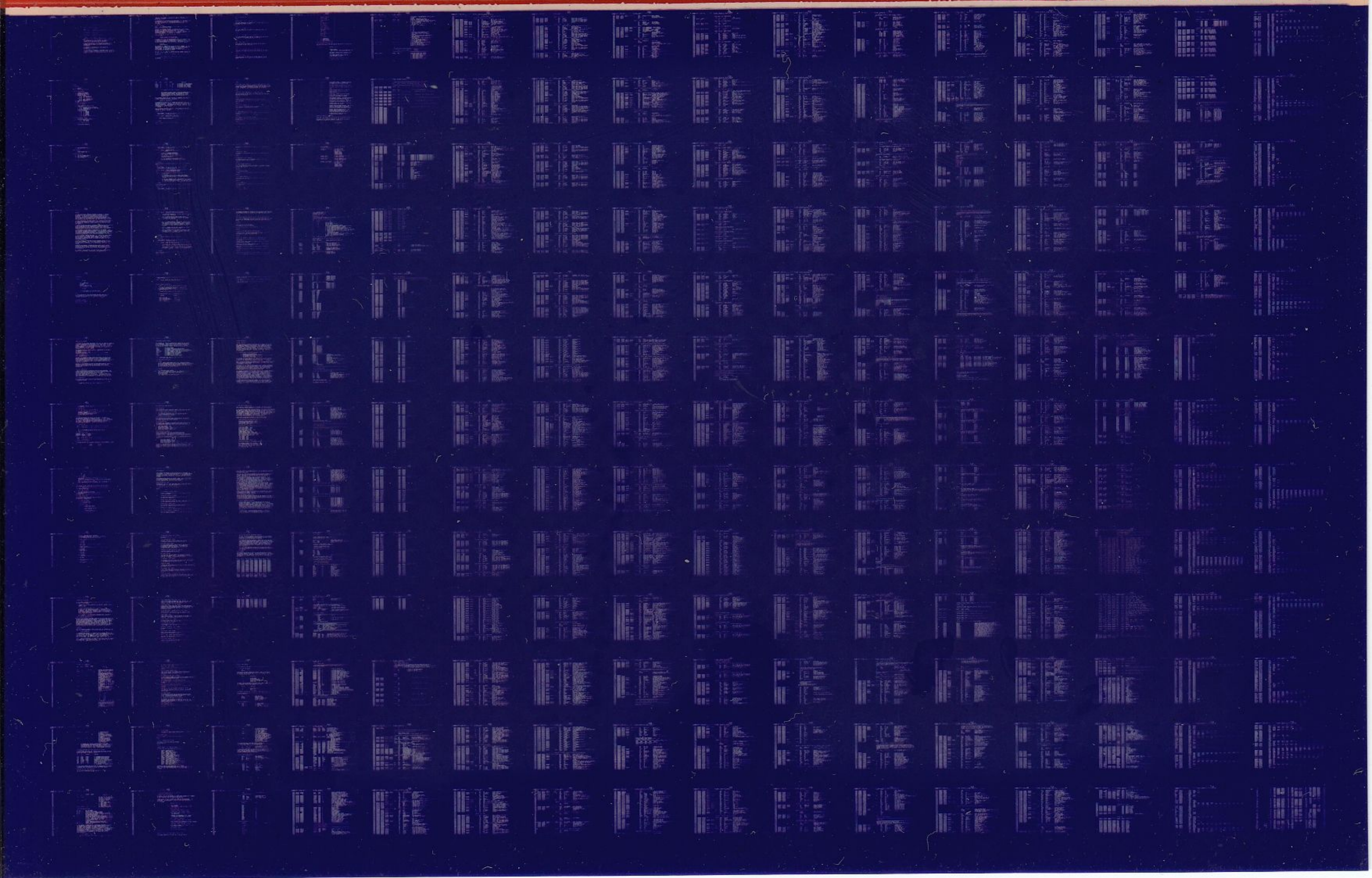
RM03,02

PERFORMANCE EXERCISER
CZRMBB0

AH-995B-MC

FICHE 1 OF 2

JAN 1978
digital
MADE IN USA



RM03,02

PERFORMANCE EXERCISER
CZRMBB0

AH-995B-MC

FICHE 2 OF 2

JAN 1978
digital
MADE IN USA

```
                                .REM    @
```

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

PRODUCT CODE: AC-A994B-MC

PRODUCT NAME: CZRMBB0 RM03/RM02 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,RM02 FORMATTER PROGRAM (CZRMAC0). 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
RANDOM	8	000000	0 OR 1	ERRORS PRINTED OUT IF SW<07>=0 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>

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

EXAMPLE: D0<CR> - DEASSIGN DRIVE 0
DA<CR> - DEASSIGN ALL DRIVES BEING TESTED.

NOTES: 1. IF THE 'D' COMMAND REFERENCES A DRIVE NOT ASSIGNED THE PROGRAM WILL TYPEOUT '?DRIVE NOT ASSIGNED'

2. THE DRIVES WILL BE DEASSIGNED AS THEIR OPERATIONS COMPLETE.

3. IF 'DA' IS USED,ALL DRIVES BEING TESTED WILL BE DEASSIGNED; THE MESSAGE IN (1) WILL BE DISPLAYED FOR ALL DRIVES NOT BEING TESTED.

4.4.3 'S' COMMAND

USED TO REQUEST A PERFORMANCE SUMMARY TYPEOUT FOR THE REFERENCED DRIVE(S).

FORMAT: SN<CR>

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

EXAMPLE: S0<CR> - TYPEOUT PERFORMANCE SUMMARY FOR DRIVE 0
SA<CR> - TYPEOUT PERFORMANCE SUMMARY FOR ALL DRIVES BEING TESTED.

NOTES: 1. IF 'SA' IS USED ONLY DRIVES BEING TESTED WILL BE DISPLAYED.

2. IF PARAMETER 'MINUTE' IS NOT ZERO, THE PROGRAM WILL AUTOMATICALLY DISPLAY A PERFORMANCE SUMMARY FOR EACH DRIVE BEING TESTED AT A RATE DETERMINED BY 'MINUTE'.

3. IF THE 'SA' COMMAND IS USED, THE PROGRAM WILL TYPEOUT THE OPERATOR ENTERED DATE, OPERATOR I.D., AND THE DRIVE I.D. FOR EACH DRIVE BEING TESTED. THE DATE AND OPERATOR I.D. WILL NOT BE TYPED OUT IF NO DRIVES ARE BEING TESTED.

4.4.4 'W' COMMAND

USED TO WRITE A DATA PACK WITH DATA ACCEPTABLE TO THE RM03 PERFORMANCE EXERCISER PROGRAM.

FORMAT: WN<CR>

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

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 (CZRMAC0) 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.

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.

```
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
```

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
```

EM60 DEVICE UNSAFE

THE INDICATED DRIVE UNSAFE ERROR OCCURRED; THE ERROR WAS CLEARED BY A 'DRIVE CLEAR' INSTRUCTION.

7.2 DETAIL ERROR LINES

THE LINE NUMBERS GIVEN BELOW ARE FOR REFERENCE ONLY.

LINE 1

TT:TT:TT (DESCRIPTION OF ERROR)

'TT:TT:TT' IS THE TIME SINCE THE PROGRAM WAS STARTED. TT:TT:TT IS GIVEN IN HOURS: MINUTES: SECONDS.

LINE 2

'PRESENT ORDER = XXXX PREVIOUS ORDER = YYYY'

MNEMONICS USED FOR THE ORDERS ARE DEFINED BELOW:

UNLOAD - UNLOAD (OCTAL 3)
SEEK - SEEK (OCTAL 5)
RECAL - RECALIBRATE (OCTAL 7)
DRVCLR - DRIVE CLEAR (OCTAL 11)
RELSE - RELEASE (OCTAL 13)
OFFSET - OFFSET (OCTAL 15)
RTC - RETURN TO CENTERLINE (OCTAL 17)
READIN - READIN PRESET (OCTAL 21)
PACK - PACK ACKNOWLEDGE (OCTAL 23)
SEARCH - SEARCH (OCTAL 31)
GETREG - GET REGISTERS (OCTAL 41)
SETFMT - SET FORMAT (ECI OR HCI) (OCTAL 43)
SELDRV - SELECT DRIVE (OCTAL 45)
WCKD - WRITE CHECK DATA (OCTAL 51)
WCKHD - WRITE CHECK HEADER & DATA (OCTAL 53)
WRTDAT - WRITE DATA (OCTAL 61)
WRTHD - WRITE CHECK HEADER & DATA (OCTAL 63)
RDDAT - READ DATA (OCTAL 71)
RDHD - READ HEADER & DATA (OCTAL 73)

(DISPLAY OF THE RH11/RM03 REGISTERS IN TWO GROUPS: RMCS1,RMCS2,RMDS1,RMER1,RMER2,RMER3,RMEC1, & RMEC2 FORM THE FIRST GROUP; ALL THE OTHER REGISTERS ARE IN THE SECOND GROUP. IF SW<05> IS SET, ONLY THE REGISTERS IN THE FIRST GROUP WILL BE DISPLAYED.)

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.

```
                                LINE 10
                                ------

                                BUFFER ADDR = XXXX  SIZE = YYYY  ACTUAL NUMBR WRDS XFRD = ZZZZ

                                THIS LINE GIVES THE STARTING ADDRESS OF THE BUFFER USED FOR THE
                                CURRENT DATA TRANSFER OPERATION, ITS SIZE, AND THE ACTUAL NUMBER
                                OF WORD TRANSFERED.  THE STARTING ADDRESS OF THE BUFFER IS IN
                                OCTAL, THE SIZE AND WORD TRANSFERED VALUE ARE IN DECIMAL.

                                LINE 11
                                ------

                                GOOD DATA = XXXX  BAD DATA = YYYY  SECT POS = ZZZ

                                THIS LINE GIVES THE GOOD DATA, THE ACTUAL DATA FROM THE DISK,
                                AND THE LOCATION IN THE SECTOR OF THE ACTUAL DATA.  THE SECTOR
                                POSITION IS IN DECIMAL.

                                LINE 12
                                -------

                                HEADER CONTENTS OF ERROR SECTOR = XXXX XXXX XXXX XXXX

                                THIS LINE GIVES THE CONTENTS OF THE HEADER OF THE SECTOR WHICH
                                GAVE THE ERROR.

                                LINE 13
                                -------

                                RMEC1 = XXXX  RMEC2 = YYYY

                                THIS LINE WILL BE PRINTED AFTER A SUCESSFUL RETRY OF A SECTOR
                                WHICH BECAME ECC CORRECTABLE DURING RETRY.

                                LINE 14
                                ------

                                ECC CORRECTABLE WITHOUT OFFSET

                                THE SECTOR IN ERROR IS ECC CORRECTABLE; NO RETRY ATTEMPTS ARE
                                NECESSARY.

                                LINE 15
                                -------

                                READ CORRECTLY AT (NEG OR POS) OFFSET

                                THE SECTOR IN ERROR WAS READ WITHOUT ERROR AT THE INDICATED
                                OFFSET VALUE.

                                LINE 16
                                -------

                                ECC CORRECTABLE AT (NEG OR POS) OFFSET
```

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

```
1637                                    NOT BEEN ON CYLINDER AS LONG.
1638
1639                                    WHEN THE DATA TRANSFER OPERATION IS COMPLETE, THE DRIVE REGISTERS
1640                                    ARE STORED AND A DATA TRANSFER IS INITIATED FOR A WAITING DRIVE.
1641
1642                                    IF THE OPERATION HAS BEEN COMPLETED NORMALLY, THE SAVED DRIVE REGISTERS
1643                                    ARE CHECKED TO VERIFY THAT NO ERROR BITS ARE SET; THE RH11 BUS ADDRESS
1644                                    AND WORD COUNT ADDRESS REGISTERS ARE CHECKED TO VERIFY THAT THE
1645                                    CORRECT NUMBER OF WORDS HAVE BEEN TRANSFERED AND THAT THE TWO REGISTERS
1646                                    ARE CONSISTENT WITH EACH OTHER; AND IF THE ORDER WAS A READ ORDER, THE
1647                                    DATA BUFFER IS COMPARED.  WHEN THIS SEQUENCE IS COMPLETED, THE DRIVE
1648                                    IS RETURNED TO THE ASSIGNED, INACTIVE LIST.  THE PROGRAM THEN
1649                                    INITIATES A DATA TRANSFER ON A WAITING DRIVE AND RESELECTS AND
1650                                    REINITIATES ANOTHER OPERATION ON THE RELEASED DRIVE.
1651
1652                                    ERRORS WHICH OCCUR ARE PROCESSED IN THE FOLLOWING ORDER.  MULTIPLE
1653                                    ERRORS WILL BE REPORTED AS THE FIRST ERROR TYPE CHECKED.
1654
1655                                    A.  ERRORS REPORTED FOR OPERATIONS WHICH HAVE NOT COMPLETED NORMALLY.
1656
1657                                        PERSISTENT UNSAFE CONDITION - EM12
1658                                        UNCORRECTABLE MASSBUS PARITY ERROR - EM10
1659                                        FATAL MASSBUS PARITY ERROR - EM11
1660                                        OPERATION NOT COMPLETED WITHIN TIME LIMIT - EM13
1661                                        UNIT WENT OFFLINE - EM14
1662
1663                                    B.  ERRORS REPORTED FOR OPERATIONS WHICH COMPLETE NORMALLY.
1664
1665                                        CORRECTABLE UNSAFE - EM60
1666                                        DRIVE TIMING ERROR - EM32
1667                                        DATA CHECK ERROR - EM21
1668                                        WRITE CHECK WITH DCK SET - EM22
1669                                        HEADER CRC ERRORS - EM20
1670                                        FORMAT ERRORS - EM24, EM26
1671                                        HEADER COMPARE ERRORS - EM25, EM27
1672                                        PROGRAM DETECTED POSITIONING ERROR - EM51
1673                                        SEEK INCOMPLETE OR OFF CYLINDER ERROR - EM50
1674                                        WRITE CHECK WITHOUT 'DCK' SET - EM23
1675                                        RH11 OR UNIBUS TRANSFER ERROR - EM40
1676                                        'OPI' ERROR - EM31
1677                                        'PAR' ERROR - EM33
1678                                        'WCF' ERROR - EM34
1679                                        'IAE' ERROR - EM35
1680                                        'WLE' ERROR - EM36
1681                                        MISCELLANEOUS DRIVE ERROR - EM30
1682
1683                                    C.  ERRORS NOT FLAGGED BY THE HARDWARE ERROR DETECTION LOGIC.
1684
1685                                        BUS ADDRESS OR WORD COUNT INCORRECT - EM41
1686                                        DATA COMPARE ERRORS - NO DRIVE ERROR DETECTED - EM42
1687                                        CAN'T MATCH DATA READ WITH A PATTERN - EM43
1688                                        ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11 - EM44
1689                                        ECC LOGIC FAILURE - EM45
1690                                        BUS ADDRESS OR WORD COUNT NOT CONSISTENT - EM46
1691
1692                            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 OR FMT22, ECT, AND MCI
        .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   ERRTB5          ;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,ERRTB5,0

                        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  CZRMB80 RM03/2 PERF EXER
                        ;*COPYRIGHT (C) 1977
                        ;*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
```

```
                                ;
                                ;GENERAL REGISTER
                                ;GENERAL REGISTER
                                ;GENERAL REGISTER
                                ;GENERAL REGISTER
                                ;STACK POINTER
                                ;PROGRAM COUNTER
                                ;
                                ;*PRIORITY LEVEL DEFINITIONS
                                ;PRIORITY LEVEL 0
                                ;PRIORITY LEVEL 1
                                ;PRIORITY LEVEL 2
                                ;PRIORITY LEVEL 3
                                ;PRIORITY LEVEL 4
                                ;PRIORITY LEVEL 5
                                ;PRIORITY LEVEL 6
                                ;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
```

```
                        
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
176700                          ABASE=176700
000254                          AVECT1=254

                        ;;*****************************************************************
                        .SBTTL  RM03 REGISTERS

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

                        ;CONTROL AND STATUS REGISTER 1 (RMCS1)

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

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

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

```
                                ;CONTROL AND STATUS REGISTER 2 (RMCS2)

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

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


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

                                .SBTTL  RM03 REGISTERS

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

                                ;CONTROL AND STATUS 1 REGISTER. (#00)

000001                          GO=     1                       ;GO BIT (BIT #0)
000002                          F0=     2                       ;FUNCTION CODE BIT #1
000004                          F1=     4                       ;FUNCTION CODE BIT #2
000010                          F2=     10                      ;FUNCTION CODE BIT #3
000020                          F3=     20                      ;FUNCTION CODE BIT #4
000040                          F4=     40                      ;FUNCTION CODE BIT #5
004000                          DVA=    4000                    ;DEVICE AVAILABLE (BIT #11)

                                ;DRIVE STATUS REGISTER (RMDS1) (#01)

000001                          OFFON=  1                       ;OFFSET ON (BIT #0)
000100                          VV=     100                     ;VOLUME VALID (BIT #6)
000200                          DRY=    200                     ;DRIVE READY (BIT #7)
000400                          DPR=    400                     ;DRIVE PRESENT (BIT #8)
001000                          PGM=    1000                    ;PROGRAMABLE (BIT #9)
002000                          LBT=    2000                    ;LAST SECTOR TRANSFERRED (BIT #10)
004000                          WRL=    4000                    ;WRITE LOCK (BIT #11)
010000                          MOL=    10000                   ;MEDIUM ON-LINE (BIT #12)
020000                          PIP=    20000                   ;POSITIONING OPERATION IN PROGRESS (BIT #13)
040000                          ERR=    40000                   ;COMPOSITE ERROR (BIT #14)
100000                          ATA=    100000                  ;ATTENTION ACTIVE (BIT #15)

                                ;ERROR REGISTER #01 (RMER1) (#02)
```

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

                ;MAINTAINABILITY REGISTER (RMMR1)(#03)


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

                        AT0=    1               ;DEVICE 0 (BIT #0)
                        AT1=    2               ;DEVICE 1 (BIT #1)
                        AT2=    4               ;DEVICE 2 (BIT #2)
                        AT3=    10              ;DEVICE 3 (BIT #3)
                        AT4=    20              ;DEVICE 4 (BIT #4)
                        AT5=    40              ;DEVICE 5 (BIT #5)
                        AT6=    100             ;DEVICE 6 (BIT #6)
                        AT7=    200             ;DEVICE 7 (BIT #7)

                ;DESIRED SECTOR/TRACK ADDRESS REGISTER (RMDA) (#05)


                ;DRIVE TYPE REGISTER (RMDT) (#06)

                        DT00=   1               ;DRIVE TYPE NUMBER BIT 1
                        DT01=   2               ;DRIVE TYPE NUMBER BIT 2
                        DT02=   4               ;DRIVE TYPE NUMBER BIT 3
                        DT03=   10              ;DRIVE TYPE NUMBER BIT 4
                        DT04=   20              ;DRIVE TYPE NUMBER BIT 5
                        DT05=   40              ;DRIVE TYPE NUMBER BIT 6
                        DT06=   100             ;DRIVE TYPE NUMBER BIT 7
                        DT07=   200             ;DRIVE TYPE NUMBER BIT 8
                        DT08=   400             ;DRIVE TYPE NUMBER BIT 9
                        DRQ=    4000            ;DRIVE REQUEST REQUIRED (BIT #11)
                        MOH=    20000           ;MOVING HEAD (BIT #13)
                        TAP=    40000           ;TAPE DRIVE (BIT #14)
                        NSA=    100000          ;NOT SECTOR ADDRESSED (BIT #15)

