER OF WORDS TRANSFERED AS INDICATED BY THE BUS ADDRESS
1228                    REGISTER DOES NOT AGREE WITH THE TRANSFER COUNT FROM THE
1229                    WORD COUNT REGISTER.
1230
1231            EM50    SEEK INCOMPLETE  ERROR
1232
1233                    THE DRIVE SIGNALED EITHER 'SKI' OR 'OCYL' ERROR BITS.
1234
1235            EM51    NOT USED
```

```
1236
1237
1238                                    EM60    DEVICE UNSAFE
1239
1240                                            THE INDICATED DRIVE UNSAFE ERROR OCCURRED; THE ERROR WAS
1241                                            CLEARED BY A 'DRIVE CLEAR' INSTRUCTION.
1242
1243
1244                                7.2     DETAIL ERROR LINES
1245
1246                                        THE LINE NUMBERS GIVEN BELOW ARE FOR REFERENCE ONLY.
1247
1248                                        LINE 1
1249                                        ------
1250
1251                                        TT:TT:TT  (DESCRIPTION OF ERROR)
1252
1253                                        'TT:TT:TT' IS THE TIME SINCE THE PROGRAM
1254                                        WAS STARTED.  TT:TT:TT IS GIVEN IN HOURS:
1255                                        MINUTES: SECONDS.
1256
1257                                        LINE 2
1258                                        ------
1259
1260                                        'PRESENT ORDER = XXXX  PREVIOUS ORDER = YYYY'
1261
1262                                        MNEMONICS USED FOR THE ORDERS ARE DEFINED BELOW:
1263
1264                                                UNLOAD - UNLOAD (OCTAL 3)
1265                                                SEEK -  SEEK (OCTAL 5)
1266                                                RECAL - RECALIBRATE (OCTAL 7)
1267                                                DRVCLR - DRIVE CLEAR (OCTAL 11)
1268                                                RELSE - RELEASE (OCTAL 13)
1269                                                OFFSET - OFFSET (OCTAL 15)
1270                                                RTC - RETURN TO CENTERLINE (OCTAL 17)
1271                                                READIN - READIN PRESET (OCTAL 21)
1272                                                PACK - PACK ACKNOWLEDGE (OCTAL 23)
1273                                                SEARCH - SEARCH (OCTAL 31)
1274                                                GETREG - GET REGISTERS (OCTAL 41)
1275                                                SETFMT - SET FORMAT (ECI OR HCI) (OCTAL 43)
1276                                                SELDRV - SELECT DRIVE (OCTAL 45)
1277                                                WCKD -  WRITE CHECK DATA (OCTAL 51)
1278                                                WCKHD - WRITE CHECK HEADER & DATA (OCTAL 53)
1279                                                WRTDAT - WRITE DATA (OCTAL 61)
1280                                                WRTHD - WRITE CHECK HEADER & DATA (OCTAL 63)
1281                                                RDDAT - READ DATA (OCTAL 71)
1282                                                RDHD -  READ HEADER & DATA (OCTAL 73)
1283
1284                                        (DISPLAY OF THE RH11/RM03 REGISTERS IN TWO GROUPS:
1285                                        RMCS1,RMCS2,RMDS1,RMER1,RMER2,RMER3,RMEC1, & RMEC2 FORM THE FIRST
1286                                        GROUP;  ALL THE OTHER REGISTERS ARE IN THE SECOND GROUP.
1287                                        IF SW<05> IS SET, ONLY THE REGISTERS IN THE FIRST GROUP WILL BE
1288                                        DISPLAYED.)
1289
1290
1291                                        THE ABOVE LINE WILL BE TYPED IF THE ERROR OCCURRED DURING
```

THE NON-DATA TRANSFER PART OF THE OPERATION.

'# ERROR AT BAD TRACK/SECTOR'

THE ABOVE LINE WILL BE PRINTED IF A DATA ERROR OCCURES AT AN ADDRESS ON THE PACK WHICH THE OPERATOR HAS IDENTIFIED AS BEING BAD. PARAMETER 'NOTPRT' MUST BE 0 FOR THE ERROR TO BE REPORTED.

A WORD CALLED 'STATUS' IS DISPLAYED WITH THE RM03 REGISTERS. THE CONTENTS OF THIS WORD IDENTIFY HOW THE ERROR WAS PROCESSED BY THE RM03 DRIVE HANDLER ROUTINE. THE BITS IN THIS WORD ARE ENCODED AS FOLLOWS:

BIT #	MEANING IF BIT IS '1'
15	ERROR OCCURRED DONE (BIT07=0), BITS 14-9, 2, 1 SPECIFY TYPE DONE (BIT07=1), BITS 6-3 SPECIFY TYPE
14	DRIVE IS OFFLINE
12	PERSISTENT UNSAFE CONDITION EXISTS
11	UNCORRECTABLE PARITY ERROR OCCURRED
10	FATAL PARITY ERROR OCCURRED. MASSBUS CLEAR WAS PERFORMED
9	OPERATION NOT COMPLETED WITHIN 1 SECOND MASSBUS CLEAR PERFORMED. ALL OTHER OUTSTANDING OPERATIONS WERE RESTARTED.
7	DONE - OPERATION COMPLETED
6	DATA ERROR OCCURRED DURING THE TRANSFER
5	ERROR OCCURRED WHILE SEARCHING FOR THE 'TRANSFER' SECTOR OR DURING RECALIBRATE OR OFFSET COMMANDS
4	CORRECTABLE UNSAFE CONDITION OCCURRED
3	DRIVE ERROR OCCURRED THAT CAUSED AN AUTOMATIC RECALIBRATE SEQUENCE
2	PORT REQUEST TIMEOUT
1	NON-EXISTENT DRIVE REQUESTED

LINE 3

ERROR AT CXXX TYY SZZ PREV ADDR = CUUU TVV SWW

THE ACTUAL ADDRESS OF THE ERROR SECTOR AND THE PREVIOUS DISK ADDRESS ARE GIVEN IN THIS LINE. CYLINDER, TRACK, &

SECTOR ADDRESSES ARE IN DECIMAL.

LINE 4

PRESENT ADDR = CXXX TYY SZZ PREV ADDR = CUUU TVV SWW

THIS LINE IDENTIFIES THE ADDRESS WHEN THE ERROR WAS DETECTED;
THE PREVIOUS ADDRESS IS ALSO GIVEN. CYLINDER, TRACK, & SECTOR
ADDRESSES ARE GIVEN IN DECIMAL.

LINE 5

START CYL = XXX END CYL = YYY

THIS LINE IDENTIFIES THE STARTING CYLINDER OR A SEEK (IMPLIED)
AND THE DESTINATION CYLINDER. CYLINDER ADDRESSES ARE IN
DECIMAL.

LINE 6

START CYL = XXX END CYL = YYY ACTUAL CYL = ZZZ

THIS LINE IDENTIFIES THE STARTING CYLINDER OF AN IMPLIED SEEK,
THE DESTINATION CYLINDER, AND THE CYLINDER THE DISK ACTUALLY
STOPPED AT. CYLINDER ADDRESSES ARE IN DECIMAL.

LINE 7

RMBA = XXXX RMWC = YYYY

THIS LINE GIVES THE CONTENTS OF THE RH11 BUFFER ADDRESS
REGISTER AND THE RH11 WORD COUNT REGISTER. THIS LINE IS
NOT PRINTED IF SW<05> IS NOT SET.

LINE 8

START CYL = XXX START TRK = YY START SECTOR = ZZ

THIS LINE IDENTIFIES THE STARTING DISK ADDRESS OF THE PRESENT
OPERATION. CYLINDER, TRACK, AND SECTOR VALUES ARE DECIMAL.

LINE 9

RMDA = XXXX RMCA = YYYY

THIS LINE GIVES THE CONTENTS OF THE RM03 TRACK AND SECTOR
ADDRESS REGISTER AND THE CONTENTS OF THE DESIRED CYLINDER
ADDRESS REGISTER. THIS LINE IS NOT PRINTED IF SW<05> IS NOT
SET.

```
1404                                    LINE 10
1405                                    ------
1406
1407                                    BUFFER ADDR = XXXX  SIZE = YYYY  ACTUAL NUMBR WRDS XFRD = ZZZZ
1408
1409                                    THIS LINE GIVES THE STARTING ADDRESS OF THE BUFFER USED FOR THE
1410                                    CURRENT DATA TRANSFER OPERATION, ITS SIZE, AND THE ACTUAL NUMBER
1411                                    OF WORD TRANSFERED.  THE STARTING ADDRESS OF THE BUFFER IS IN
1412                                    OCTAL, THE SIZE AND WORD TRANSFERED VALUE ARE IN DECIMAL.
1413
1414                                    LINE 11
1415                                    ------
1416
1417                                    GOOD DATA = XXXX  BAD DATA = YYYY  SECT POS = ZZZ
1418
1419                                    THIS LINE GIVES THE GOOD DATA, THE ACTUAL DATA FROM THE DISK,
1420                                    AND THE LOCATION IN THE SECTOR OF THE ACTUAL DATA.  THE SECTOR
1421                                    POSITION IS IN DECIMAL.
1422
1423                                    LINE 12
1424                                    -------
1425
1426                                    HEADER CONTENTS OF ERROR SECTOR = XXXX XXXX XXXX XXXX
1427
1428                                    THIS LINE GIVES THE CONTENTS OF THE HEADER OF THE SECTOR WHICH
1429                                    GAVE THE ERROR.
1430
1431                                    LINE 13
1432                                    -------
1433
1434                                    RMEC1 = XXXX  RMEC2 = YYYY
1435
1436                                    THIS LINE WILL BE PRINTED AFTER A SUCESSFUL RETRY OF A SECTOR
1437                                    WHICH BECAME ECC CORRECTABLE DURING RETRY.
1438
1439                                    LINE 14
1440                                    ------
1441
1442                                    ECC CORRECTABLE WITHOUT OFFSET
1443
1444                                    THE SECTOR IN ERROR IS ECC CORRECTABLE; NO RETRY ATTEMPTS ARE
1445                                    NECESSARY.
1446
1447                                    LINE 15
1448                                    -------
1449
1450                                    READ CORRECTLY AT (NEG OR POS) OFFSET
1451
1452                                    THE SECTOR IN ERROR WAS READ WITHOUT ERROR AT THE INDICATED
1453                                    OFFSET VALUE.
1454
1455                                    LINE 16
1456                                    -------
1457
1458                                    ECC CORRECTABLE AT (NEG OR POS) OFFSET
1459
```

THE SECTOR IN ERROR BECAME ECC CORRECTABLE AT THE INDICATED
OFFSET.

LINE 17

CORRECTED ON X RETRY

THE OPERATION WAS PERFORMED ERROR FREE ON THE INDICATED RETRY
ATTEMPT.

LINE 18

UNCORRECTABLE AFTER X RETRIES

THE OPERATION COULD NOT BE PERFORMED CORRECTLY AFTER THE
INDICATED NUMBER OF RETRY ATTEMPTS.

LINE 19

DIFFERENT ERROR DURING RETRY

WHILE THE PROGRAM WAS RETRYING THE ERROR, A DIFFERENT OCCURRED.
IF THIS LINE IS PRINTED, THE RH11/RM03 REGISTERS WILL ALSO BE
PRINTED (SEE LINE 2).

LINE 20

DATA COMPARISON ERRORS

A PRINTOUT OF THE DATA COMPARISON ERRORS FOLLOW THIS LINE.

LINE 21

TOTAL COMPARE ERRORS = XXXX

THIS LINE GIVES THE TOTAL DATA COMPARISON ERROR COUNT. THE
VALUE GIVEN IS IN DECIMAL.

LINE 22

THE DATA COMPARED OK

THIS LINE INDICATES THE RESULTS OF THE DATA COMPARISON FOLLOWING
ECC CORRECTION.

LINE 23

ECC CORRECTION RESULTS

THE PROGRAM PERFORMED ECC CORRECTION AND THE RESULTS ARE REPORTED.
THE ADDRESS IN MEMORY OF THE WORD(S) IN ERROR ARE GIVEN, THE WORD(S)
BEFORE CORRECTION AND THE WORD(S) AFTER CORRECTION ARE PRINTED.

LINE 24

ERROR BURST BEGINS AT WORD XXX IN DATA FIELD OF ERROR SECTOR

THIS IS AN INFORMATIONAL LINE WHICH WILL BE PRINTED FOR 'DCK' ERRORS
WHICH ARE ECC CORRECTABLE OR WHICH BECOME ECC CORRECTABLE DURING
RETRY. 'XXX' IS THE WORD OFFSET VALUE FROM 'RMEC1' AND IS IN
DECIMAL.

LINE 25

ERROR WAS NOT IN THE DATA READ -
ECC CORRECTION CAN'T BE PERFORMED

THE DATA ERROR WAS NOT IN DATA TRANSFERED TO MEMORY.

LINE 26

CONTENTS OF THE ERROR SECTOR (REPORTED ABOVE)

IF SW<03> IS SET, THE SECTOR WHICH GAVE THE 'DCK', 'DTE' OR,
'WCF' ERROR OR 'HARD' DATA CHECK ERROR IS PRINTED. THE
CONTENTS OF THE SECTOR FOLLOW THIS LINE.

LINE 27

ORDERS: WWW ERRORS: X WRDS XFR: YYYY WRDS READ: ZZZZ

THIS IS THE LAST LINE PRINTED FOR ALL NON-POSITIONING
TYPE ERRORS.

'ORDERS' IS THE TOTAL NUMBER OF COMMANDS GIVEN TO THE DRIVE
WHICH REPORTED THE ERROR.

'ERRORS IS THE TOTAL ERROR COUNT FOR THE DRIVE AND INCLUDES
EVERY ERROR DETECTED, REGARDLESS OF TYPE.

'WRDS XFR' IS THE TOTAL NUMBER OF WORDS WRITTEN AND READ BY
THE DRIVE.

'WRDS READ' IS THE TOTAL NUMBER OF WORD READ BY THE DRIVE.

LINE 28

ORDERS: WWWW TOTAL SEEKS: XXX TOTAL POS ERR = YYY TOTAL SKI ERR = Z

THIS IS THE LAST LINE PRINTED FOR ALL POSITIONING TYPE ERRORS.

```
1572
1573                    'ORDERS' IS THE TOTAL NUMBER OF ORDERS GIVEN TO THE DRIVE WHICH
1574                    REPORTED THE ERROR.
1575
1576                    'TOTAL SEEKS' IS THE TOTAL NUMBER OF SEEK OPERATIONS PERFORMED
1577                    BY THE DRIVE.
1578
1579                    'TOTAL SKI ERR' IS THE TOTAL NUMBER OF 'SKI' ERRORS
1580                    SIGNALED BY THE DRIVE.
```

8. PROGRAM DESCRIPTION

8.1 PROGRAM OPERATION

WHEN THE PROGRAM IS STARTED, PROVIDING APT TTY ENABLE BIT IS SET OR DIAGNOSTIC LOADED BY OTHER THAN APT SCRIPT MODE, ALL TABLES AND PARAMETERS ARE CLEARED OR INITIALIZED. THE PARAMETERS WHICH ARE UNDER OPERATOR TTY ENTRY CONTROL ARE CHECKED FOR VALIDITY AND CONSISTENCY. RH11 INTERRUPT ENABLE ('IE') IS SET, TTY KEYBOARD INTERRUPT ENABLE IS SET, AND THE KW11-L OR KW11-P CLOCK IS STARTED. WHEN THESE ACTIONS HAVE BEEN COMPLETED, THE PROGRAM TYPES OUT 'PROGRAM INTIALIZE COMPLETE'. COMMAND ENTRIES WILL NOW BE ACCEPTED BY THE PROGRAM

THE PROGRAM SCANS ITS INTERNAL ASSIGNMENT TABLES, LOOKING FOR:

1) DRIVES TO ASSIGN/DEASSIGN
2) PERFORMANCE SUMMARY TYPEOUT REQUESTS
3) DRIVES REQUIRING COMMAND INITIATION, BUFFER ASSIGNEMENT, OR PARAMETER SELECTION.
4) DRIVES COMPLETING CURRENT OPERATIONS.

THE PROGRAM CONTINUES SCANNING ITS TABLES UNTIL AN ENTRY IS FOUND. IN THE CASE OF THE PROGRAM AT INITIAL START, THE FIRST ENTRY WILL BE MADE BY THE OPERATOR WHEN A DRIVE IS ASSIGNED ('T' COMMAND).

WHEN A DRIVE IS ASSIGNED, THE KEYBOARD ENTRY ROUTINE VERIFIES THAT THE DRIVE IS PRESENT, IS AN RM03, AND IS ONLINE. THE ASSIGNMENT ROUTINE THEN ISSUES A 'READIN PRESET' INSTRUCTION, SETS 'FMT22', AND ISSUES A 'RECALIBRATE' INSTRUCTION.

PARAMETERS FOR THE OPERATION ARE SELECTED AND A BUFFER IS ASSIGNED. IF THE OPERATION IS A WRITE OR WRITE CHECK ORDER, THE ASSIGNED BUFFER WILL BE FILLED WITH THE SELECTED PATTERN. (WRITE CHECK ORDERS ARE ISSUED AFTER EACH WRITE ORDER. THE WRITE CHECK ORDER USES THE PARAMETERS SELECTED FOR THE PRECEEDING WRITE ORDER.) CONTROL IS THEN PASSED TO THE COMMAND INITIATION ROUTINE.

THE COMMAND INITIATION ROUTINE FIRST LOOKS AT THE CYLINDER ADDRESS OF THE REQUESTED OPERATION. IF THE DRIVE MUST SEEK TO ANOTHER CYLINDER TO PERFORM THE OPERATION, THE PROGRAM ISSUES A SEARCH INSTRUCTION TO THE DRIVE WITH A 'TARGET' SECTOR WHICH IS 8 SECTORS EARLIER THAN THE 'TRANSFER' SECTOR. (THIS ALLOWS THE PROGRAM TO INITIATE OPERATIONS ON ANOTHER DRIVE WHILE THE PRESENT DRIVE, OR OTHER DRIVES, ARE SEARCHING FOR 'TARGET' SECTORS. ALL SEEKS ISSUED BY THE PROGRAM ARE IMPLIED SEEK SEARCH OPERATIONS.) WHEN A SEARCHING DRIVE FINDS THE 'TARGET' SECTOR AND INTERRUPTS, THE PROGRAM READS THE LOOK AHEAD REGISTER (RMLA) OF THE INTERRUPTING DRIVE AND COMPARES THE POSITION OF THE DISK WITH THAT OF THE DESIRED SECTOR.

IF OTHER DRIVES ARE WAITING ON CYLINDER, THEY ARE ALSO CHECKED. THE PROGRAM THEN ISSUES THE REQUESTED ORDER TO THE DRIVE NEAREST ITS TRANSFER SECTOR. THE DRIVES NOT SELECTED WILL HAVE ANOTHER SEARCH INITIATED. IF A DRIVE IS NOT SELECTED FOR TRANSFER AFTER THREE REVOLUTIONS OF ITS DISK, IT IS GIVEN PRIORITY OVER DRIVES WHICH HAVE

NOT BEEN ON CYLINDER AS LONG.

WHEN THE DATA TRANSFER OPERATION IS COMPLETE, THE DRIVE REGISTERS
ARE STORED AND A DATA TRANSFER IS INITIATED FOR A WAITING DRIVE.

IF THE OPERATION HAS BEEN COMPLETED NORMALLY, THE SAVED DRIVE REGISTERS
ARE CHECKED TO VERIFY THAT NO ERROR BITS ARE SET; THE RH11 BUS ADDRESS
AND WORD COUNT ADDRESS REGISTERS ARE CHECKED TO VERIFY THAT THE
CORRECT NUMBER OF WORDS HAVE BEEN TRANSFERED AND THAT THE TWO REGISTERS
ARE CONSISTENT WITH EACH OTHER; AND IF THE ORDER WAS A READ ORDER, THE
DATA BUFFER IS COMPARED. WHEN THIS SEQUENCE IS COMPLETED, THE DRIVE
IS RETURNED TO THE ASSIGNED, INACTIVE LIST. THE PROGRAM THEN
INITIATES A DATA TRANSFER ON A WAITING DRIVE AND RESELECTS AND
REINITIATES ANOTHER OPERATION ON THE RELEASED DRIVE.

ERRORS WHICH OCCUR ARE PROCESSED IN THE FOLLOWING ORDER. MULTIPLE
ERRORS WILL BE REPORTED AS THE FIRST ERROR TYPE CHECKED.

A. ERRORS REPORTED FOR OPERATIONS WHICH HAVE NOT COMPLETED NORMALLY.

    PERSISTENT UNSAFE CONDITION - EM12
    UNCORRECTABLE MASSBUS PARITY ERROR - EM10
    FATAL MASSBUS PARITY ERROR - EM11
    OPERATION NOT COMPLETED WITHIN TIME LIMIT - EM13
    UNIT WENT OFFLINE - EM14

B. ERRORS REPORTED FOR OPERATIONS WHICH COMPLETE NORMALLY.

    CORRECTABLE UNSAFE - EM60
    DRIVE TIMING ERROR - EM32
    DATA CHECK ERROR - EM21
    WRITE CHECK WITH DCK SET - EM22
    HEADER CRC ERRORS - EM20
    FORMAT ERRORS - EM24, EM26
    HEADER COMPARE ERRORS - EM25, EM27
    PROGRAM DETECTED POSITIONING ERROR - EM51
    SEEK INCOMPLETE OR OFF CYLINDER ERROR - EM50
    WRITE CHECK WITHOUT 'DCK' SET - EM23
    RH11 OR UNIBUS TRANSFER ERROR - EM40
    'OPI' ERROR - EM31
    'PAR' ERROR - EM33
    'WCF' ERROR - EM34
    'IAE' ERROR - EM35
    'WLE' ERROR - EM36
    MISCELLANEOUS DRIVE ERROR - EM30

C. ERRORS NOT FLAGGED BY THE HARDWARE ERROR DETECTION LOGIC.

    BUS ADDRESS OR WORD COUNT INCORRECT - EM41
    DATA COMPARE ERRORS - NO DRIVE ERROR DETECTED - EM42
    CAN'T MATCH DATA READ WITH A PATTERN - EM43
    ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11 - EM44
    ECC LOGIC FAILURE - EM45
    BUS ADDRESS OR WORD COUNT NOT CONSISTENT - EM46

8.2 DUAL PORT OPERATION

DUAL PORT OPERATION IS NEARLY IDENTICAL TO THE OPERATION DESCRIBED
IN SECTION 8.1. THE DIFFERENCES ARE IN COMMAND SEQUENCE INITIATION
AND ORDER TERMINATION.

WHEN THE DUAL PORT HANDLER ROUTINE IN THE EXERCISER PROGRAM RECEIVES
A REQUEST FOR A DRIVE, THE PROGRAM VERIFIES THAT THE DRIVE IS
ONLINE. THE DRIVE IS SELECTED AND READ THE RMCS1 REGISTER BY
TEST THE "DVA" BIT.
IF THE DRIVE IS IN NEUTRAL, THIS WILL SEIZE THE DRIVE. IF THE
DRIVE IS SEIZED BY THE OTHER PORT, READING 'RMDS1' WILL SET
'PORT REQUEST'. THE PROGRAM CHECKS 'DVA' IN 'RMCS1'. IF THE DRIVE
IS AVAILABLE AS INDICATED BY THE 'DVA' BIT, THE COMMAND SEQUENCE
WILL BE INITIATED IN THE NORMAL MANNER (SEE SECTION 8.1 ABOVE).
IF 'DVA' WAS NOT SET, THE PROGRAM MAKES AN ENTRY FOR THE DRIVE
IN AN INTERNAL 'PORT REQUEST PENDING' TABLE AND
STARTS A 10 SECOND TIMER FOR THE DRIVE. IF THE DRIVE HAS
NOT SWITCHED TO THE REQUESTING SYSTEM WITHIN THE 10 SECOND INTERVAL,
THE PROGRAM REPORTS A 'NO RESPONSE TO PORT REQUEST' ERROR. NORMALLY
THIS ERROR MESSAGE INDICATES A FAILURE IN THE DUAL PORT CONTROL
LOGIC IN THE DRIVE BEING TESTED; HOWEVER, UNDER CERTAIN CONDITIONS
(E.G. MASSBUS PARITY ERRORS BEING REPORTED ON THE OTHER SYSTEM
ON A MOD33 TTY), THE OTHER PROCESSOR WAS UNABLE TO PROCESS THE DRIVE
AFTER IT HAD REQUESTED THE DRIVE. THE OPERATOR MUST BE AWARE OF
WHAT THE OTHER SYSTEM IS DOING AT ALL TIMES TO INTERPRET THE PORT
RELATED ERROR MESSAGES PROPERLY.

AFTER A DRIVE HAS COMPLETED AN OPERATION, THE PROGRAM WILL STORE
THE REGISTERS AND ISSUE A 'RELEASE' TO THE DRIVE; IF THE OPERATION
TERMINATED WITH AN ERROR, THE DRIVE WILL NOT BE RELEASED UNTIL
ERROR PROCESSING HAS BEEN COMPLETED.

SINGLE PORT DRIVES, DRIVES WHICH
ARE IN NEUTRAL BUT NOT BEING EXERCISED BY THE OPPOSITE PORT ARE STILL
TREATED AS DUAL PORT DRIVES IN THAT A RELEASE COMMAND IS ISSUED
AT THE END OF NORMAL ORDER PROCESSING OR AT THE END OF ERROR PROCESSING.
A RELEASE COMMAND ISSUED UNDER THESE CONDITIONS HAS NO FUNCTIONAL
EFFECT ON THE OPERATION OF THE DRIVE.

8.3 SELECTION OF OPERATION VARIABLES

A. SECTOR ADDRESS SELECTION IS RANDOM BETWEEN THE VALUES IN
    'MINSEC' AND 'MAXSEC'. TRACK ADDRESS SELECTION IS RANDOM
    BETWEEN THE VALUES IN 'MINTRK' AND 'MAXTRK'. CYLINDER ADDRESS
    SELECTION IS RANDOM BETWEEN 'MINCYL' AND 'MAXCYL'. IF A MINIMUM
    ADDRESS IS GREATER THAN THE CORRESPONDING MAXIMUM ADDRESS, THE
    PROGRAM WILL EXCLUDE ALL ADDRESSES BETWEEN 'MAX' AND 'MIN' FROM
    THE SELECTION. FOR EXAMPLE: IF 'MINTRK' IS 5 AND 'MAXTRK' IS
    IS 2, THEN TRACK ADDRESS SELECTION WILL EXCLUDE TRACKS 3 - 4
    FROM THE SELECTION AND SELECT AN ADDRESS FROM AMONG ADDRESSES
    5, 0, 1, 2.

B. THE BUFFER SIZE IS RANDOM SELECTED BETWEEN 4 - AND THE
    VALUE IN 'SIZE'. THE SIZE SELECTED IS WEIGHTED TO ENSURE
      THIS IS NECESSARY AS THE PROGRAM REQUIRES 4 LOCATIONS
    IN THE DATA PORTION OF THE SECTOR TO BE ABLE TO MATCH THE DATA

TO A PATTERN FOR DATA COMPARISON PURPOSES.

C. THE DATA WRITTEN IS RANDOMLY SELECTED AMONG THE 15 STANDARD PATTERNS. THE PARAMETER "PATTERN" ENABLES THE RANDOM PATTERN SELECTION,IF THIS PARAMETER IS 0;OTHERWISE,THE DATA PATTERN INDEXED BY THE VALUE "PATTERN" IS SELECTED.

D. THE ORDERS ARE SELECTED RANDOMLY. WRITE CHECK DATA AND WRITE CHECK HEADER & DATA ORDERS ARE PERFORMED ONLY IF THE PREVIOUS ORDER WAS THE APPROPRIATE DATA ORDER. IF THE 'FORMAT' PARAMETER IS ZERO, THE PROGRAM WILL NOT SELECT WRITE HEADER & DATA (AND WRITE CHECK HEADER & DATA) ORDERS. WHEN THE PROGRAM SELECTS A WRITE HEADER & DATA ORDER, THE BUFFER SIZE IS FORCED TO 258 (10); THE PROGRAM WILL NOT PERFORM A MULTI-SECTOR FORMAT WRITE OPERATION.

E. THE FIRST ORDER PERFORMED AFTER A UNIT IS ASSIGNED WITH A 'W', OR 'R' COMMAND IS NOT RANDOMLY SELECTED. THE PARAMETERS FOR THE FIRST OPERATION ARE THE MINIMUM OR STARTING VALUES OF THE VARIABLES.

8.4 DATA PATTERNS

THE PROGRAM SELECTS ONE OF THE FOLLOWING DATA PATTERNS TO WRITE WHEN A WRITE ORDER IS SELECTED. THE ENTIRE BUFFER IS FILLED WITH THE SELECTED PATTERN. WHEN DATA IS READ FROM THE DISK, THE PROGRAM COMPARES DATA ON A SECTOR BASIS: FROM THE FIRST 4 DATA WORDS OF EACH SECTOR, THE PROGRAM MATCHES THE DATA TO ONE OF THE FOLLOWING PATTERNS.

PAT 1	PAT 2	PAT 3	PAT 4	PAT 5	PAT 6	PAT 7	PAT 8
000001	177776	000000	133331	052525	155554	026455	066666
000003	177774	000000	133331	052525	155554	026455	066666
000007	177770	000000	133331	052525	155554	026455	066666
000017	177760	177777	133331	125252	155554	151322	066666
000037	177740	177777	133331	125252	155554	151322	066666
000077	177700	177777	133331	125252	155554	151322	066666
000177	177600	000000	133331	052525	155554	026455	066666
000377	177400	000000	133331	052525	155554	026455	066666
000777	177000	177777	133331	125252	155554	151322	066666
001777	176000	177777	133331	125252	155554	151322	066666
003777	174000	000000	133331	052525	155554	026455	066666
007777	170000	177777	133331	125252	155554	151322	066666
017777	160000	000000	133331	052525	155554	026455	066666
037777	140000	177777	133331	125252	155554	151322	066666
077777	100000	000000	133331	052525	155554	026455	066666
177777	000000	177777	133331	125252	155554	151322	066666

PAT 9	PAT 10	PAT 11	PAT 12	PAT 13	PAT 14	PAT 15
000001	177776	172666	077777	153333	000000	177777
000002	177775	155555	137777	066667	177777	000000
000004	177773	172666	157777	153333	177777	000000
000010	177767	155555	167777	066667	177777	000000

```
 1805                                   000020  177757  172666  173777  153333  177777  000000
 1806                                   000040  177737  155555  175777  066667  177777  000000
 1807                                   000100  177677  172666  176777  153333  177777  000000
 1808                                   000200  177577  155555  177377  066667  177777  000000
 1809                                   000400  177377  172666  177577  153333  177777  000000
 1810                                   001000  176777  155555  177677  066667  177777  000000
 1811                                   002000  175777  172666  177737  153333  177777  000000
 1812                                   004000  173777  155555  177757  066667  177777  000000
 1813                                   010000  167777  172666  177767  153333  177777  000000
 1814                                   020000  157777  155555  177773  066667  177777  000000
 1815                                   040000  137777  172666  177775  153333  177777  000000
 1816                                   100000  077777  155555  177776  066667  177777  000000
```

9.1 RH70(11)/RM03 DRIVER

THIS DOCUMENT IS THE USER'S GUIDE FOR THE RH70/RM03 DRIVER.

9.2 TO INITIALIZE THE DRIVER:

```
        JSR     PC,RMINIT
        RETURN
```

UPON RETURN YOU MUST EXAMINE THE "DRVSTA" TABLE TO DETERMINE THE DRIVES THAT ARE ONLINE FOR TESTING. THE 'DRVSTA' TABLE IS EIGHT BYTES; ONE BYTE PER DRIVE. THE STATE OF EACH DRIVE WILL BE INDICATED AS FOLLOWS:

DRVSTA	DRIVE STATE
>0	ONLINE RM03
=0	OFFLINE RM03, DRIVE IS NOT AN RM03, OR NONEXISTENT DRIVE
<0	UNSAFE RM03

THE DRIVE TYPE IS DEFINED IN AN 8 BYTE LONG TABLE TAGGED 'DRVTYP'. THE TABLE CONTAINS ONE BYTE FOR EACH DRIVE AND IS INDEXED BY THE DRIVE NUMBER. ENTRIES ARE ENCODED AS FOLLOWS:

DRVTYP	CONDITION
0	NONEXISTENT DRIVE
4	RM03
-1	NOT AN RM03

THE 'RMINIT' ROUTINE WILL DO A READIN PRESET AND WILL SET FMT22.

9.3 AFTER THE DRIVER HAS BEEN INITIALIZED, IT IS CALLED USING THE FOLLOWING SEQUENCE.

CALL:

```
        JSR     R0,RM03         ;MAKE THE CALL
        PNTDPB                  ;ADDRESS OF DPB*
        RETURN1                 ;RETURN IF QUEUE IS FULL
        RETURN2                 ;RETURN IF REQUEST IS IN
                                ;QUEUE OR THERE IS AN
                                ;ERROR CONDITION
```

*DPB (DATA PARAMETER BLOCK)

```
PNTDPB: .BYTE   0               ;(0) DRIVE NUMBER
        .BYTE   0               ;(1) OFFSET VALUE OF FMT22, ECT, AND HCI
        .BYTE   0               ;(2) COMMAND
        .BYTE   0               ;(3) PSEL AND A17 AND A16
        .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
```

```
                        .WORD   0               ;(6) BUFFER ADDRESS OR
                                                ;REGISTER TABLE POINTER
                        .BYTE   0               ;(10) SECTOR ADDRESS OR
                                                ;FIRST REG. INDEX
                        .BYTE   0               ;(11) TRACK ADDRESS OR
                                                ;LAST REG. INDEX
                        .WORD   0               ;(12) CYLINDER ADDRESS
                        .WORD   0               ;(14) ERROR TABLE POINTER
                                                ;POINTS TO THE FIRST OF TWENTY
                                                ;LOCATIONS OF WHERE THE DRIVER
                                                ;IS TO STORE THE RH70/RM03
                                                ;REGISTERS ON AN ERROR. IF LEFT
                                                ;ZERO REGISTERS ARE NOT SAVED.
                        .WORD   0               ;(16) STATUS/ERROR INDICATOR
                                                ;BIT15=1=>ERROR OCCURRED
                                                ;BIT07=1=>DONE
                                                ;BIT14-BIT09 AND BIT06-BIT03
                                                ;INDICATE TYPE OF ERROR

9.4     THE DRIVER PROVIDES A SOFTWARE TIMEOUT CAPABILITY.
        TO UTILIZE THIS CAPABILITY YOU MUST SUPPLY THE "RM TIMER" ROUTINE
        WITH THE ELAPSED TIME IN THE FOLLOWING MANNER:

                MOV     #16.,-(SP)      ;16 MILLISECONDS BETWEEN
                                        ;CLOCK TICKS
                JSR     PC,RMTMR        ;CALL THE TIMER ROUTINE

        IT SHOULD BE NOTED THAT YOU MUST PROVIDE THE CODE TO DRIVE THE
        CLOCK.  AND THE ELAPSED TIME MUST BE IN MILLISECONDS.
        THE DRIVER WILL SET THE TIMEOUT TO 1 SECOND FOR ALL POSITIONING
        AND DATA TRANSFER OPERATIONS AND WILL SET THE TIMOUT TO 30
        SECONDS FOR ERROR RECOVERY OPERATIONS.


9.4.1   EXAMPLE - WRITE 1000. WORDS

                1$:     JSR     R0,RM03         ;CALL THE DRIVER
                        WRTDPB                  ;DPB ADDRESS
                        BR      1$              ;WAIT FOR QUEUE IF FULL
                2$:     TST     WRTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
                        BEQ     2$
                        BMI     ERROR1          ;ERROR OCCURRED
                        .
                        .
                        .

                WRTDPB: .BYTE   5               ;DRIVE #5
                        .BYTE   0               ;
                        .BYTE   161             ;WRITE COMMAND
                        .BYTE   0               ;
                        .WORD   -1000.          ;WORD COUNT
                        .WORD   WRTBUF          ;BUFFER ADDRESS
                        .BYTE   3               ;SECTOR
                        .BYTE   5               ;TRACK
                        .WORD   400             ;CYLINDER
                        .WORD   ERRTBS          ;ERROR TABLE
```

```
                        .WORD   0               ;STATUS/ERROR INDICATOR

                        ALTERNATE DPB SETUP

WRTDPB:                 .WORD   5               ;THIS SETUP ACHIEVED
                        .WORD   WRITE           ;EVERYTHING THE
                        .WORD   -1000.          ;ABOVE TABLE DID, BUT
                        .WORD   WRTBUF          ;IN A CLEANER FORMAT
                        .BYTE   3,5
                        .WORD   400,ERRTBS,0
```

9.5 RH70/RM03 REGISTERS

MNEMONIC	INDEX
RMCS1	0
RMWC	2
RMBA	4
RMDA	6
RMCS2	10
RMDS	12
RMER1	14
RMAS	16
RMLA	20
RMDB	22
RMMR1	24
RMDT	26
RMSN	30
RMOF	32
RMDC	34
RMHR	36
RMMR2	40
RMER2	42
RMEC1	44
RMEC2	46

9.6 COMMANDS PERFORMED BY THE DRIVER

COMMAND	CODE	COMMAND TYPE
NO OPERATION	101	N
UNLOAD	103	N
SEEK	105	P
RECALIRATE	107	P
DRIVE CLEAR	111	N
RELEASE	113	N
OFFSET	115	P

RETURN TO CENTER	117	P
READIN PRESET	121	N
PACK ACKNOWLEDGE	123	N
SEARCH	131	P
GET REGISTER(S)	141	S
SET FORMAT	143	S
SELECT DRIVE	145	S
WRITE CHECK DATA	151	D
WRITE CHECK HEADER AND DATA	153	D
WRITE DATA	161	D
WRITE HEADER & DATA	163	D
READ DATA	171	D
READ HEADER & DATA	173	D

N = HOUSEKEEPING
P = POSITIONING
D = DATA TRANSFER
S = SPECIAL PROVIDED BY THE DRIVER

9.7 DPB STATUS/ERROR INDICATOR WORD

THIS INDICATOR WILL INFORM THE USER OF THE RESULTS OF THE REQUEST. THIS IS ACCOMPLISHED BY SETTING VARIES BITS OF THE INDICATOR TO A ONE.

BIT NO.	MEANING IF ON A "1"
15	ERROR OCCURRED DONE (BIT07=0); BITS 14-10 SPECIFIES TYPE DONE (BIT07=1); BITS 06-03 SPECIFIES TYPE
14(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON AN OFFLINE OR UNSAFE DRIVE
13(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON A DRIVE THAT HAS AN UNLOAD REQUEST IN QUEUE.
12(2)	PERSISTENT UNSAFE CONDITION EXIST.
11(2)	UNCORRECTABLE PARITY ERROR OCCURRED

```
                                    10(2)(4)        FATAL PARITY ERROR.  A MASSBUS CLEAR WAS
                                                    PERFORMED, ALL QUEUES WERE EMPTIED, AND
                                                    ALL DRVACT'S SET TO THE IDLE STATE

                                    9(3)(4)         SOFTWARE TIMEOUT OCCURRED ON THIS DRIVE

                                    8(4)            SOFTWARE TIMEOUT OCCURRED ON ANOTHER DRIVE

                                    7               DONE

                                    6(2)            ERROR OCCURRED DURING AN I/O OPERATION

                                    5(2)            ERROR OCCURRED DURING AN OPERATION
                                                    OTHER THAN I/O.

                                    4(2)            CORRECTABLE UNSAFE CONDITION OCCURRED

                                    3(2)            DRIVE ERROR OCCURRED THAT CAUSED AN
                                                    AUTOMATIC "RECALIBRATE" SEQUENCE

                                    2               PORT REQUEST TIMEOUT.  THE DRIVER REQUESTED
                                                    THE DRIVE BUT THE OPPOSITE PORT DID NOT
                                                    RELEASE THE DRIVE WITHIN 20 SECONDS.

                                    1               NON-EXISTENT DRIVE REQUESTED.  USER MADE
                                                    A REQUEST FOR A NON-EXISTENT DRIVE.

                                    (1) =>          REQUEST WASN'T PUT IN QUEUE.  (RH70/RM03
                                                    REGISTERS WERE NOT SAVED)

                                    (2) =>          REQUEST QUEUE HAS BEEN EMPTIED.  THE DRIVER
                                                    ISSUED A "DRIVE CLEAR" TO THE DRIVE.
                                                    NOTE: ALL RH70/RM03 REGISTERS ARE SAVED
                                                    AS PER DPB+14 BEFORE THE "DRIVE CLEAR".

                                    (3) =>          REQUEST QUEUE HAS BEEN EMPTIED.  THE
                                                    DRIVER ISSUED A MASSBUS INIT.  ALL
                                                    RH70/RM03 REGISTERS FOR THE DRIVE WERE
                                                    SAVED AS PER DPB+14 BEFORE THE INIT.

                                    (4) =>          A "RECALIBRATE" SHOULD BE ISSUED
                                                    BEFORE ANY OTHER COMMAND.

        9.8     ERROR CALLS MADE BY THE DRIVER.

                THERE ARE A FEW ERRORS THAT CAN OCCUR THAT CAN NOT BE INDICATED IN A DPB.

                WHEN THIS TYPE OF ERROR IS DETECTED BY THE DRIVER IT WILL MAKE
                AN ERROR CALL OF THE FORM "ERROR N", WHERE "N" IS THE ERROR
                NUMBER AND THE ERROR WILL BE AN EMT INSTRUCTION.


                N       TYPE                    DATA AVAILABLE
                -       ----                    --------------
```

```
                        1       RH70 INTERRUPT          *R4= RMCS1'S ADDRESS
                                OCCURRED (RHAS=0)

                        2       UNEXPECTED ATTENTION     R1= DRIVE NUMBER
                                OCCURRED                 R3= ATA BIT
                                                        *R4= RMCS1'S ADDRESS
                                                         R5= (RMAS)
                                                         RMERRS  =RMDS
                                                         RMERRS+2=RMER1
                                                         RMERRS+4=RMER2
                                                         RMERRS+6=RMMR2

                        3       MASSBUS PARITY           RD.ADR= ADDRESS OF REG. READ
                                ERROR (MCPE=1)           RD.WRD= WORD READ

                        4       MASSBUS PARITY           WRT.AD= ADDRESS OF REG. WRITTEN
                                ERROR (PAR=1)            WRT.WD= WORD WRITTEN
                                                         RD.WRD= WORD READ BACK

                        5       ADDRESS PLUG CHANGE      R1= DRIVE NUMBER
                                BIT SET ('OPE' ERROR)    R3= ATA BIT
                                                        *R4= RMCS1'S ADDRESS
                                                         R5= (RMAS)
                                                         RMERRS  =RMDS
                                                         RMERRS+2=RMER1
                                                         RMERRS+4=RMER2
                                                         RMERRS+6=RMMR2

                        * THIS IS THE ACTUAL UNIBUS ADDRESS (176700)

                        @
```

```
                        .TITLE  MD-11-DZRMB A0/00, RM03 PERFORMANCE EXERCISER
                        ;*COPYRIGHT (C) 1976
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY C. CHEN
                        ;*
                        ;*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
                        ;*         7            DISPLAY ALL DATA COMPARE ERRORS
                        ;*         6            DON'T CHANGE PARAMETERS (LOOP ON PRESENT VALUES)
                        ;*         5            A. PARTIAL REGISTER DISPLAY IF ERROR
                        ;*                      B. NO ECC CORRECTION RESULTS DISPLAYED IF ERROR
                        ;*         4            A. DO NOT CHECK FOR MAXIMUM ERROR COUNTS
                        ;*                      B. DO NOT DROP DRIVE WHEN NORMAL END OF TEST REACHED
                        ;*         3            A. DISPLAY ERROR SECTOR IF 'DCK', 'DTE', OR 'WCF' ERROR
                        ;*                      B. DISPLAY SECTOR IF 'DCK' ERR UNCORRECTABLE AFTER
                        ;*                         28TH RETRY
                        ;*                      C. IF DATA COMPARE ERROR & SW7 SET, DISPLAY
                        ;*                         REMAINDER OF BUFFER
                        ;*         2            A. DON'T TYPE SUBSYSTEM STATUS WHEN PROGRAM STARTED
                        ;*                      B. DON'T TYPE PERFORMANCE SUMMARY
                        ;*         1            INHIBIT DATA COMPARSION AFTER READ ORDERS
                        ;*         0            READ ONLY MODE
                        .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
```

```
                                R3=     %3              ;;GENERAL REGISTER
                                R4=     %4              ;;GENERAL REGISTER
                                R5=     %5              ;;GENERAL REGISTER
                                R6=     %6              ;;GENERAL REGISTER
                                R7=     %7              ;;GENERAL REGISTER
                                SP=     %6              ;;STACK POINTER
                                PC=     %7              ;;PROGRAM COUNTER

                                ;*PRIORITY LEVEL DEFINITIONS
                                PR0=    0               ;;PRIORITY LEVEL 0
                                PR1=    40              ;;PRIORITY LEVEL 1
                                PR2=    100             ;;PRIORITY LEVEL 2
                                PR3=    140             ;;PRIORITY LEVEL 3
                                PR4=    200             ;;PRIORITY LEVEL 4
                                PR5=    240             ;;PRIORITY LEVEL 5
                                PR6=    300             ;;PRIORITY LEVEL 6
                                PR7=    340             ;;PRIORITY LEVEL 7

                                ;*"SWITCH REGISTER" SWITCH DEFINITIONS
                                SW15=   100000
                                SW14=   40000
                                SW13=   20000
                                SW12=   10000
                                SW11=   4000
                                SW10=   2000
                                SW09=   1000
                                SW08=   400
                                SW07=   200
                                SW06=   100
                                SW05=   40
                                SW04=   20
                                SW03=   10
                                SW02=   4
                                SW01=   2
                                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)
                                BIT15=  100000
                                BIT14=  40000
                                BIT13=  20000
                                BIT12=  10000
                                BIT11=  4000
                                BIT10=  2000
                                BIT09=  1000
                                BIT08=  400
                                BIT07=  200
```

```
                        
2240            000100  BIT06=  100
2241            000040  BIT05=  40
2242            000020  BIT04=  20
2243            000010  BIT03=  10
2244            000004  BIT02=  4
2245            000002  BIT01=  2
2246            000001  BIT00=  1
2247                    .EQUIV  BIT09,BIT9
2248                    .EQUIV  BIT08,BIT8
2249                    .EQUIV  BIT07,BIT7
2250                    .EQUIV  BIT06,BIT6
2251                    .EQUIV  BIT05,BIT5
2252                    .EQUIV  BIT04,BIT4
2253                    .EQUIV  BIT03,BIT3
2254                    .EQUIV  BIT02,BIT2
2255                    .EQUIV  BIT01,BIT1
2256                    .EQUIV  BIT00,BIT0
2257
2258                    ;*BASIC "CPU" TRAP VECTOR ADDRESSES
2259            000004  ERRVEC=  4              ;;TIME OUT AND OTHER ERRORS
2260            000010  RESVEC=  10             ;;RESERVED AND ILLEGAL INSTRUCTIONS
2261            000014  TBITVEC=14              ;;"T" BIT
2262            000014  TRTVEC=  14             ;;TRACE TRAP
2263            000014  BPTVEC=  14             ;;BREAKPOINT TRAP (BPT)
2264            000020  IOTVEC=  20             ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
2265            000024  PWRVEC=  24             ;;POWER FAIL
2266            000030  EMTVEC=  30             ;;EMULATOR TRAP (EMT) **ERROR**
2267            000034  TRAPVEC=34              ;;"TRAP" TRAP
2268            000060  TKVEC=   60             ;;TTY KEYBOARD VECTOR
2269            000064  TPVEC=   64             ;;TTY PRINTER VECTOR
2270            000240  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
2271            176700          ABASE=176700
2272            000254          AVECT1=254
2273
2274                    ;;*****************************************************************
2275
2276                    .SBTTL  RM03 REGISTERS
2277
2278                    ;;*****************************************************************
2279
2280                    ;CONTROL AND STATUS REGISTER 1 (RMCS1)
2281
2282            000100  IE=     100             ;INTERRUPT ENABLE (BIT #6)
2283            000200  RDY=    200             ;READY (BIT #7)
2284            000400  A16=    400             ;HIGH ORDER BUS ADDRESS BIT (BIT #8)
2285            001000  A17=    1000            ;HIGH ORDER BUS ADDRESS BIT (BIT #9)
2286            002000  PSEL=   2000            ;PORT SELECT (BIT #10)
2287            020000  MCPE=   20000           ;MASSBUSS PARITY ERROR (BIT #13)
2288            040000  TRE=    40000           ;TRANSFER ERROR (BIT #14)
2289                    ;SC=    100000          ;SPECIAL CONDITION (BIT #15)
2290
2291                    ;WORD COUNT REGISTER (RMWC)
2292                    ;(EACH BIT IS CALLED BY BIT NUMBER)
2293
2294                    ;BUS ADDRESS REGISTER (RMBA)
2295                    ;(EACH BIT IS CALLED BY BIT NUMBER)
```

```
2296
2297                            ;CONTROL AND STATUS REGISTER 2 (RMCS2)
2298
2299    000001                  US1=    1               ;UNIT SELECT (BIT #0)
2300    000002                  US2=    2               ;UNIT SELECT (BIT #1)
2301    000004                  US4=    4               ;UNIT SELECT (BIT #2)
2302    000010                  BAI=    10              ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
2303    000020                  PAT=    20              ;MASSBUS PARITY TEST (BIT #4)
2304    000040                  CLR=    40              ;CLEAR (BIT #5)
2305    000100                  IR=     100             ;INPUT READY (BIT #6)
2306    000200                  OR=     200             ;OUTPUT READY (BIT #7)
2307    000400                  MDPE=   400             ;MASS BUS PARITY ERROR (BIT #8)
2308    001000                  MXF=    1000            ;MISSED TRANSFER ERROR (BIT #9)
2309    002000                  PGE=    2000            ;PROGRAM ERROR (BIT #10)
2310    004000                  NEM=    4000            ;NON EXISTENT MEMORY (BIT #11)
2311    010000                  NED=    10000           ;NON EXISTENT DRIVE (BIT #12)
2312    020000                  UPE=    20000           ;UNIBUS PARITY ERROR (BIT #13)
2313    040000                  WCE=    40000           ;WRITE CHECK ERROR (BIT #14)
2314    100000                  DLT=    100000          ;DATA LATE (BIT #15)
2315
2316                            ;DATA BUFFER REGISTER (RMDB)
2317                            ;(EACH BIT IS CALLED BY BIT NUMBER)
2318
2319
2320                            ;;*****************************************************************
2321
2322                            .SBTTL  RM03 REGISTERS
2323
2324                            ;;*****************************************************************
2325
2326                            ;CONTROL AND STATUS 1 REGISTER. (#00)
2327
2328    000001                  GO=     1               ;GO BIT (BIT #0)
2329    000002                  FO=     2               ;FUNCTION CODE BIT #1
2330    000004                  F1=     4               ;FUNCTION CODE BIT #2
2331    000010                  F2=     10              ;FUNCTION CODE BIT #3
2332    000020                  F3=     20              ;FUNCTION CODE BIT #4
2333    000040                  F4=     40              ;FUNCTION CODE BIT #5
2334    004000                  DVA=    4000            ;DEVICE AVAILABLE (BIT #11)
2335
2336                            ;DRIVE STATUS REGISTER (RMDS1) (#01)
2337
2338    000001                  OFFON=  1               ;OFFSET ON (BIT #0)
2339    000100                  VV=     100             ;VOLUME VALID (BIT #6)
2340    000200                  DRY=    200             ;DRIVE READY (BIT #7)
2341    000400                  DPR=    400             ;DRIVE PRESENT (BIT #8)
2342    001000                  PGM=    1000            ;PROGRAMABLE (BIT #9)
2343    002000                  LBT=    2000            ;LAST SECTOR TRANSFERRED (BIT #10)
2344    004000                  WRL=    4000            ;WRITE LOCK (BIT #11)
2345    010000                  MOL=    10000           ;MEDIUM ON-LINE (BIT #12)
2346    020000                  PIP=    20000           ;POSITIONING OPERATION IN PROGRESS (BIT #13)
2347    040000                  ERR=    40000           ;COMPOSITE ERROR (BIT #14)
2348    100000                  ATA=    100000          ;ATTENTION ACTIVE (BIT #15)
2349
2350                            ;ERROR REGISTER #01 (RMER1) (#02)
2351
```

```
2352            000001                  ILF=    1                       ;ILLEGAL FUNCTION (BIT #0)
2353            000002                  ILR=    2                       ;ILLEGAL REGISTER (BIT #1)
2354            000004                  RMR=    4                       ;REGISTER MODIFICATION REFUSED (BIT #2)
2355            000010                  PAR=    10                      ;PARITY ERROR (BIT #3)
2356            000020                  FER=    20                      ;FORMAT ERROR (BIT #4)
2357            000040                  WCF=    40                      ;WRITE CLOCK FAIL (BIT #5)
2358            000100                  ECH=    100                     ;ECC HARD ERROR (BIT #6)
2359            000200                  HCE=    200                     ;HEADER COMPARE ERROR (BIT #7)
2360            000400                  HCRC=   400                     ;HEADER CRC ERROR (BIT #8)
2361            001000                  AOE=    1000                    ;ADDRESS OVERFLOW ERROR (BIT #9)
2362            002000                  IAE=    2000                    ;INVALID ADDRESS ERROR (BIT #10)
2363            004000                  WLE=    4000                    ;WRITE LOCK ERROR (BIT #11)
2364            010000                  DTE=    10000                   ;DRIVE TIMING ERROR (BIT #12)
2365            020000                  OPI=    20000                   ;OPERATION INCOMPLETE (BIT #13)
2366            040000                  UNS=    40000                   ;DRIVE UNSAFE (BIT #14)
2367            100000                  DCK=    100000                  ;DATA CHECK ERROR (BIT 15)
2368
2369                                    ;MAINTAINABILITY REGISTER (RMMR1)(#03)
2370
2371
2372                                    ;ATTENTION SUMMARY PSEUDO-REGISTER (RMAS) (#04)
2373
2374            000001                  AT0=    1                       ;DEVICE 0 (BIT #0)
2375            000002                  AT1=    2                       ;DEVICE 1 (BIT #1)
2376            000004                  AT2=    4                       ;DEVICE 2 (BIT #2)
2377            000010                  AT3=    10                      ;DEVICE 3 (BIT #3)
2378            000020                  AT4=    20                      ;DEVICE 4 (BIT #4)
2379            000040                  AT5=    40                      ;DEVICE 5 (BIT #5)
2380            000100                  AT6=    100                     ;DEVICE 6 (BIT #6)
2381            000200                  AT7=    200                     ;DEVICE 7 (BIT #7)
2382
2383                                    ;DESIRED SECTOR/TRACK ADDRESS REGISTER (RMDA) (#05)
2384
2385
2386                                    ;DRIVE TYPE REGISTER (RMDT) (#06)
2387
2388            000001                  DT00=   1                       ;DRIVE TYPE NUMBER BIT 1
2389            000002                  DT01=   2                       ;DRIVE TYPE NUMBER BIT 2
2390            000004                  DT02=   4                       ;DRIVE TYPE NUMBER BIT 3
2391            000010                  DT03=   10                      ;DRIVE TYPE NUMBER BIT 4
2392            000020                  DT04=   20                      ;DRIVE TYPE NUMBER BIT 5
2393            000040                  DT05=   40                      ;DRIVE TYPE NUMBER BIT 6
2394            000100                  DT06=   100                     ;DRIVE TYPE NUMBER BIT 7
2395            000200                  DT07=   200                     ;DRIVE TYPE NUMBER BIT 8
2396            000400                  DT08=   400                     ;DRIVE TYPE NUMBER BIT 9
2397            004000                  DRQ=    4000                    ;DRIVE REQUEST REQUIRED (BIT #11)
2398            020000                  MOH=    20000                   ;MOVING HEAD (BIT #13)
2399            040000                  TAP=    40000                   ;TAPE DRIVE (BIT #14)
2400            100000                  NSA=    100000                  ;NOT SECTOR ADDRESSED (BIT #15)
2401
2402                                    ;LOOK-AHEAD REGISTER (RMLA) (#07)
2403
2404            000100                  SC1=    100                     ;SECTOR COUNT FIELD 0 (BIT #6)
2405            000200                  SC2=    200                     ;SECTOR COUNT FIELD 1 (BIT #7)
2406            000400                  SC04=   400                     ;SECTOR COUNT FIELD 2 (BIT #8)
2407            001000                  SC10=   1000                    ;SECTOR COUNT FIELD 3 (BIT #9)
```

```
2408            002000                  SC20=   2000                    ;SECTOR COUNT FIELD 4 (BIT #10)
2409
2410
2411                                    ;SERIAL NUMBER REGISTER (RMSN) (#10)
2412                                    ;(EACH IS CALLED BY BIT NUMBER)
2413                                    ;OFFSET REGISTER (RMOF) (#11)
2414
2415            000001                  OFFDIR= 1                       ;RM03 OFFSET DIRECTION
2416            002000                  HCI=    2000                    ;HEADER COMPARE INHIBIT (BIT #10)
2417            004000                  ECI=    4000                    ;ERROR CORRECTION CODE INHIBIT (BIT #11)
2418            010000                  FMT16=  10000                   ;FORMAT BIT (BIT #12
2419
2420                                    ;DESIRED CYLINDER ADDRESS (RMDC) (#12)
2421                                    ;(EACH BIT IS CALLED BY BIT NUMBER)
2422
2423                                    ;CURRENT CYLINDER ADDRESS (RMCC) (#13)
2424                                    ;(REGISTER CURRENTLY NOT USED)
2425
2426                                    ;RM03 ERROR REGISTER #02 (RMER2) (#15)
2427
2428            000010                  OPE=    10
2429            000200                  DVC=    200
2430            002000                  LBC=    2000
2431            004000                  LSC=    4000
2432            010000                  IVC=    10000
2433            020000                  DPE=    20000
2434            040000                  SKI=    40000                   ;SEEK INCOMPLETE (BIT #14)
2435
2436                                    ;ECC POSITION REGISTER (RMEC1) (#16)
2437                                    ;(EACH BIT IS CALLED BY BIT NUMBER)
2438
2439                                    ;ECC PATTERN REGISTER (RMEC2) (#17)
2440                                    ;(EACH BIT IS CALLED BY BIT NUMBER)
2441
2442                                    ;;*****************************************************************
2443
2444                                    .SBTTL  RM03 DRIVER COMMANDS
2445
2446                                    ;;*****************************************************************
2447
2448            000101          RNOP    =       101             ;NO OPERATION
2449            000105          SEEK    =       105             ;SEEK
2450            000107          RECAL   =       107             ;RECALIBRATE
2451            000111          DRVCLR  =       111             ;DRIVE CLEAR
2452            000113          RELSE   =       113             ;RELEASE
2453            000115          OFFSET  =       115             ;OFFSET
2454            000117          RTC     =       117             ;RETURN TO CENTER LINE
2455            000121          READIN  =       121             ;READ IN PRESET
2456            000123          ACK     =       123             ;PACK ACKNOWLEDGE
2457            000131          SEARCH  =       131             ;SEARCH
2458            000141          GETREG  =       141             ;GET REGISTERS
2459            000143          SETFMT  =       143             ;SET FORMAT (& ECI OR HCI)
2460            000145          SELDRV  =       145             ;SELECT DRIVE
2461            000151          WCKD    =       151             ;WRITE CHECK DATA
2462            000153          WCKHD   =       153             ;WRITE CHECK HEADER & DATA
2463            000161          WRTDAT  =       161             ;WRITE DATA
```

```
                    000163                  WRTHD   =       163             ;WRITE HEADER & DATA
                    000171                  RDDAT   =       171             ;READ DATA
                    000173                  RDHD    =       173             ;READ HEADER & DATA

                                            .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  STARTING ADDRESS(ES)
000200  000137  003632                              JMP     @#START1        ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  003622                              JMP     @#START         ;CHANGE THE RH11 UNIBUS ADDRESS
                                                                            ;AFTER INITIAL START

                                            .SBTTL  ACT11 HOOKS

                                            ;;**************************************************************
                                            ;HOOKS REQUIRED BY ACT11
                    000210                          $SVPC=.                 ;SAVE PC
                    000046                          .=46
000046  027260                              $ENDAD                          ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                    000052                          .=52
000052  040000                              .WORD   40000                   ;;2)SET LOC.52 TO 40000
                    000210                          .=$SVPC                 ;; RESTORE PC
                    001100                          .=1100
                                            .SBTTL  APT PARAMETER BLOCK

                                            ;;**************************************************************
                                            ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                            ;;**************************************************************
                    001100                          .$X=.   ;;SAVE CURRENT LOCATION
                    000024                          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                              200     ;;FOR APT START UP
                    000044                          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001100                              $APTHDR ;;POINT TO APT HEADER BLOCK
                    001100                          .=.$X   ;;RESET LOCATION COUNTER
                                            ;;**************************************************************
                                            ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                            ;INTERFACE SPEC.

001100                                      $APTHD:
001100  000000                             $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001102  001204                             $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001104  000264                             $TSTM:  .WORD   180.    ;;RUN TIM OF LONGEST TEST
001106  000264                             $PASTM: .WORD   180.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001110  000264                             $UNITM: .WORD   180.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001112  000032                                     .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
                    001114                          TAB.XY=.
```

```
                                .SBTTL  COMMON TAGS

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

                                        .=TAB.XY
001114                          $CMTAG:                         ;;START OF COMMON TAGS
001114                                  .WORD   0
001114  000000                  $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001116     000                  $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001117     000                  $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001120  000000                  $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001122  000000                  $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001124  000000                  $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001126  000000                  $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001130     000                  $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001131     001                  $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001132  000000                  $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001134  000000                  $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001136  000000                  $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001140  000000                  $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001142  000000                          .WORD   0               ;;RESERVED--NOT TO BE USED
001144  000000                          .WORD   0
001146     000                  $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001150     000                  $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001151  000000                          .WORD   0
001152  177570                  SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001154  177570                  DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001156  177560                  $TKS:   177560                  ;;TTY KBD STATUS
001160  177562                  $TKB:   177562                  ;;TTY KBD BUFFER
001162  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001164  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001166     000                  $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001167     002                  $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001170     012                  $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001171     000                  $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001172  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001174     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
001175     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001176  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;*****************************************************************
                                .EVEN
001200                          $MAIL:                          ;;APT MAILBOX
001200  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001202  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001204  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001206  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001210  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001212  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001214  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001216  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001220                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
```

```
2572  001224  000                  $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
2573  001225  000                  $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
2574  001226  000000               $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
2575  001230  000000               $USWR:  .WORD   AUSWR   ;;USER SWITCHES
2576  001232  000000               $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
2577                                                      BITS 15-11=CPU TYPE
2578                                                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2579                                                              11/70=06,PDQ=07,Q=10
2580                                                      BIT 10=REAL TIME CLOCK
2581                                                      BIT  9=FLOATING POINT PROCESSOR
2582                                                      BIT  8=MEMORY MANAGEMENT
2583  001234  000                  $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
2584  001235  000                  $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
2585                                                      MEM.TYPE BYTE   --  (HIGH BYTE)
2586                                                              900 NSEC CORE=001
2587                                                              300 NSEC BIPOLAR=002
2588                                                              500 NSEC MOS=003
2589  001236  000000               $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
2590                                                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
2591  001240  000                  $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
2592  001241  000                  $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
2593  001242  000000               $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
2594  001244  000                  $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
2595  001245  000                  $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
2596  001246  000000               $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
2597  001250  000                  $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
2598  001251  000                  $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
2599  001252  000000               $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
2600  001254  000254               $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2601  001256  000000               $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2602  001260  176700               $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2603  001262  000000               $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
2604  001264  000000               $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
2605  001266  000000               $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
2606  001270                       $ETEND:
2607                                .MEXIT
2608        000015                 CR      =       15
2609        000012                 LF      =       12
2610  001270  176700               $RMADR: .WORD   176700          ;FIRST ADDRESS OF RH11/RM03 REGISTERS
2611  001272  000254               $RMVEC: .WORD   254             ;RM03 VECTOR ADDRESS
2612  001274  172540               $LKCSR: .WORD   172540          ;ADDR OF KW11-P STATUS REGISTER
2613  001276  172542               $LKCSB: .WORD   172542          ;ADDR OF KW11-P COUNTER BUFFER
2614  001300  000104               $LPVEC: .WORD   104             ;ADDR OF KW11-P VECTOR
2615  001302  177546               $LKS:   .WORD   177546          ;ADDR OF KW11-L STATUS REGISTER
2616  001304  000100               $LLVEC: .WORD   100             ;ADDR OF KW11-L VECTOR
2617  001306  177777               PCLOCK: .WORD   -1              ;'0' IF KW11-P IS ON SYSTEM
2618  001310  177777               CLKFLG: .WORD   -1              ;'0' IF A CLOCK IS AVAILABLE
2619  001312  000074               HZ:     .WORD   74              ;74 (8) IF 60 HZ SYSTEM; 62 (8) IF 50 HZ SYSTEM
2620  001314  000000               STATIN: .WORD   0               ;'TYPE STATISTICS' INDICATOR
2621  001316  000000               PACK:   .WORD   0               ;'W ' COMMAND INDICATOR
2622  001320  000000  000000  000000 DATE:  .WORD   0,0,0,0,0      ;OPERATOR ENTERED DATE
2623  001326  000000  000000
2624  001332  000000  000000  000000 OPERID: .WORD  0,0,0,0        ;OPERATOR ID
2625  001340  000000
2626        001216                 DRIVE   =       $UNIT           ;DRIVE # STORAGE: ERRORS 1-5 & 10
2627  001342  000000               ATTN:   .WORD   0               ;ATTN REG STORAGE: ERRORS 1-5 & 10
```

```
2628  001344  000000                  UNIT:   .WORD   0               ;DRIVE # STORAGE FOR PRINTOUT
2629  001346  000000                  MASK:   .WORD   0               ;ERROR RETRY REGISTER MASK
2630  001350    000       000         RETRY:  .BYTE   0,0             ;ERROR RETRY LIMIT IN THE LOWER BYTE
2631                                                                  ;RETRY COUNT IN THE UPPER BYTE
2632  001352  000003                  FAIRNS: .WORD   3               ;MAXIMUM TIME IN QUEUE VALUE
2633  001354  000000                  LSTAD:  .WORD   0               ;STORE LAST MEMORY ADDRESS HERE
2634  001356  000000                  CHGADR: .WORD   0               ;CHANGE RH11 UNIBUS ADDRESS FLAG
2635  001360  000000                  CFLAG:  .WORD   0               ;'CONTROL C' FLAG
2636  001362  000000                  BADSEC: .WORD   0               ;BAD SECTOR/TRACK FLAG
2637  001364  000000                  HOUR:   .WORD   0               ;HOUR COUNT STORED HERE (MAXIMUM - 999.)
2638  001366  000000                  MINUTE: .WORD   0               ;MINUTE'S COUNT STORED HERE
2639  001370  000000                  SECOND: .WORD   0               ;SECOND'S COUNT STORED HERE
2640  001372  000000                  SIXTEE: .WORD   0               ;TIMER ROUTINE COUNTER (FOR ONE SECOND)
2641  001374  177777                  ZROIND: .WORD   -1              ;ZERO INDICATOR FOR THE DATA COMPARE ROUTINE
2642  001376    000                   FRSTER: .BYTE   0               ;DATA COMPARE ERROR FLAG
2643                                                                  ;IF > 0, PROCESSING 'DCKER' OR CAN'T MATCH PATTERN
2644                                                                  ;IF < 0, MISCOMPARSION FOUND
2645  001377    000                           .BYTE   0               ;MISCOMPARSION OR CAN'T MATCH PATTERN FLAG
2646                                                                  ;IF < 0, ERROR IN BUFFER
2647  001400  000000                  SAVER1: .WORD   0               ;SAVE R1 HERE
2648  001402  000000                  SAVER5: .WORD   0               ;SAVE R5 HERE
2649  001404  000000                  ERCTR:  .WORD   0               ;NUMBER OF ERRORS
2650  001406  000000                  LIMIT:  .WORD   0               ;DISPLAY LIMIT
2651  001410  000000                  CMCNT:  .WORD   0               ;WORD COUNT
2652  001412  000000                  CMCYL:  .WORD   0               ;CYLINDER ADDRESS
2653  001414    000                   CMSEC:  .BYTE   0               ;SECTOR ADDRESS
2654  001415    000                   CMTRK:  .BYTE   0               ;TRACK ADDRESS
2655  001416  000000                  ECBIT:  .WORD   0               ;ERROR BURST BIT OFFSET
2656  001420  000000                  ECSEC:  .WORD   0               ;ERROR BURST WORD OFFSET (RELATIVE TO SECTOR)
2657  001422  000000                  ECMSK0: .WORD   0               ;CORRECTION MASK FOR FIRST ERROR WORD
2658  001424  000000                  ECMSK1: .WORD   0               ;CORRECTION MASK FOR SECOND ERROR WORD
2659  001426  000000                  ECWRD:  .WORD   0               ;LOCATION OF FIRST ERROR WORD
2660  001430  000000                  ECGD:   .WORD   0               ;GOOD DATA, FIRST WORD
2661  001432  000000                  ECBAD0: .WORD   0               ;BAD DATA, FIRST WORD
2662  001434  000000                  ECWRD1: .WORD   0               ;LOCATION OF SECOND ERROR WORD
2663  001436  000000                  ECGD1:  .WORD   0               ;GOOD DATA, SECOND WORD
2664  001440  000000                  ECBAD1: .WORD   0               ;BAD DATA, SECOND WORD
2665  001442  000037                  SECLMT: .WORD   31.             ;SECTOR ADDRESS LIMIT
2666  001444  000004                  TRKLMT: .WORD   4.              ;TRACK ADDRESS LIMIT
2667  001446  001465                  CYLIMT: .WORD   821.            ;CYLINDER ADDRESS LIMIT FOR RM03
2668
2669                                  ;;*****************************************************************
2670
2671                                  .SBTTL  COMMON PARAMETERS
2672
2673                                  ;;*****************************************************************
2674
2675  001450  002740                  ENDCON: .WORD   002740          ;1.875X10↑8 WORDS (10) [3X10↑9 BITS]
2676  001452  005455                          .WORD   005455          ;MSW
2677  001454  143300                  ENDSEK: .WORD   143300          ;3 X 10↑6 SEEKS  (LSW)
2678  001456  000055                          .WORD   55              ;MSW
2679  001460  000001                  PASCNT: .WORD   1               ;NUMBER OF PASSES TO END OF TEST
2680  001462  000000                  MAXDL:  .WORD   0               ;MAXIMUM DATA TRANFER SIZE IN WORDS
2681                                                                  ;(FILLED BY PROGRAM AT STARTUP OR BY OPERATOR
2682                                                                  ;DURING PARAMETER ENTRY DIALOG.)
2683  001464  000144                  MAXER:  .WORD   100.            ;MAXIMUM ERRORS - 100(10)
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2684  001466  000005  000000          INTRVL: .WORD   5,0          ;FIRST WORD IS THE PERFORMANCE TYPEOUT INTERVAL
2685                                                               ;(IN MINUTES).  SECOND WORD IS THE INTERVAL
2686                                                               ;COUNTER
2687                                                               ;COUNTER.  UPPER BYTE IS VALUE.
2688  001472  000004                  CMPLMT: .WORD   4            ;NUMBER OF COMPARE ERRORS TYPED OUT
2689  001474  000001                  FORMAT: .WORD   1            ;IF NOT EQ 0, ALLOW WRITE HEADER & DATA ORDERS
2690                                                               ;IF EQ 0, DO NOT ALLOW WRITE HEADER & DATA ORDERS
2691  001476  000000                  WCSEL:  .WORD   0            ;IF EQ TO 0, GENERATE A RANDOM WORD COUNT
2692                                                               ;  FOR THE OPERATION.
2693                                                               ;IF NOT EQ TO 0, USE THE VALUE IN 'MAXDL' FOR
2694                                                               ;  THE WORD COUNT
2695  001500  000003                  RATIO:  .WORD   3            ;READ/WRITE RATIO [RANGE 0 - 7]
2696                                                               ;0 - 0/8          (READ/WRITE)
2697                                                               ;1 - 7/1
2698                                                               ;2 - 6/2
2699                                                               ;3 - 5/3
2700                                                               ;4 - 4/4
2701                                                               ;5 - 3/5
2702                                                               ;6 - 2/6
2703                                                               ;7 - 1/7
2704  001502  000001                  AUTOCK: .WORD   1            ;IF NOT EQ 0, DO AN APPROPRITE WRITE
2705                                                               ;  CHECK AFTER EACH WRITE ORDER.
2706                                                               ;IF EQ 0, SELECT WRITE CHECK ORDERS
2707                                                               ;  RANDOMLY.
2708  001504  000001                  NOTPRT: .WORD   1            ;IF EQ 1, DO NOT PRINT DATA ERROR MESSAGES
2709                                                               ;  ASSOCIATED WITH OPERATOR SPECIFIED
2710                                                               ;  BAD PACK AREAS.
2711                                                               ;IF NOT EQ 0, PRINT ERROR MESSAGES RELATING TO
2712                                                               ;  THESE AREAS.
2713  001506  000001                  ENDET:  .WORD   1            ;IF NOT EQ 0, END OF PASS DETERMINED
2714                                                               ;  BY THE 'WORDS READ' COUNT.
2715                                                               ;IF EQ 0, END OF PASS DETERMINED
2716                                                               ;  BY THE SEEK COUNT.
2717  001510  000000                  PATTEN: .WORD   0            ;IF EQ 0,RANDOMLY SELECT DATA PATTERN
2718                                                               ;IF NOT EQ 0,SELECT ONE SET OF PATTERN
2719                                                               ;POINTED BY THE "PATTEN".
2720  001512  000000                  HEADER: .WORD   0            ;IF EQ TO 0,RANDOMLY SELECT DATA BLOCK
2721                                                               ;ADDRESS. IF NOT EQU 0,SEQUENTIALLY
2722                                                               ;SELECT DATA BLOCK ADDRESS
2723
2724
2725                                  ;;*****************************************************************
2726
2727                                  .SBTTL  VALUES FOR FIRST OPERATION
2728
2729                                  ;;*****************************************************************
2730
2731  001514  000010                  BEGPAT: .WORD   10           ;STARTING PATTERN CODE [RANGE 1 - 17 (OCTAL)]
2732  001516  000004                  BEGCOD: .WORD   4            ;STARTING COMMAND CODE [RANGE 0 - 5]
2733                                                               ;0 = WRITE CHECK DATA ('WCKD')
2734                                                               ;1 = WRITE CHECK HEADER & DATA ('WCHKHD')
2735                                                               ;2 = WRITE DATA ('WRTDAT')
2736                                                               ;3 = WRITE HEADER & DATA ('WRTHD')
2737                                                               ;4 = READ DATA ('RDDAT')
2738                                                               ;5 = READ HEADER & DATA ('RDHD')
2739  001520  000400                  BEGSIZ: .WORD   400          ;STARTING RECORD SIZE [RANGE 4 - MAXMEM]
```

```
2740
2741                            ;;*****************************************************************
2742
2743                            .SBTTL  TABLES, CONSTANTS, AND VARIABLE LOCATIONS
2744
2745                            ;;*****************************************************************
2746
2747  001522  000000  000000  000000  ORDERQ: .WORD   0,0,0,0,0,0,0,0,0  ;LIST OF DRIVES PERFORMING COMMANDS
2748  001530  000000  000000  000000
2749  001536  000000  000000  000000
2750
2751  001544  000000                  ASNLST: .WORD   0               ;A BIT SET IS AN ASSIGNED DRIVE
2752
2753  001546  000000  000000  000000  DUNIT:  .WORD   0,0,0,0,0,0,0,0,0      ;ADDRESSES OF DRIVES TO BE DEASSIGNED
2754  001554  000000  000000  000000
2755  001562  000000  000000  000000
2756
2757  001570  000000  000000  000000  NEWUNT: .WORD   0,0,0,0,0,0,0,0,0      ;ADDRESSES OF NEWLY ASSIGNED DRIVES
2758  001576  000000  000000  000000
2759  001604  000000  000000  000000
2760
2761  001612  000000  000000  000000  AVAIL:  .WORD   0,0,0,0,0,0,0,0,0      ;LIST OF DRIVES WAITING FOR BUFFERS/PARAMETERS
2762  001620  000000  000000  000000
2763  001626  000000  000000  000000
2764
2765  001634  000000  000000  000000  WAIT:   .WORD   0,0,0,0,0,0,0,0,0      ;LIST OF DRIVES WAITING FOR BUFFERS
2766  001642  000000  000000  000000
2767  001650  000000  000000  000000
2768
2769  001656  000000  000000  000000  PARQ:   .WORD   0,0,0,0,0,0,0,0,0      ;LIST OF DRIVES WAITING FOR NEXT PARAMETERS
2770  001664  000000  000000  000000
2771  001672  000000  000000  000000
2772
2773  001700  000000                  BUFTBL: .WORD   0               ;BUFFER ALLOCATION TABLE ENTRY COUNT
2774  001702  000000  000000                  .WORD   0,0
2775  001706  000000  000000                  .WORD   0,0
2776  001712  000000  000000                  .WORD   0,0
2777  001716  000000  000000                  .WORD   0,0
2778  001722  000000  000000                  .WORD   0,0
2779  001726  000000  000000                  .WORD   0,0
2780  001732  000000  000000                  .WORD   0,0
2781  001736  000000  000000                  .WORD   0,0
2782  001742  000000  000000                  .WORD   0,0
2783  001746  000000  000000                  .WORD   0,0
2784  001752  000000  000000                  .WORD   0,0
2785  001756  000000  000000                  .WORD   0,0
2786  001762  000000  000000                  .WORD   0,0
2787  001766  000000  000000                  .WORD   0,0
2788  001772  000000  000000                  .WORD   0,0
2789  001776  000000  000000                  .WORD   0,0
2790  002002  000000  000000                  .WORD   0,0
2791  002006  000000  000000                  .WORD   0,0
2792  002012  000000  000000                  .WORD   0,0
2793  002016  000000  000000                  .WORD   0,0
2794  002022  000000  000000                  .WORD   0,0
2795  002026  000000  000000                  .WORD   0,0
```

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                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0
                                                .WORD   0,0

002102  042472                        BLKADR: .WORD   DRIVE0           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 0
002104  042776                                .WORD   DRIVE1           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 1
002106  043302                                .WORD   DRIVE2           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 2
002110  043606                                .WORD   DRIVE3           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 3
002112  044112                                .WORD   DRIVE4           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 4
002114  044416                                .WORD   DRIVE5           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 5
002116  044722                                .WORD   DRIVE6           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 6
002120  045226                                .WORD   DRIVE7           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 7

002122      151                     COMTBL: .BYTE   WCKD             ;WRITE CHECK DATA
002123      153                             .BYTE   WCKHD            ;WRITE CHECK HEADER AND DATA
002124      161                             .BYTE   WRTDAT           ;WRITE DATA
002125      163                             .BYTE   WRTHD            ;WRITE HEADER AND DATA
002126      171                             .BYTE   RDDAT            ;READ DATA
002127      173                             .BYTE   RDHD             ;READ HEADER AND DATA

002130      002                     OPTBL:  .BYTE   2                ;UNLOAD
002131      004                             .BYTE   4                ;SEEK
002132      006                             .BYTE   6                ;RECAL
002133      010                             .BYTE   10               ;DRIVE CLEAR
002134      012                             .BYTE   12               ;RELEASE
002135      014                             .BYTE   14               ;OFFSET
002136      016                             .BYTE   16               ;RETURN TO CENTERLINE
002137      020                             .BYTE   20               ;READIN PRESET
002140      022                             .BYTE   22               ;PACK ACKNOWLEDGE
002141      030                             .BYTE   30               ;SEARCH
002142      050                             .BYTE   50               ;WRITE CHECK DATA
002143      052                             .BYTE   52               ;WRITE CHECK HEADER AND DATA
002144      060                             .BYTE   60               ;WRITE DATA
002145      062                             .BYTE   62               ;WRITE HEADER AND DATA
002146      070                             .BYTE   70               ;READ DATA
002147      072                             .BYTE   72               ;READ HEADER AND DATA
002150      377                             .BYTE   -1               ;TERMINATOR

            002152                      .EVEN

002152  047125  047514  042101    MNTBL:  .ASCIZ  /UNLOAD /
002160  000040
002162  042523  045505  020040            .ASCIZ  /SEEK   /
002170  000040
002172  042522  040503  020114            .ASCIZ  /RECAL  /
002200  000040
002202  051104  041526  051114            .ASCIZ  /DRVCLR /
002210  000040
```

```
002212  042522  051514  020105          .ASCIZ  /RELSE  /
002220  000040
002222  043117  051506  052105          .ASCIZ  /OFFSET /
002230  000040
002232  052122  020103  020040          .ASCIZ  /RTC    /
002240  000040
002242  042522  042101  047111          .ASCIZ  /READIN /
002250  000040
002252  040520  045503  020040          .ASCIZ  /PACK   /
002260  000040
002262  042523  051101  044103          .ASCIZ  /SEARCH /
002270  000040
002272  041527  042113  020040          .ASCIZ  /WCKD   /
002300  000040
002302  041527  044113  020104          .ASCIZ  /WCKHD  /
002310  000040
002312  051127  042124  052101          .ASCIZ  /WRTDAT /
002320  000040
002322  051127  044124  020104          .ASCIZ  /WRTHD  /
002330  000040
002332  042122  040504  020124          .ASCIZ  /RDDAT  /
002340  000040
002342  042122  042110  020040          .ASCIZ  /RDHD   /
002350  000040
002352  047516  042516  020040          .ASCIZ  /NONE   /
002360  000040


002362  043101  042524  020122  OFMSG0: .ASCIZ  /AFTER RETRY WITHOUT OFFSET/
002370  042522  051124  020131
002376  044527  044124  052517
002404  020124  043117  051506
002412  052105     000
002415     101  020124  042516  OFMSG1: .ASCIZ  /AT NEGATIVE OFFSET/
002422  040507  044524  042526
002430  047440  043106  042523
002436  000124
002440  052101  050040  051517  OFMSG2: .ASCIZ  /AT POSITIVE OFFSET/
002446  052111  053111  020105
002454  043117  051506  052105
002462     000


        002464                          .EVEN


002464     000          OFFCOD: .BYTE   0               ;OFFSET CODE TABLE
002465     001                  .BYTE   1               ;NUMBER FOR NEGATIVE OFFSET (DIR = OUT)
002466     000                  .BYTE   0               ;NUMBER FOR POSITIVE OFFSET (DIR = IN)


        002470          .EVEN


002470  002362          OFMTBL: .WORD   OFMSG0          ;1ST OFFSET MESSAGE
002472  002415                  .WORD   OFMSG1          ;2ND OFFSET MESSAGE
002474  002440                  .WORD   OFMSG2          ;3RD OFFSET MESSAGE


                        ;;*****************************************************************
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```
                                .SBTTL  DATA PATTERNS

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

002476  002542                STNDAT: .WORD   DATA0           ;STANDARD DATA PATTERN POINTER TABLE
002500  002602                        .WORD   DATA1
002502  002642                        .WORD   DATA1+40
002504  002702                        .WORD   DATA1+100
002506  002742                        .WORD   DATA1+140
002510  003002                        .WORD   DATA1+200
002512  003042                        .WORD   DATA1+240
002514  003102                        .WORD   DATA1+300
002516  003142                        .WORD   DATA1+340
002520  003202                        .WORD   DATA1+400
002522  003242                        .WORD   DATA1+440
002524  003302                        .WORD   DATA1+500
002526  003342                        .WORD   DATA1+540
002530  003402                        .WORD   DATA1+600
002532  003442                        .WORD   DATA1+640
002534  003502                        .WORD   DATA1+700
002536  002542                        .WORD   DATA0           ;ZEROES
002540  003444                        .WORD   DATA1+642       ;ONES

002542  000000                DATA0:  .WORD   0               ;DUMMY DATA PATTERN
002544  000000                        .WORD   0
002546  000000                        .WORD   0
002550  000000                        .WORD   0
002552  000000                        .WORD   0
002554  000000                        .WORD   0
002556  000000                        .WORD   0
002560  000000                        .WORD   0
002562  000000                        .WORD   0
002564  000000                        .WORD   0
002566  000000                        .WORD   0
002570  000000                        .WORD   0
002572  000000                        .WORD   0
002574  000000                        .WORD   0
002576  000000                        .WORD   0
002600  000000                        .WORD   0

002602  000001                DATA1:  .WORD   000001  ;STANDARD PATTERN 1
002604  000003                        .WORD   000003
002606  000007                        .WORD   000007
002610  000017                        .WORD   000017
002612  000037                        .WORD   000037
002614  000077                        .WORD   000077
002616  000177                        .WORD   000177
002620  000377                        .WORD   000377
002622  000777                        .WORD   000777
002624  001777                        .WORD   001777
002626  003777                        .WORD   003777
002630  007777                        .WORD   007777
002632  017777                        .WORD   017777
002634  037777                        .WORD   037777
002636  077777                        .WORD   077777
```

H05


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2964  002640  177777                          .WORD   177777
2965
2966  002642  177776                          .WORD   177776  ;STANDARD PATTERN 2
2967  002644  177774                          .WORD   177774
2968  002646  177770                          .WORD   177770
2969  002650  177760                          .WORD   177760
2970  002652  177740                          .WORD   177740
2971  002654  177700                          .WORD   177700
2972  002656  177600                          .WORD   177600
2973  002660  177400                          .WORD   177400
2974  002662  177000                          .WORD   177000
2975  002664  176000                          .WORD   176000
2976  002666  174000                          .WORD   174000
2977  002670  170000                          .WORD   170000
2978  002672  160000                          .WORD   160000
2979  002674  140000                          .WORD   140000
2980  002676  100000                          .WORD   100000
2981  002700  000000                          .WORD   000000
2982
2983  002702  000000                          .WORD   000000  ;STANDARD PATTERN 3
2984  002704  000000                          .WORD   000000
2985  002706  000000                          .WORD   000000
2986  002710  177777                          .WORD   177777
2987  002712  177777                          .WORD   177777
2988  002714  177777                          .WORD   177777
2989  002716  000000                          .WORD   000000
2990  002720  000000                          .WORD   000000
2991  002722  177777                          .WORD   177777
2992  002724  177777                          .WORD   177777
2993  002726  000000                          .WORD   000000
2994  002730  177777                          .WORD   177777
2995  002732  000000                          .WORD   000000
2996  002734  177777                          .WORD   177777
2997  002736  000000                          .WORD   000000
2998  002740  177777                          .WORD   177777
2999
3000  002742  133331                          .WORD   133331  ;STANDARD PATTERN 4
3001  002744  133331                          .WORD   133331
3002  002746  133331                          .WORD   133331
3003  002750  133331                          .WORD   133331
3004  002752  133331                          .WORD   133331
3005  002754  133331                          .WORD   133331
3006  002756  133331                          .WORD   133331
3007  002760  133331                          .WORD   133331
3008  002762  133331                          .WORD   133331
3009  002764  133331                          .WORD   133331
3010  002766  133331                          .WORD   133331
3011  002770  133331                          .WORD   133331
3012  002772  133331                          .WORD   133331
3013  002774  133331                          .WORD   133331
3014  002776  133331                          .WORD   133331
3015  003000  133331                          .WORD   133331
3016
3017  003002  052525                          .WORD   052525  ;STANDARD PATTERN 5
3018  003004  052525                          .WORD   052525
3019  003006  052525                          .WORD   052525
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3020  003010  125252                  .WORD   125252
3021  003012  125252                  .WORD   125252
3022  003014  125252                  .WORD   125252
3023  003016  052525                  .WORD   052525
3024  003020  052525                  .WORD   052525
3025  003022  125252                  .WORD   125252
3026  003024  125252                  .WORD   125252
3027  003026  052525                  .WORD   052525
3028  003030  125252                  .WORD   125252
3029  003032  052525                  .WORD   052525
3030  003034  125252                  .WORD   125252
3031  003036  052525                  .WORD   052525
3032  003040  125252                  .WORD   125252
3033
3034  003042  155554                  .WORD   155554  ;STANDARD PATTERN 6
3035  003044  155554                  .WORD   155554
3036  003046  155554                  .WORD   155554
3037  003050  155554                  .WORD   155554
3038  003052  155554                  .WORD   155554
3039  003054  155554                  .WORD   155554
3040  003056  155554                  .WORD   155554
3041  003060  155554                  .WORD   155554
3042  003062  155554                  .WORD   155554
3043  003064  155554                  .WORD   155554
3044  003066  155554                  .WORD   155554
3045  003070  155554                  .WORD   155554
3046  003072  155554                  .WORD   155554
3047  003074  155554                  .WORD   155554
3048  003076  155554                  .WORD   155554
3049  003100  155554                  .WORD   155554
3050
3051  003102  026455                  .WORD   026455  ;STANDARD PATTERN 7
3052  003104  026455                  .WORD   026455
3053  003106  026455                  .WORD   026455
3054  003110  151322                  .WORD   151322
3055  003112  151322                  .WORD   151322
3056  003114  151322                  .WORD   151322
3057  003116  026455                  .WORD   026455
3058  003120  026455                  .WORD   026455
3059  003122  151322                  .WORD   151322
3060  003124  151322                  .WORD   151322
3061  003126  026455                  .WORD   026455
3062  003130  151322                  .WORD   151322
3063  003132  026455                  .WORD   026455
3064  003134  151322                  .WORD   151322
3065  003136  026455                  .WORD   026455
3066  003140  151322                  .WORD   151322
3067
3068  003142  066666                  .WORD   066666  ;STANDARD PATTERN 8
3069  003144  066666                  .WORD   066666
3070  003146  066666                  .WORD   066666
3071  003150  066666                  .WORD   066666
3072  003152  066666                  .WORD   066666
3073  003154  066666                  .WORD   066666
3074  003156  066666                  .WORD   066666
3075  003160  066666                  .WORD   066666
```

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3076  003162  066666                    .WORD   066666
3077  003164  066666                    .WORD   066666
3078  003166  066666                    .WORD   066666
3079  003170  066666                    .WORD   066666
3080  003172  066666                    .WORD   066666
3081  003174  066666                    .WORD   066666
3082  003176  066666                    .WORD   066666
3083  003200  066666                    .WORD   066666
3084
3085  003202  000001                    .WORD   000001  ;STANDARD PATTERN 9
3086  003204  000002                    .WORD   000002
3087  003206  000004                    .WORD   000004
3088  003210  000010                    .WORD   000010
3089  003212  000020                    .WORD   000020
3090  003214  000040                    .WORD   000040
3091  003216  000100                    .WORD   000100
3092  003220  000200                    .WORD   000200
3093  003222  000400                    .WORD   000400
3094  003224  001000                    .WORD   001000
3095  003226  002000                    .WORD   002000
3096  003230  004000                    .WORD   004000
3097  003232  010000                    .WORD   010000
3098  003234  020000                    .WORD   020000
3099  003236  040000                    .WORD   040000
3100  003240  100000                    .WORD   100000
3101
3102  003242  177776                    .WORD   177776  ;STANDARD PATTERN 10
3103  003244  177775                    .WORD   177775
3104  003246  177773                    .WORD   177773
3105  003250  177767                    .WORD   177767
3106  003252  177757                    .WORD   177757
3107  003254  177737                    .WORD   177737
3108  003256  177677                    .WORD   177677
3109  003260  177577                    .WORD   177577
3110  003262  177377                    .WORD   177377
3111  003264  176777                    .WORD   176777
3112  003266  175777                    .WORD   175777
3113  003270  173777                    .WORD   173777
3114  003272  167777                    .WORD   167777
3115  003274  157777                    .WORD   157777
3116  003276  137777                    .WORD   137777
3117  003300  077777                    .WORD   077777
3118
3119  003302  172666                    .WORD   172666  ;STANDARD PATTERN 11
3120  003304  155555                    .WORD   155555
3121  003306  172666                    .WORD   172666
3122  003310  155555                    .WORD   155555
3123  003312  172666                    .WORD   172666
3124  003314  155555                    .WORD   155555
3125  003316  172666                    .WORD   172666
3126  003320  155555                    .WORD   155555
3127  003322  172666                    .WORD   172666
3128  003324  155555                    .WORD   155555
3129  003326  172666                    .WORD   172666
3130  003330  155555                    .WORD   155555
3131  003332  172666                    .WORD   172666
```

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 3132  003334  155555                    .WORD   155555
 3133  003336  172666                    .WORD   172666
 3134  003340  155555                    .WORD   155555
 3135
 3136  003342  077777                    .WORD   077777  ;STANDARD PATTERN 12
 3137  003344  137777                    .WORD   137777
 3138  003346  157777                    .WORD   157777
 3139  003350  167777                    .WORD   167777
 3140  003352  173777                    .WORD   173777
 3141  003354  175777                    .WORD   175777
 3142  003356  176777                    .WORD   176777
 3143  003360  177377                    .WORD   177377
 3144  003362  177577                    .WORD   177577
 3145  003364  177677                    .WORD   177677
 3146  003366  177737                    .WORD   177737
 3147  003370  177757                    .WORD   177757
 3148  003372  177767                    .WORD   177767
 3149  003374  177773                    .WORD   177773
 3150  003376  177775                    .WORD   177775
 3151  003400  177776                    .WORD   177776
 3152
 3153  003402  153333                    .WORD   153333  ;STANDARD PATTERN 13
 3154  003404  066667                    .WORD   066667
 3155  003406  153333                    .WORD   153333
 3156  003410  066667                    .WORD   066667
 3157  003412  153333                    .WORD   153333
 3158  003414  066667                    .WORD   066667
 3159  003416  153333                    .WORD   153333
 3160  003420  066667                    .WORD   066667
 3161  003422  153333                    .WORD   153333
 3162  003424  066667                    .WORD   066667
 3163  003426  153333                    .WORD   153333
 3164  003430  066667                    .WORD   066667
 3165  003432  153333                    .WORD   153333
 3166  003434  066667                    .WORD   066667
 3167  003436  153333                    .WORD   153333
 3168  003440  066667                    .WORD   066667
 3169
 3170  003442  000000                    .WORD   000000  ;STANDARD PATTERN 14
 3171  003444  177777                    .WORD   177777
 3172  003446  177777                    .WORD   177777
 3173  003450  177777                    .WORD   177777
 3174  003452  177777                    .WORD   177777
 3175  003454  177777                    .WORD   177777
 3176  003456  177777                    .WORD   177777
 3177  003460  177777                    .WORD   177777
 3178  003462  177777                    .WORD   177777
 3179  003464  177777                    .WORD   177777
 3180  003466  177777                    .WORD   177777
 3181  003470  177777                    .WORD   177777
 3182  003472  177777                    .WORD   177777
 3183  003474  177777                    .WORD   177777
 3184  003476  177777                    .WORD   177777
 3185  003500  177777                    .WORD   177777
 3186
 3187  003502  177777                    .WORD   177777  ;STANDARD PATTERN 15
```

```
 3188  003504  000000                          .WORD   000000
 3189  003506  000000                          .WORD   000000
 3190  003510  000000                          .WORD   000000
 3191  003512  000000                          .WORD   000000
 3192  003514  000000                          .WORD   000000
 3193  003516  000000                          .WORD   000000
 3194  003520  000000                          .WORD   000000
 3195  003522  000000                          .WORD   000000
 3196  003524  000000                          .WORD   000000
 3197  003526  000000                          .WORD   000000
 3198  003530  000000                          .WORD   000000
 3199  003532  000000                          .WORD   000000
 3200  003534  000000                          .WORD   000000
 3201  003536  000000                          .WORD   000000
 3202  003540  000000                          .WORD   000000
 3203
```

```
3204                                    .SBTTL  ERROR POINTER TABLE
3205
3206                                    ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
3207                                    ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
3208                                    ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
3209                                    ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
3210                                    ;*NOTE2:       EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
3211
3212                                    ;*      EM              ;;POINTS TO THE ERROR MESSAGE
3213                                    ;*      DH              ;;POINTS TO THE DATA HEADER
3214                                    ;*      DT              ;;POINTS TO THE DATA
3215                                    ;*      DF              ;;POINTS TO THE DATA FORMAT
3216
3217
3218  003542                            $ERRTB:
3219                                    ;ERROR 1
3220
3221                                    ;ERROR 1
3222
3223  003542  045622                            EM1                     ;RH70 INTERRUPT OCCURRED (RMAS = 0)
3224  003544  050241                            DH1
3225  003546  050672                            DT1
3226  003550  000000                            0
3227
3228                                    ;ERROR 2
3229
3230  003552  045671                            EM2                     ;UNEXPECTED ATTENTION OCCURRED
3231  003554  050246                            DH2
3232  003556  050676                            DT2
3233  003560  000000                            0
3234
3235                                    ;ERROR 3
3236
3237  003562  045727                            EM3                     ;MASSBUS PARITY ERROR (MCPE=1)
3238  003564  050322                            DH3
3239  003566  050714                            DT3
3240  003570  000000                            0
3241
3242                                    ;ERROR 4
3243
3244  003572  045765                            EM4                     ;MASSBUS PARITY ERROR (PAR=1)
3245  003574  050350                            DH4
3246  003576  050724                            DT4
3247  003600  000000                            0
3248
3249                                    ;ERROR 5
3250
3251  003602  046022                            EM5                     ;ADDRESS PLUG BIT CHANGED
3252  003604  050246                            DH2
3253  003606  050676                            DT2
3254  003610  000000                            0
3255
3256                                    ;ERROR 6
3257
3258  003612  046056                            EM6                     ;RH11 DIDN'T RESPOND TO ADDRESSING
3259  003614  050407                            DH6
```

```
3260  003616  050736                        DT6
3261  003620  000000                        0
3262
3263                                  ;;*****************************************************************
3264
3265                                  .SBTTL  SETUP AND INITIALIZATION ROUTINE
3266
3267                                  ;       START ADDRESS = 200
3268                                  ;       ADDRESS TO CHANGE RH11 UNIBUS ADDRESS = 204
3269
3270                                  ;;*****************************************************************
3271
3272  003622  012737  177777  001356  START:  MOV     #-1,CHGADR      ;SET RH11 ADDRESS CHANGE FLAG
3273  003630  000407                  BR      START2          ;START THE PROGRAM
3274  003632  012737  000400  001356  START1: MOV     #400,CHGADR     ;CLEAR THE RH11 ADDRESS CHANGE FLAG
3275                                  ;;*****************************************************************
3276  003640  000240                  TST1:   NOP
3277  003642  012737  000001  001210          MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
3278  003650  000005                  START2: RESET                   ;CLEAR THE BUS
3279                                  .SBTTL  INITIALIZE THE COMMON TAGS
3280                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
3281  003652  012706  001114                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
3282  003656  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
3283  003660  022706  001154                  CMP     #SWR,R6 ;;DONE?
3284  003664  001374                  BNE     .-6             ;;LOOP BACK IF NO
3285  003666  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
3286                                  ;;INITIALIZE A FEW VECTORS
3287  003672  012737  031006  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
3288  003700  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
3289  003706  012737  034062  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
3290  003714  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
3291  003722  012737  032056  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
3292  003730  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
3293  003736  012737  176543  033446          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
3294  003744  012737  123456  033450          MOV     #123456,$LONUM  ;;BOTH HIGH AND LOW WORDS
3295                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
3296                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
3297  003752  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
3298  003756  012737  004012  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
3299  003764  012737  177570  001154          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
3300  003772  012737  177570  001156          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
3301  004000  022777  177777  175146          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
3302  004006  001012                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
3303                                                          ;;AND  THE HARDWARE SWR IS NOT = -1
3304  004010  000403                  BR      65$             ;;BRANCH IF NO TIMEOUT
3305  004012  012716  004020          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
3306  004016  000002                  RTI
3307  004020  012737  000176  001154  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
3308  004026  012737  000174  001156          MOV     #DISPREG,DISPLAY
3309  004034  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR .
3310
3311  004040  005037  001212                  CLR     $PASS           ;;CLEAR PASS COUNT
3312  004044  132737  000200  001225          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
3313  004052  001403                  BEQ     67$             ;;YES,USE NON-APT SWITCH
3314  004054  012737  001226  001154          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
3315  004062                          67$:
```

```
3316  004062  012737  000240  000032          MOV     #240,@#EMTVEC+2  ;CHANGE EMT PRIORITY TO 4
3317  004070  012737  000240  000036          MOV     #240,@#TRAPVEC+2 ;CHANGE TRAP PRIORITY TO 4
3318  004076  005227  177777                  INC     #-1              ;FIRST START ?
3319  004102  001013                          BNE     1$               ;BR IF NOT
3320  004104  104401  057150                  TYPE    ,TITLE           ;NAME AND MANDEC NUMBER
3321  004110  005737  000042                  TST     42               ;AUTO ACCEPT OR CHAIN MODE ?
3322  004114  001006                          BNE     1$               ;BR IF EITHER
3323  004116  122737  000011  000041          CMPB    #11,41           ;LOADED FROM AN RM03 ?
3324  004124  001002                          BNE     1$               ;BR IF NOT
3325  004126  104401  057233                  TYPE    ,LOADRV          ;INSTRUCT THE OPERATOR ON HOW TO TEST DRIVE 0
3326  004132  004737  030326          1$:     JSR     PC,STKINT        ;TURN ON THE KEYBOARD INTERRUPT
3327                          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
3328  004136  005737  000042                  TST     @#42             ;;ARE WE RUNNING UNDER XXDP/ACT?
3329  004142  001012                          BNE     68$              ;;BRANCH IF YES
3330  004144  123727  001224  000001          CMPB    $ENV,#1          ;;ARE WE RUNNING UNDER APT?
3331  004152  001406                          BEQ     68$              ;;BRANCH IF YES
3332  004154  023727  001154  000176          CMP     SWR,#SWREG       ;;SOFTWARE SWITCH REG SELECTED?
3333  004162  001005                          BNE     69$              ;;BRANCH IF NO
3334  004164  104406                          GTSWR                    ;;GET SOFT-SWR SETTINGS
3335  004166  000403                          BR      69$
3336  004170  112737  000001  001150  68$:    MOVB    #1,$AUTOB        ;;SET AUTO-MODE INDICATOR
3337  004176                          69$:
3338  004176  105737  001224                  TSTB    $ENV             ;RUN UNDER APT MODE
3339  004202  001423                          BEQ     4$               ;NO,DONOT BOTHER
3340  004204  105737  001254                  TSTB    $VECT1           ;NEW VECTOR ?
3341  004210  001403                          BEQ     .+10             ;NOT LOAD IF = 0
3342  004212  113737  001254  001272          MOVB    $VECT1,$RMVEC    ;NEW VECTOR
3343  004220  005737  001260                  TST     $BASE            ;NEW BASE ADDRESS ?
3344  004224  001403                          BEQ     .+10             ;NO
3345  004226  013737  001260  001270          MOV     $BASE,$RMADR     ;NEW BASE ADDRESS
3346  004234  013737  001270  034316          MOV     $RMADR,RMADR     ;LOAD ADDRESS INTO DRIVER
3347  004242  013737  001272  034320          MOV     $RMVEC,RMVEC     ;LOAD VECTOR INTO DRIVER
3348  004250  000420                          BR      2$
3349  004252  105737  001150          4$:     TSTB    $AUTOB           ;AUTO MODE ?
3350  004256  001015                          BNE     2$               ;YES
3351  004260  004737  055676                  JSR     PC,BUSADR        ;CHECK RH11 BUS ADDRESS
3352  004264  013737  001270  034316          MOV     $RMADR,RMADR     ;RH11 ADDRESS
3353  004272  013737  001272  034320          MOV     $RMVEC,RMVEC     ;RH11 VECTOR ADDRESS
3354  004300  005227  177777                  INC     #-1              ;FIRST START ?
3355  004304  001002                          BNE     2$               ;BRANCH IF NOT
3356  004306  004737  055410                  JSR     PC,OPRDAT        ;GET THE DATE AND OPERATOR ID
3357  004312  005037  001314          2$:     CLR     STATIN           ;CLEAR PERFORMANCE SUMMARY TYPEOUT FLAG
3358  004316  012705  001522                  MOV     #ORDERQ,R5       ;START OF AREA TO CLEAR
3359  004322  005025                  3$:     CLR     (R5)+
3360  004324  022705  002102                  CMP     #BLKADR,R5       ;LOOK FOR END OF CLEAR AREA
3361  004330  001374                          BNE     3$               ;BR IF NOT FINISHED
3362  004332  012706  001100                  MOV     #STACK,SP        ;SETUP THE STACK POINTER
3363  004336  005037  177776                  CLR     PS               ;CLEAR THE PROCESSOR STATUS WORD
3364  004342  013737  001312  001372          MOV     HZ,SIXTEE        ;1/60 TH OR 1/50 TH SECOND COUNTER VALUE
3365  004350  005037  001364                  CLR     HOUR             ;CLEAR THE HOUR'S COUNTER
3366  004354  005037  001366                  CLR     MINUTE           ;CLEAR THE MINUTE'S COUNTER
3367  004360  005037  001370                  CLR     SECOND           ;CLEAR THE SECOND'S COUNTER
3368  004364  005037  001470                  CLR     INTRVL+2         ;CLEAR INTERVAL COUNTER
3369  004370  005037  001316                  CLR     PACK             ;CLEAR THE 'R' OR 'W' COMMAND FLAG
3370  004374  005037  001360                  CLR     CFLAG            ;CLEAR THE 'CONTROL C' FLAG
3371  004400  042737  170000  001464          BIC     #170000,MAXER    ;MAKE SURE ERROR LIMITS ARE NOT TOO HIGH
```

```
3372
3373                                    ;ROUTINE TO DETERMINE BUFFER AREA SIZE
3374
3375  004406  005227  177777      SIZMEM: INC     #-1             ;SEE IF TIME TO SIZE MEMORY
3376  004412  001005                      BNE     1$              ;BR IF NOT
3377  004414  004737  055600              JSR     PC,$SIZE        ;SEE HOW MUCH MEMORY ON SYSTEM
3378  004420  013737  055674  001354      MOV     $LSTAD,LSTAD    ;SAVE THE LAST ADDRESS
3379  004426  012737  000001  001700  1$: MOV     #1,BUFTBL       ;LOAD NUMBER OF BUFFERS
3380  004434  012737  057150  001702      MOV     #ENDPGM,BUFTBL+2  ;STARTING ADDRESS OF BUFFER
3381  004442  013737  001354  001704      MOV     LSTAD,BUFTBL+4  ;LAST ADDR TO BUFFER ALLOCATION TABLE
3382  004450  023727  001354  160000      CMP     LSTAD,#160000   ;OVER 28K ?
3383  004456  101403                      BLOS    2$              ;NO
3384  004460  012737  160000  001704      MOV     #160000,BUFTBL+4        ;XXDP MAX MEMORY 28K
3385  004466  162737  057150  001704  2$: SUB     #ENDPGM,BUFTBL+4  ;SUBTRACT PROGRAM SPACE
3386  004474  000241                      CLC                     ;CLEAR THE 'C' BIT
3387  004476  006037  001704              ROR     BUFTBL+4        ;CONVERT TO WORD COUNT
3388  004502  162737  000144  001704      SUB     #100.,BUFTBL+4  ;SAVE ROOM FOR THE 'ABS' LOADER
3389  004510  005737  000042              TST     42              ;LOAD FROM XXDP OR OTHER MONITOR ?
3390  004514  001403                      BEQ     3$              ;BR IF LOADED BY PAPER TAPE
3391  004516  162737  002570  001704      SUB     #1400.,BUFTBL+4  ;SUBTRACT 'XXDP' LOADER SIZE
3392  004524  005737  001462          3$: TST     MAXDL           ;VALUE IN 'MAXDL' ?
3393  004530  001003                      BNE     4$              ;BR IF VALUE IS
3394  004532  012737  020000  001462      MOV     #8192.,MAXDL    ;ASSUME FULL TRACK   MAXIMUM
3395  004540  023737  001462  001704  4$: CMP     MAXDL,BUFTBL+4  ;IS THAT TOO LARGE ?
3396  004546  103403                      BLO     5$              ;BR IF NOT
3397  004550  013737  001704  001462      MOV     BUFTBL+4,MAXDL  ;USE MAX AVAIL MEMORY AS MAX BUFFER SIZE
3398  004556  013737  001704  054354  5$: MOV     BUFTBL+4,PARLST+2  ;VALUE FOR THE PARAMETER TABLE
3399
3400                                    ;SEE IF THE OPERATOR WANTS TO CHANGE ANY PARAMETERS
3401
3402  004564  105737  001150      LKPAR:  TSTB    $AUTOB          ;'XXDP' CHAIN MODE OR 'ACT11' OPERATION ?
3403  004570  001027                      BNE     SETVEC          ;BR IF YES
3404  004572  105737  001224              TSTB    $ENV            ;APT STAND ALONE MODE ?
3405  004576  001024                      BNE     SETVEC          ;NO
3406  004600  104401  001201              TYPE    ,$CRLF
3407  004604  104401  054450              TYPE    ,ASKPAR         ;ASK FOR PARMETERS
3408  004610  104411                      RDLIN                   ;READ THE ENTRY
3409  004612  012605                      MOV     (SP)+,R5        ;ADDRESS OF ENTRY TO R5
3410  004614  122715  000131              CMPB    #'Y,(R5)        ;WAS ENTRY A 'Y' (YES)
3411  004620  001013                      BNE     SETVEC          ;BR IF NOT 'Y'
3412  004622  012703  054352      ENTPR:  MOV     #PARLST,R3      ;PARAMETER TABLE ADDRESS
3413  004626  004737  026420              JSR     PC,PARENT       ;GET THE PARAMETER ENTRY
3414  004632  023727  001462  000004      CMP     MAXDL,#4        ;IS THE 'MAXDL' VALUE OK ?
3415  004640  103003                      BHIS    SETVEC          ;BR IF IT IS
3416  004642  012737  000004  001462      MOV     #4,MAXDL        ;SET 'MAXDL' TO THE MINIMUM VALUE
3417
3418                                    ;DISPLAY DRIVE STATUS AND SET UP THE OTHER SYSTEM DEVICES THAT
3419                                    ;       THE PROGRAM WILL USE
3420
3421  004650  004737  022412      SETVEC: JSR     PC,CKCLK        ;START THE CLOCK
3422  004654  004737  034334              JSR     PC,RMINIT       ;INITIALIZE THE RM03 DRIVER
3423  004660  012737  177777  034256      MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
3424  004666  062727  177777  000000      ADD     #-1,#0          ;CHECK FOR FIRST START
3425  004674  103004                      BCC     11$             ;BR IF FIRST START
3426  004676  032777  000004  174250      BIT     #SW02,@SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
3427  004704  001061                      BNE     10$             ;BR IF NOT
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3428  004706  005004                  11$:    CLR     R4              ;DRIVE TABLE POINTER
3429  004710  104401  001201                  TYPE    ,$CRLF          ;CR-LF
3430  004714  104401  053135                  TYPE    ,SYSTAT         ;TYPE STATUS HEADING
3431  004720                          1$:
3432  004720  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
3433                                                                  ;;TYPE DRIVE NUMBER
3434  004722  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3435  004724     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3436  004725     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3437  004726  104401  052714                  TYPE    ,LIN4SP         ;SPACES
3438  004732  105764  034170                  TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
3439  004736  100416                          BMI     4$              ;BR IF UNSAFE
3440  004740  001020                          BNE     5$              ;BR IF ONLINE
3441  004742  105764  034200                  TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
3442  004746  001404                          BEQ     2$              ;BR IF NONEXISTENT
3443  004750  100006                          BPL     3$              ;BR IF OFFLINE
3444  004752  104401  053054          12$:    TYPE    ,NOTRM          ;DRIVE NOT AN RM03
3445  004756  000426                          BR      9$              ;CHECK NEXT DRIVE
3446  004760  104401  053071          2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
3447  004764  000423                          BR      9$              ;CHECK NEXT DRIVE
3448  004766  104401  052763          3$:     TYPE    ,UNTOFF         ;DRIVE OFFLINE
3449  004772  000405                          BR      6$              ;PRINT DRIVE TYPE
3450  004774  104401  053125          4$:     TYPE    ,NOTSAF         ;DRIVE UNSAFE
3451  005000  000402                          BR      6$              ;PRINT DRIVE TYPE
3452  005002  104401  052774          5$:     TYPE    ,UNTON          ;DRIVE ONLINE
3453  005006  104401  052716          6$:     TYPE    ,LINSP          ;SPACES
3454  005012  012737  053155  005032          MOV     #RM03A,8$       ;ADDRESS OF RM03 MESSAGE
3455  005020  132764  000004  034200          BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
3456  005026  001751                          BEQ     12$             ;BR IF NO TYPE NOT RM03 MSG
3457  005030  104401                  7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
3458  005032  000000                  8$:     .WORD   0               ;MESSAGE ADDRESS HERE
3459  005034  104401  001201          9$:     TYPE    ,$CRLF          ;CR-LF
3460  005040  005204                          INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
3461  005042  020427  000010                  CMP     R4,#8.          ;FINISHED ?
3462  005046  001324                          BNE     1$              ;BR IF NOT
3463  005050  104401  001201          10$:    TYPE    ,$CRLF          ;CR-LF
3464  005054  005037  177776                  CLR     @PS             ;SET PRIORITY BACK TO '0'
3465  005060  000137  005064                  JMP     MONTR           ;CHECK FOR 'XXDP' OR 'ACT11' MONITOR
3466
3467                                  ;SETUP IF 'XXDP' OR 'ACT11' OPERATION
3468
3469  005064  005737  000042          MONTR:  TST     42              ;'XXDP' CHAIN MODE OR 'ACT11' AUTO ACCEPT
3470  005070  001405                          BEQ     1$              ;BR IF NEITHER
3471  005072  005737  001356                  TST     CHGADR          ;200 START ?
3472  005076  003002                          BGT     1$              ;YES
3473  005100  004737  024324                  JSR     PC,ASGN2        ;ASSIGN DRIVES
3474  005104  005227  177777          1$:     INC     #-1             ;FIRST START ?
3475  005110  001011                          BNE     2$              ;BR IF NOT
3476  005112  105737  000041                  TSTB    @#41            ;LOADED FROM PAPER TAPE ?
3477  005116  001406                          BEQ     2$              ;BR IF YES
3478  005120  023727  001354  100000          CMP     LSTAD,#100000   ;MORE THAN 16K ON THE SYSTEM ?
3479  005126  103002                          BHIS    2$              ;BR IF YES
3480  005130  104401  057432                  TYPE    ,NOLOAD         ;TELL THE OPERATOR THAT THE 'XXDP' LOADER
3481                                                                  ;WILL BE OVERWRITTEN
3482  005134  004737  030326          2$:     JSR     PC,$TKINT       ;INITIALIZE THE KEYBOARD INTERRUPT HANDLER
3483                                  ;       FORCE TO   TEST PACK FOR 200 START
```

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3484  005140  105737  001150          FOWT1:  TSTB    $AUTOB          ;AUTO MODE ?
3485  005144  001412                          BEQ     1$              ;NO
3486  005146  012737  000001  001500          MOV     #1,RATIO        ;SPEED UP TEST
3487  005154  012737  077777  001450          MOV     #77777,ENDCON   ;SET LSW OF ENDING VALUE
3488  005162  012737  000027  001452          MOV     #27,ENDCON+2    ;SET MSW OF ENDING VALUE
3489  005170  000403                          BR      FOWT2           ;START TO WRITE AND TEST
3490  005172  005737  001356          1$:     TST     CHGADR          ;START AT 200 ?
3491  005176  003461                          BLE     FOWT3           ;NO
3492  005200  005001                  FOWT2:  CLR     R1              ;DRIVE #
3493  005202  005002                          CLR     R2              ;AVAIL TABLE INDEX
3494  005204  005003                          CLR     R3              ;DRIVE# X 2
3495  005206  122737  000024  000041          CMPB    #24,41          ;LOAD FROM DRIVE RM03
3496  005214  001002                          BNE     1$              ;NO
3497  005216  005201                          INC     R1              ;START FROM DRIVE 1
3498  005220  005723                          TST     (R3)+           ;ADJUST INDEX
3499  005222  105761  034170          1$:     TSTB    DRVSTA(R1)      ;DRIVE ON LINE ?
3500  005226  003434                          BLE     2$              ;NO
3501  005230  016300  002102                  MOV     BLKADR(R3),R0   ;LOAD DPB ADDRESS
3502  005234  004737  025212                  JSR     PC,CLRDPB       ;CLEAR DPB BLOCK
3503  005240  004537  025764                  JSR     R5,GETADR       ;RETRIEVE BAD SPOT FILE
3504  005244  000425                          BR      2$              ;ERROR RET FROM GETADR RT.
3505  005246  010062  001570                  MOV     R0,NEWUNT(R2)   ;LOAD DPB ADDRESS TO ABAIL QUEUE
3506  005252  105060  000026                  CLRB    $PACK(R0)       ;TEST PACK FLAG
3507  005256  013760  001446  000106          MOV     CYLIMT,MAXCYL(R0) ;UP CYLINDER LIMIT
3508  005264  013760  001444  000112          MOV     TRKLMT,MAXTRK(R0) ;UPPER TRACK LIMIT
3509  005272  013760  001442  000116          MOV     SECLMT,MAXSEC(R0) ;UPPER SECTOR LIMIT
3510  005300  005060  000110                  CLR     MINCYL(R0)      ;CLEAR LOWER LIMIT
3511  005304  005060  000114                  CLR     MINTRK(R0)      ;CLEAR LOWER LIMIT
3512  005310  005060  000120                  CLR     MINSEC(R0)      ;CLEAR LOWER LIMIT
3513  005314  004737  017474                  JSR     PC,WRTPK        ;SET UP PARAMETERS
3514  005320  022322                  2$:     CMP     (R3)+,(R2)+     ;INCREMENT INDEX
3515  005322  005201                          INC     R1              ;NEXT DRIVE
3516  005324  022701  000007                  CMP     #7,R1           ;ALL DRIVE ASSIGN ?
3517  005330  002334                          BGE     1$              ;NO
3518  005332  005037  001316                  CLR     PACK            ;TEST PACK FLAG
3519  005336  000137  005524                  JMP     MAIN1           ;JUMP TO WAIT PARAMETER AND BUFFER LOOP
3520  005342  104401  054120          FOWT3:  TYPE    ,INTDON         ;TYPE 'INITIALIZE COMPLETE'
3521  005346  000137  005524                  JMP     MAIN1           ;START THE PROGRAM
3522                                  ;;$DOAGN:       JMP     START           ;START AGAIN
3523
3524                                  ;;**************************************************************
3525
3526                                  .SBTTL  MAIN PROGRAM
3527
3528                                  ;;**************************************************************
3529
3530  005352  005737  001522          MAIN:   TST     ORDERQ          ;DON'T DEASSIGN ANY DRIVE IF SYSTEM NOT IDLE
3531  005356  001402                          BEQ     1$              ;LET ALL DRIVE FINISH WITH COMMAND
3532  005360  000137  006006                  JMP     IDLE
3533  005364  005737  001360          1$:     TST     CFLAG           ;KEYBOARD INTERRUPTTED ?
3534  005370  001402                          BEQ     2$              ;BRANCH IF NOT
3535  005372  004737  023710                  JSR     PC,KSR          ;SERVICE THE KEYBOARD
3536  005376                          2$:
3537  005376  012703  000010          MAINDA: MOV     #8.,R3          ;DRIVE COUNTER
3538  005402  012705  001546                  MOV     #DUNIT,R5       ;ADDRESS OF 'DROP DRIVE' TABLE
3539  005406  005715                  1$:     TST     (R5)            ;SEE IF ENTRY AT PRESENT POSITION
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3540  005410  001011                        BNE     3$              ;BR IF THERE IS ONE
3541  005412  062705  000002        2$:     ADD     #2,R5           ;INCREMENT TO NEXT TABLE POSITION
3542  005416  005303                        DEC     R3              ;DECREMENT DRIVE COUNTER
3543  005420  001372                        BNE     1$              ;BR IF MORE TO CHECK
3544  005422  105737  001544                TSTB    ASNLST          ;ANY DRIVES ACTIVE ?
3545  005426  001036                        BNE     MAIN1           ;BR IF YES
3546  005430  000137  027250                JMP     $GET42          ;CHECK FOR MONITOR RETURN
3547  005434  012701  001612        3$:     MOV     #AVAIL,R1       ;ADDRESS OF 'AVAILABLE DRIVES' TABLE
3548  005440  005711                4$:     TST     (R1)            ;SEE IF AT END OF TABLE
3549  005442  001405                        BEQ     5$              ;BR IF AT END: GO CHECK 'WAIT' TABLE
3550  005444  021115                        CMP     (R1),(R5)       ;IS DRIVE IN 'AVAIL' THE ONE TO BE DROPPED
3551  005446  001414                        BEQ     7$              ;BR IF YES
3552  005450  062701  000002                ADD     #2,R1           ;INCREMENT 'AVAIL' TABLE ADDRESS
3553  005454  000771                        BR      4$              ;CONTINUE LOOKING
3554  005456  012701  001634        5$:     MOV     #WAIT,R1        ;MOVE THE ADDRESS OF THE BUFFER WAIT TABLE
3555  005462  005711                6$:     TST     (R1)            ;AT THE END OF THE 'WAIT' TABLE ?
3556  005464  001752                        BEQ     2$              ;BR IF YES: SEE IF ANY MORE 'DROP' REQUESTS
3557  005466  021115                        CMP     (R1),(R5)       ;DRIVE IN THE 'WAIT' TABLE ?
3558  005470  001403                        BEQ     7$              ;BR IF IT IS
3559  005472  062701  000002                ADD     #2,R1           ;INCREMENT 'WAIT' TABLE ADDRESS
3560  005476  000771                        BR      6$              ;CONTINUE LOOK THROUGH THE 'WAIT' TABLE
3561  005500  011100                7$:     MOV     (R1),R0         ;PUT THE DRIVE'S BLOCK ADDRESS IN R0
3562  005502  104401  053427                TYPE    ,DEASSG         ;TYPE 'DRIVE DEASSIGNED'
3563  005506  004737  022702                JSR     PC,TYPEST       ;TYPE THE DRIVE'S PERFORMANCE SUMMARY
3564  005512  005015                        CLR     (R5)            ;CLEAR THE 'DROP DRIVE' TABLE ENTRY
3565  005514  005011                        CLR     (R1)            ;REMOVE THE DRIVE FROM THE 'AVAIL' OR 'WAIT' TABLE
3566  005516  004737  017456                JSR     PC,CMPRES       ;COMPRESS THE RESPECTIVE TABLE
3567  005522  000733                        BR      2$              ;SEE IF ANY MORE DRIVES
3568
3569                                  ;LOOK FOR DRIVES TO BE ASSIGNED
3570
3571  005524  012703  000010        MAIN1:  MOV     #8.,R3          ;DRIVE COUNT
3572  005530  005002                        CLR     R2              ;'AVAIL' INDEX
3573  005532  005004                        CLR     R4              ;ASSIGN LIST INDEX
3574  005534  005005                        CLR     R5              ;NEW DRIVE INDEX
3575  005536  005765  001570        1$:     TST     NEWUNT(R5)      ;NEW DRIVE IN THIS POSITION
3576  005542  001006                        BNE     3$              ;BR IF THERE IS
3577  005544  062705  000002        2$:     ADD     #2,R5           ;INCREMENT R5
3578  005550  005204                        INC     R4              ;INCREMENT ASSIGN INDEX
3579  005552  005303                        DEC     R3              ;DECREMENT DRIVE COUNT
3580  005554  001370                        BNE     1$              ;BR IF MORE DRIVES
3581  005556  000430                        BR      MAIN2           ;START OPERATIONS FOR THE AVAILABLE DRIVES
3582  005560  104401  052755        3$:     TYPE    ,UNTMSG         ;'DRIVE'
3583  005564  010446                        MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
3584                                        ;;TYPE DRIVE NUMBER
3585  005566  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
3586  005570     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
3587  005571     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
3588  005572  104401  053477                TYPE    ,ASGND          ;'STARTED'
3589  005576  005762  001612        4$:     TST     AVAIL(R2)       ;AT END OF AVAILABLE TABLE
3590  005602  001403                        BEQ     5$              ;BR IF YES
3591  005604  062702  000002                ADD     #2,R2           ;INCREMENT AVAILABLE TABLE INDEX
3592  005610  000772                        BR      4$              ;CONTINUE LOOKING FOR END OF TABLE
3593  005612  016562  001570  001612  5$:     MOV     NEWUNT(R5),AVAIL(R2)  ;MOVE ADDR OF DRIVE INTO AVAIL LST
3594  005620  005065  001570                CLR     NEWUNT(R5)      ;TAKE DRIVE OUT OF NEW DRIVE TABLE
3595  005624  156437  034304  001544        BISB    ATABIT(R4),ASNLST ;SET DRIVE ASSIGNED INDICATOR
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3596  005632  062702  000002                  ADD     #2,R2           ;INCREMENT AVAILABLE TABLE POINTER
3597  005636  000742                          BR      2$              ;LOOK FOR MORE DRIVES
3598
3599                                  ;GET PARAMETERS, BUFFER SPACE, AND START ORDERS FOR DRIVES IN
3600                                  ;       THE 'AVAILABLE' QUEUE
3601
3602  005640  005737  001522          MAIN2:  TST     ORDERQ          ;OUTSTANDING BUFFER REQUESTS
3603  005644  001060                          BNE     IDLE            ;BR IF THERE ARE
3604  005646  005002                          CLR     R2              ;CLEAR DRIVE TABLE POINTER
3605  005650  005762  001612          1$:     TST     AVAIL(R2)       ;ANY DRIVES WAITING FOR PARAMETERS
3606  005654  001002                          BNE     .+6             ;BRANCH IF ANY
3607  005656  000137  006006                  JMP     IDLE            ;BRANCH IF NONE
3608  005662  016200  001612                  MOV     AVAIL(R2),R0    ;CONTROL BLOCK ADDR IN R0
3609  005666  005760  000104                  TST     $NEXT(R0)       ;PARAMETERS BEEN SELECTED ?
3610  005672  001010                          BNE     6$              ;BR IF THEY HAVE
3611  005674  105760  000026                  TSTB    $PACK(R0)       ;'R' OR 'W' COMMAND FOR THE DRIVE ?
3612  005700  001403                          BEQ     5$              ;BR IF NOT
3613  005702  004737  017474                  JSR     PC,WRTPK        ;GET DATA PACK PARAMETERS
3614  005706  000404                          BR      7$              ;GET THE BUFFER
3615  005710  004737  016210          5$:     JSR     PC,SELPAR       ;SELECT THE PARAMETERS
3616  005714  004737  017164          6$:     JSR     PC,GETPAR       ;LOAD NEW PARAMETERS
3617  005720  005046                  7$:     CLR     -(SP)           ;MAKE ROOM ON THE STACK FOR THE BUFFER ADDR
3618  005722  004737  015420                  JSR     PC,GETBUF       ;GET BUFFER
3619  005726  012660  000006                  MOV     (SP)+,$BUF(R0)  ;MOVE BUFFER ADDR TO DPB
3620  005732  001414                          BEQ     8$              ;BR IF '0' ADDR (NO BUFFER)
3621  005734  004737  016004                  JSR     PC,FILBUF       ;FILL THE BUFFER
3622  005740  005060  000072                  CLR     $FAIR(R0)       ;CLEAR THE 'FAIRNESS' COUNT
3623  005744  004737  016132                  JSR     PC,GODRIV       ;PUT CURRENT DPB IN DRIVER
3624  005750  012705  001522                  MOV     #ORDERQ,R5      ;ADDRESS OF ORDER QUEUE IN R5
3625  005754  005725                          TST     (R5)+           ;END OF QUEUE ?
3626  005756  001376                          BNE     .-2             ;BR IF NOT
3627  005760  010045                          MOV     R0,-(R5)        ;PUT BLOCK ADDRESS INTO QUEUE
3628  005762  000403                          BR      10$             ;CONTINUE LOOKING
3629  005764  062702  000002          8$:     ADD     #2,R2           ;INCREMENT INDEX
3630  005770  000727                          BR      1$              ;BRANCH BACK TO FIRE NEXT DRIVE
3631  005772  012701  001612          10$:    MOV     #AVAIL,R1       ;'AVAILABLE' TABLE ADDRESS
3632  005776  060201                          ADD     R2,R1           ;FORM ADDRESS OF LAST ENTRY
3633  006000  004737  017456                  JSR     PC,CMPRES       ;COMPRESS THE TABLE
3634  006004  000721                          BR      1$              ;CONTINUE LOOKING
3635
3636                                  ;GET BUFFER ASSIGNMENTS FOR DRIVES IN THE 'BUFFER WAIT' QUEUE
3637
3638
3639                                  ;WAIT FOR AN ORDER TO FINISH
3640
3641  006006  012701  001522          IDLE:   MOV     #ORDERQ,R1      ;ADDRESS OF THE ORDER QUEUE IN R1
3642  006012  012100                  1$:     MOV     (R1)+,R0        ;PUT BLOCK ADDRESS INTO R0
3643  006014  001433                          BEQ     IDLE1           ;BR IF END OF QUEUE
3644  006016  005760  000016                  TST     $STATUS(R0)     ;SEE IF DRIVE FINISHED
3645  006022  001773                          BEQ     1$              ;BR IF DRIVE NOT FINISHED
3646  006024  162701  000002                  SUB     #2,R1           ;CORRECT THE QUEUE POINTER
3647  006030  010146                          MOV     R1,-(SP)        ;SAVE THE QUEUE ADDRESS
3648  006032  004737  015262                  JSR     PC,STATIS       ;ACCUMULATE STATISTICS FOR DRIVE IN R0
3649  006036  000240                          NOP                     ;DEBUGGING AID
3650  006040  004737  006260                  JSR     PC,PROCES       ;PROCESS END OF ORDER
3651  006044  005037  001362                  CLR     BADSEC          ;CLEAR THE BAD TRK/SEC ERROR INDICATOR
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3652  006050  004737  026674          JSR     PC,ABNRML       ;SEE IF ANY DRIVES HAVE TOO MANY ERRORS
3653  006054  004737  026722          JSR     PC,EOP          ;SEE IF ANY DRIVE HAS XFERED 3X10↑9 BITS
3654  006060  012601                  MOV     (SP)+,R1        ;RESTORE THE ORDER TABLE INDEX
3655  006062  012705  001612          MOV     #AVAIL,R5       ;FIND THE END OF THE 'AVAILABLE' TABLE
3656  006066  005725          2$:     TST     (R5)+           ;END OF THE TABLE ?
3657  006070  001376                  BNE     2$              ;BR IF NOT AT END OF LIST
3658  006072  011145                  MOV     (R1),-(R5)      ;MOVE THE BLOCK ADDRESS INTO THE TABLE
3659  006074  004737  017456          JSR     PC,CMPRES       ;COMPRESS THE ORDER QUEUE
3660  006100  004737  015554          JSR     PC,RELBUF       ;RESTORE BUFFER
3661  006104                  IDLE1:
3662  006104  032777  000004  173042  1$:     BIT     #SW02,@SWR      ;TYPE PERFORMANCE SUMMARY
3663  006112  001007                  BNE     2$              ;BR IF NOT
3664  006114  005737  001314          TST     STATIN          ;TIME TO TYPE THE PERFORMANCE SUMMARY ?
3665  006120  001404                  BEQ     2$              ;BR IF NOT
3666  006122  005037  001314          CLR     STATIN          ;CLEAR THE INDICATOR
3667  006126  004737  022614          JSR     PC,STATPR       ;TYPE THE SUMMARY
3668  006132  000137  005352  2$:     JMP     MAIN            ;CONTINUE THE LOOP
3669
3670                          ;SETUP TO REFORMAT AN ERROR SECTOR
3671
3672  006136  032777  000001  173010  REFMT:  BIT     #SW0,@SWR       ;READ ONLY SWITCH SET ?
3673  006144  001044                  BNE     REFMTX          ;BR IF IT IS
3674  006146  032777  000200  173000          BIT     #SW7,@SWR       ;SWITCH 7 SET ?
3675  006154  001040                  BNE     REFMTX          ;BR IF IT IS
3676  006156  005737  001474          TST     FORMAT          ;WRITE HEADER & DATA ORDERS ALLOWED ?
3677  006162  001435                  BEQ     REFMTX          ;BR IF NOT
3678  006164  022760  001465  000270          CMP     #821.,$RMDC(R0) ;LEGAL VALUE ?
3679  006172  101431                  BLOS    REFMTX          ;NO, NOT FORMAT
3680  006174  004737  022262          JSR     PC,READDR       ;GET CORRECTED SECTOR-TRACK ADDRESSES
3681  006200  012660  000100          MOV     (SP)+,$NCYL(R0)         ;CYLINDER
3682  006204  112660  000077          MOVB    (SP)+,$NTRK(R0) ;TRACK ADDR TO DPB
3683  006210  112660  000076          MOVB    (SP)+,$NSEC(R0) ;SECTOR ADDR TO DPB
3684  006214  012760  000402  000102  MOV     #258.,$NWRDL(R0)  ;WORD COUNT FOR FORMAT
3685  006222  112760  000003  000074  1$:     MOVB    #3,$NCODE(R0)   ;COMMAND CODE
3686  006230  004537  016762          JSR     R5,CHKADR       ;AVOID REFORMAT BAD SPOT
3687  006234  000401                  BR      2$              ;BRANCH IF NOT ON BAD SPOT
3688  006236  000407                  BR      REFMTX          ;BRANCH IF ON BAD SPOT
3689  006240  004737  017122          JSR     PC,GETPAT       ;GET A PATTERN
3690  006244  110560  000075  2$:     MOVB    R5,$NPATC(R0)   ;PATTERN CODE TO CONTROL BLOCK
3691  006250  012760  177777  000104  MOV     #-1,$NEXT(R0)   ;SET PARAMETERS SELECTED INDICATOR
3692  006256  000207          REFMTX: RTS     PC              ;RETURN
3693
3694                          ;PROCESS THE ORDER TERMINATION
3695
3696  006260  111037  001344  PROCES: MOVB    (R0),UNIT       ;DRIVE NUMBER FOR ANY ERROR MESSAGES
3697  006264  005760  000016          TST     $TATUS(R0)      ;SEE IF DRIVER SIGNALED AN ERROR
3698  006270  100427                  BMI     ERPROC          ;BR IF ERROR
3699  006272  032760  100000  000234          BIT     #BIT15,$RMCS1(R0)  ;SEE IF 'SC' SET
3700  006300  001410                  BEQ     1$              ;BR IF NOT SET
3701  006302  032760  040000  000234          BIT     #BIT14,$RMCS1(R0)  ;SEE IF 'TRE' SET
3702  006310  001017                  BNE     ERPROC          ;BR IF SET
3703  006312  032760  040000  000246          BIT     #BIT14,$RMDS(R0)  ;SEE IF 'ERR' SET
3704  006320  001013                  BNE     ERPROC          ;BR IF SET
3705  006322  004737  012440  1$:     JSR     PC,CKERR        ;NO ERROR, CHECK ERROR BITS ANYWAY
3706  006326  004737  012532          JSR     PC,CKBUS        ;NO ERROR, CHECK BUS ADDR & WC
3707  006332  032777  000002  172614          BIT     #SW01,@SWR      ;DATA COMPARE ?
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3708  006340  001002                        BNE     2$                      ;BR IF NOT
3709  006342  004737  012616                JSR     PC,CMPAR                ;NO ERROR, COMPARE DATA
3710  006346  000207                2$:     RTS     PC                      ;RETURN
3711
3712                                ;ORDER TERMINATED WITH AN ERROR - PROCESS THE ERROR
3713
3714  006350  032760  000200  000016  ERPROC: BIT     #BIT07,STATUS(R0) ;DONE BIT SET ?
3715  006356  001402                        BEQ     ERPRC1                  ;BR IF ORDER DIDN'T COMPLETE NORMALLY
3716  006360  000137  007004                JMP     DONE                    ;PROCESS ERROR WITH 'DONE' BIT SET
3717
3718                                ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE NOT' BITS
3719
3720  006364  032760  010000  000016  ERPRC1: BIT     #BIT12,STATUS(R0) ;SEE IF DRIVE WAS UNSAFE
3721  006372  001025                        BNE     PUNSAF                  ;BR IF YES
3722  006374  032760  004000  000016        BIT     #BIT11,STATUS(R0) ;PARITY ERROR OCCURRED
3723  006402  001055                        BNE     UCPAR                   ;BR IF IT DID
3724  006404  032760  002000  000016        BIT     #BIT10,STATUS(R0) ;FATAL PARITY ERROR?
3725  006412  001056                        BNE     FALPAR                  ;BR IF THERE IS ONE
3726  006414  032760  001000  000016        BIT     #BIT09,STATUS(R0) ;TIMEOUT?
3727  006422  001076                        BNE     SWTIM                   ;BR IF YES
3728  006424  032760  040002  000016        BIT     #BIT14!BIT01,STATUS(R0)  ;DRIVE WENT OFFLINE ?
3729  006432  001111                        BNE     OFLIN                   ;BR IF IT DID
3730  006434  032760  000004  000016        BIT     #BIT2,STATUS(R0)  ;PORT REQUEST TIME OUT ?
3731  006442  001141                        BNE     PRTIM                   ;BR IF IT DID
3732  006444  000207                        RTS     PC                      ;ERROR. RETURN
3733
3734                                ;DRIVE IS PERSISTENTLY UNSAFE
3735
3736  006446  104401  001201  PUNSAF: TYPE    ,$CRLF                  ;CR-LF
3737  006452  104401  046222          TYPE    ,EM12                   ;'DRIVE UNSAFE' MESSAGE
3738  006456  104401  053452          TYPE    ,DRNUM                  ;DRIVE NUMBER
3739  006462  013746  001344          MOV     UNIT,-(SP)              ;;SAVE UNIT FOR TYPEOUT
3740                                                                  ;;TYPE DRIVE NUMBER
3741  006466  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
3742  006470     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
3743  006471     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
3744  006472  104401  001201          TYPE    ,$CRLF                  ;CR-LF
3745  006476  004737  020176          JSR     PC,LINE1                ;PRINT LINE 1 OF ERROR MESSAGE
3746  006502  104414  046222          DISPLY  ,EM12                   ;PERSISTENT DEVICE UNSAFE MESSAGE
3747  006506  004737  020242          JSR     PC,LINE2                ;PRINT LINE 2 OF ERROR MESSAGE
3748  006512  004737  020650          JSR     PC,LINE3                ;PRINT LINE 3 OF ERROR MESSAGE
3749  006516  004737  021320          JSR     PC,LINE4                ;PRINT LINE 4 OF THE ERROR MESSAGE
3750  006522  004737  023424          JSR     PC,INCTOT               ;INCREMENT TOTAL ERROR COUNT
3751  006526  004737  021730          JSR     PC,LINE7                ;PRINT LINE 7 OF ERROR MESSAGE
3752  006532  000137  026574          JMP     DROP                    ;DROP THE DRIVE
3753
3754                                ;UNCORRECTABLE MASSBUS PARITY ERROR OCCURRED
3755
3756  006536  104401  001201  UCPAR:  TYPE    ,$CRLF                  ;CR-LF
3757  006542  104401  046124          TYPE    ,EM10                   ;'UNCORRECTABLE PARITY ERROR' MESSAGE
3758  006546  000404                  BR      FALPR1                  ;FINISH PROCESSING THE ERROR
3759
3760                                ;'FATAL' MASSBUS PARITY ERROR OCCURRED
3761
3762  006550  104401  001201  FALPAR: TYPE    ,$CRLF                  ;CR-LF
3763  006554  104401  046167          TYPE    ,EM11                   ;'FATAL PARITY ERROR' MESSAGE
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```
3764  006560  104401  053452          FALPR1: TYPE    ,DRNUM          ;DRIVE NUMBER
3765  006564  013746  001344                  MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
3766                                                                  ;;TYPE DRIVE NUMBER
3767  006570  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3768  006572     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3769  006573     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3770  006574  104401  001201                  TYPE    ,$CRLF          ;CR-LF
3771  006600  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3772  006604  032777  100000  172342          BIT     #SW15,@SWR      ;HALT ON ERROR ?
3773  006612  001401                          BEQ     1$              ;BR IF NOT
3774  006614  000000                          HALT                    ;ERROR HALT
3775  006616  000207                  1$:     RTS     PC
3776
3777                                  ;SOFTWARE TIMEOUT OCCURRED
3778
3779  006620  004737  020176          SWTIM:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
3780  006624  104414  046253                  DISPLY  ,EM13           ;PRINT THE TIME OUT MESSAGE
3781  006630  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
3782  006634  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
3783  006640  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3784  006644  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3785  006650  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
3786  006654  000207                          RTS     PC              ;RETURN
3787
3788                                  ;DRIVE WENT OFFLINE
3789
3790  006656  104401  001201          OFLIN:  TYPE    ,$CRLF          ;CR-LF
3791  006662  104401  046325                  TYPE    ,EM14           ;'DRIVE WENT OFFLINE' MESSAGE
3792  006666  104401  053452                  TYPE    ,DRNUM          ;DRIVE NUMBER
3793  006672  013746  001344                  MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
3794                                                                  ;;TYPE DRIVE NUMBER
3795  006676  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3796  006700     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3797  006701     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3798  006702  104401  001201                  TYPE    ,$CRLF          ;CR-LF
3799  006706  004737  020176                  JSR     PC,LINE1        ;PRINT LINE 1 OF THE ERROR MESSAGE
3800  006712  104414  046325                  DISPLY  ,EM14           ;PRINT OFFLINE MESSAGE
3801  006716  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF THE ERROR MESSAGE
3802  006722  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF THE ERROR MESSAGE
3803  006726  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF THE ERROR MESSAGE
3804  006732  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3805  006736  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7 OF THE ERROR MESSAGE
3806  006742  000137  026574                  JMP     DROP            ;DROP THE DRIVE
3807
3808                                  ;PORT REQUEST TIMEOUT ERROR
3809
3810  006746  004737  020176          PRTIM:  JSR     PC,LINE1        ;TYPE LINE 1 OF THE ERROR MESSAGE
3811  006752  104414  046350                  DISPLY  ,EM15           ;PRINT PORT TIME OUT MESSAGE
3812  006756  004737  020242                  JSR     PC,LINE2        ;TYPE LINE 2 OF THE ERROR MESSAGE
3813  006762  004737  020650                  JSR     PC,LINE3        ;TYPE LINE 3 OF THE ERROR MESSAGE
3814  006766  004737  021320                  JSR     PC,LINE4        ;TYPE LINE 4 OF THE ERROR MESSAGE
3815  006772  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3816  006776  004737  021730                  JSR     PC,LINE7        ;TYPE LINE 7 OF THE ERROR MESSAGE
3817  007002  000207                          RTS     PC              ;RETURN
3818
3819                                  ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE' BITS SET
```