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

                        SC1=    100             ;SECTOR COUNT FIELD 0 (BIT #6)
                        SC2=    200             ;SECTOR COUNT FIELD 1 (BIT #7)
                        SC04=   400             ;SECTOR COUNT FIELD 2 (BIT #8)
                        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
```

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

                                .SBTTL  TRAP CATCHER

                                        .=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
                                        .=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
                                        $SVPC=.                 ;SAVE PC
                                        .=46
000046  027450                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                        .=52
000052  040000                          .WORD   40000           ;;2)SET LOC.52 TO 40000
                                        .=$SVPC                 ;; RESTORE PC
                                        .=1100
                                .SBTTL  APT PARAMETER BLOCK

                                ;;*****************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;*****************************************************************
                                        .$X=.   ;;SAVE CURRENT LOCATION
                                        .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                  200    ;;FOR APT START UP
                                        .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001100                  $APTHDR ;;POINT TO APT HEADER BLOCK
                                        .=.$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)
                                        TAB.XY=.
```

```
                                .SBTTL  COMMON TAGS

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

001114                                  .=TAB.XY
001114                          $CMTAG:                         ;;START OF COMMON TAGS
001114  000000                          .WORD   0
001116  000                     $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001117  000                     $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001120  000000                  $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001122  000000                  $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001124  000000                  $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001126  000000                  $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001130  000                     $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001131  001                     $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001132  000000                  $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001134  000000                  $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001136  000000                  $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001140  000000                  $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001142  000000                  $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001144  000000                          .WORD   0               ;;RESERVED--NOT TO BE USED
001146  000000                          .WORD   0
001150  000                     $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001151  000                     $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001152  000000                          .WORD   0
001154  177570                  SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001156  177570                  DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001160  177560                  $TKS:   177560                  ;;TTY KBD STATUS
001162  177562                  $TKB:   177562                  ;;TTY KBD BUFFER
001164  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001166  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001170  000                     $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001171  002                     $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001172  012                     $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001173  000                     $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001174  177607  000377           $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001200  077                     $QUES:  .ASCII  /?/             ;;QUESTION MARK
001201  015                     $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001202  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;*****************************************************************
                                .EVEN
001204                          $MAIL:                          ;;APT MAILBOX
001204  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001206  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001210  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001212  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001214  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001216  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001220  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001222  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001224                          $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)
```

```
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]
```

```
                                        ;;*****************************************************************
                                        .SBTTL  TABLES, CONSTANTS, AND VARIABLE LOCATIONS
                                        ;;*****************************************************************
001522  000000  000000  000000  ORDERQ: .WORD   0,0,0,0,0,0,0,0,0  ;LIST OF DRIVES PERFORMING COMMANDS
001530  000000  000000  000000
001536  000000  000000  000000

001544  000000                  ASNLST: .WORD   0               ;A BIT SET IS AN ASSIGNED DRIVE

001546  000000  000000  000000  DUNIT:  .WORD   0,0,0,0,0,0,0,0,0       ;ADDRESSES OF DRIVES TO BE DEASSIGNED
001554  000000  000000  000000
001562  000000  000000  000000

001570  000000  000000  000000  NEWUNT: .WORD   0,0,0,0,0,0,0,0,0       ;ADDRESSES OF NEWLY ASSIGNED DRIVES
001576  000000  000000  000000
001604  000000  000000  000000

001612  000000  000000  000000  AVAIL:  .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR BUFFERS/PARAMETERS
001620  000000  000000  000000
001626  000000  000000  000000

001634  000000  000000  000000  WAIT:   .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR BUFFERS
001642  000000  000000  000000
001650  000000  000000  000000

001656  000000  000000  000000  PARQ:   .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR NEXT PARAMETERS
001664  000000  000000  000000
001672  000000  000000  000000

001700  000000                  BUFTBL: .WORD   0               ;BUFFER ALLOCATION TABLE ENTRY COUNT
001702  000000  000000                  .WORD   0,0
001706  000000  000000                  .WORD   0,0
001712  000000  000000                  .WORD   0,0
001716  000000  000000                  .WORD   0,0
001722  000000  000000                  .WORD   0,0
001726  000000  000000                  .WORD   0,0
001732  000000  000000                  .WORD   0,0
001736  000000  000000                  .WORD   0,0
001742  000000  000000                  .WORD   0,0
001746  000000  000000                  .WORD   0,0
001752  000000  000000                  .WORD   0,0
001756  000000  000000                  .WORD   0,0
001762  000000  000000                  .WORD   0,0
001766  000000  000000                  .WORD   0,0
001772  000000  000000                  .WORD   0,0
001776  000000  000000                  .WORD   0,0
002002  000000  000000                  .WORD   0,0
002006  000000  000000                  .WORD   0,0
002012  000000  000000                  .WORD   0,0
002016  000000  000000                  .WORD   0,0
002022  000000  000000                  .WORD   0,0
002026  000000  000000                  .WORD   0,0
```

```
2796   002032   000000   000000                  .WORD   0,0
2797   002036   000000   000000                  .WORD   0,0
2798   002042   000000   000000                  .WORD   0,0
2799   002046   000000   000000                  .WORD   0,0
2800   002052   000000   000000                  .WORD   0,0
2801   002056   000000   000000                  .WORD   0,0
2802   002062   000000   000000                  .WORD   0,0
2803   002066   000000   000000                  .WORD   0,0
2804   002072   000000   000000                  .WORD   0,0
2805   002076   000000   000000                  .WORD   0,0
2806
2807   002102   043022                  BLKADR: .WORD   DRIVE0          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 0
2808   002104   043326                          .WORD   DRIVE1          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 1
2809   002106   043632                          .WORD   DRIVE2          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 2
2810   002110   044136                          .WORD   DRIVE3          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 3
2811   002112   044442                          .WORD   DRIVE4          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 4
2812   002114   044746                          .WORD   DRIVE5          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 5
2813   002116   045252                          .WORD   DRIVE6          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 6
2814   002120   045556                          .WORD   DRIVE7          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 7
2815
2816   002122       151                 COMTBL: .BYTE   WCKD            ;WRITE CHECK DATA
2817   002123       153                         .BYTE   WCKHD           ;WRITE CHECK HEADER AND DATA
2818   002124       161                         .BYTE   WRTDAT          ;WRITE DATA
2819   002125       163                         .BYTE   WRTHD           ;WRITE HEADER AND DATA
2820   002126       171                         .BYTE   RDDAT           ;READ DATA
2821   002127       173                         .BYTE   RDHD            ;READ HEADER AND DATA
2822
2823   002130       002                 OPTBL:  .BYTE   2               ;UNLOAD
2824   002131       004                         .BYTE   4               ;SEEK
2825   002132       006                         .BYTE   6               ;RECAL
2826   002133       010                         .BYTE   10              ;DRIVE CLEAR
2827   002134       012                         .BYTE   12              ;RELEASE
2828   002135       014                         .BYTE   14              ;OFFSET
2829   002136       016                         .BYTE   16              ;RETURN TO CENTERLINE
2830   002137       020                         .BYTE   20              ;READIN PRESET
2831   002140       022                         .BYTE   22              ;PACK ACKNOWLEDGE
2832   002141       030                         .BYTE   30              ;SEARCH
2833   002142       050                         .BYTE   50              ;WRITE CHECK DATA
2834   002143       052                         .BYTE   52              ;WRITE CHECK HEADER AND DATA
2835   002144       060                         .BYTE   60              ;WRITE DATA
2836   002145       062                         .BYTE   62              ;WRITE HEADER AND DATA
2837   002146       070                         .BYTE   70              ;READ DATA
2838   002147       072                         .BYTE   72              ;READ HEADER AND DATA
2839   002150       377                         .BYTE   -1              ;TERMINATOR
2840
2841              002152                        .EVEN
2842
2843
2844   002152   047125   047514   042101  MNTBL:  .ASCIZ  /UNLOAD /
2845   002160   000040
2846   002162   042523   045505   020040          .ASCIZ  /SEEK   /
2847   002170   000040
2848   002172   042522   040503   020114          .ASCIZ  /RECAL  /
2849   002200   000040
2850   002202   051104   041526   051114          .ASCIZ  /DRVCLR /
2851   002210   000040
```

```
2852  002212  042522  051514  020105          .ASCIZ  /RELSE  /
2853  002220  000040
2854  002222  043117  051506  052105          .ASCIZ  /OFFSET /
2855  002230  000040
2856  002232  052122  020103  020040          .ASCIZ  /RTC    /
2857  002240  000040
2858  002242  042522  042101  047111          .ASCIZ  /READIN /
2859  002250  000040
2860  002252  040520  045503  020040          .ASCIZ  /PACK   /
2861  002260  000040
2862  002262  042523  051101  044103          .ASCIZ  /SEARCH /
2863  002270  000040
2864  002272  041527  042113  020040          .ASCIZ  /WCKD   /
2865  002300  000040
2866  002302  041527  044113  020104          .ASCIZ  /WCKHD  /
2867  002310  000040
2868  002312  051127  042124  052101          .ASCIZ  /WRTDAT /
2869  002320  000040
2870  002322  051127  044124  020104          .ASCIZ  /WRTHD  /
2871  002330  000040
2872  002332  042122  040504  020124          .ASCIZ  /RDDAT  /
2873  002340  000040
2874  002342  042122  042110  020040          .ASCIZ  /RDHD   /
2875  002350  000040
2876  002352  047516  042516  020040          .ASCIZ  /NONE   /
2877  002360  000040
2878
2879
2880  002362  043101  042524  020122  OFMSG0: .ASCIZ  /AFTER RETRY WITHOUT OFFSET/
2881  002370  042522  051124  020131
2882  002376  044527  044124  052517
2883  002404  020124  043117  051506
2884  002412  052105     000
2885  002415     101  020124  042516  OFMSG1: .ASCIZ  /AT NEGATIVE OFFSET/
2886  002422  040507  044524  042526
2887  002430  047440  043106  042523
2888  002436  000124
2889  002440  052101  050040  051517  OFMSG2: .ASCIZ  /AT POSITIVE OFFSET/
2890  002446  052111  053111  020105
2891  002454  043117  051506  052105
2892  002462     000
2893
2894          002464                          .EVEN
2895
2896  002464     000                  OFFCOD: .BYTE   0               ;OFFSET CODE TABLE
2897  002465     001                          .BYTE   1               ;NUMBER FOR NEGATIVE OFFSET (DIR = OUT)
2898  002466     000                          .BYTE   0               ;NUMBER FOR POSITIVE OFFSET (DIR = IN)
2899
2900          002470                  .EVEN
2901
2902  002470  002362                  OFMTBL: .WORD   OFMSG0          ;1ST OFFSET MESSAGE
2903  002472  002415                          .WORD   OFMSG1          ;2ND OFFSET MESSAGE
2904  002474  002440                          .WORD   OFMSG2          ;3RD OFFSET MESSAGE
2905
2906
2907                                  ;;*****************************************************************
```

```
2908
2909                                    .SBTTL  DATA PATTERNS
2910
2911                                    ;;*****************************************************************
2912
2913  002476  002542                    STNDAT: .WORD   DATA0            ;STANDARD DATA PATTERN POINTER TABLE
2914  002500  002602                            .WORD   DATA1
2915  002502  002642                            .WORD   DATA1+40
2916  002504  002702                            .WORD   DATA1+100
2917  002506  002742                            .WORD   DATA1+140
2918  002510  003002                            .WORD   DATA1+200
2919  002512  003042                            .WORD   DATA1+240
2920  002514  003102                            .WORD   DATA1+300
2921  002516  003142                            .WORD   DATA1+340
2922  002520  003202                            .WORD   DATA1+400
2923  002522  003242                            .WORD   DATA1+440
2924  002524  003302                            .WORD   DATA1+500
2925  002526  003342                            .WORD   DATA1+540
2926  002530  003402                            .WORD   DATA1+600
2927  002532  003442                            .WORD   DATA1+640
2928  002534  003502                            .WORD   DATA1+700
2929  002536  002542                            .WORD   DATA0            ;ZEROES
2930  002540  003444                            .WORD   DATA1+642        ;ONES
2931
2932  002542  000000                    DATA0:  .WORD   0                ;DUMMY DATA PATTERN
2933  002544  000000                            .WORD   0
2934  002546  000000                            .WORD   0
2935  002550  000000                            .WORD   0
2936  002552  000000                            .WORD   0
2937  002554  000000                            .WORD   0
2938  002556  000000                            .WORD   0
2939  002560  000000                            .WORD   0
2940  002562  000000                            .WORD   0
2941  002564  000000                            .WORD   0
2942  002566  000000                            .WORD   0
2943  002570  000000                            .WORD   0
2944  002572  000000                            .WORD   0
2945  002574  000000                            .WORD   0
2946  002576  000000                            .WORD   0
2947  002600  000000                            .WORD   0
2948
2949  002602  000001                    DATA1:  .WORD   000001   ;STANDARD PATTERN 1
2950  002604  000003                            .WORD   000003
2951  002606  000007                            .WORD   000007
2952  002610  000017                            .WORD   000017
2953  002612  000037                            .WORD   000037
2954  002614  000077                            .WORD   000077
2955  002616  000177                            .WORD   000177
2956  002620  000377                            .WORD   000377
2957  002622  000777                            .WORD   000777
2958  002624  001777                            .WORD   001777
2959  002626  003777                            .WORD   003777
2960  002630  007777                            .WORD   007777
2961  002632  017777                            .WORD   017777
2962  002634  037777                            .WORD   037777
2963  002636  077777                            .WORD   077777
```

```
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
```

```
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
```

```
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
```

```
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
```

```
                                .SBTTL  ERROR POINTER TABLE

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

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

003542                          $ERRTB:
                                ;ERROR 1

                                ;ERROR 1

003542  046152                          EM1                     ;RH70 INTERRUPT OCCURRED (RMAS = 0)
003544  050571                          DH1
003546  051222                          DT1
003550  000000                          0

                                ;ERROR 2

003552  046221                          EM2                     ;UNEXPECTED ATTENTION OCCURRED
003554  050576                          DH2
003556  051226                          DT2
003560  000000                          0

                                ;ERROR 3

003562  046257                          EM3                     ;MASSBUS PARITY ERROR (MCPE=1)
003564  050652                          DH3
003566  051244                          DT3
003570  000000                          0

                                ;ERROR 4

003572  046315                          EM4                     ;MASSBUS PARITY ERROR (PAR=1)
003574  050700                          DH4
003576  051254                          DT4
003600  000000                          0

                                ;ERROR 5

003602  046352                          EM5                     ;ADDRESS PLUG BIT CHANGED
003604  050576                          DH2
003606  051226                          DT2
003610  000000                          0

                                ;ERROR 6

003612  046406                          EM6                     ;RH11 DIDN'T RESPOND TO ADDRESSING
003614  050737                          DH6
```

```
3260  003616  051266                          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     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
3282  003656  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
3283  003660  022706  001154                  CMP     #SWR,R6 ;;DONE?
3284  003664  001374                  BNE     .-6             ;;LOOP BACK IF NO
3285  003666  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
3286                                  ;;INITIALIZE A FEW VECTORS
3287  003672  012737  031176  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
3288  003700  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
3289  003706  012737  034364  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
3290  003714  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
3291  003722  012737  032246  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
3292  003730  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
3293  003736  012737  176543  033750          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
3294  003744  012737  123456  033752          MOV     #123456,$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  001014                          BNE     1$                ;BR IF NOT
3320  004104  104401  057512                  TYPE    ,TITLE            ;NAME AND MANDEC NUMBER
3321  004110  005737  000042                  TST     42                ;AUTO ACCEPT OR CHAIN MODE ?
3322  004114  001007                          BNE     1$                ;BR IF EITHER
3323  004116  122737  000077  000041          CMPB    #77,41            ;LOADED FROM AN RM03 ?
3324  004124  001003                          BNE     1$                ;BR IF NOT
3325  004126  104401  057571                  TYPE    ,LOADRV           ;INSTRUCT THE OPERATOR ON HOW TO TEST DRIVE 0
3326  004132  000000                          HALT
3327  004134  004737  030516          1$:     JSR     PC,$TKINT         ;TURN ON THE KEYBOARD INTERRUPT
3328                          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
3329  004140  005737  000042                  TST     @#42              ;;ARE WE RUNNING UNDER XXDP/ACT?
3330  004144  001012                          BNE     68$               ;;BRANCH IF YES
3331  004146  123727  001224  000001          CMPB    $ENV,#1           ;;ARE WE RUNNING UNDER APT?
3332  004154  001406                          BEQ     68$               ;;BRANCH IF YES
3333  004156  023727  001154  000176          CMP     SWR,#SWREG        ;;SOFTWARE SWITCH REG SELECTED?
3334  004164  001005                          BNE     69$               ;;BRANCH IF NO
3335  004166  104406                          GTSWR                     ;;GET SOFT-SWR SETTINGS
3336  004170  000403                          BR      69$
3337  004172  112737  000001  001150  68$:     MOVB    #1,$AUTOB         ;;SET AUTO-MODE INDICATOR
3338  004200                          69$:
3339  004200  105737  001224                  TSTB    $ENV              ;RUN UNDER APT MODE
3340  004204  001423                          BEQ     4$                ;NO,DONOT BOTHER
3341  004206  105737  001254                  TSTB    $VECT1            ;NEW VECTOR ?
3342  004212  001403                          BEQ     .+10              ;NOT LOAD IF = 0
3343  004214  113737  001254  001272          MOVB    $VECT1,$RMVEC     ;NEW VECTOR
3344  004222  005737  001260                  TST     $BASE             ;NEW BASE ADDRESS ?
3345  004226  001403                          BEQ     .+10              ;NO
3346  004230  013737  001260  001270          MOV     $BASE,$RMADR      ;NEW BASE ADDRESS
3347  004236  013737  001270  034620          MOV     $RMADR,RMADR      ;LOAD ADDRESS INTO DRIVER
3348  004244  013737  001272  034622          MOV     $RMVEC,RMVEC      ;LOAD VECTOR INTO DRIVER
3349  004252  000420                          BR      2$
3350  004254  105737  001150          4$:     TSTB    $AUTOB            ;AUTO MODE ?
3351  004260  001015                          BNE     2$                ;YES
3352  004262  004737  056240                  JSR     PC,BUSADR         ;CHECK RH11 BUS ADDRESS
3353  004266  013737  001270  034620          MOV     $RMADR,RMADR      ;RH11 ADDRESS
3354  004274  013737  001272  034622          MOV     $RMVEC,RMVEC      ;RH11 VECTOR ADDRESS
3355  004302  005227  177777                  INC     #-1               ;FIRST START ?
3356  004306  001002                          BNE     2$                ;BRANCH IF NOT
3357  004310  004737  055752                  JSR     PC,OPRDAT         ;GET THE DATE AND OPERATOR ID
3358  004314  005037  001314          2$:     CLR     STATIN            ;CLEAR PERFORMANCE SUMMARY TYPEOUT FLAG
3359  004320  012705  001522                  MOV     #ORDERQ,R5        ;START OF AREA TO CLEAR
3360  004324  005025                  3$:     CLR     (R5)+
3361  004326  022705  002102                  CMP     #BLKADR,R5        ;LOOK FOR END OF CLEAR AREA
3362  004332  001374                          BNE     3$                ;BR IF NOT FINISHED
3363  004334  012706  001100                  MOV     #STACK,SP         ;SETUP THE STACK POINTER
3364  004340  005037  177776                  CLR     PS                ;CLEAR THE PROCESSOR STATUS WORD
3365  004344  013737  001312  001372          MOV     HZ,SIXTEE         ;1/60 TH OR 1/50 TH SECOND COUNTER VALUE
3366  004352  005037  001364                  CLR     HOUR              ;CLEAR THE HOUR'S COUNTER
3367  004356  005037  001366                  CLR     MINUTE            ;CLEAR THE MINUTE'S COUNTER
3368  004362  005037  001370                  CLR     SECOND            ;CLEAR THE SECOND'S COUNTER
3369  004366  005037  001470                  CLR     INTRVL+2          ;CLEAR INTERVAL COUNTER
3370  004372  005037  001316                  CLR     PACK              ;CLEAR THE 'R' OR 'W' COMMAND FLAG
3371  004376  005037  001360                  CLR     CFLAG             ;CLEAR THE 'CONTROL C' FLAG
```

```
3372  004402  042737  170000  001464          BIC     #170000,MAXER   ;MAKE SURE ERROR LIMITS ARE NOT TOO HIGH
3373
3374                                          ;ROUTINE TO DETERMINE BUFFER AREA SIZE
3375
3376  004410  005227  177777          SIZMEM: INC     #-1             ;SEE IF TIME TO SIZE MEMORY
3377  004414  001005                          BNE     1$              ;BR IF NOT
3378  004416  004737  056142                  JSR     PC,$SIZE        ;SEE HOW MUCH MEMORY ON SYSTEM
3379  004422  013737  056236  001354          MOV     $LSTAD,LSTAD    ;SAVE THE LAST ADDRESS
3380  004430  012737  000001  001700  1$:     MOV     #1,BUFTBL       ;LOAD NUMBER OF BUFFERS
3381  004436  012737  057512  001702          MOV     #ENDPGM,BUFTBL+2  ;STARTING ADDRESS OF BUFFER
3382  004444  013737  001354  001704          MOV     LSTAD,BUFTBL+4  ;LAST ADDR TO BUFFER ALLOCATION TABLE
3383  004452  023727  001354  160000          CMP     LSTAD,#160000   ;OVER 28K ?
3384  004460  101403                          BLOS    2$              ;NO
3385  004462  012737  160000  001704          MOV     #160000,BUFTBL+4        ;XXDP MAX MEMORY 28K
3386  004470  162737  057512  001704  2$:     SUB     #ENDPGM,BUFTBL+4  ;SUBTRACT PROGRAM SPACE
3387  004476  000241                          CLC                     ;CLEAR THE 'C' BIT
3388  004500  006037  001704                  ROR     BUFTBL+4        ;CONVERT TO WORD COUNT
3389  004504  162737  000144  001704          SUB     #100.,BUFTBL+4  ;SAVE ROOM FOR THE 'ABS' LOADER
3390  004512  005737  000042                  TST     42              ;LOAD FROM XXDP OR OTHER MONITOR ?
3391  004516  001403                          BEQ     3$              ;BR IF LOADED BY PAPER TAPE
3392  004520  162737  002570  001704          SUB     #1400.,BUFTBL+4  ;SUBTRACT 'XXDP' LOADER SIZE
3393  004526  005737  001462          3$:     TST     MAXDL           ;VALUE IN 'MAXDL' ?
3394  004532  001003                          BNE     4$              ;BR IF VALUE IS
3395  004534  012737  020000  001462          MOV     #8192.,MAXDL    ;ASSUME FULL TRACK   MAXIMUM
3396  004542  023737  001462  001704  4$:     CMP     MAXDL,BUFTBL+4  ;IS THAT TOO LARGE ?
3397  004550  103403                          BLO     5$              ;BR IF NOT
3398  004552  013737  001704  001462          MOV     BUFTBL+4,MAXDL  ;USE MAX AVAIL MEMORY AS MAX BUFFER SIZE
3399  004560  013737  001704  054716  5$:     MOV     BUFTBL+4,PARLST+2  ;VALUE FOR THE PARAMETER TABLE
3400
3401                                          ;SEE IF THE OPERATOR WANTS TO CHANGE ANY PARAMETERS
3402
3403  004566  105737  001150          LKPAR:  TSTB    $AUTOB          ;'XXDP' CHAIN MODE OR 'ACT11' OPERATION ?
3404  004572  001033                          BNE     SETVEC          ;BR IF YES
3405  004574  022737  007070  001264          CMP     #7070,$CDW1     ;FROM THE POWER FAIL RT. ?
3406  004602  001427                          BEQ     SETVEC          ;BRANCH IF SO
3407  004604  105737  001224                  TSTB    $ENV            ;APT STAND ALONE MODE ?
3408  004610  001024                          BNE     SETVEC          ;NO
3409  004612  104401  001201                  TYPE    ,$CRLF
3410  004616  104401  055012                  TYPE    ,ASKPAR         ;ASK FOR PARMETERS
3411  004622  104411                          RDLIN                   ;READ THE ENTRY
3412  004624  012605                          MOV     (SP)+,R5        ;ADDRESS OF ENTRY TO R5
3413  004626  122715  000131                  CMPB    #'Y,(R5)        ;WAS ENTRY A 'Y' (YES)
3414  004632  001013                          BNE     SETVEC          ;BR IF NOT 'Y'
3415  004634  012703  054714          ENTPR:  MOV     #PARLST,R3      ;PARAMETER TABLE ADDRESS
3416  004640  004737  026610                  JSR     PC,PARENT       ;GET THE PARAMETER ENTRY
3417  004644  023727  001462  000004          CMP     MAXDL,#4        ;IS THE 'MAXDL' VALUE OK ?
3418  004652  103003                          BHIS    SETVEC          ;BR IF IT IS
3419  004654  012737  000004  001462          MOV     #4,MAXDL        ;SET 'MAXDL' TO THE MINIMUM VALUE
3420
3421                                          ;DISPLAY DRIVE STATUS AND SET UP THE OTHER SYSTEM DEVICES THAT
3422                                          ;       THE PROGRAM WILL USE
3423
3424  004662  004737  022632          SETVEC: JSR     PC,CKCLK        ;START THE CLOCK
3425  004666  004737  034636                  JSR     PC,RMINIT       ;INITIALIZE THE RM03 DRIVER
3426  004672  012737  177777  034560          MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
3427  004700  062727  177777  000000          ADD     #-1,#0          ;CHECK FOR FIRST START
```

```
3428  004706  103004                    BCC     11$             ;BR IF FIRST START
3429  004710  032777  000004  174236    BIT     #SW02,@SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
3430  004716  001071                    BNE     10$             ;BR IF NOT
3431  004720  005004              11$:  CLR     R4              ;DRIVE TABLE POINTER
3432  004722  104401  001201            TYPE    ,$CRLF          ;CR-LF
3433  004726  104401  053472            TYPE    ,SYSTAT         ;TYPE STATUS HEADING
3434  004732                        1$:
3435  004732  010446                    MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
3436                                                            ;;TYPE DRIVE NUMBER
3437  004734  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
3438  004736     002                    .BYTE   2               ;;TYPE 2 DIGIT(S)
3439  004737     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
3440  004740  104401  053244            TYPE    ,LIN4SP         ;SPACES
3441  004744  105764  034472            TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
3442  004750  100416                    BMI     4$              ;BR IF UNSAFE
3443  004752  001020                    BNE     5$              ;BR IF ONLINE
3444  004754  105764  034502            TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
3445  004760  001404                    BEQ     2$              ;BR IF NONEXISTENT
3446  004762  100006                    BPL     3$              ;BR IF OFFLINE
3447  004764  104401  053404      12$:  TYPE    ,NOTRM          ;DRIVE NOT AN RM03
3448  004770  000436                    BR      9$              ;CHECK NEXT DRIVE
3449  004772  104401  053426        2$: TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
3450  004776  000433                    BR      9$              ;CHECK NEXT DRIVE
3451  005000  104401  053313        3$: TYPE    ,UNTOFF         ;DRIVE OFFLINE
3452  005004  000405                    BR      6$              ;PRINT DRIVE TYPE
3453  005006  104401  053462        4$: TYPE    ,NOTSAF         ;DRIVE UNSAFE
3454  005012  000402                    BR      6$              ;PRINT DRIVE TYPE
3455  005014  104401  053324        5$: TYPE    ,UNTON          ;DRIVE ONLINE
3456  005020  104401  053246        6$: TYPE    ,LINSP          ;SPACES
3457  005024  012737  053512  005064    MOV     #RM03A,8$       ;ADDRESS OF RM03 MESSAGE
3458  005032  122764  000004  034502    CMPB    #4,DRVTYP(R4)   ;RM03 ?
3459  005040  001410                    BEQ     7$              ;BRANCH IF SO
3460  005042  012737  053517  005064    MOV     #RM03B,8$       ;RM02 MESSAGE
3461  005050  122764  000005  034502    CMPB    #5,DRVTYP(R4)   ;RM02 DRIVE ?
3462  005056  001401                    BEQ     7$              ;BRANCH IF SO
3463  005060  000741                    BR      12$             ;OTHERWISE , EXIT
3464  005062  104401              7$:   TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
3465  005064  000000              8$:   .WORD   0               ;MESSAGE ADDRESS HERE
3466  005066  104401  001201      9$:   TYPE    ,$CRLF          ;CR-LF
3467  005072  005204                    INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
3468  005074  020427  000010            CMP     R4,#8.          ;FINISHED ?
3469  005100  001314                    BNE     1$              ;BR IF NOT
3470  005102  104401  001201      10$:  TYPE    ,$CRLF          ;CR-LF
3471  005106  005037  177776            CLR     @S              ;SET PRIORITY BACK TO '0'
3472  005112  012706  001100            MOV     #STACK,SP       ;SET UP STACK POINT
3473
3474                              ;SETUP IF 'XXDP' OR 'ACT11' OPERATION
3475
3476  005116  005737  000042    MONTR: TST     42              ;'XXDP' CHAIN MODE OR 'ACT11' AUTO ACCEPT
3477  005122  001405                    BEQ     1$              ;BR IF NEITHER
3478  005124  005737  001356            TST     CHGADR          ;200 START ?
3479  005130  003002                    BGT     1$              ;YES
3480  005132  004737  024544            JSR     PC,ASGN2        ;ASSIGN DRIVES
3481  005136  005227  177777      1$:   INC     #-1             ;FIRST START ?
3482  005142  001011                    BNE     2$              ;BR IF NOT
3483  005144  105737  000041            TSTB    @#41            ;LOADED FROM PAPER TAPE ?
```

```
3484  005150  001406                    BEQ     2$                ;BR IF YES
3485  005152  023727  001354  100000    CMP     LSTAD,#100000     ;MORE THAN 16K ON THE SYSTEM ?
3486  005160  103002                    BHIS    2$                ;BR IF YES
3487  005162  104401  057770            TYPE    ,NOLOAD           ;TELL THE OPERATOR THAT THE 'XXDP' LOADER
3488                                                              ;WILL BE OVERWRITTEN
3489  005166  004737  030516    2$:     JSR     PC,$TKINT         ;INITIALIZE THE KEYBOARD INTERRUPT HANDLER
3490                                    .
                                        FORCE TO   TEST PACK FOR 200 START
3491  005172  105737  001150    FOWT1:  TSTB    $AUTOB            ;AUTO MODE ?
3492  005176  001412                    BEQ     1$                ;NO
3493  005200  012737  000001  001500    MOV     #1,RATIO          ;SPEED UP TEST
3494  005206  012737  077777  001450    MOV     #77777,ENDCON     ;SET LSW OF ENDING VALUE
3495  005214  012737  000027  001452    MOV     #27,ENDCON+2      ;SET MSW OF ENDING VALUE
3496  005222  000403                    BR      FOWT2             ;START TO WRITE AND TEST
3497  005224  005737  001356    1$:     TST     CHGADR            ;START AT 200 ?
3498  005230  003467                    BLE     FOWT3             ;NO
3499  005232  005001    FOWT2:  CLR     R1                        ;DRIVE #
3500  005234  005002            CLR     R2                        ;AVAIL TABLE INDEX
3501  005236  005003            CLR     R3                        ;DRIVE# X 2
3502  005240  122737  000024  000041    CMPB    #24,41            ;LOAD FROM DRIVE RM03
3503  005246  001002                    BNE     1$                ;NO
3504  005250  005201                    INC     R1                ;START FROM DRIVE 1
3505  005252  005723                    TST     (R3)+             ;ADJUST INDEX
3506  005254  105761  034472    1$:     TSTB    DRVSTA(R1)        ;DRIVE ON LINE ?
3507  005260  003442                    BLE     2$                ;NO
3508  005262  016300  002102            MOV     BLKADR(R3),R0     ;LOAD DPB ADDRESS
3509  005266  004737  025432            JSR     PC,CLRDPB         ;CLEAR DPB BLOCK
3510  005272  004537  026154            JSR     R5,GETADR         ;RETRIEVE BAD SPOT FILE
3511  005276  000433                    BR      2$                ;ERROR RET FROM GETADR RT.
3512  005300  010062  001570            MOV     R0,NEWUNT(R2)     ;LOAD DPB ADDRESS TO ABAIL QUEUE
3513  005304  105060  000026            CLRB    $PACK(R0)         ;TEST PACK FLAG
3514  005310  105737  001150            TSTB    $AUTOB            ;IN AUTO MODE ?
3515  005314  001403                    BEQ     .+8.              ;BRANCH IF SO
3516  005316  112760  177776  000026    MOVB    #-2,$PACK(R0)     ;WRITE PATTERN THEN TEST
3517  005324  013760  001446  000106    MOV     CYLIMT,MAXCYL(R0) ;UP CYLINDER LIMIT
3518  005332  013760  001444  000112    MOV     TRKLMT,MAXTRK(R0) ;UPPER TRACK LIMIT
3519  005340  013760  001442  000116    MOV     SECLMT,MAXSEC(R0) ;UPPER SECTOR LIMIT
3520  005346  005060  000110            CLR     MINCYL(R0)        ;CLEAR LOWER LIMIT
3521  005352  005060  000114            CLR     MINTRK(R0)        ;CLEAR LOWER LIMIT
3522  005356  005060  000120            CLR     MINSEC(R0)        ;CLEAR LOWER LIMIT
3523  005362  004737  017704            JSR     PC,WRTPK          ;SET UP PARAMETERS
3524  005366  022322            2$:     CMP     (R3)+,(R2)+       ;INCREMENT INDEX
3525  005370  005201                    INC     R1                ;NEXT DRIVE
3526  005372  022701  000007            CMP     #7,R1             ;ALL DRIVE ASSIGN ?
3527  005376  002326                    BGE     1$                ;NO
3528  005400  005037  001316            CLR     PACK              ;TEST PACK FLAG
3529  005404  000137  005574            JMP     MAIN1             ;JUMP TO WAIT PARAMETER AND BUFFER LOOP
3530  005410  104401  054462    FOWT3:  TYPE    ,INTDON           ;TYPE 'INITIALIZE COMPLETE'
3531  005414  000137  005574            JMP     MAIN1             ;START THE PROGRAM
3532                                    ;;$DOAGN:       JMP     START             ;START AGAIN
3533
3534                                    ;;*****************************************************************
3535
3536                                    .SBTTL  MAIN PROGRAM
3537
3538                                    ;;*****************************************************************
3539
```

```
                        MAIN PROGRAM

3540  005420  005737  001360        MAIN:   TST     CFLAG           ;KEYBOARD INTERRUPTED ?
3541  005424  001407                        BEQ     3$              ;BRANCH IF NOT
3542  005426  005737  001522        1$:     TST     ORDERQ          ;DON'T DEASSIGN ANY DRIVE,IF SYSTEM NOT IDLE
3543  005432  001402                        BEQ     2$              ;
3544  005434  000137  006206              JMP     IDLE            ;LET ALL DRIVE FINISH ODDER
3545  005440  004737  024130        2$:     JSR     PC,KSR          ;SERVICE THE KEYBOARD
3546  005444  000240        3$:     NOP                             ;EXIT
3547  005446  012703  000010        MAINDA: MOV     #8.,R3          ;DRIVE COUNTER
3548  005452  012705  001546              MOV     #DUNIT,R5       ;ADDRESS OF 'DROP DRIVE' TABLE
3549  005456  005715        1$:     TST     (R5)            ;SEE IF ENTRY AT PRESENT POSITION
3550  005460  001011                        BNE     3$              ;BR IF THERE IS ONE
3551  005462  062705  000002        2$:     ADD     #2,R5           ;INCREMENT TO NEXT TABLE POSITION
3552  005466  005303                        DEC     R3              ;DECREMENT DRIVE COUNTER
3553  005470  001372                        BNE     1$              ;BR IF MORE TO CHECK
3554  005472  105737  001544              TSTB    ASNLST          ;ANY DRIVES ACTIVE ?
3555  005476  001036                        BNE     MAIN1           ;BR IF YES
3556  005500  000137  027440              JMP     $GET42          ;CHECK FOR MONITOR RETURN
3557  005504  012701  001612        3$:     MOV     #AVAIL,R1       ;ADDRESS OF 'AVAILABLE DRIVES' TABLE
3558  005510  005711        4$:     TST     (R1)            ;SEE IF AT END OF TABLE
3559  005512  001405                        BEQ     5$              ;BR IF AT END: GO CHECK 'WAIT' TABLE
3560  005514  021115                        CMP     (R1),(R5)       ;IS DRIVE IN 'AVAIL' THE ONE TO BE DROPPED
3561  005516  001414                        BEQ     7$              ;BR IF YES
3562  005520  062701  000002              ADD     #2,R1           ;INCREMENT 'AVAIL' TABLE ADDRESS
3563  005524  000771                        BR      4$              ;CONTINUE LOOKING
3564  005526  012701  001634        5$:     MOV     #WAIT,R1        ;MOVE THE ADDRESS OF THE BUFFER WAIT TABLE
3565  005532  005711        6$:     TST     (R1)            ;AT THE END OF THE 'WAIT' TABLE ?
3566  005534  001752                        BEQ     2$              ;BR IF YES: SEE IF ANY MORE 'DROP' REQUESTS
3567  005536  021115                        CMP     (R1),(R5)       ;DRIVE IN THE 'WAIT' TABLE ?
3568  005540  001403                        BEQ     7$              ;BR IF IT IS
3569  005542  062701  000002              ADD     #2,R1           ;INCREMENT 'WAIT' TABLE ADDRESS
3570  005546  000771                        BR      6$              ;CONTINUE LOOK THROUGH THE 'WAIT' TABLE
3571  005550  011100        7$:     MOV     (R1),R0         ;PUT THE DRIVE'S BLOCK ADDRESS IN R0
3572  005552  104401  053771              TYPE    ,DEASSG         ;TYPE 'DRIVE DEASSIGNED'
3573  005556  004737  023122              JSR     PC,TYPEST       ;TYPE THE DRIVE'S PERFORMANCE SUMMARY
3574  005562  005015                        CLR     (R5)            ;CLEAR THE 'DROP DRIVE' TABLE ENTRY
3575  005564  005011                        CLR     (R1)            ;REMOVE THE DRIVE FROM THE 'AVAIL' OR 'WAIT' TABLE
3576  005566  004737  017666              JSR     PC,CMPRES       ;COMPRESS THE RESPECTIVE TABLE
3577  005572  000733                        BR      2$              ;SEE IF ANY MORE DRIVES
3578
3579                          ;LOOK FOR DRIVES TO BE ASSIGNED
3580
3581  005574  012703  000010        MAIN1:  MOV     #8.,R3          ;DRIVE COUNT
3582  005600  005002                        CLR     R2              ;'AVAIL' INDEX
3583  005602  005004                        CLR     R4              ;ASSIGN LIST INDEX
3584  005604  005005                        CLR     R5              ;NEW DRIVE INDEX
3585  005606  005765  001570        1$:     TST     NEWUNT(R5)      ;NEW DRIVE IN THIS POSITION
3586  005612  001006                        BNE     3$              ;BR IF THERE IS
3587  005614  062705  000002        2$:     ADD     #2,R5           ;INCREMENT R5
3588  005620  005204                        INC     R4              ;INCREMENT ASSIGN INDEX
3589  005622  005303                        DEC     R3              ;DECREMENT DRIVE COUNT
3590  005624  001370                        BNE     1$              ;BR IF MORE DRIVES
3591  005626  000430                        BR      MAIN2           ;START OPERATIONS FOR THE AVAILABLE DRIVES
3592  005630  104401  053305        3$:     TYPE    ,UNTMSG         ;'DRIVE'
3593  005634  010446                        MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
3594                                                                ;;TYPE DRIVE NUMBER
3595  005636  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
```

```
3596  005640  002                                .BYTE   2               ;;TYPE 2 DIGIT(S)
3597  005641  000                                .BYTE   0               ;;SUPPRESS LEADING ZEROS
3598  005642  104401  054041                     TYPE    ASGND           ;'STARTED'
3599  005646  005762  001612          4$:       TST     AVAIL(R2)       ;AT END OF AVAILABLE TABLE
3600  005652  001403                             BEQ     5$              ;BR IF YES
3601  005654  062702  000002                     ADD     #2,R2           ;INCREMENT AVAILABLE TABLE INDEX
3602  005660  000772                             BR      4$              ;CONTINUE LOOKING FOR END OF TABLE
3603  005662  016562  001570  001612  5$:       MOV     NEWUNT(R5),AVAIL(R2)  ;MOVE ADDR OF DRIVE INTO AVAIL LST
3604  005670  005065  001570                     CLR     NEWUNT(R5)      ;TAKE DRIVE OUT OF NEW DRIVE TABLE
3605  005674  156437  034606  001544             BISB    ATABIT(R4),ASNLST ;SET DRIVE ASSIGNED INDICATOR
3606  005702  062702  000002                     ADD     #2,R2           ;INCREMENT AVAILABLE TABLE POINTER
3607  005706  000742                             BR      2$              ;LOOK FOR MORE DRIVES
3608
3609                                     ;GET PARAMETERS, BUFFER SPACE, AND START ORDERS FOR DRIVES IN
3610                                     ;       THE 'AVAILABLE' QUEUE
3611
3612  005710                             MAIN2:
3613                                     ;                               SET UP THE WAIT QUEUE FOR
3614                                     ;                               ALL THE DRIVES THAT WAITING
3615                                     ;                               FOR BUFFER IN THREE TIMES OF
3616                                     ;                               SEARCHING
3617  005710  005002                             CLR     R2              ;START FROM THE FIRST LOCATION
3618  005712  005762  001634          1$:       TST     WAIT(R2)        ;WAIT FOR THE BUFFER ?
3619  005716  001437                             BEQ     MAIN3           ;EXIT IF NONE
3620  005720  016200  001634                     MOV     WAIT(R2),R0     ;LOAD R0 WITH THE DPB ADDRESS
3621  005724  005046                             CLR     -(SP)           ;CLEAR THE STACK FOR BUFFER REQ
3622  005726  004737  015630                     JSR     PC,GETBUF       ;CALL TO GET THE BUFFER RT.
3623  005732  012660  000006                     MOV     (SP)+,$BUF(R0)  ;IF 0,BUFFER IS STILL NOT AVAILABLE
3624  005736  001421                             BEQ     2$              ;BRANCH IF NO BUFFER AVAILABLE
3625  005740  005060  000072                     CLR     $FAIR(R0)       ;CLEAR THE FAIR FLAG
3626  005744  004737  016214                     JSR     PC,FILBUF       ;FILL THE BUFFER
3627  005750  004737  016342                     JSR     PC,GODRIV       ;SET COMMAND AND GO
3628  005754  012705  001522                     MOV     #ORDERQ,R5      ;PUT THE WAIT QUEUE INTO ORDER QUEUE
3629  005760  005725                             TST     (R5)+           ;QUEUE AVAILABLE ?
3630  005762  001376                             BNE     .-2             ;BRANCH IF NOT
3631  005764  010045                             MOV     R0,-(R5)        ;LOAD THE DPB ADDRESS INTO THE ORDER QUEUE
3632  005766  012701  001634                     MOV     #WAIT,R1        ;REMOVE THE QUEUE FROM THE WAITING QUEUE
3633  005772  060201                             ADD     R2,R1           ;OFFSET THE QUEUE POSITION
3634  005774  004737  017666                     JSR     PC,CMPRES       ;COMPRESS THE QUEUE
3635  006000  000744                             BR      1$              ;BRANCH IF DONE
3636  006002  062702  000002          2$:       ADD     #2,R2           ;CHECK THE NEXT QUEUE
3637  006006  000741                             BR      1$              ;LOOPING BACK
3638  006010  000240                             NOP
3639  006012  000240                             NOP
3640  006014  000240                             NOP
3641  006016                             MAIN3:
3642                                     ;       TST     ORDERQ          ;OUTSTANDING BUFFER REQUESTS
3643                                     ;       BNE     IDLE            ;BR IF THERE ARE