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3820
3821  007004  032760  000030  000016  DONE:   BIT     #BIT04!BIT03,$STATUS(R0) ;UNSAFE OCCURRED
3822  007012  001402                          BEQ     .+6                     ;BR IF NOT
3823  007014  000137  012106                  JMP     UNSAF                   ;REPORT UNSAFE
3824  007020  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)   ;IS 'WCE' SET ?
3825  007026  001402                          BEQ     .+6                     ;BRANCH IF NOT SET
3826  007030  000137  007766                  JMP     WCKER                   ;WRITE CHECK ERROR
3827  007034  032760  040000  000246          BIT     #BIT14,$RMDS(R0)    ;CHECK 'ERR'
3828  007042  001002                          BNE     1$                      ;BR IF SET
3829  007044  000137  011652                  JMP     TRFER                   ;PROCESS 'TRE
3830  007050  032760  000400  000250  1$:     BIT     #BIT08,$RMER1(R0)   ;'HCRC' SET?
3831  007056  001402                          BEQ     .+6                     ;BR IF NOT
3832  007060  000137  010314                  JMP     HCRCER                  ;PROCESS 'HCRC'
3833  007064  032760  000020  000250          BIT     #BIT04,$RMER1(R0)   ;'FMT' SET?
3834  007072  001402                          BEQ     .+6                     ;BR IF NOT SET
3835  007074  000137  010512                  JMP     CKFMT                   ;CHECK FORMAT ERROR
3836  007100  032760  000200  000250          BIT     #BIT07,$RMER1(R0)   ;'HCE' SET?
3837  007106  001402                          BEQ     .+6                     ;BR IF NOT SET
3838  007110  000137  010706                  JMP     CKHCE                   ;CHECK 'HCE' ERROR
3839  007114  032760  020000  000250          BIT     #BIT13,$RMER1(R0)   ;'OPI' SET?
3840  007122  001402                          BEQ     .+6                     ;BR IF NOT SET
3841  007124  000137  011206                  JMP     OPIER                   ;REPORT 'OPI'
3842  007130  032760  000010  000250          BIT     #BIT3,$RMER1(R0)    ;'PAR' SET?
3843  007136  001402                          BEQ     .+6                     ;BR IF NOT SET
3844  007140  000137  011340                  JMP     PARER                   ;REPORT 'PAR'
3845  007144  032760  000040  000250          BIT     #BIT5,$RMER1(R0)    ;'WCF' SET?
3846  007152  001402                          BEQ     .+6                     ;BR IF NOT SET
3847  007154  000137  012010                  JMP     WCFER                   ;REPORT 'WCF'
3848  007160  032760  002000  000250          BIT     #BIT10,$RMER1(R0)   ;'IAE' SET?
3849  007166  001402                          BEQ     .+6                     ;BR IF NOT SET
3850  007170  000137  011432                  JMP     IAEER                   ;REPORT 'IAE'
3851  007174  032760  004000  000250          BIT     #BIT11,$RMER1(R0)   ;'WLE' SET?
3852  007202  001402                          BEQ     .+6                     ;BR IF NOT SET
3853  007204  000137  011464                  JMP     WLEER                   ;REPORT 'WLE'
3854  007210  032760  001000  000250          BIT     #BIT9,$RMER1(R0)    ;'AOE' SET?
3855  007216  001405                          BEQ     2$                      ;BR IF NOT SET
3856  007220  032760  002000  000246          BIT     #BIT10,$RMDS(R0)    ;'LST' SET?
3857  007226  001401                          BEQ     2$                      ;BR IF NOT SET
3858  007230  000207                          RTS     PC                      ;'AOE' & 'LST' SET, EXIT
3859  007232  032760  010000  000250  2$:     BIT     #BIT12,$RMER1(R0)   ;SEE IF 'DTE' SET
3860  007240  001402                          BEQ     .+6                     ;BR IF NOT
3861  007242  000137  011316                  JMP     DTEER                   ;REPORT 'DTE' ERROR
3862  007246  005760  000250                  TST     $RMER1(R0)              ;SEE IF 'DCK' SET
3863  007252  100002                          BPL     .+6                     ;BR IF NOT
3864  007254  000137  007312                  JMP     DCKER                   ;PROCESS 'DCK'
3865  007260  032760  060000  000276          BIT     #BIT14!BIT13,$RMER2(R0) ;'SKI' OR 'OCYL' SET
3866  007266  001006                          BNE     3$                      ;BRANCH IF SKI, OCYL SET
3867  007270  032760  100000  000276          BIT     #BIT15,$RMER2(R0)   ;BAD SPOT ?
3868  007276  001004                          BNE     4$                      ;BRANCH IF SO (NO, OTHER ERROR)
3869  007300  000137  010460                  JMP     DRVER                   ;REPORT ERROR
3870  007304  000137  011752          3$:     JMP     SKIER                   ;REPORT SKI ERROR
3871  007310  000207                  4$:     RTS     PC                      ;EXIT FROM ERROR ANALYSIS  ROUT.
3872
3873                                  ;PROCESS DATA ('DCK') CHECK ERROR
3874
3875  007312  022760  010041  000300  DCKER:  CMP     #10041,$RMEC1(R0)   ;VALID POSITION COUNT ?
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3876  007320  101407                          BLOS    1$              ;BR IF NOT VALID
3877  007322  005760  000300                  TST     $RMEC1(R0)      ;POSITION COUNT 0 ?
3878  007326  001404                          BEQ     1$              ;BR IF 0'S
3879  007330  005760  000302                  TST     $RMEC2(R0)      ;VALUE IN PATTERN REGISTER ?
3880  007334  001027                          BNE     4$              ;BR IF YES
3881  007336  000431                          BR      6$              ;DATA CHECK ERROR
3882  007340  004737  020176        1$:       JSR     PC,LINE1        ;TYPE FIRST LINE OF ERROR MESSAGE
3883  007344  104414  047755                  DISPLY  .EM45           ;TYPE 'ECC LOGIC ERROR'
3884  007350  004737  020242                  JSR     PC,LINE2        ;TYPE LINE 2 OF ERROR MESSAGE
3885  007354  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3886  007360  012737  000003  001350          MOV     #3,RETRY        ;RETRY COUNT
3887  007366  004737  015134                  JSR     PC,$RETRY       ;RETRY THE ORDER
3888  007372  000403                          BR      2$              ;RETRY WAS NOT SUCCESSFUL
3889  007374  004737  021646                  JSR     PC,LINE6C       ;TYPE LINE 6C OF ERROR MESSAGE
3890  007400  000402                          BR      3$              ;FINISH THE ERROR REPORT
3891  007402  004737  021654        2$:       JSR     PC,LINE6D       ;TYPE LINE 6D OF ERROR MESSAGE
3892  007406  004737  021730        3$:       JSR     PC,LINE7        ;TYPE LINE 7 OF ERROR MESSAGE
3893  007412  000402                          BR      5$              ;EXIT
3894  007414  004737  020060        4$:       JSR     PC,SPOTCK       ;SEE IF ERROR AT A BAD SPOT ON THE PACK
3895  007420  000207                5$:       RTS     PC              ;IT IS, DON'T REPORT IT
3896  007422  004737  020176        6$:       JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
3897  007426  104414  046425                  DISPLY  .EM21           ;DATA CHECK ERROR
3898  007432  004737  020242        DCKER1:   JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
3899  007436  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
3900  007442  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3901  007446  004737  014566                  JSR     PC,PRTBAD       ;SEE IF BAD SECTOR TO BE PRINTED
3902  007452  012737  110100  001346          MOV     #BIT15!BIT12!BIT06,MASK  ;LOAD ERROR MASK
3903  007460  032760  010100  000250          BIT     #BIT12!BIT06,$RMER1(R0)  ;CHECK 'DTE' & 'ECH'
3904  007466  001003                          BNE     1$              ;BR IF SET
3905  007470  004737  021620                  JSR     PC,LINE6        ;PRINT LINE 6 OF ERROR MESSAGE
3906  007474  000477                          BR      8$              ;FINISH THE ERROR REPORT
3907  007476  012737  000020  001350  1$:     MOV     #16.,RETRY      ;RETRY COUNT
3908  007504  005001                          CLR     R1              ;R1 IS OFFSET CODE POINTER
3909
3910
3911  007506  004737  016132        2$:       JSR     PC,GODRIV       ;RETRY
3912  007512  005760  000016        3$:       TST     $TATUS(R0)      ;TEST FOR DONE
3913  007516  001775                          BEQ     3$              ;BR IF NOT DONE
3914  007520  100075                          BPL     10$             ;BR IF NOT ERROR
3915  007522  032760  000200  000016          BIT     #BIT7,$TATUS(R0)  ;SEE IF ORDER TERMINIATED NORMALLY
3916  007530  001006                          BNE     14$             ;BR IF NOT
3917  007532  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3918  007536  104414  052103                  DISPLY  .LIN8M          ;'DIFFERENT ERROR DURING RETRY'
3919  007542  000137  006364                  JMP     ERPRC1          ;SEE WHICH ERROR
3920  007546  033760  001346  000250  14$:    BIT     MASK,$RMER1(R0) ;LOOK AT CURRENT ERROR
3921  007554  001430                          BEQ     5$              ;BR IF DIFFERENT ERROR
3922  007556  032760  010100  000250          BIT     #BIT12!BIT6,$RMER1(R0)  ;'ECH' OR 'DTE' STILL SET ?
3923  007564  001437                          BEQ     7$              ;BR IF NEITHER SET
3924  007566  105237  001351                  INCB    RETRY+1         ;INCREMENT RETRY COUNT
3925  007572  123737  001350  001351          CMPB    RETRY,RETRY+1   ;DONE ?
3926  007600  001342                          BNE     2$              ;BR IF NOT
3927  007602  005201                          INC     R1              ;INCREMENT TABLE INDEX
3928  007604  116137  002464  045533          MOVB    OFFCOD(R1),GENDPB+$FMT  ;OFFSET CODE
3929  007612  001435                          BEQ     9$              ;BR IF END OF OFFSET TABLE
3930  007614  062737  000002  001350          ADD     #2,RETRY        ;NEW RETRY LIMIT
3931  007622  004737  015016                  JSR     PC,OFFST        ;OFFSET
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3932  007626  005737  045550          4$:     TST     GENDPB+$TATUS   ;SEE IF FINISHED WITH OFFSET
3933  007632  001775                          BEQ     4$              ;BR IF NOT
3934  007634  100324                          BPL     2$              ;BR IF NO ERROR PERFORMING OFFSET
3935  007636  004737  022176          5$:     JSR     PC,LINE8        ;PRINT LINE 8 OF ERROR MESSAGE
3936  007642  004737  023330          6$:     JSR     PC,INCHRD       ;INCREMENT 'HARD' ERROR COUNT
3937  007646  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3938  007652  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
3939  007656  004737  014566                  JSR     PC,PRTBAD       ;PRINT THE BAD SECTOR
3940  007662  000436                          BR      13$             ;CLEAN UP AND RETURN
3941  007664  004737  021640          7$:     JSR     PC,LINE6B       ;PRINT LINE 6B OF ERROR MESSAGE
3942  007670  004737  021556                  JSR     PC,LINE5B       ;PRINT LINE 5B OF THE ERROR MESSAGE
3943  007674  004737  023304          8$:     JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
3944  007700  004737  014026                  JSR     PC,ECC          ;CORRECT THE ERROR USING ECC AND CHECK IT
3945  007704  000407                          BR      11$             ;COMPARE THE BUFFER
3946  007706  004737  021654          9$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
3947  007712  000753                          BR      6$              ;INCREMENT ERROR COUNT
3948  007714  004737  021632          10$:    JSR     PC,LINE6A       ;PRINT LINE 6A OF ERROR MESSAGE
3949  007720  004737  023304                  JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
3950  007724  012737  000001  001376  11$:    MOV     #1,FRSTER       ;SET PROCESSING 'DCKER' INDICATOR
3951  007732  004737  012634                  JSR     PC,CMPARD       ;COMPARE THE BUFFER
3952  007736  105737  001377                  TSTB    FRSTER+1        ;ERROR IN COMPARE ?
3953  007742  100406                          BMI     13$             ;BRANCH IF ERROR
3954  007744  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3955  007750  104414  052303                  DISPLY  ,LIN9G          ;'DATA COMPARE OK' MESSAGE
3956  007754  004737  021730          12$:    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
3957  007760  004737  006136          13$:    JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
3958  007764  000207                          RTS     PC              ;RETURN
3959
3960                                  ;WRITE CHECK ERROR PROCESSING
3961
3962  007766  032760  100000  000250  WCKER:  BIT     #BIT15,$RMER1(R0)  ;SEE IF 'DCK' SET ALSO
3963  007774  001034                          BNE     2$              ;BR IF IT IS
3964  007776  004737  020176                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
3965  010002  104414  046531                  DISPLY  ,EM23           ;PRINT WCE & DCK NOT
3966  010006  005037  001346                  CLR     MASK            ;CLEAR ERROR MASK
3967  010012  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
3968  010016  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
3969  010022  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3970  010026  004737  021410                  JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
3971  010032  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3972  010036  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
3973  010044  004737  015134                  JSR     PC,$RETRY       ;RETRY THE OPERATION
3974  010050  000403                          BR      1$              ;RETRY UNSUCESSFUL
3975  010052  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
3976  010056  000502                          BR      8$              ;FINISH PROCESSING THE ERROR
3977  010060  004737  021654          1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
3978  010064  000506                          BR      10$             ;FINISH PROCESSING THE ERROR
3979  010066  004737  020060          2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
3980  010072  000507                          BR      11$             ;EXIT IF AT BAD SPOT ON PACK
3981  010074  004737  020176                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
3982  010100  012737  046456  010126          MOV     #EM22,13$       ;ASSUME THAT EM22 WILL BE PRINTED
3983  010106  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;DID 'WCK' ALSO SET ?
3984  010114  001003                          BNE     12$             ;BR IF IT DID
3985  010116  012737  047357  010126          MOV     #EM37,13$       ;MESSAGE FOR 'DCK' AND 'WCK' NOT DURING
3986                                                                  ;WRITE CHECK
3987  010124  104414                  12$:    DISPLY                  ;TYPE THE ERROR MESSAGE
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3988  010126  000000                  13$:    .WORD   0               ;MESSAGE ADDRESS GOES HERE
3989  010130  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
3990  010134  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
3991  010140  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3992  010144  004737  021410                  JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
3993  010150  032760  000100  000250          BIT     #BIT06,$RMER1(R0)  ;'ECH' SET ALSO ?
3994  010156  001442                          BEQ     8$              ;FINISH PROCESSING THE ERROR
3995  010160  012737  000020  001350  3$:     MOV     #16.,RETRY      ;RETRY LIMIT - 16 (10)
3996  010166  004737  016132          4$:     JSR     PC,GODRIV       ;RETRY THE ORDER
3997  010172  005760  000016          5$:     TST     $TATUS(R0)      ;ORDER FINISHED ?
3998  010176  001775                          BEQ     5$              ;BR IF NOT
3999  010200  100405                          BMI     6$              ;BR IF ERROR ON ORDER
4000  010202  105237  001351                  INCB    RETRY+1         ;INCREMENT RETRY COUNT
4001  010206  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4002  010212  000431                          BR      9$              ;FINISH ERROR PROCESSING
4003  010214  105237  001351          6$:     INCB    RETRY+1         ;INCREMENT RETRY COUNT
4004  010220  123737  001350  001351          CMPB    RETRY,RETRY+1   ;DONE ?
4005  010226  001714                          BEQ     1$              ;BR IF AT RETRY LIMIT
4006  010230  032760  100000  000250          BIT     #BIT15,$RMER1(R0)  ;'DCK' SET
4007  010236  001407                          BEQ     7$              ;BR IF NOT - DIFFERENT ERROR
4008  010240  032760  000100  000250          BIT     #BIT06,$RMER1(R0)  ;'ECH' ALSO SET ?
4009  010246  001347                          BNE     4$              ;BR IF IT IS, RETRY ORDER
4010  010250  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4011  010254  000403                          BR      8$              ;FINISH PROCESSING ERROR
4012  010256  004737  022176          7$:     JSR     PC,LINE8        ;PRINT LINE 8 - 'DIFFERENT ERROR '
4013  010262  000405                          BR      9$              ;FINISH PROCESSING ERROR
4014  010264  004737  023424          8$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4015  010270  004737  021730                  JSR     PC,LINE7        ;FINISH THE ERROR MESSAGE
4016  010274  000406                          BR      11$             ;EXIT
4017  010276  004737  023424          9$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4018  010302  004737  021730          10$:    JSR     PC,LINE7        ;FINISH THE ERROR MESSAGE
4019  010306  004737  006136                  JSR     PC,REFMT        ;REFORMAT THE SECTOR IN ERROR
4020  010312  000207                  11$:    RTS     PC              ;RETURN
4021
4022                                  ;REPORT 'HCRC' ERROR
4023
4024  010314  004737  020060          HCRCER: JSR     PC,SPOTCK       ;SEE IF ERROR AT PACK BAD SPOT
4025  010320  000456                          BR      3$              ;EXIT IF IT IS
4026  010322  004737  022262                  JSR     PC,READDR       ;READ ERROR SECTOR HEADER
4027  010326  004737  015042                  JSR     PC,READHD       ;GET THE HEAD INFORMATION
4028  010332  004737  020176                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4029  010336  104414  046404                  DISPLY  ,EM20           ;REPORT 'HCRC'
4030  010342  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4031  010346  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4032  010352  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4033  010356  004737  021510                  JSR     PC,LINE5A       ;PRINT THE HEADER INFORMATION
4034  010362  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4035  010370  001402                          BEQ     1$              ;BR IF NOT
4036  010372  004737  021410                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4037  010376  004737  023304          1$:     JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
4038  010402  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4039  010406  012737  000400  001346          MOV     #BIT8,MASK      ;SET ERROR MASK
4040  010414  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
4041  010422  004737  015134                  JSR     PC,$RETRY       ;RETRY ORDER
4042  010426  000405                          BR      2$              ;RETRY NOT SUCESSFUL
4043  010430  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
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4044  010434  004737  021730          JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4045  010440  000406                  BR      3$              ;EXIT
4046  010442  004737  021654  2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4047  010446  004737  021730          JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4048  010452  004737  006136          JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4049  010456  000207          3$:     RTS     PC              ;RETURN
4050
4051                                  ;REPORT DRIVE ERROR
4052
4053  010460  004737  020176  DRVER: JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4054  010464  104414  047021          DISPLY  ,EM30           ;REPORT DRIVE ERROR
4055  010470  004737  020242          JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4056  010474  004737  020650          JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4057  010500  004737  023424          JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4058  010504  004737  021730          JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4059  010510  000207                  RTS     PC              ;RETURN
4060
4061                                  ;PROCESS FORMAT ('FER') ERROR
4062
4063  010512  032760  000400  000250 CKFMT:  BIT     #BIT8,$RMER1(R0) ;'HCRC' SET ON ORIGINAL ERROR ?
4064  010520  001402                  BEQ     1$              ;BR IF NOT SET
4065  010522  000137  010314          JMP     HCRCER          ;REPORT HCRC ERROR
4066  010526  004737  022262  1$:     JSR     PC,READDR       ;GET CORRECTED TRACK & SECTOR ADDRSSES
4067  010532  004737  015042          JSR     PC,READHD       ;READ HEADER
4068  010536  032737  000400  045566  BIT     #BIT8,GENREG+RMER1 ;'HCRC' SET WHEN HEADER READ?
4069  010544  001002                  BNE     2$              ;BR IF 'HCRC' SET
4070  010546  000137  011512          JMP     FMTER           ;NO, ERROR IS 'FMT' ONLY
4071  010552  004737  020060  2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
4072  010556  000452                  BR      5$              ;EXIT IF IT IS
4073  010560  004737  020176          JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4074  010564  104414  046610          DISPLY  ,EM24           ;HEADER READ ERROR - FMT BIT DROPPED UP
4075  010570  004737  020242          JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4076  010574  004737  020650          JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4077  010600  004737  021320          JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4078  010604  032760  040000  000244  BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4079  010612  001402                  BEQ     3$              ;BR IF NOT
4080  010614  004737  021410          JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4081  010620  004737  021510  3$:     JSR     PC,LINE5A       ;DISPLAY HEADER
4082  010624  004737  023304          JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
4083  010630  004737  023424          JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4084  010634  012737  000020  001346  MOV     #BIT4,MASK      ;SET ERROR MASK
4085  010642  012737  000003  001350  MOV     #3,RETRY        ;RETRY LIMIT
4086  010650  004737  015134          JSR     PC,$RETRY       ;RETRY THE ORDER
4087  010654  000405                  BR      4$              ;RETRY NOT SUCESSFUL
4088  010656  004737  021646          JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4089  010662  004737  021730          JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4090  010666  000406                  BR      5$              ;EXIT
4091  010670  004737  021654  4$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4092  010674  004737  021730          JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4093  010700  004737  006136          JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4094  010704  000207          5$:     RTS     PC              ;RETURN
4095
4096                                  ;PROCESS HEADER COMPARE ('HCE') ERROR
4097
4098  010706  032760  000400  000250 CKHCE:  BIT     #BIT8,$RMER1(R0) ;HCRC SET ON ORIGINAL ERROR ?
4099  010714  001402                  BEQ     1$              ;BR IF NOT SET
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4100  010716  000137  010314            JMP     HCRCER          ;REPORT HEADER CRC ERROR
4101  010722  004737  022262      1$:   JSR     PC,READDR       ;GET CURRENT SECTOR & TRACK ADDRS
4102  010726  004737  015042            JSR     PC,READHD       ;READ HEADER OF CURRENT SECTOR
4103  010732  032737  000400  045566    BIT     #BIT8,GENREG+RMER1 ;'HCRC' SET ?
4104  010740  001016                    BNE     3$              ;BR IF SET
4105  010742  042737  150000  056150    BIC     #150000,CYLDER  ;CLEAR FORMAT,MFG,USER BITS FROM HEADER
4106  010750  026037  000270  056150    CMP     $RMDC(R0),CYLDER  ;CORRECT CYLINDER ?
4107  010756  001402                    BEQ     2$              ;BR IF IT IS
4108  010760  000137  011132            JMP     POSER           ;REPORT POSITIONING ERROR
4109  010764  052737  150000  056150  2$:   BIS     #150000,CYLDER  ;RESTORE THE FORMAT,MFG,USER BITS
4110  010772  000137  011570            JMP     HCEER           ;REPORT 'HCE' ERROR
4111  010776  004737  020060      3$:   JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4112  011002  000452                    BR      6$              ;EXIT IF IT IS
4113  011004  004737  020176            JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4114  011010  104414  046656            DISPLY  ,EM25           ;HEADER READ ERROR - 'HCE' SET
4115  011014  004737  020242            JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4116  011020  004737  020650            JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4117  011024  004737  021320            JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4118  011030  032760  040000  000244    BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4119  011036  001402                    BEQ     4$              ;BR IF NOT
4120  011040  004737  021410            JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4121  011044  004737  021510      4$:   JSR     PC,LINE5A       ;PRINT LINE 5 OF ERROR MESSAGE
4122  011050  004737  023304            JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
4123  011054  004737  023424            JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4124  011060  012737  000200  001346    MOV     #BIT7,MASK      ;SET ERROR MASK
4125  011066  012737  000003  001350    MOV     #3,RETRY        ;RETRY LIMIT
4126  011074  004737  015134            JSR     PC,$RETRY       ;RETRY THE ORDER
4127  011100  000405                    BR      5$              ;RETRY NOT SUCESSFUL
4128  011102  004737  021646            JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4129  011106  004737  021730            JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4130  011112  000406                    BR      6$              ;EXIT
4131  011114  004737  021654      5$:   JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4132  011120  004737  021730            JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4133  011124  004737  006136            JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4134  011130  000207              6$:   RTS     PC              ;RETURN
4135
4136                          ;REPORT POSSIBLE POSITIONING ERROR
4137
4138  011132  004737  014764  POSER:   JSR     PC,RECALT       ;RECALIBRATE
4139  011136  004737  020176            JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4140  011142  104414  050153            DISPLY  ,EM51           ;PROGRAM DETECTED POSITIONING ERROR
4141  011146  004737  020242            JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4142  011152  004737  020676            JSR     PC,LINE3C       ;PRINT LINE 3C OF ERROR MESSAGE
4143  011156  052737  150000  056150    BIS     #150000,CYLDER  ;RESTORE THE FORMAT BIT
4144  011164  004737  021510            JSR     PC,LINE5A       ;PRINT LINE 5A OF THE ERROR MESSAGE
4145  011170  004737  023400            JSR     PC,INCMIS       ;INCREMENT MISPOSITIONING COUNT
4146  011174  004737  023424            JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4147  011200  004737  022056            JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
4148  011204  000207                    RTS     PC              ;EXIT
4149
4150                          ;REPORT 'OPI' ERROR
4151
4152  011206  004737  020060  OPIER:   JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4153  011212  000207                    RTS     PC              ;RETURN IF IT IS
4154  011214  004737  020176            JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4155  011220  104414  047053            DISPLY  ,EM31           ;'OPI' ERROR
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4156  011224  004737  020242                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4157  011230  004737  020650                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4158  011234  004737  021320                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4159  011240  004737  023424                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4160  011244  012737  020000  001346            MOV     #BIT13,MASK     ;ERROR MASK
4161  011252  012737  000003  001350  OPIER1:   MOV     #3,RETRY        ;RETRY LIMIT
4162  011260  004737  015134                    JSR     PC,$RETRY       ;RETRY THE ORDER
4163  011264  000405                            BR      1$              ;RETRY UNSUCESSFUL
4164  011266  004737  021646                    JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4165  011272  004737  021730                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4166  011276  000207                            RTS     PC              ;EXIT
4167  011300  004737  021654          1$:       JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4168  011304  004737  021730                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4169  011310  004737  006136                    JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4170  011314  000207                            RTS     PC              ;RETURN
4171
4172                                    ;REPORT 'DTE' ERROR
4173
4174  011316  004737  020060          DTEER:    JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4175  011322  000207                            RTS     PC              ;RETURN IF IT IS
4176  011324  004737  020176                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4177  011330  104414  047116                    DISPLY  ,EM32           ;'DTE' ERROR
4178  011334  000137  007432                    JMP     DCKER1          ;FINISH PROCESSING THE 'DTE' ERROR
4179
4180                                    ;REPORT 'PAR' ERROR
4181
4182  011340  004737  020176          PARER:    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4183  011344  104414  047151                    DISPLY  ,EM33           ;REPORT 'PAR'
4184  011350  004737  020242                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4185  011354  004737  020754                    JSR     PC,LINE3E       ;PRINT LINE 3E OF ERROR MESSAGE
4186  011360  004737  021320                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4187  011364  004737  023424                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4188  011370  012737  000010  001346            MOV     #BIT03,MASK     ;ERROR MASK
4189  011376  012737  000003  001350            MOV     #3,RETRY        ;RETRY LIMIT
4190  011404  004737  015134                    JSR     PC,$RETRY       ;RETRY ORDER
4191  011410  000405                            BR      2$              ;RETRY UNSUCESSFUL
4192  011412  004737  021646                    JSR     PC,LINE6C       ;RETRY SUCESSFUL
4193  011416  004737  021730          1$:       JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4194  011422  000207                            RTS     PC              ;EXIT
4195  011424  004737  021654          2$:       JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4196  011430  000772                            BR      1$              ;FINISH ERROR MESSAGE
4197
4198                                    ;REPORT 'IAE' ERROR
4199
4200  011432  004737  020176          IAEER:    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4201  011436  104414  047270                    DISPLY  ,EM35           ;REPORT 'IAE'
4202  011442  004737  020242                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4203  011446  004737  021042                    JSR     PC,LINE3F       ;PRINT LINE 3F OF ERROR MESSAGE
4204  011452  004737  023424                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4205  011456  004737  021730                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4206  011462  000207                            RTS     PC              ;RETURN
4207
4208                                    ;REPORT 'WLE' ERROR
4209
4210  011464  004737  020176          WLEER:    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4211  011470  104414  047326                    DISPLY  ,EM36           ;REPORT 'WLE'
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4212  011474  004737  020242              JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4213  011500  004737  023424              JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4214  011504  004737  021730              JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4215  011510  000207                      RTS     PC              ;RETURN
4216
4217                                  ;REPORT FORMAT ERROR
4218
4219  011512  004737  020176      FMTER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4220  011516  104414  046737              DISPLY  ,EM26           ;FORMAT ERROR
4221  011522  004737  020242              JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4222  011526  004737  020650              JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4223  011532  004737  021320              JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4224  011536  032760  040000  000244      BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4225  011544  001402                      BEQ     1$              ;BR IF NOT
4226  011546  004737  021410              JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4227  011552  004737  021510      1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
4228  011556  004737  023424              JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4229  011562  004737  021730              JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4230  011566  000207                      RTS     PC
4231
4232                                  ;REPORT HEADER COMPARE ERROR
4233
4234  011570  004737  020176      HCEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4235  011574  104414  046764              DISPLY  ,EM27           ;HEADER COMPARE ERROR
4236  011600  004737  020242              JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4237  011604  004737  020650              JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4238  011610  004737  021320              JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4239  011614  032760  040000  000244      BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4240  011622  001402                      BEQ     1$              ;BR IF NOT
4241  011624  004737  021410              JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4242  011630  004737  021510      1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
4243  011634  004737  023424              JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4244  011640  004737  021730              JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4245  011644  004737  006136              JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4246  011650  000207                      RTS     PC              ;RETURN
4247
4248                                  ;PROCESS CONTROL/INTERFACE TRANSFER ERROR
4249
4250  011652  004737  020176      TRFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4251  011656  104414  047441              DISPLY  ,EM40           ;RH11 OR UNIBUS TRANSFER ERROR
4252  011662  004737  020242              JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4253  011666  004737  020650              JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4254  011672  004737  021320              JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4255  011676  004737  023424              JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4256  011702  032760  121400  000244      BIT     #BIT15!BIT13!BIT9!BIT8,$RMCS2(R0)  ;'DLT','UPE','MXF', 'MDPE' SET ?
4257  011710  001415                      BEQ     2$              ;BR IF NONE SET
4258  011712  012737  000003  001350      MOV     #3,RETRY        ;RETRY LIMIT
4259  011720  005037  001346              CLR     MASK            ;CLEAR ERROR MASK
4260  011724  004737  015134              JSR     PC,$RETRY       ;RETRY THE OPERATION
4261  011730  000403                      BR      1$              ;RETURN HERE IF RETRY UNSUCESSFUL
4262  011732  004737  021646              JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4263  011736  000402                      BR      2$              ;FINISH THE ERROR REPORT
4264  011740  004737  021654      1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4265  011744  004737  021730      2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4266  011750  000207                      RTS     PC
4267
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4268
4269
4270  011752  004737  020176          SKIER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4271  011756  104414  050115                  DISPLY  ,EM50           ;'SKI' OR 'OCYL' ERROR
4272  011762  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4273  011766  004737  020664                  JSR     PC,LINE3B       ;PRINT LINE 3B OF ERROR MESSAGE
4274  011772  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4275  011776  004737  023354                  JSR     PC,INCSKI       ;INCREMENT 'SKI' OR 'OCYL' ERROR COUNT
4276  012002  004737  022056                  JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
4277  012006  000207                          RTS     PC
4278
4279                                  ;REPORT WRITE CLOCK FAILURE ('WCF')
4280
4281  012010  004737  020176          WCFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4282  012014  104414  047226                  DISPLY  ,EM34           ;REPORT WRITE CLOCK FAILURE
4283  012020  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4284  012024  004737  020656                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
4285  012030  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4286  012034  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4287  012040  004737  014566                  JSR     PC,PRTBAD       ;SEE IF BAD SECTOR TO BE PRINTED
4288  012044  012737  000003  001350          MOV     #3,RETRY        ;RETRY COUNT
4289  012052  012737  000040  001346          MOV     #BIT05,MASK     ;ERROR MASK
4290  012060  004737  015134                  JSR     PC,$RETRY       ;RETRY THE ORDER
4291  012064  000405                          BR      2$              ;RETURN HERE IF RETRY UNSUCESSFUL
4292  012066  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4293  012072  004737  021730          1$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4294  012076  000207                          RTS     PC
4295  012100  004737  021654          2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4296  012104  000772                          BR      1$
4297
4298                                  ;PROCESS DRIVE UNSAFE ERROR
4299
4300  012106  004737  020176          UNSAF:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4301  012112  104414  050216                  DISPLY  ,EM60           ;REPORT DRIVE UNSAFE
4302  012116  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4303  012122  004737  020650                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4304  012126  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4305  012132  012737  000003  001350          MOV     #3,RETRY        ;RETRY COUNT
4306  012140  004737  015134                  JSR     PC,$RETRY       ;RETRY THE ORDER
4307  012144  000403                          BR      1$              ;RETRY WAS UNSUCESSFUL
4308  012146  004737  021646                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4309  012152  000402                          BR      2$              ;CONTINUE WITH ERROR REPORT
4310  012154  004737  021654          1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4311  012160  004737  021730          2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4312  012164  000207                          RTS     PC              ;RETURN
4313
4314                                  ;REPORT AN 'UNKNOWN' DATA PATTERN
4315
4316  012166  105737  001376          NOMTCH: TSTB    FRSTER          ;FIRST ERROR IN THE SECTOR ?
4317  012172  001013                          BNE     1$              ;BR IF NOT OR IF PROCESSING 'DCKER'
4318  012174  004737  020176                  JSR     PC,LINE1        ;TYPE LINE 1 OF ERROR MESSAGE
4319  012200  104414  047624                  DISPLY  ,EM43           ;'CAN'T MATCH DATA WITH PATTERN'
4320  012204  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4321  012210  004737  020656                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
4322  012214  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4323  012220  000404                          BR      2$              ;CONTINUE PROCESSING ERROR
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4324  012222  104414  047624          1$:     DISPLY  ,EM43           ;'CAN'T MATCH DATA WITH PATTERN'
4325  012226  104414  001201                  DISPLY  ,$CRLF           ;CR-LF
4326  012232  104414  052233          2$:     DISPLY  ,LIN9I           ;HEADER FOR DATA PRINTOUT
4327  012236  010146                          MOV     R1,-(SP)         ;ADDRESS OF WORD 1
4328  012240  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 1
4329  012244  104414  052716                  DISPLY  ,LINSP           ;SPACES
4330  012250  012146                          MOV     (R1)+,-(SP)      ;ADDRESS OF WORD 1
4331  012252  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 1
4332  012256  104414  001201                  DISPLY  ,$CRLF           ;CR-LF
4333  012262  010146                          MOV     R1,-(SP)         ;ADDRESS OF WORD 2
4334  012264  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 2
4335  012270  104414  052716                  DISPLY  ,LINSP           ;SPACES
4336  012274  012146                          MOV     (R1)+,-(SP)      ;ADDRESS OF WORD 2
4337  012276  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 2
4338  012302  104414  001201                  DISPLY  ,$CRLF           ;CR-LF
4339  012306  010146                          MOV     R1,-(SP)         ;ADDRESS OF WORD 3
4340  012310  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 3
4341  012314  104414  052716                  DISPLY  ,LINSP           ;SPACES
4342  012320  012146                          MOV     (R1)+,-(SP)      ;ADDRESS OF WORD 3
4343  012322  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 3
4344  012326  104414  001201                  DISPLY  ,$CRLF           ;CR-LF
4345  012332  010146                          MOV     R1,-(SP)         ;ADDRESS OF WORD 4
4346  012334  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 4
4347  012340  104414  052716                  DISPLY  ,LINSP           ;SPACES
4348  012344  012146                          MOV     (R1)+,-(SP)      ;ADDRESS OF WORD 4
4349  012346  004737  022210                  JSR     PC,LINOCT        ;TYPE WORD 4
4350  012352  104414  001201                  DISPLY  ,$CRLF           ;CR-LF
4351  012356  062701  000770                  ADD     #<252.*2.>,R1    ;INCREMENT BUFFER POINTER
4352  012362  162737  000400  001410          SUB     #256.,CMCNT      ;ADJUST WORD COUNT FOR MATCH
4353  012370  132760  000001  000024          BITB    #BIT00,$CODE(R0) ;HEADER OPERATION INVOLVED ?
4354  012376  001405                          BEQ     3$               ;NO
4355  012400  062701  000004                  ADD     #4,R1            ;ADJUST BUFFER ADDRESS
4356  012404  162737  000002  001410          SUB     #2,CMCNT         ;ADJUST WORD COUNT
4357  012412  005002                  3$:     CLR     R2               ;CLEAR 'WORDS TO COMPARE' COUNT IN R2
4358  012414  112737  000001  001376          MOVB    #1,FRSTER        ;SET 'NOT FIRST ERROR' INDICATOR
4359  012422  112737  177777  001377          MOVB    #-1,FRSTER+1     ;SET ERROR FOUND INDICATOR
4360  012430  013737  001472  001406          MOV     CMPLMT,LIMIT     ;RESET THE COMPARE ERROR TYPEOUT LIMIT
4361  012436  000207                          RTS     PC               ;RETURN
4362
4363                                  ;CHECK ERROR BITS IN THE RH11 & RM03 REGISTERS
4364
4365  012440  032760  060000  000234  CKERR:  BIT     #60000,$RMCS1(R0)  ;SEE IF 'TRE' OR 'MCPE' SET
4366  012446  001012                          BNE     1$               ;BR IT EITHER SET
4367  012450  032760  177400  000244          BIT     #177400,$RMCS2(R0)  ;SEE IF ERROR BITS IN CS2 SET
4368  012456  001006                          BNE     1$               ;BR IF ANY SET
4369  012460  005760  000250                  TST     $RMER1(R0)       ;ANY BITS SET IN ER1
4370  012464  001003                          BNE     1$               ;BR IF ANY SET
4371  012466  005760  000276                  TST     $RMER2(R0)       ;ANY BITS SET IN ER2 ?
4372  012472  001416                          BEQ     2$               ;BR IF NONE SET
4373  012474  004737  020176          1$:     JSR     PC,LINE1         ;PRINT LINE 1 OF ERROR MESSAGE
4374  012500  104414  047671                  DISPLY  ,EM44            ;ERROR BITS SET, BUT 'SC' OR 'TRE' NOT SET
4375  012504  004737  020242                  JSR     PC,LINE2         ;PRINT LINE 2 OF ERROR MESSAGE
4376  012510  004737  020650                  JSR     PC,LINE3         ;PRINT LINE 3 OF ERROR MESSAGE
4377  012514  004737  021320                  JSR     PC,LINE4         ;PRINT LINE 4 OF ERROR MESSAGE
4378  012520  004737  023424                  JSR     PC,INCTOT        ;INCREMENT TOTAL ERROR COUNT
4379  012524  004737  021730                  JSR     PC,LINE7         ;PRINT LINE 7 OF ERROR MESSAGE
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4380  012530  000207                  2$:     RTS     PC              ;RETURN
4381
4382                                  ;CHECK BUS ADDRESS REGISTER & WORD COUNT REGISTER
4383
4384  012532  005760  000236          CKBUS:  TST     $RMWC(R0)       ;CHECK WORD COUNT
4385  012536  001010                          BNE     1$              ;BR IF NOT ZERO
4386  012540  016046  000020                  MOV     $WRDL(R0),-(SP) ;WORD LENGTH
4387  012544  006316                          ASL     (SP)            ;CHANGE INTO BYTE COUNT
4388  012546  066016  000006                  ADD     $BUF(R0),(SP)   ;ADD THE STARTING LOCATION
4389  012552  022660  000240                  CMP     (SP)+,$RMBA(R0) ;BUFFER ADDRESS PROPER ?
4390  012556  001416                          BEQ     2$              ;BR IF OK
4391  012560  004737  020176          1$:     JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4392  012564  104414  047477                  DISPLY  ,EM41           ;BUS ADDRESS OR WORD COUNT INCORRECT
4393  012570  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4394  012574  004737  020706                  JSR     PC,LINE3D       ;PRINT LINE 3D OF ERROR MESSAGE
4395  012600  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4396  012604  004737  023424                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4397  012610  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4398  012614  000207                  2$:     RTS     PC
4399
4400                                  ;COMPARE THE BUFFER
4401
4402  012616  132760  000004  000024  CMPAR:  BITB    #BIT02,$CODE(R0)  ;SEE IF READ ORDER
4403  012624  001001                          BNE     1$              ;BR IF IT IS
4404  012626  000207                          RTS     PC              ;RETURN
4405  012630  005037  001376          1$:     CLR     FRSTER          ;CLEAR 'FIRST ERROR' INDICATOR
4406  012634  032777  000002  166312  CMPARD: BIT     #SW01,@SWR      ;IS SWITCH 1 SET?
4407  012642  001401                          BEQ     1$              ;BR IF NOT
4408  012644  000207                          RTS     PC              ;YES, DON'T COMPARE
4409  012646  005037  001404          1$:     CLR     ERCTR           ;CLEAR THE ERROR COUNTER
4410  012652  016001  000006                  MOV     $BUF(R0),R1     ;BUFFER ADDRESS
4411  012656  016037  000020  001410          MOV     $WRDL(R0),CMCNT  ;WORD COUNT TO WORKING LOCATION
4412  012664  066037  000236  001410          ADD     $RMWC(R0),CMCNT  ;CALCULATE ACTUAL WORDS TRANSFERED
4413  012672  016037  000012  001412          MOV     $CYL(R0),CMCYL  ;CYLINDER ADDRESS WORKING LOCATION
4414  012700  052737  010000  001412          BIS     #BIT12,CMCYL    ;SET FORMAT BIT
4415  012706  052737  140000  001412          BIS     #140000,CMCYL   ;SET MFG AND USER BITS
4416  012714  016037  000010  001414          MOV     $SEC(R0),CMSEC  ;SECTOR & TRACK ADDRESSES TO WORKING LOCNS
4417  012722  013737  001472  001406          MOV     CMPLMT,LIMIT    ;DISPLAY LIMIT
4418  012730  005237  001406                  INC     LIMIT           ;CONVERT PARAMETER INTO LIMIT VALUE
4419  012734  012737  177777  001374  CMSTR:  MOV     #-1,ZROIND      ;CLEAR THE 'ZERO'S' INDICATOR
4420  012742  005037  001400                  CLR     SAVER1          ;CLEAR THE R1 SAVE WORD
4421  012746  005037  001402                  CLR     SAVER5          ;CLEAR THE R5 SAVE WORD
4422  012752  023760  001410  000022          CMP     CMCNT,$SSEC(R0)  ;IS BUFFER SIZE GREATER THAN ONE SECTOR ?
4423  012760  101005                          BHI     1$              ;BR IF IT IS
4424  012762  013702  001410                  MOV     CMCNT,R2        ;LESS THAN, USE REMAINING BUFFER
4425  012766  005037  001410                  CLR     CMCNT           ;SET COUNTER TO 0
4426  012772  000405                          BR      2$              ;
4427  012774  016002  000022          1$:     MOV     $SSEC(R0),R2    ;COMPARE SECTOR
4428  013000  166037  000022  001410          SUB     $SSEC(R0),CMCNT ;DECREMENT WORD COUNT
4429  013006  126027  000024  000005  2$:     CMPB    $CODE(R0),#5    ;READ HEADER & DATA?
4430  013014  001023                          BNE     CMDAT           ;BR IF NOT
4431  013016  023721  001412          CMHED:  CMP     CMCYL,(R1)+     ;CHECK CYLINDER
4432  013022  001402                          BEQ     1$              ;BR IF COMPARE OK
4433  013024  004737  013052                  JSR     PC,CMSTR2               ;REPORT ERROR
4434  013030  023721  001414          1$:     CMP     CMSEC,(R1)+     ;COMPARE SECTOR & TRACK
4435  013034  001402                          BEQ     4$              ;BR IF EQ
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4436  013036  004737  013052              JSR     PC,CMSTR2       ;REPORT ERROR
4437  013042  162702  000002      4$:     SUB     #2,R2           ;SUBTRACT HEADER LENGTH FROM SIZE
4438  013046  003564                      BLE     CMPRX           ;BR IF FINISHED
4439  013050  000405                      BR      CMDAT           ;COMPARE THE DATA PORTION
4440  013052  005237  001404      CMSTR2: INC     ERCTR           ;INCREMENT THE ERROR COUNT
4441  013056  004737  013426              JSR     PC,CMPRT        ;REPORT THE COMPARISON ERROR
4442  013062  000207                      RTS     PC              ;CHECK THE REST OF THE HEADER
4443  013064  004737  013750      CMDAT:  JSR     PC,MATCH        ;FIND THE PATTERN
4444  013070  000403                      BR      2$              ;FOUND A PATTERN
4445  013072  004737  012166              JSR     PC,NOMTCH       ;RETURN HERE IF NO MATCH WITH PATTERN MADE
4446  013076  000456                      BR      8$              ;BYPASS COMPARE ROUTINE
4447  013100  011405              2$:     MOV     (R4),R5         ;ADDRESS OF PATTERN ADDRESS IN R4
4448  013102  012703  000020              MOV     #20,R3          ;R3 IS PATTERN POS COUNTER
4449  013106  022125              3$:     CMP     (R1)+,(R5)+     ;COMPARE BUFFER WITH PATTERN
4450  013110  001016                      BNE     5$              ;BR IF NOT EQUAL
4451  013112  005737  001404              TST     ERCTR           ;ERRORS DETECTED ?
4452  013116  001406                      BEQ     4$              ;BR IF NO ERRORS
4453  013120  032777  000010  166026      BIT     #SW3,@SWR       ;SWITCH 3 SET ?
4454  013126  001402                      BEQ     4$              ;BR IF NOT SET
4455  013130  004737  013426              JSR     PC,CMPRT        ;DISPLAY THE WORD
4456  013134  005302              4$:     DEC     R2              ;DECREMENT SIZE COUNT
4457  013136  003436                      BLE     8$              ;BR WHEN AT END
4458  013140  005303                      DEC     R3              ;DECREMENT PATT POS COUNT
4459  013142  001361                      BNE     3$              ;BR IF NOT AT END OF PATT
4460  013144  000755                      BR      2$              ;RESTART THE PATTERN
4461  013146  005761  177776      5$:     TST     -2(R1)          ;IS MISCOMPARED CHARACTER=0
4462  013152  001410                      BEQ     6$              ;BR IF YES
4463  013154  012737  177777  001374      MOV     #-1,ZROIND      ;SET NON-ZERO MISCOMPARED INDCATOR
4464  013162  005237  001404              INC     ERCTR           ;INCREMENT THE ERROR COUNTER
4465  013166  004737  013426              JSR     PC,CMPRT        ;REPORT ERROR
4466  013172  000760                      BR      4$              ;CONTINUE COMPARE
4467  013174  105737  001376      6$:     TSTB    FRSTER          ;FIRST ERROR?
4468  013200  100407                      BMI     7$              ;BR IF NOT
4469  013202  005037  001374              CLR     ZROIND          ;SET THE ZERO INDICATOR
4470  013206  010137  001400              MOV     R1,SAVER1       ;SAVE CURRENT R1
4471  013212  010537  001402              MOV     R5,SAVER5       ;SAVE CURRENT R5
4472  013216  000746                      BR      4$              ;CONTINUE COMPARE
4473  013220  005737  001374      7$:     TST     ZROIND          ;ANY MISCOMPARIONS NOT ZEROS ?
4474  013224  001743                      BEQ     4$              ;BR IF NONE-ALL ERRORS=ZERO
4475  013226  004737  013426              JSR     PC,CMPRT        ;REPORT ERROR
4476  013232  000740                      BR      4$              ;CONTINUE COMPARING
4477  013234  023727  001410  000004  8$: CMP     CMCNT,#4        ;LAST 3WORDS ?
4478  013242  002466                      BLT     CMPRX           ;YES
4479  013244  126027  000024  000005      CMPB    $CODE(R0),#5    ;READ HEAD AND DATA ?
4480  013252  001414                      BEQ     9$              ;YES
4481  013254  013702  001410      13$:    MOV     CMCNT,R2        ;SET COUNTER = REMAIN BUFFER LENGTH
4482  013260  020227  000004              CMP     R2,#4           ;LAST  3 WORDS ?
4483  013264  002455                      BLT     CMPRX           ;YES,EXIT
4484  013266  162737  000400  001410      SUB     #256.,CMCNT     ;GREATER THAN A SECTOR ?
4485  013274  003673                      BLE     CMDAT           ;NO,RETURN TO COMPARE LOOP
4486  013276  012702  000400              MOV     #256.,R2        ;SET COUNTER =SECTOR SIZE
4487  013302  000670                      BR      CMDAT           ;RETURN TO COMPARE LOOP
4488  013304  105237  001414      9$:     INCB    CMSEC           ;INCREMENT COUNTER
4489  013310  123727  001414  000040      CMPB    CMSEC,#32.      ;MAX SECTOR # ?
4490  013316  103421                      BLO     10$             ;NO
4491  013320  105037  001414              CLRB    CMSEC           ;RESET SECTOR #
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4492  013324  105237  001415                  INCB    CMTRK           ;INCREMENT TRACK #
4493  013330  123727  001415  000005          CMPB    CMTRK,#5        ;MAX TRACK # ?
4494  013336  103411                          BLO     10$             ;NO
4495  013340  105037  001415                  CLRB    CMTRK           ;RESET TRACK #
4496  013344  005237  001412                  INC     CMCYL           ;INCREMENT CYLINDER NUMBER
4497  013350  023727  001412  151466          CMP     CMCYL,#150000+822.      ;LAST CYLINDER ?
4498  013356  103401                          BLO     10$             ;NO
4499  013360  000417                          BR      CMPRX           ;NORMAL RETURN,NOT WRAP AROUND
4500  013362  023721  001412          10$:    CMP     CMCYL,(R1)+     ;COMPARE 1ST HEADER WORD
4501  013366  001402                          BEQ     11$             ;MATCH
4502  013370  004737  013052                  JSR     PC,CMSTR2       ;NOT MATCH
4503  013374  023721  001414          11$:    CMP     CMSEC,(R1)+     ;SECOND WORD OF HEADER
4504  013400  001402                          BEQ     12$             ;MATCH
4505  013402  004737  013052                  JSR     PC,CMSTR2       ;NOT MATCH
4506  013406  162737  000002  001410  12$:    SUB     #2,CMCNT                ;ADJUST WORD COUNT
4507  013414  003401                          BLE     CMPRX           ;COMPARE IS DONE
4508  013416  000716                          BR      13$             ;RETURN TO COMPARE LOOP
4509
4510  013420  004737  013702          CMPRX:  JSR     PC,ENDCMP       ;PRINT LAST LINE IF ERRORS
4511  013424  000207                          RTS     PC
4512
4513                                  ;TYPE DATA COMPARE ERRORS
4514
4515  013426  005737  001400          CMPRT:  TST     SAVER1          ;PRINT SAVED VALUES ?
4516  013432  001010                          BNE     2$              ;BR IF NOT
4517  013434  105737  001376                  TSTB    FRSTER          ;FIRST ERROR?
4518  013440  100402                          BMI     1$              ;BR IF NOT
4519  013442  004737  013522                  JSR     PC,4$           ;PRINT INITIAL MESSAGE INFO
4520  013446  004737  013604          1$:     JSR     PC,8$           ;PRINT REMAINDER OF MESSAGE
4521  013452  000422                          BR      3$              ;EXIT
4522  013454                          2$:
4523  013454  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4524  013456  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
4525  013460  013701  001400                  MOV     SAVER1,R1       ;DISPLAY SAVED R1
4526  013464  013705  001402                  MOV     SAVER5,R5       ;DISPLAY SAVED R5
4527  013470  004737  013522                  JSR     PC,4$           ;PRINT INITIAL MESSAGE INFO
4528  013474  004737  013604                  JSR     PC,8$           ;PRINT SAVED VALUES
4529  013500  005037  001400                  CLR     SAVER1          ;CLEAR SAVED REGISTER INDICATORS
4530  013504  005037  001402                  CLR     SAVER5          ;CLEAR THE OTHER ONE
4531  013510  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
4532  013512  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
4533  013514  004737  013604                  JSR     PC,8$           ;PRINT REMAINDER OF MESSAGE
4534  013520  000207                  3$:     RTS     PC              ;RETURN
4535  013522  105737  001376          4$:     TSTB    FRSTER          ;FIRST ERROR ?
4536  013526  100425                          BMI     7$              ;BR IF NOT
4537  013530  001013                          BNE     5$              ;BR IF FIRST ERROR AND PROCESSING 'DCK' ERROR
4538  013532  004737  020176                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4539  013536  104414  047543                  DISPLY  ,EM42           ;DATA COMPARE ERROR
4540  013542  004737  020242                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4541  013546  004737  020656                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
4542  013552  004737  021320                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4543  013556  000404                          BR      6$              ;GO TO TYPE HEADER
4544  013560  104414  052126          5$:     DISPLY  ,LIN9B          ;HEADER MESSAGE OF PROCESSING 'DCK' ERROR
4545  013564  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
4546  013570  104414  052155          6$:     DISPLY  ,LIN9H          ;DISPLAY HEADER
4547  013574  012737  177777  001376          MOV     #-1,FRSTER      ;SET ERROR FLAG
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4548  013602  000207                  7$:     RTS     PC              ;RETURN
4549  013604  005737  001406          8$:     TST     LIMIT           ;TYPEOUT LIMIT REACHED ?
4550  013610  001403                          BEQ     9$              ;BR IF IT HAS
4551  013612  005337  001406                  DEC     LIMIT           ;DECREMENT LIMIT COUNTER
4552  013616  001005                          BNE     10$             ;BR IF NOT AT LIMIT
4553  013620  032777  000200  165326  9$:     BIT     #SW07,@SWR      ;PRINT ALL DATA COMPARE ERRORS ?
4554  013626  001001                          BNE     10$             ;BR IF YES
4555  013630  000207                          RTS     PC              ;RETURN
4556  013632  010146                  10$:    MOV     R1,-(SP)        ;BUFFER ADDRESS
4557  013634  162716  000002                  SUB     #2,(SP)         ;ADJUST ADDRESS
4558  013640  004737  022210                  JSR     PC,LINOCT       ;TYPE IT
4559  013644  104414  052716                  DISPLY  ,LINSP          ;2 SPACES
4560  013650  016546  177776                  MOV     -2(R5),-(SP)    ;PUT GOOD DATA ON THE STACK
4561  013654  004737  022210                  JSR     PC,LINOCT       ;TYPE IT
4562  013660  104414  052716                  DISPLY  ,LINSP          ;2 SPACES
4563  013664  016146  177776                  MOV     -2(R1),-(SP)    ;BAD DATA
4564  013670  004737  022210                  JSR     PC,LINOCT       ;TYPE IT
4565  013674  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
4566  013700  000207                          RTS     PC              ;RETURN
4567
4568                                  ;LAST LINE OF COMPARE ERROR REPORTING
4569
4570  013702  105737  001377          ENDCMP: TSTB    FRSTER+1        ;ANY COMPARE ERRORS FOUND ?
4571  013706  001417                          BEQ     2$              ;BR IF NOT
4572  013710  005737  001404                  TST     ERCTR           ;SEE HOW MANY ERRORS
4573  013714  001410                          BEQ     1$              ;BR IF ONLY CAN'T MATCH PATTERN
4574  013716  104414  052253                  DISPLY  ,LIN9E          ;'NUMBER OF ERRORS='
4575  013722  013746  001404                  MOV     ERCTR,-(SP)     ;NUMBER OF ERRORS
4576  013726  004737  022242                  JSR     PC,LINDEC       ;TYPE IT
4577  013732  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
4578  013736  004737  023424          1$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4579  013742  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4580  013746  000207                  2$:     RTS     PC              ;RETURN
4581
4582
4583                                  ;ROUTINE TO MATCH THE DATA WITH A PATTERN
4584                                  ;CALL:
4585                                  ;       MOV     #BUFFER,R1      ;BUFFER ADDRESS
4586                                  ;       JSR     PC,MATCH
4587                                  ;       RETURN1                 ;PATTERN ADDRESS IN R4
4588                                  ;       RETURN2                 ;COULDN'T MATCH PATTERN
4589
4590  013750  010146                  MATCH:  MOV     R1,-(SP)        ;SAVE R1 ON THE STACK
4591  013752  012704  000044                  MOV     #44,R4          ;PATTERN TABLE INDEX
4592  013756  011601                  1$:     MOV     (SP),R1         ;RELOAD R1
4593  013760  162704  000002                  SUB     #2,R4           ;DECREMENT INDEX
4594  013764  001413                          BEQ     3$              ;BR IF  PATTERN NOT MATCH
4595  013766  016405  002476                  MOV     STNDAT(R4),R5   ;ADDRESS OF PATTERN ADDRESS
4596  013772  012703  000004                  MOV     #4,R3           ;NUMBER OF LOCATIONS TO CHECK
4597  013776  022125                  2$:     CMP     (R1)+,(R5)+     ;COMPARE THE BUFFER AGAINST THE PATTERN
4598  014000  001366                          BNE     1$              ;BR IF NOT EQUAL, TRY NEXT PATTERN
4599  014002  005303                          DEC     R3              ;FINISHED CHECKING?
4600  014004  001374                          BNE     2$              ;BR IF NOT FINISHED
4601  014006  062704  002476                  ADD     #STNDAT,R4      ;MAKE PATTERN ADDRESS ABSOLUTE
4602  014012  000403                          BR      4$              ;EXIT
4603  014014  062766  000002  000002  3$:     ADD     #2,2(SP)        ;INCREMENT RETURN ADDRESS
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4604  014022  012601                  4$:     MOV     (SP)+,R1        ;RESTORE R1
4605  014024  000207                          RTS     PC              ;RETURN
4606
4607                                  ;USE ECC TO CORRECT THE DATA ERROR
4608
4609  014026  016037  000240  001420  ECC:    MOV     $RMBA(R0),ECSEC ;ADDRESS OF LAST LOCN XFERED
4610  014034  016046  000236          ECC:    MOV     $RMWC(R0),-(SP) ;ACT WORDS XFERED (2'S COMP)
4611  014040  066016  000020                  ADD     $WRDL(R0),(SP)  ;ADD WORDS REQUESTED
4612  014044  005046                          CLR     -(SP)           ;CLEAR NEXT STACK LOCN
4613  014046  016046  000022                  MOV     $SSEC(R0),-(SP) ;SECTOR SIZE
4614  014052  004737  027332                  JSR     PC,LINKDV       ;DIVIDE WORDS XFERED BY SECTOR SIZE
4615  014056  005716                          TST     (SP)            ;PARTIAL SECTOR XFERED ?
4616  014060  001413                          BEQ     1$              ;BR IF NOT
4617  014062  006316                          ASL     (SP)            ;CONVERT INTO NUMBER OF BYTES
4618  014064  161637  001420                  SUB     (SP),ECSEC      ;SUBTRACT SECTOR RESIDUE
4619  014070  126027  000024  000005          CMPB    $CODE(R0),#5    ;WAS OP READ HEAD & DATA
4620  014076  001007                          BNE     2$              ;BR IF NOT
4621  014100  062737  000004  001420          ADD     #4,ECSEC        ;ADD HEADER SIZE (IN BYTES) BACK IN
4622  014106  000403                          BR      2$              ;GO ADJUST THE STACK POINTER
4623  014110  162737  001000  001420  1$:     SUB     #1000,ECSEC     ;SUBTRACT SECTOR DATA FIELD SIZE (IN BYTES)
4624  014116  062706  000004          2$:     ADD     #4,SP           ;ADJUST THE STACK POINTER
4625  014122  016037  000300  001416          MOV     $RMEC1(R0),ECBIT  ;ECC POSITION COUNT
4626  014130  005337  001416                  DEC     ECBIT           ;ADJUST THE POSITION COUNT
4627  014134  013737  001416  001426          MOV     ECBIT,ECWRD     ;LOAD THE WORD COUNT LOCATION
4628  014142  042737  177760  001416          BIC     #^C17,ECBIT     ;SAVE THE BIT OFFSET COUNT
4629  014150  042737  000017  001426          BIC     #17,ECWRD       ;CLEAR THE BIT OFFSET
4630  014156  006237  001426                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
4631  014162  006237  001426                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
4632  014166  006237  001426                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
4633  014172  104414  052332                  DISPLY  ,LIN10A         ;'ERROR BURST BEGINS AT '
4634  014176  013746  001426                  MOV     ECWRD,-(SP)     ;PUT THE WORD COUNT ON THE STACK
4635  014202  006216                          ASR     (SP)            ;CONVERT TO WORD COUNT FOR MESSAGE
4636  014204  004737  030246                  JSR     PC,$B2D         ;CONVERT THE WORD COUNT
4637  014210  004737  027646                  JSR     PC,$SUPRS       ;PRINT IT
4638  014214  104414  052366                  DISPLY  ,LIN10B         ;' IN DATA FIELD OF ERROR SECTOR'
4639  014220  063737  001420  001426          ADD     ECSEC,ECWRD     ;FIND THE BEGINNING OF THE ERROR BURST
4640  014226  026037  000240  001426          CMP     $RMBA(R0),ECWRD  ;SEE IF BURST WAS IN DATA READ
4641  014234  101002                          BHI     .+6             ;BR IF IN DATA READ
4642  014236  000137  014554                  JMP     ECC2            ;NOT IN DATA READ - REPORT IT
4643  014242  016037  000302  001422          MOV     $RMEC2(R0),ECMSK0  ;GET THE ERROR MASK
4644  014250  005037  001424                  CLR     ECMSK1          ;CLEAR THE UPPER MASK WORD
4645  014254  005737  001416          3$:     TST     ECBIT           ;BIT OFFSET EQUAL ZERO
4646  014260  001407                          BEQ     4$              ;BR IF IT IS
4647  014262  005337  001416                  DEC     ECBIT           ;DECREMENT THE BIT OFFSET COUNT
4648  014266  006337  001422                  ASL     ECMSK0          ;SHIFT THE ERROR MASK
4649  014272  006137  001424                  ROL     ECMSK1          ;SHIFT THE LOWER INTO THE UPPER
4650  014276  000766                          BR      3$              ;CONTINUE THE SHIFT
4651  014300  017737  165122  001432  4$:     MOV     @ECWRD,ECBAD0   ;SAVE THE INCORRECT WORD
4652  014306  005037  001434                  CLR     ECWRD1          ;CLEAR SECOND INCORRECT WORD ADDRESS
4653  014312  013746  001422                  MOV     ECMSK0,-(SP)    ;PUT LOWER MASK ON STACK
4654  014316  047716  165104                  BIC     @ECWRD,(SP)     ;CLEAR ERRONEOUS ONE BITS FROM MASK
4655  014322  043777  001422  165076          BIC     ECMSK0,@ECWRD   ;CLEAR ERRONEOUS ONE BITS FROM BAD WORD
4656  014330  052677  165072                  BIS     (SP)+,@ECWRD    ;SET DROPPED BITS
4657  014334  005737  001424                  TST     ECMSK1          ;DOES BURST GO INTO NEXT WORD ?
4658  014340  001431                          BEQ     ECC1            ;BR IF BURST ONLY IN ONE WORD
4659  014342  013737  001426  001434          MOV     ECWRD,ECWRD1    ;DUPLICATE ADDRESS
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4660  014350  062737  000002  001434          ADD     #2,ECWRD1               ;INCREMENT ERROR ADDRESS
4661  014356  026037  000240  001434          CMP     $RMBA(R0),ECWRD1        ;IS NEXT WORD IN THE BUFFER
4662  014364  101003                          BHI     5$                      ;BR IF IT IS
4663  014366  005037  001434                  CLR     ECWRD1                  ;CLEAR 2ND WORD ADDRESS
4664  014372  000414                          BR      ECC1                    ;PRINT WORD CORRECTED
4665  014374  017737  165034  001440  5$:     MOV     @ECWRD1,ECBAD1          ;SAVE THE SECOND BAD WORD
4666  014402  013746  001424                  MOV     ECMSK1,-(SP)            ;PUT THE UPPER MASK ON THE STACK
4667  014406  047716  165022                  BIC     @ECWRD1,(SP)            ;CLEAR ERRONEOUS ONE BITS FROM UPPER MASK
4668  014412  043777  001424  165014          BIC     ECMSK1,@ECWRD1          ;CLEAR ERRONEOUS ONE BITS FROM DATA WORD
4669  014420  052677  165010                  BIS     (SP)+,@ECWRD1           ;SET DROPPED BITS
4670  014424  104414  052534          ECC1:   DISPLY  ,LIN10H                 ;HEADER
4671  014430  013746  001426                  MOV     ECWRD,-(SP)             ;PUT ECWRD ON THE STACK
4672  014434  004737  022210                  JSR     PC,LINOCT               ;TYPE ECWRD
4673  014440  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4674  014444  013746  001432                  MOV     ECBADO,-(SP)            ;PUT ECBADO ON THE STACK
4675  014450  004737  022210                  JSR     PC,LINOCT               ;TYPE ECBADO
4676  014454  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4677  014460  017746  164742                  MOV     @ECWRD,-(SP)            ;PUT @ECWRD ON THE STACK
4678  014464  004737  022210                  JSR     PC,LINOCT               ;TYPE @ECWRD
4679  014470  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4680  014474  005737  001434                  TST     ECWRD1                  ;PRINT THE NEXT WORD ?
4681  014500  001427                          BEQ     ECCX                    ;BR IF NOT
4682  014502  104414  001201                  DISPLY  ,$CRLF                  ;CR-LF
4683  014506  013746  001434                  MOV     ECWRD1,-(SP)            ;PUT ECWRD1 ON THE STACK
4684  014512  004737  022210                  JSR     PC,LINOCT               ;TYPE ECWRD1
4685  014516  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4686  014522  013746  001440                  MOV     ECBAD1,-(SP)            ;PUT ECBAD1 ON THE STACK
4687  014526  004737  022210                  JSR     PC,LINOCT               ;TYPE ECBAD1
4688  014532  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4689  014536  017746  164672                  MOV     @ECWRD1,-(SP)           ;PUT @ECWRD1 ON THE STACK
4690  014542  004737  022210                  JSR     PC,LINOCT               ;TYPE @ECWRD1
4691  014546  104414  052716                  DISPLY  ,LINSP                  ;SPACES
4692  014552  000402                          BR      ECCX                    ;EXIT
4693  014554  104414  052427          ECC2:   DISPLY  ,LIN10C                 ;ERROR BURST WAS NOT TRANSFERED TO MEMORY
4694  014560  104414  001201          ECCX:   DISPLY  ,$CRLF                  ;CR-LF
4695  014564  000207                          RTS     PC                      ;RETURN
4696
4697                                  ;ROUTINE TO DISPLAY THE SECTOR WHICH GAVE THE HARD ERROR
4698
4699  014566  032777  000010  164360  PRTBAD: BIT     #SW3,@SWR               ;PRINT THE BAD SECTOR ?
4700  014574  001460                          BEQ     6$                      ;BR IF NOT
4701  014576  016001  000240                  MOV     $RMBA(R0),R1            ;PUT THE END ADDRESS INTO R1
4702  014602  016046  000020                  MOV     $WRDL(R0),-(SP)         ;FIND THE BEGINNING OF THE SECTOR
4703  014606  066016  000236                  ADD     $RMWC(R0),(SP)          ;SUBTRACT THE WORDS NOT TRANSFERED
4704  014612  005046                          CLR     -(SP)                   ;MAKE THE UPPER DIVIDEND 0
4705  014614  016046  000022                  MOV     $SSEC(R0),-(SP)         ;DIVDE THE WORDS TRANSFERED BY THE SECTOR SIZE
4706  014620  004737  027332                  JSR     PC,LINKDV               ;DIVIDE
4707  014624  005716                          TST     (SP)                    ;REMANDER = 0 ?
4708  014626  001403                          BEQ     1$                      ;BR IF IT IS - COMPLETE SECTOR TRANSFERED
4709  014630  006316                          ASL     (SP)                    ;CONVERT THE RESIDUAL SECTOR SIZE INTO BYTE COUNT
4710  014632  161601                          SUB     (SP),R1                 ;SUBTRACT IT FROM THE END ADDRESS
4711  014634  000410                          BR      2$                      ;FINISH THE SIZING
4712  014636  162701  001000          1$:     SUB     #1000,R1                ;SUBTRACT FULL SECTOR SIZE FROM END ADDR
4713  014642  126027  000024  000005          CMPB    $CODE(R0),#5            ;WAS OPERATION READ HEADER & DATA ?
4714  014650  001002                          BNE     2$                      ;BR IF NOT
4715  014652  162701  000004                  SUB     #4,R1                   ;SUBTRACK HEADER SIZE FROM ADDR
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4716  014656  062706  000004          2$:     ADD     #4,SP           ;RESTORE THE STACK POINTER
4717  014662  104414  052621                  DISPLY  ,LIN11H         ;PRINT THE HEADER
4718  014666  012702  000007          3$:     MOV     #7,R2           ;R2 CONTAINS THE WORDS/LINE COUNT
4719  014672  010146                          MOV     R1,-(SP)        ;PUT THE ADDRESS ON THE STACK
4720  014674  004737  022210                  JSR     PC,LINOCT       ;TYPE THE ADDRESS
4721  014700  020160  000240          4$:     CMP     R1,$RMBA(R0)    ;PRINTED ALL THE SECTOR ?
4722  014704  001412                          BEQ     5$              ;BR IF ALL PRINTED
4723  014706  104414  052716                  DISPLY  ,LINSP          ;SPACES
4724  014712  012146                          MOV     (R1)+,-(SP)     ;PUT THE DATA ON THE STACK
4725  014714  004737  022210                  JSR     PC,LINOCT       ;TYPE THE DATA
4726  014720  005302                          DEC     R2              ;DECREMENT THE HORIZONTAL COUNT
4727  014722  001366                          BNE     4$              ;BR IF NOT AT THE END OF THE LINE
4728  014724  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
4729  014730  000756                          BR      3$              ;RESTORE THE WORDS/LINE COUNT
4730  014732  104414  001201          5$:     DISPLY  ,$CRLF          ;PRINT WHAT REMAINS IN THE BUFFER
4731  014736  000207                  6$:     RTS     PC              ;RETURN
4732
4733                                  ;ROUTINE TO DO AN RTC - DRIVE SELECTED IN R0
4734                                  ;CALL:
4735                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4736                                  ;       JSR     PC,RTNCTR
4737                                  ;       RETURN
4738
4739  014740  111037  045532          RTNCTR: MOVB    (R0),GENDPB     ;MOVE THE DRIVE # TO THE GENERAL DPB
4740  014744  112737  000117  045534          MOVB    #RTC,GENDPB+$COMND  ;COMMAND CODE
4741  014752  004037  035040          1$:     JSR     R0,RM03         ;DRIVER ENTRANCE
4742  014756  045532                          GENDPB                  ;DPB ADDRESS FOR ORDER
4743  014760  000774                          BR      1$              ;DRIVER DIDN'T ACCEPT ORDER
4744  014762  000207                          RTS     PC              ;RETURN
4745
4746                                  ;ROUTINE TO DO A RECALIBRATE - DRIVE SELECTED IN R0
4747                                  ;CALL:
4748                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4749                                  ;       JSR     PC,RECALT
4750                                  ;       RETURN
4751                                  ;
4752                                  ;OR
4753                                  ;
4754                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4755                                  ;       MOVB    #DRIVE,GENDPB   ;DRIVE ADDRESS
4756                                  ;       JSR     PC,RECALTO
4757                                  ;       RETURN
4758
4759  014764  111037  045532          RECALT: MOVB    (R0),GENDPB     ;MOVE THE DRIVE # TO THE GENERAL DPB
4760  014770  112737  000107  045534  RECALO: MOVB    #RECAL,GENDPB+$COMND  ;RELCALIBRATE COMMAND
4761  014776  004037  035040          1$:     JSR     R0,RM03         ;DRIVER ENTRANCE
4762  015002  045532                          GENDPB                  ;DPB ADDRESS FOR ORDER
4763  015004  000774                          BR      1$              ;DRIVER DIDN'T ACCEPT THE ORDER
4764  015006  005737  045550          2$:     TST     GENDPB+$STATUS  ;SEE IF FINISHED
4765  015012  001775                          BEQ     2$              ;BR IF NOT FINISHED
4766  015014  000207                          RTS     PC              ;RETURN
4767
4768                                  ;OFFSET THE DRIVE IN R0 (OFFSET CODE PRELOADED INTO 'RMOF')
4769                                  ;CALL:
4770                                  ;       MOVB    #OFFSET,GENDPB+$FMT  ;OFFSET CODE
4771                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
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                                        ;       JSR     PC,OFFST
                                        ;       RETURN

015016 111037 045532                    OFFST:  MOVB    (R0),GENDPB     ;DRIVE # TO GENERAL DPB
015022 112737 000115 045534             1$:     MOVB    #OFFSET,GENDPB+$COMND ;COMMAND
015030 004037 035040                            JSR     R0,RM03         ;DRIVER ENTRANCE
015034 045532                                   GENDPB                  ;DPB ADDRESS FOR ORDER
015036 000774                                   BR      1$              ;DRIVER DIDN'T ACCEPT ORDER
015040 000207                                   RTS     PC

                                        ;UTILITY READ HEADER ROUTINE
                                        ;CALL:
                                        ;       MOV     #DPB,R0         ;DPB ADDRESS
                                        ;       MOV     #SECTOR,-(SP)   ;SECTOR ADDRESS
                                        ;       MOV     #TRACK,-(SP)    ;TRACK ADDRESS
                                        ;       MOV     #CYLINDER,-(SP) ;CYLINDER ADDRESS
                                        ;       JSR     PC,READDR
                                        ;       RETURN

015042 116637 000004 045543             READHD: MOVB    4(SP),GENDPB+$TRK ;TRACK ADDRESS
015050 116637 000006 045542                     MOVB    6(SP),GENDPB+$SEC ;SECTOR ADDRESS
015056 016637 000002 045544                     MOV     2(SP),GENDPB+$CYL       ;CYLINDER ADDRESS
015064 111037 045532                            MOVB    (R0),GENDPB     ;DRIVE NUMBER
015070 112737 000173 045534                     MOVB    #RDHD,GENDPB+$COMND ;COMMAND
015076 012737 177776 045536                     MOV     #-2,GENDPB+$WRDM        ;WORD CTR = 2
015104 004037 035040                    1$:     JSR     R0,RM03         ;DRIVER ENTRANCE
015110 045532                                   GENDPB                  ;DPB ADDRESS FOR ORDER
015112 000774                                   BR      1$              ;DRIVER DIDN'T ACCEPT COMMAND
015114 005737 045550                    2$:     TST     GENDPB+$STATUS  ;FINISHED?
015120 001775                                   BEQ     2$              ;BR IF NOT
015122 011666 000006                            MOV     (SP),6(SP)      ;ADJUST STACK FOR RETURN
015126 062706 000006                            ADD     #6,SP           ;ADJUST RETRUN POINTER
015132 000207                                   RTS     PC              ;RETURN

                                        ;RETRY THE PRESENT OPERATION
                                        ;CALL:
                                        ;       MOV     #COUNT,RETRY    ;RETRY COUNT
                                        ;       JSR     PC,$RETRY
                                        ;       RETURN1                 ;RETRY UNSUCESSFUL
                                        ;       RETURN2                 ;SUCESSFUL RETRY
                                        ;                               ;NOTE: IF A DIFFERENT ERROR OCCURS DURING
                                        ;                               ;RETRY, THE ROUTINE EXITS TO 'ERPRC1'

015134 004737 016132                    $RETRY: JSR     PC,GODRIV       ;RE-START ORDER
015140 005760 000016                    1$:     TST     STATUS(R0)      ;ORDER FINISHED?
015144 001775                                   BEQ     1$              ;BR IF NOT
015146 100405                                   BMI     2$              ;BR IF ERROR
015150 105237 001351                            INCB    RETRY+1         ;INCREMENT RETRY COUNT
015154 062716 000002                            ADD     #2,(SP)         ;INCREMENT RETURN
015160 000425                                   BR      5$              ;GO TO EXIT
015162 032760 000200 000016             2$:     BIT     #BIT7,STATUS(R0)  ;DID ORDER TERMINATE NORMALLY ?
015170 001430                                   BEQ     7$              ;BR IF NOT
015172 005737 001346                            TST     MASK            ;IS ERROR MASK 0 ?
015176 001004                                   BNE     3$              ;BR IF NOT
015200 005760 000250                            TST     $RMER1(R0)      ;MAKE SURE THAT THE DRIVE ERROR REG IS CLEAR
015204 001014                                   BNE     6$              ;BR IF NOT
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4828  015206  000404                          BR      4$              ;CONTINUE RETRY
4829  015210  033760  001346  000250  3$:     BIT     MASK,$RMER1(R0) ;SAME ERROR?
4830  015216  001407                          BEQ     6$              ;BR IF NOT
4831  015220  105237  001351          4$:     INCB    RETRY+1         ;INCREMENT RETRY COUNT
4832  015224  123737  001350  001351          CMPB    RETRY,RETRY+1   ;DONE ?
4833  015232  001340                          BNE     $RETRY          ;BR IF NOT DONE
4834  015234  000207                  5$:     RTS     PC              ;RETURN
4835  015236  004737  022176          6$:     JSR     PC,LINE8        ;REPORT DIFFERENT ERROR
4836  015242  004737  021730                  JSR     PC,LINE7        ;PRINT LINE 7
4837  015246  005726                          TST     (SP)+           ;ADJUST STACK POINTER FOR DIRECT RETURN
4838  015250  000207                          RTS     PC              ;RETURN
4839  015252  104414  052103          7$:     DISPLY  ,LIN8M          ;'DIFFERENT ERROR DURING RETRY'
4840  015256  000137  006364                  JMP     ERPRC1          ;REPORT THE ERROR
4841
4842                                  ;ROUTINE TO UPDATE THE PERFORMANCE SUMMARY STATISTICS
4843                                  ;CALL:
4844                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4845                                  ;       JSR     PC,STATIS
4846                                  ;       RETURN
4847
4848  015262  032760  000300  000016  STATIS: BIT     #BIT07!BIT06,$STATUS(R0) ;CHECK FOR DATA TERMINATION
4849  015270  001451                          BEQ     3$              ;BR IF NOT DATA TERMINATION
4850  015272  016037  000240  015416          MOV     $RMBA(R0),FACTOR  ;STORE THE FINAL BUFFER ADDRESS
4851  015300  166037  000206  015416          SUB     $BUF(R0),FACTOR ;SUBTRACT THE INITIAL ADDRESS
4852  015306  001431                          BEQ     2$              ;BR IF NO DATA TRANSFER
4853  015310  006237  015416                  ASR     FACTOR          ;CONVERT TO A WORD COUNT
4854  015314  063760  015416  000046          ADD     FACTOR,$TRANS(R0)  ;UPDATE WORD COUNT
4855  015322  005560  000050                  ADC     $TRANS+2(R0)    ;ADD ANY CARRY
4856  015326  132760  000002  000024          BITB    #BIT01,$CODE(R0)  ;SEE IF ORDER READ OR WRITE
4857  015334  001016                          BNE     2$              ;BRANCH IF ORDER WRITE
4858  015336  126027  000024  000001          CMPB    $CODE(R0),#1    ;PRESENT OPERATION AN AUTOMATIC WRITE CHECK ?
4859  015344  101005                          BHI     1$              ;BR IF NOT
4860  015346  066060  000020  000046          ADD     $WRDL(R0),$TRANS(R0)  ;ADD WORDS WRITTEN
4861  015354  005560  000050                  ADC     $TRANS+2(R0)    ;ADD A CARRY
4862  015360  063760  015416  000052  1$:     ADD     FACTOR,$READ(R0)  ;UPDATE THE READ WORD COUNT
4863  015366  005560  000054                  ADC     $READ+2(R0)     ;ADD ANY CARRY
4864  015372  026060  000012  000270  2$:     CMP     $CYL(R0),$RMDC(R0)  ;DID MID-TRANSFER SEEK OCCUR
4865  015400  001405                          BEQ     3$              ;BR IF NOT
4866  015402  062760  000001  000042          ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
4867  015410  005560  000044                  ADC     $POSIT+2(R0)    ;ADD CARRY TO UPPER WORD
4868  015414  000207                  3$:     RTS     PC
4869
4870  015416  000000                  FACTOR: .WORD   0               ;USED FOR WORDS TRANSFERED
4871
4872                                  ;ROUTINE TO GET A BUFFER
4873                                  ;CALL:
4874                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4875                                  ;       CLR     -(SP)           ;CLEAR THE STACK
4876                                  ;       JSR     PC,GETBUF
4877                                  ;       RETURN                  ;BUFFER ADDRESS WILL BE ON THE STACK
4878                                  ;                               ;STACK WILL BE ZERO IF NO BUFFER AVAILABLE
4879
4880  015420  010146                  GETBUF: MOV     R1,-(SP)        ;SAVE R1
4881  015422  010246                          MOV     R2,-(SP)        ;SAVE R2
4882  015424  010346                          MOV     R3,-(SP)        ;SAVE R3
4883  015426  013702  001700                  MOV     BUFTBL,R2       ;NUMBER OF SEPARATE BUFFERS
```