3644  006016  005002                             CLR     R2              ;CLEAR DRIVE TABLE POINTER
3645  006020  005762  001612          1$:       TST     AVAIL(R2)       ;ANY DRIVES WAITING FOR PARAMETERS
3646  006024  001002                             BNE     .+6             ;BRANCH IF ANY
3647  006026  000137  006206                     JMP     IDLE            ;BRANCH IF NONE
3648  006032  016200  001612                     MOV     AVAIL(R2),R0    ;CONTROL BLOCK ADDR IN R0
3649  006036  005760  000104                     TST     $NEXT(R0)       ;PARAMETERS BEEN SELECTED ?
3650  006042  001010                             BNE     6$              ;BR IF THEY HAVE
3651  006044  105760  000026                     TSTB    $PACK(R0)       ;'R' OR 'W' COMMAND FOR THE DRIVE ?
```

```
3652  006050  001403                    BEQ     5$              ;BR IF NOT
3653  006052  004737  017704            JSR     PC,WRTPK        ;GET DATA PACK PARAMETERS
3654  006056  000404                    BR      7$              ;GET THE BUFFER
3655  006060  004737  016420    5$:     JSR     PC,SELPAR       ;SELECT THE PARAMETERS
3656  006064  004737  017374    6$:     JSR     PC,GETPAR       ;LOAD NEW PARAMETERS
3657  006070  005046            7$:     CLR     -(SP)           ;MAKE ROOM ON THE STACK FOR THE BUFFER ADDR
3658  006072  004737  015630            JSR     PC,GETBUF       ;GET BUFFER
3659  006076  012660  000006            MOV     (SP)+,$BUF(R0)  ;MOVE BUFFER ADDR TO DPB
3660  006102  001414                    BEQ     8$              ;BR IF '0' ADDR (NO BUFFER)
3661  006104  004737  016214            JSR     PC,FILBUF       ;FILL THE BUFFER
3662  006110  005060  000072            CLR     $FAIR(R0)       ;CLEAR THE 'FAIRNESS' COUNT
3663  006114  004737  016342            JSR     PC,GODRIV       ;PUT CURRENT DPB IN DRIVER
3664  006120  012705  001522            MOV     #ORDERQ,R5      ;ADDRESS OF ORDER QUEUE IN R5
3665  006124  005725                    TST     (R5)+           ;END OF QUEUE ?
3666  006126  001376                    BNE     .-2             ;BR IF NOT
3667  006130  010045                    MOV     R0,-(R5)        ;PUT BLOCK ADDRESS INTO QUEUE
3668  006132  000417                    BR      10$             ;CONTINUE LOOKING
3669  006134                    8$:
3670  006134  005260  000072            INC     $FAIR(R0)       ;INCREMENT THE FAIR COUNT
3671  006140  022760  000003  000072    CMP     #3,$FAIR(R0)    ;THREE TIMES,BUFFER IS NOT AVAILABLE?
3672  006146  101006                    BHI     9$              ;BRANCH IF NOT OVER THREE TIMES
3673  006150  012705  001634            MOV     #WAIT,R5        ;LOAD INTO THE WAIT QUEUE
3674  006154  005725                    TST     (R5)+           ;AN AVAILABLE LOCATION ?
3675  006156  001376                    BNE     .-2             ;BRANCH IF NOT
3676  006160  010045                    MOV     R0,-(R5)        ;LOAD INTO WAIT QUE
3677  006162  000403                    BR      10$             ;REMOVE THE DPB FROM AVAILABLE QUE
3678  006164                    9$:
3679  006164  062702  000002            ADD     #2,R2           ;INCREMENT INDEX
3680  006170  000713                    BR      1$              ;BRANCH BACK TO FIRE NEXT DRIVE
3681  006172  012701  001612    10$:    MOV     #AVAIL,R1       ;'AVAILABLE' TABLE ADDRESS
3682  006176  060201                    ADD     R2,R1           ;FORM ADDRESS OF LAST ENTRY
3683  006200  004737  017666            JSR     PC,CMPRES       ;COMPRESS THE TABLE
3684  006204  000705                    BR      1$              ;CONTINUE LOOKING
3685
3686                            ;GET BUFFER ASSIGNMENTS FOR DRIVES IN THE 'BUFFER WAIT' QUEUE
3687
3688
3689                            ;WAIT FOR AN ORDER TO FINISH
3690
3691  006206  012701  001522    IDLE:   MOV     #ORDERQ,R1      ;ADDRESS OF THE ORDER QUEUE IN R1
3692  006212  012100            1$:     MOV     (R1)+,R0        ;PUT BLOCK ADDRESS INTO R0
3693  006214  001433                    BEQ     IDLE1           ;BR IF END OF QUEUE
3694  006216  005760  000016            TST     $STATUS(R0)     ;SEE IF DRIVE FINISHED
3695  006222  001773                    BEQ     1$              ;BR IF DRIVE NOT FINISHED
3696  006224  162701  000002            SUB     #2,R1           ;CORRECT THE QUEUE POINTER
3697  006230  010146                    MOV     R1,-(SP)        ;SAVE THE QUEUE ADDRESS
3698  006232  004737  015472            JSR     PC,STATIS       ;ACCUMULATE STATISTICS FOR DRIVE IN R0
3699  006236  000240                    NOP                     ;DEBUGGING AID
3700  006240  004737  006460            JSR     PC,PROCES       ;PROCESS END OF ORDER
3701  006244  005037  001362            CLR     BADSEC          ;CLEAR THE BAD TRK/SEC ERROR INDICATOR
3702  006250  004737  027064            JSR     PC,ABNRML       ;SEE IF ANY DRIVES HAVE TOO MANY ERRORS
3703  006254  004737  027112            JSR     PC,EOP          ;SEE IF ANY DRIVE HAS XFERED 3X10↑9 BITS
3704  006260  012601                    MOV     (SP)+,R1        ;RESTORE THE ORDER TABLE INDEX
3705  006262  012705  001612            MOV     #AVAIL,R5       ;FIND THE END OF THE 'AVAILABLE' TABLE
3706  006266  005725            2$:     TST     (R5)+           ;END OF THE TABLE ?
3707  006270  001376                    BNE     2$              ;BR IF NOT AT END OF LIST
```

```
3708  006272  011145                          MOV     (R1),-(R5)      ;MOVE THE BLOCK ADDRESS INTO THE TABLE
3709  006274  004737  017666                  JSR     PC,CMPRES       ;COMPRESS THE ORDER QUEUE
3710  006300  004737  015764                  JSR     PC,RELBUF       ;RESTORE BUFFER
3711  006304                          IDLE1:
3712  006304  032777  000004  172642  1$:     BIT     #SW02,@SWR      ;TYPE PERFORMANCE SUMMARY
3713  006312  001007                          BNE     2$              ;BR IF NOT
3714  006314  005737  001314                  TST     STATIN          ;TIME TO TYPE THE PERFORMANCE SUMMARY ?
3715  006320  001404                          BEQ     2$              ;BR IF NOT
3716  006322  005037  001314                  CLR     STATIN          ;CLEAR THE INDICATOR
3717  006326  004737  023034                  JSR     PC,STATPR       ;TYPE THE SUMMARY
3718  006332  000137  005420          2$:     JMP     MAIN            ;CONTINUE THE LOOP
3719
3720                                  ;SETUP TO REFORMAT AN ERROR SECTOR
3721
3722  006336  032777  000001  172610  REFMT:  BIT     #SW0,@SWR       ;READ ONLY SWITCH SET ?
3723  006344  001044                          BNE     REFMTX          ;BR IF IT IS
3724  006346  032777  000200  172600          BIT     #SW7,@SWR       ;SWITCH 7 SET ?
3725  006354  001040                          BNE     REFMTX          ;BR IF IT IS
3726  006356  005737  001474                  TST     FORMAT          ;WRITE HEADER & DATA ORDERS ALLOWED ?
3727  006362  001435                          BEQ     REFMTX          ;BR IF NOT
3728  006364  022760  001465  000270          CMP     #821.,$RMDC(R0) ;LEGAL VALUE ?
3729  006372  101431                          BLOS    REFMTX          ;NO, NOT FORMAT
3730  006374  004737  022502                  JSR     PC,READDR       ;GET CORRECTED SECTOR-TRACK ADDRESSES
3731  006400  012660  000100                  MOV     (SP)+,$NCYL(R0)                 ;CYLINDER
3732  006404  112660  000077                  MOVB    (SP)+,$NTRK(R0) ;TRACK ADDR TO DPB
3733  006410  112660  000076                  MOVB    (SP)+,$NSEC(R0) ;SECTOR ADDR TO DPB
3734  006414  012760  000402  000102          MOV     #258.,$NWRDL(R0)  ;WORD COUNT FOR FORMAT
3735  006422  112760  000003  000074  1$:     MOVB    #3,$NCODE(R0)   ;COMMAND CODE
3736  006430  004537  017172                  JSR     R5,CHKADR       ;AVOID REFORMAT BAD SPOT
3737  006434  000401                          BR      2$              ;BRANCH IF NOT ON BAD SPOT
3738  006436  000407                          BR      REFMTX          ;BRANCH IF ON BAD SPOT
3739  006440  004737  017332          2$:     JSR     PC,GETPAT       ;GET A PATTERN
3740  006444  110560  000075                  MOVB    R5,$NPATC(R0)   ;PATTERN CODE TO CONTROL BLOCK
3741  006450  012760  177777  000104          MOV     #-1,$NEXT(R0)   ;SET PARAMETERS SELECTED INDICATOR
3742  006456  000207                  REFMTX: RTS     PC              ;RETURN
3743
3744                                  ;PROCESS THE ORDER TERMINATION
3745
3746  006460  111037  001344          PROCES: MOVB    (R0),UNIT       ;DRIVE NUMBER FOR ANY ERROR MESSAGES
3747  006464  005760  000016                  TST     $TATUS(R0)      ;SEE IF DRIVER SIGNALED AN ERROR
3748  006470  100427                          BMI     ERPROC          ;BR IF ERROR
3749  006472  032760  100000  000234          BIT     #BIT15,$RMCS1(R0)  ;SEE IF 'SC' SET
3750  006500  001410                          BEQ     1$              ;BR IF NOT SET
3751  006502  032760  040000  000234          BIT     #BIT14,$RMCS1(R0)  ;SEE IF 'TRE' SET
3752  006510  001017                          BNE     ERPROC          ;BR IF SET
3753  006512  032760  040000  000246          BIT     #BIT14,$RMDS(R0)  ;SEE IF 'ERR' SET
3754  006520  001013                          BNE     ERPROC          ;BR IF SET
3755  006522  004737  012640          1$:     JSR     PC,CKERR        ;NO ERROR, CHECK ERROR BITS ANYWAY
3756  006526  004737  012732                  JSR     PC,CKBUS        ;NO ERROR, CHECK BUS ADDR & WC
3757  006532  032777  000002  172414          BIT     #SW01,@SWR      ;DATA COMPARE ?
3758  006540  001002                          BNE     2$              ;BR IF NOT
3759  006542  004737  013016                  JSR     PC,CMPAR        ;NO ERROR, COMPARE DATA
3760  006546  000207                  2$:     RTS     PC              ;RETURN
3761
3762                                  ;ORDER TERMINATED WITH AN ERROR - PROCESS THE ERROR
3763
```

```
3764  006550  032760  000200  000016  ERPROC: BIT     #BIT07,$STATUS(R0) ;DONE BIT SET ?
3765  006556  001402                          BEQ     ERPRC1             ;BR IF ORDER DIDN'T COMPLETE NORMALLY
3766  006560  000137  007204                  JMP     DONE               ;PROCESS ERROR WITH 'DONE' BIT SET
3767
3768                                          ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE NOT' BITS
3769
3770  006564  032760  010000  000016  ERPRC1: BIT     #BIT12,$STATUS(R0) ;SEE IF DRIVE WAS UNSAFE
3771  006572  001025                          BNE     PUNSAF             ;BR IF YES
3772  006574  032760  004000  000016          BIT     #BIT11,$STATUS(R0) ;PARITY ERROR OCCURRED
3773  006602  001055                          BNE     UCPAR              ;BR IF IT DID
3774  006604  032760  002000  000016          BIT     #BIT10,$STATUS(R0) ;FATAL PARITY ERROR?
3775  006612  001056                          BNE     FALPAR             ;BR IF THERE IS ONE
3776  006614  032760  001000  000016          BIT     #BIT09,$STATUS(R0) ;TIMEOUT?
3777  006622  001076                          BNE     SWTIM              ;BR IF YES
3778  006624  032760  040002  000016          BIT     #BIT14!BIT01,$STATUS(R0)  ;DRIVE WENT OFFLINE ?
3779  006632  001111                          BNE     OFLIN              ;BR IF IT DID
3780  006634  032760  000004  000016          BIT     #BIT2,$STATUS(R0)  ;PORT REQUEST TIME OUT ?
3781  006642  001141                          BNE     PRTIM              ;BR IF IT DID
3782  006644  000207                          RTS     PC                 ;ERROR. RETURN
3783
3784                                          ;DRIVE IS PERSISTENTLY UNSAFE
3785
3786  006646  104401  001201  PUNSAF: TYPE    ,$CRLF             ;CR-LF
3787  006652  104401  046552          TYPE    ,EM12              ;'DRIVE UNSAFE' MESSAGE
3788  006656  104401  054014          TYPE    ,DRNUM             ;DRIVE NUMBER
3789  006662  013746  001344          MOV     UNIT,-(SP)         ;;SAVE UNIT FOR TYPEOUT
3790                                                             ;;TYPE DRIVE NUMBER
3791  006666  104403                  TYPOS                      ;;GO TYPE--OCTAL ASCII
3792  006670     002                  .BYTE   2                  ;;TYPE 2 DIGIT(S)
3793  006671     000                  .BYTE   0                  ;;SUPPRESS LEADING ZEROS
3794  006672  104401  001201          TYPE    ,$CRLF             ;CR-LF
3795  006676  004737  020406          JSR     PC,LINE1           ;PRINT LINE 1 OF ERROR MESSAGE
3796  006702  104414  046552          DISPLY  ,EM12              ;PERSISTENT DEVICE UNSAFE MESSAGE
3797  006706  004737  020462          JSR     PC,LINE2           ;PRINT LINE 2 OF ERROR MESSAGE
3798  006712  004737  021070          JSR     PC,LINE3           ;PRINT LINE 3 OF ERROR MESSAGE
3799  006716  004737  021540          JSR     PC,LINE4           ;PRINT LINE 4 OF THE ERROR MESSAGE
3800  006722  004737  023644          JSR     PC,INCTOT          ;INCREMENT TOTAL ERROR COUNT
3801  006726  004737  022150          JSR     PC,LINE7           ;PRINT LINE 7 OF ERROR MESSAGE
3802  006732  000137  026764          JMP     DROP               ;DROP THE DRIVE
3803
3804                                  ;UNCORRECTABLE MASSBUS PARITY ERROR OCCURRED
3805
3806  006736  104401  001201  UCPAR:  TYPE    ,$CRLF             ;CR-LF
3807  006742  104401  046454          TYPE    ,EM10              ;'UNCORRECTABLE PARITY ERROR' MESSAGE
3808  006746  000404                  BR      FALPR1             ;FINISH PROCESSING THE ERROR
3809
3810                                  ;'FATAL' MASSBUS PARITY ERROR OCCURRED
3811
3812  006750  104401  001201  FALPAR: TYPE    ,$CRLF             ;CR-LF
3813  006754  104401  046517          TYPE    ,EM11              ;'FATAL PARITY ERROR' MESSAGE
3814  006760  104401  054014  FALPR1: TYPE    ,DRNUM             ;DRIVE NUMBER
3815  006764  013746  001344          MOV     UNIT,-(SP)         ;;SAVE UNIT FOR TYPEOUT
3816                                                             ;;TYPE DRIVE NUMBER
3817  006770  104403                  TYPOS                      ;;GO TYPE--OCTAL ASCII
3818  006772     002                  .BYTE   2                  ;;TYPE 2 DIGIT(S)
3819  006773     000                  .BYTE   0                  ;;SUPPRESS LEADING ZEROS
```

```
3820  006774  104401  001201                  TYPE    ,$CRLF          ;CR-LF
3821  007000  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3822  007004  032777  100000  172142          BIT     #SW15,@SWR      ;HALT ON ERROR ?
3823  007012  001401                          BEQ     1$              ;BR IF NOT
3824  007014  000000                          HALT                    ;ERROR HALT
3825  007016  000207                  1$:     RTS     PC
3826
3827                                  ;SOFTWARE TIMEOUT OCCURRED
3828
3829  007020  004737  020406          SWTIM:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
3830  007024  104414  046603                  DISPLY  ,EM13           ;PRINT THE TIME OUT MESSAGE
3831  007030  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
3832  007034  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
3833  007040  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3834  007044  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3835  007050  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
3836  007054  000207                          RTS     PC              ;RETURN
3837
3838                                  ;DRIVE WENT OFFLINE
3839
3840  007056  104401  001201          OFLIN:  TYPE    ,$CRLF          ;CR-LF
3841  007062  104401  046655                  TYPE    ,EM14           ;'DRIVE WENT OFFLINE' MESSAGE
3842  007066  104401  054014                  TYPE    ,DRNUM          ;DRIVE NUMBER
3843  007072  013746  001344                  MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
3844                                                                  ;;TYPE DRIVE NUMBER
3845  007076  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3846  007100     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3847  007101     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3848  007102  104401  001201                  TYPE    ,$CRLF          ;CR-LF
3849  007106  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF THE ERROR MESSAGE
3850  007112  104414  046655                  DISPLY  ,EM14           ;PRINT OFFLINE MESSAGE
3851  007116  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF THE ERROR MESSAGE
3852  007122  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF THE ERROR MESSAGE
3853  007126  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF THE ERROR MESSAGE
3854  007132  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3855  007136  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF THE ERROR MESSAGE
3856  007142  000137  026764                  JMP     DROP            ;DROP THE DRIVE
3857
3858                                  ;PORT REQUEST TIMEOUT ERROR
3859
3860  007146  004737  020406          PRTIM:  JSR     PC,LINE1        ;TYPE LINE 1 OF THE ERROR MESSAGE
3861  007152  104414  046700                  DISPLY  ,EM15           ;PRINT PORT TIME OUT MESSAGE
3862  007156  004737  020462                  JSR     PC,LINE2        ;TYPE LINE 2 OF THE ERROR MESSAGE
3863  007162  004737  021070                  JSR     PC,LINE3        ;TYPE LINE 3 OF THE ERROR MESSAGE
3864  007166  004737  021540                  JSR     PC,LINE4        ;TYPE LINE 4 OF THE ERROR MESSAGE
3865  007172  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
3866  007176  004737  022150                  JSR     PC,LINE7        ;TYPE LINE 7 OF THE ERROR MESSAGE
3867  007202  000207                          RTS     PC              ;RETURN
3868
3869                                  ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE' BITS SET
3870
3871  007204  032760  000030  000016  DONE:   BIT     #BIT04!BIT03,$TATUS(R0) ;UNSAFE OCCURRED
3872  007212  001402                          BEQ     .+6             ;BR IF NOT
3873  007214  000137  012306                  JMP     UNSAF           ;REPORT UNSAFE
3874  007220  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;IS 'WCE' SET ?
3875  007226  001402                          BEQ     .+6             ;BRANCH IF NOT SET
```

```
3876  007230  000137  010166                    JMP     WCKER           ;WRITE CHECK ERROR
3877  007234  032760  040000  000246            BIT     #BIT14,$RMDS(R0) ;CHECK 'ERR'
3878  007242  001002                            BNE     1$              ;BR IF SET
3879  007244  000137  012052                    JMP     TRFER           ;PROCESS 'TRE'
3880  007250  032760  000400  000250  1$:       BIT     #BIT08,$RMER1(R0) ;'HCRC' SET?
3881  007256  001402                            BEQ     .+6             ;BR IF NOT
3882  007260  000137  010514                    JMP     HCRCER          ;PROCESS 'HCRC'
3883  007264  032760  000020  000250            BIT     #BIT04,$RMER1(R0) ;'FMT' SET?
3884  007272  001402                            BEQ     .+6             ;BR IF NOT SET
3885  007274  000137  010712                    JMP     CKFMT           ;CHECK FORMAT ERROR
3886  007300  032760  000200  000250            BIT     #BIT07,$RMER1(R0) ;'HCE' SET?
3887  007306  001402                            BEQ     .+6             ;BR IF NOT SET
3888  007310  000137  011106                    JMP     CKHCE           ;CHECK 'HCE' ERROR
3889  007314  032760  020000  000250            BIT     #BIT13,$RMER1(R0) ;'OPI' SET?
3890  007322  001402                            BEQ     .+6             ;BR IF NOT SET
3891  007324  000137  011406                    JMP     OPIER           ;REPORT 'OPI'
3892  007330  032760  000010  000250            BIT     #BIT3,$RMER1(R0) ;'PAR' SET?
3893  007336  001402                            BEQ     .+6             ;BR IF NOT SET
3894  007340  000137  011540                    JMP     PARER           ;REPORT 'PAR'
3895  007344  032760  000040  000250            BIT     #BIT5,$RMER1(R0) ;'WCF' SET?
3896  007352  001402                            BEQ     .+6             ;BR IF NOT SET
3897  007354  000137  012210                    JMP     WCFER           ;REPORT 'WCF'
3898  007360  032760  002000  000250            BIT     #BIT10,$RMER1(R0) ;'IAE' SET?
3899  007366  001402                            BEQ     .+6             ;BR IF NOT SET
3900  007370  000137  011632                    JMP     IAEER           ;REPORT 'IAE'
3901  007374  032760  004000  000250            BIT     #BIT11,$RMER1(R0) ;'WLE' SET?
3902  007402  001402                            BEQ     .+6             ;BR IF NOT SET
3903  007404  000137  011664                    JMP     WLEER           ;REPORT 'WLE'
3904  007410  032760  001000  000250            BIT     #BIT9,$RMER1(R0) ;'AOE' SET?
3905  007416  001405                            BEQ     2$              ;BR IF NOT SET
3906  007420  032760  002000  000246            BIT     #BIT10,$RMDS(R0) ;'LST' SET?
3907  007426  001401                            BEQ     2$              ;BR IF NOT SET
3908  007430  000207                            RTS     PC              ;'AOE' & 'LST' SET, EXIT
3909  007432  032760  010000  000250  2$:       BIT     #BIT12,$RMER1(R0) ;SEE IF 'DTE' SET
3910  007440  001402                            BEQ     .+6             ;BR IF NOT
3911  007442  000137  011516                    JMP     DTEER           ;REPORT 'DTE' ERROR
3912  007446  005760  000250                    TST     $RMER1(R0)      ;SEE IF 'DCK' SET
3913  007452  100002                            BPL     .+6             ;BR IF NOT
3914  007454  000137  007512                    JMP     DCKER           ;PROCESS 'DCK'
3915  007460  032760  060000  000276            BIT     #BIT14!BIT13,$RMER2(R0) ;'SKI' OR 'OCYL' SET
3916  007466  001006                            BNE     3$              ;BRANCH IF SKI, OCYL SET
3917  007470  032760  100000  000276            BIT     #BIT15,$RMER2(R0) ;BAD SPOT ?
3918  007476  001004                            BNE     4$              ;BRANCH IF SO (NO, OTHER ERROR)
3919  007500  000137  010660                    JMP     DRVER           ;REPORT ERROR
3920  007504  000137  012152          3$:       JMP     SKIER           ;REPORT SKI ERROR
3921  007510  000207                4$:       RTS     PC              ;EXIT FROM ERROR ANALYSIS  ROUT.
3922
3923                                ;PROCESS DATA ('DCK') CHECK ERROR
3924
3925  007512  022760  010041  000300  DCKER:    CMP     #10041,$RMEC1(R0) ;VALID POSITION COUNT ?
3926  007520  101407                            BLOS    1$              ;BR IF NOT VALID
3927  007522  005760  000300                    TST     $RMEC1(R0)      ;POSITION COUNT 0 ?
3928  007526  001404                            BEQ     1$              ;BR IF 0'S
3929  007530  005760  000302                    TST     $RMEC2(R0)      ;VALUE IN PATTERN REGISTER ?
3930  007534  001027                            BNE     4$              ;BR IF YES
3931  007536  000431                            BR      6$              ;DATA CHECK ERROR
```

```
3932  007540  004737  020406          1$:     JSR     PC,LINE1          ;TYPE FIRST LINE OF ERROR MESSAGE
3933  007544  104414  050305                  DISPLY  .EM45             ;TYPE 'ECC LOGIC ERROR'
3934  007550  004737  020462                  JSR     PC,LINE2          ;TYPE LINE 2 OF ERROR MESSAGE
3935  007554  004737  023644                  JSR     PC,INCTOT         ;INCREMENT TOTAL ERROR COUNT
3936  007560  012737  000003  001350          MOV     #3,RETRY          ;RETRY COUNT
3937  007566  004737  015344                  JSR     PC,$RETRY         ;RETRY THE ORDER
3938  007572  000403                          BR      2$                ;RETRY WAS NOT SUCCESSFUL
3939  007574  004737  022066                  JSR     PC,LINE6C         ;TYPE LINE 6C OF ERROR MESSAGE
3940  007600  000402                          BR      3$                ;FINISH THE ERROR REPORT
3941  007602  004737  022074          2$:     JSR     PC,LINE6D         ;TYPE LINE 6D OF ERROR MESSAGE
3942  007606  004737  022150          3$:     JSR     PC,LINE7          ;TYPE LINE 7 OF ERROR MESSAGE
3943  007612  000402                          BR      5$                ;EXIT
3944  007614  004737  020270          4$:     JSR     PC,SPOTCK         ;SEE IF ERROR AT A BAD SPOT ON THE PACK
3945  007620  000207          5$:     RTS     PC                        ;IT IS, DON'T REPORT IT
3946  007622  004737  020406          6$:     JSR     PC,LINE1          ;PRINT LINE 1 OF ERROR MESSAGE
3947  007626  104414  046755                  DISPLY  .EM21             ;DATA CHECK ERROR
3948  007632  004737  020462          DCKER1: JSR     PC,LINE2          ;PRINT LINE 2 OF ERROR MESSAGE
3949  007636  004737  021070                  JSR     PC,LINE3          ;PRINT LINE 3 OF ERROR MESSAGE
3950  007642  004737  021540                  JSR     PC,LINE4          ;PRINT LINE 4 OF ERROR MESSAGE
3951  007646  004737  014776                  JSR     PC,PRTBAD         ;SEE IF BAD SECTOR TO BE PRINTED
3952  007652  012737  110100  001346          MOV     #BIT15!BIT12!BIT06,MASK   ;LOAD ERROR MASK
3953  007660  032760  010100  000250          BIT     #BIT12!BIT06,$RMER1(R0)   ;CHECK 'DTE' & 'ECH'
3954  007666  001003                          BNE     1$                ;BR IF SET
3955  007670  004737  022040                  JSR     PC,LINE6          ;PRINT LINE 6 OF ERROR MESSAGE
3956  007674  000477                          BR      8$                ;FINISH THE ERROR REPORT
3957  007676  012737  000020  001350  1$:     MOV     #16.,RETRY        ;RETRY COUNT
3958  007704  005001                          CLR     R1                ;R1 IS OFFSET CODE POINTER
3959
3960
3961  007706  004737  016342          2$:     JSR     PC,GODRIV         ;RETRY
3962  007712  005760  000016          3$:     TST     $TATUS(R0)        ;TEST FOR DONE
3963  007716  001775                          BEQ     3$                ;BR IF NOT DONE
3964  007720  100075                          BPL     10$               ;BR IF NOT ERROR
3965  007722  032760  000200  000016          BIT     #BIT7,$TATUS(R0)  ;SEE IF ORDER TERMINIATED NORMALLY
3966  007730  001006                          BNE     14$               ;BR IF NOT
3967  007732  004737  023644                  JSR     PC,INCTOT         ;INCREMENT TOTAL ERROR COUNT
3968  007736  104414  052433                  DISPLY  .LIN8M            ;'DIFFERENT ERROR DURING RETRY'
3969  007742  000137  006564                  JMP     ERPRC1            ;SEE WHICH ERROR
3970  007746  033760  001346  000250  14$:    BIT     MASK,$RMER1(R0)   ;LOOK AT CURRENT ERROR
3971  007754  001430                          BEQ     5$                ;BR IF DIFFERENT ERROR
3972  007756  032760  010100  000250          BIT     #BIT12!BIT6,$RMER1(R0)  ;'ECH' OR 'DTE' STILL SET ?
3973  007764  001437                          BEQ     7$                ;BR IF NEITHER SET
3974  007766  105227  001351                  INCB    RETRY+1           ;INCREMENT RETRY COUNT
3975  007772  123737  001350  001351          CMPB    RETRY,RETRY+1     ;DONE ?
3976  010000  001342                          BNE     2$                ;BR IF NOT
3977  010002  005201                          INC     R1                ;INCREMENT TABLE INDEX
3978  010004  116137  002464  046063          MOVB    OFFCOD(R1),GENDPB+$FMT    ;OFFSET CODE
3979  010012  001435                          BEQ     9$                ;BR IF END OF OFFSET TABLE
3980  010014  062737  000002  001350          ADD     #2,RETRY          ;NEW RETRY LIMIT
3981  010022  004737  015226                  JSR     PC,OFFST          ;OFFSET
3982  010026  005737  046100          4$:     TST     GENDPB+$TATUS     ;SEE IF FINISHED WITH OFFSET
3983  010032  001775                          BEQ     4$                ;BR IF NOT
3984  010034  100324                          BPL     2$                ;BR IF NO ERROR PERFORMING OFFSET
3985  010036  004737  022416          5$:     JSR     PC,LINE8          ;PRINT LINE 8 OF ERROR MESSAGE
3986  010042  004737  023550          6$:     JSR     PC,INCHRD         ;INCREMENT 'HARD' ERROR COUNT
3987  010046  004737  023644                  JSR     PC,INCTOT         ;INCREMENT TOTAL ERROR COUNT
```

```
3988  010052  004737  022150                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
3989  010056  004737  014776                    JSR     PC,PRTBAD       ;PRINT THE BAD SECTOR
3990  010062  000436                            BR      13$             ;CLEAN UP AND RETURN
3991  010064  004737  022060            7$:     JSR     PC,LINE6B       ;PRINT LINE 6B OF ERROR MESSAGE
3992  010070  004737  021776                    JSR     PC,LINE5B       ;PRINT LINE 5B OF THE ERROR MESSAGE
3993  010074  004737  023524            8$:     JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
3994  010100  004737  014236                    JSR     PC,ECC          ;CORRECT THE ERROR USING ECC AND CHECK IT
3995  010104  000407                            BR      11$             ;COMPARE THE BUFFER
3996  010106  004737  022074            9$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
3997  010112  000753                            BR      6$              ;INCREMENT ERROR COUNT
3998  010114  004737  022052            10$:    JSR     PC,LINE6A       ;PRINT LINE 6A OF ERROR MESSAGE
3999  010120  004737  023524                    JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
4000  010124  012737  000001  001376    11$:    MOV     #1,FRSTER       ;SET PROCESSING 'DCKER' INDICATOR
4001  010132  004737  013034                    JSR     PC,CMPARD       ;COMPARE THE BUFFER
4002  010136  105737  001377                    TSTB    FRSTER+1        ;ERROR IN COMPARE ?
4003  010142  100406                            BMI     13$             ;BRANCH IF ERROR
4004  010144  004737  023644                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4005  010150  104414  052633                    DISPLY  ,LIN9G          ;'DATA COMPARE OK' MESSAGE
4006  010154  004737  022150            12$:    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4007  010160  004737  006336            13$:    JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4008  010164  000207                            RTS     PC              ;RETURN
4009
4010                                    ;WRITE CHECK ERROR PROCESSING
4011
4012  010166  032760  100000  000250  WCKER:   BIT     #BIT15,$RMER1(R0)   ;SEE IF 'DCK' SET ALSO
4013  010174  001034                            BNE     2$              ;BR IF IT IS
4014  010176  004737  020406                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4015  010202  104414  047061                    DISPLY  ,EM23           ;PRINT WCE & DCK NOT
4016  010206  005037  001346                    CLR     MASK            ;CLEAR ERROR MASK
4017  010212  004737  020462                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4018  010216  004737  021070                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4019  010222  004737  021540                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4020  010226  004737  021630                    JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
4021  010232  004737  023644                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4022  010236  012737  000003  001350            MOV     #3,RETRY        ;RETRY LIMIT
4023  010244  004737  015344                    JSR     PC,$RETRY       ;RETRY THE OPERATION
4024  010250  000403                            BR      1$              ;RETRY UNSUCESSFUL
4025  010252  004737  022066                    JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4026  010256  000502                            BR      8$              ;FINISH PROCESSING THE ERROR
4027  010260  004737  022074            1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4028  010264  000506                            BR      10$             ;FINISH PROCESSING THE ERROR
4029  010266  004737  020270            2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
4030  010272  000507                            BR      11$             ;EXIT IF AT BAD SPOT ON PACK
4031  010274  004737  020406                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4032  010300  012737  047006  010326            MOV     #EM22,13$       ;ASSUME THAT EM22 WILL BE PRINTED
4033  010306  032760  040000  000244            BIT     #BIT14,$RMCS2(R0)   ;DID 'WCK' ALSO SET ?
4034  010314  001003                            BNE     12$             ;BR IF IT DID
4035  010316  012737  047707  010326            MOV     #EM37,13$       ;MESSAGE FOR 'DCK' AND 'WCK' NOT DURING
4036                                                                    ;WRITE CHECK
4037  010324  104414                    12$:    DISPLY                  ;TYPE THE ERROR MESSAGE
4038  010326  000000                    13$:    .WORD   0               ;MESSAGE ADDRESS GOES HERE
4039  010330  004737  020462                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4040  010334  004737  021070                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4041  010340  004737  021540                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4042  010344  004737  021630                    JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
4043  010350  032760  000100  000250            BIT     #BIT06,$RMER1(R0)   ;ECH SET ALSO ?
```

```
4044  010356  001442                          BEQ     8$              ;FINISH PROCESSING THE ERROR
4045  010360  012737  000020  001350  3$:     MOV     #16.,RETRY      ;RETRY LIMIT - 16 (10)
4046  010366  004737  016342          4$:     JSR     PC,GODRIV       ;RETRY THE ORDER
4047  010372  005760  000016          5$:     TST     STATUS(R0)      ;ORDER FINISHED ?
4048  010376  001775                          BEQ     5$              ;BR IF NOT
4049  010400  100405                          BMI     6$              ;BR IF ERROR ON ORDER
4050  010402  105237  001351                  INCB    RETRY+1         ;INCREMENT RETRY COUNT
4051  010406  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4052  010412  000431                          BR      9$              ;FINISH ERROR PROCESSING
4053  010414  105237  001351          6$:     INCB    RETRY+1         ;INCREMENT RETRY COUNT
4054  010420  123737  001350  001351          CMPB    RETRY,RETRY+1   ;DONE ?
4055  010426  001714                          BEQ     1$              ;BR IF AT RETRY LIMIT
4056  010430  032760  100000  000250          BIT     #BIT15,$RMER1(R0)  ;'DCK' SET
4057  010436  001407                          BEQ     7$              ;BR IF NOT - DIFFERENT ERROR
4058  010440  032760  000100  000250          BIT     #BIT06,$RMER1(R0)  ;'ECH' ALSO SET ?
4059  010446  001347                          BNE     4$              ;BR IF IT IS, RETRY ORDER
4060  010450  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4061  010454  000403                          BR      8$              ;FINISH PROCESSING ERROR
4062  010456  004737  022416          7$:     JSR     PC,LINE8        ;PRINT LINE 8 - 'DIFFERENT ERROR '
4063  010462  000405                          BR      9$              ;FINISH PROCESSING ERROR
4064  010464  004737  023644          8$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4065  010470  004737  022150                  JSR     PC,LINE7        ;FINISH THE ERROR MESSAGE
4066  010474  000406                          BR      11$             ;EXIT
4067  010476  004737  023644          9$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4068  010502  004737  022150          10$:    JSR     PC,LINE7        ;FINISH THE ERROR MESSAGE
4069  010506  004737  006336                  JSR     PC,REFMT        ;REFORMAT THE SECTOR IN ERROR
4070  010512  000207                  11$:    RTS     PC              ;RETURN
4071
4072                                  ;REPORT 'HCRC' ERROR
4073
4074  010514  004737  020270          HCRCER: JSR     PC,SPOTCK       ;SEE IF ERROR AT PACK BAD SPOT
4075  010520  000456                          BR      3$              ;EXIT IF IT IS
4076  010522  004737  022502                  JSR     PC,READDR       ;READ ERROR SECTOR HEADER
4077  010526  004737  015252                  JSR     PC,READHD       ;GET THE HEAD INFORMATION
4078  010532  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4079  010536  104414  046734                  DISPLY  EM20            ;REPORT 'HCRC'
4080  010542  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4081  010546  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4082  010552  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4083  010556  004737  021730                  JSR     PC,LINE5A       ;PRINT THE HEADER INFORMATION
4084  010562  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4085  010570  001402                          BEQ     1$              ;BR IF NOT
4086  010572  004737  021630                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4087  010576  004737  023524          1$:     JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
4088  010602  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4089  010606  012737  000400  001346          MOV     #BIT8,MASK      ;SET ERROR MASK
4090  010614  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
4091  010622  004737  015344                  JSR     PC,$RETRY       ;RETRY ORDER
4092  010626  000405                          BR      2$              ;RETRY NOT SUCESSFUL
4093  010630  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4094  010634  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4095  010640  000406                          BR      3$              ;EXIT
4096  010642  004737  022074          2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4097  010646  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4098  010652  004737  006336                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4099  010656  000207                  3$:     RTS     PC              ;RETURN
```

```
                                        ;REPORT DRIVE ERROR
                                        ;
                                        ;
010660  004737  020406          DRVER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
010664  104414  047351                  DISPLY  EM30            ;REPORT DRIVE ERROR
010670  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
010674  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
010700  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
010704  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
010710  000207                          RTS     PC              ;RETURN
                                        ;
                                        ;PROCESS FORMAT ('FER') ERROR
                                        ;
010712  032760  000400  000250  CKFMT:  BIT     #BIT8,$RMER1(R0) ;'HCRC' SET ON ORIGINAL ERROR ?
010720  001402                          BEQ     1$              ;BR IF NOT SET
010722  000137  010514                  JMP     HCRCER          ;REPORT HCRC ERROR
010726  004737  022502          1$:     JSR     PC,READDR       ;GET CORRECTED TRACK & SECTOR ADDRSSES
010732  004737  015252                  JSR     PC,READHD       ;READ HEADER
010736  032737  000400  046116          BIT     #BIT8,GENREG+RMER1 ;'HCRC' SET WHEN HEADER READ?
010744  001002                          BNE     2$              ;BR IF 'HCRC' SET
010746  000137  011712                  JMP     FMTER           ;NO, ERROR IS 'FMT' ONLY
010752  004737  020270          2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
010756  000452                          BR      5$              ;EXIT IF IT IS
010760  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
010764  104414  047140                  DISPLY  EM24            ;HEADER READ ERROR - FMT BIT DROPPED UP
010770  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
010774  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
011000  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
011004  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
011012  001402                          BEQ     3$              ;BR IF NOT
011014  004737  021630                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
011020  004737  021730          3$:     JSR     PC,LINE5A       ;DISPLAY HEADER
011024  004737  023524                  JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
011030  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
011034  012737  000020  001346          MOV     #BIT4,MASK      ;SET ERROR MASK
011042  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
011050  004737  015344                  JSR     PC,$RETRY       ;RETRY THE ORDER
011054  000405                          BR      4$              ;RETRY NOT SUCESSFUL
011056  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
011062  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
011066  000406                          BR      5$              ;EXIT
011070  004737  022074          4$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
011074  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
011100  004737  006336                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
011104  000207                  5$:     RTS     PC              ;RETURN
                                        ;
                                        ;PROCESS HEADER COMPARE ('HCE') ERROR
                                        ;
011106  032760  000400  000250  CKHCE:  BIT     #BIT8,$RMER1(R0) ;HCRC SET ON ORIGINAL ERROR ?
011114  001402                          BEQ     1$              ;BR IF NOT SET
011116  000137  010514                  JMP     HCRCER          ;REPORT HEADER CRC ERROR
011122  004737  022502          1$:     JSR     PC,READDR       ;GET CURRENT SECTOR & TRACK ADDRS
011126  004737  015252                  JSR     PC,READHD       ;READ HEADER OF CURRENT SECTOR
011132  032737  000400  046116          BIT     #BIT8,GENREG+RMER1 ;'HCRC' SET ?
011140  001016                          BNE     3$              ;BR IF SET
011142  042737  150000  056512          BIC     #150000,CYLDER  ;CLEAR FORMAT,MFG,USER BITS FROM HEADER
```

```
4156  011150  026037  000270  056512          CMP     $RMDC(R0),CYLDER  ;CORRECT CYLINDER ?
4157  011156  001402                          BEQ     2$              ;BR IF IT IS
4158  011160  000137  011332                  JMP     POSER           ;REPORT POSITIONING ERROR
4159  011164  052737  150000  056512  2$:     BIS     #150000,CYLDER  ;RESTORE THE FORMAT,MFG,USER BITS
4160  011172  000137  011770                  JMP     HCEER           ;REPORT 'HCE' ERROR
4161  011176  004737  020270          3$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4162  011202  000452                          BR      6$              ;EXIT IF IT IS
4163  011204  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4164  011210  104414  047206                  DISPLY  ,EM25           ;HEADER READ ERROR - 'HCE' SET
4165  011214  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4166  011220  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4167  011224  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4168  011230  032760  040000  000244          BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
4169  011236  001402                          BEQ     4$              ;BR IF NOT
4170  011240  004737  021630                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
4171  011244  004737  021730          4$:     JSR     PC,LINE5A       ;PRINT LINE 5 OF ERROR MESSAGE
4172  011250  004737  023524                  JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
4173  011254  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4174  011260  012737  000200  001346          MOV     #BIT7,MASK      ;SET ERROR MASK
4175  011266  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
4176  011274  004737  015344                  JSR     PC,$RETRY       ;RETRY THE ORDER
4177  011300  000405                          BR      5$              ;RETRY NOT SUCESSFUL
4178  011302  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4179  011306  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4180  011312  000406                          BR      6$              ;EXIT
4181  011314  004737  022074          5$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4182  011320  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4183  011324  004737  006336                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4184  011330  000207          6$:     RTS     PC              ;RETURN
4185
4186                          ;REPORT POSSIBLE POSITIONING ERROR
4187
4188  011332  004737  015174  POSER:  JSR     PC,RECALT       ;RECALIBRATE
4189  011336  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4190  011342  104414  050503                  DISPLY  ,EM51           ;PROGRAM DETECTED POSITIONING ERROR
4191  011346  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4192  011352  004737  021116                  JSR     PC,LINE3C       ;PRINT LINE 3C OF ERROR MESSAGE
4193  011356  052737  150000  056512          BIS     #150000,CYLDER  ;RESTORE THE FORMAT BIT
4194  011364  004737  021730                  JSR     PC,LINE5A       ;PRINT LINE 5A OF THE ERROR MESSAGE
4195  011370  004737  023620                  JSR     PC,INCMIS       ;INCREMENT MISPOSITIONING COUNT
4196  011374  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4197  011400  004737  022276                  JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
4198  011404  000207                          RTS     PC              ;EXIT
4199
4200                          ;REPORT 'OPI' ERROR
4201
4202  011406  004737  020270  OPIER:  JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4203  011412  000207                          RTS     PC              ;RETURN IF IT IS
4204  011414  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4205  011420  104414  047403                  DISPLY  ,EM31           ;'OPI' ERROR
4206  011424  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4207  011430  004737  021070                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4208  011434  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4209  011440  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4210  011444  012737  020000  001346          MOV     #BIT13,MASK     ;ERROR MASK
4211  011452  012737  000003  001350  OPIER1: MOV     #3,RETRY        ;RETRY LIMIT
```

```
4212  011460  004737  015344                  JSR     PC,$RETRY       ;RETRY THE ORDER
4213  011464  000405                          BR      1$              ;RETRY UNSUCESSFUL
4214  011466  004737  022066                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4215  011472  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4216  011476  000207                          RTS     PC              ;EXIT
4217  011500  004737  022074          1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4218  011504  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4219  011510  004737  006336                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
4220  011514  000207                          RTS     PC              ;RETURN
4221
4222                                  ;REPORT 'DTE' ERROR
4223
4224  011516  004737  020270          DTEER:  JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
4225  011522  000207                          RTS     PC              ;RETURN IF IT IS
4226  011524  004737  020406                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4227  011530  104414  047446                  DISPLY  ,EM32           ;'DTE' ERROR
4228  011534  000137  007632                  JMP     DCKER1          ;FINISH PROCESSING THE 'DTE' ERROR
4229
4230                                  ;REPORT 'PAR' ERROR
4231
4232  011540  004737  020406          PARER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4233  011544  104414  047501                  DISPLY  ,EM33           ;REPORT 'PAR'
4234  011550  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4235  011554  004737  021174                  JSR     PC,LINE3E       ;PRINT LINE 3E OF ERROR MESSAGE
4236  011560  004737  021540                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4237  011564  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4238  011570  012737  000010  001346          MOV     #BIT03,MASK     ;ERROR MASK
4239  011576  012737  000003  001350          MOV     #3,RETRY        ;RETRY LIMIT
4240  011604  004737  015344                  JSR     PC,$RETRY       ;RETRY ORDER
4241  011610  000405                          BR      2$              ;RETRY UNSUCESSFUL
4242  011612  004737  022066                  JSR     PC,LINE6C       ;RETRY SUCESSFUL
4243  011616  004737  022150          1$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4244  011622  000207                          RTS     PC              ;EXIT
4245  011624  004737  022074          2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4246  011630  000772                          BR      1$              ;FINISH ERROR MESSAGE