```
4884  015432  001444                        BEQ     6$                ;BR IF NONE AVAILABLE
4885  015434  012701  001702                MOV     #BUFTBL+2,R1      ;FIRST ADDRESS OF ALLOCATION TABLE
4886  015440  026061  000020  000002  1$:   CMP     $WRDL(R0),2(R1)   ;SEE IF THERE IS A BLOCK LARGE ENOUGH
4887  015446  101405                        BLOS    3$                ;BRANCH IF IT IS
4888  015450  005302                        DEC     R2                ;DECREMENT TABLE COUNT
4889  015452  001434                        BEQ     6$                ;BR IF THROUGH TABLE
4890  015454  062701  000004                ADD     #4,R1             ;INCREMENT TABLE POINTER
4891  015460  000767                        BR      1$                ;CONTINUE LOOKING
4892  015462  011166  000010          3$:   MOV     (R1),10(SP)       ;BUFFER ADDRESS TO STACK
4893  015466  166061  000020  000002        SUB     $WRDL(R0),2(R1)   ;ADJUST BUFFER SIZE
4894  015474  001407                        BEQ     4$                ;BR IF DIFFERENCE IS ZERO
4895  015476  006360  000020                ASL     $WRDL(R0)         ;CONVERT # WORDS TO BYTES
4896  015502  066011  000020                ADD     $WRDL(R0),(R1)    ;MAKE NEW STARTING ADDRESS
4897  015506  006260  000020                ASR     $WRDL(R0)         ;RETURN # BYTES TO WORDS
4898  015512  000414                        BR      6$                ;RETURN
4899  015514  005337  001700          4$:   DEC     BUFTBL            ;DECREMENT ENTRIES COUNT
4900  015520  001411                        BEQ     6$                ;BR IF ALLOCATION TABLE EMPTY
4901  015522  005302                        DEC     R2                ;DECREMENT TABLE COUNT
4902  015524  001407                        BEQ     6$                ;BR IF ITEM WERE LAST ENTRY
4903  015526  010103                        MOV     R1,R3             ;MOVE TABLE POINTER
4904  015530  062703  000004                ADD     #4,R3             ;POINT TO NEXT ENTRY
4905  015534  012321          5$:   MOV     (R3)+,(R1)+       ;MOVE ITEMS
4906  015536  012321                        MOV     (R3)+,(R1)+
4907  015540  005302                        DEC     R2                ;DECREMENT TABLE COUNT
4908  015542  001374                        BNE     5$                ;CONTINUE IF NOT AT END OF TABLE
4909  015544  012603          6$:   MOV     (SP)+,R3          ;RESTORE R3
4910  015546  012602                        MOV     (SP)+,R2          ;RESTORE R2
4911  015550  012601                        MOV     (SP)+,R1          ;RESTORE R1
4912  015552  000207                        RTS     PC                ;RETURN
4913
4914
4915                                  ;ROUTINE TO PUT BUFFER BACK IN TABLE
4916                                  ;CALL:
4917                                  ;       MOV     #DPB,R0           ;DPB ADDRESS
4918                                  ;       JSR     PC,RELBUF
4919                                  ;       RETURN
4920
4921  015554  010146          RELBUF: MOV     R1,-(SP)          ;SAVE R1
4922  015556  010246                  MOV     R2,-(SP)          ;SAVE R2
4923  015560  010446                  MOV     R4,-(SP)          ;SAVE R4
4924  015562  010546                  MOV     R5,-(SP)          ;SAVE R5
4925  015564  012701  001702          MOV     #BUFTBL+2,R1      ;BEGINNING OF TABLE
4926  015570  013702  001700          MOV     BUFTBL,R2         ;ENTRY COUNT
4927  015574  001424                  BEQ     2$                ;BR IF EMPTY TABLE
4928  015576  016003  000020          MOV     $WRDL(R0),R3      ;TRIAL ADDRESS
4929  015602  006303                  ASL     R3                ;CHANGE TO BYTE COUNT
4930  015604  066003  000006          ADD     $BUF(R0),R3       ;ADDRESS OF HIGHER ADJACENT BLOCK
4931  015610  021103          1$:     CMP     (R1),R3           ;UPPER ADJACENT BLOCK
4932  015612  001424                  BEQ     4$                ;BR IF YES
4933  015614  062701  000004          ADD     #4,R1             ;INCREMENT POINTER
4934  015620  005302                  DEC     R2                ;DECREMENT ENTRY COUNT
4935  015622  001372                  BNE     1$                ;CONTINUE SEARCHING
4936  015624  016011  000006          MOV     $BUF(R0),(R1)     ;PUT THE BUFFER BLOCK INTO THE TABLE
4937  015630  016061  000020  000002  MOV     $WRDL(R0),2(R1)    ;BLOCK SIZE
4938  015636  005237  001700          INC     BUFTBL            ;INCREMENT ENTRY COUNT
4939  015642  005202                  INC     R2                ;INCREMENT R2 FOR USE LATER
```

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4940  015644  000414                    BR      5$                      ;SEE IF A LOWER ADJACENT BLOCK IS IN THE TABLE
4941  015646  016021  000006      2$:   MOV     $BUF(R0),(R1)+          ;BLOCK ADDRESS TO TABLE
4942  015652  016021  000020            MOV     $WRDL(R0),(R1)+         ;SIZE TO TABLE
4943  015656  005237  001700            INC     BUFTBL                  ;INCREMENT ENTRY COUNT
4944  015662  000443                    BR      10$                     ;EXIT
4945  015664  016011  000006      4$:   MOV     $BUF(R0),(R1)           ;RELEASED BUFFER IS LOWER ADJACENT
4946  015670  066061  000020  000002    ADD     $WRDL(R0),2(R1)         ;INCREMENTED SIZE
4947  015676  010246              5$:   MOV     R2,-(SP)                ;SAVE R2
4948  015700  013702  001700            MOV     BUFTBL,R2               ;ENTRY COUNT
4949  015704  012705  001702            MOV     #BUFTBL+2,R5            ;BEGINNING OF TABLE
4950  015710  016504  000002      6$:   MOV     2(R5),R4                ;BLOCK SIZE (IN WORDS)
4951  015714  006304                    ASL     R4                      ;CHANGE TO BYTE COUNT
4952  015716  061504                    ADD     (R5),R4                 ;ADD BLOCK BEGINNING ADDRESS
4953  015720  020411                    CMP     R4,(R1)                 ;R1 STILL POINTS TO INSERTED ENTRY
4954  015722  001406                    BEQ     8$                      ;LOWER ADJACENT IN TABLE
4955  015724  062705  000004            ADD     #4,R5                   ;INCREMENT POINTER
4956  015730  005302                    DEC     R2                      ;DECREMENT ENTRY COUNT
4957  015732  001366                    BNE     6$                      ;CONTINUE LOOKING
4958  015734  005726                    TST     (SP)+                   ;RESTORE STACK POINTER
4959  015736  000415                    BR      10$                     ;END
4960  015740  012602              8$:   MOV     (SP)+,R2                ;RESTORE R2
4961  015742  066165  000002  000002    ADD     2(R1),2(R5)             ;INCREMENT LOWER BLOCK LENGTH
4962  015750  005337  001700            DEC     BUFTBL                  ;DECREMENT ENTRY COUNT
4963  015754  010105                    MOV     R1,R5                   ;GET READY TO COMPRESS
4964  015756  062705  000004            ADD     #4,R5                   ;INCREMENT TO NEXT ENTRY
4965  015762  012521              9$:   MOV     (R5)+,(R1)+             ;COMPRESS TABLE
4966  015764  012521                    MOV     (R5)+,(R1)+             ;MOVE SIZE FIELD DOWN
4967  015766  005302                    DEC     R2                      ;DECREMENT ENTRY COUNT
4968  015770  001374                    BNE     9$                      ;BR IF NOT FINISHED
4969  015772  012605              10$:  MOV     (SP)+,R5                ;RESTORE R5
4970  015774  012604                    MOV     (SP)+,R4                ;RESTORE R4
4971  015776  012602                    MOV     (SP)+,R2                ;RESTORE R2
4972  016000  012601                    MOV     (SP)+,R1                ;RESTORE R1
4973  016002  000207                    RTS     PC                      ;RETURN
4974
4975
4976                                    ;FILL THE ASSIGNED BUFFER (IF WRITE OR WRITE CHECK ORDER)
4977                                    ;CALL:
4978                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
4979                                    ;       MOV     #BUFADR,$BUF(R0)  ;LOAD BUFFER ADDRESS INTO THE DPB
4980                                    ;       MOVB    #PATTERN,$PATTC(R0)  ;PATTERN CODE
4981                                    ;       JSR     PC,FILBUF
4982                                    ;       RETURN
4983
4984  016004  104412            FILBUF: SAVREG                          ;SAVE THE REGISTERS
4985  016006  132760  000004  000024    BITB    #BIT02,$CODE(R0)        ;SEE IF READ ORDER
4986  016014  001044                    BNE     4$                      ;BR IF READ
4987  016016  016001  000006      1$:   MOV     $BUF(R0),R1             ;BUFFER ADDRESS
4988  016022  016002  000020            MOV     $WRDL(R0),R2            ;POSITIVE WORD COUNT
4989  016026  132760  000001  000024    BITB    #BIT00,$CODE(R0)        ;SEE IF WRITE HEADER TYPE ORDER
4990  016034  001413                    BEQ     2$                      ;BR IF NOT
4991  016036  016011  000012            MOV     $CYL(R0),(R1)           ;CYLINDER ADDRESS
4992  016042  052711  010000            BIS     #BIT12,(R1)             ;SET FMT22 BIT
4993  016046  052721  140000            BIS     #140000,(R1)+           ;SET MFG AND USER BITS
4994  016052  016021  000010            MOV     $SEC(R0),(R1)+          ;MOVE SECTOR & TRACK
4995  016056  162702  000002            SUB     #2,R2                   ;ADJUST THE WORD COUNT
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 4996  016062  003421                        BLE     4$              ;BR IF END OF PATTERN
 4997  016064  005004                2$:     CLR     R4              ;CLEAR R4
 4998  016066  116004  000030                MOVB    $PATIC(R0),R4   ;RELATIVE PATTERN ADDRESS
 4999  016072  016405  002476                MOV     STNDAT(R4),R5   ;PATTERN ADDRESS
 5000  016076  012703  000020                MOV     #20,R3          ;PATTERN COUNT
 5001  016102  012521                3$:     MOV     (R5)+,(R1)+     ;MOVE THE PATTERN INTO THE BUFFER
 5002  016104  005302                        DEC     R2              ;DECREMENT THE WORD COUNT
 5003  016106  003407                        BLE     4$              ;BR IF DONE (WORD COUNT = 0)
 5004  016110  005303                        DEC     R3              ;DECREMENT THE PATTERN COUNT
 5005  016112  001373                        BNE     3$              ;BR IF MORE PATTERN
 5006  016114  012703  000020                MOV     #20,R3          ;RESTORE PATTERN COUNT
 5007  016120  016405  002476                MOV     STNDAT(R4),R5   ;RESTORE THE ADDRESS
 5008  016124  000766                        BR      3$              ;CONTINUE DISTRIBUTING THE PATTERN
 5009  016126  104413                4$:     RESREG                  ;RESTORE THE REGISTERS
 5010  016130  000207                        RTS     PC              ;RETURN
 5011
 5012                                  ;START THE ORDER FOR THE DPB IN R0
 5013                                  ;CALL:
 5014                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
 5015                                  ;       JSR     PC,GODRIV
 5016                                  ;       RETURN
 5017
 5018  016132  010046                GODRIV: MOV     R0,-(SP)        ;SAVE R0
 5019  016134  010037  016144                MOV     R0,2$           ;CURRENT DPB ADDRESS
 5020  016140  004037  035040        1$:     JSR     R0,RM03         ;CALL THE DRIVE HANDLER
 5021  016144  000000                2$:     .WORD   0               ;DRIVE BLOCK ADDRESS GOES HERE
 5022  016146  000000                        HALT                    ;DRIVER REJECTED REQUEST
 5023  016150  012600                        MOV     (SP)+,R0        ;RESTORE R0
 5024  016152  062760  000001  000036        ADD     #1,$OPERC(R0)   ;INCREMENT THE OPERATION COUNT
 5025  016160  005560  000040                ADC     $OPERC+2(R0)
 5026  016164  026060  000034  000012        CMP     $PREVA+2(R0),$CYL(R0)  ;DID ORDER REQUIRE A CYLINDER CHANGE
 5027  016172  001405                        BEQ     3$              ;BR IF NOT
 5028  016174  062760  000001  000042        ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
 5029  016202  005560  000044                ADC     $POSIT+2(R0)    ;ADD ANY CARRY
 5030  016206  000207                3$:     RTS     PC
 5031
 5032                                  ;GENERATE PARAMETERS FOR THE OPERATION
 5033                                  ;CALL:
 5034                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
 5035                                  ;       JSR     PC,SELPAR
 5036                                  ;       RETURN
 5037
 5038  016210  004737  033350        SELPAR: JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
 5039  016214  032777  000001  162732        BIT     #SW0,@SWR       ;SEE IF SW0 SET
 5040  016222  001012                        BNE     2$              ;BR IF SET - READ ONLY
 5041  016224  012705  000010        1$:     MOV     #10,R5          ;READ/WRITE SELECTION DIVISOR
 5042  016230  004737  027304                JSR     PC,GETREM       ;GET SELECTION VALUE
 5043  016234  020537  001500                CMP     R5,RATIO        ;DETERMINE IF READ OR WRITE
 5044  016240  103003                        BHIS    2$              ;BR IF READ
 5045  016242  004737  017066                JSR     PC,RANWRT       ;SELECT A WRITE ORDER
 5046  016246  000410                        BR      THEAD           ;SELECT ADDRESS
 5047  016250  013705  033450        2$:     MOV     $LONUM,R5       ;SELECT READ OPERATION CODE
 5048  016254  042705  177776                BIC     #^C1,R5         ;MASK OUT ALL BUT BIT 0
 5049  016260  062705  000004                ADD     #4,R5           ;TABLE OFFSET FOR READ CODE
 5050  016264  110560  000074                MOVB    R5,$NCODE(R0)   ;ORDER SELECTION CODE TO CONTROL BLOCK
 5051  016270  005737  001512        THEAD:  TST     HEADER  ;ENABLE RANDOM ADDRESS SELECT ?
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5052  016274  001425                        BEQ     RANSEC          ;YES
5053  016276  016060  000242  000076        MOV     $RMDA(R0),$NSEC(R0)     ;SECTOR AND TRACK
5054  016304  016060  000270  000100        MOV     $RMDC(R0),$NCYL(R0) ;CYLINDER NUMBER
5055  016312  026060  000100  000106        CMP     $NCYL(R0),MAXCYL(R0) ;OVER MAX CYLINDER #  ?
5056  016320  103520                        BLO     XWCNT           ;NO
5057  016322  016060  000110  000100        MOV     MINCYL(R0),$NCYL(R0) ;RESET CYLINDER NUMBER
5058  016330  116060  000120  000076        MOVB    MINSEC(R0),$NSEC(R0) ;RESET SECTOR NUMBER
5059  016336  116060  000114  000077        MOVB    MINTRK(R0),$NTRK(R0) ;RESET TRACK NUMBER
5060  016344  000137  016562                JMP     XWCNT           ;SELECT BUFFER SIZE
5061
5062                          ;GENERATE A RANDOM SECTOR ADDRESS BETWEEN VALUES 'MINSEC' & 'MAXSEC'
5063
5064  016350  016005  000116  RANSEC: MOV     MAXSEC(R0),R5   ;GET MAXIMUM SECTOR ADDRESS
5065  016354  026005  000120          CMP     MINSEC(R0),R5   ;'MINSEC' AND 'MAXSEC' THE SAME ?
5066  016360  001417                  BEQ     2$              ;BR IF THEY ARE
5067  016362  166005  000120          SUB     MINSEC(R0),R5   ;SUBTRACT MINIMUM SECTOR ADDRESS
5068  016366  100002                  BPL     1$              ;BR IF MAX LARGER THAN MIN
5069  016370  062705  000040          ADD     #32.,R5         ;CORRECT THE NUMBER
5070  016374  005205                  INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5071  016376  004737  027304  1$:     JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5072  016402  066005  000120          ADD     MINSEC(R0),R5   ;NEW ADDRESS
5073  016406  020527  000037          CMP     R5,#31.         ;IS VALUE TOO LARGE ?
5074  016412  101402                  BLOS    2$              ;BR IF NOT
5075  016414  162705  000040          SUB     #32.,R5         ;CORRECT VALUE
5076  016420  110560  000076  2$:     MOVB    R5,$NSEC(R0)    ;STORE SECTOR ADDRESS IN DPB
5077
5078                          ;GENERATE A RANDOM TRACK ADDRESS BETWEEN VALUES 'MINTRK' & 'MAXTRK'
5079
5080  016424  016005  000112  RANTRK: MOV     MAXTRK(R0),R5   ;GET MAXIMUM TRACK ADDRESS
5081  016430  026005  000114          CMP     MINTRK(R0),R5   ;'MINTRK' AND 'MAXTRK' THE SAME ?
5082  016434  001417                  BEQ     2$              ;BR IF THEY ARE
5083  016436  166005  000114          SUB     MINTRK(R0),R5   ;SUBTRACT MINIMUM TRACK ADDRESS
5084  016442  100002                  BPL     1$              ;BR IF MAX LARGER THAN MIN
5085  016444  062705  000005          ADD     #5.,R5          ;CORRECT THE NUMBER
5086  016450  005205                  INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5087  016452  004737  027304  1$:     JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5088  016456  066005  000114          ADD     MINTRK(R0),R5   ;NEW TRACK ADDRESS
5089  016462  020527  000004          CMP     R5,#4.          ;IS VALUE TOO LARGE ?
5090  016466  101402                  BLOS    2$              ;BR IF NOT
5091  016470  162705  000005          SUB     #5.,R5          ;CORRECT VALUE
5092  016474  110560  000077  2$:     MOVB    R5,$NTRK(R0)    ;STORE TRACK ADDRESS IN DPB
5093
5094                          ;GENERATE A RANDOM CYLINDER ADDRESS BETWEEN VALUES 'MINCYL' & 'MAXCYL'
5095
5096  016500  016037  000106  001446          MOV     MAXCYL(R0),CYLIMT       ;ASSUME AN RM03
5097  016506  016005  000106  RANCYL: MOV     MAXCYL(R0),R5   ;GET MAXIMUM CYLINDER ADDRESS
5098  016512  026005  000110          CMP     MINCYL(R0),R5   ;'MINCYL' AND 'MAXCYL' THE SAME ?
5099  016516  001417                  BEQ     2$              ;BR IF THEY ARE
5100  016520  166005  000110          SUB     MINCYL(R0),R5   ;SUBTRACT MINIMUM CYLINDER ADDRESS
5101  016524  100002                  BPL     1$              ;BR IF MAX LARGER THAN MIN
5102  016526  063705  001446          ADD     CYLIMT,R5       ;CORRECT THE NUMBER
5103  016532  005205                  INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5104  016534  004737  027304  1$:     JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5105  016540  066005  000110          ADD     MINCYL(R0),R5   ;NEW CYLINDER ADDRESS
5106  016544  023705  001446          CMP     CYLIMT,R5       ;IS VALUE TOO LARGE ?
5107  016550  003002                  BGT     2$              ;BR IF NOT
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5108  016552  016005  000110                    MOV     MINCYL(R0),R5   ;CORRECT VALUE
5109  016556  010560  000100            2$:     MOV     R5,$NCYL(R0)    ;STORE CYLINDER ADDRESS IN DPB
5110  016562  132760  000001  000074    XWCNT:  BITB    #BIT00,$NCODE(R0) ;HEADER OPERATION INVOLED ?
5111  016570  001414                            BEQ     RANSIZ          ;NO
5112  016572  012760  000402  000102            MOV     #258.,$NWRDL(R0)  ;CHANGE WORD LENGTH TO 258 FOR WRTHD ORDER
5113  016600  122760  000005  000074    3$:     CMPB    #5,$NCODE(R0)   ;READ HEADER AND DATA ?
5114  016606  001461                            BEQ     RANXIT          ;YES
5115  016610  004537  016762                    JSR     R5,CHKADR       ;IF WRITE HEAD AND DATA COMMAND
5116                                                                    ;AVOID WRITING BAD SPOT HEADER
5117  016614  000452                            BR      RANPAT          ;BRANCH IF NOT ON BAD SPOT
5118  016616  000137  016210                    JMP     SELPAR          ;SELECT THE PARAMETERS AGAIN
5119
5120                                    ;GENERATE A RANDOM BUFFER LENGTH BETWEEN 4 & THE VALUE IN 'MAXDL'
5121
5122  016622  013705  001462            RANSIZ: MOV     MAXDL,R5        ;GET BUFFER SIZE
5123  016626  005737  001476                    TST     WCSEL           ;SELECT A RANDOM WORD COUNT ?
5124  016632  001010                            BNE     1$              ;BR IF NOT
5125  016634  005205                            INC     R5              ;INCREMENT THE MAXIMUM SIZE
5126  016636  004737  027304                    JSR     PC,GETREM       ;DIVIDE BY MAX VALUE
5127  016642  005705                            TST     R5              ;IS THE REMAINDER 0 ?
5128  016644  001003                            BNE     1$              ;NOT 0, CONTINUE
5129  016646  004737  033350                    JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
5130  016652  000763                            BR      RANSIZ          ;TRY AGAIN
5131  016654  022705  000004            1$:     CMP     #4,R5           ;LESS THAN 4 ?
5132  016660  003403                            BLE     2$              ;NO
5133  016662  012705  000004                    MOV     #4,R5           ;SET SIZE TO 4
5134  016666  000405                            BR      3$
5135  016670  023705  001462            2$:     CMP     MAXDL,R5        ;LARGE THAN MAX ALLOWED ?
5136  016674  101002                            BHI     3$              ;NO
5137  016676  013705  001462                    MOV     MAXDL,R5        ;RESET COUNTER
5138  016702  132760  000004  000074    3$:     BITB    #BIT02,$NCODE(R0) ;READ OPERATION ?
5139  016710  001006                            BNE     4$              ;YES
5140  016712  042705  000377                    BIC     #377,R5         ;SECTOR BOUNDARY FOR WRITE OP
5141  016716  005705                            TST     R5              ;NONE
5142  016720  003002                            BGT     4$              ;NO
5143  016722  012705  000400                    MOV     #400,R5         ;AT LEAST ONE SECTOR
5144  016726  010560  000102            4$:     MOV     R5,$NWRDL(R0)   ;WORD COUNT
5145  016732  132760  000004  000074            BITB    #BIT02,$NCODE(R0) ;READ OP ?
5146  016740  001004                            BNE     RANXIT          ;YES
5147                                    ;GET A RANDOM PATTERN NUMBER
5148
5149  016742  004737  017122            RANPAT: JSR     PC,GETPAT       ;GET PATTERN CODE
5150  016746  110560  000075                    MOVB    R5,$NPATC(R0)   ;MOVE PATTERN CODE TO CONTROL BLOCK
5151  016752  012760  177777  000104    RANXIT: MOV     #-1,$NEXT(R0)   ;SET PARAMETERS SELECTED INDICATOR
5152  016760  000207                            RTS     PC              ;RETURN
5153
5154                                    ;ROUTINE TO CHECK THE SELECTED ADDRESS IS NOT ON THE BAD SPOT
5155                                    ;CALLING SEQ
5156                                    ;       R0=DPB ADDRESS
5157                                    ;       JSR     R5,CHKADR
5158                                    ;       RET1                    NORMAL RETURN
5159                                    ;       RET2                    ERROR RET
5160
5161  016762                            CHKADR:
5162  016762  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5163  016764  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
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5164  016766  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5165  016770  012701  000020                MOV     #16.,R1         ;TOTAL 16 SETS OF BAD SECTOR ADDRESSES
5166  016774  010002                        MOV     R0,R2           ;TABLE ADDRESS
5167  016776  062702  000124                ADD     #$BDSEC,R2      ;DBP ADDRESS + TABLE ADDRES OFFSET
5168  017002  022712  177777        1$:     CMP     #-1,(R2)        ;EMPTY ENTRY ?
5169  017006  001423                        BEQ     3$              ;BRANCH IF SO
5170  017010  026012  000100                CMP     $NCYL(R0),(R2)  ;ON THE SAME CYLINDER ?
5171  017014  001013                        BNE     2$              ;BRANCH IF NOT
5172  017016  126062  000011  000003        CMPB    $TRK(R0),3(R2)  ;ON THE SAME TRACK ?
5173  017024  001007                        BNE     2$              ;BRANCH IF NOT
5174  017026  126062  000010  000002        CMPB    $SEC(R0),2(R2)  ;ON THE SAME SECTOR ?
5175  017034  001003                        BNE     2$              ;BRANCH IF NOT
5176  017036  062705  000002                ADD     #2,R5           ;OTHERWISE,TAKE ERROR EXIT
5177  017042  000405                        BR      3$              ;EXIT
5178  017044  005301                2$:     DEC     R1              ;ALL 16 BAD SPOT CHECKED ?
5179  017046  003403                        BLE     3$              ;BRANCH IF SO
5180  017050  062702  000004                ADD     #4,R2           ;ADJUST TO NEXT TABLE ENTRY
5181  017054  000752                        BR      1$              ;LOOP BACK
5182  017056                        3$:
5183  017056  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
5184  017060  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5185  017062  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5186  017064  000205                        RTS     R5              ;RETRUN
5187
5188                          ;ROUTINE TO SELECT A WRITE (OR WRITE HEAD AND DATA) OPERATION
5189
5190  017066  012705  000002        RANWRT: MOV     #2,R5           ;SET WRITE DATA COMMAND
5191  017072  005737  001474                TST     FORMAT          ;ALLOW FORMAT OPERATION ?
5192  017076  001406                        BEQ     1$              ;NO
5193  017100  122760  000004  000024        CMPB    #4,$CODE(R0)    ;PREVIOUS A READ DATA COMMAND ?
5194  017106  001002                        BNE     1$              ;NO
5195  017110  012705  000003                MOV     #3,R5           ;SET A WRITE HEAD AND DATA COMMAND
5196  017114  110560  000074        1$:     MOVB    R5,$NCODE(R0)   ;SELECT THE WRITE COMMAND
5197  017120  000207                        RTS     PC              ;EXIT
5198
5199                          ;ROUTINE TO SELECT A PATTERN
5200
5201  017122  012705  000020        GETPAT: MOV     #20,R5          ;SELECT PATTERN
5202  017126  005737  001510                TST     PATTEN          ;ENABLE RANDOM PATTERN SELECTION ?
5203  017132  001403                        BEQ     2$              ;YES
5204  017134  013705  001510                MOV     PATTEN,R5       ;USE INDEXED PATTERN
5205  017140  000407                        BR      1$              ;NO
5206  017142  004737  027304        2$:     JSR     PC,GETREM       ;GET CODE
5207  017146  005705                        TST     R5              ;WAS PATTERN ZERO SELECTED ?
5208  017150  001003                        BNE     1$              ;BR IF NOT ZERO
5209  017152  004737  033350                JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
5210  017156  000761                        BR      GETPAT          ;TRY AGAIN
5211  017160  006305                1$:     ASL     R5              ;MAKE CODE INTO TABLE INDEX
5212  017162  000207                        RTS     PC
5213
5214                          ;ROUTINE TO GET THE PREVIOUSLY SELECTED PARAMETER VALUES
5215                          ;CALL:
5216                          ;       MOV     #DPB,R0         ;DPB ADDRESS
5217                          ;       JSR     PC,SELPAR       ;SELECT THE PARAMETERS
5218                          ;       JSR     PC,GETPAR
5219                          ;       RETURN
```

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5220
5221  017164  010546                    GETPAR: MOV     R5,-(SP)          ;SAVE R5
5222  017166  116060  000234  000027            MOVB    $RMCS1(R0),$PREVO(R0)  ;SAVE CURRENT PARAMETERS
5223  017174  142760  177701  000027            BICB    #^C76,$PREVO(R0)       ;STRIP GO AND IE BITS
5224  017202  032760  000006  000074            BIT     #6,$NCODE(R0)    ;SEE IF NEXT OPERATION IS READ OR WRITE
5225  017210  001007                            BNE     1$               ;BR IF EITHER
5226  017212  016060  000012  000034            MOV     $CYL(R0),$PREVA+2(R0)  ;SAVE STARTING CYLINDER
5227  017220  016060  000010  000032            MOV     $SEC(R0),$PREVA(R0)  ;SAVE STARTING SECTOR AND TRACK
5228  017226  000410                            BR      22$
5229  017230  004737  022262            1$:     JSR     PC,READDR        ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
5230  017234  012660  000034                    MOV     (SP)+,$PREVA+2(R0)     ;CYLINDER ADDRESS
5231  017240  112660  000033                    MOVB    (SP)+,$PREVA+1(R0)  ;TRACK ADDRESS
5232  017244  112660  000032                    MOVB    (SP)+,$PREVA(R0)  ;SECTOR ADDRESS
5233                                    ;
5234  017250  032777  000100  161676    22$:    BIT     #SW06,@SWR       ;SWITCH 6 SET ?
5235  017256  001073                            BNE     5$               ;BR IF SET
5236  017260  116060  000074  000024            MOVB    $NCODE(R0),$CODE(R0)  ;LOGICAL CODE FOR OPERATION
5237  017266  116005  000074                    MOVB    $NCODE(R0),R5    ;LOAD R5 FOR USE AS TABLE INDEX
5238  017272  116560  002122  000002            MOVB    COMTBL(R5),$COMND(R0)  ;RM03 COMMAND CODE
5239  017300  122760  000151  000002            CMPB    #151,$COMND(R0)  ;WRITE CHECK DATA COMMAND ?
5240  017306  001013                            BNE     3$               ;NO,DONOT CARE
5241  017310  122760  000060  000027            CMPB    #60,$PREVO(R0)   ;PREVIOUS A WRITE DATA COMMAND ?
5242  017316  001420                            BEQ     4$               ;YES,O K
5243  017320  112760  000171  000002    2$:     MOVB    #171,$COMND(R0)  ;CHANG TO READ DATA COMMAND
5244  017326  112760  000004  000024            MOVB    #4,$CODE(R0)     ;CODE NUMBER CHANGED TO READ DATA
5245  017334  000411                            BR      4$               ;EXIT
5246  017336  122760  000153  000002    3$:     CMPB    #153,$COMND(R0)  ;WRITE CHECK HEAD AND DATA COMMAND ?
5247  017344  001005                            BNE     4$               ;NO,THEN EXIT
5248  017346  122760  000062  000027            CMPB    #62,$PREVO(R0)   ;PREVIOUS A WRITE HEAD AND DATA COMMAND?
5249  017354  001401                            BEQ     4$               ;YES,EXIT
5250  017356  000760                            BR      2$               ;SET TO READ DATA COMMAND
5251  017360                            4$:
5252  017360  116060  000075  000030            MOVB    $NPATC(R0),$PATTC(R0)  ;PATTERN CODE
5253  017366  016060  000076  000010            MOV     $NSEC(R0),$SEC(R0)  ;TRACK AND SECTOR ADDRESSES
5254  017374  016060  000100  000012            MOV     $NCYL(R0),$CYL(R0)  ;CYLINDER ADDRESS
5255  017402  016060  000102  000020            MOV     $NWRDL(R0),$WRDL(R0)  ;BUFFER SIZE
5256  017410  016060  000102  000004            MOV     $NWRDL(R0),$WRDM(R0)  ;WORD COUNT FOR THE RH11
5257  017416  005460  000004                    NEG     $WRDM(R0)        ;COMPLEMENT IT
5258  017422  012760  000400  000022            MOV     #256.,$SSEC(R0)  ;INITIAL VALUE OF SECTOR SIZE
5259  017430  032760  000001  000024            BIT     #1,$CODE(R0)     ;HEADER OPERATION ?
5260  017436  001403                            BEQ     5$               ;BR IF NOT
5261  017440  062760  000002  000022            ADD     #2,$SSEC(R0)     ;ADD HEADER SIZE
5262  017446  005060  000104            5$:     CLR     $NEXT(R0)        ;RESET 'PARAMETERS LOADED' INDICATOR
5263  017452  012605                            MOV     (SP)+,R5         ;RESTORE R5
5264  017454  000207                            RTS     PC               ;RETURN
5265
5266                                    ;ROUTINE TO COMPRESS A LIST
5267                                    ;CALL:
5268                                    ;       MOV     #ADDRS,R1        ;COMPRESS LIST STARTING AT THIS ADDRESS
5269                                    ;       JSR     PC,CMPRES
5270                                    ;       RETURN
5271
5272  017456  016111  000002            CMPRES: MOV     2(R1),(R1)       ;COMPRESS THE TABLE IN R1
5273  017462  001403                            BEQ     1$               ;BR WHEN ZERO FOUND
5274  017464  062701  000002                    ADD     #2,R1            ;INCREMENT R1
5275  017470  000772                            BR      CMPRES           ;CONTINUE COMPRESSING TABLE
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5276  017472  000207                  1$:     RTS     PC              ;RETURN
5277
5278                                  ;ROUTINE TO SETUP PARAMETERS FOR A SEQUENTIAL READ OR WRITE OF THE DISK
5279                                  ;CALL:
5280                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
5281                                  ;       MOV     #-1,$PACK(R0)   ;'WRITE PACK' FLAG
5282                                  ;  OR
5283                                  ;       MOV     #1,$PACK(R0)    ;'READ PACK' FLAG
5284                                  ;       JSR     PC,WRTPK
5285                                  ;       RETURN
5286
5287  017474  004737  033350          WRTPK:  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
5288  017500  005760  000040                  TST     $OPERC+2(R0)    ;SEE IF FIRST OPERATION
5289  017504  001007                          BNE     WRTPK1          ;BR IF UPPER WORD OF COUNTER NOT ZERO
5290  017506  005760  000036                  TST     $OPERC(R0)      ;LOWER WORD ZERO ?
5291  017512  001004                          BNE     WRTPK1          ;BR IF NOT 1ST OPERATION
5292  017514  105760  000026                  TSTB    $PACK(R0)       ;SEE WHICH - 'R' OR 'W'
5293  017520  100530                          BMI     WRTPK3          ;BR IF 'W'
5294  017522  000515                          BR      WRTPK2          ;'R' OPERATION
5295  017524  116060  000234  000027  WRTPK1: MOVB    $RMCS1(R0),$PREV0(R0)  ;SAVE CURRENT PARAMETERS
5296  017532  004737  022262                  JSR     PC,READDR       ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
5297  017536  012660  000034                  MOV     (SP)+,$PREVA+2(R0)      ;CYLINDER ADDRESS
5298  017542  112660  000033                  MOVB    (SP)+,$PREVA+1(R0)  ;TRACK ADDRESS
5299  017546  112660  000032                  MOVB    (SP)+,$PREVA(R0)  ;SECTOR ADDRESS
5300  017552  016060  000242  000010          MOV     $RMDA(R0),$SEC(R0)  ;NEW SECTOR & TRACK ADDRESS
5301  017560  016060  000270  000012          MOV     $RMDC(R0),$CYL(R0)  ;NEW CYLINDER ADDRESS
5302  017566  026060  000012  000106          CMP     $CYL(R0),MAXCYL(R0)  ;SEE IF AT END
5303  017574  103436                          BLO     2$              ;BR IF LESS THAN 'MAXCYL'
5304  017576  101004                          BHI     1$              ;BR IF GREATER THAN 'MAXCYL'
5305  017600  126060  000011  000112          CMPB    $TRK(R0),MAXTRK(R0)  ;SEE IF AT MAX TRACK
5306  017606  103431                          BLO     2$              ;BR IF NOT GREATER
5307  017610  116060  000114  000011  1$:     MOVB    MINTRK(R0),$TRK(R0)  ;RESET TRACK ADDRESS
5308  017616  116060  000120  000010          MOVB    MINSEC(R0),$SEC(R0)  ;RESET SECTOR ADDRESS
5309  017624  016060  000110  000012          MOV     MINCYL(R0),$CYL(R0)  ;RESET CYLINDER ADDRESS
5310  017632  112760  000004  000024          MOVB    #4,$CODE(R0)    ;SET CODE TO READ DATA
5311  017640  122760  177776  000026          CMPB    #-2,$PACK(R0)   ;WT OPERATION IN PROCESSING
5312  017646  001475                          BEQ     WRTPK5          ;YES
5313  017650  004737  026776                  JSR     PC,EOP2         ;DROP THE DRIVE (NORMAL TERMINATION)
5314  017654  032777  000020  161272          BIT     #SW04,@SWR      ;IS SWITCH 4 SET ?
5315  017662  001003                          BNE     2$              ;BR IF SET
5316  017664  005726                          TST     (SP)+           ;INCREMENT THE STACK POINTER
5317  017666  000137  005352                  JMP     MAIN            ;RETURN DIRECTLY TO 'MAIN'
5318  017672  013760  001462  000020  2$:     MOV     MAXDL,$WRDL(R0)  ;BUFFER SIZE IS MAXIMUM
5319  017700  042760  000377  000020          BIC     #377,$WRDL(R0)  ;SECTOR BOUNDRY FOR WRITTING
5320  017706  013760  001462  000004          MOV     MAXDL,$WRDM(R0)  ;WORD COUNT
5321  017714  042760  000377  000004          BIC     #377,$WRDM(R0)  ;SECTOR BOUNDRY FOR WRITTING
5322  017722  005760  000004                  TST     $WRDM(R0)       ;SIZE=0 ?
5323  017726  003006                          BGT     3$              ;NO
5324  017730  012760  000400  000004          MOV     #400,$WRDM(R0)  ;SET TO ONE SECTOR
5325  017736  012760  000400  000020          MOV     #400,$WRDL(R0)  ;SET ONE SECTOR
5326  017744  005460  000004          3$:     NEG     $WRDM(R0)       ;CHANGE WORD COUNT TO 2'S COMPLEMENT
5327  017750  105760  000026                  TSTB    $PACK(R0)       ;READ OR WRITE ?
5328  017754  100412                          BMI     WRTPK3          ;BR IF WRITE
5329  017756  012760  000402  000022  WRTPK2: MOV     #258.,$SSEC(R0)  ;SECTOR SIZE FOR READ
5330  017764  112760  000005  000024          MOVB    #5,$CODE(R0)    ;CODE FOR READ HEADER & DATA
5331  017772  112760  000173  000002          MOVB    #RDHD,$COMND(R0)  ;DRIVE CODE FOR OPERATION
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5332  020000  000415                          BR      WRTPK4          ;SET UP FOR EXIT
5333  020002  012760  000400  000022  WRTPK3: MOV     #256.,$SSEC(R0) ;SECTOR SIZE
5334  020010  112760  000002  000024          MOVB    #2,$CODE(R0)    ;CODE FOR WRTDAT
5335  020016  112760  000161  000002          MOVB    #WRTDAT,$COMND(R0)  ;OP CODE
5336  020024  004737  017122                  JSR     PC,GETPAT       ;GET PATTERN CODE
5337  020030  110560  000030                  MOVB    R5,$PATTC(R0)   ;PATTERN CODE
5338  020034  005060  000104          WRTPK4: CLR     $NEXT(R0)       ;CLEAR 'PARAMETER SELECTED' INDICATOR
5339  020040  000207                          RTS     PC              ;RETURN
5340  020042  005037  001316          WRTPK5: CLR     PACK            ;CLEAR WT FLAG
5341  020046  105060  000026                  CLRB    $PACK(R0)       ;CLEAR WT FLAG
5342  020052  005726                          TST     (SP)+           ;CLEAR STACK LEVEL
5343  020054  000137  005352                  JMP     MAIN            ;JUMP TO MAIN BACKGROUND LOOP
5344
5345                                  ;ROUTINE TO DETERMINE OF ERROR IS AT A LOCATION ON THE PACK DEFINED
5346                                  ;       IN THE BAD TRACK/SECTOR TABLE FOR THE DRIVE.
5347                                  ;CALL:
5348                                  ;       JSR     PC,SPOTCK
5349                                  ;       RETURN1                 ;ERROR AT AN ADDRESS IN TABLE
5350                                  ;       RETURN2                 ;NO TABLE ENTRY FOR ERROR ADDRESS OR
5351                                  ;                               ;PARAMETER 'NOTPRT' IS 0
5352
5353  020060                          SPOTCK:
5354  020060  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5355  020062  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5356  020064  012701  000124                  MOV     #$BDSEC,R1      ;INCREMENT FOR BAD SECTOR TABLE
5357  020070  060001                          ADD     R0,R1           ;ADD THE BLOCK'S STARTING ADDRESS
5358  020072  012702  000020                  MOV     #16.,R2         ;BAD SECTOR TABLE SIZE COUNT
5359  020076  004737  022262          1$:     JSR     PC,READDR       ;DECREMENT THE SECTOR/TRACK ADDRESS
5360  020102  021126                          CMP     (R1),(SP)+      ;ON THE SAME CYLINDER ?
5361  020104  001007                          BNE     2$              ;BRANCH IF NOT
5362  020106  122661  000003                  CMPB    (SP)+,3(R1)     ;COMPARE THE TRACK ADDRESS
5363  020112  001005                          BNE     3$              ;BR IF IT IS NOT EQUAL
5364  020114  122661  000002                  CMPB    (SP)+,2(R1)     ;COMPARE THE SECTOR ADDRESS
5365  020120  001003                          BNE     4$              ;BR IF NOT EQUAL
5366  020122  000411                          BR      5$              ;CHECK 'NOTPRT'
5367  020124  005726                  2$:     TST     (SP)+           ;CLEAR OFF THE STACK
5368  020126  005726                  3$:     TST     (SP)+           ;INCREMENT THE STACK POINTER
5369  020130  062701  000004          4$:     ADD     #4,R1           ;GO TO THE NEXT LOCATION IN THE TABLE
5370  020134  005711                          TST     (R1)            ;PAST THE TABLE ENTRIES ?
5371  020136  100411                          BMI     6$              ;BR IF PAST
5372  020140  005302                          DEC     R2              ;DECREMENT THE MAXIMUM ENTRY COUNT
5373  020142  001355                          BNE     1$              ;BR IF MORE TO CHECK
5374  020144  000406                          BR      6$              ;END, EXIT
5375  020146  005737  001504          5$:     TST     NOTPRT          ;PRINT THE ERROR ANYWAY ?
5376  020152  001006                          BNE     7$              ;BR IF NOT
5377  020154  012737  177777  001362          MOV     #-1,BADSEC      ;SET THE INDICATOR FOR THE IDENTIFICATION LINE
5378  020162  062766  000002  000004  6$:     ADD     #2,4(SP)        ;INCREMENT THE RETURN
5379  020170                          7$:
5380  020170  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5381  020172  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5382  020174  000207                          RTS     PC              ;RETURN
5383
5384                                  ;;*****************************************************************
5385
5386                                  .SBTTL  ERROR MESSAGE GENERATION ROUTINES
5387
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                        ;;*****************************************************************
                        ;PRINT LINE 1 OF ERROR MESSAGE:
                        ;'HH:MM:SS'
020176  032777  002000  160750  LINE1:  BIT     #SW10,@SWR      ;SWITCH 10 SET ?
020204  001402                   BEQ     1$              ;BR IF NOT
020206  104401  001174           TYPE    ,$BELL          ;RING THE BELL
020212  032777  020000  160734  1$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT ?
020220  001403                   BEQ     2$              ;BR IF NOT
020222  104414  001201           DISPLY  ,$CRLF          ;CR-LF
020226  000404                   BR      3$              ;EXIT
020230  004737  023450  2$:     JSR     PC,$TIME        ;TYPE THE TIME
020234  104414  052717           DISPLY  ,LINSPO         ;SPACES
020240  000207          3$:      RTS     PC              ;RETURN & TYPE DESCRIPTION

                        ;PRINT LINE 2 OF ERROR MESSAGE
                        ;'PRESENT ORDER = XXXX  PREVIOUS ORDER = XXXX'
                        ;'* ERROR AT BAD TRACK/SECTOR'
                        ;'DRV RMCS1   RMCS2   RMDS1   RMER1   RMMR2   RMER2   RMEC1   RMEC2'
                        ;'RMWC    RMBA    RMDA    RMAS    RMLA    RMDB   RMMR1.  RMDT'
                        ;'RMSN    RMOF    RMDC    RMCC    STATUS'
                        ;'BUS ADDRESS OR WORD COUNT NOT CONSISTENT'
                        ;'RMBA = XXXXXX   RMWC = XXXXXX'
                        ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'

020242          LINE2:
020242  010346          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
020244  010446          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
020246  010546          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
020250  104414  001201   DISPLY  ,$CRLF          ;CR-LF
020254  005037  020402   CLR     4$              ;CLEAR MESSAGE ADDRESS STORAGE
020260  005004          CLR     R4              ;WORKING REGISTER
020262  012737  051022  020402  MOV     #LIN2C,4$       ;ADDRESS OF 'PRESENT ORDER = ' MSG
020270  116004  000234   MOVB    $RMCS1(R0),R4   ;GET THE OPCODE
020274  042704  177701   BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
020300  004737  020336   JSR     PC,1$           ;TYPE THE FIRST MNEMONIC
020304  005737  020406   TST     5$              ;SEE IF MNEMONIC ENTRY FOUND
020310  001440          BEQ     LINE2A          ;BR IF NOT
020312  012737  051043  020402  MOV     #LIN2P,4$       ;ADDRESS OF 'PREVIOUS ORDER = ' MSG
020320  116004  000027   MOVB    $PREVO(R0),R4   ;PREVIOUS OPERATION CODE
020324  042704  177701   BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
020330  004737  020336   JSR     PC,1$           ;TYPE THE PREVIOUS MNEMONIC
020334  000426          BR      LINE2A          ;CONTINUE
020336  005005  1$:      CLR     R5              ;CLEAR THE TABLE INDEX
020340  126504  002130  2$:      CMPB    OPTBL(R5),R4    ;LOOK FOR THE OPCODE
020344  001405          BEQ     3$              ;BR WHEN OPCODE COUNT EQUALS OPCODE
020346  105765  002130   TSTB    OPTBL(R5)       ;LOOK FOR END OF TABLE
020352  100402          BMI     3$              ;BR IF END
020354  005205          INC     R5              ;INCREMENT THE POINTER
020356  000770          BR      2$              ;CONTINUE - NOT END OF TABLE
020360  006305  3$:      ASL     R5              ;SHIFT INDEX
020362  006305          ASL     R5              ;SHIFT THE INDEX
020364  006305          ASL     R5              ;SHIFT THE INDEX
020366  012737  002152  020406  MOV     #MNTBL,5$       ;ADDRESS OF ASCII TEXT TABLE
020374  060537  020406   ADD     R5,5$           ;ADD THE INDEX
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5444  020400  104414                    DISPLY                  ;TYPE IT
5445  020402  000000            4$:     .WORD   0               ;ADDRESS OF 'PRESENT' OR 'PREVIOUS' MESSAGE
5446  020404  104414                    DISPLY                  ;TYPE THE OPERATION MNEMONIC
5447  020406  000000            5$:     .WORD   0               ;ADDRESS OF MESSAGE
5448  020410  000207                    RTS     PC              ;RETURN TO MAIN ROUTINE
5449  020412  005737  001362    LINE2A: TST     BADSEC          ;PRINT THE BAD SECTOR LINE ?
5450  020416  001404                    BEQ     LINE2B          ;BR IF NOT
5451  020420  104414  001201            DISPLY  ,$CRLF          ;CR-LF
5452  020424  104414  051067            DISPLY  ,LIN2S          ;ERROR ADDRESS DEFINED AS BAD AREA
5453  020430  104414  001201    LINE2B: DISPLY  ,$CRLF          ;CR-LF
5454  020434  104414  050416            DISPLY  ,DH14           ;STANDARD RM03 REGISTER HEADER
5455  020440  104414  052717            DISPLY  ,LINSPO         ;TYPE A SPACE
5456  020444  013746  001344            MOV     UNIT,-(SP)      ;PUT THE DRIVE NUMBER ON THE STACK
5457  020450  004737  022242            JSR     PC,LINDEC       ;TYPE DRIVE NUMBER
5458  020454  104414  052716            DISPLY  ,LINSP          ;SPACES
5459  020460  012705  050742            MOV     #DT14,R5        ;REGISTER INDEXES
5460  020464  004737  020614            JSR     PC,3$           ;PRINT THE REGISTERS
5461  020470  032777  000040  160456    BIT     #SWO5,@SWR      ;PRINT THE OPTIONAL REGISTERS ?
5462  020476  001014                    BNE     1$              ;BR IF NOT
5463  020500  104414  050521            DISPLY  ,DH15
5464  020504  012705  050764            MOV     #DT15,R5        ;SECOND DATA LINE
5465  020510  004737  020614            JSR     PC,3$           ;PRINT THEM
5466  020514  104414  050620            DISPLY  ,DH16
5467  020520  012705  051006            MOV     #DT16,R5        ;THIRD DATA LINE
5468  020524  004737  020614            JSR     PC,3$           ;PRINT THE REGISTERS
5469  020530  032760  000100  000016  1$:BIT     #BIT6,$STATUS(R0)  ;DATA ERROR ?
5470  020536  001422                    BEQ     2$              ;BR IF NOT
5471  020540  016046  000020            MOV     $WRDL(R0),-(SP) ;TRANSFER SIZE
5472  020544  066016  000236            ADD     $RMWC(R0),(SP)  ;ADD REMAINING WORD COUNT
5473  020550  006316                    ASL     (SP)            ;CONVERT TO AN BYTE INCREMENT
5474  020552  066016  000006            ADD     $BUF(R0),(SP)   ;BUFFER STARTING ADDRESS
5475  020556  022660  000240            CMP     (SP)+,$RMBA(R0) ;CORRECT BUFFER ADDRESS ?
5476  020562  001410                    BEQ     2$              ;BR IF YES
5477  020564  104414  050043            DISPLY  ,EM46           ;'BUS ADDRESS AND WORD COUNT ARE NOT CONSISTENT'
5478  020570  104414  001201            DISPLY  ,$CRLF          ;CR-LF
5479  020574  004737  020706            JSR     PC,LINE3D       ;PRINT LINE 3D OF ERROR MESSAGE
5480  020600  004737  021320            JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
5481  020604                        2$:
5482  020604  012605                    MOV     (SP)+,R5        ;;POP STACK INTO R5
5483  020606  012604                    MOV     (SP)+,R4        ;;POP STACK INTO R4
5484  020610  012603                    MOV     (SP)+,R3        ;;POP STACK INTO R3
5485  020612  000207                    RTS     PC              ;RETURN TO ERROR PROCESSING ROUTINE
5486  020614  012546            3$:     MOV     (R5)+,-(SP)     ;PUT THE REGISTER INDEX ON THE STACK
5487  020616  060016                    ADD     R0,(SP)         ;ADD DRIVE'S TABLE ADDRESS
5488  020620  017646  000000            MOV     @(SP),-(SP)     ;VALUE
5489  020624  004737  022210            JSR     PC,LINOCT       ;TYPE IT
5490  020630  005726                    TST     (SP)+           ;CORRECT THE STACK POINTER
5491  020632  104414  052716            DISPLY  ,LINSP          ;PRINT 2 SPACES
5492  020636  005715                    TST     (R5)            ;AT END OF LINE ?
5493  020640  001365                    BNE     3$              ;BR IF NOT
5494  020642  104414  001201    4$:     DISPLY  ,$CRLF          ;CR-LF
5495  020646  000207                    RTS     PC              ;RETURN
5496
5497                                    ;PRINT LINE 3 OF ERROR MESSAGE
5498                                    ;'ERROR AT CCC TT SS   PREVIOUS ADR = CCC TT SS'
5499
```

```
5500  020650  104414  051123          LINE3:  DISPLY  ,LINM3           ;LINE 3 ENTRANCE
5501  020654  000517                          BR      LIN3.1           ;FINISH PRINTOUT
5502
5503                                  ;PRINT LINE 3A OF ERROR MESSAGE
5504                                  ;'START CYL = CCC   END CYL = CCC'
5505
5506  020656  104414  051141          LINE3A: DISPLY  ,LINM3           ;LINE 3A ENTRANCE
5507  020662  000514                          BR      LIN3.1           ;FINISH ERROR LINE
5508
5509                                  ;PRINT LINE 3B OF ERROR MESSAGE
5510                                  ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC'
5511
5512  020664  004737  021222          LINE3B: JSR     PC,LIN3.3        ;LINE 3B ENTRANCE
5513  020670  104414  001201                  DISPLY  ,$CRLF
5514  020674  000207                          RTS     PC
5515
5516                                  ;PRINT LINE 3C OF ERROR MESSAGE
5517                                  ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC   TRK = TT'
5518
5519  020676  004737  021222          LINE3C: JSR     PC,LIN3.3        ;LINE 3C ENTRANCE
5520  020702  000137  021254                  JMP     LIN3.4           ;FINISH MESSAGE
5521
5522                                  ;PRINT LINE 3D OF ERROR MESSAGE
5523                                  ;'RMBA = XXXXXX   RMWC = XXXXXX'
5524
5525  020706  032777  000040  160240  LINE3D: BIT     #SW05,@SWR       ;SWITCH 5 SET ?
5526  020714  001416                          BEQ     1$               ;BR IF IT IS
5527  020716  104414  051312                  DISPLY  ,LINB3           ;'RMBA = '
5528  020722  016046  000240                  MOV     $RMBA(R0),-(SP)  ;BUFFER ADDR REG CONTENTS
5529  020726  004737  022210                  JSR     PC,LINOCT        ;CONVERT TO OCTAL AND TYPE IT
5530  020732  104414  051322                  DISPLY  ,LINW3           ;'   RMWC = '
5531  020736  016046  000236                  MOV     $RMWC(R0),-(SP)  ;WORD COUNT REGISTER CONTENTS
5532  020742  004737  022210                  JSR     PC,LINOCT        ;CONVERT TO OCTAL AND TYPE IT
5533  020746  104414  001201                  DISPLY  ,$CRLF
5534  020752  000207                  1$:     RTS     PC
5535
5536                                  ;PRINT LINE 3E OF ERROR MESSAGE
5537                                  ;'START CYL = CCC   START TRK = TT   START SEC = SS'
5538
5539  020754  104414  051206          LINE3E: DISPLY  ,LINS3           ;'START CYL = '
5540  020760  016046  000012                  MOV     $CYL(R0),-(SP)   ;MOVE CYL TO STACK
5541  020764  004737  022242                  JSR     PC,LINDEC        ;TYPE IT IN DECIMAL
5542  020770  104414  052716                  DISPLY  ,LINSP           ;SPACES
5543  020774  104414  051334                  DISPLY  ,LINST3          ;'START TRK = '
5544  021000  005046                          CLR     -(SP)            ;CLEAR STACK
5545  021002  116016  000011                  MOVB    $TRK(R0),(SP)    ;TRACK TO STACK
5546  021006  004737  022242                  JSR     PC,LINDEC        ;TYPE IT IN DECIMAL
5547  021012  104414  052716                  DISPLY  ,LINSP           ;SPACES
5548  021016  104414  051351                  DISPLY  ,LINSS3          ;'START SEC = '
5549  021022  005046                          CLR     -(SP)            ;CLEAR STACK
5550  021024  116016  000010                  MOVB    $SEC(R0),(SP)    ;SECTOR ADDR TO STACK
5551  021030  004737  022242                  JSR     PC,LINDEC        ;TYPE IT IN DECIMAL
5552  021034  104414  001201                  DISPLY  ,$CRLF
5553  021040  000207                          RTS     PC
5554
5555                                  ;PRINT LINE 3F OF ERROR MESSAGE
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                                ;'RMDA = XXXXXX   RMCA = XXXXXX'

021042  032777  000040  160104  LINE3F: BIT     #SW5,@SWR       ;SWITCH 5 SET ?
021050  001420                          BEQ     1$              ;BR IF NOT
021052  104414  051302                  DISPLY  ,LINDA3         ;'RMDA = '
021056  016046  000242                  MOV     $RMDA(R0),-(SP) ;PUT SECTOR/TRACK ADDRESS ON THE STACK
021062  004737  022210                  JSR     PC,LINOCT       ;TYPE IT
021066  104414  052716                  DISPLY  ,LINSP          ;SPACES
021072  104414  051271                  DISPLY  ,LINCA3         ;' RMDC = '
021076  016046  000270                  MOV     $RMDC(R0),-(SP) ;PUT DESIRED CYLINDER ADDRESS ON THE STACK
021102  004737  022210                  JSR     PC,LINOCT       ;TYPE IT
021106  104414  001201                  DISPLY  ,$CRLF
021112  000207                  1$:     RTS     PC

                                ;'CCC TT SS   PREV ADR = CCC TT SS'

                                ;LIN3.1:        MOV     $RMDC(R0),-(SP) ;PUT CYLINDER ADDR ON STACK
021114  004737  022262          LIN3.1: JSR     PC,READDR       ;DECREMENT TRACK AND SECTOR ADDRESS
021120  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021124  104414  051136                  DISPLY  ,T              ;PRINT ' T'
                                ;       JSR     PC,READDR       ;DECREMENT TRACK AND SECTOR ADDRESSES
021130  004737  022242                  JSR     PC,LINDEC       ;TYPE TRACK IN DECIMAL
021134  104414  051162                  DISPLY  ,S              ;PRINT ' S'
021140  004737  022242                  JSR     PC,LINDEC       ;TYPE SECTOR ADDRESS
021144  104414  051165                  DISPLY  ,LINP3          ;PRINT 'PREV ADDR'
021150  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
021154  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021160  104414  051136                  DISPLY  ,T              ;PRINT ' T'
021164  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK
021166  116016  000033                  MOVB    $PREVA+1(R0),(SP)  ;PREVIOUS TRACK ADDRESS
021172  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021176  104414  051162                  DISPLY  ,S              ;PRINT ' S'
021202  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK
021204  116016  000032                  MOVB    $PREVA(R0),(SP)  ;PREVIOUS SECTOR DDRESS
021210  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021214  104414  001201                  DISPLY  ,$CRLF
021220  000207                          RTS     PC

                                ;'START CYL = CCC   END CYL = CCC'

021222  104414  051206          LIN3.3: DISPLY  ,LINS3          ;LINE '3B & 3C' ENTRANCE
021226  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
021232  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021236  104414  051223                  DISPLY  ,LINEN3         ;PRINT 'END CYL'
021242  016046  000270                  MOV     $RMDC(R0),-(SP) ;PRESENT CYLINDER
021246  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021252  000207                          RTS     PC

                                ;'ACTUAL CYL = CCC   TRK = TT'