4247
4248                                  ;REPORT 'IAE' ERROR
4249
4250  011632  004737  020406          IAEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4251  011636  104414  047620                  DISPLY  ,EM35           ;REPORT 'IAE'
4252  011642  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4253  011646  004737  021262                  JSR     PC,LINE3F       ;PRINT LINE 3F OF ERROR MESSAGE
4254  011652  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4255  011656  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4256  011662  000207                          RTS     PC              ;RETURN
4257
4258                                  ;REPORT 'WLE' ERROR
4259
4260  011664  004737  020406          WLEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4261  011670  104414  047656                  DISPLY  ,EM36           ;REPORT 'WLE'
4262  011674  004737  020462                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4263  011700  004737  023644                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4264  011704  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4265  011710  000207                          RTS     PC              ;RETURN
4266
4267                                  ;REPORT FORMAT ERROR
```

```
                                FMTER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
                                        DISPLY  ,EM26           ;FORMAT ERROR
                                        JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
                                        JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
                                        JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
                                        BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
                                        BEQ     1$              ;BR IF NOT
                                        JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
                                1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
                                        JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
                                        JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
                                        RTS     PC

                                ;REPORT HEADER COMPARE ERROR

                                HCEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
                                        DISPLY  ,EM27           ;HEADER COMPARE ERROR
                                        JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
                                        JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
                                        JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
                                        BIT     #BIT14,$RMCS2(R0)  ;'WCE' ERROR ALSO ?
                                        BEQ     1$              ;BR IF NOT
                                        JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
                                1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
                                        JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
                                        JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
                                        JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
                                        RTS     PC              ;RETURN

                                ;PROCESS CONTROL/INTERFACE TRANSFER ERROR

                                TRFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
                                        DISPLY  ,EM40           ;RH11 OR UNIBUS TRANSFER ERROR
                                        JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
                                        JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
                                        JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
                                        JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
                                        BIT     #BIT15!BIT13!BIT9!BIT8,$RMCS2(R0)  ;'DLT','UPE','MXF', 'MDPE' SET ?
                                        BEQ     2$              ;BR IF NONE SET
                                        MOV     #3,RETRY        ;RETRY LIMIT
                                        CLR     MASK            ;CLEAR ERROR MASK
                                        JSR     PC,$RETRY       ;RETRY THE OPERATION
                                        BR      1$              ;RETURN HERE IF RETRY UNSUCESSFUL
                                        JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
                                        BR      2$              ;FINISH THE ERROR REPORT
                                1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
                                2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
                                        RTS     PC

                                ;PROCESS 'SKI' OR 'OCYL' ERRORS

                                SKIER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
                                        DISPLY  ,EM50           ;'SKI' OR 'OCYL' ERROR
                                        JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
                                        JSR     PC,LINE3B       ;PRINT LINE 3B OF ERROR MESSAGE
```

```
4324  012172  004737  023644                 JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4325  012176  004737  023574                 JSR     PC,INCSKI       ;INCREMENT 'SKI' OR 'OCYL' ERROR COUNT
4326  012202  004737  022276                 JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
4327  012206  000207                         RTS     PC
4328
4329                                 ;REPORT WRITE CLOCK FAILURE ('WCF')
4330
4331  012210  004737  020406         WCFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4332  012214  104414  047556                 DISPLY  ,EM34           ;REPORT WRITE CLOCK FAILURE
4333  012220  004737  020462                 JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4334  012224  004737  021076                 JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
4335  012230  004737  021540                 JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4336  012234  004737  023644                 JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4337  012240  004737  014776                 JSR     PC,PRTBAD       ;SEE IF BAD SECTOR TO BE PRINTED
4338  012244  012737  000003  001350         MOV     #3,RETRY        ;RETRY COUNT
4339  012252  012737  000040  001346         MOV     #BIT05,MASK     ;ERROR MASK
4340  012260  004737  015344                 JSR     PC,$RETRY       ;RETRY THE ORDER
4341  012264  000405                         BR      2$              ;RETURN HERE IF RETRY UNSUCESSFUL
4342  012266  004737  022066                 JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4343  012272  004737  022150         1$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4344  012276  000207                         RTS     PC
4345  012300  004737  022074         2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4346  012304  000772                         BR      1$
4347
4348                                 ;PROCESS DRIVE UNSAFE ERROR
4349
4350  012306  004737  020406         UNSAF:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4351  012312  104414  050546                 DISPLY  ,EM60           ;REPORT DRIVE UNSAFE
4352  012316  004737  020462                 JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4353  012322  004737  021070                 JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
4354  012326  004737  023644                 JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4355  012332  012737  000003  001350         MOV     #3,RETRY        ;RETRY COUNT
4356  012340  004737  015344                 JSR     PC,$RETRY       ;RETRY THE ORDER
4357  012344  000403                         BR      1$              ;RETRY WAS UNSUCESSFUL
4358  012346  004737  022066                 JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
4359  012352  000402                         BR      2$              ;CONTINUE WITH ERROR REPORT
4360  012354  004737  022074         1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
4361  012360  004737  022150         2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4362  012364  000207                         RTS     PC              ;RETURN
4363
4364                                 ;REPORT AN 'UNKNOWN' DATA PATTERN
4365
4366  012366  105737  001376         NOMTCH: TSTB    FRSTER          ;FIRST ERROR IN THE SECTOR ?
4367  012372  001013                         BNE     1$              ;BR IF NOT OR IF PROCESSING 'DCKER'
4368  012374  004737  020406                 JSR     PC,LINE1        ;TYPE LINE 1 OF ERROR MESSAGE
4369  012400  104414  050154                 DISPLY  ,EM43           ;'CAN'T MATCH DATA WITH PATTERN'
4370  012404  004737  020462                 JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4371  012410  004737  021076                 JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
4372  012414  004737  021540                 JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4373  012420  000404                         BR      2$              ;CONTINUE PROCESSING ERROR
4374  012422  104414  050154         1$:     DISPLY  ,EM43           ;'CAN'T MATCH DATA WITH PATTERN'
4375  012426  104414  001201                 DISPLY  ,$CRLF          ;CR-LF
4376  012432  104414  052563         2$:     DISPLY  ,LIN9I          ;HEADER FOR DATA PRINTOUT
4377  012436  010146                         MOV     R1,-(SP)        ;ADDRESS OF WORD 1
4378  012440  004737  022430                 JSR     PC,LINOCT       ;TYPE WORD 1
4379  012444  104414  053246                 DISPLY  ,LINSP          ;SPACES
```

```
                                                MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 1
                                                JSR     PC,LINOCT       ;TYPE WORD 1
                                                DISPLY  ,$CRLF          ;CR-LF
                                                MOV     R1,-(SP)        ;ADDRESS OF WORD 2
                                                JSR     PC,LINOCT       ;TYPE WORD 2
                                                DISPLY  ,LINSP          ;SPACES
                                                MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 2
                                                JSR     PC,LINOCT       ;TYPE WORD 2
                                                DISPLY  ,$CRLF          ;CR-LF
                                                MOV     R1,-(SP)        ;ADDRESS OF WORD 3
                                                JSR     PC,LINOCT       ;TYPE WORD 3
                                                DISPLY  ,LINSP          ;SPACES
                                                MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 3
                                                JSR     PC,LINOCT       ;TYPE WORD 3
                                                DISPLY  ,$CRLF          ;CR-LF
                                                MOV     R1,-(SP)        ;ADDRESS OF WORD 4
                                                JSR     PC,LINOCT       ;TYPE WORD 4
                                                DISPLY  ,LINSP          ;SPACES
                                                MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 4
                                                JSR     PC,LINOCT       ;TYPE WORD 4
                                                DISPLY  ,$CRLF          ;CR-LF
                                                ADD     #<252.*2.),R1   ;INCREMENT BUFFER POINTER
                                                SUB     #256.,CMCNT     ;ADJUST WORD COUNT FOR MATCH
                                                BITB    #BIT00,$CODE(R0) ;HEADER OPERATION INVOLVED ?
                                                BEQ     3$              ;NO
                                                ADD     #4,R1           ;ADJUST BUFFER ADDRESS
                                                SUB     #2,CMCNT        ;ADJUST WORD COUNT
                                3$:             CLR     R2              ;CLEAR 'WORDS TO COMPARE' COUNT IN R2
                                                MOVB    #1,FRSTER       ;SET 'NOT FIRST ERROR' INDICATOR
                                                MOVB    #-1,FRSTER+1    ;SET ERROR FOUND INDICATOR
                                                MOV     CMPLMT,LIMIT    ;RESET THE COMPARE ERROR TYPEOUT LIMIT
                                                RTS     PC              ;RETURN

                                ;CHECK ERROR BITS IN THE RH11 & RM03 REGISTERS

                                CKERR:  BIT     #60000,$RMCS1(R0)  ;SEE IF 'TRE' OR 'MCPE' SET
                                        BNE     1$                 ;BR IT EITHER SET
                                        BIT     #177400,$RMCS2(R0)  ;SEE IF ERROR BITS IN CS2 SET
                                        BNE     1$                 ;BR IF ANY SET
                                        TST     $RMER1(R0)         ;ANY BITS SET IN ER1
                                        BNE     1$                 ;BR IF ANY SET
                                        TST     $RMER2(R0)         ;ANY BITS SET IN ER2 ?
                                        BEQ     2$                 ;BR IF NONE SET
                                1$:     JSR     PC,LINE1           ;PRINT LINE 1 OF ERROR MESSAGE
                                        DISPLY  ,EM44              ;ERROR BITS SET, BUT 'SC' OR 'TRE' NOT SET
                                        JSR     PC,LINE2           ;PRINT LINE 2 OF ERROR MESSAGE
                                        JSR     PC,LINE3           ;PRINT LINE 3 OF ERROR MESSAGE
                                        JSR     PC,LINE4           ;PRINT LINE 4 OF ERROR MESSAGE
                                        JSR     PC,INCTOT          ;INCREMENT TOTAL ERROR COUNT
                                        JSR     PC,LINE7           ;PRINT LINE 7 OF ERROR MESSAGE
                                2$:     RTS     PC                 ;RETURN

                                ;CHECK BUS ADDRESS REGISTER & WORD COUNT REGISTER

                                CKBUS:  TST     $RMWC(R0)          ;CHECK WORD COUNT
                                        BNE     1$                 ;BR IF NOT ZERO
```

```
4436  012740  016046  000020            MOV     $WRDL(R0),-(SP) ;WORD LENGTH
4437  012744  006316                    ASL     (SP)            ;CHANGE INTO BYTE COUNT
4438  012746  066016  000006            ADD     $BUF(R0),(SP)   ;ADD THE STARTING LOCATION
4439  012752  022660  000240            CMP     (SP)+,$RMBA(R0) ;BUFFER ADDRESS PROPER ?
4440  012756  001416                    BEQ     2$              ;BR IF OK
4441  012760  004737  020406      1$:   JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
4442  012764  104414  050027            DISPLY  .EM41           ;BUS ADDRESS OR WORD COUNT INCORRECT
4443  012770  004737  020462            JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
4444  012774  004737  021126            JSR     PC,LINE3D       ;PRINT LINE 3D OF ERROR MESSAGE
4445  013000  004737  021540            JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
4446  013004  004737  023644            JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
4447  013010  004737  022150            JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
4448  013014  000207            2$:     RTS     PC
4449
4450                                    ;COMPARE THE BUFFER
4451
4452  013016  132760  000004  000024  CMPAR:  BITB    #BIT02,$CODE(R0)  ;SEE IF READ ORDER
4453  013024  001001                    BNE     1$              ;BR IF IT IS
4454  013026  000207                    RTS     PC              ;RETURN
4455  013030  005037  001376      1$:   CLR     FRSTER          ;CLEAR 'FIRST ERROR' INDICATOR
4456  013034  032777  000002  166112  CMPARD: BIT     #SW01,@SWR      ;IS SWITCH 1 SET?
4457  013042  001401                    BEQ     1$              ;BR IF NOT
4458  013044  000207                    RTS     PC              ;YES, DON'T COMPARE
4459  013046  005037  001404      1$:   CLR     ERCTR           ;CLEAR THE ERROR COUNTER
4460  013052  016001  000006            MOV     $BUF(R0),R1     ;BUFFER ADDRESS
4461  013056  016037  000020  001410    MOV     $WRDL(R0),CMCNT  ;WORD COUNT TO WORKING LOCATION
4462  013064  066037  000236  001410    ADD     $RMWC(R0),CMCNT  ;CALCULATE ACTUAL WORDS TRANSFERED
4463  013072  016037  000012  001412    MOV     $CYL(R0),CMCYL  ;CYLINDER ADDRESS WORKING LOCATION
4464  013100  052737  010000  001412    BIS     #BIT12,CMCYL    ;SET FORMAT BIT
4465  013106  052737  140000  001412    BIS     #140000,CMCYL   ;SET MFG AND USER BITS
4466  013114  016037  000010  001414    MOV     $SEC(R0),CMSEC  ;SECTOR & TRACK ADDRESSES TO WORKING LOCNS
4467  013122  013737  001472  001406    MOV     CMPLMT,LIMIT    ;DISPLAY LIMIT
4468  013130  005237  001406            INC     LIMIT           ;CONVERT PARAMETER INTO LIMIT VALUE
4469  013134  012737  177777  001374  CMSTR:  MOV     #-1,ZROIND      ;CLEAR THE 'ZERO'S' INDICATOR
4470  013142  005037  001400            CLR     SAVER1          ;CLEAR THE R1 SAVE WORD
4471  013146  005037  001402            CLR     SAVER5          ;CLEAR THE R5 SAVE WORD
4472  013152  023760  001410  000022    CMP     CMCNT,$SSEC(R0)  ;IS BUFFER SIZE GREATER THAN ONE SECTOR ?
4473  013160  101005                    BHI     1$              ;BR IF IT IS
4474  013162  013702  001410            MOV     CMCNT,R2        ;LESS THAN, USE REMAINING BUFFER
4475  013166  005037  001410            CLR     CMCNT           ;SET COUNTER TO 0
4476  013172  000405                    BR      2$              ;
4477  013174  016002  000022      1$:   MOV     $SSEC(R0),R2    ;COMPARE SECTOR
4478  013200  166037  000022  001410    SUB     $SSEC(R0),CMCNT ;DECREMENT WORD COUNT
4479  013206  126027  000024  000005  2$:   CMPB    $CODE(R0),#5    ;READ HEADER & DATA?
4480  013214  001025                    BNE     CMDAT           ;BR IF NOT
4481  013216  052711  140000      CMHED:  BIS     #BIT15!BIT14,(R1)  ;SET BIT14,BIT15 IN CASE BAD SPOT ENCOUNTER
4482  013222  023721  001412            CMP     CMCYL,(R1)+     ;CHECK CYLINDER
4483  013226  001402                    BEQ     1$              ;BR IF COMPARE OK
4484  013230  004737  013256            JSR     PC,CMSTR2               ;REPORT ERROR
4485  013234  023721  001414      1$:   CMP     CMSEC,(R1)+     ;COMPARE SECTOR & TRACK
4486  013240  001402                    BEQ     4$              ;BR IF EQ
4487  013242  004737  013256            JSR     PC,CMSTR2               ;REPORT ERROR
4488  013246  162702  000002      4$:   SUB     #2,R2           ;SUBTRACT HEADER LENGTH FROM SIZE
4489  013252  003566                    BLE     CMPRX           ;BR IF FINISHED
4490  013254  000405                    BR      CMDAT           ;COMPARE THE DATA PORTION
4491  013256  005237  001404      CMSTR2: INC     ERCTR           ;INCREMENT THE ERROR COUNT
```

```
4492  013262  004737  013636                    JSR     PC,CMPRT        ;REPORT THE COMPARISON ERROR
4493  013266  000207                            RTS     PC              ;CHECK THE REST OF THE HEADER
4494  013270  004737  014160            CMDAT:  JSR     PC,MATCH        ;FIND THE PATTERN
4495  013274  000403                            BR      2$              ;FOUND A PATTERN
4496  013276  004737  012366                    JSR     PC,NOMTCH       ;RETURN HERE IF NO MATCH WITH PATTERN MADE
4497  013302  000456                            BR      8$              ;BYPASS COMPARE ROUTINE
4498  013304  011405                    2$:     MOV     (R4),R5         ;ADDRESS OF PATTERN ADDRESS IN R4
4499  013306  012703  000020                    MOV     #20,R3          ;R3 IS PATTERN POS COUNTER
4500  013312  022125                    3$:     CMP     (R1)+,(R5)+     ;COMPARE BUFFER WITH PATTERN
4501  013314  001016                            BNE     5$              ;BR IF NOT EQUAL
4502  013316  005737  001404                    TST     ERCTR           ;ERRORS DETECTED ?
4503  013322  001406                            BEQ     4$              ;BR IF NO ERRORS
4504  013324  032777  000010  165622            BIT     #SW3,@SWR       ;SWITCH 3 SET ?
4505  013332  001402                            BEQ     4$              ;BR IF NOT SET
4506  013334  004737  013636                    JSR     PC,CMPRT        ;DISPLAY THE WORD
4507  013340  005302                    4$:     DEC     R2              ;DECREMENT SIZE COUNT
4508  013342  003436                            BLE     8$              ;BR WHEN AT END
4509  013344  005303                            DEC     R3              ;DECREMENT PATT POS COUNT
4510  013346  001361                            BNE     3$              ;BR IF NOT AT END OF PATT
4511  013350  000755                            BR      2$              ;RESTART THE PATTERN
4512  013352  005761  177776            5$:     TST     -2(R1)          ;IS MISCOMPARED CHARACTER=0
4513  013356  001410                            BEQ     6$              ;BR IF YES
4514  013360  012737  177777  001374            MOV     #-1,ZROIND      ;SET NON-ZERO MISCOMPARED INDCATOR
4515  013366  005237  001404                    INC     ERCTR           ;INCREMENT THE ERROR COUNTER
4516  013372  004737  013636                    JSR     PC,CMPRT        ;REPORT ERROR
4517  013376  000760                            BR      4$              ;CONTINUE COMPARE
4518  013400  105737  001376            6$:     TSTB    FRSTER          ;FIRST ERROR?
4519  013404  100407                            BMI     7$              ;BR IF NOT
4520  013406  005037  001374                    CLR     ZROIND          ;SET THE ZERO INDICATOR
4521  013412  010137  001400                    MOV     R1,SAVER1       ;SAVE CURRENT R1
4522  013416  010537  001402                    MOV     R5,SAVER5       ;SAVE CURRENT R5
4523  013422  000746                            BR      4$              ;CONTINUE COMPARE
4524  013424  005737  001374            7$:     TST     ZROIND          ;ANY MISCOMPARIONS NOT ZEROS ?
4525  013430  001743                            BEQ     4$              ;BR IF NONE-ALL ERRORS=ZERO
4526  013432  004737  013636                    JSR     PC,CMPRT        ;REPORT ERROR
4527  013436  000740                            BR      4$              ;CONTINUE COMPARING
4528  013440  023727  001410  000004    8$:     CMP     CMCNT,#4        ;LAST 3WORDS ?
4529  013446  002470                            BLT     CMPRX           ;YES
4530  013450  126027  000024  000005            CMPB    $CODE(R0),#5    ;READ HEAD AND DATA ?
4531  013456  001414                            BEQ     9$              ;YES
4532  013460  013702  001410            13$:    MOV     CMCNT,R2        ;SET COUNTER = REMAIN BUFFER LENGTH
4533  013464  020227  000004                    CMP     R2,#4           ;LAST  3 WORDS ?
4534  013470  002457                            BLT     CMPRX           ;YES,EXIT
4535  013472  162737  000400  001410            SUB     #256.,CMCNT     ;GREATER THAN A SECTOR ?
4536  013500  003673                            BLE     CMDAT           ;NO,RETURN TO COMPARE LOOP
4537  013502  012702  000400                    MOV     #256.,R2        ;SET COUNTER =SECTOR SIZE
4538  013506  000670                            BR      CMDAT           ;RETURN TO COMPARE LOOP
4539  013510  105237  001414            9$:     INCB    CMSEC           ;INCREMENT COUNTER
4540  013514  123727  001414  000040            CMPB    CMSEC,#32.      ;MAX SECTOR # ?
4541  013522  103421                            BLO     10$             ;NO
4542  013524  105037  001414                    CLRB    CMSEC           ;RESET SECTOR #
4543  013530  105237  001415                    INCB    CMTRK           ;INCREMENT TRACK #
4544  013534  123727  001415  000005            CMPB    CMTRK,#5        ;MAX TRACK # ?
4545  013542  103411                            BLO     10$             ;NO
4546  013544  105037  001415                    CLRB    CMTRK           ;RESET TRACK #
4547  013550  005237  001412                    INC     CMCYL           ;INCREMENT CYLINDER NUMBER
```

```
4548  013554  023727  001412  151466          CMP     CMCYL,#150000+822.      ;LAST CYLINDER ?
4549  013562  103401                          BLO     10$                     ;NO
4550  013564  000421                          BR      CMPRX                   ;NORMAL RETURN,NOT WRAP AROUND
4551  013566  052711  140000          10$:    BIS     #BIT15!BIT14,(R1)       ;SET BIT15/14 INCASE BAD SPOT ENCOUNTER
4552  013572  023721  001412                  CMP     CMCYL,(R1)+             ;COMPARE 1ST HEADER WORD
4553  013576  001402                          BEQ     11$                     ;MATCH
4554  013600  004737  013256                  JSR     PC,CMSTR2               ;NOT MATCH
4555  013604  023721  001414          11$:    CMP     CMSEC,(R1)+             ;SECOND WORD OF HEADER
4556  013610  001402                          BEQ     12$                     ;MATCH
4557  013612  004737  013256                  JSR     PC,CMSTR2               ;NOT MATCH
4558  013616  162737  000002  001410  12$:    SUB     #2,CMCNT                ;ADJUST WORD COUNT
4559  013624  003401                          BLE     CMPRX                   ;COMPARE IS DONE
4560  013626  000714                          BR      13$                     ;RETURN TO COMPARE LOOP
4561
4562  013630  004737  014112          CMPRX:  JSR     PC,ENDCMP               ;PRINT LAST LINE IF ERRORS
4563  013634  000207                          RTS     PC
4564
4565                                  ;TYPE DATA COMPARE ERRORS
4566
4567  013636  005737  001400          CMPRT:  TST     SAVER1                  ;PRINT SAVED VALUES ?
4568  013642  001010                          BNE     2$                      ;BR IF NOT
4569  013644  105737  001376                  TSTB    FRSTER                  ;FIRST ERROR?
4570  013650  100402                          BMI     1$                      ;BR IF NOT
4571  013652  004737  013732                  JSR     PC,4$                   ;PRINT INITIAL MESSAGE INFO
4572  013656  004737  014014          1$:     JSR     PC,8$                   ;PRINT REMAINDER OF MESSAGE
4573  013662  000422                          BR      3$                      ;EXIT
4574  013664                          2$:
4575  013664  010146                          MOV     R1,-(SP)                ;;PUSH R1 ON STACK
4576  013666  010546                          MOV     R5,-(SP)                ;;PUSH R5 ON STACK
4577  013670  013701  001400                  MOV     SAVER1,R1               ;DISPLAY SAVED R1
4578  013674  013705  001402                  MOV     SAVER5,R5               ;DISPLAY SAVED R5
4579  013700  004737  013732                  JSR     PC,4$                   ;PRINT INITIAL MESSAGE INFO
4580  013704  004737  014014                  JSR     PC,8$                   ;PRINT SAVED VALUES
4581  013710  005037  001400                  CLR     SAVER1                  ;CLEAR SAVED REGISTER INDICATORS
4582  013714  005037  001402                  CLR     SAVER5                  ;CLEAR THE OTHER ONE
4583  013720  012605                          MOV     (SP)+,R5                ;;POP STACK INTO R5
4584  013722  012601                          MOV     (SP)+,R1                ;;POP STACK INTO R1
4585  013724  004737  014014                  JSR     PC,8$                   ;PRINT REMAINDER OF MESSAGE
4586  013730  000207                  3$:     RTS     PC                      ;RETURN
4587  013732  105737  001376          4$:     TSTB    FRSTER                  ;FIRST ERROR ?
4588  013736  100425                          BMI     7$                      ;BR IF NOT
4589  013740  001013                          BNE     5$                      ;BR IF FIRST ERROR AND PROCESSING 'DCK' ERROR
4590  013742  004737  020406                  JSR     PC,LINE1                ;PRINT LINE 1 OF ERROR MESSAGE
4591  013746  104414  050073                  DISPLY  ,EM42                   ;DATA COMPARE ERROR
4592  013752  004737  020462                  JSR     PC,LINE2                ;PRINT LINE 2 OF ERROR MESSAGE
4593  013756  004737  021076                  JSR     PC,LINE3A               ;PRINT LINE 3A OF ERROR MESSAGE
4594  013762  004737  021540                  JSR     PC,LINE4                ;PRINT LINE 4 OF ERROR MESSAGE
4595  013766  000404                          BR      6$                      ;GO TO TYPE HEADER
4596  013770  104414  052456          5$:     DISPLY  ,LIN9B                  ;HEADER MESSAGE OF PROCESSING 'DCK' ERROR
4597  013774  104414  001201                  DISPLY  ,$CRLF                  ;CR-LF
4598  014000  104414  052505          6$:     DISPLY  ,LIN9H                  ;DISPLAY HEADER
4599  014004  012737  177777  001376          MOV     #-1,FRSTER              ;SET ERROR FLAG
4600  014012  000207                  7$:     RTS     PC                      ;RETURN
4601  014014  005737  001406          8$:     TST     LIMIT                   ;TYPEOUT LIMIT REACHED ?
4602  014020  001403                          BEQ     9$                      ;BR IF IT HAS
4603  014022  005337  001406                  DEC     LIMIT                   ;DECREMENT LIMIT COUNTER
```

```
4604  014026  001005                        BNE     10$                     ;BR IF NOT AT LIMIT
4605  014030  032777  000200  165116  9$:   BIT     #SW07,@SWR              ;PRINT ALL DATA COMPARE ERRORS ?
4606  014036  001001                        BNE     10$                     ;BR IF YES
4607  014040  000207                        RTS     PC                      ;RETURN
4608  014042  010146                10$:    MOV     R1,-(SP)                ;BUFFER ADDRESS
4609  014044  162716  000002                SUB     #2,(SP)                 ;ADJUST ADDRESS
4610  014050  004737  022430                JSR     PC,LINOCT               ;TYPE IT
4611  014054  104414  053246                DISPLY  ,LINSP                  ;2 SPACES
4612  014060  016546  177776                MOV     -2(R5),-(SP)            ;PUT GOOD DATA ON THE STACK
4613  014064  004737  022430                JSR     PC,LINOCT               ;TYPE IT
4614  014070  104414  053246                DISPLY  ,LINSP                  ;2 SPACES
4615  014074  016146  177776                MOV     -2(R1),-(SP)            ;BAD DATA
4616  014100  004737  022430                JSR     PC,LINOCT               ;TYPE IT
4617  014104  104414  001201                DISPLY  ,$CRLF                  ;CR-LF
4618  014110  000207                        RTS     PC                      ;RETURN
4619
4620                                  ;LAST LINE OF COMPARE ERROR REPORTING
4621
4622  014112  105737  001377        ENDCMP: TSTB    FRSTER+1                ;ANY COMPARE ERRORS FOUND ?
4623  014116  001417                        BEQ     2$                      ;BR IF NOT
4624  014120  005737  001404                TST     ERCTR                   ;SEE HOW MANY ERRORS
4625  014124  001410                        BEQ     1$                      ;BR IF ONLY CAN'T MATCH PATTERN
4626  014126  104414  052603                DISPLY  ,LIN9E                  ;'NUMBER OF ERRORS='
4627  014132  013746  001404                MOV     ERCTR,-(SP)             ;NUMBER OF ERRORS
4628  014136  004737  022462                JSR     PC,LINDEC               ;TYPE IT
4629  014142  104414  001201                DISPLY  ,$CRLF                  ;CR-LF
4630  014146  004737  023644        1$:     JSR     PC,INCTOT               ;INCREMENT TOTAL ERROR COUNT
4631  014152  004737  022150                JSR     PC,LINE7                ;PRINT LINE 7 OF ERROR MESSAGE
4632  014156  000207                2$:     RTS     PC                      ;RETURN
4633
4634
4635                                  ;ROUTINE TO MATCH THE DATA WITH A PATTERN
4636                                  ;CALL:
4637                                  ;       MOV     #BUFFER,R1              ;BUFFER ADDRESS
4638                                  ;       JSR     PC,MATCH
4639                                  ;       RETURN1                         ;PATTERN ADDRESS IN R4
4640                                  ;       RETURN2                         ;COULDN'T MATCH PATTERN
4641
4642  014160  010146                MATCH:  MOV     R1,-(SP)                ;SAVE R1 ON THE STACK
4643  014162  012704  000044                MOV     #44,R4                  ;PATTERN TABLE INDEX
4644  014166  011601                1$:     MOV     (SP),R1                 ;RELOAD R1
4645  014170  162704  000002                SUB     #2,R4                   ;DECREMENT INDEX
4646  014174  001413                        BEQ     3$                      ;BR IF  PATTERN NOT MATCH
4647  014176  016405  002476                MOV     STNDAT(R4),R5           ;ADDRESS OF PATTERN ADDRESS
4648  014202  012703  000004                MOV     #4,R3                   ;NUMBER OF LOCATIONS TO CHECK
4649  014206  022125                2$:     CMP     (R1)+,(R5)+             ;COMPARE THE BUFFER AGAINST THE PATTERN
4650  014210  001366                        BNE     1$                      ;BR IF NOT EQUAL, TRY NEXT PATTERN
4651  014212  005303                        DEC     R3                      ;FINISHED CHECKING?
4652  014214  001374                        BNE     2$                      ;BR IF NOT FINISHED
4653  014216  062704  002476                ADD     #STNDAT,R4              ;MAKE PATTERN ADDRESS ABSOLUTE
4654  014222  000403                        BR      4$                      ;EXIT
4655  014224  062766  000002  000002  3$:   ADD     #2,2(SP)                ;INCREMENT RETURN ADDRESS
4656  014232  012601                4$:     MOV     (SP)+,R1                ;RESTORE R1
4657  014234  000207                        RTS     PC                      ;RETURN
4658
4659                                  ;USE ECC TO CORRECT THE DATA ERROR
```

```
4660
4661  014236  016037  000240  001420  ECC:    MOV     $RMBA(R0),ECSEC ;ADDRESS OF LAST LOCN XFERED
4662  014244  016046  000236          MOV     $RMWC(R0),-(SP) ;ACT WORDS XFERED (2'S COMP)
4663  014250  066016  000020          ADD     $WRDL(R0),(SP)  ;ADD WORDS REQUESTED
4664  014254  005046                  CLR     -(SP)           ;CLEAR NEXT STACK LOCN
4665  014256  016046  000022          MOV     $SSEC(R0),-(SP) ;SECTOR SIZE
4666  014262  004737  027522          JSR     PC,LINKDV       ;DIVIDE WORDS XFERED BY SECTOR SIZE
4667  014266  005716                  TST     (SP)            ;PARTIAL SECTOR XFERED ?
4668  014270  001413                  BEQ     1$              ;BR IF NOT
4669  014272  006316                  ASL     (SP)            ;CONVERT INTO NUMBER OF BYTES
4670  014274  161637  001420          SUB     (SP),ECSEC      ;SUBTRACT SECTOR RESIDUE
4671  014300  126027  000024  000005  CMPB    $CODE(R0),#5    ;WAS OP READ HEAD & DATA
4672  014306  001007                  BNE     2$              ;BR IF NOT
4673  014310  062737  000004  001420  ADD     #4,ECSEC        ;ADD HEADER SIZE (IN BYTES) BACK IN
4674  014316  000403                  BR      2$              ;GO ADJUST THE STACK POINTER
4675  014320  162737  001000  001420  1$:     SUB     #1000,ECSEC     ;SUBTRACT SECTOR DATA FIELD SIZE (IN BYTES)
4676  014326  062706  000004          2$:     ADD     #4,SP           ;ADJUST THE STACK POINTER
4677  014332  016037  000300  001416          MOV     $RMEC1(R0),ECBIT  ;ECC POSITION COUNT
4678  014340  005337  001416          DEC     ECBIT           ;ADJUST THE POSITION COUNT
4679  014344  013737  001416  001426  MOV     ECBIT,ECWRD     ;LOAD THE WORD COUNT LOCATION
4680  014352  042737  177760  001416  BIC     #^C17,ECBIT     ;SAVE THE BIT OFFSET COUNT
4681  014360  042737  000017  001426  BIC     #17,ECWRD       ;CLEAR THE BIT OFFSET
4682  014366  006237  001426          ASR     ECWRD           ;CHANGE TO BYTE COUNT
4683  014372  006237  001426          ASR     ECWRD           ;CHANGE TO BYTE COUNT
4684  014376  006237  001426          ASR     ECWRD           ;CHANGE TO BYTE COUNT
4685  014402  104414  052662          DISPLY  ,LIN10A         ;'ERROR BURST BEGINS AT '
4686  014406  013746  001426          MOV     ECWRD,-(SP)     ;PUT THE WORD COUNT ON THE STACK
4687  014412  006216                  ASR     (SP)            ;CONVERT TO WORD COUNT FOR MESSAGE
4688  014414  004737  030436          JSR     PC,$SB2D        ;CONVERT THE WORD COUNT
4689  014420  004737  030036          JSR     PC,$SUPRS       ;PRINT IT
4690  014424  104414  052716          DISPLY  ,LIN10B         ;' IN DATA FIELD OF ERROR SECTOR'
4691  014430  063737  001420  001426  ADD     ECSEC,ECWRD     ;FIND THE BEGINNING OF THE ERROR BURST
4692  014436  026037  000240  001426  CMP     $RMBA(R0),ECWRD  ;SEE IF BURST WAS IN DATA READ
4693  014444  101002                  BHI     .+6             ;BR IF IN DATA READ
4694  014446  000137  014764          JMP     ECC2            ;NOT IN DATA READ - REPORT IT
4695  014452  016037  000302  001422  MOV     $RMEC2(R0),ECMSK0  ;GET THE ERROR MASK
4696  014460  005037  001424          CLR     ECMSK1          ;CLEAR THE UPPER MASK WORD
4697  014464  005737  001416          3$:     TST     ECBIT           ;BIT OFFSET EQUAL ZERO
4698  014470  001407                  BEQ     4$              ;BR IF IT IS
4699  014472  005337  001416          DEC     ECBIT           ;DECREMENT THE BIT OFFSET COUNT
4700  014476  006337  001422          ASL     ECMSK0          ;SHIFT THE ERROR MASK
4701  014502  006137  001424          ROL     ECMSK1          ;SHIFT THE LOWER INTO THE UPPER
4702  014506  000766                  BR      3$              ;CONTINUE THE SHIFT
4703  014510  017737  164712  001432  4$:     MOV     @ECWRD,ECBAD0   ;SAVE THE INCORRECT WORD
4704  014516  005037  001434          CLR     ECWRD1          ;CLEAR SECOND INCORRECT WORD ADDRESS
4705  014522  013746  001422          MOV     ECMSK0,-(SP)    ;PUT LOWER MASK ON STACK
4706  014526  047716  164674          BIC     @ECWRD,(SP)     ;CLEAR ERRONEOUS ONE BITS FROM MASK
4707  014532  043777  001422  164666  BIC     ECMSK0,@ECWRD   ;CLEAR ERRONEOUS ONE BITS FROM BAD WORD
4708  014540  052677  164662          BIS     (SP)+,@ECWRD    ;SET DROPPED BITS
4709  014544  005737  001424          TST     ECMSK1          ;DOES BURST GO INTO NEXT WORD ?
4710  014550  001431                  BEQ     ECC1            ;BR IF BURST ONLY IN ONE WORD
4711  014552  013737  001426  001434  MOV     ECWRD,ECWRD1    ;DUPLICATE ADDRESS
4712  014560  062737  000002  001434  ADD     #2,ECWRD1       ;INCREMENT ERROR ADDRESS
4713  014566  026037  000240  001434  CMP     $RMBA(R0),ECWRD1  ;IS NEXT WORD IN THE BUFFER
4714  014574  101003                  BHI     5$              ;BR IF IT IS
4715  014576  005037  001434          CLR     ECWRD1          ;CLEAR 2ND WORD ADDRESS
```

```
4716  014602  000414                    BR      ECC1            ;PRINT WORD CORRECTED
4717  014604  017737  164624  001440    5$:     MOV     @ECWRD1,ECBAD1  ;SAVE THE SECOND BAD WORD
4718  014612  013746  001424            MOV     ECMSK1,-(SP)    ;PUT THE UPPER MASK ON THE STACK
4719  014616  047716  164612            BIC     @ECWRD1,(SP)    ;CLEAR ERRONEOUS ONE BITS FROM UPPER MASK
4720  014622  043777  001424  164604    BIC     ECMSK1,@ECWRD1  ;CLEAR ERRONEOUS ONE BITS FROM DATA WORD
4721  014630  052677  164600            BIS     (SP)+,@ECWRD1   ;SET DROPPED BITS
4722  014634  104414  053064    ECC1:   DISPLY  ,LIN10H         ;HEADER
4723  014640  013746  001426            MOV     ECWRD,-(SP)     ;PUT ECWRD ON THE STACK
4724  014644  004737  022430            JSR     PC,LINOCT       ;TYPE ECWRD
4725  014650  104414  053246            DISPLY  ,LINSP          ;SPACES
4726  014654  013746  001432            MOV     ECBADO,-(SP)    ;PUT ECBADO ON THE STACK
4727  014660  004737  022430            JSR     PC,LINOCT       ;TYPE ECBADO
4728  014664  104414  053246            DISPLY  ,LINSP          ;SPACES
4729  014670  017746  164532            MOV     @ECWRD,-(SP)    ;PUT @ECWRD ON THE STACK
4730  014674  004737  022430            JSR     PC,LINOCT       ;TYPE @ECWRD
4731  014700  104414  053246            DISPLY  ,LINSP          ;SPACES
4732  014704  005737  001434            TST     ECWRD1          ;PRINT THE NEXT WORD ?
4733  014710  001427                    BEQ     ECCX            ;BR IF NOT
4734  014712  104414  001201            DISPLY  ,$CRLF          ;CR-LF
4735  014716  013746  001434            MOV     ECWRD1,-(SP)    ;PUT ECWRD1 ON THE STACK
4736  014722  004737  022430            JSR     PC,LINOCT       ;TYPE ECWRD1
4737  014726  104414  053246            DISPLY  ,LINSP          ;SPACES
4738  014732  013746  001440            MOV     ECBAD1,-(SP)    ;PUT ECBAD1 ON THE STACK
4739  014736  004737  022430            JSR     PC,LINOCT       ;TYPE ECBAD1
4740  014742  104414  053246            DISPLY  ,LINSP          ;SPACES
4741  014746  017746  164462            MOV     @ECWRD1,-(SP)   ;PUT @ECWRD1 ON THE STACK
4742  014752  004737  022430            JSR     PC,LINOCT       ;TYPE @ECWRD1
4743  014756  104414  053246            DISPLY  ,LINSP          ;SPACES
4744  014762  000402                    BR      ECCX            ;EXIT
4745  014764  104414  052757    ECC2:   DISPLY  ,LIN10C         ;ERROR BURST WAS NOT TRANSFERED TO MEMORY
4746  014770  104414  001201    ECCX:   DISPLY  ,$CRLF          ;CR-LF
4747  014774  000207                    RTS     PC              ;RETURN
4748
4749                                    ;ROUTINE TO DISPLAY THE SECTOR WHICH GAVE THE HARD ERROR
4750
4751  014776  032777  000010  164150  PRTBAD: BIT     #SW3,@SWR       ;PRINT THE BAD SECTOR ?
4752  015004  001460                    BEQ     6$              ;BR IF NOT
4753  015006  016001  000240            MOV     $RMBA(R0),R1    ;PUT THE END ADDRESS INTO R1
4754  015012  016046  000020            MOV     $WRDL(R0),-(SP) ;FIND THE BEGINNING OF THE SECTOR
4755  015016  066016  000236            ADD     $RMWC(R0),(SP)  ;SUBTRACT THE WORDS NOT TRANSFERED
4756  015022  005046                    CLR     -(SP)           ;MAKE THE UPPER DIVIDEND 0
4757  015024  016046  000022            MOV     $SSEC(R0),-(SP)  ;DIVDE THE WORDS TRANSFERED BY THE SECTOR SIZE
4758  015030  004737  027522            JSR     PC,LINKDV       ;DIVIDE
4759  015034  005716                    TST     (SP)            ;REMAINDER = 0 ?
4760  015036  001403                    BEQ     1$              ;BR IF IT IS - COMPLETE SECTOR TRANSFERED
4761  015040  006316                    ASL     (SP)            ;CONVERT THE RESIDUAL SECTOR SIZE INTO BYTE COUNT
4762  015042  161601                    SUB     (SP),R1         ;SUBTRACT IT FROM THE END ADDRESS
4763  015044  000410                    BR      2$              ;FINISH THE SIZING
4764  015046  162701  001000    1$:     SUB     #1000,R1        ;SUBTRACT FULL SECTOR SIZE FROM END ADDR
4765  015052  126027  000024  000005    CMPB    $CODE(R0),#5    ;WAS OPERATION READ HEADER & DATA ?
4766  015060  001002                    BNE     2$              ;BR IF NOT
4767  015062  162701  000004            SUB     #4,R1           ;SUBTRACK HEADER SIZE FROM ADDR
4768  015066  062706  000004    2$:     ADD     #4,SP           ;RESTORE THE STACK POINTER
4769  015072  104414  053151            DISPLY  ,LIN11H         ;PRINT THE HEADER
4770  015076  012702  000007    3$:     MOV     #7,R2           ;R2 CONTAINS THE WORDS/LINE COUNT
4771  015102  010146                    MOV     R1,-(SP)        ;PUT THE ADDRESS ON THE STACK
```

```
4772  015104  004737  022430          4$:     JSR     PC,LINOCT       ;TYPE THE ADDRESS
4773  015110  020160  000240                  CMP     R1,$RMBA(R0)    ;PRINTED ALL THE SECTOR ?
4774  015114  001412                          BEQ     5$              ;BR IF ALL PRINTED
4775  015116  104414  053246                  DISPLY  .LINSP          ;SPACES
4776  015122  012146                          MOV     (R1)+,-(SP)     ;PUT THE DATA ON THE STACK
4777  015124  004737  022430                  JSR     PC,LINOCT       ;TYPE THE DATA
4778  015130  005302                          DEC     R2              ;DECREMENT THE HORIZONTAL COUNT
4779  015132  001366                          BNE     4$              ;BR IF NOT AT THE END OF THE LINE
4780  015134  104414  001201                  DISPLY  .$CRLF          ;CR-LF
4781  015140  000756                          BR      3$              ;RESTORE THE WORDS/LINE COUNT
4782  015142  104414  001201          5$:     DISPLY  .$CRLF          ;PRINT WHAT REMAINS IN THE BUFFER
4783  015146  000207                  6$:     RTS     PC              ;RETURN
4784
4785                                  ;ROUTINE TO DO AN RTC - DRIVE SELECTED IN R0
4786                                  ;CALL:
4787                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4788                                  ;       JSR     PC,RTNCTR
4789                                  ;       RETURN
4790
4791  015150  111037  046062  RTNCTR: MOVB    (R0),GENDPB     ;MOVE THE DRIVE # TO THE GENERAL DPB
4792  015154  112737  000117  046064  MOVB    #RTC,GENDPB+$COMND  ;COMMAND CODE
4793  015162  004037  035364  1$:     JSR     R0,RM03         ;DRIVER ENTRANCE
4794  015166  046062                  GENDPB                  ;DPB ADDRESS FOR ORDER
4795  015170  000774                  BR      1$              ;DRIVER DIDN'T ACCEPT ORDER
4796  015172  000207                  RTS     PC              ;RETURN
4797
4798                                  ;ROUTINE TO DO A RECALIBRATE - DRIVE SELECTED IN R0
4799                                  ;CALL:
4800                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4801                                  ;       JSR     PC,RECALT
4802                                  ;       RETURN
4803
4804                                  ;OR
4805
4806                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4807                                  ;       MOVB    #DRIVE,GENDPB   ;DRIVE ADDRESS
4808                                  ;       JSR     PC,RECALTO
4809                                  ;       RETURN
4810
4811  015174  111037  046062  RECALT: MOVB    (R0),GENDPB     ;MOVE THE DRIVE # TO THE GENERAL DPB
4812  015200  112737  000107  046064  RECALO: MOVB  #RECAL,GENDPB+$COMND  ;RELCALIBRATE COMMAND
4813  015206  004037  035364  1$:     JSR     R0,RM03         ;DRIVER ENTRANCE
4814  015212  046062                  GENDPB                  ;DPB ADDRESS FOR ORDER
4815  015214  000774                  BR      1$              ;DRIVER DIDN'T ACCEPT THE ORDER
4816  015216  005737  046100  2$:     TST     GENDPB+$TATUS   ;SEE IF FINISHED
4817  015222  001775                  BEQ     2$              ;BR IF NOT FINISHED
4818  015224  000207                  RTS     PC              ;RETURN
4819
4820                                  ;OFFSET THE DRIVE IN R0 (OFFSET CODE PRELOADED INTO 'RMOF')
4821                                  ;CALL:
4822                                  ;       MOVB    #OFFSET,GENDPB+$FMT  ;OFFSET CODE
4823                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4824                                  ;       JSR     PC,OFFST
4825                                  ;       RETURN
4826
4827  015226  111037  046062  OFFST:  MOVB    (R0),GENDPB     ;DRIVE # TO GENERAL DPB
```

```
4828  015232  112737  000115  046064          MOVB    #OFFSET,GENDPB+$COMND ;COMMAND
4829  015240  004037  035364          1$:     JSR     R0,RM03               ;DRIVER ENTRANCE
4830  015244  046062                          GENDPB                        ;DPB ADDRESS FOR ORDER
4831  015246  000774                          BR      1$                    ;DRIVER DIDN'T ACCEPT ORDER
4832  015250  000207                          RTS     PC
4833
4834                                  ;UTILITY READ HEADER ROUTINE
4835                                  ;CALL:
4836                                  ;       MOV     #DPB,R0               ;DPB ADDRESS
4837                                  ;       MOV     #SECTOR,-(SP)         ;SECTOR ADDRESS
4838                                  ;       MOV     #TRACK,-(SP)          ;TRACK ADDRESS
4839                                  ;       MOV     #CYLINDER,-(SP)       ;CYLINDER ADDRESS
4840                                  ;       JSR     PC,READDR
4841                                  ;       RETURN
4842
4843  015252  116637  000004  046073  READHD: MOVB    4(SP),GENDPB+$TRK ;TRACK ADDRESS