021254  104414  051240          LIN3.4: DISPLY  ,LINA3          ;PRINT 'ACTUAL'
021260  013746  056150                  MOV     CYLDER,-(SP)    ;ACTUAL CYLINDER
021264  042716  010000                  BIC     #BIT12,(SP)     ;CLEAR THE FORMAT BIT
021270  004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021274  104414  051260                  DISPLY  ,LINT3          ;PRINT TRACK
021300  005046                          CLR     -(SP)           ;CLEAR STACK WORD
```

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5612  021302  116016  000243                  MOVB    $RMDA+1(R0),(SP) ;PUT TRACK ON STACK
5613  021306  004737  022242                  JSR     PC,LINDEC        ;TYPE IT IN DECIMAL
5614  021312  104414  001201                  DISPLY  ,$CRLF
5615  021316  000207                          RTS     PC
5616
5617                                  ;PRINT LINE 4 OF ERROR MESSAGE
5618                                  ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'
5619
5620  021320  032760  000100  000016  LINE4:  BIT     #BIT06,$STATUS(R0)  ;DATA ERROR ?
5621  021326  001427                          BEQ     1$                  ;BR IF NOT
5622  021330  104414  051366                  DISPLY  ,LIN44              ;'PRINT BUFFER'
5623  021334  016046  000006                  MOV     $BUF(R0),-(SP)      ;BUFFER ADDR ON STACK
5624  021340  004737  022210                  JSR     PC,LINOCT           ;CONVERT TO OCTAL & PRINT
5625  021344  104414  051405                  DISPLY  ,LINS4              ;PRINT 'SIZE'
5626  021350  016046  000020                  MOV     $WRDL(R0),-(SP)     ;BUFFER SIZE
5627  021354  004737  022242                  JSR     PC,LINDEC           ;TYPE IT IN DECIMAL
5628  021360  104414  051417                  DISPLY  ,LINX4              ;'ACTUAL NMBR WRDS XFRD = '
5629  021364  016046  000240                  MOV     $RMBA(R0),-(SP)     ;VALUE IN BUFFER ADDR REGISTER
5630  021370  166016  000006                  SUB     $BUF(R0),(SP)       ;SUBTRACT STARTING ADDRESS
5631  021374  006216                          ASR     (SP)                ;CONVERT INTO A WORD COUNT
5632  021376  004737  022242                  JSR     PC,LINDEC           ;TYPE IT IN DECIMAL
5633  021402  104414  001201                  DISPLY  ,$CRLF              ;CR-LF
5634  021406  000207                  1$:     RTS     PC                  ;RETURN
5635
5636                                  ;PRINT LINE 5 OF ERROR MESSAGE
5637                                  ;'GOOD DATA = XXXXXX   BAD DATA = XXXXXX   SECT POS = XXX'
5638
5639  021410  104414  051452          LINE5:  DISPLY  ,LIN55              ;PRINT 'GOOD DATA'
5640  021414  162760  000002  000240          SUB     #2,$RMBA(R0)        ;BACK THE ADDRESS UP
5641  021422  017046  000240                  MOV     @$RMBA(R0),-(SP)    ;'GOOD' DATA - AT THE BUFFER LOCATION
5642  021426  004737  022210                  JSR     PC,LINOCT           ;TYPE IT
5643  021432  104414  051467                  DISPLY  ,LINBS              ;PRINT 'BAD DATA'
5644  021436  016046  000256                  MOV     $RMDB(R0),-(SP)     ;BAD DATA FROM BUFFER
5645  021442  004737  022210                  JSR     PC,LINOCT           ;TYPE IT
5646  021446  016046  000236                  MOV     $RMWC(R0),-(SP)     ;WORD LENGTH ON STACK
5647  021452  066016  000020                  ADD     $WRDL(R0),(SP)      ;MAKE INTO A POSITIVE NUMBER
5648  021456  005046                          CLR     -(SP)               ;UPPER DIVIDEND TO ZERO
5649  021460  016046  000022                  MOV     $SSEC(R0),-(SP)     ;SECTOR SIZE ON THE STACK
5650  021464  004737  027332                  JSR     PC,LINKDV           ;DIVIDE WORDS XFERED BY SECTOR SIZE
5651  021470  012616                          MOV     (SP)+,(SP)          ;MOVE REMAINDER UP THE STACK
5652  021472  104414  051505                  DISPLY  ,LINP5              ;PRINT 'SECT POS'
5653  021476  004737  022242                  JSR     PC,LINDEC           ;TYPE THE POSITION
5654  021502  104414  001201                  DISPLY  ,$CRLF
5655  021506  000207                          RTS     PC
5656
5657                                  ;PRINT LINE 5A OF THE ERROR MESSAGE
5658                                  ;'HEADER FROM ERROR SECTOR  XXXXXX  XXXXXX  XXXXXX  XXXXXX'
5659
5660  021510                          LINE5A:
5661  021510  104414  051523          2$:     DISPLY  ,LIN55              ;'HEADER CONTENTS OF ERROR SECTOR'
5662  021514  013746  056150                  MOV     CYLDER,-(SP)        ;HEADER POSITION
5663  021520  004737  022210                  JSR     PC,LINOCT           ;TYPE IT
5664  021524  104414  052716                  DISPLY  ,LINSP              ;SPACES
5665  021530  013746  056152                  MOV     CYLDER+2,-(SP)      ;HEADER POSITION +2
5666  021534  004737  022210                  JSR     PC,LINOCT           ;TYPE IT
5667  021540  104414  052716                  DISPLY  ,LINSP              ;SPACES
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5668  021544  104414  052721              DISPLY  ,LINX5          ;APPENDING INFO 1/23/77
5669  021550  104414  001201  3$:         DISPLY  ,$CRLF
5670  021554  000207                      RTS     PC
5671
5672                                      ;PRINT LINE 5B OF ERROR MESSAGE
5673                                      ;'RMEC1 = XXXXXX   RMEC2 = XXXXXX'
5674
5675  021556  104414  051557  LINE5B:     DISPLY  ,LINEP5         ;'RMEC1 = '
5676  021562  016046  000300              MOV     $RMEC1(R0),-(SP) ;PUT REGISTER CONTENTS ON THE STACK
5677  021566  004737  022210              JSR     PC,LINOCT       ;TYPE IT
5678  021572  104414  052716              DISPLY  ,LINSP          ;SPACES
5679  021576  104414  051570              DISPLY  ,LINE05         ;' RMEC2 = '
5680  021602  016046  000302              MOV     $RMEC2(R0),-(SP) ;PUT REGISTER CONTENTS ON THE STACK
5681  021606  004737  022210              JSR     PC,LINOCT       ;TYPE IT
5682  021612  104414  001201              DISPLY  ,$CRLF
5683  021616  000207                      RTS     PC              ;RETURN
5684
5685                                      ;PRINT LINE 6 OF ERROR MESSAGE
5686                                      ;'SECTOR IS ECC CORRECTABLE'
5687
5688  021620  104414  051602  LINE6:      DISPLY  ,LIN86          ;ECC CORRECTABLE
5689  021624  104414  001201              DISPLY  ,$CRLF
5690  021630  000207                      RTS     PC
5691
5692                                      ;PRINT LINE 6A OF THE ERROR MESSAGE
5693                                      ;'SECTOR READ CORRECTLY AT OFFSET N'
5694
5695  021632  104414  051635  LINE6A:     DISPLY  ,LINC6          ;PRINT 'READ CORRECTLY AT OFFSET N'
5696  021636  000411                      BR      LIN6.1          ;TYPE THE REST OF THE LINE
5697
5698                                      ;PRINT LINE 6B OF THE ERROR MESSAGE
5699                                      ;'SECTOR IS ECC CORRECTABLE AT OFFSET N'
5700
5701  021640  104414  051602  LINE6B:     DISPLY  ,LIN86          ;PRINT 'SECTOR IS ECC CORRECTABLE '
5702  021644  000406                      BR      LIN6.1
5703
5704                                      ;PRINT LINE 6C OF THE ERROR MESSAGE
5705                                      ;'CORRECTED ON NTH RETRY'
5706
5707  021646  104414  051664  LINE6C:     DISPLY  ,LING6          ;'CORRECTED ON NTH RETRY'
5708  021652  000414                      BR      LIN6.2          ;TYPE THE REST OF THE LINE
5709
5710                                      ;PRINT LINE 6D OF THE ERROR MESSAGE
5711                                      ;'UNCORRECTABLE AFTER N RETRIES'
5712
5713  021654  104414  051713  LINE6D:     DISPLY  ,LINU06         ;'UNCORRECTABLE AFTER N RETRIES'
5714  021660  000411                      BR      LIN6.2          ;FINISH
5715
5716                                      ;TYPE THE OFFSET VALUE IN MICRO-INCHES
5717
5718  021662  006301              LIN6.1: ASL     R1              ;DOUBLE THE OFFSET TABLE INDEX
5719  021664  016137  002470  021674      MOV     OFMTBL(R1),1$   ;ADDRESS OF OFFSET POSITION MESSAGE
5720  021672  104414                      DISPLY
5721  021674  000000              1$:     .WORD   0               ;OFFSET VALUE
5722  021676  104414  001201              DISPLY  ,$CRLF
5723  021702  000207                      RTS     PC
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                                ;RETRY COUNT TYPEOUT
                                ;
005046                  LIN6.2: CLR     -(SP)           ;CLEAR STACK
113716  001351                  MOVB    RETRY+1,(SP)    ;RETRY COUNT
004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
104414  051702                  DISPLY  ,LIN6           ;'RETRY'
104414  001201                  DISPLY  ,$CRLF
000207                          RTS     PC
                                ;
                                ;PRINT LINE 7 OF THE ERROR MESSAGE
                                ;'ORDERS:XXXXX   TOTAL ERRORS:XXX   WRDS XFRD:XXXXXXX   WRDS READ:XXXXXXX'
                                ;
104414  051766          LINE7:  DISPLY  ,LIN7O          ;PRINT ORDER COUNT
012746  000036                  MOV     #$OPERC,-(SP)   ;TO STACK
060016                          ADD     R0,(SP)         ;ADD THE BASE ADDRESS
004737  033546                  JSR     PC,$DB2D        ;CONVERT IT
004737  027646                  JSR     PC,$SUPRS       ;PRINT IT
104414  052040                  DISPLY  ,LIN7T          ;TOTAL ERRORS
016046  000056                  MOV     $TOTAL(R0),-(SP)        ;TO STACK
004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
104414  052052                  DISPLY  ,LIN7X          ;PRINT 'WRDS XFR'
012746  000046                  MOV     #$TRANS,-(SP)   ;ADDRESS OF LOW WORD ON STACK
060016                          ADD     R0,(SP)
004737  033546                  JSR     PC,$DB2D        ;CONVERT
004737  027646                  JSR     PC,$SUPRS       ;PRINT
104414  052066                  DISPLY  ,LIN7R          ;'BITS READ'
012746  000052                  MOV     #$READ,-(SP)    ;LOW WORD ADDRESS
060016                          ADD     R0,(SP)
004737  033546                  JSR     PC,$DB2D        ;CONVERT
004737  027646                  JSR     PC,$SUPRS       ;PRINT
104414  001201                  DISPLY  ,$CRLF
104414  001201                  DISPLY  ,$CRLF
032777  100000  157104          BIT     #SW15,@SWR      ;SEE IF 'HALT ON ERROR' - SWITCH 15
001401                          BEQ     1$              ;BR IF NOT
000000                          HALT                    ;SWITCH 15 HALT
000207                  1$:     RTS     PC
                                ;
                                ;PRINT LINE 7A OF ERROR MESSAGE
                                ;'ORDERS:XXXXX   TOTAL SEEKS=XXXXX   TOTAL MISPOS ERR = XXX   TOTAL SKI= XXX'
                                ;
104414  051766          LINE7A: DISPLY  ,LIN7O          ;'ORDERS = '
012746  000036                  MOV     #$OPERC,-(SP)   ;ORDER COUNT INCREMENT
060016                          ADD     R0,(SP)         ;ADD BASE ADDRESS
004737  033546                  JSR     PC,$DB2D        ;CONVERT THE COUNT
004737  027646                  JSR     PC,$SUPRS       ;PRINT IT
104414  051776                  DISPLY  ,LIN7P          ;'TOTAL SEEKS = '
012746  000042                  MOV     #$POSIT,-(SP)   ;TOTAL SEEKS
060016                          ADD     R0,(SP)         ;DEVICE TABLE ADDRESS
004737  033546                  JSR     PC,$DB2D        ;CONVERT THE SEEK COUNT
004737  027646                  JSR     PC,$SUPRS       ;PRINT IT
104414  051740                  DISPLY  ,LIN7M          ;'  TOTAL MISPOS ERR = '
016046  000066                  MOV     $MISPO(R0),-(SP)  ;TOTAL ERRORS
004737  022242                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
104414  052016                  DISPLY  ,LIN7S          ;'  TOTAL SKI,OCYL ERR = '
016046  000064                  MOV     $SKI(R0),-(SP)  ;CONVERT & PRINT IT
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5780  022146  004737  022242                JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5781  022152  104414  001201                DISPLY  ,$CRLF
5782  022156  104414  001201                DISPLY  ,$CRLF
5783  022162  032777  100000  156764        BIT     #SW15,@SWR      ;SEE IF HALT ON ERROR - SWITCH 15 SET
5784  022170  001401                        BEQ     1$              ;BR IF NOT
5785  022172  000000                        HALT                    ;SWITCH 15 HALT
5786  022174  000207                1$:     RTS     PC
5787
5788                                        ;PRINT LINE 8 OF THE ERROR MESSAGE
5789                                        ;'DIFFERENT ERROR DURING RETRY'
5790
5791  022176  104414  052103          LINE8:  DISPLY  ,LIN8M
5792  022202  004737  020242                JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
5793  022206  000207                        RTS     PC
5794
5795                                        ;OCTAL TYPEOUT ROUTINE
5796                                        ;CALL:
5797                                        ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
5798                                        ;       JSR     PC,LINOCT
5799                                        ;       RETURN
5800
5801  022210  016646  000002          LINOCT: MOV     2(SP),-(SP)     ;PUT NUMBER IN PROPER LOCATION ON STACK
5802  022214  004737  030276                JSR     PC,$SB2O        ;CONVERT THE NUMBER TO OCTAL
5803  022220  012637  022234                MOV     (SP)+,1$        ;GET THE ADDRESS OF THE ASCII STRING
5804  022224  062737  000005  022234        ADD     #5.,1$          ;ADDRESS THE LAST 6 ASCII DIGITS
5805  022232  104414                        DISPLY                  ;TYPE IT
5806  022234  000000                1$:     .WORD   0               ;ADDRESS
5807  022236  012616                        MOV     (SP)+,(SP)      ;CORRECT THE STACK
5808  022240  000207                        RTS     PC              ;RETURN
5809
5810                                        ;ROUTINE TO CONVERT THE INPUT NUMBER TO DECIMAL AND TYPE IT WITH
5811                                        ;LEADING ZERO SUPRESSION
5812                                        ;CALL:
5813                                        ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
5814                                        ;       JSR     PC,LINDEC
5815                                        ;       RETURN
5816
5817  022242  016646  000002          LINDEC: MOV     2(SP),-(SP)     ;SET UP STACK FOR CONVERT
5818  022246  004737  030246                JSR     PC,$SB2D        ;CONVERT IT TO DECIMAL
5819  022252  004737  027646                JSR     PC,$SUPRS       ;TYPE IT (WITH LEADING ZEROS SUPRESSED)
5820  022256  012616                        MOV     (SP)+,(SP)      ;RESTORE STACK POINTER
5821  022260  000207                        RTS     PC
5822
5823                                        ;;*****************************************************************
5824
5825                                        .SBTTL  GENERAL SUPPORT SUBROUTINES
5826
5827                                        ;;*****************************************************************
5828
5829                                        ;DECREMENT THE SECTOR-TRACK ADDRESS
5830                                        ;CALL:
5831                                        ;       MOV     #DPB,R0         ;DPB ADDRESS
5832                                        ;       JSR     PC,READDR
5833                                        ;       RETURN
5834                                        ;       (SP) CONTAINS THE CYLINDER ADDRESS
5835                                        ;       2(SP) CONTAINS THE TRACK ADDRESS
```

```
                                        ;       4(SP) CONTAINS THE SECTOR ADDRESS
                                        ;
                                        READDR: SUB     #6,SP           ;DECREMENT THE STACK POINTER
                                                MOV     6(SP),(SP)      ;MOVE THE RETURN ADDR DOWN THE STACK
                                                CLR     6(SP)           ;CLEAR STACK FOR SECTOR
                                                CLR     4(SP)           ;CLEAR STACK FOR TRACK
                                                CLR     2(SP)           ;CLEAR STACK FOR CYLINDER
                                                MOVB    $RMDA(R0),6(SP)  ; SECTOR ON STACK
                                                MOVB    $RMDA+1(R0),4(SP)  ;TRACK ADDRESS
                                                MOV     $RMDC(R0),2(SP) ;CYLINDER ADDRESS
                                                TST     6(SP)           ;SECTOR 0 ?
                                                BEQ     1$              ;BRANCH IF SO
                                                DECB    6(SP)           ;DECREMENT ONE SECTOR
                                                BR      3$              ;BRANCH TO EXIT
                                        1$:     TST     4(SP)           ;ALSO ON TRACK 0 ?
                                                BEQ     2$              ;BRANCH IF SO
                                                MOVB    #31.,6(SP)      ;LAST SECTOR
                                                DECB    4(SP)           ;DECREMENT ONE TRACK
                                                BR      3$              ;EXIT
                                        2$:     MOVB    #31.,6(SP)      ;LAST SECTOR
                                                MOVB    #4,4(SP)        ;LAST TRACK
                                                DEC     2(SP)           ;DECREMENT ONE CYLINDER COUNT
                                        3$:     NOP                     ;DONE
                                                RTS     PC              ;RETURN

                                        ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS

                                        CKCLK:  MOV     #-1,CLKFLG      ;CLEAR CLOCK AVAILABILITY FLAG
                                                MOV     #-1,PCLOCK      ;CLEAR KW11-P CLOCK AVAILABILITY FLAG
                                                MOV     #CKCLK1,ERRVEC  ;SET UP VECTOR FOR CLOCK CHECK
                                                CLR     @#ERRVEC+2        ;NEW PSW
                                                TST     @$LKCSR         ;CHECK FOR KW11-P
                                                CLR     CLKFLG          ;SET CLOCK AVAILABILITY FLAG
                                                CLR     PCLOCK          ;SET KW11-P CLOCK FLAG
                                                MOV     $LPVEC,R1       ;KW11-P VECTOR ADDRESS
                                                MOV     #CLOCK,(R1)+    ;SET UP KW11-P VECTOR
                                                MOV     #300,(R1)       ;PSW - PRI 6
                                                MOV     #-1667.,@$LKCSB ;LOAD COUNTER BUFFER WITH 16.67
                                                MOV     #131,@$LKCSR    ;SET CLOCK - CNT UP, 10US, CONT INT
                                                BR      CKCLK3
                                        CKCLK1: ADD     #4,SP           ;RESTORE THE STACK POINTER
                                                MOV     #CKCLK2,@#ERRVEC  ;CHANGE ERROR VECTOR TO CHECK FOR KW11-L
                                                TST     @$LKS           ;LOOK FOR KW11-L
                                                CLR     CLKFLG          ;SET CLOCK FLAG
                                                MOV     $LLVEC,R1       ;KW11-L VECTOR ADDRESS
                                                MOV     #CLOCK,(R1)+    ;SET UP KW11-L VECTOR
                                                MOV     #300,(R1)       ;PSW - PRI 6
                                                MOV     #100,@$LKS      ;SET KW11-L INTERRUPT
                                                BR      CKCLK3
                                        CKCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
                                                TYPE    ,NEDCLK         ;'P OR L CLOCK MUST BE ON SYSTEM'
                                                TST     42              ;UNDER MONITOR CONTROL ?
                                                BEQ     1$              ;BR IF NOT
                                                JMP     $GET42          ;ABORT PROGRAM
                                        1$:     HALT                    ;HALT
                                                JMP     START           ;TRY AGAIN
```

```
5892  022604  012737  000006  000004  CKCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
5893  022612  000207                          RTS     PC
5894
5895                                  ;ROUTINE TO DISPLAY STATISTICS FOR ALL DRIVES ASSIGNED
5896                                  ;CALL:
5897                                  ;       JSR     PC,STATPR
5898                                  ;       RETURN
5899
5900  022614  010046                  STATPR: MOV     R0,-(SP)        ;SAVE R0
5901  022616  010446                          MOV     R4,-(SP)        ;SAVE R4
5902  022620  005737  001544                  TST     ASNLST          ;ANY DRIVES ASSIGNED ?
5903  022624  001423                          BEQ     3$              ;BR IF NOT
5904  022626  004737  022730                  JSR     PC,SHDTYP       ;TYPE THE HEADING
5905  022632  005004                          CLR     R4              ;CLEAR THE DRIVE INDEX
5906  022634  006304                  1$:     ASL     R4              ;CHANGE TO INDEX WORDS
5907  022636  016400  002102                  MOV     BLKADR(R4),R0   ;GET THE DRIVE'S BLOCK ADDRESS
5908  022642  006204                          ASR     R4              ;RESTORE R4
5909  022644  136437  034304  001544          BITB    ATABIT(R4),ASNLST  ;IS THIS DRIVE ASSIGNED ?
5910  022652  001404                          BEQ     2$              ;BR IF NOT
5911  022654  004737  022752                  JSR     PC,SDETAL       ;TYPE THE PERFORMANCE SUMMARY
5912  022660  104401  001201                  TYPE    ,$CRLF          ;CR-LF
5913  022664  005204                  2$:     INC     R4              ;INCREMENT THE INDEX
5914  022666  020427  000010                  CMP     R4,#8.          ;FINISHED ?
5915  022672  001360                          BNE     1$              ;BR IF NOT
5916  022674  012604                  3$:     MOV     (SP)+,R4        ;RESTORE R4
5917  022676  012600                          MOV     (SP)+,R0        ;RESTORE R0
5918  022700  000207                          RTS     PC              ;RETURN
5919
5920                                  ;ROUTINE TO TYPE STATISTICS FOR AN INDIVIDUAL DRIVE
5921                                  ;CALL:
5922                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
5923                                  ;       JSR     PC,TYPEST
5924                                  ;       RETURN
5925
5926  022702  010046                  TYPEST: MOV     R0,-(SP)        ;SAVE R0
5927  022704  010446                          MOV     R4,-(SP)        ;SAVE R4
5928  022706  004737  022730                  JSR     PC,SHDTYP       ;TYPE THE HEADING
5929  022712  005004                          CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
5930  022714  111004                          MOVB    (R0),R4         ;DRIVE NUMBER
5931  022716  004737  022752                  JSR     PC,SDETAL       ;TYPE THE STATISTICS
5932  022722  012604                          MOV     (SP)+,R4        ;RESTORE R4
5933  022724  012600                          MOV     (SP)+,R0        ;RESTORE R0
5934  022726  000207                          RTS     PC              ;RETURN
5935
5936                                  ;TYPE THE HEADER FOR THE DRIVE PERFORMANCE SUMMARY TYPEOUT
5937                                  ;CALL:
5938                                  ;       JSR     PC,SHDTYP
5939                                  ;       RETURN
5940
5941  022730  004737  023450  SHDTYP: JSR     PC,$TIME        ;TYPE THE TIME OF DAY
5942  022734  004537  027706          JSR     R5,TYPRI4       ;TYPE AT PRIORITY 4
5943  022740  001201                  $CRLF                   ;CR-LF
5944  022742  004537  027706          JSR     R5,TYPRI4       ;TYPE THE HEADER
5945  022746  053162                  STATHD                  ;HEADER
5946  022750  000207                  RTS     PC              ;RETURN
5947
```

```
5948                                    ;TYPE THE PERFORMANCE SUMMARY DATE LINE
5949                                    ;CALL:
5950                                    ;       MOV     #DRIVE,R4       ;DRIVE NUMBER
5951                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
5952                                    ;       RETURN
5953
5954  022752  010246                    SDETAL: MOV     R2,-(SP)        ;SAVE R2
5955  022754  010002                            MOV     R0,R2           ;DPB ADDRESS
5956  022756  062702  000036                    ADD     #$OPERC,R2      ;FIRST STATISTICAL FIELD
5957  022762  010446                            MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
5958                                                                    ;;TYPE DRIVE NUMBER
5959  022764  104403                            TYPOS                   ;;GO TYPE--OCTAL ASCII
5960  022766     002                            .BYTE   2               ;;TYPE 2 DIGIT(S)
5961  022767     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
5962  022770  104401  052716                    TYPE    ,LINSP          ;SPACES
5963  022774  016046  000070                    MOV     $PASSC(R0),-(SP)  ;PUT THE PASS COUNT ON THE STACK
5964  023000  004737  030246                    JSR     PC,$SB2D        ;CONVERT IT
5965  023004  004537  027556                    JSR     R5,REPLZ        ;TYPE IT
5966  023010  000003                            .WORD   3               ;TYPE 3 DIGITS
5967  023012  104401  052716                    TYPE    ,LINSP          ;SPACES
5968  023016  010246                            MOV     R2,-(SP)        ;PUT $OPERC ON THE STACK
5969  023020  004737  033546                    JSR     PC,$DB2D        ;CONVERT IT
5970  023024  004537  027556                    JSR     R5,REPLZ        ;TYPE $OPERC
5971  023030  000006                            .WORD   6               ;TYPE 6 DIGITS
5972  023032  104401  052716                    TYPE    ,LINSP          ;SPACES
5973  023036  062702  000004                    ADD     #4,R2           ;INCREMENT R2
5974  023042  010246                            MOV     R2,-(SP)        ;PUT $POSIT ON THE STACK
5975  023044  004737  033546                    JSR     PC,$DB2D        ;CONVERT IT
5976  023050  004537  027556                    JSR     R5,REPLZ        ;TYPE $POSIT
5977  023054  000006                            .WORD   6               ;TYPE 6 DIGITS
5978  023056  104401  052716                    TYPE    ,LINSP          ;SPACES
5979  023062  062702  000004                    ADD     #4,R2           ;INCREMENT R2
5980  023066  010246                            MOV     R2,-(SP)        ;PUT $TRANS ON THE STACK
5981  023070  004737  033546                    JSR     PC,$DB2D        ;CONVERT $TRANS
5982  023074  004537  027556                    JSR     R5,REPLZ        ;TYPE IT
5983  023100  000012                            .WORD   10.             ;TYPE 10 DIGITS
5984  023102  104401  052716                    TYPE    ,LINSP          ;SPACES
5985  023106  062702  000004                    ADD     #4,R2           ;INCREMENT R2
5986  023112  010246                            MOV     R2,-(SP)        ;PUT $READ ON THE STACK
5987  023114  004737  033546                    JSR     PC,$DB2D        ;CONVERT $READ
5988  023120  004537  027556                    JSR     R5,REPLZ        ;TYPE IT
5989  023124  000012                            .WORD   10.             ;TYPE 10 DIGITS
5990  023126  104401  052717                    TYPE    ,LINSPO         ;1 SPACE
5991  023132  062702  000004                    ADD     #4,R2           ;INCREMENT R2
5992  023136  062702  000002                    ADD     #2,R2           ;INCREMENT R2 AGAIN
5993  023142  012246                            MOV     (R2)+,-(SP)     ;PUT $SOFT ON THE STACK
5994  023144  004737  030246                    JSR     PC,$SB2D        ;CONVERT $SOFT
5995  023150  004537  027556                    JSR     R5,REPLZ        ;TYPEOUT $SOFT
5996  023154  000004                            .WORD   4               ;TYPE 4 DIGITS
5997  023156  104401  052717                    TYPE    ,LINSPO         ;SPACES
5998  023162  012246                            MOV     (R2)+,-(SP)     ;PUT $HARD ON THE STACK
5999  023164  004737  030246                    JSR     PC,$SB2D        ;CONVERT $HARD
6000  023170  004537  027556                    JSR     R5,REPLZ        ;TYPEOUT $HARD
6001  023174  000004                            .WORD   4               ;TYPE 4 DIGITS
6002  023176  104401  052717                    TYPE    ,LINSPO         ;SPACES
6003  023202  012246                            MOV     (R2)+,-(SP)     ;PUT $SKI ON THE STACK
```

```
 6004  023204  004737  030246          JSR     PC,$SB2D        ;CONVERT $SKI
 6005  023210  004537  027556          JSR     R5,REPLZ        ;TYPEOUT $SKI
 6006  023214  000004                  .WORD   4               ;TYPE 4 DIGITS
 6007  023216  104401  052717          TYPE    ,LINSPO         ;SPACES
 6008  023222  012246                  MOV     (R2)+,-(SP)     ;PUT $MISPO ON THE STACK
 6009  023224  004737  030246          JSR     PC,$SB2D        ;CONVERT $MISPO
 6010  023230  004537  027556          JSR     R5,REPLZ        ;TYPEOUT $MISPO
 6011  023234  000004                  .WORD   4               ;TYPE 4 DIGITS
 6012  023236  104401  052717          TYPE    ,LINSPO         ;SPACES
 6013  023242  016046  000056          MOV     $TOTAL(R0),-(SP) ;CALCULATE NUMBER OF OTHER ERRORS
 6014  023246  166016  000060          SUB     $SOFT(R0),(SP)  ;SUBTRACT $SOFT FROM $TOTAL
 6015  023252  166016  000062          SUB     $HARD(R0),(SP)  ;SUBTRACT $HARD FROM $TOTAL
 6016  023256  166016  000064          SUB     $SKI(R0),(SP)   ;SUBTRACT $SKI FROM $TOTAL
 6017  023262  166016  000066          SUB     $MISPO(R0),(SP) ;SUBTRACT $MISPO FROM $TOTAL
 6018  023266  004737  030246          JSR     PC,$SB2D        ;CONVERT 'OTHER' COUNT
 6019  023272  004537  027556          JSR     R5,REPLZ        ;TYPE IT
 6020  023276  000004                  .WORD   4               ;TYPE 4 DIGITS
 6021  023300  005726                  TST     (SP)+           ;CLEAR STACK
 6022  023302  000207                  RTS     PC
 6023
 6024
 6025
 6026                          ;ROUTINE TO INCREMENT $SOFT
 6027                          ;
 6028                          ;NOTE:  $SOFT WILL NOT BE INCREMENTED BEYOND 9999 (10)
 6029
 6030  023304  005737  001362  INCSOF: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
 6031  023310  001006                  BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
 6032  023312  026027  000060  023417  CMP     $SOFT(R0),#9999. ;IS $SOFT ALREADY AT MAXIMUM ?
 6033  023320  103002                  BHIS    1$              ;BR IF IT IS
 6034  023322  005260  000060          INC     $SOFT(R0)               ;INCREMENT $SOFT
 6035  023326  000207          1$:     RTS     PC              ;RETURN
 6036
 6037
 6038                          ;ROUTINE TO INCREMENT $HARD
 6039                          ;
 6040                          ;NOTE:  $HARD WILL NOT BE INCREMENTED BEYOND 9999 (10)
 6041
 6042  023330  005737  001362  INCHRD: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
 6043  023334  001006                  BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
 6044  023336  026027  000062  023417  CMP     $HARD(R0),#9999. ;IS $HARD ALREADY AT MAXIMUM ?
 6045  023344  103002                  BHIS    1$              ;BR IF IT IS
 6046  023346  005260  000062          INC     $HARD(R0)               ;INCREMENT $HARD
 6047  023352  000207          1$:     RTS     PC              ;RETURN
 6048
 6049
 6050                          ;ROUTINE TO INCREMENT $SKI
 6051                          ;
 6052                          ;NOTE:  $SKI WILL NOT BE INCREMENTED BEYOND 9999 (10)
 6053
 6054  023354  005737  001362  INCSKI: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
 6055  023360  001006                  BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
 6056  023362  026027  000064  023417  CMP     $SKI(R0),#9999. ;IS $SKI ALREADY AT MAXIMUM ?
 6057  023370  103002                  BHIS    1$              ;BR IF IT IS
 6058  023372  005260  000064          INC     $SKI(R0)                ;INCREMENT $SKI
 6059  023376  000207          1$:     RTS     PC              ;RETURN
```

```
                                        ;ROUTINE TO INCREMENT $MISPO
                                        ;
                                        ;NOTE:  $MISPO WILL NOT BE INCREMENTED BEYOND 9999 (10)

023400  005737  001362          INCMIS: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
023404  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
023406  026027  000066  023417          CMP     $MISPO(R0),#9999.  ;IS $MISPO ALREADY AT MAXIMUM ?
023414  103002                          BHIS    1$              ;BR IF IT IS
023416  005260  000066                  INC     $MISPO(R0)              ;INCREMENT $MISPO
023422  000207                  1$:     RTS     PC              ;RETURN

                                        ;ROUTINE TO INCREMENT $TOTAL
                                        ;
                                        ;NOTE:  $TOTAL WILL NOT BE INCREMENTED BEYOND 9999 (10)

023424  005737  001362          INCTOT: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
023430  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
023432  026027  000056  023417          CMP     $TOTAL(R0),#9999.  ;IS $TOTAL ALREADY AT MAXIMUM ?
023440  103002                          BHIS    1$              ;BR IF IT IS
023442  005260  000056                  INC     $TOTAL(R0)              ;INCREMENT $TOTAL
023446  000207                  1$:     RTS     PC              ;RETURN

                                        ;ROUTINE TO TYPE THE TIME

023450  005737  001310          $TIME:  TST     CLKFLG          ;CLOCK ON THE SYSTEM ?
023454  001033                          BNE     1$              ;BR IF NOT
023456  104401  001201                  TYPE    ,$CRLF          ;CR-LF
023462  013746  001364                  MOV     HOUR,-(SP)      ;PUT 'HOURS' ON THE STACK
023466  004737  030246                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023472  004537  027556                  JSR     R5,REPLZ        ;TYPE IT
023476  000002                          .WORD   2               ;TYPE 2 DIGITS
023500  104401  053766                  TYPE    ,COLON          ;':'
023504  013746  001366                  MOV     MINUTE,-(SP)    ;PUT 'MINUTES' ON THE STACK
023510  004737  030246                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023514  004537  027556                  JSR     R5,REPLZ        ;TYPE IT
023520  000002                          .WORD   2               ;TYPE 2 DIGITS
023522  104401  053766                  TYPE    ,COLON          ;':'
023526  013746  001370                  MOV     SECOND,-(SP)    ;PUT SECONDS ON THE STACK
023532  004737  030246                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023536  004537  027556                  JSR     R5,REPLZ        ;TYPE IT
023542  000002                          .WORD   2               ;TYPE 2 DIGITS
023544  000207                  1$:     RTS     PC

                                        ;CLOCK HANDLER ROUTINE

023546  005337  001372          CLOCK:  DEC     SIXTEE          ;INCREMENT THE 1/60 SECOND COUNTER
023552  001035                          BNE     1$              ;BR IF A SECOND NOT COUNTED
023554  013737  001312  001372          MOV     HZ,SIXTEE       ;RESTORE THE VALUE
023562  005237  001370                  INC     SECOND          ;COUNT THE SECOND
023566  022737  000074  001370          CMP     #60.,SECOND     ;AT MAXIMUM ?
023574  001024                          BNE     1$              ;BR IF NOT
023576  005037  001370                  CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
```

```
6116  023602  005237  001470            INC     INTRVL+2        ;COUNT THE PERFORMANCE SUMMARY INTERVAL
6117  023606  005237  001366            INC     MINUTE          ;COUNT THE MINUTE
6118  023612  022737  000074  001366    CMP     #60.,MINUTE     ;AT MAXIMUM ?
6119  023620  001012                    BNE     1$              ;BR IF NOT
6120  023622  005037  001366            CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
6121  023626  005237  001364            INC     HOUR            ;COUNT THE HOURS
6122  023632  022737  001747  001364    CMP     #999.,HOUR      ;AT MAXIMUM
6123  023640  103002                    BHIS    1$              ;BR IF NOT
6124  023642  005037  001364            CLR     HOUR            ;CLEAR THE HOURS
6125  023646  012746  000020      1$:   MOV     #20,-(SP)       ;1 MS ON THE STACK
6126  023652  004737  040576            JSR     PC,RPTMR        ;DRIVER TIMER ROUTINE
6127  023656  005737  001466            TST     INTRVL          ;DISPLAY THE PERFORMANCE SUMMARY ?
6128  023662  001411                    BEQ     2$              ;BR IF NOT
6129  023664  023737  001466  001470    CMP     INTRVL,INTRVL+2 ;DISPLAY INTERVAL FINISHED ?
6130  023672  001005                    BNE     2$              ;BR IF NOT
6131  023674  012737  177777  001314    MOV     #-1,STATIN      ;SET PERFORMANCE SUMMARY DISPLAY FLAG
6132  023702  005037  001470            CLR     INTRVL+2        ;CLEAR THE PERFORMANCE INTERVAL COUNTER
6133  023706  000002              2$:   RTI
6134
6135                                ;COMMAND DECODE ROUTINE
6136                                ;CALL:
6137                                ;       MOV     #-1,CFLAG       ;'CFLAG' IS NORMALLY SET BY THE TTY SERVICE
6138                                ;                               ;ROUTINE IN INTERRUPT MODE
6139                                ;       JSR     PC,KSR
6140                                ;       RETURN1                 ;SYSTEM BUSY RETURN
6141                                ;       RETURN2                 ;RETURN AFTER KEYBOARD SERVICED
6142
6143  023710  005737  001540      KSR:  TST     ORDERQ+16               ;ANY OPERATIONS ACTIVE ?
6144  023714  001402                    BEQ     KSR1
6145  023716  104401  054077            TYPE    ,BUSY           ;'SYSTEM BUSY...'
6146  023722  104412            KSR1:   SAVREG                  ;SAVE THE REGISTERS
6147  023724  012737  000200  177776    MOV     #PR4,PS         ;SET PRIORITY TO 4
6148  023732  005037  001360            CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6149  023736  004737  023450            JSR     PC,$TIME        ;TYPE THE TIME
6150  023742  005777  155214            TST     @$TKB           ;CLEAR ANY GARBAGE IN THE TTY BUFFER
6151  023746  104401  053612            TYPE    ,ENTCOM         ;'ENTER COMMANDS'
6152  023752  104411                    RDLIN                   ;READ THE KEYBOARD
6153  023754  012605                    MOV     (SP)+,R5        ;GET ADDRESS OF INPUT STRING
6154  023756  005737  001360            TST     CFLAG           ;CHECK THE CONTROL C FLAG
6155  023762  001116                    BNE     7$              ;EXIT IF 'CONTROL C' ENTERED
6156  023764  005205                    INC     R5              ;POINT TO SECOND CHARACTER
6157  023766  122715  000124            CMPB    #'T,(R5)        ;EQ TO A 'T' ?
6158  023772  001462                    BEQ     8$              ;YES
6159  023774  122715  000101            CMPB    #'A,(R5)        ;EQ TO AN 'A'
6160  024000  001410                    BEQ     1$              ;BR IF IT IS
6161  024002  121527  000067            CMPB    (R5),#'7        ;DRIVE NUMBER GREATER THAN AN ASCII 7 ?
6162  024006  101102                    BHI     6$              ;BR IF IT IS
6163  024010  121527  000060            CMPB    (R5),#'0        ;DRIVE NUMBER LESS THAN AN ASCII 0 ?
6164  024014  103477                    BLO     6$              ;BR IF IT IS
6165  024016  142715  177770            BICB    #^C7,(R5)       ;LEAVE ONLY LOWER 3 BITS IF CHAR NOT 'A'
6166  024022  122765  000124  177777  1$:   CMPB    #'T,-1(R5)      ;EQ TO 'T'
6167  024030  001003                    BNE     2$              ;BR IF NOT EQ
6168  024032  004737  024576            JSR     PC,NEWASN       ;ASSIGN DRIVE FOR TEST
6169  024036  000470                    BR      7$              ;EXIT
6170  024040  122765  000104  177777  2$:   CMPB    #'D,-1(R5)      ;EQ TO 'D' ?
6171  024046  001003                    BNE     3$              ;BR IF NOT EQ
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 6172  024050  004737  024606              JSR     PC,DEASGN       ;DEASSIGN DRIVE
 6173  024054  000461                      BR      7$              ;EXIT
 6174  024056  122765  000123  177777  3$: CMPB    #'S,-1(R5)      ;EQ TO 'S'
 6175  024064  001003                      BNE     4$              ;BR IF NOT EQ
 6176  024066  004737  024716              JSR     PC,SCMND        ;TYPE STATISTICS
 6177  024072  000452                      BR      7$              ;EXIT
 6178  024074  122765  000127  177777  4$: CMPB    #'W,-1(R5)      ;EQ TO 'W'
 6179  024102  001007                      BNE     5$              ;BR IF NOT EQ
 6180  024104  032777  000001  155042      BIT     #SW0,@SWR       ;IS SWITCH 0 SET ?
 6181  024112  001040                      BNE     6$              ;BR IF SET, CAN'T DO 'W' COMMAND
 6182  024114  004737  025150              JSR     PC,DATAPK       ;WRITE A DATA PACK
 6183  024120  000437                      BR      7$              ;EXIT
 6184  024122  122765  000122  177777  5$: CMPB    #'R,-1(R5)      ;EQ TO 'R' ?
 6185  024130  001031                      BNE     6$              ;BR IF NOT EQ
 6186  024132  004737  025200              JSR     PC,REDAPK       ;READ A DATA PACK
 6187  024136  000430                      BR      7$              ;EXIT
 6188  024140  122765  000127  177777  8$: CMPB    #'W,-1(R5)      ;WT COMMAND ?
 6189  024146  001022                      BNE     6$              ;NO
 6190  024150  122765  000101  000001      CMPB    #'A,1(R5)       ;ALL DRIVES ?
 6191  024156  001413                      BEQ     9$              ;YES
 6192  024160  126527  000001  000067      CMPB    1(R5),#'7       ;GREAT THAN 7
 6193  024166  101012                      BHI     6$              ;YES
 6194  024170  126527  000001  000000      CMPB    1(R5),#0        ;LESS THAN 0
 6195  024176  103406                      BLO     6$              ;YES
 6196  024200  142765  177770  000001      BICB    #^C7,1(R5)      ;CHOP OFF THE HIGHER BITS
 6197  024206  004737  025162          9$: JSR     PC,WATPAK       ;ASSIGN DRIVES WITH WT COMMAND
 6198  024212  000402                      BR      7$
 6199  024214  104401  053570          6$: TYPE    ,INVLD          ;TYPE 'INVALID COMMAND' MESSAGE
 6200  024220  104413                  7$: RESREG                  ;RESTORE R0 - R5
 6201  024222  005777  154734              TST     @$TKB           ;CLEAR THE TTY BUFFER
 6202  024226  052777  000100  154724      BIS     #BIT06,@$TKS    ;SET TTY INTERRUPT ENABLE
 6203  024234  005037  177776              CLR     PS              ;SET PRIORITY BACK TO ZERO
 6204  024240  000207                      RTS     PC              ;RETURN
 6205
 6206                          ;ROUTINE TO PROCESS THE ASSIGN REQUEST ('T', 'R', OR 'W' COMMANDS)
 6207
 6208  024242  122715  000101          ASSIGN: CMPB    #'A,(R5)        ;ASSIGN ALL DRIVES?
 6209  024246  001426                      BEQ     ASGN2           ;BR IF ALL DRIVES
 6210  024250  111504                  ASGN1: MOVB    (R5),R4         ;PUT DRIVE # IN R4
 6211  024252  012737  053026  026564      MOV     #UNTASN,ASNMSG  ;'DRIVE ASSIGNED' MESSAGE ADDRESS
 6212  024260  136437  034304  001544      BITB    ATABIT(R4),ASNLST  ;DRIVE ALREADY ASSIGNED ?
 6213  024266  001014                      BNE     2$              ;BR IF IT IS
 6214  024270  005704                      TST     R4              ;TRYING TO ASSIGN DRIVE 0 ?
 6215  024272  001007                      BNE     1$              ;BR IF NOT
 6216  024274  012737  053106  026564      MOV     #NOTAVL,ASNMSG  ;'NOT AVAILABLE' MESSAGE ADDRESS
 6217  024302  122737  000024  000041      CMPB    #24,41          ;SEE IF LOADED FROM AN RM03
 6218  024310  001403                      BEQ     2$              ;BR IF RM03 IS THE LOAD DEVICE
 6219  024312  004737  024406          1$: JSR     PC,ASGN3        ;SEE IF DRIVE ON THE SYSTEM
 6220  024316  000207                      RTS     PC              ;RETURN
 6221  024320  000137  026544          2$: JMP     ASNERR          ;EXIT ERROR
 6222  024324  122737  000024  000041  ASGN2: CMPB    #24,41          ;LOADED FROM AN RM03 ?
 6223  024332  001003                      BNE     1$              ;BR IF NOT
 6224  024334  012704  000001              MOV     #1,R4           ;START WITH DRIVE 1
 6225  024340  000401                      BR      2$              ;CONTINUE
 6226  024342  005004                  1$: CLR     R4              ;START WITH DRIVE 0
 6227  024344  012737  053026  026564  2$: MOV     #UNTASN,ASNMSG  ;ERROR MESSAGE
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6228  024352  136437  034304  001544          BITB    ATABIT(R4),ASNLST ;ALREADY ASSIGNED ?
6229  024360  001007                          BNE     4$              ;YES
6230  024362  004737  024406                  JSR     PC,ASGN3        ;ASSIGN THE DRIVE
6231  024366  005204                  3$:     INC     R4              ;INCREMENT DRIVE #
6232  024370  022704  000007                  CMP     #7,R4           ;ALL DRIVE CHECKED ?
6233  024374  002363                          BGE     2$              ;NO
6234  024376  000207                          RTS     PC              ;YES
6235  024400  004737  026544          4$:     JSR     PC,ASNERR       ;ERROR MESSAGE
6236  024404  000770                          BR      3$              ;TO LOOP
6237  024406  136437  034304  001544  ASGN3:  BITB    ATABIT(R4),ASNLST  ;DRIVE ALREADY ASSIGNED ?
6238  024414  001041                          BNE     ASGN4           ;BR IF IT IS
6239                          ;1$:    TST     DTUW            ;DATA TRANSFER UNDER WAY ?
6240                          ;       BPL     1$              ;BR IF IT IS
6241  024416  110437  045532                  MOVB    R4,GENDPB       ;DRIVE NUMBER
6242  024422  004737  014770                  JSR     PC,RECALO       ;RECALIBRATE DRIVE
6243  024426  105764  034170                  TSTB    DRVSTA(R4)      ;DRIVE AVAILABLE?
6244  024432  001440                          BEQ     ASGN7           ;BR IF DRIVE OFFLINE OR NONEXISTENT
6245  024434  100432                          BMI     ASGN6           ;BR IF DRIVE UNSAFE
6246  024436  006304                          ASL     R4              ;MAKE R4 INTO WORD INDEX
6247                          ;       MOV     BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
6248  024440  016400  002102                  MOV     BLKADR(R4),R0   ;PUT BLOCK'S ADDR INTO R0
6249  024444  004737  025212                  JSR     PC,CLRDPB       ;CLEAR BLOCK FOR DRIVE JUST ASSIGNED
6250  024450  004737  025412                  JSR     PC,DRVPRM       ;GET THE DRIVE'S ADDRESS LIMITS
6251  024454  004737  025654                  JSR     PC,GETID        ;GET DRIVE I.D.
6252  024460  004537  025764                  JSR     R5,GETADR       ;GET BAD SECTOR ADDRESSES
6253  024464  000414                          BR      2$              ;BRANCH IF RETRIEVE FAILS
6254  024466  016464  002102  001570          MOV     BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
6255  024474  012760  000001  000070          MOV     #1,$PASSC(R0)   ;PRESET PASS COUNT TO 1
6256  024502  005737  001316                  TST     PACK            ;WRITE DATA PACK ?
6257  024506  001403                          BEQ     2$              ;BR IF NOT
6258  024510  113760  001316  000026          MOVB    PACK,$PACK(R0)  ;SET READ/WRITE DATA PACK INDICATOR
6259  024516  006204                  2$:     ASR     R4              ;RESTORE DRIVE ADDRESS
6260  024520  000207                  ASGN4:  RTS     PC              ;RETURN
6261  024522  012737  053125  026564  ASGN6:  MOV     #NOTSAF,ASNMSG  ;'UNSAFE' MESSAGE ADDRESS
6262  024530  000137  026544                  JMP     ASNERR          ;TO ERROR ROUTINE
6263  024534  105764  034200          ASGN7:  TSTB    DRVTYP(R4)      ;DRIVE PRESENT?
6264  024540  001405                          BEQ     1$              ;BR IF NOT
6265  024542  100010                          BPL     2$              ;BR IF DRIVE OFFLINE
6266  024544  012737  053054  026564          MOV     #NOTRM,ASNMSG   ;ADDRESS OF 'NOT RM03' MSG
6267  024552  000407                          BR      3$              ;EXIT
6268  024554  012737  053071  026564  1$:     MOV     #NOTPRS,ASNMSG  ;ADDRESS OF 'NOT PRESENT' MSG
6269  024562  000403                          BR      3$              ;EXIT
6270  024564  012737  052763  026564  2$:     MOV     #UNTOFF,ASNMSG  ;ADDRESS OF 'DRIVE OFFLINE' MESSAGE
6271                          ;3$:    RTS     PC              ;ERROR RETURN
6272  024572  000137  026544          3$:     JMP     ASNERR          ;TO ERROR ROUTINE
6273
6274                  ;'T' COMMAND (ROUTINE TO ASSIGN A DRIVE)
6275
6276  024576  005037  001316  NEWASN: CLR     PACK            ;CLEAR 'W' COMMAND INDICATOR
6277  024602  000137  024242          JMP     ASSIGN          ;GO TO THE ASSIGN ROUTINE
6278
6279                  ;'D' COMMAND (ROUTINE TO DEASSIGN A DRIVE)
6280
6281  024606  005004  DEASGN: CLR     R4
6282  024610  012703  000010          MOV     #8.,R3          ;COUNTER
6283  024614  122715  000101          CMPB    #'A,(R5)        ;DEASSIGN ALL DRIVES ?
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6284  024620  001403                        BEQ     1$                      ;BR IF YES
6285  024622  012703  000001                MOV     #BIT00,R3               ;SET R3 FOR ONE UNIT
6286  024626  111504                        MOVB    (R5),R4                 ;GET DRIVE NUMBER
6287  024630  136437  034304  001544  1$:   BITB    ATABIT(R4),ASNLST       ;DRIVE ASSIGNED ?
6288  024636  001414                        BEQ     3$                      ;BR IF NOT
6289  024640  146437  034304  001544        BICB    ATABIT(R4),ASNLST       ;DELETE THE DRIVE FROM THE ASSIGNED LIST
6290  024646  006304                        ASL     R4                      ;MAKE ADDR INTO A WORD INDEX
6291  024650  016464  002102  001546        MOV     BLKADR(R4),DUNIT(R4)    ;PUT ADDRESS IN DEASSIGN LIST
6292  024656  006204                        ASR     R4
6293  024660  005303                  2$:   DEC     R3                      ;ANY MORE DRIVES ?
6294  024662  001412                        BEQ     4$                      ;BR IF NOT
6295  024664  005204                        INC     R4
6296  024666  000760                        BR      1$
6297  024670  012737  053004  026564  3$:   MOV     #UNTNOT,ASNMSG          ;ADDR OF 'NOT ASSIGNED' MESSAGE
6298  024676  004737  026544                JSR     PC,ASNERR               ;REPORT IT
6299  024702  122715  000101                CMPB    #'A,(R5)                ;ALL DRIVE ?
6300  024706  001764                        BEQ     2$                      ;YES
6301  024710  104401  001201            4$:  TYPE    ,$CRLF
6302  024714  000207                        RTS     PC
6303
6304                                  ;'S' COMMAND (ROUTINE TO TYPE DRIVE PERFORMANCE SUMMARY)
6305
6306  024716  005004                  SCMND:CLR     R4
6307  024720  012703  000010                MOV     #8.,R3                  ;COUNTER
6308  024724  122715  000101                CMPB    #'A,(R5)                ;ALL STATISTICS ?
6309  024730  001421                        BEQ     3$                      ;BR IF YES
6310  024732  111504                        MOVB    (R5),R4                 ;GET DRIVE NUMBER
6311  024734  136437  034304  001544        BITB    ATABIT(R4),ASNLST       ;SEE IF DRIVE ASSIGNED
6312  024742  001406                        BEQ     1$                      ;BR IF NOT
6313  024744  006304                        ASL     R4                      ;MAKE DRIVE ADDR INTO WORD INDEX
6314  024746  016400  002102                MOV     BLKADR(R4),R0           ;ADDR OF BLOCK
6315  024752  004737  022702                JSR     PC,TYPEST               ;TYPE DRIVE STATISTICS
6316  024756  000471                        BR      8$                      ;EXIT
6317  024760  012737  053004  026564  1$:   MOV     #UNTNOT,ASNMSG          ;ADDR OF 'NOT ASSIGNED' MSG
6318  024766  004737  026544                JSR     PC,ASNERR               ;TYPE ERROR MESSAGE
6319  024772  000463                        BR      8$                      ;EXIT
6320  024774  105737  001544            3$: TSTB    ASNLST                  ;ANY DRIVE ASSIGNED ?
6321  025000  001001                        BNE     4$                      ;YES
6322  025002  000457                        BR      8$                      ;RETURN
6323  025004  004737  022614            4$: JSR     PC,STATPR               ;TYPE ALL STATISTICS
6324  025010  105737  001320                TSTB    DATE                    ;SEE IF 'DATE' ENTERED
6325  025014  001404                        BEQ     11$                     ;BR IF NOT
6326  025016  104401  053770                TYPE    ,DATEIS                 ;'DATE: '
6327  025022  104401  001320                TYPE    ,DATE                   ;THE OPERATOR ENTERED DATE
6328  025026  105737  001332           11$: TSTB    OPERID                  ;SEE IF OPERATOR I.D. ENTERED
6329  025032  001404                        BEQ     12$                     ;BR IF NOT
6330  025034  104401  054001                TYPE    ,IDIS                   ;'OPERATOR I.D.: '
6331  025040  104401  001332                TYPE    ,OPERID                 ;THE OPERATOR I.D.
6332  025044  104401  054023           12$: TYPE    ,HEDLIN                 ;HEADER LINE
6333  025050  012737  042716  025116        MOV     #DRIVED+$DRVID,6$       ;DRIVE I.D. FIELD ADDRESS
6334  025056  136437  034304  001544  5$:   BITB    ATABIT(R4),ASNLST       ;SEE IF DRIVE ASSIGNED
6335  025064  001417                        BEQ     7$                      ;BR IF NOT ASSIGNED
6336  025066  010446                        MOV     R4,-(SP)                ;;SAVE R4 FOR TYPEOUT
6337                                                                        ;;TYPE DRIVE NUMBER
6338  025070  104403                        TYPOS                           ;;GO TYPE--OCTAL ASCII
6339  025072     002                        .BYTE   2                       ;;TYPE 2 DIGIT(S)
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6340  025073  000          .BYTE   0               ;;SUPPRESS LEADING ZEROS
6341  025074  104401 052714       TYPE    ,LIN4SP         ;4 SPACES
6342  025100  105777 000012       TSTB    @6$             ;SEE IF DRIVE I.D. ENTERED
6343  025104  001003             BNE     10$             ;BR IF DRIVE I.D. PRESENT
6344  025106  104401 054046       TYPE    ,NONE           ;TYPE 'NONE'
6345  025112  000404             BR      7$              ;CONTINUE
6346  025114  104401       10$:  TYPE                    ;TYPE THE DRIVE I.D.
6347  025116  000000       6$:   .WORD   0               ;ADDRESS OF DRIVE I.D. FIELD HERE
6348  025120  104401 001201       TYPE    ,$CRLF          ;CR-LF
6349  025124  005303       7$:   DEC     R3              ;DECREMENT THE COUNTER
6350  025126  003405             BLE     8$              ;BR IF AT END
6351  025130  062737 000304 025116 ADD     #$RMEC2+2,6$    ;INCREMENT THE MESSAGE FIELD ADDRESS
6352  025136  005204             INC     R4              ;INCREMENT DRIVE ADDRESS
6353  025140  000746             BR      5$              ;CONTINUE
6354  025142  104401 001201 8$:   TYPE    ,$CRLF          ;CR-LF
6355  025146  000207       9$:   RTS     PC
6356
6357                        ;'W' COMMAND (ROUTINE TO WRITE A DATA PACK)
6358
6359  025150  012737 177777 001316 DATAPK: MOV     #-1,PACK        ;SET THE 'W' COMMAND INDICATOR
6360  025156  000137 024242       JMP     ASSIGN          ;ASSIGN REQUESTED DRIVE
6361
6362                        ;'WT' COMMAND (TO WRITE A PACK AND FOLLOWED BY TEST PACK)
6363  025162  116515 000001 WATPAK: MOVB    1(R5),(R5)      ;ADJUST DRIVE NUMBER ADDRESS
6364  025166  012737 177776 001316       MOV     #-2,PACK        ;PACK WRITE COMMAND
6365  025174  000137 024242       JMP     ASSIGN          ;JUMP TO ASSIGN ROUTINE
6366                        ;'R' COMMAND (ROUTINE TO READ A DATA PACK)
6367
6368  025200  012737 000001 001316 REDAPK: MOV     #1,PACK         ;SET THE 'READ' INDICATOR
6369  025206  000137 024242       JMP     ASSIGN          ;ASSIGN THE REQUESTED DRIVE
6370
6371                        ;ROUTINE TO CLEAR THE DPB FOR THE ASSIGNED DRIVE
6372                        ;CALL:
6373                        ;       MOV     #DPB,R0         ;DPB ADDRESS
6374                        ;       JSR     PC,CLRDPB
6375                        ;       RETURN
6376
6377  025212             CLRDPB:
6378  025212  010146             MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6379  025214  010346             MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6380  025216  010446             MOV     R4,-(SP)        ;;PUSH R4 ON STACK
6381  025220  010546             MOV     R5,-(SP)        ;;PUSH R5 ON STACK
6382  025222  010004             MOV     R0,R4           ;GET THE DPB ADDRESS
6383  025224  062704 000002       ADD     #2,R4           ;ADDRESS OF FIRST LOCN TO BE CLEARED
6384  025230  012703 000005       MOV     #5,R3           ;NUMBER OF LOCNS TO BE CLEARED
6385  025234  005024       1$:   CLR     (R4)+           ;CLEAR THE LOCATION
6386  025236  005303             DEC     R3              ;DECREMENT THE COUNTER
6387  025240  001375             BNE     1$              ;BR IF NOT FINISHED
6388  025242  062704 000002       ADD     #2,R4           ;MOVE THE ADDRESS PAST THE 'REG' ADDR
6389  025246  012703 000070       MOV     #$NEXT-$REG,R3  ;NUMBER OF LOCNS TO BE CLEARED
6390  025252  005024       2$:   CLR     (R4)+           ;CLEAR
6391  025254  162703 000002       SUB     #2,R3           ;DECREMENT THE LOCN COUNTER
6392  025260  001374             BNE     2$              ;BR IF NOT FINISHED
6393  025262  062704 000014       ADD     #12.,R4         ;MOVE PAST ADDRESS LIMITS
6394  025266  012703 000162       MOV     #$RMEC2-MINSEC,R3  ;NUMBER OF LOCNS TO BE CLEARED
6395  025272  005024       3$:   CLR     (R4)+           ;CLEAR A LOCATION
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6396  025274  162703  000002          SUB     #2,R3           ;DECREMENT THE COUNTER
6397  025300  001374                  BNE     3$              ;BR IF NOT DONE
6398  025302  113760  001516  000024  MOVB    BEGCOD,$CODE(R0)  ;INITIAL COMMAND CODE
6399  025310  013701  001516          MOV     BEGCOD,R1       ;GET THE ACTUAL OP CODE
6400  025314  116160  002122  000002  MOVB    COMTBL(R1),$COMND(R0)  ;OPERATION CODE
6401  025322  113760  001514  000030  MOVB    BEGPAT,$PATTC(R0)  ;PATTERN CODE
6402  025330  106360  000030          ASLB    $PATTC(R0)      ;CONVERT CODE TO A TABLE INDEX
6403  025334  013760  001520  000020  MOV     BEGSIZ,$WRDL(R0)  ;BEGINNING RECORD SIZE
6404  025342  013760  001520  000004  MOV     BEGSIZ,$WRDM(R0)  ;VALUE FOR DATA TRANSFER
6405  025350  005460  000004          NEG     $WRDM(R0)       ;MAKE IT INTO 2'S COMPLEMENT
6406  025354  012760  000400  000022  MOV     #256.,$SSEC(R0)  ;INITIAL VALUE OF SECTOR SIZE
6407  025362  132760  000001  000024  BITB    #1,$CODE(R0)    ;HEADER ORDER ?
6408  025370  001403                  BEQ     4$              ;BR IF NOT
6409  025372  062760  000002  000022  ADD     #2,$SSEC(R0)    ;ADD HEADER SIZE TO SECTOR SIZE
6410  025400                  4$:
6411  025400  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
6412  025402  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
6413  025404  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
6414  025406  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
6415  025410  000207                  RTS     PC              ;RETURN
6416
6417                  ;ROUTINE TO GET ADDRESS LIMITS FROM THE OPERATOR
6418
6419  025412  010346          DRVPRM: MOV     R3,-(SP)        ;SAVE R3
6420  025414  010446                  MOV     R4,-(SP)        ;SAVE R4
6421  025416  005737  000042          TST     42              ;RUNNING UNDER MONITOR CONTROL
6422  025422  001024                  BNE     3$              ;BR IF YES
6423  025424  104401  053664          TYPE    ,ENTLMT         ;'ENTER ADDRESSES'
6424  025430  006204                  ASR     R4              ;CONVERT INDEX TO DRIVE NUMBER
6425  025432  010446                  MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6426                                                          ;;TYPE DRIVE NUMBER
6427  025434  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
6428  025436     002                  .BYTE   2               ;;TYPE 2 DIGIT(S)
6429  025437     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
6430  025440  104401  054474          TYPE    ,SLASH          ;'/'
6431  025444  012737  053155  025466  MOV     #RM03A,2$       ;ADDRESS OF 'RM03' MESSAGE
6432  025452  132764  000004  034200  BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
6433  025460  001001                  BNE     1$              ;BR IF YES
6434  025462  000000                  HALT                    ;NOT RM03 PROGRAM SHOULD NOT HAVE
6435                                                          ;REACHED THIS POINT
6436  025464  104401          1$:     TYPE                    ;TYPE THE MESSAGE WHICH FOLLOWS
6437  025466  000000          2$:     .WORD   0               ;MESSAGE ADDRESS
6438  025470  104401  001201          TYPE    ,$CRLF          ;CR-LF
6439  025474  012737  001465  001446  3$:     MOV     #821.,CYLIMT    ;ASSUME AN RM03
6440  025502  132764  000004  034200  BITB    #BIT02,DRVTYP(R4)  ;MAKE SURE RM03
6441  025510  001001                  BNE     4$              ;BR IF RM03
6442  025512  000000                  HALT                    ;HALT IF NOT
6443  025514  116460  034200  000262  4$:     MOVB    DRVTYP(R4),$RMDT(R0)    ;INITIATE $RMDT
6444  025522  062760  177777  000122  ADD     #-1,$FIRST(R0)  ;SEE IF FIRST TIME STARTED
6445  025530  103417                  BCS     5$              ;BR IF NOT
6446  025532  013760  001446  000106  MOV     CYLIMT,MAXCYL(R0)  ;LOAD MAXIMUM CYLINDER
6447  025540  005060  000110          CLR     MINCYL(R0)      ;CLEAR MINIMUM CYLINDER
6448  025544  013760  001444  000112  MOV     TRKLMT,MAXTRK(R0)  ;LOAD MAXIMUM TRACK
6449  025552  005060  000114          CLR     MINTRK(R0)      ;CLEAR MINIMUM TRACK
6450  025556  013760  001442  000116  MOV     SECLMT,MAXSEC(R0)  ;LOAD MAXIMUM SECTOR
6451  025564  005060  000120          CLR     MINSEC(R0)      ;CLEAR MINIMUM SECTOR
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6452  025570  006304                  5$:     ASL     R4              ;SETUP TO ADDRESS WORDS
6453  025572  016403  054710                  MOV     TABLE(R4),R3    ;PARAMETER TABLE ADDRESS
6454  025576  013763  001446  000002          MOV     CYLIMT,2(R3)    ;LOAD CYLINDER LIMIT FOR LAST CYLINDER
6455  025604  013763  001446  000010          MOV     CYLIMT,10(R3)   ;LOAD CYLINDER LIMIT FOR STARTING CYLINDER
6456  025612  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
6457  025616  001002                          BNE     6$              ;BR IF YES
6458  025620  004737  026420                  JSR     PC,PARENT       ;GET THE DRIVE'S PARAMETERS
6459  025624  116060  000120  000010  6$:     MOVB    MINSEC(R0),$SEC(R0)  ;INITIAL SECTOR VALUE
6460  025632  116060  000114  000011          MOVB    MINTRK(R0),$TRK(R0)  ;INITIAL TRACK VALUE
6461  025640  016060  000110  000012          MOV     MINCYL(R0),$CYL(R0)  ;INITIAL CYLINDER VALUE
6462  025646  012604                          MOV     (SP)+,R4        ;RESTORE R4
6463  025650  012603                          MOV     (SP)+,R3        ;RESTORE R3
6464  025652  000207                          RTS     PC              ;RETURN
6465
6466                                  ;ROUTINE TO GET THE DRIVE I.D. FROM THE OPERATOR
6467
6468  025654  010546                  GETID:  MOV     R5,-(SP)        ;SAVE R5
6469  025656  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
6470  025662  001036                          BNE     2$              ;BR IF NOT
6471  025664  005037  001360          1$:     CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6472  025670  104401  053637                  TYPE    ,ENTDRV         ;'ENTER DRV I.D.: '
6473  025674  005046                          CLR     -(SP)           ;CLEAR THE STACK
6474  025676  111016                          MOVB    (R0),(SP)       ;PUT THE DRIVE NUMBER ON THE STACK
6475  025700  104403                          TYPOS                   ;TYPE THE DRIVE NUMBER
6476  025702     002                          .BYTE   2               ;TYPE 2 DIGITS
6477  025703     000                          .BYTE   0               ;SUPRESS LEADING ZEROS
6478  025704  104401  001201                  TYPE    ,$CRLF          ;CR-LF
6479  025710  104411                          RDLIN                   ;READ THE ENTRY
6480  025712  012605                          MOV     (SP)+,R5        ;GET THE ENTRY ADDRESS
6481  025714  005737  001360                  TST     CFLAG           ;'CONTROL C' ENTERED ?
6482  025720  001361                          BNE     1$              ;BR IF IT WAS
6483  025722  121527  000056                  CMPB    (R5),#'.        ;PERIOD ENTERED ?
6484  025726  001414                          BEQ     2$              ;BR IF YES
6485  025730  112560  000224                  MOVB    (R5)+,$DRVID(R0)  ;STORE THE I.D.
6486  025734  112560  000225                  MOVB    (R5)+,$DRVID+1(R0)  ;STORE THE I.D.
6487  025740  112560  000226                  MOVB    (R5)+,$DRVID+2(R0)  ;STORE THE I.D.
6488  025744  112560  000227                  MOVB    (R5)+,$DRVID+3(R0)  ;STORE THE I.D.
6489  025750  112560  000230                  MOVB    (R5)+,$DRVID+4(R0)  ;STORE THE I.D.
6490  025754  112560  000231                  MOVB    (R5)+,$DRVID+5(R0)  ;STORE THE I.D.
6491  025760  012605                  2$:     MOV     (SP)+,R5        ;RESTORE R5
6492  025762  000207                          RTS     PC              ;RETURN
6493
6494                                  ;ROUTINE TO GET THE ADDRESSES OF ANY BAD SECTORS (UP TO A MAX OF 16)
6495                                  ;CALL SEQ
6496                                  ;       JSR     R5,GETADR
6497                                  ;       RET1                    ERROR RET
6498                                  ;       RET2                    NORMAL RET
6499                                  ;
6500                                  ;R0 DPB ADDRESS
6501
6502  025764                          GETADR:
6503  025764  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6504  025766  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6505  025770  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6506  025772  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
6507  025774  010001                          MOV     R0,R1           ;DPB ADDRESS
```

```
6508  025776  062701  000124                ADD     #$BDSEC,R1      ;ADDRESS OF BAD SECTOR TABLE
6509  026002  012702  000040                MOV     #32.,R2         ;WORD CTR
6510  026006  012721  177777        1$:     MOV     #-1,(R1)+       ;INITIALIZE ALL LOCS TO -1
6511  026012  005302                        DEC     R2              ;DECREMENT WORD CTR
6512  026014  001374                        BNE     1$              ;BRANCH IF NOT DONE
6513  026016  112737  000171  045534        MOVB    #RDDAT,GENDPB+$COMND  ;READ DATA COMMAND
6514  026024  012737  001466  045544        MOV     #822.,GENDPB+$CYL     ;LAST CYLINDER
6515  026032  112737  000004  045543        MOVB    #4,GENDPB+$TRK        ;LAST TRACK
6516  026040  012737  177400  045536        MOV     #-256.,GENDPB+$WRDM   ;ONE SECTOR WORD CTR
6517  026046  111037  045532                MOVB    (R0),GENDPB           ;DRIVE NUMBER
6518  026052  005037  001264                CLR     $CDW1                 ;ERROR FLAG
6519  026056  005046                        CLR     -(SP)                 ;DUMMY PAIR
6520  026060  005046                        CLR     -(SP)                 ;DUMMY PAIR
6521  026062  012746  000012                MOV     #12,-(SP)             ;STARTING SECTOR 10.
6522  026066  012746  000036                MOV     #30.,-(SP)            ;LAST SECTOR
6523  026072  012737  000010  001266        MOV     #10,$CDW2             ;LAST SECTOR
6524  026100  105037  045542                CLRB    GENDPB+$SEC           ;STARTING SECTOR
6525  026104  004037  035040        2$:     JSR     R0,RM03               ;READ CURRENT SECTOR
6526  026110  045532                        GENDPB                        ;BRANCH IF QUEUE FAILS
6527  026112  000774                        BR      2$                    ;
6528  026114  005737  045550        3$:     TST     GENDPB+$STATUS  ;DONE YET ?
6529  026120  001775                        BEQ     3$                    ;BRANCH IF NOT
6530  026122  100013                        BPL     4$                    ;BRANCH IF DONE WITHOUT ERROR
6531  026124  062737  000002  045542        ADD     #2,GENDPB+$SEC        ;INCREMENT TO NEXT 2ND SECTOR
6532  026132  123737  001266  045542        CMPB    $CDW2,GENDPB+$SEC     ;ALL SECTORS ARE TRIED ?
6533  026140  103361                        BHIS    2$                    ;BRANCH IF NOT
6534  026142  052737  000001  001264        BIS     #BIT0,$CDW1           ;FLAG-RETRIEVE FAILS
6535  026150  000451                        BR      9$                    ;NEXT SETS
6536  026152  010001                4$:     MOV     R0,R1                 ;BAD SECTOR TABLE
6537  026154  062701  000124                ADD     #$BDSEC,R1            ;BAD SECTOR TABLE ADDRESS
6538  026160  012702  000040                MOV     #32.,R2               ;WORD CTR OF BAD SECTOR TABLE
6539  026164  012703  056150                MOV     #CYLDER,R3            ;BUFFER ADDRESS
6540  026170  062703  000010                ADD     #10,R3                ;STARTS AT THE 5TH WORD
6541  026174  012704  000374                MOV     #252.,R4              ;WORD CTR FOR BAD SPOT FILE
6542  026200  022713  177777        5$:     CMP     #-1,(R3)              ;END OF BAD SPOT FILE ?
6543  026204  001433                        BEQ     9$                    ;BRANCH IF SO
6544  026206  022711  177777        6$:     CMP     #-1,(R1)              ;ENTRY OF THE TABLE ?
6545  026212  001406                        BEQ     7$                    ;BRANCH IF SO
6546  026214  062701  000004                ADD     #4,R1                 ;ADJUST TABLE ENTRY
6547  026220  162702  000002                SUB     #2,R2                 ;DECREMENT WORD CTR
6548  026224  002420                        BLT     8$                    ;OVER 16 BAD SECTOR DETECTED
6549  026226  000767                        BR      6$                    ;LOOP BACK
6550  026230  011311                7$:     MOV     (R3),(R1)             ;LOAD THE TABLE
6551  026232  016361  000002  000002        MOV     2(R3),2(R1)           ;TRK AND SECTOR
6552  026240  162704  000002                SUB     #2,R4                 ;DECREMENT WORD CTR FOR FILE
6553  026244  003413                        BLE     9$                    ;BRANCH IF DONE
6554  026246  062703  000004                ADD     #4,R3                 ;ADJUST FILE ADDRESS
6555  026252  162702  000002                SUB     #2,R2                 ;DECREMENT TABLE WORD CTR
6556  026256  003403                        BLE     8$                    ;TABLE ENTRY EXHAUSTED
6557  026260  062701  000004                ADD     #4,R1                 ;ADJUST TABLE ENTRY
6558  026264  000745                        BR      5$                    ;LOOP BACK
6559  026266  052737  000002  001264  8$:   BIS     #BIT1,$CDW1           ;ERROR FLAG-OVER 16 BAD SECTORS
6560  026274  012637  001266        9$:     MOV     (SP)+,$CDW2           ;UPDATE LAST SECTOR
6561  026300  112637  045542                MOVB    (SP)+,GENDPB+$SEC     ;STARTING SECTOR
6562  026304  001277                        BNE     2$                    ;BRANCH IF NOT DUMMY PAIR
6563  026306  032737  000001  001264        BIT     #BIT0,$CDW1           ;RETRIEVE FAILS ?
```

```
6564  026314  001412                        BEQ     10$                     ;BRANCH IF NOT
6565  026316  104401  054233                TYPE    ,MERR1                  ;FAILS TO RETRIEVE BAD SPOT FILE
6566  026322  104401  052755                TYPE    ,UNTMSG                 ;ON DRIVE
6567  026326  111046                        MOVB    (R0),-(SP)              ; #
6568  026330  104403                        TYPOS
6569  026332     002                        .BYTE   2
6570  026333     000                        .BYTE   0
6571  026334  104401  001201                TYPE    ,$CRLF                  ;CR-LF
6572  026340  000415                        BR      11$                     ;EXIT
6573  026342  032737  000002  001264  10$:  BIT     #BIT1,$CDW1             ;OVER 16 BAD SECTORS ?
6574  026350  001411                        BEQ     11$                     ;BRANCH IF NOT
6575  026352  104401  054301                TYPE    ,MERR2                  ;OVER 16 BAD SECTORS DETECTED
6576  026356  104401  052755                TYPE    ,UNTMSG                 ;ON DRIVE
6577  026362  111046                        MOVB    (R0),-(SP)      ;
6578  026364  104403                        TYPOS
6579  026366     002                        .BYTE   2
6580  026367     000                        .BYTE   0
6581  026370  104401  001201                TYPE    ,$CRLF
6582  026374  005737  001264          11$:  TST     $CDW1                   ;ERROR FLAG SET ?
6583  026400  001002                        BNE     12$                     ;BRANCH IS SET
6584  026402  062705  000002                ADD     #2,R5                   ;ADJUST FOR NORMAL RET
6585  026406                          12$:
6586  026406  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
6587  026410  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
6588  026412  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
6589  026414  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
6590  026416  000205                        RTS     R5                      ;EXIT
6591
6592                                  ;PARAMETER ENTRY ROUTINE
6593                                  ;CALL
6594                                  ;       MOV     #ADR,R3         ;PARAMETER TABLE ADDRESS
6595                                  ;       JSR     PC,PARENT       ;GET THE PARAMETERS
6596
6597  026420  010346                  PARENT: MOV     R3,-(SP)        ;SAVE THE PARAMETER TABLE ADDRESS
6598  026422  005037  001360                  CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6599  026426  012337  026436          1$:     MOV     (R3)+,3$        ;ADDRESS OF PARAMETER NAME
6600  026432  001442                        BEQ     9$              ;BR IF AT END OF TABLE
6601  026434  104401                        TYPE                    ;TYPE THE PARAMETER NAME
6602  026436  000000                  3$:     .WORD   0               ;ADDRESS OF PARAMETER NAME TEXT
6603  026440  012302                        MOV     (R3)+,R2        ;MAXIMUM PARAMETER VALUE
6604  026442  012305                        MOV     (R3)+,R5        ;ADDRESS OF PARAMETER
6605  026444  011546                        MOV     (R5),-(SP)      ;CURRENT VALUE OF PARAMETER
6606  026446  104405                        TYPDS                   ;TYPE THE CURRENT VALUE OF THE PARAMETER
6607  026450  104401  054474                TYPE    ,SLASH          ;' /'
6608  026454  104411                        RDLIN                   ;READ THE KEYBOARD
6609  026456  012601                        MOV     (SP)+,R1        ;INPUT ASCII STRING ADDRESS
6610  026460  005737  001360                TST     CFLAG           ;'CONTROL C' ENTERED ?
6611  026464  001021                        BNE     8$              ;BR IF IT WAS
6612  026466  004537  030110                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
6613  026472  026426                        1$                      ;CARRIAGE RETURN ONLY ENTERED
6614  026474  026540                        9$                      ;PERIOD ONLY ENTERED
6615  026476  026512                        6$                      ;ILLEGAL INPUT
6616  026500  026506                        5$                      ;TERMINATED WITH A CARRIAGE RETURN
6617  026502  026512                        6$                      ;TERMINATED WITH A "."
6618  026504  026524                        7$                      ;TERMINATED WITH A "'"
6619  026506  010215                  5$:     MOV     R2,(R5)         ;MOVE NEW VALUE TO PARAMETER LOCATION
```

```
6620  026510  000746                        BR      1$                ;GET MORE PARAMETERS
6621  026512  104401  054055        6$:     TYPE    ,BADENT           ;'BAD ENTRY'
6622  026516  162703  000006              SUB     #6,R3             ;DECREMENT THE TABLE POINTER
6623  026522  000741                        BR      1$                ;TRY AGAIN
6624  026524  010215                7$:     MOV     R2,(R5)           ;NEW VALUE
6625  026526  000404                        BR      9$                ;EXIT
6626  026530  005037  001360        8$:     CLR     CFLAG             ;CLEAR THE 'CONTROL C' FLAG
6627  026534  011603                        MOV     (SP),R3           ;RELOAD THE PARAMETER TABLE ADDRESS
6628  026536  000733                        BR      1$                ;TRY AGAIN
6629  026540  005726                9$:     TST     (SP)+             ;CORRECT THE STACK POINTER
6630  026542  000207                        RTS     PC                ;RETURN
6631
6632                                ;TYPEOUT ASSIGN/DEASSIGN ERROR MESSAGE
6633                                ;CALL
6634                                ;       MOV     #MESADR,ASNMSG    ;ERROR MESSAGE ADDRESS
6635                                ;       JSR     PC,ASNERR
6636                                ;       RETURN
6637
6638  026544  104401  053566        ASNERR: TYPE    ,QUES             ;QUESTION MARK
6639  026550  104401  052755                TYPE    ,UNTMSG           ;TYPE 'DRIVE'
6640  026554  010446                        MOV     R4,-(SP)          ;;SAVE R4 FOR TYPEOUT
6641                                                                  ;;TYPE DRIVE NUMBER
6642  026556  104403                        TYPOS                     ;;GO TYPE--OCTAL ASCII
6643  026560     002                        .BYTE   2                 ;;TYPE 2 DIGIT(S)
6644  026561     000                        .BYTE   0                 ;;SUPPRESS LEADING ZEROS
6645  026562  104401                        TYPE                      ;TYPE SPECIFIC MESSAGE
6646  026564  000000        ASNMSG: .WORD   0                         ;MESSAGE ADDRESS
6647  026566  104401  001201                TYPE    ,$CRLF
6648  026572  000207                        RTS     PC
6649
6650                                ;DEASSIGN DRIVE IF A FATAL ERROR OCCURS
6651                                ;CALL
6652                                ;       JSR     PC,DROP
6653                                ;       RETURN
6654
6655  026574  005004        DROP:   CLR     R4                ;CLEAR R4 FOR DRIVE NUMBER
6656  026576  111004                MOVB    (R0),R4           ;MOVE DRIVE NUMBER TO R4
6657  026600  146437  034304  001544        BICB    ATABIT(R4),ASNLST  ;REMOVE DRIVE FROM ASSIGNED LIST
6658  026606  006304                ASL     R4                ;MAKE DRIVE NUMBER INTO A TABLE INDEX
6659  026610  010064  001546        MOV     R0,DUNIT(R4)      ;PUT DRIVE IN DROP LIST
6660  026614  104401  001201        TYPE    ,$CRLF
6661  026620  104401  001201        TYPE    ,$CRLF
6662  026624  104401  053341        TYPE    ,DROPNG           ;TYPE 'DROPPING DRIVE'
6663  026630  104401  053452        TYPE    ,DRNUM            ;'DRIVE #'
6664  026634  006204                ASR     R4                ;DRIVE NUMBER
6665  026636  010446                MOV     R4,-(SP)          ;;SAVE R4 FOR TYPEOUT
6666                                                          ;;TYPE DRIVE NUMBER
6667  026640  104403                TYPOS                     ;;GO TYPE--OCTAL ASCII
6668  026642     002                .BYTE   2                 ;;TYPE 2 DIGIT(S)
6669  026643     000                .BYTE   0                 ;;SUPPRESS LEADING ZEROS
6670  026644  104401  001201        TYPE    ,$CRLF
6671  026650  105737  001544        TSTB    @SNLST            ;MORE DRIVES ACTIVE
6672  026654  001006                BNE     1$                ;YES
6673  026656  005737  000042        TST     @#42              ;ANY MONITOR ?
6674  026662  001403                BEQ     1$                ;NO
6675  026664  005726                TST     (SP)+             ;CLEAR STACK
```

```
6676  026666  000137  027250                JMP     $GET42          ;GIVE CONTROL TO MONITOR
6677  026672  000207                  1$:   RTS     PC
6678
6679                                  ;ROUTINE TO DEASSIGN DRIVE IF ERRORS BECOMES EXCESSIVE
6680
6681  026674  032777  000020  152252  ABNRML: BIT     #SW04,@SWR      ;SEE IF SWITCH 4 SET
6682  026702  001006                        BNE     1$              ;BR IF IT'S SET
6683  026704  023760  001464  000056        CMP     MAXER,$TOTAL(R0)  ;CHECK TOTAL ERROR VALUE
6684  026712  103002                        BHIS    1$              ;BR IF ERRORS DONOT EXCEED MAX
6685  026714  000137  026574                JMP     DROP            ;DEASSING THE DRIVE
6686  026720  000207                  1$:   RTS     PC              ;RETURN
6687
6688                                  ;ROUTINE TO CHECK FOR END OF PASS AND END OF TEST
6689
6690                                  .SBTTL  END OF PASS ROUTINE
6691
6692                                  ;;*****************************************************************
6693                                  ;*INCREMENT THE PASS NUMBER ($PASS)
6694                                  ;*IF THERES A MONITOR GO TO IT
6695                                  ;*IF THERE ISN'T JUMP TO FISK
6696
6697  026722                          $EOP:
6698  026722  005737  001506          EOP:   TST     ENDET           ;END OF PASS DETERMINED BY SEEKS OR WORDS ?
6699  026726  001412                        BEQ     EOP1            ;BR IF SEEKS
6700  026730  026037  000054  001452        CMP     $READ+2(R0),ENDCON+2  ;CHECK MSW OF WORDS READ COUNT
6701  026736  101017                        BHI     EOP2            ;BR IF MSW GREATER THAN LIMIT
6702  026740  103527                        BLO     EOPX            ;BR IF MSW LESS THAN LIMIT
6703  026742  026037  000052  001450        CMP     $READ(R0),ENDCON  ;CHECK LSW AGAINST LIMIT
6704  026750  103012                        BHIS    EOP2            ;BR IF EQUAL OR GREATER
6705  026752  000522                        BR      EOPX            ;EXIT
6706  026754  026037  000044  001456  EOP1: CMP     $POSIT+2(R0),ENDSEK+2  ;CHECK MSW OF SEEK COUNT
6707  026762  101005                        BHI     EOP2            ;BR IF MSW GREATER THAN LIMIT
6708  026764  103515                        BLO     EOPX            ;EXIT IF MSW LESS THAN LIMIT
6709  026766  026037  000042  001454        CMP     $POSIT(R0),ENDSEK  ;CHECK LSW OF SEEK COUNT
6710  026774  103511                        BLO     EOPX            ;EXIT IF LSW LESS THAN LIMIT
6711  026776  104401  001201          EOP2: TYPE    ,$CRLF          ;CR-LF
6712  027002  104401  053375                TYPE    ,ENDPAS         ;END OF PASS FOR THE DRIVE
6713  027006  016046  000070                MOV     $PASSC(R0),-(SP)  ;PUT PASS COUNT ON THE STACK
6714  027012  104405                        TYPDS                   ;CONVERT PASS COUNT TO DECIMAL AND TYPE IT
6715  027014  111037  001344                MOVB    (R0),UNIT       ;STORE THE DRIVE NUMBER
6716  027020  032777  000020  152126        BIT     #SW04,@SWR      ;SWITCH 4 SET ?
6717  027026  001017                        BNE     1$              ;BR IF SET
6718  027030  026037  000070  001460        CMP     $PASSC(R0),PASCNT  ;SEE IF AT END OF TEST
6719  027036  103413                        BLO     1$              ;BR IF NOT
6720  027040  104401  053411                TYPE    ,ENDTST         ;TYPE 'END OF TEST'
6721  027044  104401  053452                TYPE    ,DRNUM          ;'DRIVE #'
6722  027050  013746  001344                MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
6723                                                                ;;TYPE DRIVE NUMBER
6724  027054  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
6725  027056     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
6726  027057     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
6727  027060  104401  001201                TYPE    ,$CRLF          ;CR-LF
6728  027064  000431                        BR      3$              ;DEASSIGN THE DRIVE
6729  027066  104401  053452          1$:   TYPE    ,DRNUM          ;'DRIVE #'
6730  027072  013746  001344                MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
6731                                                                ;;TYPE DRIVE NUMBER
```

```
6732  027076  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
6733  027100  002                           .BYTE   2               ;;TYPE 2 DIGIT(S)
6734  027101  000                           .BYTE   0               ;;SUPPRESS LEADING ZEROS
6735  027102  104401  001201                TYPE    ,$CRLF          ;CR-LF
6736  027106  004737  022702                JSR     PC,TYPEST       ;TYPE THE DRIVE'S STATISTICS
6737  027112  010346                        MOV     R3,-(SP)        ;SAVE R3
6738  027114  010446                        MOV     R4,-(SP)        ;SAVE R4
6739  027116  010004                        MOV     R0,R4           ;DRIVE'S BLOCK ADDRESS
6740  027120  062704  000036                ADD     #$OPERC,R4      ;ADD THE STARTING ADDR OF SECTIONS TO CLEAR
6741  027124  012703  000010                MOV     #8.,R3          ;NUMBER OF LOCNS TO BE CLEARED
6742                                                                ;(ERROR COUNTERS NOT CLEARED)
6743  027130  005024                2$:     CLR     (R4)+           ;CLEAR THE LOCN
6744  027132  005303                        DEC     R3              ;DECREMENT THE LOCATION COUNTER
6745  027134  001375                        BNE     2$              ;BR IF MORE TO GO
6746  027136  012604                        MOV     (SP)+,R4        ;RESTORE R4
6747  027140  012603                        MOV     (SP)+,R3        ;RESTORE R3
6748  027142  005260  000070                INC     $PASSC(R0)      ;INCREMENT THE PASS COUNT
6749  027146  000424                        BR      EOPX            ;EXIT
6750  027150  104401  001201        3$:     TYPE    ,$CRLF
6751  027154  005004                        CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
6752  027156  111004                        MOVB    (R0),R4         ;MOVE DRIVE NUMBER
6753  027160  146437  034304  001544        BICB    ATABIT(R4),ASNLST  ;DELETE DRIVE FROM ASSIGNED LIST
6754  027166  006304                        ASL     R4              ;MAKE DRIVE NUMBER INTO TABLE INDEX
6755  027170  010064  001546                MOV     R0,DUNIT(R4)    ;PUT BLOCK ADDRESS INTO DROP LIST
6756  027174  105737  001544                TSTB    ASNLST          ;ALL DRIVES ARE DESIGNED ?
6757  027200  001007                        BNE     EOPX            ;BRANCH IF NOT
6758  027202  005237  001214                INC     $DEVCT          ;INCREMENT DEVICE COUNT
6759  027206  005237  001212                INC     $PASS           ;INCREMENT THE PASS NUMBER FOR APT
6760  027212  042737  100000  001212        BIC     #100000,$PASS   ;AVIOD NEGATIVE NUMBER
6761  027220  000207                EOPX:   RTS     PC              ;RETURN
6762  027222  005237  001212                INC     $PASS           ;;INCREMENT THE PASS NUMBER
6763  027226  042737  100000  001212        BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
6764  027234  005327                        DEC     (PC)+           ;;LOOP?
6765  027236  000001                $EOPCT: .WORD   1
6766  027240  003013                        BGT     $DOAGN          ;;YES
6767  027242  012737                        MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
6768  027244  000001                $ENDCT: .WORD   1
6769  027246  027236                        $EOPCT
6770  027250  013700  000042        $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
6771  027254  001405                        BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
6772  027256  000005                        RESET                   ;;CLEAR THE WORLD
6773  027260  004710                $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
6774  027262  000240                        NOP                     ;;SAVE ROOM
6775  027264  000240                        NOP                     ;;FOR
6776  027266  000240                        NOP                     ;;ACT11
6777  027270                        $DOAGN:
6778  027270  000137                        JMP     @(PC)+          ;;RETURN
6779  027272  027274                $RTNAD: .WORD   FISK
6780  027274  005237  001210        FISK:   INC     $TESTN          ;INCREMENT THE TEST NUMBER IN THE MAIL BOX
6781  027300  000137  005524                JMP     MAIN1           ;RETURN TO LOOP
6782
6783                                ;ROUTINE TO GET THE REMAINDER OF THE RANDOM NUMBER
6784                                ;CALL
6785                                ;       MOV     NUMBER,R5       ;DIVISOR INTO R5
6786                                ;       JSR     PC,GETREM
6787                                ;       RETURN                  ;REMAINDER IS IN R5
```

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 6788
 6789  027304  013746  033450          GETREM: MOV     $LONUM,-(SP)    ;STORE RANDOM NUMBER ON THE STACK FOR DIVIDE
 6790  027310  013746  033446                  MOV     $HINUM,-(SP)    ;UPPER PART
 6791  027314  010546                          MOV     R5,-(SP)        ;PUT THE DIVISOR ONTO THE STACK
 6792  027316  004737  027332                  JSR     PC,LINKDV       ;DIVIDE THE RANDOM NUMBERS
 6793  027322  012605                          MOV     (SP)+,R5        ;PUT THE REMAINDER INTO R5
 6794  027324  005726                          TST     (SP)+           ;ADJUST THE STACK POINTER
 6795  027326  000240                          NOP                     ;FOR DEBUGGING HALT
 6796  027330  000207                          RTS     PC
 6797
 6798                                  ;LINK ROUTINE TO THE DIVISION UTILITY SUBROUTINE
 6799                                  ;       THIS ROUTINE ALLOWS THE 'SYSMAC' DIVIDE ROUTINE
 6800                                  ;       CALLING SEQUENCE TO BE USED
 6801
 6802  027332  104412                  LINKDV: SAVREG                  ;STORE R0 - R5
 6803  027334  016605  000026                  MOV     26(SP),R5       ;DIVISOR
 6804  027340  005004                          CLR     R4              ;OTHER DIVISOR WORD
 6805  027342  016602  000030                  MOV     30(SP),R2       ;UPPER DIVIDEND WORD
 6806  027346  016603  000032                  MOV     32(SP),R3       ;LOWER DIVIDEND WORD
 6807  027352  005000                          CLR     R0              ;CLEAR OTHER DIVIDEND REGISTERS
 6808  027354  005001                          CLR     R1
 6809  027356  004737  027400                  JSR     PC,M.DPID       ;GO TO THE DIVIDE ROUTINE
 6810  027362  010166  000030                  MOV     R1,30(SP)       ;REMAINDER ON THE STACK
 6811  027366  010366  000032                  MOV     R3,32(SP)       ;QUOTIENT ON THE STACK
 6812  027372  104413                          RESREG                  ;RESTORE R0 - R5
 6813  027374  012616                          MOV     (SP)+,(SP)      ;MOVE RETURN UP THE STACK
 6814  027376  000207                          RTS     PC
 6815
 6816                                  ;       DIVISION UTILITY SUBROUTINE
 6817                                  ;       R0-R1-R2-R3=DIVIDEND
 6818                                  ;       R4-R5=DIVISOR
 6819                                  ;       R0-R1=REMAINDER AFTER DIVISION
 6820                                  ;       R2-R3=QUOTIENT AFTER DIVISION
 6821                                  ;       ENTER WITH JSR  PC,M.DPID
 6822                                  ;
 6823  027400  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 6824  027404  010446                          MOV     R4,-(SP)        ;HIGH ORDER
 6825  027406  010546                          MOV     R5,-(SP)        ;LOW ORDER DIVISOR TO THE STACK
 6826  027410  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
 6827  027414  005416                          NEG     @SP             ;VERSION OF THE DIVISOR
 6828  027416  005666  000002                  SBC     2(SP)
 6829  027422  061601                          ADD     @SP,R1
 6830  027424  005500                          ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
 6831  027426  066600  000002                  ADD     2(SP),R0
 6832  027432  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
 6833  027434  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
 6834  027436  006103          M.DP40: ROL     R3
 6835  027440  006102                  ROL     R2
 6836  027442  006101                  ROL     R1
 6837  027444  006100                  ROL     R0
 6838  027446  005716                  TST     @SP             ;TEST "CARRY" INDICATOR
 6839  027450  001410                  BEQ     M.DP41          ;IF NO "CARRY" THEN ADD ELSE SUBTRACT
 6840  027452  005016                  CLR     @SP             ;CLEAR UP FOR NEXT TIME
 6841  027454  066601  000002                  ADD     2(SP),R1
 6842  027460  005500                          ADC     R0              ;ADD -(DIVISOR)
 6843  027462  005516                          ADC     @SP     ;  I    ;SET "CARRY"
```

```
6844  027464  066600  000004            ADD     4(SP),R0;<-
6845  027470  000404                    BR      M.DP42
6846  027472  060501            M.DP41: ADD     R5,R1
6847  027474  005500                    ADC     R0                      ;ADD +(DIVISOR)
6848  027476  005516                    ADC     @SP     ;  I            ;SET "CARRY"
6849  027500  060400                    ADD     R4,R0   ;<-
6850  027502  005516            M.DP42: ADC     @SP                     ;SET "CARRY"
6851  027504  005716                    TST     @SP                     ;TEST THE UPDATE INDICATOR
6852  027506  001401                    BEQ     .+4     ;->             ;IF ZERO FORGET IT
6853  027510  005203                    INC     R3      ;  I            ;NO CARRY POSSIBLE HERE
6854  027512  005366  000006            DEC     6(SP)   ;<-             ;DECREMENT COUNTER
6855  027516  003347                    BGT     M.DP40                  ;BRANCH IF MORE TO DO
6856  027520  006003                    ROR     R3
6857  027522  103404                    BCS     M.DP44
6858  027524  060501                    ADD     R5,R1
6859  027526  005500                    ADC     R0
6860  027530  060400                    ADD     R4,R0
6861  027532  000241                    CLC
6862  027534  006103            M.DP44: ROL     R3
6863  027536  062706  000010            ADD     #10,SP                  ;ADJUST STACK BY 4 WORDS
6864  027542  000242                    CLV
6865  027544  000207                    RTS     PC
6866  027546  062706  000006    M.DP50: ADD     #6,SP
6867  027552  000262                    SEV
6868  027554  000207                    RTS     PC
6869
6870
6871                                    ;ROUTINE TO REPLACE LEADING ZEROS IN A NUMERIC STRING WITH SPACES
6872                                    ;CALL
6873                                    ;       MOV     #ADR,-(SP)      ;ADDRESS OF NUMBER (IN ASCII)
6874                                    ;       JSR     R5,REPLZ
6875                                    ;       .WORD   N               ;'N' IS NUMBER OF DIGITS TO BE TYPED
6876
6877  027556  010046            REPLZ:  MOV     R0,-(SP)                ;SAVE R0
6878  027560  012746  000012            MOV     #10.,-(SP)              ;MAXIMUM NUMBER OF DIGITS TO BE TYPED
6879  027564  162516                    SUB     (R5)+,(SP)              ;SUBTACT DIGITS TO FORM INDEX
6880  027566  016600  000006            MOV     6(SP),R0                ;ADDRESS OF NUMBER TO R0
6881  027572  122710  000060    1$:     CMPB    #'0,(R0)                ;BYTE EQUAL TO ASCII '0' ?
6882  027576  001004                    BNE     2$                      ;BR IF NOT
6883  027600  112710  000040            MOVB    #40,(R0)                ;REPLACE THE ZERO WITH A SPACE
6884  027604  005200                    INC     R0                      ;INCREMENT THE BYTE ADDRESS
6885  027606  000771                    BR      1$                      ;GO BACK AND LOOK FOR MORE LEADING ZEROS
6886  027610  105710            2$:     TSTB    (R0)                    ;SEE IF ZERO BYTE TERMINATOR
6887  027612  001003                    BNE     3$                      ;BR IF NOT
6888  027614  005300                    DEC     R0                      ;BACKUP STRING POINTER
6889  027616  112710  000060            MOVB    #'0,(R0)                ;PUT A ZERO BACK IN
6890  027622  016637  000006  027636    MOV     6(SP),4$                ;PUT ADDRESS IN LOCATION FOR TYPEOUT
6891  027630  062637  027636            ADD     (SP)+,4$                ;BEGINNING OF SIGNIFICANT DIGITS
6892  027634  104401                    TYPE                            ;TYPE THE NUMBER
6893  027636  000000            4$:     .WORD   0                       ;ADDRESS OF NUMBER
6894  027640  012600                    MOV     (SP)+,R0                ;RESTORE R0
6895  027642  012616                    MOV     (SP)+,(SP)              ;MOVE RETURN ADDRESS
6896  027644  000205                    RTS     R5                      ;RETURN
6897
6898                                    ;TYPE NUMERICAL ASCIZ STRING SUPRESS LEADING ZEROS
6899
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6900                                    ;CALL
6901                                    ;       MOV     #NUMADR,-(SP)   ;FIRST ADDRESS OF ASCIZ STRING
6902                                    ;       JSR     PC,$SUPRS
6903
6904  027646  010046                    $SUPRS: MOV     R0,-(SP)        ;SAVE R0
6905  027650  016600  000004                    MOV     4(SP),R0        ;PICKUP THE POINTER
6906  027654  105710                    1$:     TSTB    (R0)            ;TERMINATOR ?
6907  027656  001403                            BEQ     2$              ;BR IF YES
6908  027660  122720  000060                    CMPB    #'0,(R0)+       ;IS THIS AN ASCII '0' ?
6909  027664  001773                            BEQ     1$              ;BR IF YES
6910  027666  005300                    2$:     DEC     R0              ;BACKUP BY '1'
6911  027670  010037  027676                    MOV     R0,3$           ;SAVE FOR TYPING
6912  027674  104414                            DISPLY                  ;GO PRINT
6913  027676  000000                    3$:     .WORD   0               ;ASCIZ POINTER GOES HERE
6914  027700  012600                            MOV     (SP)+,R0        ;RESTORE R0
6915  027702  012616                            MOV     (SP)+,(SP)      ;RESTORE THE STACK
6916  027704  000207                            RTS     PC              ;RETURN
6917
6918                                    ;ROUTINE TO TYPE AT PRIORITY 4
6919
6920  027706  013746  177776            TYPRI4: MOV     @#PS,-(SP)      ;SAVE THE PRESENT STATUS
6921  027712  012737  000200  177776            MOV     #200,@#PS       ;CHANGE THE PRIORITY TO 4
6922  027720  012537  027730                    MOV     (R5)+,1$        ;MESSAGE ADDRESS
6923  027724  004737  031326                    JSR     PC,$TYPE        ;TYPE THE MESSAGE
6924  027730  000000                    1$:     .WORD   0               ;MESSAGE ADDRESS GOES HERE
6925  027732  000205                            RTS     R5              ;RETURN
6926
6927                                    ;ROUTINE TO TYPE ERRORS
6928                                    ;CALL
6929                                    ;       DISPLY                  ;MUST DEFINED IN 'TRAP' TABLE
6930                                    ;       MESADR                  ;ADDRESS OF MESSAGE
6931                                    ;       RETURN
6932
6933  027734  032777  020000  151212  $DSPLY: BIT     #BIT13,@SWR     ;INHIBIT ERROR TYPEOUT ?
6934  027742  001004                            BNE     1$              ;BR IF YES
6935  027744  005037  177776                    CLR     @#PS            ;SET PRIORITY TO ZERO
6936  027750  000137  031326                    JMP     $TYPE           ;TYPE THE MESSAGE
6937  027754  062716  000002            1$:     ADD     #2,(SP)         ;INCREMENT THE RETURN
6938  027760  000002                            RTI                     ;RETURN
6939
6940                                    ;THIS ROUTINE IS USED TO CHECK IF AN
6941                                    ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
6942                                    ;CALL
6943                                    ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
6944                                    ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
6945                                    ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
6946                                    ;       RETURN2                 ;CHARACTER IS IN R2 AS A
6947                                    ;                               ;OCTAL DIGIT
6948
6949  027762  121127  000060            CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
6950  027766  103407                            BLO     1$              ;YES -- BRANCH
6951  027770  121127  000067                    CMPB    (R1),#'7        ;GREATER THAN SEVEN?
6952  027774  101004                            BHI     1$              ;YES -- BRANCH
6953  027776  111102                            MOVB    (R1),R2         ;GET THE CHARACTER
6954  030000  042702  177770                    BIC     #^C7,R2         ;STRIP AWAY THE ASCII
6955  030004  005725                            TST     (R5)+           ;ADJUST FOR RETURN
```

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 6956  030006  000205                  1$:     RTS     R5              ;RETURN
 6957
 6958                                  ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
 6959                                  ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
 6960                                  ;CALL
 6961                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
 6962                                  ;       JSR     R5,CK.DEC       ;CHECK THE CHARACTER
 6963                                  ;       RETURN1                 ;NOT BETWEEN 0 AND 9
 6964                                  ;       RETURN2                 ;BETWEEN 0 AND 9
 6965                                  ;                               ;R2 = DIGIT
 6966
 6967  030010  121127  000060          CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
 6968  030014  103407                          BLO     1$              ;YES -- BRANCH
 6969  030016  121127  000071                  CMPB    (R1),#'9        ;GREATER THAN NINE?
 6970  030022  101004                          BHI     1$              ;YES -- BRANCH
 6971  030024  111102                          MOVB    (R1),R2         ;GET THE CHARACTER
 6972  030026  042702  000060                  BIC     #'0,R2          ;STRIP AWAY THE ASCII
 6973  030032  005725                          TST     (R5)+           ;ADJUST FOR RETURN
 6974  030034  000205                  1$:     RTS     R5              ;RETURN
 6975
 6976                                  ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
 6977                                  ;DETERMINE WHAT IT IS.
 6978                                  ;CALL
 6979                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
 6980                                  ;       JSR     R5,CK.CHR       ;CHECK CHARACTER
 6981                                  ;       RETURN  ADR1            ;UNKNOWN CHARACTER
 6982                                  ;       RETURN  ADR2            ;CARRIAGE RETURN * (R1)=ADR+1
 6983                                  ;       RETURN  ADR3            ;COMMA * (R1)=ADR+1
 6984                                  ;       RETURN  ADR4            ;PERIOD * (R1)=ADR+1
 6985                                  ;       RETURN  ADR5            ;DIGIT BETWEEN 0 AND 7.
 6986                                  ;       RETURN  ADR6            ;DIGIT BETWEEN 8 AND 9.
 6987                                  ;                               ;R2 = DIGIT * (R1)=ADR+1
 6988
 6989  030036  105711                  CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
 6990  030040  001417                          BEQ     3$              ;YES -- BRANCH
 6991  030042  121127  000054                  CMPB    (R1),#',        ;"COMMA"?
 6992  030046  001413                          BEQ     2$              ;YES -- BRANCH
 6993  030050  121127  000056                  CMPB    (R1),#'.        ;"PERIOD"?
 6994  030054  001407                          BEQ     1$              ;YES -- BRANCH
 6995  030056  004537  030010                  JSR     R5,CK.DEC       ;"DIGIT"?
 6996  030062  000410                          BR      4$              ;NO -- BRANCH
 6997  030064  004537  027762                  JSR     R5,CK.OCT       ;OCTAL ?
 6998  030070  005725                          TST     (R5)+           ;DIGIT BETWEEN 8-9
 6999  030072  005725                          TST     (R5)+           ;DIGIT BETWEEN 0-7
 7000  030074  005725                  1$:     TST     (R5)+           ;PERIOD
 7001  030076  005725                  2$:     TST     (R5)+           ;COMMA
 7002  030100  005725                  3$:     TST     (R5)+           ;CARRIAGE RETURN
 7003  030102  005201                          INC     R1              ;MOVE POINTER TO NEXT CHARACTER
 7004  030104  011505                  4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
 7005  030106  000205                          RTS     R5              ;RETURN
 7006
 7007                                  ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
 7008                                  ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
 7009                                  ;CALL
 7010                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
 7011                                  ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
```

```
7012                                    ;       JSR     R5,CK.DIG       ;CHECK DIGITS
7013                                    ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2=0
7014                                    ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2=0
7015                                    ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
7016                                    ;       RETURN  ADR4            ;"CR" -- R2 = NUMBER
7017                                    ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
7018                                    ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
7019
7020  030110  010446                    CK.DIG: MOV     R4,-(SP)        ;SAVE R4
7021  030112  010346                            MOV     R3,-(SP)        ;SAVE R3
7022  030114  010246                            MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
7023  030116  005002                            CLR     R2              ;START WITH 0
7024  030120  005003                            CLR     R3
7025  030122  005004                            CLR     R4
7026  030124  004537  030036                    JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
7027  030130  030224                            6$                      ;ILLEGAL CHARACTER
7028  030132  030232                            9$                      ;CARRIAGE RETURN
7029  030134  030224                            6$                      ;"
7030  030136  030226                            7$                      ;'
7031  030140  030144                            1$                      ;DIGIT 0-7
7032  030142  030144                            1$                      ;DIGIT 8-9
7033  030144  062705  000004            1$:     ADD     #4,R5           ;STEP RETURN POINTER PAST "CR" & "PERIOD" RETURNS
7034  030150  006303                    2$:     ASL     R3              ;INPUT NUMBER *2
7035  030152  010346                            MOV     R3,-(SP)        ;SAVE *2
7036  030154  006303                            ASL     R3              ;*4
7037  030156  006303                            ASL     R3              ;*8
7038  030160  062603                            ADD     (SP)+,R3        ;(*2)+(*8) = *10
7039  030162  060203                            ADD     R2,R3           ;UPDATE THE INPUT NUMBER
7040  030164  004537  030036                    JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
7041  030170  030230                            8$                      ;ILLEGAL CHARACTER
7042  030172  030214                            5$                      ;CARRIAGE RETURN
7043  030174  030212                            4$                      ;"
7044  030176  030204                            3$                      ;'
7045  030200  030150                            2$                      ;DIGIT 0-7
7046  030202  030150                            2$                      ;DIGIT 8-9
7047  030204  105711                    3$:     TSTB    (R1)            ;DOES A "CR" FOLLOW THE "PERIOD"
7048  030206  001010                            BNE     8$              ;BR IF NOT
7049  030210  005724                            TST     (R4)+           ;INCREMENT THE RETURN
7050  030212  005724                    4$:     TST     (R4)+           ;INCREMENT THE RETURN
7051  030214  005724                    5$:     TST     (R4)+           ;INCREMENT THE RETURN
7052  030216  020316                            CMP     R3,(SP)         ;CHECK THE MAGNITUDE OF THE NUMBER
7053  030220  101004                            BHI     9$              ;BR IF ENTERED NUMBER TOO LARGE
7054  030222  000402                            BR      8$              ;BYPASS INCREMENT
7055  030224  005725                    6$:     TST     (R5)+           ;INCREMENT RETURN PAST INVALID RETURN
7056  030226  005725                    7$:     TST     (R5)+           ;INCREMENT RETURN
7057  030230  060405                    8$:     ADD     R4,R5           ;SETUP RETURN POINTER
7058  030232  010302                    9$:     MOV     R3,R2           ;ENTERED VALUE
7059  030234  005726                            TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
7060  030236  012603                            MOV     (SP)+,R3        ;RESTORE R3
7061  030240  012604                            MOV     (SP)+,R4        ;RESTORE R4
7062  030242  011505                            MOV     (R5),R5         ;GET RETURN ADDRESS
7063  030244  000205                            RTS     R5              ;RETURN
7064
7065                                    ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7066                                    ;UNSIGNED DECIMAL ASCIZ NUMBER.
7067                                    ;CALL
```