4844  015260  116637  000006  046072          MOVB    6(SP),GENDPB+$SEC ;SECTOR ADDRESS
4845  015266  016637  000002  046074          MOV     2(SP),GENDPB+$CYL       ;CYLINDER ADDRESS
4846  015274  111037  046062                  MOVB    (R0),GENDPB           ;DRIVE NUMBER
4847  015300  112737  000173  046064          MOVB    #RDHD,GENDPB+$COMND ;COMMAND
4848  015306  012737  177776  046066          MOV     #-2,GENDPB+$WRDM        ;WORD CTR = 2
4849  015314  004037  035364          1$:     JSR     R0,RM03               ;DRIVER ENTRANCE
4850  015320  046062                          GENDPB                        ;DPB ADDRESS FOR ORDER
4851  015322  000774                          BR      1$                    ;DRIVER DIDN'T ACCEPT COMMAND
4852  015324  005737  046100          2$:     TST     GENDPB+$STATUS        ;FINISHED?
4853  015330  001775                          BEQ     2$                    ;BR IF NOT
4854  015332  011666  000006                  MOV     (SP),6(SP)            ;ADJUST STACK FOR RETURN
4855  015336  062706  000006                  ADD     #6,SP                 ;ADJUST RETRUN POINTER
4856  015342  000207                          RTS     PC                    ;RETURN
4857
4858                                  ;RETRY THE PRESENT OPERATION
4859                                  ;CALL:
4860                                  ;       MOV     #COUNT,RETRY          ;RETRY COUNT
4861                                  ;       JSR     PC,$RETRY
4862                                  ;       RETURN1                       ;RETRY UNSUCESSFUL
4863                                  ;       RETURN2                       ;SUCESSFUL RETRY
4864                                  ;                                     ;NOTE: IF A DIFFERENT ERROR OCCURS DURING
4865                                  ;                                     ;RETRY, THE ROUTINE EXITS TO 'ERPRC1'
4866
4867  015344  004737  016342          $RETRY: JSR     PC,GODRIV             ;RE-START ORDER
4868  015350  005760  000016          1$:     TST     $TATUS(R0)            ;ORDER FINISHED?
4869  015354  001775                          BEQ     1$                    ;BR IF NOT
4870  015356  100405                          BMI     2$                    ;BR IF ERROR
4871  015360  105237  001351                  INCB    RETRY+1               ;INCREMENT RETRY COUNT
4872  015364  062716  000002                  ADD     #2,(SP)               ;INCREMENT RETURN
4873  015370  000425                          BR      5$                    ;GO TO EXIT
4874  015372  032760  000200  000016  2$:     BIT     #BIT7,$TATUS(R0)  ;DID ORDER TERMINATE NORMALLY ?
4875  015400  001430                          BEQ     7$                    ;BR IF NOT
4876  015402  005737  001346                  TST     MASK                  ;IS ERROR MASK 0 ?
4877  015406  001004                          BNE     3$                    ;BR IF NOT
4878  015410  005760  000250                  TST     $RMER1(R0)            ;MAKE SURE THAT THE DRIVE ERROR REG IS CLEAR
4879  015414  001014                          BNE     6$                    ;BR IF NOT
4880  015416  000404                          BR      4$                    ;CONTINUE RETRY
4881  015420  033760  001346  000250  3$:     BIT     MASK,$RMER1(R0)       ;SAME ERROR?
4882  015426  001407                          BEQ     6$                    ;BR IF NOT
4883  015430  105237  001351          4$:     INCB    RETRY+1               ;INCREMENT RETRY COUNT
```

```
4884  015434  123737  001350  001351          CMPB    RETRY,RETRY+1   ;DONE ?
4885  015442  001340                          BNE     $RETRY          ;BR IF NOT DONE
4886  015444  000207                  5$:     RTS     PC              ;RETURN
4887  015446  004737  022416          6$:     JSR     PC,LINE8        ;REPORT DIFFERENT ERROR
4888  015452  004737  022150                  JSR     PC,LINE7        ;PRINT LINE 7
4889  015456  005726                          TST     (SP)+           ;ADJUST STACK POINTER FOR DIRECT RETURN
4890  015460  000207                          RTS     PC              ;RETURN
4891  015462  104414  052433          7$:     DISPLY  ,LIN8M          ;'DIFFERENT ERROR DURING RETRY'
4892  015466  000137  006564                  JMP     ERPRC1          ;REPORT THE ERROR
4893
4894                                  ;ROUTINE TO UPDATE THE PERFORMANCE SUMMARY STATISTICS
4895                                  ;CALL:
4896                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4897                                  ;       JSR     PC,STATIS
4898                                  ;       RETURN
4899
4900  015472  032760  000300  000016  STATIS: BIT     #BIT07!BIT06,$STATUS(R0) ;CHECK FOR DATA TERMINATION
4901  015500  001451                          BEQ     3$              ;BR IF NOT DATA TERMINATION
4902  015502  016037  000240  015626          MOV     $RMBA(R0),FACTOR  ;STORE THE FINAL BUFFER ADDRESS
4903  015510  166037  000006  015626          SUB     $BUF(R0),FACTOR ;SUBTRACT THE INITIAL ADDRESS
4904  015516  001431                          BEQ     2$              ;BR IF NO DATA TRANSFER
4905  015520  006237  015626                  ASR     FACTOR          ;CONVERT TO A WORD COUNT
4906  015524  063760  015626  000046          ADD     FACTOR,$TRANS(R0)  ;UPDATE WORD COUNT
4907  015532  005560  000050                  ADC     $TRANS+2(R0)    ;ADD ANY CARRY
4908  015536  132760  000002  000024          BITB    #BIT01,$CODE(R0)  ;SEE IF ORDER READ OR WRITE
4909  015544  001016                          BNE     2$              ;BRANCH IF ORDER WRITE
4910  015546  126027  000024  000001          CMPB    $CODE(R0),#1    ;PRESENT OPERATION AN AUTOMATIC WRITE CHECK ?
4911  015554  101005                          BHI     1$              ;BR IF NOT
4912  015556  066060  000020  000046          ADD     $WRDL(R0),$TRANS(R0)  ;ADD WORDS WRITTEN
4913  015564  005560  000050                  ADC     $TRANS+2(R0)    ;ADD A CARRY
4914  015570  063760  015626  000052  1$:     ADD     FACTOR,$READ(R0)  ;UPDATE THE READ WORD COUNT
4915  015576  005560  000054                  ADC     $READ+2(R0)     ;ADD ANY CARRY
4916  015602  026060  000012  000270  2$:     CMP     $CYL(R0),$RMDC(R0)  ;DID MID-TRANSFER SEEK OCCUR
4917  015610  001405                          BEQ     3$              ;BR IF NOT
4918  015612  062760  000001  000042          ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
4919  015620  005560  000044                  ADC     $POSIT+2(R0)    ;ADD CARRY TO UPPER WORD
4920  015624  000207                  3$:     RTS     PC
4921
4922  015626  000000                  FACTOR: .WORD   0               ;USED FOR WORDS TRANSFERED
4923
4924                                  ;ROUTINE TO GET A BUFFER
4925                                  ;CALL:
4926                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4927                                  ;       CLR     -(SP)           ;CLEAR THE STACK
4928                                  ;       JSR     PC,GETBUF
4929                                  ;       RETURN                  ;BUFFER ADDRESS WILL BE ON THE STACK
4930                                  ;                               ;STACK WILL BE ZERO IF NO BUFFER AVAILABLE
4931
4932  015630  010146                  GETBUF: MOV     R1,-(SP)        ;SAVE R1
4933  015632  010246                          MOV     R2,-(SP)        ;SAVE R2
4934  015634  010346                          MOV     R3,-(SP)        ;SAVE R3
4935  015636  013702  001700                  MOV     BUFTBL,R2       ;NUMBER OF SEPARATE BUFFERS
4936  015642  001444                          BEQ     6$              ;BR IF NONE AVAILABLE
4937  015644  012701  001702                  MOV     #BUFTBL+2,R1    ;FIRST ADDRESS OF ALLOCATION TABLE
4938  015650  026061  000020  000002  1$:     CMP     $WRDL(R0),2(R1) ;SEE IF THERE IS A BLOCK LARGE ENOUGH
4939  015656  101405                          BLOS    3$              ;BRANCH IF IT IS
```

```
4940  015660  005302                        DEC     R2              ;DECREMENT TABLE COUNT
4941  015662  001434                        BEQ     6$              ;BR IF THROUGH TABLE
4942  015664  062701  000004                ADD     #4,R1           ;INCREMENT TABLE POINTER
4943  015670  000767                        BR      1$              ;CONTINUE LOOKING
4944  015672  011166  000010          3$:   MOV     (R1),10(SP)     ;BUFFER ADDRESS TO STACK
4945  015676  166061  000020  000002        SUB     $WRDL(R0),2(R1) ;ADJUST BUFFER SIZE
4946  015704  001407                        BEQ     4$              ;BR IF DIFFERENCE IS ZERO
4947  015706  006360  000020                ASL     $WRDL(R0)       ;CONVERT # WORDS TO BYTES
4948  015712  066011  000020                ADD     $WRDL(R0),(R1)  ;MAKE NEW STARTING ADDRESS
4949  015716  006260  000020                ASR     $WRDL(R0)       ;RETURN # BYTES TO WORDS
4950  015722  000414                        BR      6$              ;RETURN
4951  015724  005337  001700          4$:   DEC     BUFTBL          ;DECREMENT ENTRIES COUNT
4952  015730  001411                        BEQ     6$              ;BR IF ALLOCATION TABLE EMPTY
4953  015732  005302                        DEC     R2              ;DECREMENT TABLE COUNT
4954  015734  001407                        BEQ     6$              ;BR IF ITEM WERE LAST ENTRY
4955  015736  010103                        MOV     R1,R3           ;MOVE TABLE POINTER
4956  015740  062703  000004                ADD     #4,R3           ;POINT TO NEXT ENTRY
4957  015744  012321                  5$:   MOV     (R3)+,(R1)+     ;MOVE ITEMS
4958  015746  012321                        MOV     (R3)+,(R1)+
4959  015750  005302                        DEC     R2              ;DECREMENT TABLE COUNT
4960  015752  001374                        BNE     5$              ;CONTINUE IF NOT AT END OF TABLE
4961  015754  012603                  6$:   MOV     (SP)+,R3        ;RESTORE R3
4962  015756  012602                        MOV     (SP)+,R2        ;RESTORE R2
4963  015760  012601                        MOV     (SP)+,R1        ;RESTORE R1
4964  015762  000207                        RTS     PC              ;RETURN
4965
4966
4967                                  ;ROUTINE TO PUT BUFFER BACK IN TABLE
4968                                  ;CALL:
4969                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
4970                                  ;       JSR     PC,RELBUF
4971                                  ;       RETURN
4972
4973  015764  010146                  RELBUF: MOV     R1,-(SP)        ;SAVE R1
4974  015766  010246                        MOV     R2,-(SP)        ;SAVE R2
4975  015770  010446                        MOV     R4,-(SP)        ;SAVE R4
4976  015772  010546                        MOV     R5,-(SP)        ;SAVE R5
4977  015774  012701  001702                MOV     #BUFTBL+2,R1    ;BEGINNING OF TABLE
4978  016000  013702  001700                MOV     BUFTBL,R2       ;ENTRY COUNT
4979  016004  001424                        BEQ     2$              ;BR IF EMPTY TABLE
4980  016006  016003  000020                MOV     $WRDL(R0),R3    ;TRIAL ADDRESS
4981  016012  006303                        ASL     R3              ;CHANGE TO BYTE COUNT
4982  016014  066003  000006                ADD     $BUF(R0),R3     ;ADDRESS OF HIGHER ADJACENT BLOCK
4983  016020  021103                  1$:   CMP     (R1),R3         ;UPPER ADJACENT BLOCK
4984  016022  001424                        BEQ     4$              ;BR IF YES
4985  016024  062701  000004                ADD     #4,R1           ;INCREMENT POINTER
4986  016030  005302                        DEC     R2              ;DECREMENT ENTRY COUNT
4987  016032  001372                        BNE     1$              ;CONTINUE SEARCHING
4988  016034  016011  000006                MOV     $BUF(R0),(R1)   ;PUT THE BUFFER BLOCK INTO THE TABLE
4989  016040  016061  000020  000002        MOV     $WRDL(R0),2(R1)  ;BLOCK SIZE
4990  016046  005237  001700                INC     BUFTBL          ;INCREMENT ENTRY COUNT
4991  016052  005202                        INC     R2              ;INCREMENT R2 FOR USE LATER
4992  016054  000414                        BR      5$              ;SEE IF A LOWER ADJACENT BLOCK IS IN THE TABLE
4993  016056  016021  000006          2$:   MOV     $BUF(R0),(R1)+  ;BLOCK ADDRESS TO TABLE
4994  016062  016021  000020                MOV     $WRDL(R0),(R1)+ ;SIZE TO TABLE
4995  016066  005237  001700                INC     BUFTBL          ;INCREMENT ENTRY COUNT
```

```
                                        BR      10$             ;EXIT
                                4$:     MOV     $BUF(R0),(R1)   ;RELEASED BUFFER IS LOWER ADJACENT
                                        ADD     $WRDL(R0),2(R1) ;INCREMENTED SIZE
                                5$:     MOV     R2,-(SP)        ;SAVE R2
                                        MOV     BUFTBL,R2       ;ENTRY COUNT
                                        MOV     #BUFTBL+2,R5    ;BEGINNING OF TABLE
                                6$:     MOV     2(R5),R4        ;BLOCK SIZE (IN WORDS)
                                        ASL     R4              ;CHANGE TO BYTE COUNT
                                        ADD     (R5),R4         ;ADD BLOCK BEGINNING ADDRESS
                                        CMP     R4,(R1)         ;R1 STILL POINTS TO INSERTED ENTRY
                                        BEQ     8$              ;LOWER ADJACENT IN TABLE
                                        ADD     #4,R5           ;INCREMENT POINTER
                                        DEC     R2              ;DECREMENT ENTRY COUNT
                                        BNE     6$              ;CONTINUE LOOKING
                                        TST     (SP)+           ;RESTORE STACK POINTER
                                        BR      10$             ;END
                                8$:     MOV     (SP)+,R2        ;RESTORE R2
                                        ADD     2(R1),2(R5)     ;INCREMENT LOWER BLOCK LENGTH
                                        DEC     BUFTBL          ;DECREMENT ENTRY COUNT
                                        MOV     R1,R5           ;GET READY TO COMPRESS
                                        ADD     #4,R5           ;INCREMENT TO NEXT ENTRY
                                9$:     MOV     (R5)+,(R1)+     ;COMPRESS TABLE
                                        MOV     (R5)+,(R1)+     ;MOVE SIZE FIELD DOWN
                                        DEC     R2              ;DECREMENT ENTRY COUNT
                                        BNE     9$              ;BR IF NOT FINISHED
                                10$:    MOV     (SP)+,R5        ;RESTORE R5
                                        MOV     (SP)+,R4        ;RESTORE R4
                                        MOV     (SP)+,R2        ;RESTORE R2
                                        MOV     (SP)+,R1        ;RESTORE R1
                                        RTS     PC              ;RETURN


                                ;FILL THE ASSIGNED BUFFER (IF WRITE OR WRITE CHECK ORDER)
                                ;CALL:
                                ;       MOV     #DPB,R0             ;DPB ADDRESS
                                ;       MOV     #BUFADR,$BUF(R0)    ;LOAD BUFFER ADDRESS INTO THE DPB
                                ;       MOVB    #PATTERN,$PATTC(R0) ;PATTERN CODE
                                ;       JSR     PC,FILBUF
                                ;       RETURN

 016214  104412                 FILBUF: SAVREG                  ;SAVE THE REGISTERS
 016216  132760  000004  000024         BITB    #BIT02,$CODE(R0)  ;SEE IF READ ORDER
 016224  001044                         BNE     4$              ;BR IF READ
 016226  016001  000006         1$:     MOV     $BUF(R0),R1     ;BUFFER ADDRESS
 016232  016002  000020                 MOV     $WRDL(R0),R2    ;POSITIVE WORD COUNT
 016236  132760  000001  000024         BITB    #BIT00,$CODE(R0)  ;SEE IF WRITE HEADER TYPE ORDER
 016244  001413                         BEQ     2$              ;BR IF NOT
 016246  016011  000012                 MOV     $CYL(R0),(R1)   ;CYLINDER ADDRESS
 016252  052711  010000                 BIS     #BIT12,(R1)     ;SET FMT22 BIT
 016256  052721  140000                 BIS     #140000,(R1)+   ;SET MFG AND USER BITS
 016262  016021  000010                 MOV     $SEC(R0),(R1)+  ;MOVE SECTOR & TRACK
 016266  162702  000002                 SUB     #2,R2           ;ADJUST THE WORD COUNT
 016272  003421                         BLE     4$              ;BR IF END OF PATTERN
 016274  005004                 2$:     CLR     R4              ;CLEAR R4
 016276  116004  000030                 MOVB    $PATTC(R0),R4   ;RELATIVE PATTERN ADDRESS
 016302  016405  002476                 MOV     STNDAT(R4),R5   ;PATTERN ADDRESS
```

```
5052  016306  012703  000020            3$:     MOV     #20,R3          ;PATTERN COUNT
5053  016312  012521                            MOV     (R5)+,(R1)+     ;MOVE THE PATTERN INTO THE BUFFER
5054  016314  005302                            DEC     R2              ;DECREMENT THE WORD COUNT
5055  016316  003407                            BLE     4$              ;BR IF DONE (WORD COUNT = 0)
5056  016320  005303                            DEC     R3              ;DECREMENT THE PATTERN COUNT
5057  016322  001373                            BNE     3$              ;BR IF MORE PATTERN
5058  016324  012703  000020                    MOV     #20,R3          ;RESTORE PATTERN COUNT
5059  016330  016405  002476                    MOV     STNDAT(R4),R5   ;RESTORE THE ADDRESS
5060  016334  000766                            BR      3$              ;CONTINUE DISTRIBUTING THE PATTERN
5061  016336  104413                    4$:     RESREG                  ;RESTORE THE REGISTERS
5062  016340  000207                            RTS     PC              ;RETURN
5063
5064                                    ;START THE ORDER FOR THE DPB IN R0
5065                                    ;CALL:
5066                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
5067                                    ;       JSR     PC,GODRIV
5068                                    ;       RETURN
5069
5070  016342  010046                    GODRIV: MOV     R0,-(SP)        ;SAVE R0
5071  016344  010037  016354                    MOV     R0,2$           ;CURRENT DPB ADDRESS
5072  016350  004037  035364            1$:     JSR     R0,RM03         ;CALL THE DRIVE HANDLER
5073  016354  000000            2$:     .WORD   0                       ;DRIVE BLOCK ADDRESS GOES HERE
5074  016356  000000                            HALT                    ;DRIVER REJECTED REQUEST
5075  016360  012600                            MOV     (SP)+,R0        ;RESTORE R0
5076  016362  062760  000001  000036            ADD     #1,$OPERC(R0)   ;INCREMENT THE OPERATION COUNT
5077  016370  005560  000040                    ADC     $OPERC+2(R0)
5078  016374  026060  000034  000012            CMP     $PREVA+2(R0),$CYL(R0)  ;DID ORDER REQUIRE A CYLINDER CHANGE
5079  016402  001405                            BEQ     3$              ;BR IF NOT
5080  016404  062760  000001  000042            ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
5081  016412  005560  000044                    ADC     $POSIT+2(R0)    ;ADD ANY CARRY
5082  016416  000207                    3$:     RTS     PC
5083
5084                                    ;GENERATE PARAMETERS FOR THE OPERATION
5085                                    ;CALL:
5086                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
5087                                    ;       JSR     PC,SELPAR
5088                                    ;       RETURN
5089
5090  016420  004737  033652            SELPAR: JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
5091  016424  032777  000001  162522            BIT     #SWO,@SWR       ;SEE IF SWO SET
5092  016432  001012                            BNE     2$              ;BR IF SET - READ ONLY
5093  016434  012705  000010            1$:     MOV     #10,R5          ;READ/WRITE SELECTION DIVISOR
5094  016440  004737  027474                    JSR     PC,GETREM       ;GET SELECTION VALUE
5095  016444  020537  001500                    CMP     R5,RATIO        ;DETERMINE IF READ OR WRITE
5096  016450  103003                            BHIS    2$              ;BR IF READ
5097  016452  004737  017276                    JSR     PC,RANWRT       ;SELECT A WRITE ORDER
5098  016456  000410                            BR      THEAD           ;SELECT ADDRESS
5099  016460  013705  033752            2$:     MOV     $LONUM,R5       ;SELECT READ OPERATION CODE
5100  016464  042705  177776                    BIC     #^C1,R5         ;MASK OUT ALL BUT BIT 0
5101  016470  062705  000004                    ADD     #4,R5           ;TABLE OFFSET FOR READ CODE
5102  016474  110560  000074                    MOVB    R5,$NCODE(R0)   ;ORDER SELECTION CODE TO CONTROL BLOCK
5103  016500  005737  001512            THEAD:  TST     HEADER  ;ENABLE RANDOM ADDRESS SELECT ?
5104  016504  001425                            BEQ     RANSEC          ;YES
5105  016506  016060  000242  000076            MOV     $RMDA(R0),$NSEC(R0)     ;SECTOR AND TRACK
5106  016514  016060  000270  000100            MOV     $RMDC(R0),$NCYL(R0) ;CYLINDER NUMBER
5107  016522  026060  000100  000106            CMP     $NCYL(R0),MAXCYL(R0) ;OVER MAX CYLINDER #  ?
```

```
5108  016530  103520                          BLO     XWCNT                   ;NO
5109  016532  016060  000110  000100          MOV     MINCYL(R0),$NCYL(R0) ;RESET CYLINDER NUMBER
5110  016540  116060  000120  000076          MOVB    MINSEC(R0),$NSEC(R0) ;RESET SECTOR NUMBER
5111  016546  116060  000114  000077          MOVB    MINTRK(R0),$NTRK(R0) ;RESET TRACK NUMBER
5112  016554  000137  016772                  JMP     XWCNT                   ;SELECT BUFFER SIZE
5113
5114                                  ;GENERATE A RANDOM SECTOR ADDRESS BETWEEN VALUES 'MINSEC' & 'MAXSEC'
5115
5116  016560  016005  000116          RANSEC: MOV     MAXSEC(R0),R5   ;GET MAXIMUM SECTOR ADDRESS
5117  016564  026005  000120                  CMP     MINSEC(R0),R5   ;'MINSEC' AND 'MAXSEC' THE SAME ?
5118  016570  001417                          BEQ     2$              ;BR IF THEY ARE
5119  016572  166005  000120                  SUB     MINSEC(R0),R5   ;SUBTRACT MINIMUM SECTOR ADDRESS
5120  016576  100002                          BPL     1$              ;BR IF MAX LARGER THAN MIN
5121  016600  062705  000040                  ADD     #32.,R5         ;CORRECT THE NUMBER
5122  016604  005205                  1$:     INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5123  016606  004737  027474                  JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5124  016612  066005  000120                  ADD     MINSEC(R0),R5   ;NEW ADDRESS
5125  016616  020527  000037                  CMP     R5,#31.         ;IS VALUE TOO LARGE ?
5126  016622  101402                          BLOS    2$              ;BR IF NOT
5127  016624  162705  000040                  SUB     #32.,R5         ;CORRECT VALUE
5128  016630  110560  000076          2$:     MOVB    R5,$NSEC(R0)    ;STORE SECTOR ADDRESS IN DPB
5129
5130                                  ;GENERATE A RANDOM TRACK ADDRESS BETWEEN VALUES 'MINTRK' & 'MAXTRK'
5131
5132  016634  016005  000112          RANTRK: MOV     MAXTRK(R0),R5   ;GET MAXIMUM TRACK ADDRESS
5133  016640  026005  000114                  CMP     MINTRK(R0),R5   ;'MINTRK' AND 'MAXTRK' THE SAME ?
5134  016644  001417                          BEQ     2$              ;BR IF THEY ARE
5135  016646  166005  000114                  SUB     MINTRK(R0),R5   ;SUBTRACT MINIMUM TRACK ADDRESS
5136  016652  100002                          BPL     1$              ;BR IF MAX LARGER THAN MIN
5137  016654  062705  000005                  ADD     #5.,R5          ;CORRECT THE NUMBER
5138  016660  005205                  1$:     INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5139  016662  004737  027474                  JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5140  016666  066005  000114                  ADD     MINTRK(R0),R5   ;NEW TRACK ADDRESS
5141  016672  020527  000004                  CMP     R5,#4.          ;IS VALUE TOO LARGE ?
5142  016676  101402                          BLOS    2$              ;BR IF NOT
5143  016700  162705  000005                  SUB     #5.,R5          ;CORRECT VALUE
5144  016704  110560  000077          2$:     MOVB    R5,$NTRK(R0)    ;STORE TRACK ADDRESS IN DPB
5145
5146                                  ;GENERATE A RANDOM CYLINDER ADDRESS BETWEEN VALUES 'MINCYL' & 'MAXCYL'
5147
5148  016710  016037  000106  001446          MOV     MAXCYL(R0),CYLIMT       ;ASSUME AN RM03
5149  016716  016005  000106          RANCYL: MOV     MAXCYL(R0),R5   ;GET MAXIMUM CYLINDER ADDRESS
5150  016722  026005  000110                  CMP     MINCYL(R0),R5   ;'MINCYL' AND 'MAXCYL' THE SAME ?
5151  016726  001417                          BEQ     2$              ;BR IF THEY ARE
5152  016730  166005  000110                  SUB     MINCYL(R0),R5   ;SUBTRACT MINIMUM CYLINDER ADDRESS
5153  016734  100002                          BPL     1$              ;BR IF MAX LARGER THAN MIN
5154  016736  063705  001446                  ADD     CYLIMT,R5       ;CORRECT THE NUMBER
5155  016742  005205                  1$:     INC     R5              ;INCREMENT DIFFERENCE TO USE AS DIVISOR
5156  016744  004737  027474                  JSR     PC,GETREM       ;GET THE RANDOM AUGMENT
5157  016750  066005  000110                  ADD     MINCYL(R0),R5   ;NEW CYLINDER ADDRESS
5158  016754  023705  001446                  CMP     CYLIMT,R5       ;IS VALUE TOO LARGE ?
5159  016760  003002                          BGT     2$              ;BR IF NOT
5160  016762  016005  000110                  MOV     MINCYL(R0),R5   ;CORRECT VALUE
5161  016766  010560  000100          2$:     MOV     R5,$NCYL(R0)    ;STORE CYLINDER ADDRESS IN DPB
5162  016772  132760  000001  000074  XWCNT:  BITB    #BIT00,$NCODE(R0) ;HEADER OPERATION INVOLED ?
5163  017000  001414                          BEQ     RANSIZ          ;NO
```

```
5164  017002  012760  000402  000102          MOV     #258.,$NWRDL(R0)  ;CHANGE WORD LENGTH TO 258 FOR WRTHD ORDER
5165  017010  122760  000005  000074  3$:     CMPB    #5,$NCODE(R0)     ;READ HEADER AND DATA ?
5166  017016  001461                          BEQ     RANXIT            ;YES
5167  017020  004537  017172                  JSR     R5,CHKADR         ;IF WRITE HEAD AND DATA COMMAND
5168                                                                    ;AVOID WRITING BAD SPOT HEADER
5169  017024  000452                          BR      RANPAT            ;BRANCH IF NOT ON BAD SPOT
5170  017026  000137  016420                  JMP     SELPAR            ;SELECT THE PARAMETERS AGAIN
5171
5172                                  ;GENERATE A RANDOM BUFFER LENGTH BETWEEN 4 & THE VALUE IN 'MAXDL'
5173
5174  017032  013705  001462          RANSIZ: MOV     MAXDL,R5          ;GET BUFFER SIZE
5175  017036  005737  001476                  TST     WCSEL             ;SELECT A RANDOM WORD COUNT ?
5176  017042  001010                          BNE     1$                ;BR IF NOT
5177  017044  005205                          INC     R5                ;INCREMENT THE MAXIMUM SIZE
5178  017046  004737  027474                  JSR     PC,GETREM         ;DIVIDE BY MAX VALUE
5179  017052  005705                          TST     R5                ;IS THE REMAINDER 0 ?
5180  017054  001003                          BNE     1$                ;NOT 0, CONTINUE
5181  017056  004737  033652                  JSR     PC,$RAND          ;CYCLE THE RANDOM NUMBER GENERATOR
5182  017062  000763                          BR      RANSIZ            ;TRY AGAIN
5183  017064  022705  000004          1$:     CMP     #4,R5             ;LESS THAN 4 ?
5184  017070  003403                          BLE     2$                ;NO
5185  017072  012705  000004                  MOV     #4,R5             ;SET SIZE TO 4
5186  017076  000405                          BR      3$
5187  017100  023705  001462          2$:     CMP     MAXDL,R5          ;LARGE THAN MAX ALLOWED ?
5188  017104  101002                          BHI     3$                ;NO
5189  017106  013705  001462                  MOV     MAXDL,R5          ;RESET COUNTER
5190  017112  132760  000004  000074  3$:     BITB    #BIT02,$NCODE(R0) ;READ OPERATION ?
5191  017120  001006                          BNE     4$                ;YES
5192  017122  042705  000377                  BIC     #377,R5           ;SECTOR BOUNDARY FOR WRITE OP
5193  017126  005705                          TST     R5                ;NONE
5194  017130  003002                          BGT     4$                ;NO
5195  017132  012705  000400                  MOV     #400,R5           ;AT LEAST ONE SECTOR
5196  017136  010560  000102          4$:     MOV     R5,$NWRDL(R0)     ;WORD COUNT
5197  017142  132760  000004  000074          BITB    #BIT02,$NCODE(R0) ;READ OP ?
5198  017150  001004                          BNE     RANXIT            ;YES
5199                                  ;GET A RANDOM PATTERN NUMBER
5200
5201  017152  004737  017332          RANPAT: JSR     PC,GETPAT         ;GET PATTERN CODE
5202  017156  110560  000075                  MOVB    R5,$NPATC(R0)     ;MOVE PATTERN CODE TO CONTROL BLOCK
5203  017162  012760  177777  000104  RANXIT: MOV     #-1,$NEXT(R0)     ;SET PARAMETERS SELECTED INDICATOR
5204  017170  000207                          RTS     PC                ;RETURN
5205
5206                                  ;ROUTINE TO CHECK THE SELECTED ADDRESS IS NOT ON THE BAD SPOT
5207                                  ;CALLING SEQ
5208                                  ;       R0=DPB ADDRESS
5209                                  ;       JSR     R5,CHKADR
5210                                  ;       RET1                      NORMAL RETURN
5211                                  ;       RET2                      ERROR RET
5212
5213  017172                          CHKADR:
5214  017172  010146                          MOV     R1,-(SP)          ;;PUSH R1 ON STACK
5215  017174  010246                          MOV     R2,-(SP)          ;;PUSH R2 ON STACK
5216  017176  010346                          MOV     R3,-(SP)          ;;PUSH R3 ON STACK
5217  017200  012701  000020                  MOV     #16.,R1           ;TOTAL 16 SETS OF BAD SECTOR ADDRESSES
5218  017204  010002                          MOV     R0,R2             ;TABLE ADDRESS
5219  017206  062702  000124                  ADD     #$BDSEC,R2        ;DBP ADDRESS + TABLE ADDRES OFFSET
```

```
5220  017212  022712  177777          1$:     CMP     #-1,(R2)            ;EMPTY ENTRY ?
5221  017216  001423                          BEQ     3$                  ;BRANCH IF SO
5222  017220  026012  000100                  CMP     $NCYL(R0),(R2)      ;ON THE SAME CYLINDER ?
5223  017224  001013                          BNE     2$                  ;BRANCH IF NOT
5224  017226  126062  000011  000003          CMPB    $TRK(R0),3(R2)      ;ON THE SAME TRACK ?
5225  017234  001007                          BNE     2$                  ;BRANCH IF NOT
5226  017236  126062  000010  000002          CMPB    $SEC(R0),2(R2)      ;ON THE SAME SECTOR ?
5227  017244  001003                          BNE     2$                  ;BRANCH IF NOT
5228  017246  062705  000002                  ADD     #2,R5               ;OTHERWISE,TAKE ERROR EXIT
5229  017252  000405                          BR      3$                  ;EXIT
5230  017254  005301                  2$:     DEC     R1                  ;ALL 16 BAD SPOT CHECKED ?
5231  017256  003403                          BLE     3$                  ;BRANCH IF SO
5232  017260  062702  000004                  ADD     #4,R2               ;ADJUST TO NEXT TABLE ENTRY
5233  017264  000752                          BR      1$                  ;LOOP BACK
5234  017266                          3$:
5235  017266  012603                          MOV     (SP)+,R3            ;;POP STACK INTO R3
5236  017270  012602                          MOV     (SP)+,R2            ;;POP STACK INTO R2
5237  017272  012601                          MOV     (SP)+,R1            ;;POP STACK INTO R1
5238  017274  000205                          RTS     R5                  ;RETRUN
5239
5240                                  ;ROUTINE TO SELECT A WRITE (OR WRITE HEAD AND DATA) OPERATION
5241
5242  017276  012705  000002          RANWRT: MOV     #2,R5               ;SET WRITE DATA COMMAND
5243  017302  005737  001474                  TST     FORMAT              ;ALLOW FORMAT OPERATION ?
5244  017306  001406                          BEQ     1$                  ;NO
5245  017310  122760  000004  000024          CMPB    #4,$CODE(R0)        ;PREVIOUS A READ DATA COMMAND ?
5246  017316  001002                          BNE     1$                  ;NO
5247  017320  012705  000003                  MOV     #3,R5               ;SET A WRITE HEAD AND DATA COMMAND
5248  017324  110560  000074          1$:     MOVB    R5,$NCODE(R0)       ;SELECT THE WRITE COMMAND
5249  017330  000207                          RTS     PC                  ;EXIT
5250
5251                                  ;ROUTINE TO SELECT A PATTERN
5252
5253  017332  012705  000020          GETPAT: MOV     #20,R5              ;SELECT PATTERN
5254  017336  005737  001510                  TST     PATTEN              ;ENABLE RANDOM PATTERN SELECTION ?
5255  017342  001403                          BEQ     2$                  ;YES
5256  017344  013705  001510                  MOV     PATTEN,R5           ;USE INDEXED PATTERN
5257  017350  000407                          BR      1$                  ;NO
5258  017352  004737  027474          2$:     JSR     PC,GETREM           ;GET CODE
5259  017356  005705                          TST     R5                  ;WAS PATTERN ZERO SELECTED ?
5260  017360  001003                          BNE     1$                  ;BR IF NOT ZERO
5261  017362  004737  033652                  JSR     PC,$RAND            ;CYCLE THE RANDOM NUMBER GENERATOR
5262  017366  000761                          BR      GETPAT              ;TRY AGAIN
5263  017370  006305                  1$:     ASL     R5                  ;MAKE CODE INTO TABLE INDEX
5264  017372  000207                          RTS     PC
5265
5266                                  ;ROUTINE TO GET THE PREVIOUSLY SELECTED PARAMETER VALUES
5267                                  ;CALL:
5268                                  ;       MOV     #DPB,R0             ;DPB ADDRESS
5269                                  ;       JSR     PC,SELPAR           ;SELECT THE PARAMETERS
5270                                  ;       JSR     PC,GETPAR
5271                                  ;       RETURN
5272
5273  017374  010546                  GETPAR: MOV     R5,-(SP)            ;SAVE R5
5274  017376  116060  000234  000027          MOVB    $RMCS1(R0),$PREV0(R0)  ;SAVE CURRENT PARAMETERS
5275  017404  142760  177701  000027          BICB    #1C76,$PREV0(R0)        ;STRIP GO,AND IE BITS
```

```
5276  017412  032760  000006  000074          BIT     #6,$NCODE(R0)   ;SEE IF NEXT OPERATION IS READ OR WRITE
5277  017420  001007                          BNE     1$              ;BR IF EITHER
5278  017422  016060  000012  000034          MOV     $CYL(R0),$PREVA+2(R0)   ;SAVE STARTING CYLINDER
5279  017430  016060  000010  000032          MOV     $SEC(R0),$PREVA(R0)   ;SAVE STARTING SECTOR AND TRACK
5280  017436  000410                          BR      22$
5281  017440  004737  022502          1$:     JSR     PC,READDR       ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
5282  017444  012660  000034                  MOV     (SP)+,$PREVA+2(R0)      ;CYLINDER ADDRESS
5283  017450  112660  000033                  MOVB    (SP)+,$PREVA+1(R0)   ;TRACK ADDRESS
5284  017454  112660  000032                  MOVB    (SP)+,$PREVA(R0)   ;SECTOR ADDRESS
5285                                          MOV     $CYL(R0),$PREVA+2(R0)   ;CURRENT CYLINDER
5286  017460  032777  000100  161466  22$:    BIT     #SWO6,@SWR      ;SWITCH 6 SET ?
5287  017466  001073                          BNE     5$              ;BR IF SET
5288  017470  116060  000074  000024          MOVB    $NCODE(R0),$CODE(R0)   ;LOGICAL CODE FOR OPERATION
5289  017476  116005  000074                  MOVB    $NCODE(R0),R5   ;LOAD R5 FOR USE AS TABLE INDEX
5290  017502  116560  002122  000002          MOVB    COMTBL(R5),$COMND(R0)   ;RM03 COMMAND CODE
5291  017510  122760  000151  000002          CMPB    #151,$COMND(R0) ;WRITE CHECK DATA COMMAND ?
5292  017516  001013                          BNE     3$              ;NO,DONOT CARE
5293  017520  122760  000060  000027          CMPB    #60,$PREVO(R0)  ;PREVIOUS A WRITE DATA COMMAND ?
5294  017526  001420                          BEQ     4$              ;YES,O K
5295  017530  112760  000171  000002  2$:     MOVB    #171,$COMND(R0) ;CHANG TO READ DATA COMMAND
5296  017536  112760  000004  000024          MOVB    #4,$CODE(R0)    ;CODE NUMBER CHANGED TO READ DATA
5297  017544  000411                          BR      4$              ;EXIT
5298  017546  122760  000153  000002  3$:     CMPB    #153,$COMND(R0) ;WRITE CHECK HEAD AND DATA COMMAND ?
5299  017554  001005                          BNE     4$              ;NO,THEN EXIT
5300  017556  122760  000062  000027          CMPB    #62,$PREVO(R0)  ;PREVIOUS A WRITE HEAD AND DATA COMMAND?
5301  017564  001401                          BEQ     4$              ;YES,EXIT
5302  017566  000760                          BR      2$              ;SET TO READ DATA COMMAND
5303  017570                          4$:
5304  017570  116060  000075  000030          MOVB    $NPATC(R0),$PATTC(R0)   ;PATTERN CODE
5305  017576  016060  000076  000010          MOV     $NSEC(R0),$SEC(R0)   ;TRACK AND SECTOR ADDRESSES
5306  017604  016060  000100  000012          MOV     $NCYL(R0),$CYL(R0)   ;CYLINDER ADDRESS
5307  017612  016060  000102  000020          MOV     $NWRDL(R0),$WRDL(R0)   ;BUFFER SIZE
5308  017620  016060  000102  000004          MOV     $NWRDL(R0),$WRDM(R0)   ;WORD COUNT FOR THE RH11
5309  017626  005460  000004                  NEG     $WRDM(R0)       ;COMPLEMENT IT
5310  017632  012760  000400  000022          MOV     #256.,$SSEC(R0) ;INITIAL VALUE OF SECTOR SIZE
5311  017640  032760  000001  000024          BIT     #1,$CODE(R0)    ;HEADER OPERATION ?
5312  017646  001403                          BEQ     5$              ;BR IF NOT
5313  017650  062760  000002  000022          ADD     #2,$SSEC(R0)    ;ADD HEADER SIZE
5314  017656  005060  000104          5$:     CLR     $NEXT(R0)       ;RESET 'PARAMETERS LOADED' INDICATOR
5315  017662  012605                          MOV     (SP)+,R5        ;RESTORE R5
5316  017664  000207                          RTS     PC              ;RETURN
5317
5318                                  ;ROUTINE TO COMPRESS A LIST
5319                                  ;CALL:
5320                                  ;       MOV     #ADDRS,R1       ;COMPRESS LIST STARTING AT THIS ADDRESS
5321                                  ;       JSR     PC,CMPRES
5322                                  ;       RETURN
5323
5324  017666  016111  000002          CMPRES: MOV     2(R1),(R1)      ;COMPRESS THE TABLE IN R1
5325  017672  001403                          BEQ     1$              ;BR WHEN ZERO FOUND
5326  017674  062701  000002                  ADD     #2,R1           ;INCREMENT R1
5327  017700  000772                          BR      CMPRES          ;CONTINUE COMPRESSING TABLE
5328  017702  000207                  1$:     RTS     PC              ;RETURN
5329
5330                                  ;ROUTINE TO SETUP PARAMETERS FOR A SEQUENTIAL READ OR WRITE OF THE DISK
5331                                  ;CALL:
```

```
5332                                            ;       MOV     #DPB,R0         ;DPB ADDRESS
5333                                            ;       MOV     #-1,$PACK(R0)   ;'WRITE PACK' FLAG
5334                                            ;   OR
5335                                            ;       MOV     #1,$PACK(R0)    ;'READ PACK' FLAG
5336                                            ;       JSR     PC,WRTPK
5337                                            ;       RETURN
5338
5339  017704  004737  033652          WRTPK:  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
5340  017710  005760  000040                  TST     $OPERC+2(R0)    ;SEE IF FIRST OPERATION
5341  017714  001007                          BNE     WRTPK1          ;BR IF UPPER WORD OF COUNTER NOT ZERO
5342  017716  005760  000036                  TST     $OPERC(R0)      ;LOWER WORD ZERO ?
5343  017722  001004                          BNE     WRTPK1          ;BR IF NOT 1ST OPERATION
5344  017724  105760  000026                  TSTB    $PACK(R0)       ;SEE WHICH - 'R' OR 'W'
5345  017730  100530                          BMI     WRTPK3          ;BR IF 'W'
5346  017732  000515                          BR      WRTPK2          ;'R' OPERATION
5347  017734  116060  000234  000027  WRTPK1: MOVB    $RMCS1(R0),$PREVO(R0)   ;SAVE CURRENT PARAMETERS
5348  017742  004737  022502                  JSR     PC,READDR       ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
5349  017746  012660  000034                  MOV     (SP)+,$PREVA+2(R0)      ;CYLINDER ADDRESS
5350  017752  112660  000033                  MOVB    (SP)+,$PREVA+1(R0)      ;TRACK ADDRESS
5351  017756  112660  000032                  MOVB    (SP)+,$PREVA(R0)        ;SECTOR ADDRESS
5352  017762  016060  000242  000010          MOV     $RMDA(R0),$SEC(R0)      ;NEW SECTOR & TRACK ADDRESS
5353  017770  016060  000270  000012          MOV     $RMDC(R0),$CYL(R0)      ;NEW CYLINDER ADDRESS
5354  017776  026060  000012  000106          CMP     $CYL(R0),MAXCYL(R0)     ;SEE IF AT END
5355  020004  103436                          BLO     2$              ;BR IF LESS THAN 'MAXCYL'
5356  020006  101004                          BHI     1$              ;BR IF GREATER THAN 'MAXCYL'
5357  020010  126060  000011  000112          CMPB    $TRK(R0),MAXTRK(R0)     ;SEE IF AT MAX TRACK
5358  020016  103431                          BLO     2$              ;BR IF NOT GREATER
5359  020020  116060  000114  000011  1$:     MOVB    MINTRK(R0),$TRK(R0)     ;RESET TRACK ADDRESS
5360  020026  116060  000120  000010          MOVB    MINSEC(R0),$SEC(R0)     ;RESET SECTOR ADDRESS
5361  020034  016060  000110  000012          MOV     MINCYL(R0),$CYL(R0)     ;RESET CYLINDER ADDRESS
5362  020042  112760  000004  000024          MOVB    #4,$CODE(R0)    ;SET CODE TO READ DATA
5363  020050  122760  177776  000026          CMPB    #-2,$PACK(R0)   ;WT OPERATION IN PROCESSING
5364  020056  001475                          BEQ     WRTPK5          ;YES
5365  020060  004737  027166                  JSR     PC,EOP2         ;DROP THE DRIVE (NORMAL TERMINATION)
5366  020064  032777  000020  161062          BIT     #SW04,@SWR      ;IS SWITCH 4 SET ?
5367  020072  001003                          BNE     2$              ;BR IF SET
5368  020074  005726                          TST     (SP)+           ;INCREMENT THE STACK POINTER
5369  020076  000137  005420                  JMP     MAIN            ;RETURN DIRECTLY TO 'MAIN'
5370  020102  013760  001462  000020  2$:     MOV     MAXDL,$WRDL(R0)         ;BUFFER SIZE IS MAXIMUM
5371  020110  042760  000377  000020          BIC     #377,$WRDL(R0)  ;SECTOR BOUNDRY FOR WRITTING
5372  020116  013760  001462  000004          MOV     MAXDL,$WRDM(R0)         ;WORD COUNT
5373  020124  042760  000377  000004          BIC     #377,$WRDM(R0)  ;SECTOR BOUNDRY FOR WRITTING
5374  020132  005760  000004                  TST     $WRDM(R0)       ;SIZE=0 ?
5375  020136  003006                          BGT     3$              ;NO
5376  020140  012760  000400  000004          MOV     #400,$WRDM(R0)  ;SET TO ONE SECTOR
5377  020146  012760  000400  000020          MOV     #400,$WRDL(R0)  ;SET ONE SECTOR
5378  020154  005460  000004          3$:     NEG     $WRDM(R0)       ;CHANGE WORD COUNT TO 2'S COMPLEMENT
5379  020160  105760  000026                  TSTB    $PACK(R0)       ;READ OR WRITE ?
5380  020164  100412                          BMI     WRTPK3          ;BR IF WRITE
5381  020166  012760  000402  000022  WRTPK2: MOV     #258.,$SSEC(R0)         ;SECTOR SIZE FOR READ
5382  020174  112760  000005  000024          MOVB    #5,$CODE(R0)    ;CODE FOR READ HEADER & DATA
5383  020202  112760  000173  000002          MOVB    #RDHD,$COMND(R0)        ;DRIVE CODE FOR OPERATION
5384  020210  000415                          BR      WRTPK4          ;SET UP FOR EXIT
5385  020212  012760  000400  000022  WRTPK3: MOV     #256.,$SSEC(R0) ;SECTOR SIZE
5386  020220  112760  000002  000024          MOVB    #2,$CODE(R0)    ;CODE FOR WRTDAT
5387  020226  112760  000161  000002          MOVB    #WRTDAT,$COMND(R0)      ;OP CODE
```

```
5388  020234  004737  017332          JSR     PC,GETPAT       ;GET PATTERN CODE
5389  020240  110560  000030          MOVB    R5,$PATTC(R0)   ;PATTERN CODE
5390  020244  005060  000104  WRTPK4: CLR     $NEXT(R0)       ;CLEAR 'PARAMETER SELECTED' INDICATOR
5391  020250  000207                  RTS     PC              ;RETURN
5392  020252  005037  001316  WRTPK5: CLR     PACK            ;CLEAR WT FLAG
5393  020256  105060  000026          CLRB    $PACK(R0)       ;CLEAR WT FLAG
5394  020262  005726                  TST     (SP)+           ;CLEAR STACK LEVEL
5395  020264  000137  005420          JMP     MAIN            ;JUMP TO MAIN BACKGROUND LOOP
5396
5397                                  ;ROUTINE TO DETERMINE OF ERROR IS AT A LOCATION ON THE PACK DEFINED
5398                                  ;       IN THE BAD TRACK/SECTOR TABLE FOR THE DRIVE.
5399                                  ;CALL:
5400                                  ;       JSR     PC,SPOTCK
5401                                  ;       RETURN1                 ;ERROR AT AN ADDRESS IN TABLE
5402                                  ;       RETURN2                 ;NO TABLE ENTRY FOR ERROR ADDRESS OR
5403                                  ;                               ;PARAMETER 'NOTPRT' IS 0
5404
5405  020270                          SPOTCK:
5406  020270  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5407  020272  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5408  020274  012701  000124          MOV     #$BDSEC,R1      ;INCREMENT FOR BAD SECTOR TABLE
5409  020300  060001                  ADD     R0,R1           ;ADD THE BLOCK'S STARTING ADDRESS
5410  020302  012702  000020          MOV     #16.,R2         ;BAD SECTOR TABLE SIZE COUNT
5411  020306  004737  022502  1$:     JSR     PC,READDR       ;DECREMENT THE SECTOR/TRACK ADDRESS
5412  020312  021126                  CMP     (R1),(SP)+      ;ON THE SAME CYLINDER ?
5413  020314  001007                  BNE     2$              ;BRANCH IF NOT
5414  020316  122661  000003          CMPB    (SP)+,3(R1)     ;COMPARE THE TRACK ADDRESS
5415  020322  001005                  BNE     3$              ;BR IF IT IS NOT EQUAL
5416  020324  122661  000002          CMPB    (SP)+,2(R1)     ;COMPARE THE SECTOR ADDRESS
5417  020330  001003                  BNE     4$              ;BR IF NOT EQUAL
5418  020332  000411                  BR      5$              ;CHECK 'NOTPRT'
5419  020334  005726          2$:     TST     (SP)+           ;CLEAR OFF THE STACK
5420  020336  005726          3$:     TST     (SP)+           ;INCREMENT THE STACK POINTER
5421  020340  062701  000004  4$:     ADD     #4,R1           ;GO TO THE NEXT LOCATION IN THE TABLE
5422  020344  005711                  TST     (R1)            ;PAST THE TABLE ENTRIES ?
5423  020346  100411                  BMI     6$              ;BR IF PAST
5424  020350  005302                  DEC     R2              ;DECREMENT THE MAXIMUM ENTRY COUNT
5425  020352  001355                  BNE     1$              ;BR IF MORE TO CHECK
5426  020354  000406                  BR      6$              ;END, EXIT
5427  020356  005737  001504  5$:     TST     NOTPRT          ;PRINT THE ERROR ANYWAY ?
5428  020362  001006                  BNE     7$              ;BR IF NOT
5429  020364  012737  177777  001362  MOV     #-1,BADSEC      ;SET THE INDICATOR FOR THE IDENTIFICATION LINE
5430  020372  062766  000002  000004  6$:     ADD     #2,4(SP)        ;INCREMENT THE RETURN
5431  020400                          7$:
5432  020400  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
5433  020402  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
5434  020404  000207                  RTS     PC              ;RETURN
5435
5436                                  ;;*****************************************************************
5437
5438                                  .SBTTL  ERROR MESSAGE GENERATION ROUTINES
5439
5440                                  ;;*****************************************************************
5441
5442                                  ;PRINT LINE 1 OF ERROR MESSAGE:
5443                                  ;'HH:MM:SS'
```

```
5444
5445  020406  032777  002000  160540  LINE1:  BIT     #SW10,@SWR      ;SWITCH 10 SET ?
5446  020414  001402                          BEQ     1$              ;BR IF NOT
5447  020416  104401  001174                  TYPE    ,$BELL          ;RING THE BELL
5448  020422  032777  020000  160524  1$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT ?
5449  020430  001407                          BEQ     2$              ;BR IF NOT
5450  020432  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
5451  020436  104414  001201                  DISPLY  ,$CRLF          ;CRLF
5452  020442  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
5453  020446  000404                          BR      3$              ;EXIT
5454  020450  004737  023670          2$:     JSR     PC,$TIME        ;TYPE THE TIME
5455  020454  104414  053247                  DISPLY  ,LINSPO         ;SPACES
5456  020460  000207                  3$:     RTS     PC              ;RETURN & TYPE DESCRIPTION
5457
5458                                  ;PRINT LINE 2 OF ERROR MESSAGE
5459                                  ;'PRESENT ORDER = XXXX  PREVIOUS ORDER = XXXX'
5460                                  ;'* ERROR AT BAD TRACK/SECTOR'
5461                                  ;'DRV RMCS1   RMCS2   RMDS1   RMER1   RMMR2   RMER2   RMEC1   RMEC2'
5462                                  ;'RMWC    RMBA    RMDA    RMAS    RMLA    RMDB    RMMR1   RMDT'
5463                                  ;'RMSN    RMOF    RMDC    RMCC    STATUS'
5464                                  ;'BUS ADDRESS OR WORD COUNT NOT CONSISTENT'
5465                                  ;'RMBA = XXXXXX   RMWC = XXXXXX'
5466                                  ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'
5467
5468  020462                  LINE2:
5469  020462  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5470  020464  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
5471  020466  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5472  020470  104414  001201                  DISPLY  ,$CRLF          ;CR-LF
5473  020474  005037  020622                  CLR     4$              ;CLEAR MESSAGE ADDRESS STORAGE
5474  020500  005004                          CLR     R4              ;WORKING REGISTER
5475  020502  012737  051352  020622          MOV     #LIN2C,4$       ;ADDRESS OF 'PRESENT ORDER = ' MSG
5476  020510  116004  000234                  MOVB    $RMCS1(R0),R4   ;GET THE OPCODE
5477  020514  042704  177701                  BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
5478  020520  004737  020556                  JSR     PC,1$           ;TYPE THE FIRST MNEMONIC
5479  020524  005737  020626                  TST     5$              ;SEE IF MNEMONIC ENTRY FOUND
5480  020530  001440                          BEQ     LINE2A          ;BR IF NOT
5481  020532  012737  051373  020622          MOV     #LIN2P,4$       ;ADDRESS OF 'PREVIOUS ORDER = ' MSG
5482  020540  116004  000027                  MOVB    $PREVO(R0),R4   ;PREVIOUS OPERATION CODE
5483  020544  042704  177701                  BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
5484  020550  004737  020556                  JSR     PC,1$           ;TYPE THE PREVIOUS MNEMONIC
5485  020554  000426                          BR      LINE2A          ;CONTINUE
5486  020556  005005                  1$:     CLR     R5              ;CLEAR THE TABLE INDEX
5487  020560  126504  002130          2$:     CMPB    OPTBL(R5),R4    ;LOOK FOR THE OPCODE
5488  020564  001405                          BEQ     3$              ;BR WHEN OPCODE COUNT EQUALS OPCODE
5489  020566  105765  002130                  TSTB    OPTBL(R5)       ;LOOK FOR END OF TABLE
5490  020572  100402                          BMI     3$              ;BR IF END
5491  020574  005205                          INC     R5              ;INCREMENT THE POINTER
5492  020576  000770                          BR      2$              ;CONTINUE - NOT END OF TABLE
5493  020600  006305                  3$:     ASL     R5              ;SHIFT INDEX
5494  020602  006305                          ASL     R5              ;SHIFT THE INDEX
5495  020604  006305                          ASL     R5              ;SHIFT THE INDEX
5496  020606  012737  002152  020626          MOV     #MNTBL,5$       ;ADDRESS OF ASCII TEXT TABLE
5497  020614  060537  020626                  ADD     R5,5$           ;ADD THE INDEX
5498  020620  104414                          DISPLY                  ;TYPE IT
5499  020622  000000                  4$:     .WORD   0               ;ADDRESS OF 'PRESENT' OR 'PREVIOUS' MESSAGE
```

```
5500  020624  104414            DISPLY                  ;TYPE THE OPERATION MNEMONIC
5501  020626  000000      5$:   .WORD   0               ;ADDRESS OF MESSAGE
5502  020630  000207            RTS     PC              ;RETURN TO MAIN ROUTINE
5503  020632  005737  001362    LINE2A: TST     BADSEC  ;PRINT THE BAD SECTOR LINE ?
5504  020636  001404            BEQ     LINE2B          ;BR IF NOT
5505  020640  104414  001201            DISPLY  ,$CRLF  ;CR-LF
5506  020644  104414  051417            DISPLY  ,LIN2S  ;ERROR ADDRESS DEFINED AS BAD AREA
5507  020650  104414  001201    LINE2B: DISPLY  ,$CRLF  ;CR-LF
5508  020654  104414  050746            DISPLY  ,DH14   ;STANDARD RM03 REGISTER HEADER
5509  020660  104414  053247            DISPLY  ,LINSP0 ;TYPE A SPACE
5510  020664  013746  001344            MOV     UNIT,-(SP)      ;PUT THE DRIVE NUMBER ON THE STACK
5511  020670  004737  022462            JSR     PC,LINDEC       ;TYPE DRIVE NUMBER
5512  020674  104414  053246            DISPLY  ,LINSP  ;SPACES
5513  020700  012705  051272            MOV     #DT14,R5        ;REGISTER INDEXES
5514  020704  004737  021034            JSR     PC,3$           ;PRINT THE REGISTERS
5515  020710  032777  000040  160236    BIT     #SWO5,@SWR      ;PRINT THE OPTIONAL REGISTERS ?
5516  020716  001014            BNE     1$              ;BR IF NOT
5517  020720  104414  051051            DISPLY  ,DH15
5518  020724  012705  051314            MOV     #DT15,R5        ;SECOND DATA LINE
5519  020730  004737  021034            JSR     PC,3$           ;PRINT THEM
5520  020734  104414  051150            DISPLY  ,DH16
5521  020740  012705  051336            MOV     #DT16,R5        ;THIRD DATA LINE
5522  020744  004737  021034            JSR     PC,3$           ;PRINT THE REGISTERS
5523  020750  032760  000100  000016  1$:BIT     #BIT6,$STATUS(R0)       ;DATA ERROR ?
5524  020756  001422            BEQ     2$              ;BR IF NOT
5525  020760  016046  000020            MOV     $WRDL(R0),-(SP) ;TRANSFER SIZE
5526  020764  066016  000236            ADD     $RMWC(R0),(SP)  ;ADD REMAINING WORD COUNT
5527  020770  006316            ASL     (SP)            ;CONVERT TO AN BYTE INCREMENT
5528  020772  066016  000006            ADD     $BUF(R0),(SP)   ;BUFFER STARTING ADDRESS
5529  020776  022660  000240            CMP     (SP)+,$RMBA(R0) ;CORRECT BUFFER ADDRESS ?
5530  021002  001410            BEQ     2$              ;BR IF YES
5531  021004  104414  050373            DISPLY  ,EM46   ;'BUS ADDRESS AND WORD COUNT ARE NOT CONSISTENT'
5532  021010  104414  001201            DISPLY  ,$CRLF  ;CR-LF
5533  021014  004737  021126            JSR     PC,LINE3D       ;PRINT LINE 3D OF ERROR MESSAGE
5534  021020  004737  021540            JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
5535  021024                    2$:
5536  021024  012605                    MOV     (SP)+,R5        ;;POP STACK INTO R5
5537  021026  012604                    MOV     (SP)+,R4        ;;POP STACK INTO R4
5538  021030  012603                    MOV     (SP)+,R3        ;;POP STACK INTO R3
5539  021032  000207                    RTS     PC              ;RETURN TO ERROR PROCESSING ROUTINE
5540  021034  012546            3$:     MOV     (R5)+,-(SP)     ;PUT THE REGISTER INDEX ON THE STACK
5541  021036  060016                    ADD     R0,(SP)         ;ADD DRIVE'S TABLE ADDRESS
5542  021040  017646  000000            MOV     @(SP),-(SP)     ;VALUE
5543  021044  004737  022430            JSR     PC,LINOCT       ;TYPE IT
5544  021050  005726                    TST     (SP)+           ;CORRECT THE STACK POINTER
5545  021052  104414  053246            DISPLY  ,LINSP  ;PRINT 2 SPACES
5546  021056  005715                    TST     (R5)            ;AT END OF LINE ?
5547  021060  001365                    BNE     3$              ;BR IF NOT
5548  021062  104414  001201    4$:     DISPLY  ,$CRLF  ;CR-LF
5549  021066  000207                    RTS     PC              ;RETURN
5550
5551                              ;PRINT LINE 3 OF ERROR MESSAGE
5552                              ;'ERROR AT CCC TT SS   PREVIOUS ADR = CCC TT SS'
5553
5554  021070  104414  051453    LINE3:  DISPLY  ,LINM3  ;LINE 3 ENTRANCE
5555  021074  000517            BR      LIN3.1          ;FINISH PRINTOUT
```

```
5556
5557                                    ;PRINT LINE 3A OF ERROR MESSAGE
5558                                    ;'START CYL = CCC   END CYL = CCC'
5559
5560  021076  104414  051471    LINE3A: DISPLY  #LINN3          ;LINE 3A ENTRANCE
5561  021102  000514                    BR      LIN3.1          ;FINISH ERROR LINE
5562
5563                                    ;PRINT LINE 3B OF ERROR MESSAGE
5564                                    ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC'
5565
5566  021104  004737  021442    LINE3B: JSR     PC,LIN3.3       ;LINE 3B ENTRANCE
5567  021110  104414  001201            DISPLY  #$CRLF
5568  021114  000207                    RTS     PC
5569
5570                                    ;PRINT LINE 3C OF ERROR MESSAGE
5571                                    ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC   TRK = TT'
5572
5573  021116  004737  021442    LINE3C: JSR     PC,LIN3.3       ;LINE 3C ENTRANCE
5574  021122  000137  021474            JMP     LIN3.4          ;FINISH MESSAGE
5575
5576                                    ;PRINT LINE 3D OF ERROR MESSAGE
5577                                    ;'RMBA = XXXXXX   RMWC = XXXXXX'
5578
5579  021126  032777  000040  160020 LINE3D: BIT     #SW05,@SWR      ;SWITCH 5 SET ?
5580  021134  001416                    BEQ     1$              ;BR IF IT IS
5581  021136  104414  051642            DISPLY  #LINB3          ;'RMBA = '
5582  021142  016046  000240            MOV     $RMBA(R0),-(SP) ;BUFFER ADDR REG CONTENTS
5583  021146  004737  022430            JSR     PC,LINOCT       ;CONVERT TO OCTAL AND TYPE IT
5584  021152  104414  051652            DISPLY  #LINW3          ;'   RMWC = '
5585  021156  016046  000236            MOV     $RMWC(R0),-(SP) ;WORD COUNT REGISTER CONTENTS
5586  021162  004737  022430            JSR     PC,LINOCT       ;CONVERT TO OCTAL AND TYPE IT
5587  021166  104414  001201            DISPLY  #$CRLF
5588  021172  000207            1$:     RTS     PC
5589
5590                                    ;PRINT LINE 3E OF ERROR MESSAGE
5591                                    ;'START CYL = CCC   START TRK = TT   START SEC = SS'
5592
5593  021174  104414  051536 LINE3E: DISPLY  #LINS3           ;'START CYL = '
5594  021200  016046  000012            MOV     $CYL(R0),-(SP)  ;MOVE CYL TO STACK
5595  021204  004737  022462            JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5596  021210  104414  053246            DISPLY  #LINSP          ;SPACES
5597  021214  104414  051664            DISPLY  #LINST3         ;'START TRK = '
5598  021220  005046                    CLR     -(SP)           ;CLEAR STACK
5599  021222  116016  000011            MOVB    $TRK(R0),(SP)   ;TRACK TO STACK
5600  021226  004737  022462            JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5601  021232  104414  053246            DISPLY  #LINSP          ;SPACES
5602  021236  104414  051701            DISPLY  #LINSS3         ;'START SEC = '
5603  021242  005046                    CLR     -(SP)           ;CLEAR STACK
5604  021244  116016  000010            MOVB    $SEC(R0),(SP)   ;SECTOR ADDR TO STACK
5605  021250  004737  022462            JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5606  021254  104414  001201            DISPLY  #$CRLF
5607  021260  000207                    RTS     PC
5608
5609                                    ;PRINT LINE 3F OF ERROR MESSAGE
5610                                    ;'RMDA = XXXXXX   RMCA = XXXXXX'
5611
```

```
5612  021262  032777  000040  157664  LINE3F: BIT     #SW5,@SWR       ;SWITCH 5 SET ?
5613  021270  001420                          BEQ     1$              ;BR IF NOT
5614  021272  104414  051632                  DISPLY  ,LINDA3         ;'RMDA = '
5615  021276  016046  000242                  MOV     $RMDA(R0),-(SP) ;PUT SECTOR/TRACK ADDRESS ON THE STACK
5616  021302  004737  022430                  JSR     PC,LINOCT       ;TYPE IT
5617  021306  104414  053246                  DISPLY  ,LINSP          ;SPACES
5618  021312  104414  051621                  DISPLY  ,LINCA3         ;'  RMDC = '
5619  021316  016046  000270                  MOV     $RMDC(R0),-(SP) ;PUT DESIRED CYLINDER ADDRESS ON THE STACK
5620  021322  004737  022430                  JSR     PC,LINOCT       ;TYPE IT
5621  021326  104414  001201                  DISPLY  ,$CRLF
5622  021332  000207                  1$:     RTS     PC
5623
5624                                  ;'CCC TT SS   PREV ADR = CCC TT SS'
5625
5626                                  ;LIN3.1:        MOV     $RMDC(R0),-(SP) ;PUT CYLINDER ADDR ON STACK
5627  021334  004737  022502          LIN3.1: JSR     PC,READDR       ;DECREMENT TRACK AND SECTOR ADDRESS
5628  021340  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5629  021344  104414  051466                  DISPLY  ,T              ;PRINT ' T'
5630                                  ;       JSR     PC,READDR       ;DECREMENT TRACK AND SECTOR ADDRESSES
5631  021350  004737  022462                  JSR     PC,LINDEC       ;TYPE TRACK IN DECIMAL
5632  021354  104414  051512                  DISPLY  ,S              ;PRINT ' S'
5633  021360  004737  022462                  JSR     PC,LINDEC       ;TYPE SECTOR ADDRESS
5634  021364  104414  051515                  DISPLY  ,LINP3          ;PRINT 'PREV ADDR'
5635  021370  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
5636  021374  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5637  021400  104414  051466                  DISPLY  ,T              ;PRINT ' T'
5638  021404  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK
5639  021406  116016  000033                  MOVB    $PREVA+1(R0),(SP) ;PREVIOUS TRACK ADDRESS
5640  021412  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5641  021416  104414  051512                  DISPLY  ,S              ;PRINT ' S'
5642  021422  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK
5643  021424  116016  000032                  MOVB    $PREVA(R0),(SP) ;PREVIOUS SECTOR DDRESS
5644  021430  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5645  021434  104414  001201                  DISPLY  ,$CRLF
5646  021440  000207                          RTS     PC
5647
5648
5649
5650  021442  104414  051536          LIN3.3: DISPLY  ,LINS3          ;LINE '3B & 3C' ENTRANCE
5651  021446  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
5652  021452  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5653  021456  104414  051553                  DISPLY  ,LINEN3         ;PRINT 'END CYL'
5654  021462  016046  000270                  MOV     $RMDC(R0),-(SP) ;PRESENT CYLINDER
5655  021466  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5656  021472  000207                          RTS     PC
5657
5658                                  ;'ACTUAL CYL = CCC   TRK = TT'
5659
5660  021474  104414  051570          LIN3.4: DISPLY  ,LINA3          ;PRINT 'ACTUAL'
5661  021500  013746  056512                  MOV     CYLDER,-(SP)    ;ACTUAL CYLINDER
5662  021504  042716  010000                  BIC     #BIT12,(SP)     ;CLEAR THE FORMAT BIT
5663  021510  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5664  021514  104414  051610                  DISPLY  ,LINT3          ;PRINT TRACK
5665  021520  005046                          CLR     -(SP)           ;CLEAR STACK WORD
5666  021522  116016  000243                  MOVB    $RMDA+1(R0),(SP) ;PUT TRACK ON STACK
5667  021526  004737  022462                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
```

```
5668  021532  104414  001201                  DISPLY  ,$CRLF
5669  021536  000207                          RTS     PC
5670
5671                                  ;PRINT LINE 4 OF ERROR MESSAGE
5672                                  ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'
5673
5674  021540  032760  000100  000016  LINE4:  BIT     #BIT06,$STATUS(R0)  ;DATA ERROR ?
5675  021546  001427                          BEQ     1$                  ;BR IF NOT
5676  021550  104414  051716                  DISPLY  ,LINM4              ;'PRINT BUFFER'
5677  021554  016046  000006                  MOV     $BUF(R0),-(SP)      ;BUFFER ADDR ON STACK
5678  021560  004737  022430                  JSR     PC,LINOCT           ;CONVERT TO OCTAL & PRINT
5679  021564  104414  051735                  DISPLY  ,LINS4              ;PRINT 'SIZE'
5680  021570  016046  000020                  MOV     $WRDL(R0),-(SP)     ;BUFFER SIZE
5681  021574  004737  022462                  JSR     PC,LINDEC           ;TYPE IT IN DECIMAL
5682  021600  104414  051747                  DISPLY  ,LINX4              ;'ACTUAL NMBR WRDS XFRD = '
5683  021604  016046  000240                  MOV     $RMBA(R0),-(SP)     ;VALUE IN BUFFER ADDR REGISTER
5684  021610  166016  000006                  SUB     $BUF(R0),(SP)       ;SUBTRACT STARTING ADDRESS
5685  021614  006216                          ASR     (SP)                ;CONVERT INTO A WORD COUNT
5686  021616  004737  022462                  JSR     PC,LINDEC           ;TYPE IT IN DECIMAL
5687  021622  104414  001201                  DISPLY  ,$CRLF              ;CR-LF
5688  021626  000207                  1$:     RTS     PC                  ;RETURN
5689
5690                                  ;PRINT LINE 5 OF ERROR MESSAGE
5691                                  ;'GOOD DATA = XXXXXX   BAD DATA = XXXXXX   SECT POS = XXX'
5692
5693  021630  104414  052002  LINE5:  DISPLY  ,LIND5              ;PRINT 'GOOD DATA'
5694  021634  162760  000002  000240  SUB     #2,$RMBA(R0)        ;BACK THE ADDRESS UP
5695  021642  017046  000240          MOV     @$RMBA(R0),-(SP)    ;'GOOD' DATA - AT THE BUFFER LOCATION
5696  021646  004737  022430          JSR     PC,LINOCT           ;TYPE IT
5697  021652  104414  052017          DISPLY  ,LINB5              ;PRINT 'BAD DATA'
5698  021656  016046  000256          MOV     $RMDB(R0),-(SP)     ;BAD DATA FROM BUFFER
5699  021662  004737  022430          JSR     PC,LINOCT           ;TYPE IT
5700  021666  016046  000236          MOV     $RMWC(R0),-(SP)     ;WORD LENGTH ON STACK
5701  021672  066016  000020          ADD     $WRDL(R0),(SP)      ;MAKE INTO A POSITIVE NUMBER
5702  021676  005046                  CLR     -(SP)               ;UPPER DIVIDEND TO ZERO
5703  021700  016046  000022          MOV     $SSEC(R0),-(SP)     ;SECTOR SIZE ON THE STACK
5704  021704  004737  027522          JSR     PC,LINKDV           ;DIVIDE WORDS XFERED BY SECTOR SIZE
5705  021710  012616                  MOV     (SP)+,(SP)          ;MOVE REMAINDER UP THE STACK
5706  021712  104414  052035          DISPLY  ,LINP5              ;PRINT 'SECT POS'
5707  021716  004737  022462          JSR     PC,LINDEC           ;TYPE THE POSITION
5708  021722  104414  001201          DISPLY  ,$CRLF
5709  021726  000207                  RTS     PC
5710
5711                                  ;PRINT LINE 5A OF THE ERROR MESSAGE
5712                                  ;'HEADER FROM ERROR SECTOR  XXXXXX  XXXXXX  XXXXXX  XXXXXX'
5713
5714  021730                  LINE5A:
5715  021730  104414  052053  2$:     DISPLY  ,LIN5S              ;'HEADER CONTENTS OF ERROR SECTOR'
5716  021734  013746  056512          MOV     CYLDER,-(SP)        ;HEADER POSITION
5717  021740  004737  022430          JSR     PC,LINOCT           ;TYPE IT
5718  021744  104414  053246          DISPLY  ,LINSP              ;SPACES
5719  021750  013746  056514          MOV     CYLDER+2,-(SP)      ;HEADER POSITION +2
5720  021754  004737  022430          JSR     PC,LINOCT           ;TYPE IT
5721  021760  104414  053246          DISPLY  ,LINSP              ;SPACES
5722  021764  104414  053251          DISPLY  ,LINX5              ;APPENDING INFO 1/23/77
5723  021770  104414  001201  3$:     DISPLY  ,$CRLF
```

```
5724  021774  000207                    RTS     PC
5725
5726                                    ;PRINT LINE 5B OF ERROR MESSAGE
5727                                    ;'RMEC1 = XXXXXX   RMEC2 = XXXXXX'
5728
5729  021776  104414  052107            LINE5B: DISPLY  ,LINEP5         ;'RMEC1 = '
5730  022002  016046  000300                    MOV     $RMEC1(R0),-(SP) ;PUT REGISTER CONTENTS ON THE STACK
5731  022006  004737  022430                    JSR     PC,LINOCT       ;TYPE IT
5732  022012  104414  053246                    DISPLY  ,LINSP          ;SPACES
5733  022016  104414  052120                    DISPLY  ,LINE05         ;' RMEC2 = '
5734  022022  016046  000302                    MOV     $RMEC2(R0),-(SP) ;PUT REGISTER CONTENTS ON THE STACK
5735  022026  004737  022430                    JSR     PC,LINOCT       ;TYPE IT
5736  022032  104414  001201                    DISPLY  ,$CRLF
5737  022036  000207                            RTS     PC              ;RETURN
5738
5739                                    ;PRINT LINE 6 OF ERROR MESSAGE
5740                                    ;'SECTOR IS ECC CORRECTABLE'
5741
5742  022040  104414  052132            LINE6:  DISPLY  ,LINB6          ;ECC CORRECTABLE
5743  022044  104414  001201                    DISPLY  ,$CRLF
5744  022050  000207                            RTS     PC
5745
5746                                    ;PRINT LINE 6A OF THE ERROR MESSAGE
5747                                    ;'SECTOR READ CORRECTLY AT OFFSET N'
5748
5749  022052  104414  052165            LINE6A: DISPLY  ,LINC6          ;PRINT 'READ CORRECTLY AT OFFSET N'
5750  022056  000411                            BR      LIN6.1          ;TYPE THE REST OF THE LINE
5751
5752                                    ;PRINT LINE 6B OF THE ERROR MESSAGE
5753                                    ;'SECTOR IS ECC CORRECTABLE AT OFFSET N'
5754
5755  022060  104414  052132            LINE6B: DISPLY  ,LINB6          ;PRINT 'SECTOR IS ECC CORRECTABLE '
5756  022064  000406                            BR      LIN6.1
5757
5758                                    ;PRINT LINE 6C OF THE ERROR MESSAGE
5759                                    ;'CORRECTED ON NTH RETRY'
5760
5761  022066  104414  052214            LINE6C: DISPLY  ,LING6          ;'CORRECTED ON NTH RETRY'
5762  022072  000414                            BR      LIN6.2          ;TYPE THE REST OF THE LINE
5763
5764                                    ;PRINT LINE 6D OF THE ERROR MESSAGE
5765                                    ;'UNCORRECTABLE AFTER N RETRIES'
5766
5767  022074  104414  052243            LINE6D: DISPLY  ,LINU06         ;'UNCORRECTABLE AFTER N RETRIES'
5768  022100  000411                            BR      LIN6.2          ;FINISH
5769
5770                                    ;TYPE THE OFFSET VALUE IN MICRO-INCHES
5771
5772  022102  006301                    LIN6.1: ASL     R1              ;DOUBLE THE OFFSET TABLE INDEX
5773  022104  016137  002470  022114            MOV     OFMTBL(R1),1$   ;ADDRESS OF OFFSET POSITION MESSAGE
5774  022112  104414                            DISPLY
5775  022114  000000                    1$:     .WORD   0               ;OFFSET VALUE
5776  022116  104414  001201                    DISPLY  ,$CRLF
5777  022122  000207                            RTS     PC
5778
5779                                    ;RETRY COUNT TYPEOUT
```

```
5780
5781  022124  005046                LIN6.2: CLR     -(SP)           ;CLEAR STACK
5782  022126  113716  001351                MOVB    @RETRY+1,(SP)   ;RETRY COUNT
5783  022132  004737  022462                JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5784  022136  104414  052232                DISPLY  ,LIN6           ;'RETRY'
5785  022142  104414  001201                DISPLY  ,$CRLF
5786  022146  000207                        RTS     PC
5787
5788                                ;PRINT LINE 7 OF THE ERROR MESSAGE
5789                                ;'ORDERS:XXXXX   TOTAL ERRORS:XXX   WRDS XFRD:XXXXXXX   WRDS READ:XXXXXXX'
5790
5791  022150  104414  052316        LINE7:  DISPLY  ,LIN7O          ;PRINT ORDER COUNT
5792  022154  012746  000036                MOV     #$OPERC,-(SP)   ;TO STACK
5793  022160  060016                        ADD     R0,(SP)         ;ADD THE BASE ADDRESS
5794  022162  004737  034050                JSR     PC,$DB2D        ;CONVERT IT
5795  022166  004737  030036                JSR     PC,$SUPRS       ;PRINT IT
5796  022172  104414  052370                DISPLY  ,LIN7T          ;TOTAL ERRORS
5797  022176  016046  000056                MOV     $TOTAL(R0),-(SP)        ;TO STACK
5798  022202  004737  022462                JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5799  022206  104414  052402                DISPLY  ,LIN7X          ;PRINT 'WRDS XFR'
5800  022212  012746  000046                MOV     #$TRANS,-(SP)   ;ADDRESS OF LOW WORD ON STACK
5801  022216  060016                        ADD     R0,(SP)
5802  022220  004737  034050                JSR     PC,$DB2D        ;CONVERT
5803  022224  004737  030036                JSR     PC,$SUPRS       ;PRINT
5804  022230  104414  052416                DISPLY  ,LIN7R          ;'BITS READ'
5805  022234  012746  000052                MOV     #$READ,-(SP)    ;LOW WORD ADDRESS
5806  022240  060016                        ADD     R0,(SP)
5807  022242  004737  034050                JSR     PC,$DB2D        ;CONVERT
5808  022246  004737  030036                JSR     PC,$SUPRS       ;PRINT
5809  022252  104414  001201                DISPLY  ,$CRLF
5810  022256  104414  001201                DISPLY  ,$CRLF
5811  022262  032777  100000  156664        BIT     #SW15,@SWR      ;SEE IF 'HALT ON ERROR' - SWITCH 15
5812  022270  001401                        BEQ     1$              ;BR IF NOT
5813  022272  000000                        HALT                    ;SWITCH 15 HALT
5814  022274  000207                1$:     RTS     PC
5815
5816                                ;PRINT LINE 7A OF ERROR MESSAGE
5817                                ;'ORDERS:XXXXX   TOTAL SEEKS=XXXXX   TOTAL MISPOS ERR = XXX   TOTAL SKI= XXX'
5818
5819  022276  104414  052316        LINE7A: DISPLY  ,LIN7O          ;'ORDERS = '
5820  022302  012746  000036                MOV     #$OPERC,-(SP)   ;ORDER COUNT INCREMENT
5821  022306  060016                        ADD     R0,(SP)         ;ADD BASE ADDRESS
5822  022310  004737  034050                JSR     PC,$DB2D        ;CONVERT THE COUNT
5823  022314  004737  030036                JSR     PC,$SUPRS       ;PRINT IT
5824  022320  104414  052326                DISPLY  ,LIN7P          ;'TOTAL SEEKS = '
5825  022324  012746  000042                MOV     #$POSIT,-(SP)   ;TOTAL SEEKS
5826  022330  060016                        ADD     R0,(SP)         ;DEVICE TABLE ADDRESS
5827  022332  004737  034050                JSR     PC,$DB2D        ;CONVERT THE SEEK COUNT
5828  022336  004737  030036                JSR     PC,$SUPRS       ;PRINT IT
5829  022342  104414  052270                DISPLY  ,LIN7M          ;'   TOTAL MISPOS ERR = '
5830  022346  016046  000066                MOV     $MISPO(R0),-(SP)  ;TOTAL ERRORS
5831  022352  004737  022462                JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5832  022356  104414  052346                DISPLY  ,LIN7S          ;'   TOTAL SKI,OCYL ERR = '
5833  022362  016046  000064                MOV     $SKI(R0),-(SP)  ;CONVERT & PRINT IT
5834  022366  004737  022462                JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
5835  022372  104414  001201                DISPLY  ,$CRLF
```

```
5836  022376  104414  001201            DISPLY  ,$CRLF
5837  022402  032777  100000  156544    BIT     #SW15,@SWR      ;SEE IF HALT ON ERROR - SWITCH 15 SET
5838  022410  001401                    BEQ     1$              ;BR IF NOT
5839  022412  000000                    HALT                    ;SWITCH 15 HALT
5840  022414  000207              1$:   RTS     PC
5841
5842                                    ;PRINT LINE 8 OF THE ERROR MESSAGE
5843                                    ;'DIFFERENT ERROR DURING RETRY'
5844
5845  022416  104414  052433            LINE8:  DISPLY  ,LIN8M
5846  022422  004737  020462                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
5847  022426  000207                    RETURN  PC
5848
5849                                    ;OCTAL TYPEOUT ROUTINE
5850                                    ;CALL:
5851                                    ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
5852                                    ;       JSR     PC,LINOCT
5853                                    ;       RETURN
5854
5855  022430  016646  000002            LINOCT: MOV     2(SP),-(SP)     ;PUT NUMBER IN PROPER LOCATION ON STACK
5856  022434  004737  030466                    JSR     PC,$SB2O        ;CONVERT THE NUMBER TO OCTAL
5857  022440  012637  022454                    MOV     (SP)+,1$        ;GET THE ADDRESS OF THE ASCII STRING
5858  022444  062737  000005  022454            ADD     #5.,1$          ;ADDRESS THE LAST 6 ASCII DIGITS
5859  022452  104414                    DISPLY                          ;TYPE IT
5860  022454  000000              1$:   .WORD   0                       ;ADDRESS
5861  022456  012616                    MOV     (SP)+,(SP)              ;CORRECT THE STACK
5862  022460  000207                    RTS     PC                      ;RETURN
5863
5864                                    ;ROUTINE TO CONVERT THE INPUT NUMBER TO DECIMAL AND TYPE IT WITH
5865                                    ;LEADING ZERO SUPRESSION
5866                                    ;CALL:
5867                                    ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
5868                                    ;       JSR     PC,LINDEC
5869                                    ;       RETURN
5870
5871  022462  016646  000002            LINDEC: MOV     2(SP),-(SP)     ;SET UP STACK FOR CONVERT
5872  022466  004737  030436                    JSR     PC,$SB2D        ;CONVERT IT TO DECIMAL
5873  022472  004737  030036                    JSR     PC,$SUPRS       ;TYPE IT (WITH LEADING ZEROS SUPRESSED)
5874  022476  012616                    MOV     (SP)+,(SP)              ;RESTORE STACK POINTER
5875  022500  000207                    RTS     PC
5876
5877                                    ;;*****************************************************************
5878
5879                                    .SBTTL  GENERAL SUPPORT SUBROUTINES
5880
5881                                    ;;*****************************************************************
5882
5883                                    ;DECREMENT THE SECTOR-TRACK ADDRESS
5884                                    ;CALL:
5885                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
5886                                    ;       JSR     PC,READDR
5887                                    ;       RETURN
5888                                    ;       (SP) CONTAINS THE CYLINDER ADDRESS
5889                                    ;       2(SP) CONTAINS THE TRACK ADDRESS
5890                                    ;       4(SP) CONTAINS THE SECTOR ADDRESS
5891
```

```
5892  022502  162706  000006          READDR: SUB     #6,SP           ;DECREMENT THE STACK POINTER
5893  022506  016616  000006                  MOV     6(SP),(SP)      ;MOVE THE RETURN ADDR DOWN THE STACK
5894  022512  005066  000006                  CLR     6(SP)           ;CLEAR STACK FOR SECTOR
5895  022516  005066  000004                  CLR     4(SP)           ;CLEAR STACK FOR TRACK
5896  022522  005066  000002                  CLR     2(SP)           ;CLEAR STACK FOR CYLINDER
5897  022526  116066  000242  000006          MOVB    $RMDA(R0),6(SP) ; SECTOR ON STACK
5898  022534  116066  000243  000004          MOVB    $RMDA+1(R0),4(SP)  ;TRACK ADDRESS
5899  022542  016066  000270  000002          MOV     $RMDC(R0),2(SP) ;CYLINDER ADDRESS
5900  022550  005766  000006                  TST     6(SP)           ;SECTOR 0 ?
5901  022554  001403                          BEQ     1$              ;BRANCH IF SO
5902  022556  105366  000006                  DECB    6(SP)           ;DECREMENT ONE SECTOR
5903  022562  000421                          BR      3$              ;BRANCH TO EXIT
5904  022564  005766  000004          1$:     TST     4(SP)           ;ALSO ON TRACK 0 ?
5905  022570  001406                          BEQ     2$              ;BRANCH IF SO
5906  022572  112766  000037  000006          MOVB    #31.,6(SP)      ;LAST SECTOR
5907  022600  105366  000004                  DECB    4(SP)           ;DECREMENT ONE TRACK
5908  022604  000410                          BR      3$              ;EXIT
5909  022606  112766  000037  000006  2$:     MOVB    #31.,6(SP)      ;LAST SECTOR
5910  022614  112766  000004  000004          MOVB    #4,4(SP)        ;LAST TRACK
5911  022622  005366  000002                  DEC     2(SP)           ;DECREMENT ONE CYLINDER COUNT
5912  022626  000240                  3$:     NOP                     ;DONE
5913  022630  000207                          RTS     PC              ;RETURN
5914
5915                                  ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
5916
5917  022632  012737  177777  001310  CKCLK:  MOV     #-1,CLKFLG      ;CLEAR CLOCK AVAILABILITY FLAG
5918  022640  012737  177777  001306          MOV     #-1,PCLOCK      ;CLEAR KW11-P CLOCK AVAILABILITY FLAG
5919  022646  012737  022726  000004          MOV     #CKCLK1,ERRVEC  ;SET UP VECTOR FOR CLOCK CHECK
5920  022654  005037  000006                  CLR     @#ERRVEC+2      ;NEW PSW
5921  022660  005777  156410                  TST     @$LKCSR         ;CHECK FOR KW11-P
5922  022664  005037  001310                  CLR     CLKFLG          ;SET CLOCK AVAILABILITY FLAG
5923  022670  005037  001306                  CLR     PCLOCK          ;SET KW11-P CLOCK FLAG
5924  022674  013701  001300                  MOV     $LPVEC,R1       ;KW11-P VECTOR ADDRESS
5925  022700  012721  023766                  MOV     #CLOCK,(R1)+    ;SET UP KW11-P VECTOR
5926  022704  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
5927  022710  012777  174575  156360          MOV     #-1667.,@$LKCSB ;LOAD COUNTER BUFFER WITH 16.67
5928  022716  012777  000131  156350          MOV     #131,@$LKCSR    ;SET CLOCK - CNT UP, 10US, CONT INT
5929  022724  000437                          BR      CKCLK3
5930  022726  062706  000004          CKCLK1: ADD     #4,SP           ;RESTORE THE STACK POINTER
5931  022732  012737  022774  000004          MOV     #CKCLK2,@#ERRVEC  ;CHANGE ERROR VECTOR TO CHECK FOR KW11-L
5932  022740  005777  156336                  TST     @$LKS           ;LOOK FOR KW11-L
5933  022744  005037  001310                  CLR     CLKFLG          ;SET CLOCK FLAG
5934  022750  013701  001304                  MOV     $LLVEC,R1       ;KW11-L VECTOR ADDRESS
5935  022754  012721  023766                  MOV     #CLOCK,(R1)+    ;SET UP KW11-L VECTOR
5936  022760  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
5937  022764  012777  000100  156310          MOV     #100,@$LKS      ;SET KW11-L INTERRUPT
5938  022772  000414                          BR      CKCLK3
5939  022774  062706  000004          CKCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
5940  023000  104401  054054                  TYPE    ,NEDCLK         ;'P OR L CLOCK MUST BE ON SYSTEM'
5941  023004  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
5942  023010  001402                          BEQ     1$              ;BR IF NOT
5943  023012  000137  027440                  JMP     $GET42          ;ABORT PROGRAM
5944  023016  000000                  1$:     HALT                    ;HALT
5945  023020  000137  003622                  JMP     START           ;TRY AGAIN
5946  023024  012737  000006  000004  CKCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
5947  023032  000207                          RTS     PC
```

```
                                ;ROUTINE TO DISPLAY STATISTICS FOR ALL DRIVES ASSIGNED
                                ;CALL:
                                ;       JSR     PC,STATPR
                                ;       RETURN

023034  010046                  STATPR: MOV     R0,-(SP)        ;SAVE R0
023036  010446                          MOV     R4,-(SP)        ;SAVE R4
023040  005737  001544                  TST     ASNLST          ;ANY DRIVES ASSIGNED ?
023044  001423                          BEQ     3$              ;BR IF NOT
023046  004737  023150                  JSR     PC,SHDTYP       ;TYPE THE HEADING
023052  005004                          CLR     R4              ;CLEAR THE DRIVE INDEX
023054  006304                  1$:     ASL     R4              ;CHANGE TO INDEX WORDS
023056  016400  002102                  MOV     BLKADR(R4),R0   ;GET THE DRIVE'S BLOCK ADDRESS
023062  006204                          ASR     R4              ;RESTORE R4
023064  136437  034606  001544          BITB    ATABIT(R4),ASNLST ;IS THIS DRIVE ASSIGNED ?
023072  001404                          BEQ     2$              ;BR IF NOT
023074  004737  023172                  JSR     PC,SDETAL       ;TYPE THE PERFORMANCE SUMMARY
023100  104401  001201                  TYPE    $CRLF           ;CR-LF
023104  005204                  2$:     INC     R4              ;INCREMENT THE INDEX
023106  020427  000010                  CMP     R4,#8.          ;FINISHED ?
023112  001360                          BNE     1$              ;BR IF NOT
023114  012604                  3$:     MOV     (SP)+,R4        ;RESTORE R4
023116  012600                          MOV     (SP)+,R0        ;RESTORE R0
023120  000207                          RTS     PC              ;RETURN

                                ;ROUTINE TO TYPE STATISTICS FOR AN INDIVIDUAL DRIVE
                                ;CALL:
                                ;       MOV     #DPB,R0         ;DPB ADDRESS
                                ;       JSR     PC,TYPEST
                                ;       RETURN

023122  010046                  TYPEST: MOV     R0,-(SP)        ;SAVE R0
023124  010446                          MOV     R4,-(SP)        ;SAVE R4
023126  004737  023150                  JSR     PC,SHDTYP       ;TYPE THE HEADING
023132  005004                          CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
023134  111004                          MOVB    (R0),R4         ;DRIVE NUMBER
023136  004737  023172                  JSR     PC,SDETAL       ;TYPE THE STATISTICS
023142  012604                          MOV     (SP)+,R4        ;RESTORE R4
023144  012600                          MOV     (SP)+,R0        ;RESTORE R0
023146  000207                          RTS     PC              ;RETURN

                                ;TYPE THE HEADER FOR THE DRIVE PERFORMANCE SUMMARY TYPEOUT
                                ;CALL:
                                ;       JSR     PC,SHDTYP
                                ;       RETURN

023150  004737  023670          SHDTYP: JSR     PC,$TIME        ;TYPE THE TIME OF DAY
023154  004537  030076                  JSR     R5,TYPRI4       ;TYPE AT PRIORITY 4
023160  001201                          $CRLF                   ;CR-LF
023162  004537  030076                  JSR     R5,TYPRI4       ;TYPE THE HEADER
023166  053524                          STATHD                  ;HEADER
023170  000207                          RTS     PC              ;RETURN

                                ;TYPE THE PERFORMANCE SUMMARY DATE LINE
                                ;CALL:
```

```
6004                                    ;       MOV     #DRIVE,R4       ;DRIVE NUMBER
6005                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
6006                                    ;       RETURN
6007
6008   023172  010246                    SDETAL: MOV     R2,-(SP)        ;SAVE R2
6009   023174  010002                            MOV     R0,R2           ;DPB ADDRESS
6010   023176  062702  000036                    ADD     #$OPERC,R2      ;FIRST STATISTICAL FIELD
6011   023202  010446                            MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6012                                                                    ;;TYPE DRIVE NUMBER
6013   023204  104403                            TYPOS                   ;;GO TYPE--OCTAL ASCII
6014   023206     002                            .BYTE   2               ;;TYPE 2 DIGIT(S)
6015   023207     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
6016   023210  104401  053246                    TYPE    ,LINSP          ;SPACES
6017   023214  016046  000070                    MOV     $PASSC(R0),-(SP)  ;PUT THE PASS COUNT ON THE STACK
6018   023220  004737  030436                    JSR     PC,$SB2D        ;CONVERT IT
6019   023224  004537  027746                    JSR     R5,REPLZ        ;TYPE IT
6020   023230  000003                            .WORD   3               ;TYPE 3 DIGITS
6021   023232  104401  053246                    TYPE    ,LINSP          ;SPACES
6022   023236  010246                            MOV     R2,-(SP)        ;PUT $OPERC ON THE STACK
6023   023240  004737  034050                    JSR     PC,$DB2D        ;CONVERT IT
6024   023244  004537  027746                    JSR     R5,REPLZ        ;TYPE $OPERC
6025   023250  000006                            .WORD   6               ;TYPE 6 DIGITS
6026   023252  104401  053246                    TYPE    ,LINSP          ;SPACES
6027   023256  062702  000004                    ADD     #4,R2           ;INCREMENT R2
6028   023262  010246                            MOV     R2,-(SP)        ;PUT $POSIT ON THE STACK
6029   023264  004737  034050                    JSR     PC,$DB2D        ;CONVERT IT
6030   023270  004537  027746                    JSR     R5,REPLZ        ;TYPE $POSIT
6031   023274  000006                            .WORD   6               ;TYPE 6 DIGITS
6032   023276  104401  053246                    TYPE    ,LINSP          ;SPACES
6033   023302  062702  000004                    ADD     #4,R2           ;INCREMENT R2
6034   023306  010246                            MOV     R2,-(SP)        ;PUT $TRANS ON THE STACK
6035   023310  004737  034050                    JSR     PC,$DB2D        ;CONVERT $TRANS
6036   023314  004537  027746                    JSR     R5,REPLZ        ;TYPE IT
6037   023320  000012                            .WORD   10.             ;TYPE 10 DIGITS
6038   023322  104401  053246                    TYPE    ,LINSP          ;SPACES
6039   023326  062702  000004                    ADD     #4,R2           ;INCREMENT R2
6040   023332  010246                            MOV     R2,-(SP)        ;PUT $READ ON THE STACK
6041   023334  004737  034050                    JSR     PC,$DB2D        ;CONVERT $READ
6042   023340  004537  027746                    JSR     R5,REPLZ        ;TYPE IT
6043   023344  000012                            .WORD   10.             ;TYPE 10 DIGITS
6044   023346  104401  053247                    TYPE    ,LINSP0         ;1 SPACE
6045   023352  062702  000004                    ADD     #4,R2           ;INCREMENT R2
6046   023356  062702  000002                    ADD     #2,R2           ;INCREMENT R2 AGAIN
6047   023362  012246                            MOV     (R2)+,-(SP)     ;PUT $SOFT ON THE STACK
6048   023364  004737  030436                    JSR     PC,$SB2D        ;CONVERT $SOFT
6049   023370  004537  027746                    JSR     R5,REPLZ        ;TYPEOUT $SOFT
6050   023374  000004                            .WORD   4               ;TYPE 4 DIGITS
6051   023376  104401  053247                    TYPE    ,LINSP0         ;SPACES
6052   023402  012246                            MOV     (R2)+,-(SP)     ;PUT $HARD ON THE STACK
6053   023404  004737  030436                    JSR     PC,$SB2D        ;CONVERT $HARD
6054   023410  004537  027746                    JSR     R5,REPLZ        ;TYPEOUT $HARD
6055   023414  000004                            .WORD   4               ;TYPE 4 DIGITS
6056   023416  104401  053247                    TYPE    ,LINSP0         ;SPACES
6057   023422  012246                            MOV     (R2)+,-(SP)     ;PUT $SKI ON THE STACK
6058   023424  004737  030436                    JSR     PC,$SB2D        ;CONVERT $SKI
6059   023430  004537  027746                    JSR     R5,REPLZ        ;TYPEOUT $SKI
```

```
6060  023434  000004                        .WORD   4                       ;TYPE 4 DIGITS
6061  023436  104401  053247                TYPE    ,LINSPO                 ;SPACES
6062  023442  012246                        MOV     (R2)+,-(SP)             ;PUT $MISPO ON THE STACK
6063  023444  004737  030436                JSR     PC,$S82D                ;CONVERT $MISPO
6064  023450  004537  027746                JSR     R5,REPLZ                ;TYPEOUT $MISPO
6065  023454  000004                        .WORD   4                       ;TYPE 4 DIGITS
6066  023456  104401  053247                TYPE    ,LINSPO                 ;SPACES
6067  023462  016046  000056                MOV     $TOTAL(R0),-(SP)        ;CALCULATE NUMBER OF OTHER ERRORS
6068  023466  166016  000060                SUB     $SOFT(R0),(SP)          ;SUBTRACT $SOFT FROM $TOTAL
6069  023472  166016  000062                SUB     $HARD(R0),(SP)          ;SUBTRACT $HARD FROM $TOTAL
6070  023476  166016  000064                SUB     $SKI(R0),(SP)           ;SUBTRACT $SKI FROM $TOTAL
6071  023502  166016  000066                SUB     $MISPO(R0),(SP)         ;SUBTRACT $MISPO FROM $TOTAL
6072  023506  004737  030436                JSR     PC,$S82D                ;CONVERT 'OTHER' COUNT
6073  023512  004537  027746                JSR     R5,REPLZ                ;TYPE IT
6074  023516  000004                        .WORD   4                       ;TYPE 4 DIGITS
6075  023520  005726                        TST     (SP)+                   ;CLEAR STACK
6076  023522  000207                        RTS     PC
6077
6078
6079
6080                                  ;ROUTINE TO INCREMENT $SOFT
6081                                  ;
6082                                  ;NOTE:  $SOFT WILL NOT BE INCREMENTED BEYOND 9999 (10)
6083
6084  023524  005737  001362        INCSOF: TST     BADSEC                  ;SEE IF BAD TRK/SEC INDICATOR SET
6085  023530  001006                        BNE     1$                      ;BR IF IT'S SET, DON'T INCREMENT COUNT
6086  023532  026027  000060  023417        CMP     $SOFT(R0),#9999.        ;IS $SOFT ALREADY AT MAXIMUM ?
6087  023540  103002                        BHIS    1$                      ;BR IF IT IS
6088  023542  005260  000060                INC     $SOFT(R0)               ;INCREMENT $SOFT
6089  023546  000207                1$:     RTS     PC                      ;RETURN
6090
6091
6092                                  ;ROUTINE TO INCREMENT $HARD
6093                                  ;
6094                                  ;NOTE:  $HARD WILL NOT BE INCREMENTED BEYOND 9999 (10)
6095
6096  023550  005737  001362        INCHRD: TST     BADSEC                  ;SEE IF BAD TRK/SEC INDICATOR SET
6097  023554  001006                        BNE     1$                      ;BR IF IT'S SET, DON'T INCREMENT COUNT
6098  023556  026027  000062  023417        CMP     $HARD(R0),#9999.        ;IS $HARD ALREADY AT MAXIMUM ?
6099  023564  103002                        BHIS    1$                      ;BR IF IT IS
6100  023566  005260  000062                INC     $HARD(R0)               ;INCREMENT $HARD
6101  023572  000207                1$:     RTS     PC                      ;RETURN
6102
6103
6104                                  ;ROUTINE TO INCREMENT $SKI
6105                                  ;
6106                                  ;NOTE:  $SKI WILL NOT BE INCREMENTED BEYOND 9999 (10)
6107
6108  023574  005737  001362        INCSKI: TST     BADSEC                  ;SEE IF BAD TRK/SEC INDICATOR SET
6109  023600  001006                        BNE     1$                      ;BR IF IT'S SET, DON'T INCREMENT COUNT
6110  023602  026027  000064  023417        CMP     $SKI(R0),#9999.         ;IS $SKI ALREADY AT MAXIMUM ?
6111  023610  103002                        BHIS    1$                      ;BR IF IT IS
6112  023612  005260  000064                INC     $SKI(R0)                ;INCREMENT $SKI
6113  023616  000207                1$:     RTS     PC                      ;RETURN
6114
6115
```