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                                        ;END OF PASS ROUTINE
7068                                    ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
7069                                    ;       JSR     PC,$SB2D        ;CALL
7070                                    ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
7071                                    ;
7072                                    ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2D', NOT THE VERSION ON
7073                                    ;       THE SYSMAC LIBRARY, REV C AND LATER
7074
7075  030246  016637  000002  030272    $SB2D:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
7076  030254  012746  030272                    MOV     #1$,-(SP)       ;SET THE POINTER
7077  030260  004737  033546                    JSR     PC,$DB2D        ;CALL THE DOUBLE LENGTH CONVERT
7078  030264  012666  000002                    MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
7079  030270  000207                            RTS     PC              ;RETURN
7080  030272  000000  000000            1$:     .WORD   0,0
7081
7082                                    ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7083                                    ;UNSIGNED OCTAL ASCIZ NUMBER.
7084                                    ;CALL
7085                                    ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
7086                                    ;       JSR     PC,$SB20        ;CALL
7087                                    ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
7088                                    ;
7089                                    ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB20', NOT THE VERSION ON
7090                                    ;       THE SYSMAC LIBRARY, REV C AND LATER
7091
7092  030276  016637  000002  030322    $SB20:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
7093  030304  012746  030322                    MOV     #1$,-(SP)       ;SET THE POINTER
7094  030310  004737  033742                    JSR     PC,$DB20        ;CALL THE DOUBLE LENGTH CONVERT
7095  030314  012666  000002                    MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
7096  030320  000207                            RTS     PC              ;RETURN
7097  030322  000000  000000            1$:     .WORD   0,0
7098
7099                                    ;KEYBOARD INTERRUPT INITIALIZATION ROUTINE
7100                                    ;CALL
7101                                    ;       JSR     PC,$TKINT
7102                                    ;       RETURN
7103
7104  030326  012737  030356  000060    $TKINT: MOV     #$TKSRV,TKVEC   ;SETUP VECTOR
7105  030334  012737  000100  000062            MOV     #100,TKVEC+2    ;PRIORITY TO 4
7106  030342  005777  150614                    TST     @$TKB           ;CLEAR THE BUFFER
7107  030346  012777  000100  150604            MOV     #BIT06,@$TKS    ;SET INTERRUPT ENABLE
7108  030354  000207                            RTS     PC              ;RETURN
7109
7110                                    ;KEYBOARD INTERRUPT SERVICE ROUTINE
7111                                    ;CALL
7112                                    ;       ENTER VIA INTERRUPT
7113
7114  030356  104410                    $TKSRV: RDCHR                   ;READ THE KEYBOARD
7115  030360  112637  030506                    MOVB    (SP)+,5$        ;GET THE CHARACTER
7116  030364  023727  030506  000003            CMP     5$,#3           ;'CONTROL C' ?
7117  030372  001012                            BNE     1$              ;BR IF NOT
7118  030374  104401  001201                    TYPE    ,$CRLF          ;CR-LF
7119  030400  104401  031000                    TYPE    ,$CNTLC         ;'↑C'
7120  030404  012737  177777  001360            MOV     #-1,CFLAG       ;SET THE 'CONTROL C' FLAG
7121  030412  005077  150542                    CLR     @$TKS           ;CLEAR THE TTY INTERRUPT
7122  030416  000432                            BR      4$              ;EXIT
7123  030420  023727  001154  000176    1$:     CMP     SWR,#SWREG      ;SOFTWARE SWITCH REGISTER IN USE ?
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7124  030426  001024                          BNE     3$              ;BR IF NOT
7125  030430  023727  030506  000007          CMP     5$,#7           ;'CONTROL G' ?
7126  030436  001020                          BNE     3$              ;BR IF NOT
7127  030440  104401  001201                  TYPE    ,$CRLF          ;CR-LF
7128  030444  104401  033321                  TYPE    ,$CNTLG         ;'↑G'
7129  030450  013746  177776                  MOV     PS,-(SP)        ;PUT THE STATUS WORD ON THE STACK
7130  030454  012746  030470                  MOV     #2$,-(SP)       ;RETURN ADDRESS
7131  030460  005077  150474                  CLR     @$TKS           ;CLEAR THE TTY INTERRUPT ENABLE
7132  030464  000137  032762                  JMP     $GTSWR          ;GET THE SWITCH REGISTER ENTRY
7133  030470  012777  000100  150462  2$:     MOV     #100,@$TKS      ;ENABLE TTY KEYBOARD INTERRUPT
7134  030476  000402                          BR      4$              ;EXIT
7135  030500  104401  030506          3$:     TYPE    ,5$             ;ECHO THE CHARACTER
7136  030504  000002                  4$:     RTI                     ;RETURN
7137
7138  030506  000000                  5$:     .WORD   0               ;ENTERED CHARACTER
7139
7140                                  ;THIS ROUTINE WILL INPUT A STRING FROM THE TTY
7141                                  ;CALL:
7142                                  ;       RDLIN                   ;;INPUT A STRING FROM THE TTY
7143                                  ;       RETURN HERE             ;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
7144                                  ;                               ;TERMINATOR WILL BE A BYTE OF ALL 0'S
7145
7146  030510  010346                  $RDLIN: MOV     R3,-(SP)        ;SAVE R3
7147  030512  005046                          CLR     -(SP)           ;CLEAR THE RUBOUT KEY
7148  030514  012703  030766          1$:     MOV     #$TTYIN,R3      ;GET ADDRESS
7149  030520  022703  031000          2$:     CMP     #$TTYIN+10.,R3  ;BUFFER FULL?
7150  030524  101467                          BLOS    4$              ;BR IF YES
7151  030526  104410                          RDCHR                   ;GO READ ONE CHARACTER FROM THE TTY
7152  030530  112613                          MOVB    (SP)+,(R3)      ;GET CHARACTER
7153  030532  122713  000177                  CMPB    #177,(R3)       ;IS IT A RUBOUT
7154  030536  001022                          BNE     5$              ;BR IF NO
7155  030540  005716                          TST     (SP)            ;IS THIS THE FIRST RUBOUT?
7156  030542  001007                          BNE     6$              ;BR IF NO
7157  030544  112737  000134  030764          MOVB    #'\,9$          ;TYPE A BACK SLASH
7158  030552  104401  030764                  TYPE    ,9$
7159  030556  012716  177777                  MOV     #-1,(SP)        ;SET THE RUBOUT KEY
7160  030562  005303                  6$:     DEC     R3              ;BACKUP BY ONE
7161  030564  020327  030766                  CMP     R3,#$TTYIN      ;STACK EMPTY?
7162  030570  103445                          BLO     4$              ;BR IF YES
7163  030572  111337  030764                  MOVB    (R3),9$         ;SETUP TO TYPEOUT THE DELETED CHAR.
7164  030576  104401  030764                  TYPE    ,9$             ;GO TYPE
7165  030602  000746                          BR      2$              ;GO READ ANOTHER CHAR.
7166  030604  005716                  5$:     TST     (SP)            ;RUBOUT KEY SET?
7167  030606  001406                          BEQ     7$              ;BR IF NO
7168  030610  112737  000134  030764          MOVB    #'\,9$          ;TYPE A BACK SLASH
7169  030616  104401  030764                  TYPE    ,9$
7170  030622  005016                          CLR     (SP)            ;CLEAR THE RUBOUT KEY
7171  030624  122713  000025          7$:     CMPB    #25,(R3)        ;IS CHARACTER A CTRL U?
7172  030630  001003                          BNE     10$             ;BR IF NO
7173  030632  104401  033314                  TYPE    ,$CNTLU         ;TYPE A CONTROL "U"
7174  030636  000726                          BR      1$              ;GO START OVER
7175  030640  122713  000003          10$:    CMPB    #3,(R3)         ;IS CHARACTER A CTRL C ?
7176  030644  001006                          BNE     8$              ;BR IF NOT
7177  030646  012737  177777  001360          MOV     #-1,CFLAG       ;SET CNTRL C FLAG
7178  030654  104401  031000                  TYPE    ,$CNTLC         ;ECHO IT
7179  030660  000427                          BR      11$             ;EXIT
```

```
 7180  030662  122713  000012          8$:     CMPB    #12,(R3)        ;IS CHARACTER A "LF"?
 7181  030666  001011                          BNE     3$              ;BRANCH IF NO
 7182  030670  105013                          CLRB    (R3)            ;CLEAR THE CHARACTER
 7183  030672  104401  001201                  TYPE    ,$CRLF          ;TYPE A "CR" & "LF"
 7184  030676  104401  030766                  TYPE    ,$TTYIN         ;TYPE THE INPUT STRING
 7185  030702  000706                          BR      2$              ;GO PICKUP ANOTHER CHACTER
 7186  030704  104401  001200          4$:     TYPE    ,$QUES          ;TYPE A '?'
 7187  030710  000701                          BR      1$              ;CLEAR THE BUFFER AND LOOP
 7188  030712  111337  030764          3$:     MOVB    (R3),9$         ;ECHO THE CHARACTER
 7189  030716  104401  030764                  TYPE    ,9$
 7190  030722  122723  000015                  CMPB    #15,(R3)+       ;CHECK FOR RETURN
 7191  030726  001274                          BNE     2$              ;LOOP IF NOT RETURN
 7192  030730  105063  177777                  CLRB    -1(R3)          ;CLEAR RETURN (THE 15)
 7193  030734  104401  001202                  TYPE    ,$LF            ;TYPE A LINE FEED
 7194  030740  005726                  11$:    TST     (SP)+           ;CLEAN RUBOUT KEY FROM THE STACK
 7195  030742  012603                          MOV     (SP)+,R3        ;RESTORE R3
 7196  030744  011646                          MOV     (SP),-(SP)      ;ADJUST THE STACK AND PUT ADDRESS OF THE
 7197  030746  016666  000004  000002          MOV     4(SP),2(SP)     ;       FIRST ASCII CHARACTER ON IT
 7198  030754  012766  030766  000004          MOV     #$TTYIN,4(SP)
 7199  030762  000002                          RTI                     ;RETURN
 7200  030764     000                  9$:     .BYTE   0               ;STORAGE FOR ASCII CHAR. TO TYPE
 7201  030765     000                          .BYTE   0               ;TERMINATOR
 7202  030766  000012                  $TTYIN: .BLKB   10.             ;RESERVE 10 BYTES FOR TTY INPUT
 7203  031000  041536  005015     000  $CNTLC: .ASCIZ   /↑C/<CR><LF>   ;CONTROL "C"
 7204
 7205          031006                  .EVEN
 7206
 7207
 7208
 7209                                  ;;*****************************************************************
 7210
 7211                                  .SBTTL  MACRO ROUTINES
 7212
 7213                                  .SBTTL  ERROR HANDLER ROUTINE
 7214
 7215                                  ;;*****************************************************************
 7216                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 7217                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 7218                                  ;*AND GO TO $ERRTYP ON ERROR
 7219                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 7220                                  ;*SW15=1         HALT ON ERROR
 7221                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 7222                                  ;*SW10=1         BELL ON ERROR
 7223                                  ;*CALL
 7224                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 7225
 7226  031006                  $ERROR:
 7227  031006  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 7228  031010  010337  001342                  MOV     R3,ATTN         ;SAVE THE ATTENTION REGISTER CONTENTS
 7229  031014  010137  001216                  MOV     R1,DRIVE        ;DRIVE NUMBER
 7230  031020  032777  020000  150126          BIT     #SW13,@SWR      ;INHIBIT PRINTOUTS ?
 7231  031026  001002                          BNE     .+6             ;BR IF YES
 7232  031030  004737  023450                  JSR     PC,$TIME        ;TYPE THE TIME
 7233  031034  105237  001117          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 7234  031040  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 7235  031042  013777  001116  150106          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
```

```
7236  031050  032777  002000  150076          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
7237  031056  001402                          BEQ     1$              ;;NO - SKIP
7238  031060  104401  001174                  TYPE    ,$BELL          ;;RING BELL
7239  031064  005237  001126          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
7240  031070  011637  001132                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
7241  031074  162737  000002  001132          SUB     #2,$ERRPC
7242  031102  117737  150024  001130          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
7243  031110  032777  020000  150036          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
7244  031116  001004                          BNE     20$             ;;SKIP TYPEOUTS
7245  031120  004737  031172                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
7246  031124  104401  001201                  TYPE    ,$CRLF
7247  031130                          20$:
7248  031130  122737  000001  001224          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
7249  031136  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
7250  031140  113737  001130  031152          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
7251  031146  004737  031626                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
7252  031152     000          21$:     .BYTE   0
7253  031153     000                   .BYTE   0
7254  031154  000777          22$:     BR      22$             ;;APT ERROR LOOP
7255  031156  005777  147772          2$:     TST     @SWR            ;;HALT ON ERROR
7256  031162  100002                          BPL     3$              ;;SKIP IF CONTINUE
7257  031164  000000                          HALT                    ;;HALT ON ERROR!
7258  031166  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
7259  031170                          3$:
7260  031170  000002                          RTI                     ;;RETURN
7261
7262                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
7263
7264                                  ;;**************************************************************
7265                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
7266                                  ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
7267                                  ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
7268
7269  031172                          $ERRTYP:
7270  031172  104401  001201                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7271  031176  010046                          MOV     R0,-(SP)        ;;SAVE R0
7272  031200  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
7273  031202  153700  001130                  BISB    @#$ITEMB,R0
7274  031206  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
7275                                                                  ;;TYPE THE PC OF THE ERROR
7276  031210  013746  001132                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
7277                                                                  ;;ERROR ADDRESS
7278  031214  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7279  031216  000426                          BR      6$              ;;GET OUT
7280  031220  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
7281  031222  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
7282  031224  006300                          ASL     R0
7283  031226  006300                          ASL     R0
7284  031230  062700  003542                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
7285  031234  012037  031244                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
7286  031240  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
7287  031242  104401                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
7288  031244  000000                  2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
7289  031246  104401  001201                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7290  031252  012037  031262          3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
7291  031256  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
```

```
                        TYPE                    ;;TYPE THE "DATA HEADER"
031262  000000  4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
031264  104401  001201  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
031270  011000  5$:     MOV     @(R0),R0        ;;PICKUP "DATA TABLE" POINTER
031272  001004          BNE     7$              ;;GO TYPE THE DATA
031274  012600  6$:     MOV     (SP)+,R0        ;;RESTORE R0
031276  104401  001201  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
031302  000207          RTS     PC              ;;RETURN
031304          7$:
031304  013046          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
031306  104402          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
031310  005710          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
031312  001770          BEQ     6$              ;;BR IF NO
031314  104401  031322  TYPE    ,8$             ;;TYPE TWO(2) SPACES
031320  000771          BR      7$              ;;LOOP
031322  020040  000     8$:     .ASCIZ  /  /    ;;TWO(2) SPACES
031326                  .EVEN

                .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.
                ;*
                ;*CALL:
                ;*1) USING A TRAP INSTRUCTION
                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                ;*OR
                ;*      TYPE
                ;*      MESADR
                ;*

031326  105737  001173  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
031332  100002          BPL     1$              ;;BR IF YES
031334  000000          HALT                    ;;HALT HERE IF NO TERMINAL
031336  000430          BR      3$              ;;LEAVE
031340  010046  1$:     MOV     R0,-(SP)        ;;SAVE R0
031342  017600  000002  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
031346  122737  000001  001224  CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
031354  001011          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
031356  132737  000100  001225  BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
031364  001405          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
031366  010037  031376  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
031372  004737  031616  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
031376  000000  61$:     .WORD   0               ;;MESSAGE ADDRESS
031400  132737  000040  001225  62$:     BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
031406  001003          BNE     60$             ;;YES,SKIP TYPE OUT
031410  112046  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
031412  001005          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
031414  005726          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
031416  012600  60$:     MOV     (SP)+,R0        ;;RESTORE R0
031420  062716  000002  3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
031424  000002          RTI                     ;;RETURN
```

```
7348  031426  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
7349  031432  001430                          BEQ     8$
7350  031434  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
7351  031440  001006                          BNE     5$
7352  031442  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
7353  031444  104401                          TYPE                    ;;TYPE A CR AND LF
7354  031446  001201                          $CRLF
7355  031450  105037  031604                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
7356  031454  000755                          BR      2$              ;;GET NEXT CHARACTER
7357  031456  004737  031540          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
7358  031462  123726  001172          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
7359  031466  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
7360  031470  013746  001170                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
7361                                                                  ;;AND THE NULL CHAR.
7362  031474  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
7363  031500  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
7364  031502  004737  031540                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
7365  031506  105337  031604                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
7366  031512  000770                          BR      7$              ;;LOOP
7367
7368                                  ;HORIZONTAL TAB PROCESSOR
7369
7370  031514  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
7371  031520  004737  031540          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
7372  031524  132737  000007  031604          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
7373  031532  001372                          BNE     9$              ;;TAB STOP
7374  031534  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
7375  031536  000724                          BR      2$              ;;GET NEXT CHARACTER
7376  031540  105777  147420          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
7377  031544  100375                          BPL     $TYPEC
7378  031546  116677  000002  147412          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
7379  031554  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
7380  031562  001003                          BNE     1$              ;;BRANCH IF NO
7381  031564  105037  031604                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
7382  031570  000406                          BR      $TYPEX          ;;EXIT
7383  031572  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
7384  031600  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
7385  031602  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
7386  031604  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
7387  031606  000207          $TYPEX: RTS     PC
7388
7389
7390                                  .SBTTL  APT COMMUNICATIONS ROUTINE
7391
7392                                  ;;**************************************************************
7393  031610  112737  000001  032054  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
7394  031616  112737  000001  032052  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
7395  031624  000403                          BR      $ATYC
7396  031626  112737  000001  032054  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
7397  031634                          $ATYC:
7398  031634  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7399  031636  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7400  031640  105737  032052                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
7401  031644  001450                          BEQ     5$              ;;IF NOT:  BR
7402  031646  122737  000001  001224          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
7403  031654  001031                          BNE     3$              ;;IF NOT:  BR
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7404  031656  132737  000100  001225          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
7405  031664  001425                          BEQ     3$              ;;IF NOT:  BR
7406  031666  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
7407  031672  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7408  031700  005737  001204          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
7409  031704  001375                          BNE     1$              ;;IF NOT:  WAIT
7410  031706  010037  001220                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
7411  031712  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
7412  031714  001376                          BNE     2$
7413  031716  163700  001220                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
7414  031722  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
7415  031724  010037  001222                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
7416  031730  012737  000004  001204          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
7417  031736  000413                          BR      5$
7418  031740  017637  000004  031764  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
7419  031746  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
7420  031754  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
7421  031760  004737  031326                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
7422  031764  000000                  4$:     .WORD   0
7423  031766                          5$:
7424  031766  105737  032054          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
7425  031772  001416                          BEQ     12$             ;;IF NOT:  BR
7426  031774  005737  001224                  TST     $ENV            ;;RUNNING UNDER APT?
7427  032000  001413                          BEQ     12$             ;;IF NOT:  BR
7428  032002  005737  001204          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
7429  032006  001375                          BNE     11$             ;;IF NOT:  WAIT
7430  032010  017637  000004  001206          MOV     @4(SP),$FATAL   ;;GET ERROR #
7431  032016  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7432  032024  005237  001204                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
7433  032030  105037  032054          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
7434  032034  105037  032053                  CLRB    $LFLG           ;;CLEAR LOG FLAG
7435  032040  105037  032052                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
7436  032044  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
7437  032046  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7438  032050  000207                          RTS     PC              ;;RETURN
7439  032052     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
7440  032053     000          $LFLG:  .BYTE   0               ;;LOG FLAG
7441  032054     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
7442          032056                  .EVEN
7443          000200          APTSIZE=200
7444          000001          APTENV=001
7445          000100          APTSPOOL=100
7446          000040          APTCSUP=040
7447
7448                          .SBTTL  POWER DOWN AND UP ROUTINES
7449
7450                          ;;**************************************************************
7451                          ;POWER DOWN ROUTINE
7452  032056  012737  032222  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
7453  032064  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
7454  032072  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7455  032074  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7456  032076  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7457  032100  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7458  032102  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
7459  032104  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
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7460  032106  017746  147042                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
7461  032112  010637  032226                  MOV     SP,$SAVR6       ;;SAVE SP
7462  032116  012737  032130  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
7463  032124  000000                          HALT
7464  032126  000776                          BR      .-2             ;;HANG UP
7465
7466                                  ;;**************************************************************
7467                                  ;POWER UP ROUTINE
7468  032130  012737  032222  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
7469  032136  013706  032226                  MOV     $SAVR6,SP       ;;GET SP
7470  032142  005037  032226                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
7471  032146  005237  032226          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
7472  032152  001375                          BNE     1$              ;;OF  WORD
7473  032154  012677  146774                  MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
7474  032160  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
7475  032162  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
7476  032164  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
7477  032166  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
7478  032170  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
7479  032172  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7480  032174  012737  032056  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
7481  032202  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
7482  032210  104401                          TYPE                    ;REPORT THE POWER FAILURE
7483  032212  032230                  $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
7484  032214  012716                          MOV     (PC)+,(SP)      ;;RESTART AT START2
7485  032216  003650                  $PWRAD: .WORD   START2          ;;RESTART ADDRESS
7486  032220  000002                          RTI
7487  032222  000000                  $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
7488  032224  000776                          BR      .-2             ;;  BEFORE THE POWER DOWN WAS COMPLETE
7489  032226  000000                  $SAVR6: 0                       ;;PUT THE SP HERE
7490  032230  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
7491  032236  000122
7492                                          .EVEN
7493
7494                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
7495
7496                                  ;;**************************************************************
7497                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
7498                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
7499                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
7500                                  ;*CALL:
7501                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
7502                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
7503                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
7504                                  ;*      .BYTE   M               ;;M=1 OR 0
7505                                  ;*                                      ;;1=TYPE LEADING ZEROS
7506                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
7507                                  ;*
7508                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
7509                                  ;*$TYPOS OR $TYPOC
7510                                  ;*CALL:
7511                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
7512                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
7513                                  ;*
7514                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
7515                                  ;*CALL:
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```
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT
                                        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
032240  017646  000000                          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
032244  116637  000001  032463                   MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
032252  112637  032465                          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
032256  062716  000002                          BR      $TYPON
032262  000406                                  MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
032264  112737  000001  032463  $TYPOC:         MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
032272  112737  000006  032465                  MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
032300  112737  000005  032462  $TYPON:         MOV     R3,-(SP)        ;;SAVE R3
032306  010346                                  MOV     R4,-(SP)        ;;SAVE R4
032310  010446                                  MOV     R5,-(SP)        ;;SAVE R5
032312  010546                                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
032314  113704  032465                          NEG     R4
032320  005404                                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
032322  062704  000006                          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
032326  110437  032464                          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
032332  113704  032463                          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
032336  016605  000012                          CLR     R3              ;;CLEAR THE OUTPUT WORD
032342  005003                          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
032344  006105                                  BR      3$              ;;GO DO MSB
032346  000404                          2$:     ROL     R5              ;;FORM THIS DIGIT
032350  006105                                  ROL     R5
032352  006105                                  ROL     R5
032354  006105                                  MOV     R5,R3
032356  010503                          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
032360  006103                                  DECB    $OMODE          ;;TYPE THIS DIGIT?
032362  105337  032464                          BPL     7$              ;;BR IF NO
032366  100016                                  BIC     #177770,R3      ;;GET RID OF JUNK
032370  042703  177770                          BNE     4$              ;;TEST FOR 0
032374  001002                                  TST     R4              ;;SUPPRESS THIS 0?
032376  005704                                  BEQ     5$              ;;BR IF YES
032400  001403                          4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
032402  005204                          5$:     BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
032404  052703  000060                          BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
032410  052703  000040                          MOVB    R3,8$           ;;SAVE FOR TYPING
032414  110337  032460                          TYPE    ,8$             ;;GO TYPE THIS DIGIT
032420  104401  032460                  7$:     DECB    $OCNT           ;;COUNT BY 1
032424  105337  032462                          BGT     2$              ;;BR IF MORE TO DO
032430  003347                                  BLT     6$              ;;BR IF DONE
032432  002402                                  INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
032434  005204                                  BR      2$              ;;GO DO THE LAST DIGIT
032436  000744                          6$:     MOV     (SP)+,R5        ;;RESTORE R5
032440  012605                                  MOV     (SP)+,R4        ;;RESTORE R4
032442  012604                                  MOV     (SP)+,R3        ;;RESTORE R3
032444  012603                                  MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
032446  016666  000002  000004                  MOV     (SP)+,(SP)
032454  012616                                  RTI                     ;;RETURN
032456  000002                          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
032460     000                                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
032461     000                          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
032462     000                          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
032463     000                          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
032464  000000
```

```
                        .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

                        ;;**************************************************************
                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                        ;*REPLACED WITH SPACES.
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                        ;*      TYPDS                   ;;GO TO THE ROUTINE

032466                  $TYPDS:
032466  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
032470  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
032472  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
032474  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
032476  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
032500  012746  020200          MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
032504  016605  000020          MOV     20(SP),R5       ;;GET THE INPUT NUMBER
032510  100004                  BPL     1$              ;;BR IF INPUT IS POS.
032512  005405                  NEG     R5              ;;MAKE THE BINARY NUMBER POS.
032514  112766  000055  000001  MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
032522  005000          1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
032524  012703  032702          MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
032530  112723  000040          MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
032534  005002          2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
032536  016001  032672          MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
032542  160105          3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
032544  002402                  BLT     4$              ;;BR IF DONE
032546  005202                  INC     R2              ;;INCREASE THE BCD DIGIT BY 1
032550  000774                  BR      3$
032552  060105          4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
032554  005702                  TST     R2              ;;CHECK IF BCD DIGIT=0
032556  001002                  BNE     5$              ;;FALL THROUGH IF 0
032560  105716                  TSTB    (SP)            ;;STILL DOING LEADING 0'S?
032562  100407                  BMI     7$              ;;BR IF YES
032564  106316          5$:     ASLB    (SP)            ;;MSD?
032566  103003                  BCC     6$              ;;BR IF NO
032570  116663  000001  177777  MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
032576  052702  000060  6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
032602  052702  000040  7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
032606  110223                  MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
032610  005720                  TST     (R0)+           ;;JUST INCREMENTING
032612  020027  000010          CMP     R0,#10          ;;CHECK THE TABLE INDEX
032616  002746                  BLT     2$              ;;GO DO THE NEXT DIGIT
032620  003002                  BGT     8$              ;;GO TO EXIT
032622  010502                  MOV     R5,R2           ;;GET THE LSD
032624  000764                  BR      6$              ;;GO CHANGE TO ASCII
032626  105726          8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
032630  100003                  BPL     9$              ;;BR IF NO
032632  116663  177777  177776  MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
032640  105013          9$:     CLRB    (R3)            ;;SET THE TERMINATOR
032642  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
032644  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
032646  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
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 7628  032650  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 7629  032652  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 7630  032654  104401  032702                TYPE    $DBLK           ;;NOW TYPE THE NUMBER
 7631  032660  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 7632  032666  012616                        MOV     (SP)+,(SP)
 7633  032670  000002                        RTI                     ;;RETURN TO USER
 7634  032672  023420                $DTBL:  10000.
 7635  032674  001750                        1000.
 7636  032676  000144                        100.
 7637  032700  000012                        10.
 7638  032702  000004                $DBLK:  .BLKW   4
 7639
 7640                                  .SBTTL  TTY INPUT ROUTINE
 7641
 7642                                  ;;**********************************************************************
 7643                                  .ENABL  LSB
 7644
 7645                                  ;;**********************************************************************
 7646                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 7647                                  ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
 7648                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
 7649                                  ;*WHEN OPERATING IN TTY FLAG MODE.
 7650  032712  022737  000176  001154 $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
 7651  032720  001074                        BNE     15$             ;;BRANCH IF NO
 7652  032722  105777  146232                TSTB    @$TKS           ;;CHAR THERE?
 7653  032726  100071                        BPL     15$             ;;IF NO, DON'T WAIT AROUND
 7654  032730  117746  146226                MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
 7655  032734  042716  177600                BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
 7656  032740  022726  000007                CMP     #7,(SP)+        ;;IS IT A CONTROL G?
 7657  032744  001062                        BNE     15$             ;;NO, RETURN TO USER
 7658  032746  123727  001150  000001        CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 7659  032754  001456                        BEQ     15$             ;;BRANCH IF YES
 7660
 7661  032756  104401  033321                TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
 7662  032762  104401  033326        $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 7663  032766  013746  000176                MOV     $SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
 7664  032772  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 7665  032774  104401  033337                TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 7666  033000  005046                19$:    CLR     -(SP)           ;;CLEAR COUNTER
 7667  033002  005046                        CLR     -(SP)           ;;THE NEW SWR
 7668  033004  105777  146150        7$:     TSTB    @$TKS           ;;CHAR THERE?
 7669  033010  100375                        BPL     7$              ;;IF NOT TRY AGAIN
 7670
 7671  033012  117746  146144                MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 7672  033016  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 7673
 7674
 7675
 7676  033022  021627  000025        9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 7677  033026  001005                        BNE     10$             ;;BRANCH IF NOT
 7678  033030  104401  033314                TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 7679  033034  062706  000006        20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 7680  033040  000757                        BR      19$             ;;LET'S TRY IT AGAIN
 7681
 7682
 7683  033042  021627  000015        10$:    CMP     (SP),#15        ;;IS IT A <CR>?
```

```
7684  033046  001022                        BNE     16$             ;;BRANCH IF NO
7685  033050  005766  000004                TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
7686  033054  001403                        BEQ     11$             ;;BRANCH IF YES
7687  033056  016677  000002  146070        MOV     2(SP),@SWR      ;;SAVE NEW SWR
7688  033064  062706  000006          11$:  ADD     #6,SP           ;;CLEAR UP STACK
7689  033070  104401  001201          14$:  TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
7690  033074  123727  001151  000001        CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
7691  033102  001003                        BNE     15$             ;;BRANCH IF NOT
7692  033104  012777  000100  146046        MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
7693  033112  000002          15$:  RTI                             ;;RETURN
7694  033114  004737  031540          16$:  JSR     PC,$TYPEC       ;;ECHO CHAR
7695  033120  021627  000060                CMP     (SP),#60        ;;CHAR < 0?
7696  033124  002420                        BLT     18$             ;;BRANCH IF YES
7697  033126  021627  000067                CMP     (SP),#67        ;;CHAR > 7?
7698  033132  003015                        BGT     18$             ;;BRANCH IF YES
7699  033134  042726  000060                BIC     #60,(SP)+       ;;STRIP-OFF ASCII
7700  033140  005766  000002                TST     2(SP)           ;;IS THIS THE FIRST CHAR
7701  033144  001403                        BEQ     17$             ;;BRANCH IF YES
7702  033146  006316                        ASL     (SP)            ;;NO, SHIFT PRESENT
7703  033150  006316                        ASL     (SP)            ;;   CHAR OVER TO MAKE
7704  033152  006316                        ASL     (SP)            ;;   ROOM FOR NEW ONE.
7705  033154  005266  000002          17$:  INC     2(SP)           ;;KEEP COUNT OF CHAR
7706  033160  056616  177776                BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
7707  033164  000707                        BR      7$              ;;GET THE NEXT ONE
7708  033166  104401  001200          18$:  TYPE    ,$QUES          ;;TYPE ?<CR><LF>
7709  033172  000720                        BR      20$             ;;SIMULATE CONTROL-U
7710                                .DSABL  LSB
7711
7712
7713                                ;;**************************************************************
7714                                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
7715                                ;*CALL:
7716                                ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
7717                                ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
7718                                ;*                              ;;WITH PARITY BIT STRIPPED OFF
7719                                ;
7720
7721  033174  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
7722  033176  016666  000004  000002        MOV     4(SP),2(SP)     ;;SAVE THE PS
7723  033204  105777  145750          1$:   TSTB    @$TKS           ;;WAIT FOR
7724  033210  100375                        BPL     1$              ;;A CHARACTER
7725  033212  117766  145744  000004        MOVB    @$TKB,4(SP)     ;;READ THE TTY
7726  033220  042766  177600  000004        BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
7727  033226  026627  000004  000023        CMP     4(SP),#23       ;;IS IT A CONTROL-S?
7728  033234  001013                        BNE     3$              ;;BRANCH IF NO
7729  033236  105777  145716          2$:   TSTB    @$TKS           ;;WAIT FOR A CHARACTER
7730  033242  100375                        BPL     2$              ;;LOOP UNTIL ITS THERE
7731  033244  117746  145712                MOVB    @$TKB,-(SP)     ;;GET CHARACTER
7732  033250  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
7733  033254  022627  000021                CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
7734  033260  001366                        BNE     2$              ;;IF NOT DISCARD IT
7735  033262  000750                        BR      1$              ;;YES, RESUME
7736  033264  026627  000004  000140  3$:   CMP     4(SP),#140      ;;IS IT UPPER CASE?
7737  033272  002407                        BLT     4$              ;;BRANCH IF YES
7738  033274  026627  000004  000175        CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
7739  033302  003003                        BGT     4$              ;;BRANCH IF YES
```

```
7740  033304  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
7741  033312  000002                  4$:     RTI                     ;;GO BACK TO USER
7742  033314  052536  005015     000  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
7743  033321     136  006507  000012  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
7744  033326  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
7745  033334  020075     000
7746  033337     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
7747  033344  036440  000040
7748
7749                                  .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
7750
7751                                  ;;**************************************************************
7752                                  ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
7753                                  ;*WITH A RANGE OF 0 TO 2(+33)-1.
7754                                  ;*CALL:
7755                                  ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
7756                                  ;*      RETURN                  ;;RETURN HERE THE RANDOM
7757                                  ;*                              ;;NUMBER WILL BE IN
7758                                  ;*                              ;;$HINUM,$LONUM
7759
7760  033350                          $RAND:
7761  033350  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7762  033352  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7763  033354  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7764  033356  013700  033450                  MOV     $LONUM,R0       ;;SET R0 WITH LOW
7765  033362  013701  033446                  MOV     $HINUM,R1       ;;SET R1 WITH HIGH
7766  033366  012702  177771                  MOV     #-7,R2          ;;SET SHIFT COUNT
7767  033372  006300                  1$:     ASL     R0              ;;SHIFT R0 LEFT AND
7768  033374  006101                          ROL     R1              ;;ROTATE CARRY INTO R1 AND
7769  033376  005202                          INC     R2              ;;CHECK FOR DONE
7770  033400  001374                          BNE     1$              ;;CONTINUE SHIFT LOOP
7771  033402  063700  033450                  ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
7772  033406  005501                          ADC     R1              ;;PROPOGATE CARRY
7773  033410  063701  033446                  ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
7774  033414  062700  001057                  ADD     #1057,R0        ;;ADD LOW CONSTANT
7775  033420  005501                          ADC     R1              ;;PROPOGATE CARRY
7776  033422  062701  047401                  ADD     #47401,R1       ;;ADD HIGH CONSTANT
7777  033426  010037  033450                  MOV     R0,$LONUM       ;;SAVE R0
7778  033432  010137  033446                  MOV     R1,$HINUM       ;;SAVE R1
7779  033436  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
7780  033440  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
7781  033442  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7782  033444  000207                          RTS     PC              ;;RETURN
7783  033446  176543                  $HINUM: .WORD   176543
7784  033450  123456                  $LONUM: .WORD   123456
7785
7786                                  .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
7787
7788                                  ;;**************************************************************
7789                                  ;*SAVE R0-R5
7790                                  ;*CALL:
7791                                  ;*      SAVREG
7792                                  ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
7793                                  ;*
7794                                  ;*TOP---(+16)
7795                                  ;* +2---(+18)
```

```
                                ;* +4---R5
                                ;* +6---R4
                                ;* +8---R3
                                ;*+10---R2
                                ;*+12---R1
                                ;*+14---R0
                                ;
033452                          $SAVREG:
033452  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
033454  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
033456  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
033460  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
033462  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
033464  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
033466  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
033472  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
033476  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
033502  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
033506  000002                          RTI
                                ;
                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
033510                          $RESREG:
033510  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
033514  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
033520  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
033524  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
033530  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
033532  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
033534  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
033536  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
033540  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
033542  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
033544  000002                          RTI
                                .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                                ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                                ;*POSITIVE.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB2D
                                ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                ;                               ;;IS ON THE STACK
                                ;
033546  104412                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
033550  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
033554  012700  033726                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
033560  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
033564  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
033566  012202                          MOV     (R2)+,R2
033570  012737  000012  033644          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
```

```
7852  033576  012704  033656              MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
7853  033602  012705  033660              MOV     #$TNPWR+2,R5
7854  033606  005003              1$:     CLR     R3              ;;CLEAR PARTIAL
7855  033610  161401              2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
7856  033612  005602                      SBC     R2
7857  033614  161502                      SUB     (R5),R2
7858  033616  002402                      BLT     3$              ;;BR IF TEN POWER TO LARGE
7859  033620  005203                      INC     R3              ;;ADD 1 TO PARTIAL
7860  033622  000772                      BR      2$              ;;LOOP
7861  033624  062401              3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
7862  033626  005502                      ADC     R2
7863  033630  062402                      ADD     (R4)+,R2
7864  033632  022525                      CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
7865  033634  052703  000060              BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
7866  033640  110320                      MOVB    R3,(R0)+        ;;SAVE IT
7867  033642  005327                      DEC     (PC)+           ;;DONE?
7868  033644  000000              4$:     .WORD   0
7869  033646  001357                      BNE     1$              ;;BR IF NO
7870  033650  105020                      CLRB    (R0)+           ;;TERMINATOR
7871  033652  104413                      RESREG                  ;;RESTORE REGISTERS
7872  033654  000207                      RTS     PC              ;;RETURN
7873  033656  145000              $TNPWR: 145000                  ;;1.0E09
7874  033660  035632                      35632
7875  033662  160400                      160400                  ;;1.0E08
7876  033664  002765                      2765
7877  033666  113200                      113200                  ;;1.0E07
7878  033670  000230                      230
7879  033672  041100                      041100                  ;;1.0E06
7880  033674  000017                      17
7881  033676  103240                      103240                  ;;1.0E05
7882  033700  000001                      1
7883  033702  023420                      23420                   ;;1.0E04
7884  033704  000000                      0
7885  033706  001750                      1750                    ;;1.0E03
7886  033710  000000                      0
7887  033712  000144                      144                     ;;1.0E02
7888  033714  000000                      0
7889  033716  000012                      12                      ;;1.0E01
7890  033720  000000                      0
7891  033722  000001                      1                       ;;1.0E00
7892  033724  000000                      0
7893  033726  000014              $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
7894
7895                                      .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
7896
7897                                      ;;**********************************************************
7898                                      ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
7899                                      ;*UNSIGNED OCTAL ASCIZ NUMBER.
7900                                      ;*CALL
7901                                      ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7902                                      ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
7903                                      ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
7904
7905
7906  033742  104412              $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
7907  033744  016601  000002              MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
```

```
7908  033750  012705  034061              MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
7909  033754  012704  000014              MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
7910  033760  012703  177770              MOV     #^C7,R3         ;;MASK
7911  033764  012100                      MOV     (R1)+,R0        ;;LOWER WORD
7912  033766  012101                      MOV     (R1)+,R1        ;;HIGH WORD
7913  033770  005002                      CLR     R2              ;;TERMINATOR
7914  033772  110245              1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
7915  033774  010002                      MOV     R0,R2           ;;GET THIS DIGIT
7916  033776  005304                      DEC     R4              ;;COUNT THIS CHARACTER
7917  034000  003007                      BGT     3$              ;;BR IF NOT THE LAST DIGIT
7918  034002  001405                      BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
7919  034004  005205                      INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
7920  034006  010566  000002              MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
7921  034012  104413                      RESREG                  ;;RESTORE ALL REGISTERS
7922  034014  000207                      RTS     PC              ;;RETURN TO USER
7923  034016  006203              2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
7924  034020  006001              3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
7925  034022  006000                      ROR     R0              ;;      THE NEXT OCTAL DIGIT
7926  034024  006001                      ROR     R1
7927  034026  006000                      ROR     R0
7928  034030  006001                      ROR     R1
7929  034032  006000                      ROR     R0
7930  034034  040302                      BIC     R3,R2           ;;MASK OUT ALL JUNK
7931  034036  062702  000060              ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
7932  034042  000753                      BR      1$              ;;GO PUT IT IN THE DATA TABLE
7933  034044  000016              $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
7934
7935                                      .SBTTL  TRAP DECODER
7936
7937                                      ;;**************************************************************
7938                                      ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
7939                                      ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
7940                                      ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
7941                                      ;*GO TO THAT ROUTINE.
7942
7943  034062  010046              $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
7944  034064  016600  000002              MOV     2(SP),R0        ;;GET TRAP ADDRESS
7945  034070  005740                      TST     -(R0)           ;;BACKUP BY 2
7946  034072  111000                      MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
7947  034074  006300                      ASL     R0              ;;POSITION FOR INDEXING
7948  034076  016000  034116              MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
7949  034102  000200                      RTS     R0              ;;GO TO ROUTINE
7950
7951
7952                                      ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
7953
7954  034104  011646              $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
7955  034106  016666  000004  000002      MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
7956  034114  000002                      RTI                     ;;RESTORE THE PSW
7957
7958                                      .SBTTL  TRAP TABLE
7959
7960                                      ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
7961                                      ;*BY THE "TRAP" INSTRUCTION.
7962
7963                                      ;       ROUTINE
```

```
7964
7965  034116  034104                  $TRPAD: .WORD   $TRAP2
7966  034120  031326                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
7967  034122  032264                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
7968  034124  032240                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
7969  034126  032300                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
7970  034130  032466                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
7971
7972  034132  032762                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
7973
7974  034134  032712                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
7975  034136  033174                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
7976  034140  030510                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
7977  034142  033452                          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
7978  034144  033510                          $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
7979  034146  027734                          $DSPLY  ;;CALL=DISPLY   TRAP+14(104414) ROUTINE TO TYPE ERROR MESSAGES
7980           000032                  $TERM=.-$TRPAD
7981
7982                                  ;;**************************************************************
7983
7984
7985
7986                                  .SBTTL  SINGLE/DUAL PORT RH70/RM03 DRIVER (REV 1.0)
7987
7988                                  ;COPYRIGHT (C) 1976
7989                                  ;DIGITAL EQUIPMENT CORP.
7990                                  ;MAYNARD, MA 01754
7991                                  ;AUTHOR(S): JIM LACEY/CHUCK HESS/C. CHEN
7992
7993                                  ;;**************************************************************
7994
7995                                  ;STORAGE FOR RMDS, RMER1, RMER2, AND RMMR2 ON AN ERROR "2"
7996                                          ;RMERRS   = RMDS
7997                                          ;RMERRS+2 = RMER1
7998                                          ;RMERRS+4 = RMER2
7999                                          ;RMERRS+6 = RMMR2
8000
8001  034150  000000  000000  000000  RMERRS: .WORD   0,0,0,0
8002  034156  000000
8003
8004                                  ;TABLE OF DRIVE ACTIVE INDICATORS (DRVACT=8 BYTES)
8005                                          ;DRVACT=0 IF DRIVE IS IDLE
8006                                          ;DRVACT>0 IF DRIVE IS ACTIVE WITH A COMMAND
8007                                          ;DRVACT<0 IF DRIVE IS ACTIVE WITH AN ERROR RECOVERY OPERATION
8008
8009  034160      000                 DRVACT: .BYTE   0               ;DRIVE 0
8010  034161      000                         .BYTE   0               ;DRIVE 1
8011  034162      000                         .BYTE   0               ;DRIVE 2
8012  034163      000                         .BYTE   0               ;DRIVE 3
8013  034164      000                         .BYTE   0               ;DRIVE 4
8014  034165      000                         .BYTE   0               ;DRIVE 5
8015  034166      000                         .BYTE   0               ;DRIVE 6
8016  034167      000                         .BYTE   0               ;DRIVE 7
8017
8018                                  ;TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
8019                                          ;DRVSTA=0 IF DRIVE IS OFFLINE OR NONEXSITENT
```

```
                                        ;DRVSTA>0 IF DRIVE IS ONLINE
                                        ;DRVSTA<0 IF DRIVE IS UNSAFE

034170  000                     DRVSTA: .BYTE   0               ;DRIVE 0
034171  000                             .BYTE   0               ;DRIVE 1
034172  000                             .BYTE   0               ;DRIVE 2
034173  000                             .BYTE   0               ;DRIVE 3
034174  000                             .BYTE   0               ;DRIVE 4
034175  000                             .BYTE   0               ;DRIVE 5
034176  000                             .BYTE   0               ;DRIVE 6
034177  000                             .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                        ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                        ;DRVTYP=4 IF DRIVE IS RM03
                                        ;DRVTYP=-1 IF NOT RM03

034200  000                     DRVTYP: .BYTE   0               ;DRIVE 0
034201  000                             .BYTE   0               ;DRIVE 1
034202  000                             .BYTE   0               ;DRIVE 2
034203  000                             .BYTE   0               ;DRIVE 3
034204  000                             .BYTE   0               ;DRIVE 4
034205  000                             .BYTE   0               ;DRIVE 5
034206  000                             .BYTE   0               ;DRIVE 6
034207  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

034210  000                     DPINT:  .BYTE   0               ;DRIVE 0
034211  000                             .BYTE   0               ;DRIVE 1
034212  000                             .BYTE   0               ;DRIVE 2
034213  000                             .BYTE   0               ;DRIVE 3
034214  000                             .BYTE   0               ;DRIVE 4
034215  000                             .BYTE   0               ;DRIVE 5
034216  000                             .BYTE   0               ;DRIVE 6
034217  000                             .BYTE   0               ;DRIVE 7

                                ;TABLE OF PENDING DUAL PORT REQUESTS
                                        ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
                                        ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE

034220  000                     DPRQS:  .BYTE   0               ;DRIVE 0
034221  000                             .BYTE   0               ;DRIVE 1
034222  000                             .BYTE   0               ;DRIVE 2
034223  000                             .BYTE   0               ;DRIVE 3
034224  000                             .BYTE   0               ;DRIVE 4
034225  000                             .BYTE   0               ;DRIVE 5
034226  000                             .BYTE   0               ;DRIVE 6
034227  000                             .BYTE   0               ;DRIVE 7

                                ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
                                        ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
                                        ;"DPB" OF THE I/O OPERATION.
```

```
8076  034230  000000                TRNSWT: .WORD   0
8077
8078                                ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
8079                                        ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
8080                                        ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
8081                                        ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
8082                                        ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
8083
8084  034232  000000                SRCHWT: .WORD   0
8085
8086                                ;RM03 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
8087                                        ;ACTDRV=0 IF DRIVER IS INACTIVE
8088                                        ;ACTDRV>0 IF DRIVER IS ACTIVE
8089
8090  034234      000               ACTDRV: .BYTE   0
8091
8092                                ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
8093                                        ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
8094                                        ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
8095
8096  034235      000               ACTSTR: .BYTE   0
8097
8098                                ;UNLOAD FLAG (ULDFLG=8 BYTES)
8099                                        ;ULDFLG=0 IF NO UNLOAD COMMAND
8100                                        ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
8101                                        ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
8102
8103  034236      000               ULDFLG: .BYTE   0               ;DRIVE 0
8104  034237      000                       .BYTE   0               ;DRIVE 1
8105  034240      000                       .BYTE   0               ;DRIVE 2
8106  034241      000                       .BYTE   0               ;DRIVE 3
8107  034242      000                       .BYTE   0               ;DRIVE 4
8108  034243      000                       .BYTE   0               ;DRIVE 5
8109  034244      000                       .BYTE   0               ;DRIVE 6
8110  034245      000                       .BYTE   0               ;DRIVE 7
8111
8112                                ;LOOK AHEAD COUNT (LACNT=8 BYTES)
8113                                        ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
8114
8115  034246      000               LACNT:  .BYTE   0               ;DRIVE 0
8116  034247      000                       .BYTE   0               ;DRIVE 1
8117  034250      000                       .BYTE   0               ;DRIVE 2
8118  034251      000                       .BYTE   0               ;DRIVE 3
8119  034252      000                       .BYTE   0               ;DRIVE 4
8120  034253      000                       .BYTE   0               ;DRIVE 5
8121  034254      000                       .BYTE   0               ;DRIVE 6
8122  034255      000                       .BYTE   0               ;DRIVE 7
8123
8124                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
8125                                        ;SAVEFG <0 IF SAVE THE RH70/RM03 REGISTERS WHEN THE
8126                                        ;OPERATION IS COMPLETED AS PER (DPB+14).
8127                                        ;SAVEFG=0 IF SAVE THE RH70/RM03 REGISTERS, AS PER
8128                                        ;(DPB+14), AFTER AN ERROR.
8129
8130  034256  000000                SAVEFG: .WORD   0
8131
```

```
8132                                    ;SEEK FLAG (SEEKFG=1 WORD)
8133                                            ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
8134                                            ;FOR A DATA TRANSFER START A SEARCH COMMAND
8135                                            ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
8136                                            ;DISREGARD THE WINDOW
8137
8138  034260  177777                    SEEKFG: .WORD   -1
8139
8140                                    ;TIMEOUT TABLE (TIMER=8 WORDS)
8141                                            ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
8142
8143  034262  177777                    TIMER:  .WORD   -1      ;DRIVE 0
8144  034264  177777                            .WORD   -1      ;DRIVE 1
8145  034266  177777                            .WORD   -1      ;DRIVE 2
8146  034270  177777                            .WORD   -1      ;DRIVE 3
8147  034272  177777                            .WORD   -1      ;DRIVE 4
8148  034274  177777                            .WORD   -1      ;DRIVE 5
8149  034276  177777                            .WORD   -1      ;DRIVE 6
8150  034300  177777                            .WORD   -1      ;DRIVE 7
8151
8152                                    ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
8153                                            ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
8154                                            ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
8155
8156  034302  177777                    DTUW:   .WORD   -1
8157
8158                                    ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
8159                                            ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
8160                                            ;ATTENTION BIT
8161
8162  034304      001                   ATABIT: .BYTE   1       ;DRIVE 0
8163  034305      002                           .BYTE   2       ;DRIVE 1
8164  034306      004                           .BYTE   4       ;DRIVE 2
8165  034307      010                           .BYTE   10      ;DRIVE 3
8166  034310      020                           .BYTE   20      ;DRIVE 4
8167  034311      040                           .BYTE   40      ;DRIVE 5
8168  034312      100                           .BYTE   100     ;DRIVE 6
8169  034313      200                           .BYTE   200     ;DRIVE 7
8170
8171                                    ;FSRM03 TO RH70 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
8172                                    ;CALLING IT FATAL (MCPEMX=1 WORD)
8173
8174  034314  000003                    MCPEMX: .WORD   3
8175
8176                                    ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH70/RM03),
8177                                    ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).
8178
8179  034316  176700                    RMADR:  .WORD   176700
8180  034320  000254  000240           RMVEC:  .WORD   254,5*32.
8181
8182                                    ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
8183
8184  034324  000004                    MXLACT: .WORD   4
8185                                    ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
8186
8187  034326  001000                    MXDLTA: .WORD   8.*64.
```

```
                                ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)

034330  000200                  MNDLTA: .WORD   2*64.
                                ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)

034332  000005                  MXWNDW: .WORD   5

                                ;DEFINITIONS OF THE RH70/RM03 ADDRESS INDEXES

        000000                  RMCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
        000002                  RMWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
        000004                  RMBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
        000006                  RMDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
        000010                  RMCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
        000012                  RMDS=12                 ;DRIVE STATUS REGISTER (DRIVE REG 01)
        000014                  RMER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
        000016                  RMAS=16                 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
        000020                  RMLA=20                 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
        000022                  RMDB=22                 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
        000024                  RMMR1=24                ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
        000026                  RMDT=26                 ;DRIVE TYPE REGISTER (DRIVE REG. 06)
        000030                  RMSN=30                 ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
        000032                  RMOF=32                 ;OFFSET REGISTER (DRIVE REG. 11)
        000034                  RMDC=34                 ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
        000036                  RMHR=36                 ;DUMMY  ADDRESS REGISTER (DRIVE REG. 13)
        000040                  RMMR2=40                ;MAINTENANCE REGISTER #2
        000042                  RMER2=42                ;ERROR REGISTER #2 (DRIVE REG. 15)
        000044                  RMEC1=44                ;ECC POSITION REGISTER (DRIVE REG. 16)
        000046                  RMEC2=46                ;ECC PATTERN REGISTER (DRIVE REG.  17)

                                ;RH70/RM03 DRIVER INITIALIZATION CODE
                                        ;THIS ROUTINE WILL DETERMINE WHICH RM03 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,RMINIT
                                ;       RETURN
                                ;
                                ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                ;
034334  104412                  RMINIT: SAVREG                  ;SAVE R0 - R5
034336  013746  177776                  MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
034342  012737  000240  177776          MOV     #<5*32.>,@#PS   ;CHANGE THE PRIORITY TO 5
034350  004737  042230                  JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
034354  012701  034150                  MOV     #RMERRS,R1      ;FIRST ADDRESS TO BE CLEARED
034360  012702  034260                  MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
034364  005021                  1$:     CLR     (R1)+           ;CLEAR
034366  020102                          CMP     R1,R2           ;ARE WE DONE?
034370  103775                          BLO     1$              ;BRANCH IF NO
034372  012702  034302                  MOV     #DTUW,R2        ;LAST ADDRESS
034376  012721  177777          2$:     MOV     #-1,(R1)+       ;INITIALIZE
034402  020102                          CMP     R1,R2           ;DONE?
034404  101774                          BLOS    2$              ;LOOP IF NO
```