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

023620  005737  001362        INCMIS: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
023624  001006                  BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
023626  026027  000066  023417        CMP     $MISPO(R0),#9999.  ;IS $MISPO ALREADY AT MAXIMUM ?
023634  103002                  BHIS    1$              ;BR IF IT IS
023636  005260  000066            INC     $MISPO(R0)              ;INCREMENT $MISPO
023642  000207              1$:   RTS     PC              ;RETURN


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

023644  005737  001362        INCTOT: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
023650  001006                  BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
023652  026027  000056  023417        CMP     $TOTAL(R0),#9999.  ;IS $TOTAL ALREADY AT MAXIMUM ?
023660  103002                  BHIS    1$              ;BR IF IT IS
023662  005260  000056            INC     $TOTAL(R0)              ;INCREMENT $TOTAL
023666  000207              1$:   RTS     PC              ;RETURN


                                        ;ROUTINE TO TYPE THE TIME

023670  005737  001310        $TIME:  TST     CLKFLG          ;CLOCK ON THE SYSTEM ?
023674  001033                  BNE     1$              ;BR IF NOT
023676  104401  001201            TYPE    ,$CRLF          ;CR-LF
023702  013746  001364            MOV     HOUR,-(SP)      ;PUT 'HOURS' ON THE STACK
023706  004737  030436            JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023712  004537  027746            JSR     R5,REPLZ        ;TYPE IT
023716  000002                    .WORD   2               ;TYPE 2 DIGITS
023720  104401  054330            TYPE    ,COLON          ;':'
023724  013746  001366            MOV     MINUTE,-(SP)    ;PUT 'MINUTES' ON THE STACK
023730  004737  030436            JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023734  004537  027746            JSR     R5,REPLZ        ;TYPE IT
023740  000002                    .WORD   2               ;TYPE 2 DIGITS
023742  104401  054330            TYPE    ,COLON          ;':'
023746  013746  001370            MOV     SECOND,-(SP)    ;PUT SECONDS ON THE STACK
023752  004737  030436            JSR     PC,$SB2D        ;CONVERT TO DECIMAL
023756  004537  027746            JSR     R5,REPLZ        ;TYPE IT
023762  000002                    .WORD   2               ;TYPE 2 DIGITS
023764  000207              1$:   RTS     PC


                                        ;CLOCK HANDLER ROUTINE

023766  005337  001372        CLOCK:  DEC     SIXTEE          ;INCREMENT THE 1/60 SECOND COUNTER
023772  001035                  BNE     1$              ;BR IF A SECOND NOT COUNTED
023774  013737  001312  001372        MOV     HZ,SIXTEE       ;RESTORE THE VALUE
024002  005237  001370            INC     SECOND          ;COUNT THE SECOND
024006  022737  000074  001370        CMP     #60.,SECOND     ;AT MAXIMUM ?
024014  001024                  BNE     1$              ;BR IF NOT
024016  005037  001370            CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
024022  005237  001470            INC     INTRVL+2        ;COUNT THE PERFORMANCE SUMMARY INTERVAL
024026  005237  001366            INC     MINUTE          ;COUNT THE MINUTE
```

```
6172  024032  022737  000074  001366          CMP     #60.,MINUTE     ;AT MAXIMUM ?
6173  024040  001012                          BNE     1$              ;BR IF NOT
6174  024042  005037  001366                  CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
6175  024046  005237  001364                  INC     HOUR            ;COUNT THE HOURS
6176  024052  022737  001747  001364          CMP     #999.,HOUR      ;AT MAXIMUM
6177  024060  103002                          BHIS    1$              ;BR IF NOT
6178  024062  005037  001364                  CLR     HOUR            ;CLEAR THE HOURS
6179  024066  012746  000020          1$:     MOV     #20,-(SP)       ;1 MS ON THE STACK
6180  024072  004737  041122                  JSR     PC,RPTMR        ;DRIVER TIMER ROUTINE
6181  024076  005737  001466                  TST     INTRVL          ;DISPLAY THE PERFORMANCE SUMMARY ?
6182  024102  001411                          BEQ     2$              ;BR IF NOT
6183  024104  023737  001466  001470          CMP     INTRVL,INTRVL+2 ;DISPLAY INTERVAL FINISHED ?
6184  024112  001005                          BNE     2$              ;BR IF NOT
6185  024114  012737  177777  001314          MOV     #-1,STATIN      ;SET PERFORMANCE SUMMARY DISPLAY FLAG
6186  024122  005037  001470                  CLR     INTRVL+2        ;CLEAR THE PERFORMANCE INTERVAL COUNTER
6187  024126  000002                  2$:     RTI
6188
6189                                          ;COMMAND DECODE ROUTINE
6190                                          ;CALL:
6191                                          ;       MOV     #-1,CFLAG       ;'CFLAG' IS NORMALLY SET BY THE TTY SERVICE
6192                                          ;                               ;ROUTINE IN INTERRUPT MODE
6193                                          ;       JSR     PC,KSR
6194                                          ;       RETURN1                 ;SYSTEM BUSY RETURN
6195                                          ;       RETURN2                 ;RETURN AFTER KEYBOARD SERVICED
6196
6197  024130  005737  001540          KSR:    TST     ORDERQ+16               ;ANY OPERATIONS ACTIVE ?
6198  024134  001402                          BEQ     KSR1
6199  024136  104401  054441                  TYPE    ,BUSY           ;'SYSTEM BUSY...'
6200  024142  104412                  KSR1:   SAVREG                  ;SAVE THE REGISTERS
6201  024144  012737  000200  177776          MOV     #PR4,PS         ;SET PRIORITY TO 4
6202  024152  005037  001360                  CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6203  024156  004737  023670                  JSR     PC,$TIME        ;TYPE THE TIME
6204  024162  005777  154774                  TST     @$TKB           ;CLEAR ANY GARBAGE IN THE TTY BUFFER
6205  024166  104401  054154                  TYPE    ,ENTCOM         ;'ENTER COMMANDS'
6206  024172  104411                          RDLIN                   ;READ THE KEYBOARD
6207  024174  012605                          MOV     (SP)+,R5        ;GET ADDRESS OF INPUT STRING
6208  024176  005737  001360                  TST     CFLAG           ;CHECK THE CONTROL C FLAG
6209  024202  001116                          BNE     7$              ;EXIT IF 'CONTROL C' ENTERED
6210  024204  005205                          INC     R5              ;POINT TO SECOND CHARACTER
6211  024206  122715  000124                  CMPB    #'T,(R5)        ;EQ TO A 'T' ?
6212  024212  001462                          BEQ     8$              ;YES
6213  024214  122715  000101                  CMPB    #'A,(R5)        ;EQ TO AN 'A'
6214  024220  001410                          BEQ     1$              ;BR IF IT IS
6215  024222  121527  000067                  CMPB    (R5),#'7        ;DRIVE NUMBER GREATER THAN AN ASCII 7 ?
6216  024226  101102                          BHI     6$              ;BR IF IT IS
6217  024230  121527  000060                  CMPB    (R5),#'0        ;DRIVE NUMBER LESS THAN AN ASCII 0 ?
6218  024234  103477                          BLO     6$              ;BR IF IT IS
6219  024236  142715  177770                  BICB    #^C7,(R5)       ;LEAVE ONLY LOWER 3 BITS IF CHAR NOT 'A'
6220  024242  122765  000124  177777  1$:     CMPB    #'T,-1(R5)      ;EQ TO 'T'
6221  024250  001003                          BNE     2$              ;BR IF NOT EQ
6222  024252  004737  025016                  JSR     PC,NEWASN       ;ASSIGN DRIVE FOR TEST
6223  024256  000470                          BR      7$              ;EXIT
6224  024260  122765  000104  177777  2$:     CMPB    #'D,-1(R5)      ;EQ TO 'D' ?
6225  024266  001003                          BNE     3$              ;BR IF NOT EQ
6226  024270  004737  025026                  JSR     PC,DEASGN       ;DEASSIGN DRIVE
6227  024274  000461                          BR      7$              ;EXIT
```