```
8244  034406  005037  034170                  CLR     DRVSTA          ;SET ALL DRIVES TO OFFLINE
8245  034412  005037  034172                  CLR     DRVSTA+2
8246  034416  005037  034174                  CLR     DRVSTA+4
8247  034422  005037  034176                  CLR     DRVSTA+6
8248  034426  013703  034320                  MOV     RMVEC,R3        ;SETUP THE RH70/RM03 VECTOR
8249  034432  012723  037122                  MOV     #ISR,(R3)+
8250  034436  013713  034322                  MOV     RMVEC+2,(R3)
8251  034442  013704  034316                  MOV     RMADR,R4        ;FIRST ADDRESS OF RH70/RM03
8252  034446  012764  000040  000010          MOV     #BIT05,RMCS2(R4)  ;MASSBUS INIT
8253  034454  005001                          CLR     R1              ;START WITH DRIVE 0
8254  034456  004037  034546          3$:     JSR     R0,DRVINT       ;INIT THE DRIVE
8255  034462  000401                          BR      4$              ;'DVA' NOT SET OR PARITY ERROR
8256  034464  000402                          BR      5$              ;NORMAL RETURN
8257  034466  105061  034170          4$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
8258  034472  005201                  5$:     INC     R1              ;GO TO NEXT DRIVE
8259  034474  042701  177770                  BIC     #^C7,R1         ;MASK OUT UNUSED BITS
8260  034500  001366                          BNE     3$              ;BR IF MORE DRIVES TO GO
8261  034502  012701  000007                  MOV     #7,R1           ;START WITH DRIVE 7
8262  034506  005037  177776                  CLR     @#PS            ;CLEAR THE PROCESSOR STATUS
8263  034512  105761  034210          6$:     TSTB    DPINT(R1)       ;WAITING FOR DRIVE TO SWITCH PORTS ?
8264  034516  001405                          BEQ     8$              ;BR NOT WAITING
8265  034520  004737  041664                  JSR     PC,SET.IE       ;SET INTERRUPT
8266  034524  105761  034210          7$:     TSTB    DPINT(R1)       ;DRIVE SWITCHED PORTS ?
8267  034530  001375                          BNE     7$              ;BR IF NOT
8268  034532  005301                  8$:     DEC     R1              ;GO TO THE NEXT DRIVE
8269  034534  100366                          BPL     6$              ;CHECK NEXT DRIVE
8270  034536  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
8271  034542  104413                          RESREG                  ;RESTORE R0 - R5
8272  034544  000207                          RTS     PC              ;BYE-BYE
8273
8274                                  ;DRIVE INITILIZATION ROUTINE
8275                                          ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
8276                                          ;AN RM03. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
8277                                          ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
8278                                          ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
8279                                          ;DRVSTA IS SET TO THE PROPER CONDITION.
8280                                  ;CALL
8281                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
8282                                  ;       MOV     RMADR,R4        ;UNIBUS ADDRESS OF RH70/RM03 (RMCS1)
8283                                  ;       JSR     R0,DRVINT       ;CALLED BY A JSR
8284                                  ;       RETURN1                 ;ERROR OCCURRED (PARITY)
8285                                  ;       RETURN2                 ;NORMAL RETURN
8286                                  ;
8287
8288  034546  010546                  DRVINT: MOV     R5,-(SP)        ;SAVE R5
8289  034550  105061  034170          DULP:   CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
8290  034554  105061  034200                  CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
8291  034560  105061  034236                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
8292  034564  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT A DRIVE
8293  034570  112764  000111  000000          MOVB    #111,RMCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
8294  034576  032764  010000  000010          BIT     #BIT12,RMCS2(R4) ;NONEXISTENT DRIVE?
8295  034604  001403                          BEQ     1$              ;NO---BRANCH
8296  034606  004737  041664                  JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
8297  034612  000476                          BR      6$              ;LEAVE THIS ROUTINE
8298  034614  105061  034170          1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
8299  034620  032764  004000  000000          BIT     #BIT11,RMCS1(R4)  ;SEE IF DRIVE AVAILABLE
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 8300  034626  001750                        BEQ     DULP            ;BR IF DRIVE NOT AVAILABLE
 8301  034630  004037  041204                JSR     R0,RD.RM        ;READ THE DRIVE TYPE REG.
 8302  034634  000026                        RMDT
 8303  034636  035034                        8$                      ;ERROR RETURN ADDRESS
 8304  034640  012605                        MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
 8305  034642  112761  000004  034200        MOVB    #4,DRVTYP(R1)   ;SET RM03 INDICATOR
 8306  034650  022705  020024                CMP     #20024,R5       ;SINGLE PORT RM03 ?
 8307  034654  001407                        BEQ     2$              ;BR IF YES
 8308  034656  022705  024024                CMP     #24024,R5       ;DUAL PORT RM03 ?
 8309  034662  001404                        BEQ     2$              ;BR IF YES
 8310  034664  112761  177777  034200        MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
 8311  034672  000446                        BR      6$              ;EXIT
 8312  034674  012746  000121          2$:   MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
 8313  034700  004037  041360                JSR     R0,WRT.RM
 8314  034704  000000                        RMCS1
 8315  034706  035034                        8$
 8316  034710  012746  010000                MOV     #BIT12,-(SP)    ;SET FMT22=1
 8317  034714  004037  041360                JSR     R0,WRT.RM
 8318  034720  000032                        RMOF
 8319  034722  035034                        8$
 8320  034724  004037  041204                JSR     R0,RD.RM        ;READ RMDS
 8321  034730  000012                        RMDS
 8322  034732  035034                        8$
 8323  034734  012605                        MOV     (SP)+,R5        ;AND SAVE IT IN R5
 8324  034736  100015                        BPL     4$              ;BRANCH IF ATA=0
 8325  034740  116164  034304  000016        MOVB    ATABIT(R1),RMAS(R4) ;CLEAR ATTENTION BIT
 8326  034746  004037  041204                JSR     R0,RD.RM        ;FIND OUT WHY ATA=1
 8327  034752  000014                        RMER1
 8328  034754  035034                        8$
 8329  034756  006126                        ROL     (SP)+           ;IS IT UNSAFE?
 8330  034760  100004                        BPL     4$              ;BR IF NOT
 8331  034762  112761  177777  034170        MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
 8332  034770  000407                        BR      6$              ;EXIT
 8333  034772  005105                4$:     COM     R5              ;CHECK MOL, DPR, DRY, AND VV
 8334  034774  042705  167077                BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
 8335  035000  001003                        BNE     6$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
 8336  035002  112761  000001  034170        MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
 8337  035010  005720                6$:     TST     (R0)+           ;STEP OVER THE ERROR RETURN
 8338  035012  000410                        BR      8$              ;EXIT
 8339  035014  006301                7$:     ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
 8340  035016  012761  003720  034262        MOV     #2000.,TIMER(R1)  ;START 2 SEC TIMER
 8341  035024  006201                        ASR     R1              ;RESTORE R1
 8342  035026  112761  177777  034210        MOVB    #-1,DPINT(R1)   ;SET PORT INITIALIZE INIDICATOR
 8343  035034  012605                8$:     MOV     (SP)+,R5        ;RESTORE R5
 8344  035036  000200                        RTS     R0              ;EXIT
 8345
 8346                                ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
 8347                                ;
 8348                                ;CALL
 8349                                ;
 8350                                ;       JSR     R0,@#RM03       ;CALL THE RM03 DRIVER
 8351                                ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
 8352                                ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
 8353                                ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
 8354                                                                ;IS AN ERROR CONDITION
 8355
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 8356  035040  013746  177776          RM03:   MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
 8357  035044  013737  034322  177776          MOV     RMVEC+2,@#PS    ;DON'T ALLOW ANY RM03 INTERRUPTS
 8358  035052  112737  000001  034234          MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
 8359  035060  104412                          SAVREG                  ;SAVE R0 - R5
 8360  035062  011002                          MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
 8361  035064  005062  000016                  CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
 8362  035070  111201                          MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
 8363  035072  013704  034316                  MOV     RMADR,R4        ;UNIBUS ADDRESS OF RMCS1
 8364  035076  105761  034170                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
 8365  035102  003014                          BGT     1$              ;BRANCH IF ONLINE
 8366  035104  105761  034236                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
 8367  035110  001036                          BNE     3$              ;BRANCH IF YES
 8368  035112  105761  034210                  TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
 8369  035116  001042                          BNE     5$              ;BR IF YES
 8370  035120  004037  034546                  JSR     R0,DRVINT       ;GO INIT. THE DRIVE
 8371  035124  000434                          BR      4$              ;ERROR RETURN
 8372  035126  105761  034170                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
 8373  035132  003445                          BLE     6$              ;BR IF NOT
 8374  035134  105761  034220          1$:     TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 8375  035140  001031                          BNE     5$              ;BR IF YES
 8376  035142  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
 8377  035146  004037  042326                  JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
 8378  035152  000460                          BR      9$              ;QUEUE IS FULL
 8379  035154  122762  000103  000002          CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
 8380  035162  001003                          BNE     2$              ;BR IF NO
 8381  035164  112761  177777  034236          MOVB    #-1,ULDFLG(R1)  ;SET THE "UNLOAD IN QUEUE" FLAG
 8382  035172  105761  034160          2$:     TSTB    DRVACT(R1)      ;IS THIS DRIVE ACTIVE?
 8383  035176  001043                          BNE     8$              ;BR IF YES
 8384  035200  004737  035332                  JSR     PC,OPT          ;CALL THE OPTIMIZER
 8385  035204  000440                          BR      8$
 8386  035206  012762  120000  000016  3$:     MOV     #BIT15!BIT13,16(R2) ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
 8387  035214  000434                          BR      8$              ;EXIT
 8388  035216  004737  036412          4$:     JSR     PC,CI7          ;GO HANDLE THE PARITY ERROR
 8389  035222  000431                          BR      8$
 8390  035224  004037  042326          5$:     JSR     R0,DRVQUE       ;PUT REQUEST IN QUEUE
 8391  035230  000431                          BR      9$              ;QUEUE IS FULL
 8392  035232  032714  000100                  BIT     #BIT06,(R4)     ;IE BIT SET ?
 8393  035236  001023                          BNE     8$              ;YES
 8394  035240  004737  041664                  JSR     PC,SET.IE       ;SET THE INTERRUPT
 8395  035244  000420                          BR      8$              ;RETURN
 8396  035246  105761  034170          6$:     TSTB    DRVSTA(R1)      ;SEE IF DRIVE OFFLINE OR UNSAFE
 8397  035252  002412                          BLT     7$              ;BR IF UNSAFE
 8398  035254  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE ERROR INDICATOR
 8399  035262  105761  034200                  TSTB    DRVTYP(R1)      ;SEE IF OFFLINE OR NONEXISTENT
 8400  035266  001007                          BNE     8$              ;BR IF OFFLINE
 8401  035270  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;REPORT DRIVE NONEXISTENT
 8402  035276  000403                          BR      8$              ;GO TO EXIT
 8403  035300  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2)  ;DRIVE IS UNSAFE
 8404  035306  104413                  8$:     RESREG                  ;RESTORE R0 - R5
 8405  035310  005720                          TST     (R0)+           ;SETUP FOR NORMAL RETURN
 8406  035312  000401                          BR      10$             ;FINISH UP, THEN EXIT
 8407  035314  104413                  9$:     RESREG                  ;RESTORE R0 - R5
 8408  035316  005720                  10$:    TST     (R0)+           ;CORRECT THE RETURN ADDRESS
 8409  035320  105037  034234                  CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
 8410  035324  012637  177776                  MOV     (SP)+,@#PS      ;RETURN "PS" TO USER LEVEL
 8411  035330  000200                          RTS     R0              ;RETURN TO CALLER
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8412
8413                                    ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
8414                                    ;
8415                                    ;CALL
8416                                    ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
8417                                    ;       JSR     PC,OPT          ;SETUP A COMMAND
8418                                    ;
8419  035332  104412                   OPT:    SAVREG                  ;SAVE R0 - R5
8420  035334  013746  177776                   MOV     @#PS,-(SP)      ;SAVE PROC. STATUS
8421  035340  146137  034304  034232           BICB    ATABIT(R1),SRCHWT       ;CLEAR LA SEACH FLAG
8422  035346  105061  034220                   CLRB    DPRQS(R1)       ;RESET THE PORT REQ FLAG ****
8423  035352  004737  042402                   JSR     PC,GETREQ       ;GET "DPB" POINTER OF REQUEST
8424  035356  005702                           TST     R2              ;IS THERE A REQUEST IN QUEUE?
8425  035360  001472                           BEQ     7$              ;NO--BRANCH TO EXIT
8426  035362  010164  000010                   MOV     R1,RMCS2(R4)    ;LOAD THE DRIVE ADDRESS *******
8427  035366  012764  000111  000000           MOV     #111,RMCS1(R4)  ;CLEAR THE DRIVE
8428  035374  032764  004000  000000           BIT     #BIT11,RMCS1(R4)        ;DVA SET ?
8429  035402  001446                           BEQ     5$              ;TO PROT REQUEST ,IF NOT
8430  035404  105761  034170           10$:    TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
8431  035410  003014                           BGT     1$              ;YES--BRANCH
8432  035412  004737  042424                   JSR     PC,POPQUE       ;NO--REMOVE REQUEST FROM QUEUE
8433  035416  012762  140000  000016           MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE STATUS/ERROR INDICATOR
8434  035424  105761  034170                   TSTB    DRVSTA(R1)      ;IS DRIVE UNSAFE ?
8435  035430  100053                           BPL     8$              ;BR TO EXIT IF NOT
8436  035432  012762  110000  000016           MOV     #BIT15!BIT12,16(R2)  ;SET UNSAFE STATUS/ERROR INDICATOR
8437  035440  000447                           BR      8$              ;BRANCH TO EXIT
8438  035442                           1$:
8439                                    ;       MOV     #111,-(SP)      ;LOAD COMMAND ONTO THE STACK
8440                                    ;       JSR     R0,WRT.RM       ;LOAD THE REGISTER
8441                                    ;       RMCS1                   ;REGISTER INCREMENT
8442                                    ;       6$                      ;ERROR RETURN ADDRESS
8443                                    ;       BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
8444                                    ;       BEQ     9$              ;BR IF NOT
8445  035442  122762  000150  000002           CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
8446  035450  002403                           BLT     2$              ;YES--BRANCH
8447  035452  004737  035776                   JSR     PC,CI4          ;CALL THE COMMAND INITIATOR
8448  035456  000440                           BR      8$              ;BRANCH TO EXIT
8449  035460  005737  034302           2$:     TST     DTUW            ;DATA TRANSFER UNDERWAY?
8450  035464  002012                           BGE     4$              ;YES--GO START A SEARCH
8451  035466  005737  034260                   TST     SEEKFG          ;DO IMPLIED SEEKS?
8452  035472  100404                           BMI     3$              ;YES---BRANCH
8453  035474  004037  036746                   JSR     R0,LA           ;NO--DO LOOK AHEAD
8454  035500  000427                           BR      8$              ;RETURN HERE ON A PARITY ERROR
8455  035502  000403                           BR      4$              ;GO START A SEARCH
8456  035504  004737  035570           3$:     JSR     PC,CI1          ;START A DATA TRANSFER
8457  035510  000423                           BR      8$
8458  035512  004737  035676           4$:     JSR     PC,CI3          ;START A SEARCH
8459  035516  000420                           BR      8$              ;GO TO THE EXIT
8460  035520  112761  177777  034220   5$:     MOVB    #-1,DPRQS(R1)   ;SET PORT REQUEST INDICATOR
8461  035526  010103                           MOV     R1,R3           ;SET UP TO ADDRESS WORDS
8462  035530  006303                           ASL     R3              ;CONVERT TO WORD INDEX
8463  035532  012763  023420  034262           MOV     #10000.,TIMER(R3)  ;START 10 SEC TIMER
8464  035540  000402                           BR      7$              ;EXIT
8465  035542  004737  036412           6$:     JSR     PC,CI7          ;PROCESS THE PARITY ERROR
8466  035546  032714  000100           7$:     BIT     #BIT06,(R4)     ;SEE IF 'IE' ALREADY SET
8467  035552  001002                           BNE     8$              ;BR IF SET
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 8468  035554  004737  041664            JSR     PC,SET.IE       ;SET "IE" WITHOUT A "TRE"
 8469  035560  012637  177776      8$:   MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
 8470  035564  104413                    RESREG                  ;RESTORE R0 - R5
 8471  035566  000207                    RTS     PC
 8472
 8473                              ;COMMAND INITIATOR
 8474                              ;
 8475                              ;CALL
 8476                                      MOV     #DRVNUM,R1      ;DRIVE NUMBER
 8477                                      MOV     #DPB,R2         ;ADDRESS OF DPB
 8478                                      JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
 8479                                                              ;WHERE:
 8480                                                              ;CI1=DATA TRANSFER
 8481                                                              ;CI2=SEARCH REQUESTED BY DATA XFER
 8482                                                              ;CI4=NOT DATA TRANSFER
 8483
 8484  035570  004737  042424      CI1:  JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
 8485  035574  010237  034230            MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
 8486  035600  010203                    MOV     R2,R3           ;DPB ADDRESS TO R3
 8487  035602  013704  034316            MOV     RMADR,R4        ;RMCS1 ADDRESS
 8488  035606  010164  000010            MOV     R1,RMCS2(R4)    ;SELECT DRIVE
 8489  035612  062703  000004            ADD     #4,R3           ;DESIRED WORD COUNT
 8490  035616  062704  000002            ADD     #2,R4           ;RMWC ADDRESS
 8491  035622  012324                    MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
 8492  035624  012324                    MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
 8493  035626  012346                    MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
 8494  035630  004037  041360            JSR     R0,WRT.RM       ;CALL THE LOAD(WRITE) ROUTINE
 8495  035634  000006                    RMDA                    ;INDEX OF REGISTER TO LOAD
 8496  035636  036412                    CI7                     ;ERROR RETURN ADDRESS
 8497  035640  012346                    MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
 8498  035642  004037  041360            JSR     R0,WRT.RM
 8499  035646  000034                    RMDC
 8500  035650  036412                    CI7
 8501  035652  016246  000002            MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
 8502  035656  004037  041360            JSR     R0,WRT.RM
 8503  035662  000000                    RMCS1
 8504  035664  036412                    CI7
 8505  035666  010137  034302            MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
 8506  035672  000137  036354            JMP     CI5
 8507  035676  013704  034316      CI3:  MOV     RMADR,R4        ;RMCS1 ADDRESS
 8508  035702  010164  000010            MOV     R1,RMCS2(R4)    ;SELECT DRIVE
 8509  035706  016246  000012            MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
 8510  035712  004037  041360            JSR     R0,WRT.RM
 8511  035716  000034                    RMDC
 8512  035720  036412                    CI7
 8513  035722  116203  000010            MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
 8514                                    SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
 8515                                    BGE     1$
 8516                                    ADD     #32.,R3
 8517  035726  010346            1$:   MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
 8518  035730  042716  177740            BIC     #177740,(SP)    ;CHOP OF ALL EXENTED BITS ,IF ANY
 8519  035734  116266  000011  000001    MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
 8520  035742  004037  041360            JSR     R0,WRT.RM       ;LOAD DESIRED TRACK & SECTOR
 8521  035746  000006                    RMDA
 8522  035750  036412                    CI7
 8523  035752  012746  000131            MOV     #131,-(SP)      ;START A SEARCH
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8524  035756  004037  041360              JSR     R0,WRT.RM
8525  035762  000008                      RMCS1
8526  035764  036412                      CI7
8527  035766  156137  034304  034232      BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
8528  035774  000567                      BR      CI5
8529  035776  013704  034316      CI4:    MOV     RMADR,R4        ;RMCS1 ADDRESS
8530  036002  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8531  036006  116203  000002              MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
8532  036012  122703  000131              CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
8533  036016  001007                      BNE     1$              ;BRANCH IF NO
8534  036020  016246  000010              MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
8535  036024  004037  041360              JSR     R0,WRT.RM
8536  036030  000006                      RMDA
8537  036032  036412                      CI7
8538  036034  000403                      BR      2$              ;GO LOAD CYLINDER
8539  036036  122703  000105      1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
8540  036042  001007                      BNE     3$              ;BRANCH IF NO
8541  036044  016246  000012      2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
8542  036050  004037  041360              JSR     R0,WRT.RM
8543  036054  000034                      RMDC
8544  036056  036412                      CI7
8545  036060  000546                      BR      CI6
8546  036062  122703  000115      3$:     CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
8547  036066  001013                      BNE     4$              ;BR IF NO
8548  036070  004037  041204              JSR     R0,RD.RM        ;MERGE THE OFFSET VALUE INTO RMOF
8549  036074  000032                      RMOF                    ;BUT DON'T CHANGE THE UPPER
8550  036076  036412                      CI7
8551  036100  116216  000001              MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
8552  036104  004037  041360              JSR     R0,WRT.RM       ;REGISTER (RMOF)
8553  036110  000032                      RMOF
8554  036112  036412                      CI7
8555  036114  000530                      BR      CI6             ;GO START THE COMMAND
8556  036116  122703  000107      4$:     CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
8557  036122  001525                      BEQ     CI6             ;BRANCH IF YES
8558  036124  122703  000117              CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
8559  036130  001522                      BEQ     CI6             ;BRANCH IF YES
8560  036132  122703  000103              CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
8561  036136  001016                      BNE     5$              ;BRANCH IF NO
8562  036140  112761  000001  034160      MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
8563  036146  105061  034170              CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
8564  036152  112761  000001  034236      MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
8565  036160  010346                      MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
8566  036162  004037  041360              JSR     R0,WRT.RM
8567  036166  000000                      RMCS1
8568  036170  036412                      CI7
8569  036172  000207                      RTS     PC              ;RETURN TO USER
8570  036174  122703  000143      5$:     CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
8571  036200  001014                      BNE     6$              ;BRANCH IF NO
8572  036202  004037  041204              JSR     R0,RD.RM        ;READ THE OFFSET REGISTER
8573  036206  000032                      RMOF
8574  036210  036412                      CI7
8575  036212  116266  000001  000001      MOVB    1(R2),1(SP)     ;COMBINE "FMT22","ECI", AND "HCI"
8576  036220  004037  041360              JSR     R0,WRT.RM       ;LOAD "FMT22", "ECI", AND/OR "HCI".
8577  036224  000032                      RMOF
8578  036226  036412                      CI7
8579  036230  000436                      BR      12$
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8580  036232  122703  000141          6$:   CMPB   #141,R3          ;IS IT A "GET REGISTER" COMMAND?
8581  036236  001023                        BNE    10$              ;BRANCH IF NO
8582  036240  016203  000006          7$:   MOV    6(R2),R3         ;POINTS TO 1ST ADDRESS OF WHERE
8583                                        ;TO PUT THE REGISTER(S)
8584  036244  116237  000010  036262        MOVB   10(R2),9$        ;INIT. THE INDEX FOR THE FIRST REG.
8585  036252  116205  000011                MOVB   11(R2),R5        ;INDEX OF LAST REG. TO MOVE
8586  036256  004037  041204          8$:   JSR    R0,RD.RM         ;READ RH70/RM03 REGISTER
8587  036262  000000          9$:   RMCS1                           ;INDEX OF REG. TO READ
8588  036264  036412                CI7
8589  036266  012623                MOV    (SP)+,(R3)+              ;GET THE CONTENTS OF RH70//RM03 REG.
8590  036270  023705  036262        CMP    9$,R5                    ;LAST REG. BEEN READ?
8591  036274  001414                BEQ    12$                      ;GET OUT IF YES
8592  036276  062737  000002  036262  ADD    #2,9$                  ;INCREASE THE INDEX BY 2
8593  036304  000764                BR     8$                       ;LOOP--MORE TO READ
8594  036306  122703  000145         10$:   CMPB   #145,R3          ;IS IT A "SELECT DRIVE" COMMAND?
8595  036312  001405                BEQ    12$                      ;BRANCH IF YES
8596  036314  010346          11$:  MOV    R3,-(SP)                 ;LOAD THE COMMAND
8597  036316  004037  041360        JSR    R0,WRT.RM
8598  036322  000000                RMCS1
8599  036324  036412                CI7
8600  036326  004737  042424         12$:  JSR    PC,POPQUE          ;REMOVE REQ. FROM QUEUE
8601  036332  052762  000200  000016  BIS    #BIT07,16(R2)          ;SET THE "DONE" BIT
8602  036340  005737  034256        TST    SAVEFG                   ;SAVE THE RH70/RM03 REGISTERS?
8603  036344  100002                BPL    13$                      ;BRANCH IF NO
8604  036346  004737  041546        JSR    PC,SVRH70                ;YES--GO SAVE THE REGISTERS
8605  036352  000207         13$:   RTS    PC                       ;RETURN TO USER
8606  036354  006301          CI5:  ASL    R1
8607  036356  012761  001750  034262  MOV    #1000.,TIMER(R1)       ;SET A ONE SECOND TIMER
8608  036364  006201                ASR    R1
8609  036366  112761  000001  034160  MOVB   #1,DRVACT(R1)          ;SET THE DRIVE ACTIVE
8610  036374  000207                RTS    PC                       ;RETURN TO THE USER
8611  036376  010346          CI6:  MOV    R3,-(SP)                 ;LOAD THE COMMAND
8612  036400  004037  041360        JSR    R0,WRT.RM
8613  036404  000000                RMCS1
8614  036406  036412                CI7
8615  036410  000761                BR     CI5
8616  036412  032764  010000  000010  CI7:  BIT    #BIT12,RMCS2(R4)  ;DRIVE NON-EXISTENT ?
8617  036420  001034                BNE    CI8                      ;BR IF YES
8618  036422  005702          1$:   TST    R2                       ;ANYTHING IN QUEUE ?
8619  036424  001405                BEQ    CI7B                     ;BR IF NOT
8620  036426  012762  104000  000016  MOV    #BIT15!BIT11,16(R2)    ;SET "PARITY" ERROR INDICATOR
8621  036434  004737  041546        JSR    PC,SVRH70                ;GO SAVE THE RH70/RM03 REGISTERS
8622  036440  012746  000111         CI7B: MOV    #111,-(SP)         ;DO A "DRIVE CLEAR"
8623  036444  004037  041360        JSR    R0,WRT.RM
8624  036450  000000                RMCS1
8625  036452  036512                CI8
8626  036454  004737  042306        JSR    PC,EMPTYQ                ;EMPTY THE QUEUE
8627  036460  105061  034236        CLRB   ULDFLG(R1)               ;CLEAR THE UNLOAD IN QUEUE FLAG
8628  036464  105061  034160        CLRB   DRVACT(R1)               ;DRIVE IS IDLE
8629  036470  020137  034302        CMP    R1,DTUW                  ;IF THIS DRIVE HAD AN I/O REQUEST
8630  036474  001005                BNE    1$                       ;IN PROGRESS CLEAR ALL OF THE FLAGS
8631  036476  005037  034230        CLR    TRNSWT
8632  036502  012737  177777  034302  MOV    #-1,DTUW
8633  036510  000207          1$:   RTS    PC
8634  036512  104412          CI8:  SAVREG                          ;SAVE R0 - R5
8635  036514  032764  010000  000010  BIT    #BIT12,RMCS2(R4)  ;IS 'NED' SET ?
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8636  036522  001002                          BNE     1$              ;BR IF YES
8637  036524  005001                          CLR     R1
8638  036526  005003                          CLR     R3
8639  036530  105761  034160          1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
8640  036534  001443                          BEQ     5$              ;BRANCH IF NO
8641  036536  013702  034230                  MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
8642  036542  020137  034302                  CMP     R1,DTUW         ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
8643  036546  001402                          BEQ     2$              ;BRANCH IF YES
8644  036550  004737  042402                  JSR     PC,GETREQ       ;GET THE DPB POINTER
8645  036554  005702                  2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
8646  036556  001415                          BEQ     4$              ;BR IF NOT
8647  036560  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;'NED' SET ?
8648  036566  001404                          BEQ     3$              ;BR IF NOT
8649  036570  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;SET 'DRIVE NON-EXISTENT' INDICATOR
8650  036576  000405                          BR      4$              ;CONTINUE
8651  036600  012762  102000  000016  3$:     MOV     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
8652  036606  004737  041546                  JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8653  036612  012763  177777  034262  4$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8654  036620  105061  034160                  CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
8655  036624  020137  034302                  CMP     R1,DTUW         ;IS THIS DRIVE SETUP FOR A TRANSFER
8656  036630  001005                          BNE     5$              ;BR IF NOT
8657  036632  012737  177777  034302          MOV     #-1,DTUW        ;RESET THE INDICATOR
8658  036640  005037  034230                  CLR     TRNSWT          ;CLEAR THE TRANSFER QUEUE
8659  036644  105061  034236          5$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
8660  036650  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;'NED' SET ?
8661  036656  001021                          BNE     6$              ;BR IF YES
8662  036660  005201                          INC     R1              ;MOVE TO THE NEXT DRIVE
8663  036662  062703  000002                  ADD     #2,R3
8664  036666  042701  177770                  BIC     #^C7,R1
8665  036672  001316                          BNE     1$              ;BRANCH IF MORE DRIVES
8666  036674  012737  177777  034302          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8667  036702  005037  034230                  CLR     TRNSWT          ;CLEAR THE 'TRANSFER WAIT' QUEUE
8668  036706  004737  042230                  JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
8669  036712  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;DO A MASSBUS INIT.
8670  036720  000406                          BR      7$              ;CONTINUE
8671  036722  004737  042306          6$:     JSR     PC,EMPTYQ       ;CLEAR THE DRIVE'S QUEUE
8672  036726  105061  034170                  CLRB    DRVSTA(R1)      ;SET DRIVE TO OFFLINE
8673  036732  105061  034200                  CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
8674  036736  004737  041664          7$:     JSR     PC,SET.IE       ;SET "IE" WITHOUT "TRE"
8675  036742  104413                          RESREG                  ;RESTORE R0 - R5
8676  036744  000207                          RTS     PC              ;RETURN
8677
8678                                  ;LOOK AHEAD ROUTINE
8679                                  ;
8680                                  ;CALL
8681                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
8682                                  ;       MOV     #DPB,R2         ;POINT TO DPB
8683                                  ;       JSR     R0,LA           ;GO CHECK THE WINDOW
8684                                  ;       RETURN1                 ;ERROR RETURN
8685                                  ;       RETURN2                 ;START A SEARCH
8686                                  ;       RETURN3                 ;START A DATA TRANSFER
8687
8688  036746  013704  034316          LA:     MOV     RMADR,R4        ;GET RMCS1'S ADDRESS
8689  036752  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8690  036756  004037  041204                  JSR     R0,RD.RM        ;READ DRIVE STATUS
8691  036762  000012                          RMDS
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8692  036764  037114                        4$                      ;ERROR RETURN ADDRESS
8693  036766  042716  157577                BIC     #^C020200,(SP) ;ON CYLINDER ?
8694  036772  022726  000200                CMP     #200,(SP)+      ;PIP=0,DRY=1?
8695  036776  001044                        BNE     3$              ;NO
8696  037000  105261  034246                INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
8697  037004  126137  034246  034324        CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
8698  037012  003033                        BGT     2$              ;BRANCH IF YES
8699  037014  116203  000010                MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
8700  037020  000303                        SWAB    R3              ;MULT. BY 64--ALIGN WITH
8701  037022  006203                        ASR     R3              ;LOOK AHEAD REGISTER
8702  037024  006203                        ASR     R3
8703  037026  012737  000340  177776        MOV     #340,@#PS       ;PRIORITY LEVEL "7"
8704  037034  004037  041204        6$:     JSR     R0,RD.RM        ;READ LOOK AHEAD REGISTER
8705  037040  000020                        RMLA
8706  037042  037114                        4$
8707  037044  021664  000020                CMP     (SP),RMLA(R4)   ;CORRECT LA NUMBER ?
8708  037050  001402                        BEQ     7$              ;YES
8709  037052  005726                        TST     (SP)+           ;NO,CLEAR STACK
8710  037054  000415                        BR      3$
8711  037056  162603                7$:     SUB     (SP)+,R3        ;CALCULATE THE DELTA
8712  037060  002002                        BGE     1$
8713  037062  062703  004000                ADD     #<32.*64.>,R3   ;MAKE THE DELTA POSITIVE
8714  037066  023703  034326        1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
8715  037072  002406                        BLT     3$              ;IF IT IS WITHIN THE
8716  037074  023703  034330                CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
8717  037100  002003                        BGE     3$              ;THE LOOK AHEAD COUNT
8718  037102  105061  034246        2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
8719  037106  005720                        TST     (R0)+
8720  037110  005720                3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
8721  037112  000402                        BR      5$              ;EXIT
8722  037114  004737  036412        4$:     JSR     PC,CI7          ;PROCESS THE ERROR
8723  037120  000200                5$:     RTS     R0              ;RETURN
8724
8725                                ;INTERRUPT SERVICE ROUTINE
8726
8727  037122  112737  000001  034234  ISR:  MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
8728  037130  104412                        SAVREG                  ;SAVE R0 - R5
8729  037132  013704  034316                MOV     RMADR,R4        ;ADDRESS OF RHSCS1
8730  037136  013701  034302                MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
8731  037142  002403                        BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
8732  037144  004737  037166                JSR     PC,TD           ;CALL TRANSFER DONE
8733  037150  000402                        BR      2$              ;EXIT
8734  037152  004737  037442        1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
8735  037156  104413                2$:     RESREG                  ;RESTORE R0 - R5
8736  037160  105037  034234                CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
8737  037164  000002                        RTI                     ;RETURN
8738
8739                                ;TRANSFER DONE ROUTINE
8740
8741  037166  105061  034160        TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
8742  037172  012737  177777  034302        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8743  037200  006301                        ASL     R1
8744  037202  012761  177777  034262        MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
8745  037210  006201                        ASR     R1
8746  037212  013702  034230                MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
8747  037216  005037  034230                CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
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8748  037222  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET DONE
8749  037230  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
8750  037234  004037  041204                  JSR     R0,RD.RM        ;TRANSFER ERROR(TRE=1)?
8751  037240  000000                          RMCS1
8752  037242  036412                          CI7
8753  037244  006126                          ROL     (SP)+
8754  037246  100421                          BMI     3$              ;BR IF YES
8755  037250  005737  034256                  TST     SAVEFG          ;SAVE THE RH70/RM03 REGISTERS?
8756  037254  100002                          BPL     1$              ;BRANCH IF NO
8757  037256  004737  041546                  JSR     PC,SVRH70       ;YES--SAVE THE REGISTERS
8758  037262  004737  037342          1$:     JSR     PC,WC.HK                ;SEE IF WRITE CHECK TO BE PUT IN QUEUE
8759  037266  004737  042402                  JSR     PC,GETREQ       ;GET DPB POINTER
8760  037272  005702                          TST     R2              ;ENTRY FOR DRIVE ?
8761  037274  001403                          BEQ     2$              ;BR IF NOT
8762  037276  004737  035332                  JSR     PC,OPT          ;CALL OPTIMIZER
8763  037302  000457                          BR      SC              ;CHECK OTHER DRIVES
8764                                  ;THE RELEASE DRIVE COMMAND IS FORECD TO ENTER FOR DUAL PORT OPERATION
8765  037304  012714  000113          2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
8766  037310  000454                          BR      SC              ;CHECK FOR OTHER DRIVES
8767  037312  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
8768  037320  004737  042306                  JSR     PC,EMPTYQ       ;EMPTY THE "DRIVE'S WAIT" QUEUE
8769  037324  004737  041546                  JSR     PC,SVRH70       ;SAVE THE RH70/RM03 REGISTERS
8770  037330  012714  040111                  MOV     #40111,(R4)     ;ISSUE A "DRIVE CLEAR"
8771  037334  012714  000113                  MOV     #113,(R4)       ;ISSUE A RELEASE TO THE DRIVE
8772  037340  000440                          BR      SC              ;CHECK FOR OTHER DRIVES
8773
8774
8775  037342  122762  000002  000024  WC.HK:  CMPB    #2,$CODE(R2)    ;LAST OPERATION WRITE DATA ?
8776  037350  001404                          BEQ     1$              ;BR IF IT WAS
8777  037352  122762  000003  000024          CMPB    #3,$CODE(R2)    ;LAST OPERATION WRITE HEADER & DATA ?
8778  037360  001027                          BNE     2$              ;BR IF NOT
8779  037362  004037  042326          1$:     JSR     R0,DRVQUE       ;PUT THE OPERATION IN THE QUEUE
8780  037366  000424                          BR      2$              ;QUEUE IS FULL
8781  037370  005062  000016                  CLR     16(R2)          ;CLEAR 'DONE' BIT IN DPB
8782  037374  116262  000234  000027          MOVB    $RMCS1(R2),$PREVO(R2)   ;SAVE WRITE OPERATION CODE
8783  037402  016262  000012  000034          MOV     $CYL(R2),$PREVA+2(R2)   ;SAVE CYLINDER
8784  037410  016262  000010  000032          MOV     $SEC(R2),$PREVA(R2)   ;SAVE SECTOR AND TRACK ADDRESSES
8785  037416  142762  000002  000024          BICB    #2,$CODE(R2)    ;CHANGE WRITE TO CHECK
8786  037424  142762  000020  000002          BICB    #20,$COMND(R2)  ;CHANGE DRIVER CODE TO WRITE CHECK
8787  037432  152762  000010  000002          BISB    #10,$COMND(R2)  ;FINISH CHANGING CODE TO WRITE CHECK
8788  037440  000207                  2$:     RTS     PC              ;EXIT
8789
8790                                  ;SPECIAL CONDITION ROUTINE
8791
8792  037442  116403  000016          SC:     MOVB    RMAS(R4),R3     ;READ "RMAS"
8793  037446  001012                          BNE     2$              ;BRANCH IF ANY 'ATA' BITS SET
8794  037450  004037  041204                  JSR     R0,RD.RM        ;READ CONTROL AND STATUS REGISTER
8795  037454  000000                          RMCS1
8796  037456  036512                          CI8
8797  037460  106126                          ROLB    (SP)+           ;IS "IE"=1?
8798  037462  100403                          BMI     1$              ;YES, NO DRIVES TO CHECK
8799  037464  104001                          ERROR   1               ;REPORT AN ILLEGAL INTERRUPT
8800  037466  004737  041664                  JSR     PC,SET.IE       ;SET INTERRUPT ENABLE
8801  037472  000207                  1$:     RTS     PC              ;RETURN
8802  037474  005046                  2$:     CLR     -(SP)           ;PROCESS ALL DRIVES THAT HAVE
8803  037476  110316                          MOVB    R3,(SP)         ;AN "ATA"=1
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8804  037500  012703  000001          MOV     #1,R3
8805  037504  005001                  CLR     R1
8806  037506  030316          SC3:    BIT     R3,(SP)         ;ATA=1?
8807  037510  001005                  BNE     SC5             ;YES--BRANCH
8808  037512  005201          SC4:    INC     R1              ;MOVE TO THE NEXT DRIVE
8809  037514  106303                  ASLB    R3
8810  037516  001373                  BNE     SC3             ;BRANCH IF MORE TO CHECK?
8811  037520  005726                  TST     (SP)+           ;CLEAN OFF THE STACK
8812  037522  000207                  RTS     PC              ;RETURN TO USER
8813  037524  105761  034210  SC5:    TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
8814  037530  001402                  BEQ     1$              ;BR IF NOT
8815  037532  000137  040440          JMP     SC13            ;PROCESS THE DRIVE
8816  037536  105761  034220  1$:     TSTB    DPRQS(R1)       ;PORT REQUEST OUTSTANDING ?
8817  037542  001402                  BEQ     2$              ;BR IF NOT
8818  037544  000137  040440          JMP     SC13            ;START THE OUTSTANDING COMMAND
8819  037550  105761  034170  2$:     TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
8820  037554  003025                  BGT     5$              ;BRANCH IF ONLINE
8821  037556  105761  034236          TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
8822  037562  003422                  BLE     5$              ;BRANCH IF NOT
8823  037564  004737  042402          JSR     PC,GETREQ       ;GET DPB POINTER
8824  037570  004737  041546          JSR     PC,SVRH70       ;SAVE THE RH70/RM03 REGISTERS
8825  037574  004737  040370          JSR     PC,SC12         ;SAVE RMDS, RMER1, RMER2, AND RMMR2
8826                                                          ;ALSO DO A DRIVE INIT (DRVINT)
8827  037600  105761  034170          TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
8828  037604  003416                  BLE     6$              ;NO---BRANCH
8829  037606  032737  040000  034150  BIT     #BIT14,RMERRS   ;WAS THERE AN ERROR?
8830  037614  001002                  BNE     3$              ;BR IF ERROR
8831  037616  000137  040260          JMP     SC11            ;NO ERROR
8832  037622  013705  034152  3$:     MOV     RMERRS+2,R5     ;YES -- PICKUP RMER1 AND
8833  037626  000476                  BR      SC6A            ;GO PROCESS THE ERROR
8834  037630  105761  034160  5$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
8835  037634  001027                  BNE     SC6             ;BR IF EITHER
8836  037636  004737  040370          JSR     PC,SC12         ;SAVE RMDS, RMER1, RMER2, AND RMMR2
8837                                                          ;ALSO DO A DRVINT
8838  037642  105761  034210  6$:     TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE ?
8839  037646  001321                  BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
8840  037650  105761  034170          TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
8841  037654  100412                  BMI     7$              ;BR IF UNSAFE
8842  037656  032737  020000  034154  BIT     #BIT13,RMERRS+4 ;ADDRESS PLUG CHANGED ?
8843  037664  001011                  BNE     8$              ;BR IF YES
8844  037666  012746  000113          MOV     #113,-(SP)      ;RELEASE COMMAND
8845  037672  004037  041360          JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RMCS1
8846  037676  000000                  RMCS1                   ;REGISTER INDEX
8847  037700  040230                  SC8                     ;PARITY EXIT ADDRESS
8848  037702  011605          7$:     MOV     (SP),R5         ;PICKUP (RMAS) BEFORE THE ERROR CALL
8849  037704  104002                  ERROR   2               ;REPORT THE UNEXPECTED ATTENTION
8850  037706  000701                  BR      SC4             ;GO CHECK FOR MORE ATA'S
8851  037710                  8$:
8852  037710  104005                  ERROR   5               ;REPORT THE ADDRESS PLUG CHANGE
8853  037712  000677                  BR      SC4             ;CHECK FOR MORE DRIVES
8854  037714  006301          SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
8855  037716  012761  177777  034262  MOV     #-1,TIMER(R1)   ;STOP THE TIMER
8856  037724  006201                  ASR     R1              ;RESTORE THE DRIVE ADDRESS
8857  037726  004737  042402          JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
8858  037732  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8859  037736  004037  041204          JSR     R0,RD.RM        ;READ THE RM03'S STATUS REG.
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8860  037742  000012                          RMDS
8861  037744  040230                          SC8
8862  037746  011605                          MOV     (SP),R5         ;AND PUT IT IN R5
8863  037750  006126                          ROL     (SP)+           ;WAS THERE AN ERROR?
8864  037752  100407                          BMI     1$              ;BR IF ERROR
8865  037754  105761  034160                  TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
8866  037760  003137                          BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
8867  037762  052762  100210  000016          BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
8868  037770  000470                          BR      SC7
8869  037772  004037  041204          1$:     JSR     R0,RD.RM        ;READ ERROR REGISTER #1
8870  037776  000014                          RMER1
8871  040000  040230                          SC8
8872  040002  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
8873  040004  004737  041546                  JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8874  040010  012746  000111                  MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
8875  040014  004037  041360                  JSR     R0,WRT.RM
8876  040020  000000                          RMCS1
8877  040022  040230                          SC8
8878  040024  006105                  SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
8879  040026  100406                          BMI     1$              ;BRANCH IF YES
8880  040030  005702                          TST     R2              ;ANYTHING IN QUEUE ?
8881  040032  001447                          BEQ     SC7             ;BR IF NOT
8882  040034  052762  100240  000016          BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
8883  040042  000443                          BR      SC7
8884  040044  004037  041204          1$:     JSR     R0,RD.RM        ;READ DRIVE STATUS REG. #1
8885  040050  000012                          RMDS
8886  040052  040230                          SC8
8887  040054  011605                          MOV     (SP),R5         ;SAVE RMDS IN R5
8888  040056  006126                          ROL     (SP)+           ;"ERR"=1?
8889  040060  100011                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
8890  040062  112761  177777  034170          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
8891  040070  004737  041546                  JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8892  040074  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
8893  040102  000423                          BR      SC7
8894  040104  032705  010000          2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
8895  040110  001015                          BNE     3$              ;BR IF YES
8896  040112  112761  177777  034160          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
8897  040120  112761  000001  034170          MOVB    #1,DRVSTA(R1)   ;ONLINE
8898  040126  006301                          ASL     R1
8899  040130  012761  072460  034262          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
8900  040136  006201                          ASR     R1
8901  040140  000137  037512                  JMP     SC4
8902  040144  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
8903  040152  105061  034160          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
8904  040156  004737  042306                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
8905  040162  105761  034236                  TSTB    ULDFLG(R1)      ;UNLOAD IN RMOGRESS OR QUEUE?
8906  040166  003002                          BGT     1$              ;BR IF NOT
8907  040170  105061  034236                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
8908  040174  116164  034304  000016  1$:     MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
8909  040202  105761  034170                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
8910  040206  100406                          BMI     2$              ;BR IF IT IS
8911  040210  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
8912  040214  004037  041360                  JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RPCS1
8913  040220  000000                          RMCS1                   ;REGISTER INDEX
8914  040222  040230                          SC8                     ;PARITY EXIT ADDRESS
8915  040224  000137  037512          2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
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8916  040230  105761  034160          SC8:    TSTB    DRVACT(R1)          ;IS DRIVE IDLE?
8917  040234  001405                  BEQ     1$                  ;YES--BRANCH
8918  040236  004737  042402          JSR     PC,GETREQ           ;GET DPB POINTER
8919  040242  004737  036412          JSR     PC,CI7              ;PROCESS THE PARITY ERROR
8920  040246  000402                  BR      2$                  ;CONTINUE
8921  040250  004737  036440          1$:     JSR     PC,CI7B             ;PROCESS THE UNCORRECTABLE PARITY ERROR
8922  040254  000137  037512          2$:     JMP     SC4                 ;CHECK MORE DRIVES
8923  040260  105761  034236          SC11:   TSTB    ULDFLG(R1)          ;"UNLOAD IN PROGRESS"?
8924  040264  003402                  BLE     1$                  ;BRANCH IF NO
8925  040266  105061  034236                  CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
8926  040272  105061  034160          1$:     CLRB    DRVACT(R1)          ;SET DRIVE IDLE
8927  040276  136137  034304  034232          BITB    ATABIT(R1),SRCHWT   ;DOING A SEARCH OPERATION FOR
8928                                                                      ;AN I/O COMMAND?
8929  040304  001012                  BNE     2$                  ;BRANCH IF YES
8930  040306  004737  042424          JSR     PC,POPQUE           ;REMOVE REQUEST FROM QUEUE
8931  040312  052762  000200  000016  BIS     #BIT07,16(R2)       ;SET "DONE" BIT
8932  040320  005737  034256          TST     SAVEFG              ;SAVE THE REGISTERS?
8933  040324  100002                  BPL     2$                  ;BRANCH IF NO
8934  040326  004737  041546          JSR     PC,SVRH70           ;YES--SAVE ALL OF THE RH70/RM03 REG'S
8935  040332  116164  034304  000016  2$:     MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
8936  040340  146137  034304  034232          BICB    ATABIT(R1),SRCHWT       ;CLEAR IMPLIED SEEK SET
8937  040346  006301                  ASL     R1                  ;WORD INDEX
8938  040350  012761  177777  034262          MOV     #-1,TIMER(R1)       ;STOP CLOCK
8939  040356  006201                  ASR     R1                  ;RESTORE R1
8940  040360  004737  035332          JSR     PC,OPT              ;START A REQUEST
8941  040364  000137  037512          JMP     SC4                 ;CHECK FOR MORE DRIVES
8942  040370  010164  000010          SC12:   MOV     R1,RMCS2(R4)        ;SELECT DRIVE
8943  040374  016437  000012  034150          MOV     RMDS(R4),RMERRS     ;SAVE THE FOUR REGISTERS THAT
8944  040402  016437  000014  034152          MOV     RMER1(R4),RMERRS+2      ;WILL TELL US SOMETHING
8945  040410  016437  000042  034154          MOV     RMER2(R4),RMERRS+4
8946  040416  016437  000040  034156          MOV     RMMR2(R4),RMERRS+6
8947  040424  004037  034546          JSR     R0,DRVINT           ;INIT. THE STATE OF THE DRIVE
8948  040430  000401                  BR      1$                  ;TAKE ERROR EXIT
8949  040432  000207                  RTS     PC                  ;RETURN
8950  040434  005726                  1$:     TST     (SP)+               ;POP PC OFF OF THE STACK
8951  040436  000674                  BR      SC8                 ;PROCESS THE PARITY ERROR
8952  040440  006301                  SC13:   ASL     R1                  ;SETUP TO ADDRESS WORDS
8953  040442  012761  177777  034262          MOV     #-1,TIMER(R1)       ;STOP THE TIMER
8954  040450  006201                  ASR     R1                  ;
8955  040452  010164  000010                  MOV     R1,RMCS2(R4)        ;SELECT THE DRIVE
8956  040456  116164  034304  000016          MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR THE ATTENTION BIT
8957  040464  105761  034210          1$:     TSTB    DPINT(R1)           ;INITIALIZING THE DRIVE ?
8958  040470  001424                  BEQ     2$                  ;BR IF NOT
8959  040472  105061  034210                  CLRB    DPINT(R1)           ;CLEAR THE INIT INDICATOR
8960  040476  004037  034546          JSR     R0,DRVINT           ;GO INIT THE DRIVE
8961  040502  000240                  NOP                         ;DUMMY PARITY ERROR RETURN
8962  040504  105761  034170          TSTB    DRVSTA(R1)          ;DRIVE ONLINE ?
8963  040510  003014                  BGT     2$                  ;BR IF YES -- START ORDER
8964  040512  005702                  TST     R2                  ;QUEUE ENTRY FOR THE DRIVE
8965  040514  001426                  BEQ     3$                  ;BR IF NOT
8966  040516  004737  042402          JSR     PC,GETREQ           ;GET DPB ADDRESS
8967  040522  052762  140000  000016  BIS     #BIT15!BIT14,16(R2)  ;INFORM USER THAT DRIVE OFFLINE
8968  040530  004737  041546          JSR     PC,SVRH70           ;SAVE THE REGISTERS
8969  040534  004737  042306          JSR     PC,EMPTYQ           ;EMPTY THE REQUEST QUEUE
8970  040540  000414                  BR      3$
8971  040542  032764  004000  000000  2$:     BIT     #BIT11,RMCS1(R4)        ;DVA SET ?
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 8972  040550  001006                        BNE     4$              ;SET THEN CALL OPT
 8973  040552  006301                        ASL     R1
 8974  040554  012761  023420  034262        MOV     #10000.,TIMER(R1)
 8975  040562  006201                        ASR     R1
 8976  040564  000402                        BR      3$
 8977  040566  004737  035332          4$:   JSR     PC,OPT          ;START THE PENDING REQUEST
 8978  040572  000137  037512          3$:   JMP     SC4             ;PROCESS OTHER DRIVES
 8979
 8980                                  ;/RM03 TIMER ROUTINE
 8981                                  ;CALL
 8982                                  ;       MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
 8983                                  ;       JSR     PC,RPTMR        ;CALL RM03 TIME ROUTINE
 8984
 8985  040576  005737  034234          RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
 8986  040602  001027                        BNE     4$              ;IF NON ZERO EXIT
 8987  040604  112737  000001  034235        MOVB    #1,ACTSTR       ;SET "ACTSTR"
 8988  040612  104412                        SAVREG                  ;SAVE R0 - R5
 8989  040614  005001                        CLR     R1              ;START WITH DRIVE 0
 8990  040616  005003                        CLR     R3
 8991  040620  005763  034262          1$:   TST     TIMER(R3)       ;IS THE TIMER RUNNING?
 8992  040624  002406                        BLT     2$              ;BRANCH IF NO
 8993  040626  166663  000002  034262        SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
 8994  040634  003002                        BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
 8995  040636  004737  040666                JSR     PC,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
 8996  040642  005201                  2$:   INC     R1              ;MOVE TO NEXT DRIVE
 8997  040644  005723                        TST     (R3)+
 8998  040646  022701  000010                CMP     #8.,R1          ;OUT OF DRIVES?
 8999  040652  003362                        BGT     1$              ;BRANCH IF NO
 9000  040654  104413                  3$:   RESREG                  ;RESTORE R0 - R5
 9001  040656  105037  034235                CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
 9002  040662  012616                  4$:   MOV     (SP)+,(SP)      ;ADJUST THE STACK
 9003  040664  000207                        RTS     PC              ;RETURN
 9004
 9005                                  ;SOFTWARE TIMEOUT ROUTINE
 9006                                  ;
 9007                                  ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
 9008                                  ;       OR GREATER
 9009                                  ;
 9010                                  ;CALL:  STO
 9011                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
 9012                                  ;       JSR     PC,STO          ;CALL
 9013                                  ;       RETURN
 9014
 9015  040666  010146                  STO:    MOV     R1,-(SP)        ;SAVE R1
 9016  040670  010246                        MOV     R2,-(SP)        ;SAVE R2
 9017  040672  010346                        MOV     R3,-(SP)        ;SAVE R3
 9018  040674  010446                        MOV     R4,-(SP)        ;SAVE R4
 9019  040676  013704  034316                MOV     RMADR,R4        ;GET ADDRESS OF "RMCS1"
 9020  040702  010164  000010                MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
 9021  040706  004037  041204                JSR     R0,RD.RM        ;READ "DRIVE STATUS REG"
 9022  040712  000012                        RMDS
 9023  040714  041066                        ST05
 9024  040716  105726                        TSTB    (SP)+           ;IS "DRY"=1?
 9025  040720  100434                        BMI     ST02            ;BR IF YES
 9026  040722  105761  034210          ST01: TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
 9027  040726  001031                        BNE     ST02            ;BR IF YES
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9028  040730  105761  034220                  TSTB    DPRQS(R1)           ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
9029  040734  001026                          BNE     ST02                ;BR IF YES
9030  040736  013702  034230                  MOV     TRNSWT,R2           ;PICKUP TRANSFER WAIT QUEUE
9031  040742  020137  034302                  CMP     R1,DTUW             ;TRANSFER UNDERWAY ON THIS DRIVE?
9032  040746  001404                          BEQ     1$                  ;BRANCH IF YES
9033  040750  000137  041172                  JMP     ST09                ;IF NOT DON'T BOTHER DRIVES
9034  040754  004737  042402                  JSR     PC,GETREQ           ;GET DPB ADDRESS
9035  040760  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
9036  040766  004737  041546                  JSR     PC,SVRH70           ;SAVE RH70/RM03 REGISTERS
9037  040772  012764  000040  000010          MOV     #BIT05,RMCS2(R4)    ;"INIT" THE MASS BUS
9038  041000  105061  034160                  CLRB    DRVACT(R1)          ;DRIVE IS IDLE
9039  041004  105061  034236                  CLRB    ULDFLG(R1)          ;CLEAR THE UNLOAD FLAG
9040  041010  000470                          BR      ST09                ;DON'T BOTHER OTHER DRIVES
9041  041012  116405  000016          ST02:   MOVB    RMAS(R4),R5         ;READ ATTENTION REG
9042  041016  136105  034304                  BITB    ATABIT(R1),R5       ;IS ATTENTION FOR THIS DRIVE UP ?
9043  041022  001007                          BNE     ST03                ;YES--BRANCH
9044  041024  105761  034210                  TSTB    DPINT(R1)           ;TRYING TO INTIALIZE THE DRIVE ?
9045  041030  001021                          BNE     ST06                ;BR IF YES - DRIVE NOT ONLINE
9046  041032  105761  034220                  TSTB    DPRQS(R1)           ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
9047  041036  001035                          BNE     ST07                ;BR IF YES - NO RESPONSE TO REQUEST
9048  041040  000454                          BR      ST09                ;OTHER WISE EXIT
9049  041042  105761  034210          ST03:   TSTB    DPINT(R1)           ;INITIALIZING THE DRIVE ?
9050  041046  001003                          BNE     1$                  ;BR IF INIT PENDING
9051  041050  105761  034220                  TSTB    DPRQS(R1)           ;PORT REQUEST PENDING ?
9052  041054  001446                          BEQ     ST09                ;BR IF NOT
9053  041056  012763  177777  034262  1$:     MOV     #-1,TIMER(R3)       ;STOP THE TIMER
9054  041064  000442                          BR      ST09                ;EXIT
9055  041066  004737  036512          ST05:   JSR     PC,CI8              ;GO HANDLE THE PARITY ERROR
9056  041072  000437                          BR      ST09
9057  041074  105061  034210          ST06:   CLRB    DPINT(R1)           ;CLEAR THE INITIALIZE INDICATOR
9058  041100  105061  034170                  CLRB    DRVSTA(R1)          ;SET UNIT OFFLINE
9059  041104  012763  177777  034262          MOV     #-1,TIMER(R3)       ;STOP THE TIMER
9060  041112  004737  042402                  JSR     PC,GETREQ           ;GET THE DPB ADDRESS
9061  041116  005702                          TST     R2                  ;REQUEST IN QUEUE ?
9062  041120  001424                          BEQ     ST09                ;BR IF NOT
9063  041122  052762  140000  000016          BIS     #BIT15!BIT14,16(R2) ;INFORM THE USER DRIVE NOT AVAILABLE
9064  041130  000414                          BR      ST08                ;FINISH
9065  041132  012763  177777  034262  ST07:   MOV     #-1,TIMER(R3)       ;STOP THE TIMER
9066  041140  105061  034220                  CLRB    DPRQS(R1)           ;CLEAR PORT REQUEST INDICATOR
9067  041144  004737  042402                  JSR     PC,GETREQ           ;GET DPB ADDRESS
9068  041150  005702                          TST     R2                  ;QUEUE ENTRY FOR DRIVE ?
9069  041152  001407                          BEQ     ST09                ;BR IF NONE
9070  041154  012762  100004  000016          MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
9071  041162  004737  042306          ST08:   JSR     PC,EMPTYQ           ;CLEAR THE QUEUE FOR THE DRIVE
9072  041166  004737  041546                  JSR     PC,SVRH70           ;SAVE THE REGISTERS
9073  041172  012604          ST09:   MOV     (SP)+,R4            ;RESTORE R4
9074  041174  012603                  MOV     (SP)+,R3            ;RESTORE R3
9075  041176  012602                  MOV     (SP)+,R2            ;RESTORE R2
9076  041200  012601                  MOV     (SP)+,R1            ;RESTORE R1
9077  041202  000207                  RTS     PC                  ;RETURN
9078
9079                          ;ROUTINE TO READ A RH70/RM03 REGISTER
9080                          ;
9081                          ;CALL
9082                          ;       JSR     R0,RD.RM            ;GO READ A REGISTER
9083                          ;       INDEX                       ;REG. INDEX FROM BASE
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                                        ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
                                        ;                               ;AT THIS ADDRESS
                                        ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
                                        ;
 041204  013737  034314  041346  RD.RM:  MOV     MCPEMX,RD.RM2           ;MAX. RETRYS ALLOWED
 041212  011646                          MOV     (SP),-(SP)              ;SAVE R0 FOR RETURN
 041214  013737  034316  041230          MOV     RMADR,RD.ADR            ;FORM THE DESIRED ADDRESS
 041222  062037  041230                  ADD     (R0)+,RD.ADR            ;USING THE BASE AND THE INDEX
 041226  013727                  RD.RM1: MOV     @(PC)+,(PC)+            ;READ THE DESIRED REGISTER OF THE RM03
 041230  000000                  RD.ADR: .WORD   0                       ;ADDRESS IS FORMED HERE
 041232  000000                  RD.WRD: .WORD   0                       ;REG. CONTENTS PUT HERE
 041234  013766  041232  000002          MOV     RD.WRD,2(SP)            ;RETURN IT TO THE USER
 041242  013746  034316                  MOV     RMADR,-(SP)             ;PUT THE ADDRESS ON THE STACK
 041246  062716  000010                  ADD     #RMCS2,(SP)             ;FORM THE ADDRESS OF RMCS2
 041252  032736  010000                  BIT     #BIT12,@(SP)+           ;CHECK THE 'NEM' BIT
 041256  001035                          BNE     RD.RM3                  ;BR IF DRIVE NON-EXISTENT
 041260  017746  173032                  MOV     @RMADR,-(SP)            ;READ RMCS1
 041264  032716  020000                  BIT     #BIT13,(SP)             ;DID MCPE SET?
 041270  001002                          BNE     1$                      ;BRANCH IF YES
 041272  022620                          CMP     (SP)+,(R0)+             ;ADJUST FOR RETURN
 041274  000430                          BR      RD.RM4                  ;EXIT
 041276                          1$:
 041276  104003                          ERROR   3                       ;REPORT "MCPE" ERROR
 041300  005737  034302                  TST     DTUW                    ;DATA TRANSFER UNDERWAY?
 041304  100405                          BMI     2$                      ;NO--BRANCH
 041306  032716  040000                  BIT     #BIT14,(SP)             ;NO--"TRE"=1?
 041312  001402                          BEQ     2$                      ;NO--BRANCH
 041314  005726                          TST     (SP)+                   ;YES--CLEAN OFF THE STACK AND
 041316  000415                          BR      RD.RM3                  ;TAKE THE FATAL ERROR EXIT
 041320  052716  040000          2$:     BIS     #BIT14,(SP)             ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
 041324  000316                          SWAB    (SP)                    ;POSITION BEFORE WRITING
 041326  013737  034316  041342          MOV     RMADR,3$                ;FORM ADDRESS OF HIGH BYTE
 041334  005237  041342                  INC     3$
 041340  112637                          MOVB    (SP)+,@(PC)+            ;WRITE THE HIGH BYTE OF RMCS1
 041342  000000                  3$:     .WORD   0                       ;ADDRESS STORAGE
 041344  005327                          DEC     (PC)+                   ;EXCEEDED MAX. RETRYS
 041346  000003                  RD.RM2: .WORD   3
 041350  002326                          BGE     RD.RM1                  ;BRANCH IF NO
 041352  011000                  RD.RM3: MOV     (R0),R0                 ;FATAL ERROR EXIT
 041354  012616                          MOV     (SP)+,(SP)
 041356  000200                  RD.RM4: RTS     R0
                                ;ROUTINE TO WRITE A REGISTER
                                ;
                                ;CALL
                                ;       MOV     DATA,-(SP)              ;DATA TO BE LOADED ON THE STACK
                                ;       JSR     R0,WRT.RM               ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
                                ;       INDEX                           ;INDEX OF THE REGISTER TO BE LOADED
                                ;       ERRADR                          ;ADDRESS TO RETURN TO ON AN ERROR
                                ;       RETURN                          ;ERROR FREE RETURN
 041360  013737  034314  041532  WRT.RM: MOV     MCPEMX,WRT.R2           ;MAX RETRYS ALLOWED
 041366  016637  000002  041446          MOV     2(SP),WRT.WD            ;SAVE THE WORD TO WRITE
 041374  012616                          MOV     (SP)+,(SP)              ;ADJUST THE STACK
 041376  012037  041450                  MOV     (R0)+,WRT.AD            ;GET INDEX OF REGISTER TO BE WRITTEN
 041402  001015                          BNE     1$                      ;BRANCH IF NOT RMCS1
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9140  041404  122737  000150  041446          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
9141  041412  002411                          BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
9142  041414  004037  041204                  JSR     R0,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
9143  041420  000000                          RMCS1                   ;THE COMMAND BEFORE SENDING IT TO
9144  041422  041536                          WRT.R3                  ;THE RH70/RM03
9145  041424  000316                          SWAB    (SP)
9146  041426  042716  177770                  BIC     #^C7,(SP)
9147  041432  112637  041447                  MOVB    (SP)+,WRT.WD+1
9148  041436  063737  034316  041450  1$:     ADD     RMADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
9149  041444  012737                  WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
9150  041446  000000                  WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
9151  041450  000000                  WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
9152  041452  013746  034316                  MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
9153  041456  062716  000010                  ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
9154  041462  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
9155  041466  001023                          BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
9156  041470  004037  041204                  JSR     R0,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
9157  041474  000014                          RMER1
9158  041476  041536                          WRT.R3
9159  041500  032726  000010                  BIT     #BIT03,(SP)+
9160  041504  001416                          BEQ     WRT.R4          ;BRANCH IF "PAR=0"
9161  041506  016037  177776  041520          MOV     -2(R0),1$       ;PICKUP THE INDEX
9162  041514  004037  041204                  JSR     R0,RD.RM        ;READ THE REG.
9163  041520  000000                  1$:     .WORD   0               ;REG. INDEX
9164  041522  041536                          WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
9165  041524  104004                          ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
9166  041526  005726                          TST     (SP)+           ;CLEAR OFF THE STACK
9167  041530  005327                          DEC     (PC)+           ;DECREMENT THE ERROR COUNT
9168  041532  000003                  WRT.R2: .WORD   3               ;RETRY COUNTER
9169  041534  002343                          BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
9170  041536  011000                  WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
9171  041540  000401                          BR      WRT.R5          ;EXIT
9172  041542  005720                  WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
9173  041544  000200                  WRT.R5: RTS     R0
9174
9175                                  ;ROUTINE TO SAVE THE RH70/RP04/5/RM03 REGISTERS AS PER DPB+14
9176                                  ;
9177                                  ;CALL
9178                                  ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
9179                                  ;       JSR     PC,SVRH70       ;SAVE THE DRIVES REG'S
9180
9181  041546  104412                  SVRH70: SAVREG                  ;SAVE R0 - R5
9182  041550  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
9183  041552  001442                          BEQ     6$              ;BR IF NONE
9184  041554  013704  034316                  MOV     RMADR,R4
9185  041560  111264  000010                  MOVB    (R2),RMCS2(R4)  ;SELECT DRIVE
9186  041564  016203  000014                  MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
9187  041570  001433                          BEQ     6$              ;EXIT IF NO ADDRESS
9188  041572  005037  041626                  CLR     3$              ;COUNTER & POINTER
9189  041576  023727  041626  000022  1$:     CMP     3$,#RMDB        ;REACHED THE BUFFER REGISTER ?
9190  041604  001006                          BNE     2$              ;BR IF NOT
9191  041606  032764  000200  000010          BIT     #BIT07,RMCS2(R4)  ;'OR' SET ?
9192  041614  001002                          BNE     2$              ;BR IF SET
9193  041616  005023                          CLR     (R3)+           ;STORE RMDB AS ZEROES
9194  041620  000405                          BR      4$              ;CONTINUE
9195  041622  004037  041204          2$:     JSR     R0,RD.RM        ;READ THE SELECTED REGISTER
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 9196  041626  000000                  3$:     .WORD   0               ;REGISTER INDEX
 9197  041630  041654                          5$                      ;ERROR RETURN ADDRESS
 9198  041632  012623                          MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
 9199  041634  023727  041626  000046  4$:     CMP     3$,#RMEC2       ;REACHED THE END ?
 9200  041642  001406                          BEQ     6$              ;BR IF YES
 9201  041644  062737  000002  041626          ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
 9202  041652  000751                          BR      1$              ;CONTINUE READING THE REGISTERS
 9203  041654  004737  036412          5$:     JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 9204  041660  104413                  6$:     RESREG                  ;RESTORE R0 - R5
 9205  041662  000207                          RTS     PC              ;RETURN
 9206
 9207                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
 9208                                  ;CALL
 9209                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 9210                                  ;       JSR     PC,SET.IE       ;SET "IE"
 9211                                  ;       RETURN
 9212
 9213  041664  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
 9214  041666  013704  034316                  MOV     RMADR,R4        ;PICKUP ADDRESS OF RMCS1
 9215  041672  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
 9216  041676  011446                          MOV     (R4),-(SP)      ;READ RMCS1
 9217  041700  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
 9218  041704  000316                          SWAB    (SP)            ;ADJUST FOR DATO
 9219  041706  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
 9220  041712  032764  010000  000010          BIT     #BIT12,RMCS2(R4) ;IS "NED"=1?
 9221  041720  001002                          BNE     1$              ;YES--CLEAR "TRE"
 9222  041722  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 9223  041724  000402                          BR      2$
 9224  041726  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 9225  041732  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
 9226  041734  000207                          RTS     PC              ;RETURN TO CALLER
 9227
 9228                                  ;QUEUE COUNT
 9229  041736      000                 QCNT:   .BYTE   0               ;DRIVE 0
 9230  041737      000                         .BYTE   0               ;DRIVE 1
 9231  041740      000                         .BYTE   0               ;DRIVE 2
 9232  041741      000                         .BYTE   0               ;DRIVE 3
 9233  041742      000                         .BYTE   0               ;DRIVE 4
 9234  041743      000                         .BYTE   0               ;DRIVE 5
 9235  041744      000                         .BYTE   0               ;DRIVE 6
 9236  041745      000                         .BYTE   0               ;DRIVE 7
 9237
 9238                                  ;QUEUE INPUT POINTERS
 9239
 9240  041746  042030                  QINPT:  .WORD   QDRV0            ;DRIVE 0
 9241  041750  042050                          .WORD   QDRV1           ;DRIVE 1
 9242  041752  042070                          .WORD   QDRV2           ;DRIVE 2
 9243  041754  042110                          .WORD   QDRV3           ;DRIVE 3
 9244  041756  042130                          .WORD   QDRV4           ;DRIVE 4
 9245  041760  042150                          .WORD   QDRV5           ;DRIVE 5
 9246  041762  042170                          .WORD   QDRV6           ;DRIVE 6
 9247  041764  042210                          .WORD   QDRV7           ;DRIVE 7
 9248
 9249                                  ;QUEUE OUTPUT POINTERS
 9250
 9251  041766  042030                  QOUTPT: .WORD   QDRV0            ;DRIVE 0
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9252  041770  042050                          .WORD   QDRV1           ;DRIVE 1
9253  041772  042070                          .WORD   QDRV2           ;DRIVE 2
9254  041774  042110                          .WORD   QDRV3           ;DRIVE 3
9255  041776  042130                          .WORD   QDRV4           ;DRIVE 4
9256  042000  042150                          .WORD   QDRV5           ;DRIVE 5
9257  042002  042170                          .WORD   QDRV6           ;DRIVE 6
9258  042004  042210                          .WORD   QDRV7           ;DRIVE 7
9259
9260  042006  042030                  QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
9261  042010  042050                  QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
9262  042012  042070                          .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
9263  042014  042110                          .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
9264  042016  042130                          .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
9265  042020  042150                          .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
9266  042022  042170                          .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
9267  042024  042210                          .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
9268  042026  042230                          .WORD   QTERM           ;STOP DRIVE 7
9269
9270                                  ;DRIVE REQUEST QUEUES
9271
9272  042030  000010                  QDRV0:  .BLKW   10
9273  042050  000010                  QDRV1:  .BLKW   10
9274  042070  000010                  QDRV2:  .BLKW   10
9275  042110  000010                  QDRV3:  .BLKW   10
9276  042130  000010                  QDRV4:  .BLKW   10
9277  042150  000010                  QDRV5:  .BLKW   10
9278  042170  000010                  QDRV6:  .BLKW   10
9279  042210  000010                  QDRV7:  .BLKW   10
9280          042230                  QTERM=.
9281
9282                                  ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
9283                                  ;
9284                                  ;CALL
9285                                  ;       JSR     PC,CLRQUE
9286
9287  042230  104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
9288  042232  012702  041736                  MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
9289  042236  005022                          CLR     (R2)+           ;DRIVES 0 & 1
9290  042240  005022                          CLR     (R2)+           ;DRIVES 2 & 3
9291  042242  005022                          CLR     (R2)+           ;DRIVES 4 & 5
9292  042244  005022                          CLR     (R2)+           ;DRIVES 6 & 7
9293  042246  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING
9294  042252  012701  042006                  MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
9295  042256  012122                  1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
9296  042260  005303                          DEC     R3
9297  042262  001375                          BNE     1$
9298  042264  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
9299  042270  012701  042006                  MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
9300  042274  012122                  2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
9301  042276  005303                          DEC     R3
9302  042300  001375                          BNE     2$
9303  042302  104413                          RESREG                  ;RESTORE R0 - R5
9304  042304  000207                          RTS     PC
9305
9306                                  ;EMPTY THE QUEUE SPECIFIED BY R1
9307                                  ;
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                                        ;CALL
                                        ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,EMPTYQ
                                        ;
042306  105061  041736          EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
042312  006301                          ASL     R1
042314  016161  041746  041766        MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
042322  006201                          ASR     R1
042324  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
042326  122761  000010  041736  DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
042334  001421                          BEQ     2$              ;BR IF YES-TAKE RETURN1
042336  105261  041736                  INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
042342  006301                          ASL     R1
042344  010271  041746                  MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
042350  062761  000002  041746          ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
042356  026161  041746  042010          CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
042364  001003                          BNE     1$              ;BRANCH IF NO
042366  016161  042006  041746          MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
042374  006201                  1$:     ASR     R1
042376  005720                          TST     (R0)+           ;TAKE RETURN 2
042400  000200                  2$:     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
042402  005002          GETREQ: CLR     R2
042404  105761  041736          TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
042410  001404                  BEQ     2$              ;NO---BRANCH
042412  006301          1$:     ASL     R1
042414  017102  041766          MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
042420  006201                  ASR     R1
042422  000207          2$:     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
042424  105361  041736          POPQUE: DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
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9364  042430  006301                        ASL     R1
9365  042432  017102  041766                MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
9366  042436  005071  041766                CLR     @QOUTPT(R1)     ;REMOVE DPB ADDRESS FROM THE QUEUE
9367  042442  062761  000002  041766        ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
9368  042450  026161  041766  042010        CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
9369  042456  001003                        BNE     1$              ;NO--BRANCH TO EXIT
9370  042460  016161  042006  041766        MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
9371  042466  006201                1$:     ASR     R1
9372  042470  000207                        RTS     PC              ;RETURN TO USER
9373
9374
9375                                ;;*****************************************************************
9376
9377                                .SBTTL  DATA, CONTROL, & STATUS BLOCKS
9378
9379                                ;;*****************************************************************
9380
9381                                ;BLOCK LOCATION EQUATE STATEMENTS
9382
9383          000001                $FMT    =       1               ;FMT,HCI,ECI OR OFFSET CODE
9384          000002                $COMND  =       $FMT+1          ;OPERATION CODE
9385          000003                $PSEL   =       $FMT+2          ;PORT SELECT & BITS A16, A17
9386          000004                $WRDM   =       $FMT+3          ;WORD COUNT (2'S COMP)
9387          000006                $BUF    =       $FMT+5          ;BUFFER ADDR OR REGISTER TABLE POINTER
9388          000010                $SEC    =       $FMT+7          ;SECTOR ADDRESS OR 1ST REG ADDR
9389          000011                $TRK    =       $FMT+10         ;TRACK ADDRESS OF LAST REG ADDR
9390          000012                $CYL    =       $FMT+11         ;CYLINDER ADDR
9391          000014                $REG    =       $FMT+13         ;REGISTER STORAGE (IF ERROR)
9392          000016                $STATUS =       $FMT+15         ;STATUS WORD (SET BY DRIVER)
9393
9394                                ;DRIVE'S HISTORY AND CURRENT INDICATOR STORAGE EQUATES
9395
9396          000020                $WRDL   =       $FMT+17         ;WORD COUNT (NOT 2'S COMP)
9397          000022                $SSEC   =       $WRDL+2         ;SECTOR SIZE FOR CURRENT OPERATION
9398          000024                $CODE   =       $WRDL+4         ;PRESENT COMMAND SELECTION CODE
9399          000026                $PACK   =       $WRDL+6         ;WRITE DATA PACK INDICATOR
9400          000027                $PREVO  =       $WRDL+7         ;PREVIOUS COMMAND SELECTION CODE
9401          000030                $PATTC  =       $WRDL+10        ;PATTERN CODE
9402          000032                $PREVA  =       $WRDL+12        ;PREVIOUS ADDRESS - TRACK, SECTOR, CYLINDER
9403          000036                $OPERC  =       $WRDL+16        ;OPERATION COUNT
9404          000042                $POSIT  =       $WRDL+22        ;SEEK COUNT
9405          000046                $TRANS  =       $WRDL+26        ;TOTAL BITS XFERED COUNT (R & W)
9406          000052                $READ   =       $WRDL+32        ;TOTAL BITS READ COUNT
9407          000056                $TOTAL  =       $WRDL+36        ;TOTAL ERRORS (ALL TYPES) COUNT
9408          000060                $SOFT   =       $WRDL+40        ;'SOFT' ERROR COUNT
9409          000062                $HARD   =       $WRDL+42        ;'HARD' ERROR COUNT
9410          000064                $SKI    =       $WRDL+44        ;'SKI' OR 'OCYL' ERROR COUNT
9411          000066                $MISPO  =       $WRDL+46        ;PROG DETECTED MISPOSITIONING ERROR S COUNT
9412          000070                $PASSC  =       $WRDL+50        ;PASS COUNTER
9413          000072                $FAIR   =       $WRDL+52        ;OPERATION QUEUE 'FAIRNESS' COUNT
9414
9415                                ;INDEX EQUATES TO THE NEXT OPERATION PARAMETERS
9416
9417          000074                $NCODE  =       $WRDL+54        ;NEXT OPERATION CODE
9418          000075                $NPATC  =       $NCODE+1        ;NEXT PATTERN
9419          000076                $NSEC   =       $NCODE+2        ;NEXT SECTOR
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9420            000077                  $NTRK   =       $NCODE+3        ;NEXT TRACK
9421            000100                  $NCYL   =       $NCODE+4        ;NEXT CYLINDER
9422            000102                  $NWRDL  =       $NCODE+6        ;NEXT BUFFER SIZE
9423            000104                  $NEXT   =       $NCODE+10       ;PARAMETER SELECTION INDICATOR
9424
9425                                    ;INDEX EQUATES FOR MAXIMUM/MINIMUM ADDRESSES
9426
9427            000106                  MAXCYL  =       $NCODE+12       ;MAXIMUM CYLINDER ADDRESS
9428            000110                  MINCYL  =       MAXCYL+2        ;MINIMUM CYLINDER ADDRESS
9429            000112                  MAXTRK  =       MAXCYL+4        ;MAXIMUM TRACK ADDRESS
9430            000114                  MINTRK  =       MAXCYL+6        ;MINIMUM TRACK ADDRESS
9431            000116                  MAXSEC  =       MAXCYL+10       ;MAXIMUM SECTOR ADDRESS
9432            000120                  MINSEC  =       MAXCYL+12       ;MINIMUM SECTOR ADDRESS
9433            000122                  $FIRST  =       MAXCYL+14       ;FIRST OPERATION INDICATOR
9434
9435                                    ;BAD SECTOR/TRACK ADDRESS STORAGE AREA INDEX EQUATE
9436
9437            000124                  $BDSEC  =       MAXCYL+16       ;BAD SECTOR STORAGE TABLE
9438
9439                                    ;DRIVE ID AREA INDEX EQUATE
9440
9441            000224                  $DRVID  =       $BDSEC+100      ;DRIVE ID
9442
9443                                    ;RH11/RM03 REGISTER EQUATES
9444
9445            000234                  $RMCS1  =       $DRVID+10       ;RM03 REGISTER STORAGE
9446            000236                  $RMWC   =       $RMCS1+2
9447            000240                  $RMBA   =       $RMCS1+4
9448            000242                  $RMDA   =       $RMCS1+6
9449            000244                  $RMCS2  =       $RMCS1+10
9450            000246                  $RMDS   =       $RMCS1+12
9451            000250                  $RMER1  =       $RMCS1+14
9452            000252                  $RMAS   =       $RMCS1+16
9453            000254                  $RMLA   =       $RMCS1+20
9454            000256                  $RMDB   =       $RMCS1+22
9455            000260                  $RMMR1  =       $RMCS1+24
9456            000262                  $RMDT   =       $RMCS1+26
9457            000264                  $RMSN   =       $RMCS1+30
9458            000266                  $RMOF   =       $RMCS1+32
9459            000270                  $RMDC   =       $RMCS1+34
9460            000272                  $RMHR   =       $RMCS1+36
9461            000274                  $RMMR2  =       $RMCS1+40
9462            000276                  $RMER2  =       $RMCS1+42
9463            000300                  $RMEC1  =       $RMCS1+44
9464            000302                  $RMEC2  =       $RMCS1+46
9465
9466
9467                                    ;BLOCK FOR DRIVE 0
9468
9469    042472      000     000         DRIVE0: .BYTE   0,0             ;DRIVE NUMBER
9470    042474  000005                          .BLKW   5
9471    042506  042726                          .WORD   .+$RMCS1-$REG
9472    042510  000266                          .BLKB   $RMEC2-$REG
9473
9474
9475                                    ;BLOCK FOR DRIVE 1
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9476
9477  042776  001  000  DRIVE1: .BYTE  1,0          ;DRIVE NUMBER
9478  043000  000005           .BLKW  5
9479  043012  043232           .WORD  .+$RMCS1-$REG
9480  043014  000266           .BLKB  $RMEC2-$REG
9481
9482
9483                     ;BLOCK FOR DRIVE 2
9484
9485  043302  002  000  DRIVE2: .BYTE  2,0          ;DRIVE NUMBER
9486  043304  000005           .BLKW  5
9487  043316  043536           .WORD  .+$RMCS1-$REG
9488  043320  000266           .BLKB  $RMEC2-$REG
9489
9490
9491                     ;BLOCK FOR DRIVE 3
9492
9493  043606  003  000  DRIVE3: .BYTE  3,0          ;DRIVE NUMBER
9494  043610  000005           .BLKW  5
9495  043622  044042           .WORD  .+$RMCS1-$REG
9496  043624  000266           .BLKB  $RMEC2-$REG
9497
9498
9499                     ;BLOCK FOR DRIVE 4
9500
9501  044112  004  000  DRIVE4: .BYTE  4,0          ;DRIVE NUMBER
9502  044114  000005           .BLKW  5
9503  044126  044346           .WORD  .+$RMCS1-$REG
9504  044130  000266           .BLKB  $RMEC2-$REG
9505
9506
9507                     ;BLOCK FOR DRIVE 5
9508
9509  044416  005  000  DRIVE5: .BYTE  5,0          ;DRIVE NUMBER
9510  044420  000005           .BLKW  5
9511  044432  044652           .WORD  .+$RMCS1-$REG
9512  044434  000266           .BLKB  $RMEC2-$REG
9513
9514
9515                     ;BLOCK FOR DRIVE 6
9516
9517  044722  006  000  DRIVE6: .BYTE  6,0          ;DRIVE NUMBER
9518  044724  000005           .BLKW  5
9519  044736  045156           .WORD  .+$RMCS1-$REG
9520  044740  000266           .BLKB  $RMEC2-$REG
9521
9522
9523                     ;BLOCK FOR DRIVE 7
9524
9525  045226  007  000  DRIVE7: .BYTE  7,0          ;DRIVE NUMBER
9526  045230  000005           .BLKW  5
9527  045242  045462           .WORD  .+$RMCS1-$REG
9528  045244  000266           .BLKB  $RMEC2-$REG
9529
9530
9531                     ;GENERAL PURPOSE DPB - USED BY 'READHD', 'RECALT', 'OFFSET',&'RTNCTR'
```

```
 9532
 9533  045532  000000  000000  177776  GENDPB: .WORD   0,0,-2,CYLDER
 9534  045540  056150
 9535  045542  000000  000000  045552          .WORD   0,0,GENREG,0
 9536  045550  000000
 9537  045552  000024                  GENREG: .BLKW   24              ;REGISTER STORAGE IF ERROR
 9538
 9539                                  ;;*****************************************************************
 9540
 9541                                  .SBTTL  ERROR MESSAGES
 9542
 9543                                  ;;*****************************************************************
 9544
 9545                                  .NLIST  BEX
       045622  044122  030067  030450  EM1:    .ASCIZ  /RH70(11) INTERRUPT OCCURRED (RMAS = 0)/
       045671     125  042516  050130  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
       045727     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
       045765     115  051501  041123  EM4:    .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)/
       046022  042101  051104  051505  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
       046056  044122  030067  030450  EM6:    .ASCIZ  /RH70(11) DIDN'T RESPOND TO ADDRESSING/
       046124  047125  047503  051122  EM10:   .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR/
       046167     106  052101  046101  EM11:   .ASCIZ  /FATAL MASSBUS PARITY ERROR/
       046222  042520  051522  051511  EM12:   .ASCIZ  /PERSISTENT DEVICE UNSAFE/
       046253     117  042520  040522  EM13:   .ASCIZ  /OPERATION NOT COMPLETED WITHIN TIME LIMIT/
       046325     104  044522  042526  EM14:   .ASCIZ  /DRIVE WENT OFFLINE/
       046350  047516  051040  051505  EM15:   .ASCIZ  /NO RESPONSE TO PORT REQUEST/
       046404  042510  042101  051105  EM20:   .ASCIZ  /HEADER CRC ERROR/
       046425     104  052101  020101  EM21:   .ASCIZ  /DATA CHECK ('DCK') ERROR/
       046456  051127  052111  020105  EM22:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') SET/
       046531     127  044522  042524  EM23:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') NOT SET/
       046610  042510  042101  051105  EM24:   .ASCIZ  /HEADER READ ERROR - 'FMT' BIT DROPPED/
       046656  042510  042101  051105  EM25:   .ASCIZ  /HEADER READ ERROR - HEADER COMPARE ('HCE') ERROR/
       046737     106  051117  040515  EM26:   .ASCIZ  /FORMAT ERROR ('FER')/
       046764  042510  042101  051105  EM27:   .ASCIZ  /HEADER COMPARE ('HCE') ERROR/
       047021     115  051511  042503  EM30:   .ASCIZ  /MISCELLANEOUS DRIVE ERROR/
```

```
047053     117  042520  040522  EM31:   .ASCIZ  /OPERATION INCOMPLETE ('OPI') ERROR/
047116  051104  053111  020105  EM32:   .ASCIZ  /DRIVE TIMING ('DTE') ERROR/
047151     120  051101  052111  EM33:   .ASCIZ  /PARITY ('PAR') ERROR AFTER OPERATION STARTED/
047226  051127  052111  020105  EM34:   .ASCIZ  /WRITE CLOCK FAILURE ('WCF') ERROR/
047270  047111  040526  044514  EM35:   .ASCIZ  /INVALID ADDRESS ('IAE') ERROR/
047326  051127  052111  020105  EM36:   .ASCIZ  /WRITE LOCK ('WLE') ERROR/
047357     104  052101  020101  EM37:   .ASCIZ  /DATA CHECK ('DCK') SET DURING WRITE CHECK COMMAND/
047441     122  030510  020061  EM40:   .ASCIZ  /RH11 OR UNIBUS TRANSFER ERROR/
047477     102  051525  040440  EM41:   .ASCIZ  /BUS ADDRESS OR WORD COUNT INCORRECT/
047543     104  052101  020101  EM42:   .ASCIZ  /DATA COMPARE ERRORS - NO OTHER ERROR(S) DETECTED/
047624  040503  023516  020124  EM43:   .ASCIZ  /CAN'T MATCH DATA READ WITH A PATTERN/
047671     105  051122  051117  EM44:   .ASCIZ  /ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11/
047755     105  041503  046040  EM45:   .ASCIZ  /ECC LOGIC FAILURE - POSITION REGISTER VALUE NOT VALID/
050043     102  051525  040440  EM46:   .ASCIZ  /BUS ADDRESS AND WORD COUNT NOT CONSISTENT/
050115     123  042505  020113  EM50:   .ASCIZ  /SEEK INCOMPLETE ('SKI') ERROR/
050153     120  047522  051107  EM51:   .ASCIZ  /PROGRAM DETECTED POSITIONING ERROR/
050216  051104  053111  020105  EM60:   .ASCIZ  /DRIVE UNSAFE ERROR/
050241     122  040515  000123  DH1:    .ASCIZ  /RMAS/
050246  051104  053111  020105  DH2:    .ASCIZ  /DRIVE   RMDS    RMER1   RMER2  RMMR2   RMAS/
050322  051104  053111  020105  DH3:    .ASCIZ  /DRIVE   REG ADR  DATA/
050350  051104  053111  020105  DH4:    .ASCIZ  /DRIVE   REG ADR    GOOD    BAD/
050407     044  046522  042101  DH6:    .ASCIZ  /$RMADR/
050416  051104  020126  046522  DH14:   .ASCII  /DRV RMCS1   RMCS2   RMDS    RMER1   /
050462  046522  051115  020062          .ASCIZ  /RMMR2  RMER2   RMEC1   RMEC2/<CR><LF>
050521     122  053515  020103  DH15:   .ASCII  /RMWC    RMBA    RMDA    RMAS    RMLA    /
050571     122  042115  020102          .ASCIZ  /RMDB    RMMR1   RMDT/<CR><LF>
050620  046522  047123  020040  DH16:   .ASCIZ  /RMSN    RMOF    RMDC    RMMR2   STATUS/<CR><LF>
        050672                          .EVEN

                                .LIST   BEX
```

```
9546
9547  050672  001342  000000          DT1:    .WORD   ATTN,0
9548
9549  050676  001216  034150  034152  DT2:    .WORD   DRIVE,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6,ATTN,0
9550  050704  034154  034156  001342
9551  050712  000000
9552
9553  050714  001216  041230  041232  DT3:    .WORD   DRIVE,RD.ADR,RD.WRD,0
9554  050722  000000
9555
9556  050724  001216  041450  041446  DT4:    .WORD   DRIVE,WRT.AD,WRT.WD,RD.WRD,0
9557  050732  041232  000000
9558
9559  050736  001270  000000          DT6:    .WORD   $RMADR,0
9560
9561  050742  000234  000244  000246  DT14:   .WORD   $RMCS1,$RMCS2,$RMDS,$RMER1,$RMMR2,$RMER2,$RMEC1,$RMEC2,0
9562  050750  000250  000274  000276
9563  050756  000300  000302  000000
9564
9565  050764  000236  000240  000242  DT15:   .WORD   $RMWC,$RMBA,$RMDA,$RMAS,$RMLA,$RMDB,$RMMR1,$RMDT,0
9566  050772  000252  000254  000256
9567  051000  000260  000262  000000
9568
9569  051006  000264  000266  000270  DT16:   .WORD   $RMSN,$RMOF,$RMDC,$RMMR2,$STATUS,0
9570  051014  000274  000016  000000
9571
9572
9573                                  .NLIST  BEX

      051022  051120  051505  047105  LIN2C:  .ASCIZ  /PRESENT ORDER = /
      051043     040  050040  042522  LIN2P:  .ASCIZ  /  PREVIOUS ORDER = /
      051067     052  042440  051122  LIN2S:  .ASCIZ  @* ERROR AT BAD TRACK/SECTOR@
      051123     105  051122  051117  LINM3:  .ASCIZ  /ERROR AT C/
      051136  052040     000          T:      .ASCIZ  / T/
      051141     120  042522  042523  LINN3:  .ASCIZ  /PRESENT ADDR = C/
      051162  051440     000          S:      .ASCIZ  / S/
      051165     040  020040  051120  LINP3:  .ASCIZ  /   PREV ADDR = C/
      051206  052123  051101  020124  LINS3:  .ASCIZ  /START CYL = /
      051223     040  042440  042116  LINEN3: .ASCIZ  /  END CYL = /
      051240  020040  041501  052524  LINA3:  .ASCIZ  /  ACTUAL CYL = /
      051260  020040  051124  020113  LINT3:  .ASCIZ  /  TRK = /
      051271     040  046522  041504  LINCA3: .ASCIZ  / RMDC = /
      051302  046522  040504  036440  LINDA3: .ASCIZ  /RMDA = /
      051312  046522  040502  036440  LINB3:  .ASCIZ  /RMBA = /
      051322  020040  046522  041527  LINW3:  .ASCIZ  /  RMWC = /
      051334  052123  051101  020124  LINST3: .ASCIZ  /START TRK = /
      051351     123  040524  052122  LINSS3: .ASCIZ  /START SEC = /
      051366  052502  043106  051105  LINM4:  .ASCIZ  /BUFFER ADDR = /
      051405     040  051440  055111  LINS4:  .ASCIZ  /  SIZE = /
      051417     040  040440  052103  LINX4:  .ASCIZ  /  ACTUAL NMBR WRDS XFRD = /
      051452  047507  042117  042040  LIND5:  .ASCIZ  /GOOD DATA = /
      051467     040  041040  042101  LINB5:  .ASCIZ  /  BAD DATA = /
      051505     040  051440  041505  LINP5:  .ASCIZ  /  SECT POS = /
      051523     110  040505  042504  LINS5:  .ASCIZ  /HEADER FROM ERROR SECTOR = /
      051557     122  042515  030503  LINEP5: .ASCIZ  /RMEC1 = /
      051570  051040  042515  031103  LINE05: .ASCIZ  / RMEC2 = /
```

```
051602 042523 052103 051117 LINB6:  .ASCIZ /SECTOR IS ECC CORRECTABLE /
051635    123 041505 047524 LINC6:  .ASCIZ /SECTOR READ CORRECTLY /
051664 047503 051122 041505 LING6:  .ASCIZ /CORRECTED ON /
051702 051040 052105 044522 LINR6:  .ASCIZ / RETRIES/
051713    125 041516 051117 LINU06: .ASCIZ /UNCORRECTABLE AFTER /
051740 020040 047524 040524 LIN7M:  .ASCIZ /  TOTAL MISPOS ERR = /
051766 051117 042504 051522 LIN7O:  .ASCIZ /ORDERS:/
051776 052040 052117 046101 LIN7P:  .ASCIZ / TOTAL SEEKS = /
052016 052040 052117 046101 LIN7S:  .ASCIZ / TOTAL SKI ERR = /
052040 020040 051105 047522 LIN7T:  .ASCIZ /  ERRORS:/
052052 020040 051127 051504 LIN7X:  .ASCIZ /  WRDS XFR:/
052066 020040 051127 051504 LIN7R:  .ASCIZ /  WRDS READ:/
052103    105 051122 051117 LIN8M:  .ASCIZ /ERROR DURING RETRY/
052126 040504 040524 041440 LIN9B:  .ASCIZ /DATA COMPARISON ERRORS/
052155    040 020040 020040 LIN9H:  .ASCII /          GOOD    BAD/<CR><LF>
052203    114 041517 020040          .ASCIZ /LOC       DATA    DATA/<CR><LF>
052233    114 041517 020040 LIN9I:  .ASCIZ /LOC       DATA/<CR><LF>
052253    124 052117 046101 LIN9E:  .ASCIZ /TOTAL COMPARE ERRORS = /
052303    124 042510 042040 LIN9G:  .ASCIZ /THE DATA COMPARED OK/<CR><LF>
052332 051105 047522 020122 LIN10A: .ASCIZ /ERROR BURST BEGINS AT WORD /
052366 044440 020116 040504 LIN10B: .ASCIZ / IN DATA FIELD OF ERROR SECTOR/<CR><LF>
052427    105 051122 051117 LIN10C: .ASCII /ERROR WAS NOT IN THE DATA READ - /<CR><LF>
052472 041505 020103 047503          .ASCIZ /ECC CORRECTION CAN'T BE PERFORMED/
052534 041505 020103 047503 LIN10H: .ASCII /ECC CORRECTION RESULTS/<CR><LF>
052564 042101 051104 020040          .ASCIZ /ADDR    BAD     CORRECTED /<CR><LF>
052621    103 047117 042524 LIN11H: .ASCIZ /CONTENTS OF ERROR SECTOR (REPORTED ABOVE)/<CR><LF>
052675    101 042104 020122          .ASCIZ /ADDR    DATA/<CR><LF>
052714 020040                LIN4SP: .ASCII /  /
052716    040                LINSP:  .ASCII / /
052717    040    000         LINSPO: .ASCIZ / /
052721    122 052105 044522 LINX5: .ASCIZ  /RETRIEVED BY A RDHD COMMAND/

                             .SBTTL  TELETYPE MESSAGES

052755    104 044522 042526 UNTMSG: .ASCIZ /DRIVE/
052763    040 043117 046106 UNTOFF: .ASCIZ / OFFLINE/
052774 047440 046116 047111 UNTON:  .ASCIZ / ONLINE/
053004 047040 052117 041040 UNTNOT: .ASCIZ / NOT BEING TESTED/
053026 040440 051114 040505 UNTASN: .ASCIZ / ALREADY BEING TESTED/
053054 047040 052117 040440 NOTRM:  .ASCIZ @ NOT AN RM03@
053071    040 047516 020124 NOTPRS: .ASCIZ / NOT PRESENT/
053106 047040 052117 040440 NOTAVL: .ASCIZ / NOT AVAILABLE/
053125    040 047125 040523 NOTSAF: .ASCIZ / UNSAFE/
053135    125 044516 020124 SYSTAT: .ASCIZ /UNIT STATUS:/<CR><LF><LF>
053155    122 030115 000063 RM03A:  .ASCIZ /RM03/
053162 051104 053111 020105 STATHD: .ASCII /DRIVE PERFORMANCE SUMMARY/<CR><LF>
053215    104 053122 050040          .ASCII /DRV PASS ORDERS   SEEKS   WRDS XFER   WRDS READ /
053275    123 043117 020124          .ASCIZ /SOFT HARD  SKI MISP OTHER/<CR><LF>
053331    104 047117 006505 PDONE:  .ASCIZ /DONE/<CR><LF><LF>
053341    007 043077 052101 DROPNG: .ASCIZ <07>/?FATAL OR EXCESSIVE ERRORS/
053375    105 042116 047440 ENDPAS: .ASCIZ /END OF PASS/
053411    015 042412 042116 ENDTST: .ASCIZ <CR><LF>/END OF TEST/
053427    015 042012 044522 DEASSG: .ASCIZ <CR><LF>/DRIVE DEASSIGNED/
053452 005015 025052 025052 DRNUM:  .ASCIZ <CR><LF>/********** DRIVE #/
053477    040 052123 051101 ASGND:  .ASCIZ / STARTED/<CR><LF>
053512 005015 020077 046047 NEDCLK: .ASCIZ <CR><LF>/? 'L' OR 'P' CLOCK REQUIRED ON SYSTEM/<CR><LF>
```

```
053564  000056                  PERIOD: .ASCIZ  /./
053566  000077                  QUES:   .ASCIZ  /?/
053570  047111  040526  044514  INVLD:  .ASCIZ  /INVALID COMMAND/<CR><LF>
053612  005015  047105  042524  ENTCOM: .ASCIZ  <CR><LF>/ENTER COMMANDS: /<CR><LF>
053637    105   052116  051105  ENTDRV: .ASCIZ  /ENTER I.D. FOR DRV #/
053664  005015  047105  042524  ENTLMT: .ASCIZ  <CR><LF>/ENTER ADDRESS LIMITS FOR DRV #/
053725    105   052116  051105  ENTADR: .ASCIZ  @ENTER BAD TRK/SEC ADRS FOR DRV #@
053766  000072                  COLON:  .ASCIZ  /:/
053770  005015  040504  042524  DATEIS: .ASCIZ  <CR><LF>/DATE: /
054001    015   047412  042520  IDIS:   .ASCIZ  <CR><LF>/OPERATOR I.D.: /
054023    015   005012  051104  HEDLIN: .ASCIZ  <CR><LF><LF>/DRV  DRV I.D./<CR><LF>
054046  047516  042516  005015  NONE:   .ASCIZ  /NONE/<CR><LF>
054055    077   044440  053116  BADENT: .ASCIZ  /? INVALID ENTRY/<CR><LF>
054077    123   051531  042524  BUSY:   .ASCIZ  /SYSTEM BUSY.../<CR><LF>
054120  005015  051120  043517  INTDON: .ASCII  <CR><LF>/PROGRAM INITIALIZATION COMPLETE/
054161    015   052012  050131          .ASCIZ  <CR><LF>/TYPE A 'CONTROL C' TO ENTER COMMANDS/<CR><LF><LF>
054233    015   043012  044501  MERR1:  .ASCIZ  <CR><LF>/FAIL TO RETRIEVE BAD SPOT FILE ON  /
054301    015   047412  042526  MERR2:  .ASCIZ  <CR><LF>/OVER 16 BAD SECTORS ARE DETECTED ON  /

          054352                  .EVEN

                                  .LIST   BEX

 9574
 9575
 9576                             ;PARAMETER ENTRY TABLE
 9577
 9578  054352  054500  020000  001462  PARLST: .WORD   PAR1,8192.,MAXDL
 9579  054360  054510  177777  001466          .WORD   PAR2,-1,INTRVL
 9580  054366  054660  177777  001460          .WORD   PAR19,-1,PASCNT
 9581  054374  054520  000017  001510          .WORD   PAR3,15.,PATTEN
 9582  054402  054620  000001  001476          .WORD   PAR11,1,WCSEL
 9583  054410  054630  000007  001500          .WORD   PAR14,7,RATIO
 9584  054416  054650  000001  001506          .WORD   PAR16,1,ENDET
 9585  054424  054610  000001  001474          .WORD   PAR10,1,FORMAT
 9586                          ;               .WORD   PAR15,1,AUTOCK
 9587  054432  054670  000001  001504          .WORD   PAR20,1,NOTPRT
 9588  054440  054700  000001  001512          .WORD   PAR21,1,HEADER  ;RANDOM ADDRESS FLAG
 9589  054446  000000                          .WORD   0               ;TABLE TERMINATOR
 9590
 9591
 9592                             .NLIST  BEX

       054450  047105  042524  020122  ASKPAR: .ASCIZ  /ENTER PARAMETERS:  /
       054474  027440  000040          SLASH:  .ASCIZ  @ / @

       054500  044523  042532  020040  PAR1:   .ASCIZ  /SIZE   /
       054510  044515  052516  042524  PAR2:   .ASCIZ  /MINUTE /
       054520  040520  052124  051105  PAR3:   .ASCIZ  /PATTERN/
       054530  040515  041530  046131  PAR4:   .ASCIZ  /MAXCYL /
       054540  044515  041516  046131  PAR5:   .ASCIZ  /MINCYL /
       054550  040515  052130  045522  PAR6:   .ASCIZ  /MAXTRK /
       054560  044515  052116  045522  PAR7:   .ASCIZ  /MINTRK /
       054570  040515  051530  041505  PAR8:   .ASCIZ  /MAXSEC /
       054600  044515  051516  041505  PAR9:   .ASCIZ  /MINSEC /
       054610  047506  046522  052101  PAR10:  .ASCIZ  /FORMAT /
       054620  040522  042116  046517  PAR11:  .ASCIZ  /RANDOM /
```

```
        054630  040522  044524  020117  PAR14:  .ASCIZ  /RATIO  /
        054640  044103  041505  020113  PAR15:  .ASCIZ  /CHECK  /
        054650  047105  044504  043516  PAR16:  .ASCIZ  /ENDING /
        054660  040520  051523  051505  PAR19:  .ASCIZ  /PASSES /
        054670  042515  051523  043501  PAR20:  .ASCIZ  /MESSAGE/
        054700  042510  042101  051105  PAR21:  .ASCIZ  /HEADER /

                                               .EVEN


                                               .LIST   BEX

 9593
 9594
 9595                                          ;PARAMETER TABLE POINTERS FOR ADDRESS LIMITS
 9596
 9597   054710  054730                        TABLE:  .WORD   TABLE0          ;PARAMETER TABLE FOR DRIVE 0
 9598   054712  054776                                .WORD   TABLE1          ;PARAMETER TABLE FOR DRIVE 1
 9599   054714  055044                                .WORD   TABLE2          ;PARAMETER TABLE FOR DRIVE 2
 9600   054716  055112                                .WORD   TABLE3          ;PARAMETER TABLE FOR DRIVE 3
 9601   054720  055160                                .WORD   TABLE4          ;PARAMETER TABLE FOR DRIVE 4
 9602   054722  055226                                .WORD   TABLE5          ;PARAMETER TABLE FOR DRIVE 5
 9603   054724  055274                                .WORD   TABLE6          ;PARAMETER TABLE FOR DRIVE 6
 9604   054726  055342                                .WORD   TABLE7          ;PARAMETER TABLE FOR DRIVE 7
 9605
 9606                                          ;PARAMETER TABLE FOR ADDRESS LIMITS
 9607
 9608   054730  054540  000000  042602  TABLE0: .WORD   PAR5,0,MINCYL+DRIVE0
 9609   054736  054530  000000  042600          .WORD   PAR4,0,MAXCYL+DRIVE0
 9610   054744  054560  000004  042606          .WORD   PAR7,4.,MINTRK+DRIVE0
 9611   054752  054550  000004  042604          .WORD   PAR6,4.,MAXTRK+DRIVE0
 9612   054760  054600  000037  042612          .WORD   PAR9,31.,MINSEC+DRIVE0
 9613   054766  054570  000037  042610          .WORD   PAR8,31.,MAXSEC+DRIVE0,0
 9614   054774  000000
 9615
 9616   054776  054540  000000  043106  TABLE1: .WORD   PAR5,0,MINCYL+DRIVE1
 9617   055004  054530  000000  043104          .WORD   PAR4,0,MAXCYL+DRIVE1
 9618   055012  054560  000004  043112          .WORD   PAR7,4.,MINTRK+DRIVE1
 9619   055020  054550  000004  043110          .WORD   PAR6,4.,MAXTRK+DRIVE1
 9620   055026  054600  000037  043116          .WORD   PAR9,31.,MINSEC+DRIVE1
 9621   055034  054570  000037  043114          .WORD   PAR8,31.,MAXSEC+DRIVE1,0
 9622   055042  000000
 9623
 9624   055044  054540  000000  043412  TABLE2: .WORD   PAR5,0,MINCYL+DRIVE2
 9625   055052  054530  000000  043410          .WORD   PAR4,0,MAXCYL+DRIVE2
 9626   055060  054560  000004  043416          .WORD   PAR7,4.,MINTRK+DRIVE2
 9627   055066  054550  000004  043414          .WORD   PAR6,4.,MAXTRK+DRIVE2
 9628   055074  054600  000037  043422          .WORD   PAR9,31.,MINSEC+DRIVE2
 9629   055102  054570  000037  043420          .WORD   PAR8,31.,MAXSEC+DRIVE2,0
 9630   055110  000000
 9631
 9632   055112  054540  000000  043716  TABLE3: .WORD   PAR5,0,MINCYL+DRIVE3
 9633   055120  054530  000000  043714          .WORD   PAR4,0,MAXCYL+DRIVE3
 9634   055126  054560  000004  043722          .WORD   PAR7,4.,MINTRK+DRIVE3
 9635   055134  054550  000004  043720          .WORD   PAR6,4.,MAXTRK+DRIVE3
 9636   055142  054600  000037  043726          .WORD   PAR9,31.,MINSEC+DRIVE3
 9637   055150  054570  000037  043724          .WORD   PAR8,31.,MAXSEC+DRIVE3,0
```

```
 9638  055156  000000
 9639
 9640  055160  054540  000000  044222  TABLE4: .WORD   PAR5,0,MINCYL+DRIVE4
 9641  055166  054530  000000  044220          .WORD   PAR4,0,MAXCYL+DRIVE4
 9642  055174  054560  000004  044226          .WORD   PAR7,4.,MINTRK+DRIVE4
 9643  055202  054550  000004  044224          .WORD   PAR6,4.,MAXTRK+DRIVE4
 9644  055210  054600  000037  044232          .WORD   PAR9,31.,MINSEC+DRIVE4
 9645  055216  054570  000037  044230          .WORD   PAR8,31.,MAXSEC+DRIVE4,0
 9646  055224  000000
 9647
 9648  055226  054540  000000  044526  TABLE5: .WORD   PAR5,0,MINCYL+DRIVE5
 9649  055234  054530  000000  044524          .WORD   PAR4,0,MAXCYL+DRIVE5
 9650  055242  054560  000004  044532          .WORD   PAR7,4.,MINTRK+DRIVE5
 9651  055250  054550  000004  044530          .WORD   PAR6,4.,MAXTRK+DRIVE5
 9652  055256  054600  000037  044536          .WORD   PAR9,31.,MINSEC+DRIVE5
 9653  055264  054570  000037  044534          .WORD   PAR8,31.,MAXSEC+DRIVE5,0
 9654  055272  000000
 9655
 9656  055274  054540  000000  045032  TABLE6: .WORD   PAR5,0,MINCYL+DRIVE6
 9657  055302  054530  000000  045030          .WORD   PAR4,0,MAXCYL+DRIVE6
 9658  055310  054560  000004  045036          .WORD   PAR7,4.,MINTRK+DRIVE6
 9659  055316  054550  000004  045034          .WORD   PAR6,4.,MAXTRK+DRIVE6
 9660  055324  054600  000037  045042          .WORD   PAR9,31.,MINSEC+DRIVE6
 9661  055332  054570  000037  045040          .WORD   PAR8,31.,MAXSEC+DRIVE6,0
 9662  055340  000000
 9663
 9664  055342  054540  000000  045336  TABLE7: .WORD   PAR5,0,MINCYL+DRIVE7
 9665  055350  054530  000000  045334          .WORD   PAR4,0,MAXCYL+DRIVE7
 9666  055356  054560  000004  045342          .WORD   PAR7,4.,MINTRK+DRIVE7
 9667  055364  054550  000004  045340          .WORD   PAR6,4.,MAXTRK+DRIVE7
 9668  055372  054600  000037  045346          .WORD   PAR9,31.,MINSEC+DRIVE7
 9669  055400  054570  000037  045344          .WORD   PAR8,31.,MAXSEC+DRIVE7,0
 9670  055406  000000
 9671
 9672
 9673
 9674                          ;;*****************************************************************
 9675
 9676                          ;ROUTINE TO GET THE DATE AND THE OPERATOR FROM THE OPERATOR
 9677                          ;CALL:
 9678                          ;       JSR     PC,OPRDAT
 9679                          ;       RETURN
 9680                          ;
 9681                          ;NOTE: THIS ROUTINE IS ENTERED ONLY AT INITIAL START
 9682
 9683  055410  104401  055532  OPRDAT: TYPE    ,ENTDAT         ;'ENTER DATE'
 9684  055414  104411                  RDLIN                   ;READ THE ENTRY
 9685  055416  012605                  MOV     (SP)+,R5        ;PUT THE ENTRY ADDRESS INTO R5
 9686  055420  112537  001320          MOVB    (R5)+,DATE      ;STORE THE DATE
 9687  055424  112537  001321          MOVB    (R5)+,DATE+1    ;STORE THE DATE
 9688  055430  112537  001322          MOVB    (R5)+,DATE+2    ;STORE THE DATE
 9689  055434  112537  001323          MOVB    (R5)+,DATE+3    ;STORE THE DATE
 9690  055440  112537  001324          MOVB    (R5)+,DATE+4    ;STORE THE DATE
 9691  055444  112537  001325          MOVB    (R5)+,DATE+5    ;STORE THE DATE
 9692  055450  112537  001326          MOVB    (R5)+,DATE+6    ;STORE THE DATE
 9693  055454  112537  001327          MOVB    (R5)+,DATE+7    ;STORE THE DATE
```

```
 9694  055460  005037  001330                  CLR     DATE+8.          ;SET TERMINATOR
 9695  055464  104401  055551                  TYPE    ,ENTID           ;'ENTER OPERATOR I.D.'
 9696  055470  104411                          RDLIN                    ;READ THE ENTRY
 9697  055472  012605                          MOV     (SP)+,R5         ;ENTRY ADDRESS
 9698  055474  112537  001332                  MOVB    (R5)+,OPERID     ;STORE THE I.D.
 9699  055500  112537  001333                  MOVB    (R5)+,OPERID+1   ;STORE THE I.D.
 9700  055504  112537  001334                  MOVB    (R5)+,OPERID+2   ;STORE THE I.D.
 9701  055510  112537  001335                  MOVB    (R5)+,OPERID+3   ;STORE THE I.D.
 9702  055514  112537  001336                  MOVB    (R5)+,OPERID+4   ;STORE THE I.D.
 9703  055520  112537  001337                  MOVB    (R5)+,OPERID+5   ;STORE THE I.D.
 9704  055524  005037  001340                  CLR     OPERID+6         ;SET TERMINTOR
 9705  055530  000207                          RTS     PC               ;RETURN
 9706
 9707  055532  005015  047105  042524  ENTDAT: .ASCIZ  <CR><LF>/ENTER DATE: /
 9708  055540  020122  040504  042524
 9709  055546  020072     000
 9710  055551     105  052116  051105  ENTID:  .ASCIZ  /ENTER OPERATOR I.D.: /
 9711  055556  047440  042520  040522
 9712  055564  047524  020122  027111
 9713  055572  027104  020072     000
 9714          055600                  .EVEN
 9715
 9716                                  .SBTTL  ROUTINE TO SIZE MEMORY
 9717
 9718                                  ;;*****************************************************************
 9719                                  ;*CALL:
 9720                                  ;*      JSR     PC,$SIZE
 9721                                  ;*      RETURN
 9722                                  ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
 9723
 9724  055600  010046                  $SIZE:  MOV     R0,-(SP)         ;;SAVE R0 ON THE STACK
 9725  055602  010146                          MOV     R1,-(SP)         ;;SAVE R1 ON THE STACK
 9726  055604  013746  000004                  MOV     @#ERRVEC,-(SP)   ;;SAVE PRESENT ERROR VECTOR PS & PC
 9727  055610  013746  000006                  MOV     @#ERRVEC+2,-(SP)
 9728  055614  010600                          MOV     SP,R0            ;;SAVE THE STACK POINTER
 9729                                  ;;SET THE ERRVEC PS TO THE PRESENT PS
 9730  055616  104400                          TRAP                     ;;PUSH OLD PSW AND PC ON STACK
 9731  055620  012637  000006                  MOV     (SP)+,@#ERRVEC+2         ;;SAVE THE PSW IN @#ERRVEC+2
 9732  055624  012737  055644  000004          MOV     #2$,@#ERRVEC     ;;SET FOR TIMEOUT
 9733  055632  012701  020000                  MOV     #20000,R1        ;;FIRST ADDRESS
 9734  055636  005711                  1$:     TST     (R1)             ;;TEST THIS ADDRESS
 9735  055640  005721                          TST     (R1)+            ;;STEP TO NEXT ADDRESS
 9736  055642  000775                          BR      1$               ;;TRY ANOTHER
 9737  055644  162701  000002          2$:     SUB     #2,R1            ;;DROP BACK
 9738  055650  010006                          MOV     R0,SP            ;;RESTORE THE STACK
 9739  055652  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
 9740  055656  012637  000004                  MOV     (SP)+,@#ERRVEC
 9741  055662  010137  055674                  MOV     R1,$LSTAD        ;;LAST ADDRESS
 9742  055666  012601                          MOV     (SP)+,R1         ;;RESTORE R1
 9743  055670  012600                          MOV     (SP)+,R0         ;;RESTORE R0
 9744  055672  000207                          RTS     PC
 9745  055674  000000                  $LSTAD: .WORD   0                ;;CONTAINS THE LAST ADDRESS
 9746
 9747                                  .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH11
 9748                                  ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
 9749                                  ;OF THE RH11 IS SETUP FOR THE PROPER ADDRESS.
```

```
9750                                    ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
9751                                    ;REQUIRED.
9752                                    ;NOTE: THIS ROUTINE DESTROYS R0-R4
9753                                    ;CALL
9754                                    ;
9755                                    ;       JSR     PC,BUSADR
9756                                    ;       RETURN
9757
9758  055676  005737  001356  BUSADR:  TST     CHGADR          ;INPUT FROM TTY REQUESTED?
9759  055702  002036                    BGE     3$              ;NO--BRANCH
9760  055704  005037  001356            CLR     CHGADR          ;YES--CLEAR THE REQUEST FLAG
9761  055710  104401  001201            TYPE    $CRLF           ;TYPE A CR-LF
9762  055714  012700  001270  1$:       MOV     #$RMADR,R0      ;FIRST ADDRESS
9763  055720  104401  056016            TYPE    ,MRMCS1         ;"RMCS1="
9764  055724  011046                    MOV     @(R0),-(SP)     ;PRESENT RMCS1 ADDRESS
9765  055726  104402                    TYPOC                   ;TYPE IT
9766  055730  104401  052716            TYPE    ,LINSP          ;2 SPACES
9767  055734  104411                    RDLIN                   ;GET THE ENTRY
9768  055736  012601                    MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
9769  055740  004537  056040            JSR     R5,CK.NUM       ;ENTER AND STORE THE NEW ADDRESS
9770  055744  000763                    BR      1$              ;ERROR EXIT
9771  055746  012700  001272  2$:       MOV     #$RMVEC,R0      ;VECTOR ADDRESS
9772  055752  104401  056027            TYPE    ,MRHVEC         ;"RHVEC="
9773  055756  011046                    MOV     @(R0),-(SP)     ;PRESENT RH11 VECTOR ADDRESS ON THE STACK
9774  055760  104402                    TYPOC                   ;TYPE IT
9775  055762  104401  052716            TYPE    ,LINSP          ;2 SPACES
9776  055766  104411                    RDLIN                   ;READ THE ENTRY
9777  055770  012601                    MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
9778  055772  004537  056040            JSR     R5,CK.NUM       ;ENTER AND STORE NEW ADDRESS
9779  055776  000763                    BR      2$              ;ERROR EXIT
9780  056000  012700  001270  3$:       MOV     #$RMADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
9781  056004  012701  034316            MOV     #RMADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
9782  056010  012021                    MOV     (R0)+,(R1)+     ;BUS ADDRESS
9783  056012  012021                    MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
9784  056014  000207                    RTS     PC              ;RETURN
9785
9786  056016  046522  051503  020061  MRMCS1: .ASCIZ  @RMCS1 = @
9787  056024  020075     000
9788  056027     122  053110  041505  MRHVEC: .ASCIZ  @RHVEC = @
9789  056034  036440  000040
9790
9791                                    .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
9792                                    ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
9793                                    ;AND FORMS AN OCTAL NUMBER IN R2
9794                                    ;CALL:
9795                                    ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
9796                                    ;       JSR     R5,CK.NUM       ;R5 CHANGED
9797                                    ;       RET                     ;ERROR EXIT
9798                                    ;       RET                     ;NORMAL EXIT
9799  056040  010246            CK.NUM: MOV     R2,-(SP)        ;SAVE R2
9800  056042  010346                    MOV     R3,-(SP)        ;SAVE R3
9801  056044  010446                    MOV     R4,-(SP)        ;SAVE R4
9802  056046  012703  000006            MOV     #6,R3           ;MAX OCTAL DIGITS IN THE NUMBER
9803  056052  005002                    CLR     R2              ;FINAL OCTAL VALUE
9804  056054  112104            1$:     MOVB    (R1)+,R4        ;GET CURRENT POINTED BYTE
9805  056056  001424                    BEQ     3$              ;BRANCH,IF TERMINATOR DETECTED
```

```
 9806  056060  120427  000060            CMPB    R4,#'0          ;SMALLER THAN ASCII-0 ?
 9807  056064  103425                    BLO     5$              ;YES,ERROR EXIT
 9808  056066  120427  000067            CMPB    R4,#'7          ;LARGER THAN ASCII-7 ?
 9809  056072  101022                    BHI     5$              ;YES,ERROR EXIT
 9810  056074  006302                    ASL     R2              ;SHIFT LEFT
 9811  056076  103420                    BCS     5$              ;
 9812  056100  006302                    ASL     R2              ;ONE
 9813  056102  103416                    BCS     5$              ;
 9814  056104  006302                    ASL     R2              ;OCTAL DIGIT
 9815  056106  103414                    BCS     5$              ;ERROR IF CARRY BIT SET
 9816  056110  042704  177770            BIC     #177770,R4      ;CHOP OFF HIGHER BITS
 9817  056114  060402                    ADD     R4,R2           ;APPENDING CURRENT DIGIT TO NUMBER
 9818  056116  005303                    DEC     R3              ;DECREMENT BYTE COUNT
 9819  056120  001401                    BEQ     2$              ;BRANCH,IF LAST BYTE
 9820  056122  000754                    BR      1$              ;LOOPING BACK
 9821  056124  112104            2$:     MOVB    (R1)+,R4        ;CHECK TERMINATOR
 9822  056126  001004                    BNE     5$              ;ERROR EXIT
 9823  056130  005702            3$:     TST     R2              ;FINAL VALUE = 0
 9824  056132  001401                    BEQ     4$              ;YES,THEN NOT REPLACE THE ORIGINAL VALUE
 9825  056134  010210                    MOV     R2,(R0)         ;REPLACE THE ORIGINAL VALUE
 9826  056136  005725            4$:     TST     (R5)+           ;ADJUST FOR NORMAL RETURN
 9827  056140  012604            5$:     MOV     (SP)+,R4        ;RESTORE R4
 9828  056142  012603                    MOV     (SP)+,R3        ;RESTORE R3
 9829  056144  012602                    MOV     (SP)+,R2        ;RESTORE R2
 9830  056146  000205                    RTS     R5              ;EXIT
 9831
 9832  056150  000400            CYLDER: .BLKW   256.            ;ONE SECTOR WORD CTR MAX SIZE
 9833          057150            ENDPGM  =       .
 9834
 9835
 9836
 9837                            .NLIST  BEX

       057150  005015  040515  047111  TITLE:  .ASCII  <CR><LF>/MAINDEC-11-DZRM8/<CR><LF>
       057174  046522  031460  050040          .ASCIZ  @RM03 PERFORMANCE EXERCISER @<CR><LF><LF>
       057233     015  052012  020117  LOADRV: .ASCII  <CR><LF>/TO TEST DRIVE 0, REPLACE THE 'XXDP' PACK ON DRIVE 0/<CR><LF>
       057322  044527  044124  040440          .ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40,/<CR><LF>
       057400  047101  020104  042522          .ASCIZ  /AND RESTART THE PROGRAM/<CR><LF>
       057432  005015  054523  052123  NOLOAD: .ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR><L

                                        .LIST   BEX
 9838
 9839          000001                    .END
```

F15


```
ABASE = 176700           2271#   2561    2602
ABNRML  026674           3652    6681#
ACDW1 = 000000           2561    2604
ACDW2 = 000000           2561    2605
ACK   = 000123           2456#
ACPUOP= 000000           2561    2576
ACTDRV  034234           8090#   8358*   8409*   8727*   8736*   8985
ACTSTR  034235           8096#   8987*   9001*
ADDW0 = 000000           2561
ADDW1 = 000000           2561
ADDW10= 000000           2561
ADDW11= 000000           2561
ADDW12= 000000           2561
ADDW13= 000000           2561
ADDW14= 000000           2561
ADDW15= 000000           2561
ADDW2 = 000000           2561
ADDW3 = 000000           2561
ADDW4 = 000000           2561
ADDW5 = 000000           2561
ADDW6 = 000000           2561
ADDW7 = 000000           2561
ADDW8 = 000000           2561
ADDW9 = 000000           2561
ADEVCT= 000000           2561    2567
ADEVM = 000000           2561    2603
AENV  = 000000           2561    2572
AENVM = 000000           2561    2573
AFATAL= 000000           2561    2564
AMADR1= 000000           2561    2589
AMADR2= 000000           2561    2593
AMADR3= 000000           2561    2596
AMADR4= 000000           2561    2599
AMAMS1= 000000           2561    2583
AMAMS2= 000000           2561    2591
AMAMS3= 000000           2561    2594
AMAMS4= 000000           2561    2597
AMSGAD= 000000           2561    2569
AMSGLG= 000000           2561    2570
AMSGTY= 000000           2561    2563
AMTYP1= 000000           2561    2584
AMTYP2= 000000           2561    2592
AMTYP3= 000000           2561    2595
AMTYP4= 000000           2561    2598
AOE   = 001000           2361#
APASS = 000000           2561    2566
APRIOR= 000000           2561
APTCSU= 000040           7340    7446#
APTENV= 000001           7248    7333    7402    7444#
APTSIZ= 000200           3312    7443#
APTSPO= 000100           7335    7404    7445#
ASGND   053477           3588    9573#
ASGN1   024250           6210#
ASGN2   024324           3473    6209    6222#
ASGN3   024406           6219    6230    6237#
ASGN4   024520           6238    6260#
```

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ASGN6   024522          6245    6261#
ASGN7   024534          6244    6263#
ASKPAR  054450          3407    9592#
ASNERR  026544          6221    6235    6262    6272    6298    6318    6638#
ASNLST  001544          2751#   3544    3595*   5902    5909    6212    6228    6237    6287    6289*   6311    6320    6334
                        6657*   6671    6753*   6756
ASNMSG  026564          6211*   6216*   6227*   6261*   6266*   6268*   6270*   6297*   6317*   6646#
ASSIGN  024242          6208#   6277    6360    6365    6369
ASWREG= 000000          2561    2574
ATA   = 100000          2348#
ATABIT  034304          3595    5909    6212    6228    6237    6287    6289    6311    6334    6657    6753    8162#   8325
                        8421    8527    8908    8927    8935    8936    8956    9042
ATESTN= 000000          2561    2565
ATTN    001342          2627#   7228*   9547    9549
AT0   = 000001          2374#
AT1   = 000002          2375#
AT2   = 000004          2376#
AT3   = 000010          2377#
AT4   = 000020          2378#
AT5   = 000040          2379#
AT6   = 000100          2380#
AT7   = 000200          2381#
AUNIT = 000000          2561    2568
AUSWR = 000000          2561    2575
AUTOCK  001502          2704#
AVAIL   001612          2761#   3547    3589    3593*   3605    3608    3631    3655
AVECT1= 000254          2272#   2561    2600
AVECT2= 000000          2561    2601
A16   = 000400          2284#
A17   = 001000          2285#
BADENT  054055          6621    9573#
BADSEC  001362          2636#   3651*   5377*   5449    6030    6042    6054    6066    6078
BAI   = 000010          2302#
BEGCOD  001516          2732#   6398    6399
BEGPAT  001514          2731#   6401
BEGSIZ  001520          2739#   6403    6404
BIT0  = 000001          2256#   6534    6563
BIT00 = 000001          2246#   2256    4353    4989    5110    6285
BIT01 = 000002          2245#   2255    3728    4856    8401    8649
BIT02 = 000004          2244#   2254    3455    4402    4985    5138    5145    6432    6440
BIT03 = 000010          2243#   2253    3821    4188    8867    9159
BIT04 = 000020          2242#   2252    3821    3833    8902
BIT05 = 000040          2241#   2251    4289    8252    8669    8882    9037
BIT06 = 000100          2240#   2250    3902    3903    3993    4008    4848    5620    6202    7107    8334    8392    8466
                        8767    9219
BIT07 = 000200          2239#   2249    3714    3836    4848    8334    8601    8748    8867    8882    8902    8931    9191
BIT08 = 000400          2238#   2248    3830    8334
BIT09 = 001000          2237#   2247    3726    9035
BIT1  = 000002          2255#   6559    6573
BIT10 = 002000          2236#   3724    3848    3856    7236    8651
BIT11 = 004000          2235#   3722    3851    8299    8428    8620    8971
BIT12 = 010000          2234#   3720    3859    3902    3903    3922    4414    4992    5608    8294    8316    8334    8403
                        8436    8616    8635    8647    8660    8892    8894    9098    9154    9220
BIT13 = 020000          2233#   3839    3865    4160    4256    6933    7243    8386    8842    9101
BIT14 = 040000          2232#   3701    3703    3728    3824    3827    3865    3983    4034    4078    4118    4224    4239
                        8398    8433    8829    8967    9063    9109    9113    9217
```

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BIT15 = 100000          2231#  3699   3867   3902   3962   4006   4256   8386   8398   8401   8403   8433   8436
                        8620   8649   8651   8767   8867   8882   8892   8902   8967   9035   9063   9070
BIT2  = 000004          2254#  3730   9070
BIT3  = 000010          2253#  3842
BIT4  = 000020          2252#  4084
BIT5  = 000040          2251#  3845
BIT6  = 000100          2250#  3922   5469
BIT7  = 000200          2249#  3915   4124   4822
BIT8  = 000400          2248#  4039   4063   4068   4098   4103   4256
BIT9  = 001000          2247#  3854   4256
BLKADR  002102          2807#  3360   3501   5907   6248   6254   6291   6314
BPTVEC= 000014          2263#
BUFTBL  001700          2773#  3379*  3380*  3381*  3384*  3385*  3387*  3388*  3391*  3395   3397   3398   4883
                        4885   4899*  4925   4926   4938*  4943*  4948   4949   4962*
BUSADR  055676          3351   9758#
BUSY    054077          6145   9573#
CFLAG   001360          2635#  3370*  3533   6148*  6154   6471*  6481   6598*  6610   6626*  7120*  7177*
CHGADR  001356          2634#  3272*  3274*  3471   3490   9758   9760*
CHKADR  016762          3686   5115   5161#
CI1     035570          8456   8484#
CI3     035676          8458   8507#
CI4     035776          8447   8529#
CI5     036354          8506   8528   8606#  8615
CI6     036376          8545   8555   8557   8559   8611#
CI7     036412          8388   8465   8496   8500   8504   8512   8522   8526   8537   8544   8550   8554   8568
                        8574   8578   8588   8599   8614   8616#  8722   8752   8919   9203
CI7B    036440          8619   8622#  8921
CI8     036512          8617   8625   8634#  8796   9055
CKBUS   012532          3706   4384#
CKCLK   022412          3421   5863#
CKCLK1  022506          5865   5876#
CKCLK2  022554          5877   5885#
CKCLK3  022604          5875   5884   5892#
CKERR   012440          3705   4365#
CKFMT   010512          3835   4063#
CKHCE   010706          3838   4098#
CKSWR = 104407          7227   7258   7974#
CK.CHR  030036          6989#  7026   7040
CK.DEC  030010          6967#  6995
CK.DIG  030110          6612   7020#
CK.NUM  056040          9769   9778   9799#
CK.OCT  027762          6949#  6997
CLKFLG  001310          2618#  5863*  5868*  5879*  6088
CLOCK   023546          5871   5881   6109#
CLR   = 000040          2304#
CLRDPB  025212          3502   6249   6377#
CLRQUE  042230          8234   8668   9287#
CMCNT   001410          2651#  4352*  4356*  4411*  4412*  4422   4424   4425*  4428*  4477   4481   4484*  4506*
CMCYL   001412          2652#  4413*  4414*  4415*  4431   4496*  4497   4500
CMDAT   013064          4430   4439   4443#  4485   4487
CMHED   013016          4431#
CMPAR   012616          3709   4402#
CMPARD  012634          3951   4406#
CMPLMT  001472          2688#  4360   4417
CMPRES  017456          3566   3633   3659   5272#  5275
CMPRT   013426          4441   4455   4465   4475   4515#
```

```
CMPRX   013420          4438    4478    4483    4499    4507    4510#
CMSEC   001414          2653#   4416#   4434    4488#   4489    4491#   4503
CMSTR   012734          4419#
CMSTR2  013052          4433    4436    4440#   4502    4505
CMTRK   001415          2654#   4492#   4493    4495#
COLON   053766          6095    6100    9573#
COMTBL  002122          2816#   5238    6400
CR    = 000015          2171#   2608#   7203    7379    7389    9545    9573    9707    9837
CRLF  = 000200          2172#   7350    7389
CYLDER  056150          4105#   4106    4109#   4143#   5607    5662    5665    6539    9533    9832#
CYLIMT  001446          2667#   3507    5096#   5102    5106    6439#   6446    6454    6455
DATAPK  025150          6182    6359#
DATAO   002542          2913    2929    2932#
DATA1   002602          2914    2915    2916    2917    2918    2919    2920    2921    2922    2923    2924    2925    2926
                        2927    2928    2930    2949#
DATE    001320          2622#   6324    6327    9686#   9687#   9688#   9689#   9690#   9691#   9692#   9693#   9694#
DATEIS  053770          6326    9573#
DCK   = 100000          2367#
DCKER   007312          3864    3875#
DCKER1  007432          3898#   4178
DDISP = 177570          2178#   2544    3300
DEASGN  024606          6172    6281#
DEASSG  053427          3562    9573#
DH1     050241          3224    9545#
DH14    050416          5454    9545#
DH15    050521          5463    9545#
DH16    050620          5466    9545#
DH2     050246          3231    3252    9545#
DH3     050322          3238    9545#
DH4     050350          3245    9545#
DH6     050407          3259    9545#
DISPLA  001156          2544#   3300#   3308#   7235#
DISPLY= 104414          3746    3780    3800    3811    3883    3897    3918    3955    3965    3987    4029    4054    4074
                        4114    4140    4155    4177    4183    4201    4211    4220    4235    4251    4271    4282    4301
                        4319    4324    4325    4326    4329    4332    4335    4338    4341    4344    4347    4350    4374
                        4392    4539    4544    4545    4546    4559    4562    4565    4574    4577    4633    4638    4670
                        4673    4676    4679    4682    4685    4688    4691    4693    4694    4717    4723    4728    4730
                        4839    5398    5401    5418    5444    5446    5451    5452    5453    5454    5455    5458    5463
                        5466    5477    5478    5491    5494    5500    5506    5513    5527    5530    5533    5539    5542
                        5543    5547    5548    5552    5560    5563    5564    5567    5575    5578    5580    5583    5587
                        5591    5596    5599    5606    5610    5614    5622    5625    5628    5633    5639    5643    5652
                        5654    5661    5664    5667    5668    5669    5675    5678    5679    5682    5688    5689    5695
                        5701    5707    5713    5720    5722    5730    5731    5737    5742    5745    5750    5755    5756
                        5765    5770    5775    5778    5781    5782    5791    5805    6912    7979#
DISPRE  000174          2475#   3308
DLT   = 100000          2314#
DONE    007004          3716    3821#
DPE   = 020000          2433#
DPINT   034210          8050#   8263    8266    8342#   8368    8813    8838    8957    8959#   9026    9044    9049    9057#
DPR   = 000400          2341#
DPRQS   034220          8063#   8374    8422#   8460#   8816    9028    9046    9051    9066#
DRIVE = 001216          2626#   7229#   9549    9553    9556
DRIVE0  042472          2807    6333    9469#   9608    9609    9610    9611    9612    9613
DRIVE1  042776          2808    9477#   9616    9617    9618    9619    9620    9621
DRIVE2  043302          2809    9485#   9624    9625    9626    9627    9628    9629
DRIVE3  043606          2810    9493#   9632    9633    9634    9635    9636    9637
```

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```
DRIVE4  044112  2811  9501# 9640  9641  9642  9643  9644  9645
DRIVE5  044416  2812  9509# 9648  9649  9650  9651  9652  9653
DRIVE6  044722  2813  9517# 9656  9657  9658  9659  9660  9661
DRIVE7  045226  2814  9525# 9664  9665  9666  9667  9668  9669
DRNUM   053452  3738  3764  3792  6663  6721  6729  9573#
DROP    026574  3752  3806  6655# 6685
DROPNG  053341  6662  9573#
DRQ   = 004000  2397#
DRVACT  034160  8009# 8382  8562* 8609* 8628* 8639  8654* 8741* 8834  8865  8896* 8903* 8916
                8926* 9038*
DRVCLR= 000111  2451#
DRVER   010460  3869  4053#
DRVINT  034546  8254  8288# 8370  8947  8960
DRVPRM  025412  6250  6419#
DRVQUE  042326  8377  8390  8779  9327#
DRVSTA  034170  3438  3499  6243  8023# 8244* 8245* 8246* 8247* 8257* 8289* 8298* 8331* 8336*
                8364  8372  8396  8430  8434  8563* 8672* 8819  8827  8840  8890* 8897* 8909
                8962  9058*
DRVTYP  034200  3441  3455  6263  6432  6440  6443  8037# 8290* 8305* 8310* 8399  8673*
DRY   = 000200  2340#
DSWR  = 177570  2177# 2543  3299
DTE   = 010000  2364#
DTEER   011316  3861  4174#
DTUW    034302  8156# 8240  8449  8505* 8629  8632* 8642  8655  8657* 8666* 8730  8742* 9031
                9107
DT00  = 000001  2388#
DT01  = 000002  2389#
DT02  = 000004  2390#
DT03  = 000010  2391#
DT04  = 000020  2392#
DT05  = 000040  2393#
DT06  = 000100  2394#
DT07  = 000200  2395#
DT08  = 000400  2396#
DT1     050672  3225  9547#
DT14    050742  5459  9561#
DT15    050764  5464  9565#
DT16    051006  5467  9569#
DT2     050676  3232  3253  9549#
DT3     050714  3239  9553#
DT4     050724  3246  9556#
DT6     050736  3260  9559#
DULP    034550  8289# 8300
DUNIT   001546  2753# 3538  6291* 6659* 6755*
DVA   = 004000  2334#
DVC   = 000200  2429#
ECBAD0  001432  2661# 4651* 4674
ECBAD1  001440  2664# 4665* 4686
ECBIT   001416  2655# 4625* 4626* 4627  4628* 4645  4647*
ECC     014026  3944  4609#
ECCX    014560  4681  4692  4694#
ECC1    014424  4658  4664  4670#
ECC2    014554  4642  4693#
ECGD    001430  2660#
ECGD1   001436  2663#
ECH   = 000100  2358#
```

```
ECI   = 004000          2417#
ECMSK0  001422          2657#   4643*   4648*   4653    4655
ECMSK1  001424          2658#   4644*   4649*   4657    4666    4668
ECSEC   001420          2656#   4609*   4618*   4621*   4623*   4639
ECWRD   001426          2659#   4627*   4629*   4630*   4631*   4632*   4634    4639*   4640    4651    4654    4655*   4656*
                        4659    4671    4677
ECWRD1  001434          2662#   4652*   4659*   4660*   4661    4663*   4665    4667    4668*   4669*   4680    4683    4689
EMPTYQ  042306          8626    8671    8768    8904    8969    9071    9312#
EMTVEC= 000030          2266#   3287*   3288*   3316*
EM1     045622          3223    9545#
EM10    046124          3757    9545#
EM11    046167          3763    9545#
EM12    046222          3737    3746    9545#
EM13    046253          3780    9545#
EM14    046325          3791    3800    9545#
EM15    046350          3811    9545#
EM2     045671          3230    9545#
EM20    046404          4029    9545#
EM21    046425          3897    9545#
EM22    046456          3982    9545#
EM23    046531          3965    9545#
EM24    046610          4074    9545#
EM25    046656          4114    9545#
EM26    046737          4220    9545#
EM27    046764          4235    9545#
EM3     045727          3237    9545#
EM30    047021          4054    9545#
EM31    047053          4155    9545#
EM32    047116          4177    9545#
EM33    047151          4183    9545#
EM34    047226          4282    9545#
EM35    047270          4201    9545#
EM36    047326          4211    9545#
EM37    047357          3985    9545#
EM4     045765          3244    9545#
EM40    047441          4251    9545#
EM41    047477          4392    9545#
EM42    047543          4539    9545#
EM43    047624          4319    4324    9545#
EM44    047671          4374    9545#
EM45    047755          3883    9545#
EM46    050043          5477    9545#
EM5     046022          3251    9545#
EM50    050115          4271    9545#
EM51    050153          4140    9545#
EM6     046056          3258    9545#
EM60    050216          4301    9545#
ENDCMP  013702          4510    4570#
ENDCON  001450          2675#   3487*   3488*   6700    6703
ENDET   001506          2713#   6698    9584
ENDPAS  053375          6712    9573#
ENDPGM= 057150          3380    3385    9833#
ENDSEK  001454          2677#   6706    6709
ENDTST  053411          6720    9573#
ENTADR  053725          9573#
ENTCOM  053612          6151    9573#
```

```
ENTDAT  055532          9683    9707#
ENTDRV  053637          6472    9573#
ENTID   055551          9695    9710#
ENTLMT  053664          6423    9573#
ENTPR   004622          3412#
EOP     026722          3653    6698#
EOPX    027220          6702    6705    6708    6710    6749    6757    6761#
EOP1    026754          6699    6706#
EOP2    026776          5313    6701    6704    6707    6711#
ERCTR   001404          2649#   4409*   4440*   4451    4464*   4572    4575
ERPRC1  006364          3715    3720#   3919    4840
ERPROC  006350          3698    3702    3704    3714#
ERR     = 040000        2347#
ERRVEC= 000004          2259#   3297    3298*   3309*   5865*   5866*   5877*   5892*   9726    9727    9731*   9732*   9739*
                        9740*
FACTOR  015416          4850*   4851*   4853*   4854    4862    4870#
FAIRNS  001352          2632#
FALPAR  006550          3725    3762#
FALPR1  006560          3758    3764#
FER     = 000020        2356#
FILBUF  016004          3621    4984#
FISK    027274          6779    6780#
FMTER   011512          4070    4219#
FMT16 = 010000          2418#
FORMAT  001474          2689#   3676    5191    9585
FOWT1   005140          3484#
FOWT2   005200          3489    3492#
FOWT3   005342          3491    3520#
FRSTER  001376          2642#   3950*   3952    4316    4358*   4359*   4405*   4467    4517    4535    4547*   4570
F0      = 000002        2329#
F1      = 000004        2330#
F2      = 000010        2331#
F3      = 000020        2332#
F4      = 000040        2333#
GENDPB  045532          3928*   3932    4739*   4740*   4742    4759*   4760*   4762    4764    4775*   4776*   4778    4791*
                        4792*   4793*   4794*   4795*   4796*   4798    4800    6241*   6513*   6514*   6515*   6516*   6517*
                        6524*   6526    6528    6531*   6532    6561*   9533#
GENREG  045552          4068    4103    9535    9537#
GETADR  025764          3503    6252    6502#
GETBUF  015420          3618    4880#
GETID   025654          6251    6468#
GETPAR  017164          3616    5221#
GETPAT  017122          3689    5149    5201#   5210    5336
GETREG= 000141          2458#
GETREM  027304          5042    5071    5087    5104    5126    5206    6789#
GETREQ  042402          8423    8644    8759    8823    8857    8918    8966    9034    9060    9067    9348#
GNS     = ****** U      2474    7966    7967    7968    7969    7970    7972    7974    7975    7976    7977    7978    7979
GO      = 000001        2328#
GODRIV  016132          3623    3911    3996    4815    5018#
GTSWR = 104406          3334    7972#
HCE     = 000200        2359#
HCEER   011570          4110    4234#
HCI     = 002000        2416#
HCRC    = 000400        2360#
HCRCER  010314          3832    4024#   4065    4100
HEADER  001512          2720#   5051    9588
```

```
HEDLIN  054023          6332    9573#
HOUR    001364          2637#   3365*   6091    6121*   6122    6124*
HT    = 000011          2169#   7348    7389
HZ      001312          2619#   3364    6111
IAE   = 002000          2362#
IAEER   011432          3850    4200#
IDIS    054001          6330    9573#
IDLE    006006          3532    3603    3607    3641#
IDLE1   006104          3643    3661#
IE    = 000100          2282#
ILF   = 000001          2352#
ILR   = 000002          2353#
INCHRD  023330          3936    6042#
INCMIS  023400          4145    6066#
INCSKI  023354          4275    6054#
INCSOF  023304          3943    3949    4037    4082    4122    6030#
INCTOT  023424          3750    3771    3784    3804    3815    3885    3917    3937    3954    3971    4014    4017    4038
                        4057    4083    4123    4146    4159    4187    4204    4213    4228    4243    4255    4274    4286
                        4304    4378    4396    4578    6078#
INTDON  054120          3520    9573#
INTRVL  001466          2684#   3368*   6116*   6127    6129    6132*   9579
INVLD   053570          6199    9573#
IOTVEC= 000020          2264#
IR    = 000100          2305#
ISR     037122          8249    8727#
IVC   = 010000          2432#
KIPARD= ****** U        9722
KSR     023710          3535    6143#
KSR1    023722          6144    6146#
LA      036746          8453    8688#
LACNT   034246          8115#   8696*   8697    8718*
LBC   = 002000          2430#
LBT   = 002000          2343#
LF    = 000012          2170#   2609#   7203    7383    7389    9545    9573    9707    9837
LIMIT   001406          2650#   4360*   4417*   4418*   4549    4551*
LIN33   051240          5606    9573#
LINB3   051312          5527    9573#
LINB5   051467          5643    9573#
LINB6   051602          5688    5701    9573#
LINCA3  051271          5564    9573#
LINC6   051635          5695    9573#
LINDA3  051302          5560    9573#
LINDEC  022242          4576    5457    5541    5546    5551    5574    5577    5579    5582    5586    5590    5598    5601
                        5609    5613    5627    5632    5653    5729    5744    5777    5780    5817#
LIND5   051452          5639    9573#
LINEN3  051223          5599    9573#
LINE05  051570          5679    9573#
LINEP5  051557          5675    9573#
LINE1   020176          3745    3779    3799    3810    3882    3896    3964    3981    4028    4053    4073    4113    4139
                        4154    4176    4182    4200    4210    4219    4234    4250    4270    4281    4300    4318    4373
                        4391    4538    5393#
LINE2   020242          3747    3781    3801    3812    3884    3898    3967    3989    4030    4055    4075    4115    4141
                        4156    4184    4202    4212    4221    4236    4252    4272    4283    4302    4320    4375    4393
                        4540    5414#   5792
LINE2A  020412          5426    5431    5449#
LINE2B  020430          5450    5453#
```

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```
LIN3.1  021114          5501    5507    5573#
LIN3.3  021222          5512    5519    5596#
LIN3.4  021254          5520    5606#
LIN4SP  052714          3437    6341    9573#
LIN6.1  021662          5696    5702    5718#
LIN6.2  021704          5708    5714    5727#
LIN7M   051740          5775    9573#
LIN7O   051766          5737    5765    9573#
LIN7P   051776          5770    9573#
LIN7R   052066          5750    9573#
LIN7S   052016          5778    9573#
LIN7T   052040          5742    9573#
LIN7X   052052          5745    9573#
LIN8M   052103          3918    4839    5791    9573#
LIN9B   052126          4544    9573#
LIN9E   052253          4574    9573#
LIN9G   052303          3955    9573#
LIN9H   052155          4546    9573#
LIN9I   052233          4326    9573#
LKPAR   004564          3402#
LOADRV  057233          3325    9837#
LSC   = 004000          2431#
LSTAD   001354          2633#   3378*   3381    3382    3478
MAIN    005352          3530#   3668    5317    5343
MAINDA  005376          3537#
MAIN1   005524          3519    3521    3545    3571#   6781
MAIN2   005640          3581    3602#
MASK    001346          2629#   3902*   3920    3966*   4039*   4084*   4124*   4160*   4188*   4259*   4289*   4824    4829
MATCH   013750          4443    4590#
MAXCYL= 000106          3507*   5055    5096    5097    5302    6446*   9427#   9428    9429    9430    9431    9432    9433
                        9437    9609    9617    9625    9633    9641    9649    9657    9665
MAXDL   001462          2680#   3392    3394*   3395    3397*   3414    3416*   5122    5135    5137    5318    5320    9578
MAXER   001464          2683#   3371*   6683
MAXSEC= 000116          3509*   5064    6450*   9431#   9613    9621    9629    9637    9645    9653    9661    9669
MAXTRK= 000112          3508*   5080    5305    6448*   9429#   9611    9619    9627    9635    9643    9651    9659    9667
MCPE  = 020000          2287#
MCPEMX  034314          8174#   9088    9135
MDPE  = 000400          2307#
MERR1   054233          6565    9573#
MERR2   054301          6575    9573#
MINCYL= 000110          3510*   5057    5098    5100    5105    5108    5309    6447*   6461    9428#   9608    9616    9624
                        9632    9640    9648    9656    9664
MINSEC= 000120          3512*   5058    5065    5067    5072    5308    6394    6451*   6459    9432#   9612    9620    9628
                        9636    9644    9652    9660    9668
MINTRK= 000114          3511*   5059    5081    5083    5088    5307    6449*   6460    9430#   9610    9618    9626    9634
                        9642    9650    9658    9666
MINUTE  001366          2638#   3366*   6096    6117*   6118    6120*
MNDLTA  034330          8190#   8716
MNTBL   002152          2844#   5442
MOH   = 020000          2398#
MOL   = 010000          2345#
MONTR   005064          3465    3469#
MRHVEC  056027          9772    9788#
MRMCS1  056016          9763    9786#
MXDLTA  034326          8187#   8714
MXF   = 001000          2308#
```

```
MXLACT  034324          8184#   8697
MXWNDW  034332          8193#
M.DPID  027400          6809    6823#
M.DP40  027436          6834#   6855
M.DP41  027472          6839    6846#
M.DP42  027502          6845    6850#
M.DP44  027534          6857    6862#
M.DP50  027546          6832    6866#
NED   = 010000          2311#
NEDCLK  053512          5886    9573#
NEM   = 004000          2310#
NEWASN  024576          6168    6276#
NEWUNT  001570          2757#   3505*   3575    3593    3594*   6254*
NOLOAD  057432          3480    9837#
NOMTCH  012166          4316#   4445
NONE    054046          6344    9573#
NOTAVL  053106          6216    9573#
NOTPRS  053071          3446    6268    9573#
NOTPRT  001504          2708#   5375    9587
NOTRM   053054          3444    6266    9573#
NOTSAF  053125          3450    6261    9573#
NSA   = 100000          2400#
OFFCOD  002464          2896#   3928
OFFDIR= 000001          2415#
OFFON = 000001          2338#
OFFSET= 000115          2453#   4776
OFFST   015016          3931    4775#
OFLIN   006656          3729    3790#
OFMSG0  002362          2880#   2902
OFMSG1  002415          2885#   2903
OFMSG2  002440          2889#   2904
OFMTBL  002470          2902#   5719
OPE   = 000010          2428#
OPERID  001332          2624#   6328    6331    9698*   9699*   9700*   9701*   9702*   9703*   9704*
OPI   = 020000          2365#
OPIER   011206          3841    4152#
OPIER1  011252          4161#
OPRDAT  055410          3356    9683#
OPT     035332          8384    8419#   8762    8940    8977
OPTBL   002130          2823#   5433    5435
OR    = 000200          2306#
ORDERQ  001522          2747#   3358    3530    3602    3624    3641    6143
PACK    001316          2621#   3369*   3518*   5340*   6256    6258    6276*   6359*   6364*   6368*
PAR   = 000010          2355#
PARENT  026420          3413    6458    6597#
PARER   011340          3844    4182#
PARLST  054352          3398*   3412    9578#
PARQ    001656          2769#
PAR1    054500          9578    9592#
PAR10   054610          9585    9592#
PAR11   054620          9582    9592#
PAR14   054630          9583    9592#
PAR15   054640          9592#
PAR16   054650          9584    9592#
PAR19   054660          9580    9592#
PAR2    054510          9579    9592#
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PAR20    054670          9587    9592#
PAR21    054700          9588    9592#
PAR3     054520          9581    9592#
PAR4     054530          9592#   9609    9617    9625    9633    9641    9649    9657    9665
PAR5     054540          9592#   9608    9616    9624    9632    9640    9648    9656    9664
PAR6     054550          9592#   9611    9619    9627    9635    9643    9651    9659    9667
PAR7     054560          9592#   9610    9618    9626    9634    9642    9650    9658    9666
PAR8     054570          9592#   9613    9621    9629    9637    9645    9653    9661    9669
PAR9     054600          9592#   9612    9620    9628    9636    9644    9652    9660    9668
PASCNT   001460          2679#   6718    9580
PAT    = 000020          2303#
PATTEN   001510          2717#   5202    5204    9581
PCLOCK   001306          2617#   5864*   5869*
PDONE    053331          9573#
PERIOD   053564          9573#
PGE    = 002000          2309#
PGM    = 001000          2342#
PIP    = 020000          2346#
PIRQ   = 177772          2176#
PIRQVE= 000240           2270#
POPQUE   042424          8432    8484    8600    8930    9363#
POSER    011132          4108    4138#
PROCES   006260          3650    3696#
PRTBAD   014566          3901    3939    4287    4699#
PRTIM    006746          3731    3810#
PR0    = 000000          2193#
PR1    = 000040          2194#
PR2    = 000100          2195#
PR3    = 000140          2196#
PR4    = 000200          2197#   6147
PR5    = 000240          2198#
PR6    = 000300          2199#
PR7    = 000340          2200#
PS     = 177776          2173#   2174    3363*   3464*   6147*   6203*   6920    6921*   6935*   7129    8232    8233*   8262*
                         8270*   8356    8357*   8410*   8420    8469*   8703*
PSEL   = 002000          2286#
PSW    = 177776          2174#
PUNSAF   006446          3721    3736#
PWRVEC= 000024           2265#   3291*   3292*   7452*   7453*   7462*   7468*   7480*   7481*
QCNT     041736          9229#   9288    9312*   9327    9329*   9349    9363*
QDRV0    042030          9240    9251    9260    9272#
QDRV1    042050          9241    9252    9261    9273#
QDRV2    042070          9242    9253    9262    9274#
QDRV3    042110          9243    9254    9263    9275#
QDRV4    042130          9244    9255    9264    9276#
QDRV5    042150          9245    9256    9265    9277#
QDRV6    042170          9246    9257    9266    9278#
QDRV7    042210          9247    9258    9267    9279#
QINPT    041746          9240#   9314    9331*   9332*   9333    9335*
QOUTPT   041766          9251#   9314*   9352    9365    9366*   9367*   9368    9370*
QSTART   042006          9260#   9294    9299    9335    9370
QSTOP    042010          9261#   9333    9368
QTERM  = 042230          9268    9280#
QUES     053566          6638    9573#
RANCYL   016506          5097#
RANPAT   016742          5117    5149#
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RANSEC  016350          5052    5064#
RANSIZ  016622          5111    5122#   5130
RANTRK  016424          5080#
RANWRT  017066          5045    5190#
RANXIT  016752          5114    5146    5151#
RATIO   001500          2695#   3486*   5043    9583
RDCHR = 104410          7114    7151    7975#
RDDAT = 000171          2465#   2820    6513
RDHD  = 000173          2466#   2821    4795    5331
RDLIN = 104411          3408    6152    6479    6608    7976#   9684    9696    9767    9776
RDY   = 000200          2283#
RD.ADR  041230          9090*   9091*   9093#   9553
RD.RM   041204          8301    8320    8326    8548    8572    8586    8690    8704    8750    8794    8859    8869    8884
                        9021    9088#   9142    9156    9162    9195
RD.RM1  041226          9092#   9121
RD.RM2  041346          9088*   9120#
RD.RM3  041352          9099    9112    9122#
RD.RM4  041356          9104    9124#
RD.WRD  041232          9094#   9095    9553    9556
READDR  022262          3680    4026    4066    4101    5229    5296    5359    5573    5838#
READHD  015042          4027    4067    4102    4791#
READIN= 000121          2455#
RECAL = 000107          2450#   4760
RECALT  014764          4138    4759#
RECALO  014770          4760#   6242
REDAPK  025200          6186    6368#
REFMT   006136          3672#   3957    4019    4048    4093    4133    4169    4245
REFMTX  006256          3673    3675    3677    3679    3688    3692#
RELBUF  015554          3660    4921#
RELSE = 000113          2452#
REPLZ   027556          5965    5970    5976    5982    5988    5995    6000    6005    6010    6019    6093    6098    6103
                        6877#
RESREG= 104413          5009    6200    6812    7871    7921    7978#   8271    8404    8407    8470    8675    8735    9000
                        9204    9303
RESVEC= 000010          2260#
RETRY   001350          2630#   3886*   3907*   3924*   3925    3930*   3972*   3995*   4000*   4003*   4004    4040*   4085*
                        4125*   4161*   4189*   4258*   4288*   4305*   4819*   4831*   4832    5728
RMADR   034316          3346*   3352*   8179#   8251    8363    8487    8507    8529    8688    8729    9019    9090    9096
                        9100    9115    9148    9152    9184    9214    9781
RMAS  = 000016          8204#   8325*   8792    8908*   8935*   8956*   9041
RMBA  = 000004          8199#
RMCS1 = 000000          8197#   8293*   8299    8314    8427*   8428    8503    8525    8567    8587    8598    8613    8624
                        8751    8795    8846    8876    8913    8971    9143
RMCS2 = 000010          8201#   8252*   8292*   8294    8376*   8426*   8488*   8508*   8530*   8616    8635    8647    8660
                        8669*   8689*   8749*   8858*   8942*   8955*   9020*   9037*   9097    9153    9185*   9191    9215*
                        9220
RMDA  = 000006          8200#   8495    8521    8536
RMDB  = 000022          8206#   9189
RMDC  = 000034          8211#   8499    8511    8543
RMDS  = 000012          8202#   8321    8691    8860    8885    8943    9022
RMDT  = 000026          8208#   8302
RMEC1 = 000044          8215#
RMEC2 = 000046          8216#   9199
RMERRS  034150          8001#   8235    8829    8832    8842    8943*   8944*   8945*   8946*   9549
RMER1 = 000014          4068    4103    8203#   8327    8870    8944    9157
RMER2 = 000042          8214#   8945
```

F16


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RMHR  = 000036  8212#
RMINIT  034334  3422  8231#
RMLA  = 000020  8205#  8705  8707
RMMR1 = 000024  8207#
RMMR2 = 000040  8213#  8946
RMOF  = 000032  8210#  8318  8549  8553  8573  8577
RMR   = 000004  2354#
RMSN  = 000030  8209#
RMVEC   034320  3347*  3353*  8180#  8248  8250  8357
RMWC  = 000002  8198#
RM03    035040  4741  4761  4777  4797  5020  6525  8356#
RM03A   053155  3454  6431  9573#
RNOP  = 000101  2448#
RPTMR   040576  6126  8985#
RTC   = 000117  2454#  4740
RTNCTR  014740  4739#
S       051162  5578  5587  9573#
SAVEFG  034256  3423*  8130#  8602  8755  8932
SAVER1  001400  2647#  4420*  4470*  4515  4525  4529*
SAVER5  001402  2648#  4421*  4471*  4526  4530*
SAVREG= 104412  4984  6146  6802  7845  7906  7977#  8231  8359  8419  8634  8728  8988  9181
                9287
SC      037442  8734  8763  8766  8772  8792#
SCMND   024716  6176  6306#
SC04  = 000400  2406#
SC1   = 000100  2404#
SC10  = 001000  2407#
SC11    040260  8831  8866  8923#
SC12    040370  8825  8836  8942#
SC13    040440  8815  8818  8952#
SC2   = 000200  2405#
SC20  = 002000  2408#
SC3     037506  8806#  8810
SC4     037512  8808#  8839  8850  8853  8901  8915  8922  8941  8978
SC5     037524  8807  8813#
SC6     037714  8835  8854#
SC6A    040024  8833  8878#
SC7     040152  8868  8881  8883  8893  8903#
SC8     040230  8847  8861  8871  8877  8886  8914  8916#  8951
SDETAL  022752  5911  5931  5954#
SEARCH= 000131  2457#
SECLMT  001442  2665#  3509  6450
SECOND  001370  2639#  3367*  6101  6112*  6113  6115*
SEEK  = 000105  2449#
SEEKFG  034260  8138#  8236  8451
SELDRV= 000145  2460#
SELPAR  016210  3615  5038#  5118
SETFMT= 000143  2459#
SETVEC  004650  3403  3405  3411  3415  3421#
SET.IE  041664  8265  8296  8394  8468  8674  8800  9213#
SHDTYP  022730  5904  5928  5941#
SIXTEE  001372  2640#  3364*  6109*  6111*
SIZMEM  004406  3375#
SKI   = 040000  2434#
SKIER   011752  3870  4270#
SLASH   054474  6430  6607  9592#
```

DZRMBA.P11 27-JUL-77 08:04 CROSS REFERENCE TABLE -- USER SYMBOLS

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SPOTCK  020060          3894    3979    4024    4071    4111    4152    4174    5353#
SRCHWT  034232          8084#   8421#   8527#   8927    8936#
STACK = 001100          2164#   3285    3362
START   003622          2479    3272#   5891
START1  003632          2478    3274#
START2  003650          3273    3278#   7485
STATHD  053162          5945    9573#
STATIN  001314          2620#   3357#   3664    3666#   6131#
STATIS  015262          3648    4848#
STATPR  022614          3667    5900#   6323
STKLMT= 177774          2175#
STNDAT  002476          2913#   4595    4601    4999    5007
ST0     040666          8995    9015#
ST01    040722          9026#
ST02    041012          9025    9027    9029    9041#
ST03    041042          9043    9049#
ST05    041066          9023    9055#
ST06    041074          9045    9057#
ST07    041132          9047    9065#
ST08    041162          9064    9071#
ST09    041172          9033    9040    9048    9052    9054    9056    9062    9069    9073#
SVRH70  041546          8604    8621    8652    8757    8769    8824    8873    8891    8934    8968    9036    9072    9181#
SWR     001154          2543#   3283    3299#   3301    3307#   3314#   3332    3426    3662    3672    3674    3707    3772
                        4406    4453    4553    4699    5039    5234    5314    5393    5396    5461    5525    5558    5757
                        5783    6180    6681    6716    6933    7123    7230    7236    7243    7255    7460    7473#   7650
                        7687#
SWREG   000176          2476#   3307    3332    7123    7650    7663
SWTIM   006620          3727    3779#
SW0   = 000001          2228#   3672    5039    6180
SW00  = 000001          2218#   2228
SW01  = 000002          2217#   2227    3707    4406
SW02  = 000004          2216#   2226    3426    3662
SW03  = 000010          2215#   2225
SW04  = 000020          2214#   2224    5314    6681    6716
SW05  = 000040          2213#   2223    5461    5525
SW06  = 000100          2212#   2222    5234
SW07  = 000200          2211#   2221    4553
SW08  = 000400          2210#   2220
SW09  = 001000          2209#   2219
SW1   = 000002          2227#
SW10  = 002000          2208#   5393
SW11  = 004000          2207#
SW12  = 010000          2206#
SW13  = 020000          2205#   5396    7230
SW14  = 040000          2204#
SW15  = 100000          2203#   3772    5757    5783
SW2   = 000004          2226#
SW3   = 000010          2225#   4453    4699
SW4   = 000020          2224#
SW5   = 000040          2223#   5558
SW6   = 000100          2222#
SW7   = 000200          2221#   3674
SW8   = 000400          2220#
SW9   = 001000          2219#
SYSTAT  053135          3430    9573#
T       051136          5575    5583    9573#
```

```
TABLE   054710          6453    9597#
TABLE0  054730          9597    9608#
TABLE1  054776          9598    9616#
TABLE2  055044          9599    9624#
TABLE3  055112          9600    9632#
TABLE4  055160          9601    9640#
TABLE5  055226          9602    9648#
TABLE6  055274          9603    9656#
TABLE7  055342          9604    9664#
TAB.XY= 001114          2515#   2522
TAP     = 040000        2399#
TBITVE= 000014          2261#
TD      037166          8732    8741#
THEAD   016270          5046    5051#
TIMER   034262          8143#   8340*   8463*   8607*   8653*   8744*   8855*   8899*   8938*   8953*   8971*   8991    8993*
                        9053*   9059*   9065*
TITLE   057150          3320    9837#
TKVEC = 000060          2268#   7104*   7105*
TPVEC = 000064          2269#
TRAPVE= 000034          2267#   3289*   3290*   3317*
TRE     = 040000        2288#
TRFER   011652          3829    4250#
TRKLMT  001444          2666#   3508    6448
TRNSWT  034230          8076#   8485*   8631*   8641    8658*   8667*   8746    8747*   9030
TRTVEC= 000014          2262#
TST1    003640          3276#
TYPDS = 104405          6606    6714    7970#
TYPE  = 104401          3320    3325    3406    3407    3429    3430    3437    3444    3446    3448    3450    3452    3453
                        3457    3459    3463    3480    3520    3562    3582    3588    3736    3737    3738    3744    3756
                        3757    3762    3763    3764    3770    3790    3791    3792    3798    5395    5886    5912    5962
                        5967    5972    5978    5984    5990    5997    6002    6007    6012    6090    6095    6100    6145
                        6151    6199    6301    6326    6327    6330    6331    6332    6341    6344    6346    6348    6354
                        6423    6430    6436    6438    6472    6478    6565    6566    6571    6575    6576    6581    6601
                        6607    6621    6638    6639    6645    6647    6660    6661    6662    6663    6670    6711    6712
                        6720    6721    6727    6729    6735    6750    6892    7118    7119    7127    7128    7135    7158
                        7164    7169    7173    7178    7183    7184    7186    7189    7193    7238    7246    7270    7287
                        7289    7292    7294    7298    7305    7353    7482    7554    7630    7661    7662    7665    7678
                        7689    7708    7966#   9683    9695    9761    9763    9766    9772    9775
TYPEST  022702          3563    5926#   6315    6736
TYPOC = 104402          7278    7302    7664    7967#   9765    9774
TYPON = 104404          7969#
TYPOS = 104403          3434    3585    3741    3767    3795    5959    6338    6427    6475    6568    6578    6642    6667
                        6724    6732    7968#
TYPRI4  027706          5942    5944    6920#
UCPAR   006536          3723    3756#
ULDFLG  034236          8103#   8291*   8366    8381*   8564*   8627*   8659*   8821    8905    8907*   8923    8925*   9039*
UNIT    001344          2628#   3696*   3739    3765    3793    5456    6715*   6722    6730
UNS     = 040000        2366#
UNSAF   012106          3823    4300#
UNTASN  053026          6211    6227    9573#
UNTMSG  052755          3582    6566    6576    6639    9573#
UNTNOT  053004          6297    6317    9573#
UNTOFF  052763          3448    6270    9573#
UNTON   052774          3452    9573#
UPE     = 020000        2312#
US1     = 000001        2299#
```

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US2    = 000002          2300#
US4    = 000004          2301#
VV     = 000100          2339#
WAIT     001634          2765#  3554
WATPAK   025162          6197   6363#
WCE    = 040000          2313#
WCF    = 000040          2357#
WCFER    012010          3847   4281#
WCKD   = 000151          2461#  2816
WCKER    007766          3826   3962#
WCKHD  = 000153          2462#  2817
WCSEL    001476          2691#  5123   9582
WC.HK    037342          8758   8775#
WLE    = 004000          2363#
WLEER    011464          3853   4210#
WRL    = 004000          2344#
WRTDAT= 000161           2463#  2818   5335
WRTHD  = 000163          2464#  2819
WRTPK    017474          3513   3613   5287#
WRTPK1   017524          5289   5291   5295#
WRTPK2   017756          5294   5329#
WRTPK3   020002          5293   5328   5333#
WRTPK4   020034          5332   5338#
WRTPK5   020042          5312   5340#
WRT.AD   041450          9138*  9148*  9151#  9556
WRT.RM   041360          8313   8317   8494   8498   8502   8510   8520   8524   8535   8542   8552   8566   8576
                         8597   8612   8623   8845   8875   8912   9135#
WRT.R1   041444          9149#  9169
WRT.R2   041532          9135*  9168#
WRT.R3   041536          9144   9155   9158   9164   9170#
WRT.R4   041542          9160   9172#
WRT.R5   041544          9171   9173#
WRT.WD   041446          9136*  9140   9147*  9150#  9556
XWCNT    016562          5056   5060   5110#
ZROIND   001374          2641#  4419*  4463*  4469*  4473
$APTHD   001100          2502   2508#
$ASTAT= ****** U         7424   7439
$ATYC    031634          7395   7397#
$ATY1    031610          7393#
$ATY3    031616          7338   7394#
$ATY4    031626          7251   7396#
$AUTOB   001150          2540#  3336*  3349   3402   3484   7658   7748
$BASE    001260          2602#  3343   3345
$BDADR   001136          2535#
$BDDAT   001142          2537#
$BDSEC= 000124           5167   5356   6508   6537   9437#  9441
$BELL    001174          2553#  5395   7238   7261
$BUF   = 000006          3619*  4388   4410   4851   4930   4936   4941   4945   4987   5474   5623   5630   9387#
$CDW1    001264          2604#  6518*  6534*  6559*  6563   6573   6582
$CDW2    001266          2605#  6523*  6532   6560*
$CHARC   031604          7355*  7365*  7372   7381*  7386#
$CKSWR   032712          7650#  7974
$CMTAG   001114          2523#  3280   3281   3295
$CM3   = 000000          2553#
$CNTLC   031000          7119   7178   7203#
$CNTLG   033321          7128   7661   7743#
```

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$CNTLU  033314          7173    7678    7742#
$CODE = 000024          4353    4402    4429    4479    4619    4713    4856    4858    4985    4989    5193    5236*   5244*
                        5259    5310*   5330*   5334*   6398*   6407    8775    8777    8785*   9398#
$COMND= 000002          4740*   4760*   4776*   4795*   5238*   5239    5243*   5246    5331*   5335*   6400*   6513*   8786*
                        8787*   9384#
$CPUOP  001232          2576#
$CRLF   001201          2555#   3406    3429    3459    3463    3736    3744    3756    3762    3770    3790    3798    4325
                        4332    4338    4344    4350    4545    4565    4577    4682    4694    4728    4730    5398    5418
                        5451    5453    5478    5494    5513    5533    5552    5567    5591    5614    5633    5654    5669
                        5682    5689    5722    5731    5755    5756    5781    5782    5912    5943    6090    6301    6348
                        6354    6438    6478    6571    6581    6647    6660    6661    6670    6711    6727    6735    6750
                        7118    7127    7183    7246    7261    7270    7289    7294    7298    7354    7389    7689    9761
$CYL  = 000012          4413    4793*   4864    4991    5026    5226    5254*   5301*   5302    5309*   5540    6461*   6514*
                        8783    9390#
$DBLK   032702          7596    7630    7638#
$DB2D   033546          5740    5748    5753    5768    5773    5969    5975    5981    5987    7077    7845#
$DB2O   033742          7094    7906#
$DECVL  033726          7847    7893#
$DEVCT  001214          2567#   6758*
$DEVM   001262          2603#
$DOAGN  027270          6766    6771    6777#
$DRVID= 000224          6333    6485*   6486*   6487*   6488*   6489*   6490*   9441#   9445
$DSPLY  027734          6933#   7979
$DTBL   032672          7599    7634#
$ENDAD  027260          2488    6773#
$ENDCT  027244          6768#
$ENV    001224          2572#   3330    3338    3404    7248    7333    7402    7426
$ENVM   001225          2573#   3312    7335    7340    7404
$EOP    026722          6697#
$EOPCT  027236          6765#   6769
$ERFLG  001117          2526#   7233*   7261
$ERMAX  001131          2532#
$ERROR  031006          3287    7226#
$ERRPC  001132          2533#   7240*   7241*   7242    7261    7276
$ERRTB  003542          3218#   7284
$ERRTY  031172          7245    7269#
$ERTTL  001126          2530#   7239*   7261
$ESCAP= ****** U        8799    8849    8852    9106    9165    9374
$ETABL  001224          2571#
$ETEND  001270          2514    2606#
$FAIR = 000072          3622*   9413#
$FATAL  001206          2564#   7430*
$FFLG   032054          7393*   7396*   7424    7433*   7441#
$FILLC  001172          2551#   7358    7389
$FILLS  001171          2550#   7389
$FIRST= 000122          6444*   9433#
$FMT  = 000001          3928*   9383#   9384    9385    9386    9387    9388    9389    9390    9391    9392    9396
$GDADR  001134          2534#
$GDDAT  001140          2536#
$GET42  027250          3546    5889    6676    6770#
$GTSWR  032762          7132    7662#   7372
$HARD = 000062          6015    6044    6046*   9409#
$HD   = 000000          2139
$HIBTS  001100          2509#
$HINUM  033446          3293*   6790    7765    7773    7778*   7783#
$ICNT   001120          2527#
```

K16

DZRMBA.P11 27-JUL-77 08:04 CROSS REFERENCE TABLE -- USER SYMBOLS

```
$ILLUP  032222          7452    7468    7487#
$INTAG  001151          2541#   7690    7748
$ITEMB  001130          2531#   7242*   7250    7261    7273
$LF     001202          2556#   7193    7261    7389
$LFLG   032053          7434*   7440#
$LKCSB  001276          2613#   5873*
$LKCSR  001274          2612#   5867    5874*
$LKS    001302          2615#   5878    5883*
$LLVEC  001304          2616#   5880
$LONUM  033450          3294*   5047    6789    7764    7771    7777*   7784#
$LPADR  001122          2528#
$LPERR  001124          2529#
$LPVEC  001300          2614#   5870
$LSTAD  055674          3378    9741*   9745#
$MADR1  001236          2589#
$MADR2  001242          2593#
$MADR3  001246          2596#
$MADR4  001252          2599#
$MAIL   001204          2510    2514    2562#   3277    3311    3330    7248    7333
$MAMS1  001234          2583#
$MAMS2  001240          2591#
$MAMS3  001244          2594#
$MAMS4  001250          2597#
$MBADR  001102          2510#
$MFLG   032052          7394*   7400    7435*   7439#
$MISPO= 000066          5776    6017    6068    6070*   9411#
$MNEW   033337          7665    7746#
$MSGAD  001220          2569#   7410*   7413
$MSGLG  001222          2570#   7415*
$MSGTY  001204          2563#   7408    7416*   7428    7432*
$MSWR   033326          7662    7744#
$MTYP1  001235          2584#
$MTYP2  001241          2592#
$MTYP3  001245          2595#
$MTYP4  001251          2598#
$NCODE= 000074          3685*   5050*   5110    5113    5138    5145    5196*   5224    5236    5237    9417#   9418    9419
                        9420    9421    9422    9423    9427
$NCYL = 000100          3681*   5054*   5055    5057*   5109*   5170    5254    9421#
$NEXT = 000104          3609    3691*   5151*   5262*   5338*   6389    9423#
$NPATC= 000075          3690*   5150*   5252    9418#
$NSEC = 000076          3683*   5053*   5058*   5076*   5253    9419#
$NTRK = 000077          3682*   5059*   5092*   9420#
$NULL   001170          2549#   7360    7389
$NWRDL= 000102          3684*   5112*   5144*   5255    5256    9422#
$NWTST= 000000          3275#
$OCNT   032462          7526*   7555*   7568#
$OCTVL  034044          7908    7933#
$OMODE  032464          7521*   7525*   7530    7533*   7544*   7570#
$OPERC= 000036          5024*   5025*   5288    5290    5738    5766    5956    6740    9403#
$PACK = 000026          3506*   3611    5292    5311    5327    5341*   6258*   9399#
$PASS   001212          2566#   3311*   6759*   6760*   6762*   6763*   6780
$PASSC= 000070          5963    6255*   6713    6718    6748*   9412#
$PASTM  001106          2512#
$PATTC= 000030          4998    5252*   5337*   6401*   6402*   9401#
$POSIT= 000042          4866*   4867*   5028*   5029*   5771    6706    6709    9404#
$POWER  032230          7483    7490#
```

L16


```
$PREVA= 000032          5026    5226*   5227*   5230*   5231*   5232*   5297*   5298*   5299*   5581    5585    5589    5597
                        8783*   8784*   9402#
$PREVO= 000027          5222*   5223*   5241    5248    5295*   5428    8782*   9400#
$PSEL = 000003          9385#
$PWRAD  032216          7485#
$PWRDN  032056          3291    7452#   7480
$PWRMG  032212          7483#
$PWRUP  032130          7462    7468#
$QUES   001200          2554#   7186    7261    7389    7708
$RAND   033350          5038    5129    5209    5287    7760#
$RDCHR  033174          7721#   7975
$RDDEC= ****** U        7977
$RDLIN  030510          7146#   7976
$RDOCT= ****** U        7977
$RDSZ = 000001          7742#
$READ = 000052          4862*   4863*   5751    6700    6703    9406#
$REG  = 000014          6389    9391#   9471    9472    9479    9480    9487    9488    9495    9496    9503    9504    9511
                        9512    9519    9520    9527    9528
$RESRE  033510          7819#   7978
$RETRY  015134          3887    3973    4041    4086    4126    4162    4190    4260    4290    4306    4815#   4833
$RMADR  001270          2610#   3345*   3346    3352    9559    9762    9780
$RMAS = 000252          9452#   9565
$RMBA = 000240          4389    4609    4640    4661    4701    4721    4850    5475    5528    5629    5640*   5641    9447#
                        9565
$RMCS1= 000234          3699    3701    4365    5222    5295    5422    8782    9445#   9446    9447    9448    9449    9450
                        9451    9452    9453    9454    9455    9456    9457    9458    9459    9460    9461    9462    9463
                        9464    9471    9479    9487    9495    9503    9511    9519    9527    9561
$RMCS2= 000244          3824    3983    4034    4078    4118    4224    4239    4256    4367    9449#   9561
$RMDA = 000242          5053    5300    5561    5612    5843    5844    9448#   9565
$RMDB = 000256          5644    9454#   9565
$RMDC = 000270          3678    4106    4864    5054    5301    5565    5600    5845    9459#   9569
$RMDS = 000246          3703    3827    3856    9450#   9561
$RMDT = 000262          6443*   9456#   9565
$RMEC1= 000300          3875    3877    4625    5676    9463#   9561
$RMEC2= 000302          3879    4643    5680    6351    6394    9464#   9472    9480    9488    9496    9504    9512    9520
                        9528    9561
$RMER1= 000250          3830    3833    3836    3839    3842    3845    3848    3851    3854    3859    3862    3903    3920
                        3922    3962    3993    4006    4008    4063    4098    4369    4826    4829    9451#   9561
$RMER2= 000276          3865    3867    4371    9462#   9561
$RMHR = 000272          9460#
$RMLA = 000254          9453#   9565
$RMMR1= 000260          9455#   9565
$RMMR2= 000274          9461#   9561    9569
$RMOF = 000266          9458#   9569
$RMSN = 000264          9457#   9569
$RMVEC  001272          2611#   3342*   3347    3353    9771
$RMWC = 000236          4384    4412    4610    4703    5472    5531    5646    9446#   9565
$RTNAD  027272          6779#
$R2A  = ****** U        7979
$SAVRE  033452          7803#   7977
$SAVR6  032226          7461*   7469    7470*   7471*   7489#
$SB2D   030246          4636    5818    5964    5994    5999    6004    6009    6018    6092    6097    6102    7075#
$SB20   030276          5802    7092#
$SEC  = 000010          4416    4792*   4994    5174    5227    5253*   5300*   5308*   5550    6459*   6524*   6531*   6532
                        6561*   8784    9388#
$SETUP= 000156          3263#   3286    3287    3289    3291    3293    3295    3327    6762    7227    7258    7260    7645
```

M16


```
                7748
$SIZE   055600  3377    9724#
$SKI  = 000064  5779    6016    6056    6058*   9410#
$SOFT = 000060  6014    6032    6034*   9408#
$SSEC = 000022  4422    4427    4428    4613    4705    5258*   5261*   5329*   5333*   5649    6406*   6409*   9397#
$STUP = 177777  3263#
$SUPRS  027646  4637    5741    5749    5754    5769    5774    5819    6904#
$SVPC = 000210  2486#   2491
$SWR  = 122000  2128#   2139    2143    2144    2145    2146    2553    3277    3295    6694    6762    6772    6778
                6780    7219    7220    7221    7222    7223    7236    7243    7255    7259    7261    7486
$SWREG  001226  2574#   3314
$TATUS= 000016  3644    3697    3714    3720    3722    3724    3726    3728    3730    3821    3912    3915    3932
                3997    4764    4800    4816    4822    4848    5469    5620    6528    9392#   9569
$TERM = 000032  7980#
$TESTN  001210  2565#   3277*   6780*
$TIME   023450  5400    5941    6088#   6149    7232
$TKB    001162  2546#   6150    6201    7106    7643    7654    7671    7725    7731
$TKINT  030326  3326    3482    7104#
$TKS    001160  2545#   6202*   7107*   7121*   7131*   7133*   7643    7652    7668    7692*   7723    7729
$TKSRV  030356  7104    7114#
$TN   = 000002  2128#   2139    3275    3277#
$TNPWR  033656  7852    7853    7873#
$TOTAL= 000056  5743    6013    6080    6082*   6683    9407#
$TPB    001166  2548#   7378*   7389
$TPFLG  001173  2552#   7327    7389
$TPS    001164  2547#   7376    7389
$TRANS= 000046  4854*   4855*   4860*   4861*   5746    9405#
$TRAP   034062  3289    7943#
$TRAP2  034104  7954#   7965
$TRK  = 000011  4791*   5172    5305    5307*   5545    6460*   6515*   9389#
$TRP  = 000015  7958#   7967#   7968#   7969#   7970#   7971#   7972    7973#   7974    7975#   7976#   7977#   7978#
                7979#   7980#
$TRPAD  034116  7948    7965#   7980
$TSTM   001104  2511#
$TSTNM  001116  2525#   7235    7261
$TTYIN  030766  7148    7149    7161    7184    7198    7202#
$TYPBN= ****** U  7971
$TYPOS  032466  7584#   7970
$TYPE   031326  6923    6936    7327#   7421    7958    7966
$TYPEC  031540  7357    7364    7371    7376#   7377    7694
$TYPEX  031606  7382    7384    7387#
$TYPOC  032264  7524#   7967
$TYPON  032300  7523    7526#   7969
$TYPOS  032240  7519#   7968
$UNIT   001216  2568#   2626
$UNITM  001110  2513#
$USWR   001230  2575#
$VECT1  001254  2600#   3340    3342
$VECT2  001256  2601#
$WRDL = 000020  4386    4411    4611    4702    4860    4886    4893    4895*   4896    4897*   4928    4937    4942
                4946    4988    5255*   5318*   5319*   5325*   5471    5626    5647    6403*   9396#   9397    9398
                9399    9400    9401    9402    9403    9404    9405    9406    9407    9408    9409    9410    9411
                9412    9413    9417
$WRDM = 000004  4796*   5256*   5257*   5320*   5321*   5322    5324*   5326*   6404*   6405*   6516*   9386#
$$GET4= 000000  6772#
$OFILL  032463  7520*   7524*   7534    7569#
```

B01


```
$40CAT= ****** U        7245
.     = 057527          2470#   2474#   2486    2487#   2489#   2491#   2492#   2498    2499#   2501#   2503#   2515    2522#
                        2557    2841#   2894#   2900#   3284    3341    3344    3606    3626    3822    3825    3831    3834
                        3837    3840    3843    3846    3849    3852    3860    3863    4641    6780    6852    7202#   7205#
                        7231    7261    7308#   7389    7442#   7464    7488    7638#   7643    7748    7893#   7933#   7980
                        9272#   9273#   9274#   9275#   9276#   9277#   9278#   9279#   9280    9470#   9471    9472#   9478#
                        9479    9480#   9486#   9487    9488#   9494#   9495    9496#   9502#   9503    9504#   9510#   9511
                        9512#   9518#   9519    9520#   9526#   9527    9528#   9537#   9545#   9573#   9714#   9832#   9833
.$ASTA= ****** U        7394    7397
.$X   = 001100          2498#   2503
```

```
A       6024#  6025  6037  6049  6061  6073
CKCHR   2128#  7026  7040
CKDIG   2128#  6612
CKNUM   2128#
COMMEN  2271#
ENDCOM  2271#
ERENTR  7213#  7228
ERRCAL  7984#  8799  8849  8851  9105  9165
ERROR   2165#  8799  8849  8852  9106  9165
ESCAPE  2271#
GETPRI  2271#  9730
GETSWR  2128#  2271#  3327
MORETA  2492#  2608
MULT    2271#
NEWTST  2271#  3275
POP     2271#  4531  5182  5379  5481  6410  6585  7436  7437  7473  7474  7625  7779  7824
PUSH    2271#  4522  5161  5353  5414  6377  6502  7397  7399  7420  7454  7460  7584  7760  7804
REPORT  2271#
RM03.D     1#  7984
SCOPE   2166#
SETPRI  2271#
SETTRA  7958#  7967  7968  7969  7970  7972  7974  7975  7976  7977  7978  7979
SETUP   2271#  3279
SKIP    2271#
SLASH   2271#
SPACE   2271#
STARS   2271#  2274  2278  2320  2324  2442  2446  2484  2495  2497  2504  2518  2557  2560  2669
        2673   2725  2729  2741  2745  2907  2911  3263  3270  3275  3524  3528  5384  5388  5823
        5827   6692  7209  7215  7264  7312  7392  7450  7466  7496  7574  7642  7645  7713  7751
        7788   7834  7897  7937  7982  7993  9375  9379  9539  9543  9674  9718
SWRSU   2271#  3295#
TRMTRP  7958#  7980
TYPBIN  2271#
TYPDEC  2271#
TYPNAM  2271#
TYPNUM  2271#
TYPOCS  2271#  3431  3583  3739  3765  3793  5957  6336  6425  6640  6665  6722  6730
TYPOCT  2271#  7276  7300  7663
TYPTXT  2271#
XXEP    6690#  6698
$$CMRE  2516#
$$CMTM  2516#
$$ESCA  2271#
$$NEXT  2271#  3275
$$SET   7958#  7967  7968  7969  7970  7972  7974  7975  7976  7977  7978  7979
$$SETM  3311#
$$SKIP  2271#
.EQUAT  2128#  2161
.HEADE  2128#  2129
.SETUP  2128#  3263
.SWRHI  2128#  2139
.SWRLO  2128#  2146#  2147  2148  2150  2152  2157  2159  2160
.$ACT1  2128#  2482
.$APTB  2128#  2558#
.$APTH  2128#  2493
.$APTY  2128#  7390
```

```
.$CATC   2128#   2468
.$CMTA   2128#   2516
.$D82D   2128#   7832
.$D820   2128#   7895
.$EOP    2128#   6690
.$ERRO   2128#   7213
.$ERRT   2128#   7262
.$POWE   2128#   7448
.$RAND   2128#   7749
.$READ   2128#   7640
.$SAVE   2128#   7786
.$SIZE   2128#   9716
.$TRAP   2128#   7935
.$TYPD   2128#   7572
.$TYPE   2128#   7310
.$TYPO   2128#   7494

. ABS.  057527     000

 ERRORS DETECTED:  0

 DSKZ:DZRMBA,DSKZ:DZRMBA.SEQ/NL:MD:MC:CND:TOC/DOC/SOL/CRF=DSKM:RMDRV4.P11,DSKM:DZRMBA.P11
 RUN-TIME: 35 27 2 SECONDS
 RUN-TIME RATIO: 282/65=4.3
 CORE USED:  42K  (83 PAGES)

 DOCUMENT PAGES:  209
```