```
6228  024276  122765  000123  177777  3$:     CMPB    #'S,-1(R5)          ;EQ TO 'S'
6229  024304  001003                          BNE     4$                  ;BR IF NOT EQ
6230  024306  004737  025136                  JSR     PC,SCMND            ;TYPE STATISTICS
6231  024312  000452                          BR      7$                  ;EXIT
6232  024314  122765  000127  177777  4$:     CMPB    #'W,-1(R5)          ;EQ TO 'W'
6233  024322  001007                          BNE     5$                  ;BR IF NOT EQ
6234  024324  032777  000001  154622          BIT     #SWO,@SWR           ;IS SWITCH 0 SET ?
6235  024332  001040                          BNE     6$                  ;BR IF SET, CAN'T DO 'W' COMMAND
6236  024334  004737  025370                  JSR     PC,DATAPK           ;WRITE A DATA PACK
6237  024340  000437                          BR      7$                  ;EXIT
6238  024342  122765  000122  177777  5$:     CMPB    #'R,-1(R5)          ;EQ TO 'R' ?
6239  024350  001031                          BNE     6$                  ;BR IF NOT EQ
6240  024352  004737  025420                  JSR     PC,REDAPK           ;READ A DATA PACK
6241  024356  000430                          BR      7$                  ;EXIT
6242  024360  122765  000127  177777  8$:     CMPB    #'W,-1(R5)          ;WT COMMAND ?
6243  024366  001022                          BNE     6$                  ;NO
6244  024370  122765  000101  000001          CMPB    #'A,1(R5)           ;ALL DRIVES ?
6245  024376  001413                          BEQ     9$                  ;YES
6246  024400  126527  000001  000067          CMPB    1(R5),#'7           ;GREAT THAN 7
6247  024406  101012                          BHI     6$                  ;YES
6248  024410  126527  000001  000000          CMPB    1(R5),#0            ;LESS THAN 0
6249  024416  103406                          BLO     6$                  ;YES
6250  024420  142765  177770  000001          BICB    #^C7,1(R5)          ;CHOP OFF THE HIGHER BITS
6251  024426  004737  025402          9$:     JSR     PC,WATPAK           ;ASSIGN DRIVES WITH WT COMMAND
6252  024432  000402                          BR      7$
6253  024434  104401  054132          6$:     TYPE    ,INVLD              ;TYPE 'INVALID COMMAND' MESSAGE
6254  024440  104413                  7$:     RESREG                      ;RESTORE R0 - R5
6255  024442  005777  154514                  TST     @$TKB               ;CLEAR THE TTY BUFFER
6256  024446  052777  000100  154504          BIS     #BIT06,@$TKS        ;SET TTY INTERRUPT ENABLE
6257  024454  005037  177776                  CLR     PS                  ;SET PRIORITY BACK TO ZERO
6258  024460  000207                          RTS     PC                  ;RETURN
6259
6260                          ;ROUTINE TO PROCESS THE ASSIGN REQUEST ('T', 'R', OR 'W' COMMANDS)
6261
6262  024462  122715  000101          ASSIGN: CMPB    #'A,(R5)            ;ASSIGN ALL DRIVES?
6263  024466  001426                          BEQ     ASGN2               ;BR IF ALL DRIVES
6264  024470  111504                  ASGN1:  MOVB    (R5),R4             ;PUT DRIVE # IN R4
6265  024472  012737  053356  026754          MOV     #UNTASN,ASNMSG      ;'DRIVE ASSIGNED' MESSAGE ADDRESS
6266  024500  136437  034606  001544          BITB    ATABIT(R4),ASNLST   ;DRIVE ALREADY ASSIGNED ?
6267  024506  001014                          BNE     2$                  ;BR IF IT IS
6268  024510  005704                          TST     R4                  ;TRYING TO ASSIGN DRIVE 0 ?
6269  024512  001007                          BNE     1$                  ;BR IF NOT
6270  024514  012737  053443  026754          MOV     #NOTAVL,ASNMSG      ;'NOT AVAILABLE' MESSAGE ADDRESS
6271  024522  122737  000024  000041          CMPB    #24,41              ;SEE IF LOADED FROM AN RM03
6272  024530  001403                          BEQ     2$                  ;BR IF RM03 IS THE LOAD DEVICE
6273  024532  004737  024626          1$:     JSR     PC,ASGN3            ;SEE IF DRIVE ON THE SYSTEM
6274  024536  000207                          RTS     PC                  ;RETURN
6275  024540  000137  026734          2$:     JMP     ASNERR              ;EXIT ERROR
6276  024544  122737  000024  000041  ASGN2:  CMPB    #24,41              ;LOADED FROM AN RM03 ?
6277  024552  001003                          BNE     1$                  ;BR IF NOT
6278  024554  012704  000001                  MOV     #1,R4               ;START WITH DRIVE 1
6279  024560  000401                          BR      2$                  ;CONTINUE
6280  024562  005004                  1$:     CLR     R4                  ;START WITH DRIVE 0
6281  024564  012737  053356  026754  2$:     MOV     #UNTASN,ASNMSG      ;ERROR MESSAGE
6282  024572  136437  034606  001544          BITB    ATABIT(R4),ASNLST   ;ALREADY ASSIGNED ?
6283  024600  001007                          BNE     4$                  ;YES
```

```
6284  024602  004737  024626          JSR     PC,ASGN3        ;ASSIGN THE DRIVE
6285  024606  005204          3$:     INC     R4              ;INCREMENT DRIVE #
6286  024610  022704  000007          CMP     #7,R4           ;ALL DRIVE CHECKED ?
6287  024614  002363                  BGE     2$              ;NO
6288  024616  000207                  RTS     PC              ;YES
6289  024620  004737  026734          JSR     PC,ASNERR       ;ERROR MESSAGE
6290  024624  000770                  BR      3$              ;TO LOOP
6291  024626  136437  034606  001544  ASGN3:  BITB    ATABIT(R4),ASNLST  ;DRIVE ALREADY ASSIGNED ?
6292  024634  001041                  BNE     ASGN4           ;BR IF IT IS
6293                          ;1$:     TST     DTUW            ;DATA TRANSFER UNDER WAY ?
6294                          ;        BPL     1$              ;BR IF IT IS
6295  024636  110437  046062          MOVB    R4,GENDPB       ;DRIVE NUMBER
6296  024642  004737  015200          JSR     PC,RECALO       ;RECALIBRATE DRIVE
6297  024646  105764  034472          TSTB    DRVSTA(R4)      ;DRIVE AVAILABLE?
6298  024652  001440                  BEQ     ASGN7           ;BR IF DRIVE OFFLINE OR NONEXISTENT
6299  024654  100432                  BMI     ASGN6           ;BR IF DRIVE UNSAFE
6300  024656  006304                  ASL     R4              ;MAKE R4 INTO WORD INDEX
6301                          ;        MOV     BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
6302  024660  016400  002102          MOV     BLKADR(R4),R0   ;PUT BLOCK'S ADDR INTO R0
6303  024664  004737  025432          JSR     PC,CLRDPB       ;CLEAR BLOCK FOR DRIVE JUST ASSIGNED
6304  024670  004737  025632          JSR     PC,DRVPRM       ;GET THE DRIVE'S ADDRESS LIMITS
6305  024674  004737  026044          JSR     PC,GETID        ;GET DRIVE I.D.
6306  024700  004537  026154          JSR     R5,GETADR       ;GET BAD SECTOR ADDRESSES
6307  024704  000414                  BR      2$              ;BRANCH IF RETRIEVE FAILS
6308  024706  016464  002102  001570  MOV     BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
6309  024714  012760  000001  000070  MOV     #1,$PASSC(R0)   ;PRESET PASS COUNT TO 1
6310  024722  005737  001316          TST     PACK            ;WRITE DATA PACK ?
6311  024726  001403                  BEQ     2$              ;BR IF NOT
6312  024730  113760  001316  000026  MOVB    PACK,$PACK(R0)  ;SET READ/WRITE DATA PACK INDICATOR
6313  024736  006204          2$:     ASR     R4              ;RESTORE DRIVE ADDRESS
6314  024740  000207          ASGN4:  RTS     PC              ;RETURN
6315  024742  012737  053462  026754  ASGN6:  MOV     #NOTSAF,ASNMSG  ;'UNSAFE' MESSAGE ADDRESS
6316  024750  000137  026734          JMP     ASNERR          ;TO ERROR ROUTINE
6317  024754  105764  034502  ASGN7:  TSTB    DRVTYP(R4)      ;DRIVE PRESENT?
6318  024760  001405                  BEQ     1$              ;BR IF NOT
6319  024762  100010                  BPL     2$              ;BR IF DRIVE OFFLINE
6320  024764  012737  053404  026754  MOV     #NOTRM,ASNMSG   ;ADDRESS OF 'NOT RM03' MSG
6321  024772  000407                  BR      3$              ;EXIT
6322  024774  012737  053426  026754  1$:     MOV     #NOTPRS,ASNMSG  ;ADDRESS OF 'NOT PRESENT' MSG
6323  025002  000403                  BR      3$              ;EXIT
6324  025004  012737  053313  026754  2$:     MOV     #UNTOFF,ASNMSG  ;ADDRESS OF 'DRIVE OFFLINE' MESSAGE
6325                          ;3$:     RTS     PC              ;ERROR RETURN
6326  025012  000137  026734          3$:     JMP     ASNERR          ;TO ERROR ROUTINE
6327
6328                          ;'T' COMMAND (ROUTINE TO ASSIGN A DRIVE)
6329
6330  025016  005037  001316  NEWASN: CLR     PACK            ;CLEAR 'W' COMMAND INDICATOR
6331  025022  000137  024462          JMP     ASSIGN          ;GO TO THE ASSIGN ROUTINE
6332
6333                          ;'D' COMMAND (ROUTINE TO DEASSIGN A DRIVE)
6334
6335  025026  005004  DEASGN: CLR     R4
6336  025030  012703  000010          MOV     #8.,R3          ;COUNTER
6337  025034  122715  000101          CMPB    #'A,(R5)        ;DEASSIGN ALL DRIVES ?
6338  025040  001403                  BEQ     1$              ;BR IF YES
6339  025042  012703  000001          MOV     #BIT00,R3       ;SET R3 FOR ONE UNIT
```

```
6340  025046  111504                        MOVB    (R5),R4          ;GET DRIVE NUMBER
6341  025050  136437  034606  001544  1$:   BITB    ATABIT(R4),ASNLST  ;DRIVE ASSIGNED ?
6342  025056  001414                        BEQ     3$               ;BR IF NOT
6343  025060  146437  034606  001544        BICB    ATABIT(R4),ASNLST  ;DELETE THE DRIVE FROM THE ASSIGNED LIST
6344  025066  006304                        ASL     R4               ;MAKE ADDR INTO A WORD INDEX
6345  025070  016464  002102  001546        MOV     BLKADR(R4),DUNIT(R4)  ;PUT ADDRESS IN DEASSIGN LIST
6346  025076  006204                        ASR     R4
6347  025100  005303                  2$:   DEC     R3               ;ANY MORE DRIVES ?
6348  025102  001412                        BEQ     4$               ;BR IF NOT
6349  025104  005204                        INC     R4
6350  025106  000760                        BR      1$
6351  025110  012737  053334  026754  3$:   MOV     #UNTNOT,ASNMSG   ;ADDR OF 'NOT ASSIGNED' MESSAGE
6352  025116  004737  026734                JSR     PC,ASNERR        ;REPORT IT
6353  025122  122715  000101                CMPB    #'A,(R5)         ;ALL DRIVE ?
6354  025126  001764                        BEQ     2$               ;YES
6355  025130  104401  001201          4$:   TYPE    ,$CRLF
6356  025134  000207                        RTS     PC
6357
6358                                  ;'S' COMMAND (ROUTINE TO TYPE DRIVE PERFORMANCE SUMMARY)
6359
6360  025136  005004                  SCMND:  CLR     R4
6361  025140  012703  000010                MOV     #8.,R3           ;COUNTER
6362  025144  122715  000101                CMPB    #'A,(R5)         ;ALL STATISTICS ?
6363  025150  001421                        BEQ     3$               ;BR IF YES
6364  025152  111504                        MOVB    (R5),R4          ;GET DRIVE NUMBER
6365  025154  136437  034606  001544        BITB    ATABIT(R4),ASNLST  ;SEE IF DRIVE ASSIGNED
6366  025162  001406                        BEQ     1$               ;BR IF NOT
6367  025164  006304                        ASL     R4               ;MAKE DRIVE ADDR INTO WORD INDEX
6368  025166  016400  002102                MOV     BLKADR(R4),R0    ;ADDR OF BLOCK
6369  025172  004737  023122                JSR     PC,TYPEST        ;TYPE DRIVE STATISTICS
6370  025176  000471                        BR      8$               ;EXIT
6371  025200  012737  053334  026754  1$:   MOV     #UNTNOT,ASNMSG   ;ADDR OF 'NOT ASSIGNED' MSG
6372  025206  004737  026734                JSR     PC,ASNERR        ;TYPE ERROR MESSAGE
6373  025212  000463                        BR      8$               ;EXIT
6374  025214  105737  001544          3$:   TSTB    ASNLST           ;ANY DRIVE ASSIGNED ?
6375  025220  001001                        BNE     4$               ;YES
6376  025222  000457                        BR      8$               ;RETURN
6377  025224  004737  023034          4$:   JSR     PC,STATPR        ;TYPE ALL STATISTICS
6378  025230  105737  001320                TSTB    DATE             ;SEE IF 'DATE' ENTERED
6379  025234  001404                        BEQ     11$              ;BR IF NOT
6380  025236  104401  054332                TYPE    ,DATEIS          ;'DATE: '
6381  025242  104401  001320                TYPE    ,DATE            ;THE OPERATOR ENTERED DATE
6382  025246  105737  001332          11$:  TSTB    OPERID           ;SEE IF OPERATOR I.D. ENTERED
6383  025252  001404                        BEQ     12$              ;BR IF NOT
6384  025254  104401  054343                TYPE    ,IDIS            ;'OPERATOR I.D.: '
6385  025260  104401  001332                TYPE    ,OPERID          ;THE OPERATOR I.D.
6386  025264  104401  054365          12$:  TYPE    ,HEDLIN          ;HEADER LINE
6387  025270  012737  043246  025336        MOV     #DRIVE0+$DRVID,6$  ;DRIVE I.D. FIELD ADDRESS
6388  025276  136437  034606  001544  5$:   BITB    ATABIT(R4),ASNLST  ;SEE IF DRIVE ASSIGNED
6389  025304  001417                        BEQ     7$               ;BR IF NOT ASSIGNED
6390  025306  010446                        MOV     R4,-(SP)         ;;SAVE R4 FOR TYPEOUT
6391                                                                 ;;TYPE DRIVE NUMBER
6392  025310  104403                        TYPOS                    ;;GO TYPE--OCTAL ASCII
6393  025312     002                        .BYTE   2                ;;TYPE 2 DIGIT(S)
6394  025313     000                        .BYTE   0                ;;SUPPRESS LEADING ZEROS
6395  025314  104401  053244                TYPE    ,LIN4SP          ;4 SPACES
```

```
6396  025320  105777  000012                  TSTB    @6$             ;SEE IF DRIVE I.D. ENTERED
6397  025324  001003                          BNE     10$             ;BR IF DRIVE I.D. PRESENT
6398  025326  104401  054410                  TYPE    ,NONE           ;TYPE 'NONE'
6399  025332  000404                          BR      7$              ;CONTINUE
6400  025334  104401                  10$:    TYPE                    ;TYPE THE DRIVE I.D.
6401  025336  000000                  6$:     .WORD   0               ;ADDRESS OF DRIVE I.D. FIELD HERE
6402  025340  104401  001201                  TYPE    ,$CRLF          ;CR-LF
6403  025344  005303                  7$:     DEC     R3              ;DECREMENT THE COUNTER
6404  025346  003405                          BLE     8$              ;BR IF AT END
6405  025350  062737  000304  025336          ADD     #$RMEC2+2,6$    ;INCREMENT THE MESSAGE FIELD ADDRESS
6406  025356  005204                          INC     R4              ;INCREMENT DRIVE ADDRESS
6407  025360  000746                          BR      5$              ;CONTINUE
6408  025362  104401  001201          8$:     TYPE    ,$CRLF          ;CR-LF
6409  025366  000207                  9$:     RTS     PC
6410
6411                                  ;'W' COMMAND (ROUTINE TO WRITE A DATA PACK)
6412
6413  025370  012737  177777  001316  DATAPK: MOV     #-1,PACK        ;SET THE 'W' COMMAND INDICATOR
6414  025376  000137  024462                  JMP     ASSIGN          ;ASSIGN REQUESTED DRIVE
6415
6416                                  ;'WT' COMMAND (TO WRITE A PACK AND FOLLOWED BY TEST PACK)
6417  025402  116515  000001          WATPAK: MOVB    1(R5),(R5)      ;ADJUST DRIVE NUMBER ADDRESS
6418  025406  012737  177776  001316          MOV     #-2,PACK        ;PACK WRITE COMMAND
6419  025414  000137  024462                  JMP     ASSIGN          ;JUMP TO ASSIGN ROUTINE
6420                                  ;'R' COMMAND (ROUTINE TO READ A DATA PACK)
6421
6422  025420  012737  000001  001316  REDAPK: MOV     #1,PACK         ;SET THE 'READ' INDICATOR
6423  025426  000137  024462                  JMP     ASSIGN          ;ASSIGN THE REQUESTED DRIVE
6424
6425                                  ;ROUTINE TO CLEAR THE DPB FOR THE ASSIGNED DRIVE
6426                                  ;CALL:
6427                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
6428                                  ;       JSR     PC,CLRDPB
6429                                  ;       RETURN
6430
6431  025432                  CLRDPB:
6432  025432  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6433  025434  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6434  025436  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
6435  025440  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
6436  025442  010004                          MOV     R0,R4           ;GET THE DPB ADDRESS
6437  025444  062704  000002                  ADD     #2,R4           ;ADDRESS OF FIRST LOCN TO BE CLEARED
6438  025450  012703  000005                  MOV     #5,R3           ;NUMBER OF LOCNS TO BE CLEARED
6439  025454  005024                  1$:     CLR     (R4)+           ;CLEAR THE LOCATION
6440  025456  005303                          DEC     R3              ;DECREMENT THE COUNTER
6441  025460  001375                          BNE     1$              ;BR IF NOT FINISHED
6442  025462  062704  000002                  ADD     #2,R4           ;MOVE THE ADDRESS PAST THE 'REG' ADDR
6443  025466  012703  000070                  MOV     #$NEXT-$REG,R3  ;NUMBER OF LOCNS TO BE CLEARED
6444  025472  005024                  2$:     CLR     (R4)+           ;CLEAR
6445  025474  162703  000002                  SUB     #2,R3           ;DECREMENT THE LOCN COUNTER
6446  025500  001374                          BNE     2$              ;BR IF NOT FINISHED
6447  025502  062704  000014                  ADD     #12.,R4         ;MOVE PAST ADDRESS LIMITS
6448  025506  012703  000162                  MOV     #$RMEC2-MINSEC,R3  ;NUMBER OF LOCNS TO BE CLEARED
6449  025512  005024                  3$:     CLR     (R4)+           ;CLEAR A LOCATION
6450  025514  162703  000002                  SUB     #2,R3           ;DECREMENT THE COUNTER
6451  025520  001374                          BNE     3$              ;BR IF NOT DONE
```

```
6452  025522  113760  001516  000024          MOVB    BEGCOD,$CODE(R0)  ;INITIAL COMMAND CODE
6453  025530  013701  001516                  MOV     BEGCOD,R1         ;GET THE ACTUAL OP CODE
6454  025534  116160  002122  000002          MOVB    COMTBL(R1),$COMND(R0)  ;OPERATION CODE
6455  025542  113760  001514  000030          MOVB    BEGPAT,$PATTC(R0)  ;PATTERN CODE
6456  025550  106360  000030                  ASLB    $PATTC(R0)        ;CONVERT CODE TO A TABLE INDEX
6457  025554  013760  001520  000020          MOV     BEGSIZ,$WRDL(R0)  ;BEGINNING RECORD SIZE
6458  025562  013760  001520  000004          MOV     BEGSIZ,$WRDM(R0)  ;VALUE FOR DATA TRANSFER
6459  025570  005460  000004                  NEG     $WRDM(R0)         ;MAKE IT INTO 2'S COMPLEMENT
6460  025574  012760  000400  000022          MOV     #256.,$SSEC(R0)   ;INITIAL VALUE OF SECTOR SIZE
6461  025602  132760  000001  000024          BITB    #1,$CODE(R0)      ;HEADER ORDER ?
6462  025610  001403                          BEQ     4$                ;BR IF NOT
6463  025612  062760  000002  000022          ADD     #2,$SSEC(R0)      ;ADD HEADER SIZE TO SECTOR SIZE
6464  025620                                4$:
6465  025620  012605                          MOV     (SP)+,R5          ;;POP STACK INTO R5
6466  025622  012604                          MOV     (SP)+,R4          ;;POP STACK INTO R4
6467  025624  012603                          MOV     (SP)+,R3          ;;POP STACK INTO R3
6468  025626  012601                          MOV     (SP)+,R1          ;;POP STACK INTO R1
6469  025630  000207                          RTS     PC                ;RETURN
6470
6471                                  ;ROUTINE TO GET ADDRESS LIMITS FROM THE OPERATOR
6472
6473  025632  010346                  DRVPRM: MOV     R3,-(SP)          ;SAVE R3
6474  025634  010446                          MOV     R4,-(SP)          ;SAVE R4
6475  025636  005737  000042                  TST     42                ;RUNNING UNDER MONITOR CONTROL
6476  025642  001010                          BNE     3$                ;BR IF YES
6477  025644  104401  054226                  TYPE    ,ENTLMT           ;'ENTER ADDRESSES'
6478  025650  006204                          ASR     R4                ;CONVERT INDEX TO DRIVE NUMBER
6479  025652  010446                          MOV     R4,-(SP)          ;;SAVE R4 FOR TYPEOUT
6480                                                                    ;;TYPE DRIVE NUMBER
6481  025654  104403                          TYPOS                     ;;GO TYPE--OCTAL ASCII
6482  025656     002                          .BYTE   2                 ;;TYPE 2 DIGIT(S)
6483  025657     000                          .BYTE   0                 ;;SUPPRESS LEADING ZEROS
6484                                          TYPE    ,SLASH            ;;'/'
6485                                ;         MOV     #RM03A,2$         ;ADDRESS OF 'RM03' MESSAGE
6486                                ;         BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
6487                                ;         BNE     1$                ;BR IF YES
6488                                ;         HALT                      ;NOT RM03 PROGRAM SHOULD NOT HAVE
6489                                ;                                   ;REACHED THIS POINT
6490                                ;1$:      TYPE                      ;TYPE THE MESSAGE WHICH FOLLOWS
6491                                ;2$:      .WORD   0                 ;MESSAGE ADDRESS
6492  025660  104401  001201                  TYPE    ,$CRLF            ;CR-LF
6493  025664  012737  001465  001446  3$:     MOV     #821.,CYLIMT      ;ASSUME AN RM03
6494  025672  132764  000004  034502          BITB    #BIT02,DRVTYP(R4)  ;MAKE SURE RM03
6495  025700  001001                          BNE     4$                ;BR IF RM03
6496  025702  000000                          HALT                      ;HALT IF NOT
6497  025704  116460  034502  000262  4$:     MOVB    DRVTYP(R4),$RMDT(R0)  ;INITIATE $RMDT
6498  025712  062760  177777  000122          ADD     #-1,$FIRST(R0)    ;SEE IF FIRST TIME STARTED
6499  025720  103417                          BCS     5$                ;BR IF NOT
6500  025722  013760  001446  000106          MOV     CYLIMT,MAXCYL(R0)  ;LOAD MAXIMUM CYLINDER
6501  025730  005060  000110                  CLR     MINCYL(R0)        ;CLEAR MINIMUM CYLINDER
6502  025734  013760  001444  000112          MOV     TRKLMT,MAXTRK(R0)  ;LOAD MAXIMUM TRACK
6503  025742  005060  000114                  CLR     MINTRK(R0)        ;CLEAR MINIMUM TRACK
6504  025746  013760  001442  000116          MOV     SECLMT,MAXSEC(R0)  ;LOAD MAXIMUM SECTOR
6505  025754  005060  000120                  CLR     MINSEC(R0)        ;CLEAR MINIMUM SECTOR
6506  025760  006304                  5$:     ASL     R4                ;SETUP TO ADDRESS WORDS
6507  025762  016403  055252                  MOV     TABLE(R4),R3      ;PARAMETER TABLE ADDRESS
```

```
6508  025766  013763  001446  000002          MOV     CYLIMT,2(R3)    ;LOAD CYLINDER LIMIT FOR LAST CYLINDER
6509  025774  013763  001446  000010          MOV     CYLIMT,10(R3)   ;LOAD CYLINDER LIMIT FOR STARTING CYLINDER
6510  026002  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
6511  026006  001002                          BNE     6$              ;BR IF YES
6512  026010  004737  026610                  JSR     PC,PARENT       ;GET THE DRIVE'S PARAMETERS
6513  026014  116060  000120  000010  6$:     MOVB    MINSEC(R0),$SEC(R0)  ;INITIAL SECTOR VALUE
6514  026022  116060  000114  000011          MOVB    MINTRK(R0),$TRK(R0)  ;INITIAL TRACK VALUE
6515  026030  016060  000110  000012          MOV     MINCYL(R0),$CYL(R0)  ;INITIAL CYLINDER VALUE
6516  026036  012604                          MOV     (SP)+,R4        ;RESTORE R4
6517  026040  012603                          MOV     (SP)+,R3        ;RESTORE R3
6518  026042  000207                          RTS     PC              ;RETURN
6519
6520                                  ;ROUTINE TO GET THE DRIVE I.D. FROM THE OPERATOR
6521
6522  026044  010546                  GETID:  MOV     R5,-(SP)        ;SAVE R5
6523  026046  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
6524  026052  001036                          BNE     2$              ;BR IF NOT
6525  026054  005037  001360          1$:     CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6526  026060  104401  054201                  TYPE    ,ENTDRV         ;'ENTER DRV I.D.: '
6527  026064  005046                          CLR     -(SP)           ;CLEAR THE STACK
6528  026066  111016                          MOVB    (R0),(SP)       ;PUT THE DRIVE NUMBER ON THE STACK
6529  026070  104403                          TYPOS                   ;TYPE THE DRIVE NUMBER
6530  026072     002                          .BYTE   2               ;TYPE 2 DIGITS
6531  026073     000                          .BYTE   0               ;SUPRESS LEADING ZEROS
6532  026074  104401  001201                  TYPE    ,$CRLF          ;CR-LF
6533  026100  104411                          RDLIN                   ;READ THE ENTRY
6534  026102  012605                          MOV     (SP)+,R5        ;GET THE ENTRY ADDRESS
6535  026104  005737  001360                  TST     CFLAG           ;'CONTROL C' ENTERED ?
6536  026110  001361                          BNE     1$              ;BR IF IT WAS
6537  026112  121527  000056                  CMPB    (R5),#'.        ;PERIOD ENTERED ?
6538  026116  001414                          BEQ     2$              ;BR IF YES
6539  026120  112560  000224                  MOVB    (R5)+,$DRVID(R0)  ;STORE THE I.D.
6540  026124  112560  000225                  MOVB    (R5)+,$DRVID+1(R0)  ;STORE THE I.D.
6541  026130  112560  000226                  MOVB    (R5)+,$DRVID+2(R0)  ;STORE THE I.D.
6542  026134  112560  000227                  MOVB    (R5)+,$DRVID+3(R0)  ;STORE THE I.D.
6543  026140  112560  000230                  MOVB    (R5)+,$DRVID+4(R0)  ;STORE THE I.D.
6544  026144  112560  000231                  MOVB    (R5)+,$DRVID+5(R0)  ;STORE THE I.D.
6545  026150  012605                  2$:     MOV     (SP)+,R5        ;RESTORE R5
6546  026152  000207                          RTS     PC              ;RETURN
6547
6548                                  ;ROUTINE TO GET THE ADDRESSES OF ANY BAD SECTORS (UP TO A MAX OF 16)
6549                                  ;CALL SEQ
6550                                  ;       JSR     R5,GETADR
6551                                  ;       RET1                    ERROR RET
6552                                  ;       RET2                    NORMAL RET
6553                                  ;
6554                                  ;R0 DPB ADDRESS
6555
6556  026154                          GETADR:
6557  026154  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6558  026156  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6559  026160  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6560  026162  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
6561  026164  010001                          MOV     R0,R1           ;DPB ADDRESS
6562  026166  062701  000124                  ADD     #$BDSEC,R1      ;ADDRESS OF BAD SECTOR TABLE
6563  026172  012702  000040                  MOV     #32.,R2         ;WORD CTR
```

```
6564  026176  012721  177777          1$:   MOV   #-1,(R1)+          ;INITIALIZE ALL LOCS TO -1
6565  026202  005302                        DEC   R2                  ;DECREMENT WORD CTR
6566  026204  001374                        BNE   1$                  ;BRANCH IF NOT DONE
6567  026206  112737  000171  046064        MOVB  #RDDAT,GENDPB+$COMND  ;READ DATA COMMAND
6568  026214  012737  001466  046074        MOV   #822.,GENDPB+$CYL     ;LAST CYLINDER
6569  026222  112737  000004  046073        MOVB  #4,GENDPB+$TRK        ;LAST TRACK
6570  026230  012737  177400  046066        MOV   #-256.,GENDPB+$WRDM   ;ONE SECTOR WORD CTR
6571  026236  111037  046062              MOVB  (R0),GENDPB           ;DRIVE NUMBER
6572  026242  005037  001264              CLR   $CDW1                 ;ERROR FLAG
6573  026246  005046                      CLR   -(SP)                 ;DUMMY PAIR
6574  026250  005046                      CLR   -(SP)                 ;DUMMY PAIR
6575  026252  012746  000012              MOV   #12,-(SP)             ;STARTING SECTOR 10.
6576  026256  012746  000036              MOV   #30.,-(SP)            ;LAST SECTOR
6577  026262  012737  000010  001266      MOV   #10,$CDW2             ;LAST SECTOR
6578  026270  105037  046072              CLRB  GENDPB+$SEC           ;STARTING SECTOR
6579  026274  004037  035364          2$: JSR   R0,RM03               ;READ CURRENT SECTOR
6580  026300  046062                      GENDPB                      ;BRANCH IF QUEUE FAILS
6581  026302  000774                      BR    2$
6582  026304  005737  046100          3$: TST   GENDPB+$STATUS    ;DONE YET ?
6583  026310  001775                      BEQ   3$                  ;BRANCH IF NOT
6584  026312  100013                      BPL   4$                  ;BRANCH IF DONE WITHOUT ERROR
6585  026314  062737  000002  046072      ADD   #2,GENDPB+$SEC      ;INCREMENT TO NEXT 2ND SECTOR
6586  026322  123737  001266  046072      CMPB  $CDW2,GENDPB+$SEC   ;ALL SECTORS ARE TRIED ?
6587  026330  103361                      BHIS  2$                  ;BRANCH IF NOT
6588  026332  052737  000001  001264      BIS   #BIT0,$CDW1         ;FLAG-RETRIEVE FAILS
6589  026340  000451                      BR    9$                  ;NEXT SETS
6590  026342  010001                  4$: MOV   R0,R1               ;BAD SECTOR TABLE
6591  026344  062701  000124              ADD   #$BDSEC,R1          ;BAD SECTOR TABLE ADDRESS
6592  026350  012702  000040              MOV   #32.,R2             ;WORD CTR OF BAD SECTOR TABLE
6593  026354  012703  056512              MOV   #CYLDER,R3          ;BUFFER ADDRESS
6594  026360  062703  000010              ADD   #10,R3              ;STARTS AT THE 5TH WORD
6595  026364  012704  000374              MOV   #252.,R4            ;WORD CTR FOR BAD SPOT FILE
6596  026370  022713  177777          5$: CMP   #-1,(R3)            ;END OF BAD SPOT FILE ?
6597  026374  001433                      BEQ   9$                  ;BRANCH IF SO
6598  026376  022711  177777          6$: CMP   #-1,(R1)            ;ENTRY OF THE TABLE ?
6599  026402  001406                      BEQ   7$                  ;BRANCH IF SO
6600  026404  062701  000004              ADD   #4,R1               ;ADJUST TABLE ENTRY
6601  026410  162702  000002              SUB   #2,R2               ;DECREMENT WORD CTR
6602  026414  002420                      BLT   8$                  ;OVER 16 BAD SECTOR DETECTED
6603  026416  000767                      BR    6$                  ;LOOP BACK
6604  026420  011311                  7$: MOV   (R3),(R1)           ;LOAD THE TABLE
6605  026422  016361  000002  000002      MOV   2(R3),2(R1)         ;TRK AND SECTOR
6606  026430  162704  000002              SUB   #2,R4               ;DECREMENT WORD CTR FOR FILE
6607  026434  003413                      BLE   9$                  ;BRANCH IF DONE
6608  026436  062703  000004              ADD   #4,R3               ;ADJUST FILE ADDRESS
6609  026442  162702  000002              SUB   #2,R2               ;DECREMENT TABLE WORD CTR
6610  026446  003403                      BLE   8$                  ;TABLE ENTRY EXHAUSTED
6611  026450  062701  000004              ADD   #4,R1               ;ADJUST TABLE ENTRY
6612  026454  000745                      BR    5$                  ;LOOP BACK
6613  026456  052737  000002  001264  8$: BIS   #BIT1,$CDW1         ;ERROR FLAG-OVER 16 BAD SECTORS
6614  026464  012637  001266          9$: MOV   (SP)+,$CDW2         ;UPDATE LAST SECTOR
6615  026470  112637  046072              MOVB  (SP)+,GENDPB+$SEC   ;STARTING SECTOR
6616  026474  001277                      BNE   2$                  ;BRANCH IF NOT DUMMY PAIR
6617  026476  032737  000001  001264      BIT   #BIT0,$CDW1         ;RETRIEVE FAILS ?
6618  026504  001412                      BEQ   10$                 ;BRANCH IF NOT
6619  026506  104401  054575              TYPE  ,MERR1              ;FAILS TO RETRIEVE BAD SPOT FILE
```

```
6620  026512  104401  053305                TYPE    ,UNTMSG                 ;ON DRIVE
6621  026516  111046                        MOVB    (R0),-(SP)              ; #
6622  026520  104403                        TYPOS
6623  026522     002                        .BYTE   2
6624  026523     000                        .BYTE   0
6625  026524  104401  001201                TYPE    ,$CRLF                  ;CR-LF
6626  026530  000415                        BR      11$                     ;EXIT
6627  026532  032737  000002  001264  10$:  BIT     #BIT1,$CDW1             ;OVER 16 BAD SECTORS ?
6628  026540  001411                        BEQ     11$                     ;BRANCH IF NOT
6629  026542  104401  054643                TYPE    ,MERR2                  ;OVER 16 BAD SECTORS DETECTED
6630  026546  104401  053305                TYPE    ,UNTMSG                 ;ON DRIVE
6631  026552  111046                        MOVB    (R0),-(SP)      ;
6632  026554  104403                        TYPOS
6633  026556     002                        .BYTE   2
6634  026557     000                        .BYTE   0
6635  026560  104401  001201                TYPE    ,$CRLF
6636  026564  005737  001264          11$:  TST     $CDW1                   ;ERROR FLAG SET ?
6637  026570  001002                        BNE     12$                     ;BRANCH IS SET
6638  026572  062705  000002                ADD     #2,R5                   ;ADJUST FOR NORMAL RET
6639  026576                          12$:
6640  026576  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
6641  026600  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
6642  026602  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
6643  026604  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
6644  026606  000205                        RTS     R5                      ;EXIT
6645
6646                                  ;PARAMETER ENTRY ROUTINE
6647                                  ;CALL
6648                                  ;       MOV     #ADR,R3         ;PARAMETER TABLE ADDRESS
6649                                  ;       JSR     PC,PARENT       ;GET THE PARAMETERS
6650
6651  026610  010346                PARENT: MOV     R3,-(SP)        ;SAVE THE PARAMETER TABLE ADDRESS
6652  026612  005037  001360                CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6653  026616  012337  026626          1$:   MOV     (R3)+,3$        ;ADDRESS OF PARAMETER NAME
6654  026622  001442                        BEQ     9$              ;BR IF AT END OF TABLE
6655  026624  104401                        TYPE                    ;TYPE THE PARAMETER NAME
6656  026626  000000                  3$:   .WORD   0               ;ADDRESS OF PARAMETER NAME TEXT
6657  026630  012302                        MOV     (R3)+,R2        ;MAXIMUM PARAMETER VALUE
6658  026632  012305                        MOV     (R3)+,R5        ;ADDRESS OF PARAMETER
6659  026634  011546                        MOV     (R5),-(SP)      ;CURRENT VALUE OF PARAMETER
6660  026636  104405                        TYPDS                   ;TYPE THE CURRENT VALUE OF THE PARAMETER
6661  026640  104401  055036                TYPE    ,SLASH          ;' /'
6662  026644  104411                        RDLIN                   ;READ THE KEYBOARD
6663  026646  012601                        MOV     (SP)+,R1        ;INPUT ASCII STRING ADDRESS
6664  026650  005737  001360                TST     CFLAG           ;'CONTROL C' ENTERED ?
6665  026654  001021                        BNE     8$              ;BR IF IT WAS
6666  026656  004537  030300                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
6667  026662  026616                        1$                      ;CARRIAGE RETURN ONLY ENTERED
6668  026664  026730                        9$                      ;PERIOD ONLY ENTERED
6669  026666  026702                        6$                      ;ILLEGAL INPUT
6670  026670  026676                        5$                      ;TERMINATED WITH A CARRIAGE RETURN
6671  026672  026702                        6$                      ;TERMINATED WITH A "."
6672  026674  026714                        7$                      ;TERMINATED WITH A "'"
6673  026676  010215                  5$:   MOV     R2,(R5)         ;MOVE NEW VALUE TO PARAMETER LOCATION
6674  026700  000746                        BR      1$              ;GET MORE PARAMETERS
6675  026702  104401  054417          6$:   TYPE    ,BADENT         ;'BAD ENTRY'
```

```
6676  026706  162703  000006            SUB     #6,R3           ;DECREMENT THE TABLE POINTER
6677  026712  000741                    BR      1$              ;TRY AGAIN
6678  026714  010215              7$:   MOV     R2,(R5)         ;NEW VALUE
6679  026716  000404                    BR      9$              ;EXIT
6680  026720  005037  001360      8$:   CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
6681  026724  011603                    MOV     (SP),R3         ;RELOAD THE PARAMETER TABLE ADDRESS
6682  026726  000733                    BR      1$              ;TRY AGAIN
6683  026730  005726              9$:   TST     (SP)+           ;CORRECT THE STACK POINTER
6684  026732  000207                    RTS     PC              ;RETURN
6685
6686                                ;TYPEOUT ASSIGN/DEASSIGN ERROR MESSAGE
6687                                ;CALL
6688                                ;       MOV     #MESADR,ASNMSG  ;ERROR MESSAGE ADDRESS
6689                                ;       JSR     PC,ASNERR
6690                                ;       RETURN
6691
6692  026734  104401  054130      ASNERR: TYPE    ,QUES           ;QUESTION MARK
6693  026740  104401  053305              TYPE    ,UNTMSG         ;TYPE 'DRIVE'
6694  026744  010446                    MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6695                                                            ;;TYPE DRIVE NUMBER
6696  026746  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
6697  026750     002                    .BYTE   2               ;;TYPE 2 DIGIT(S)
6698  026751     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
6699  026752  104401                    TYPE                    ;TYPE SPECIFIC MESSAGE
6700  026754  000000      ASNMSG:       .WORD   0               ;MESSAGE ADDRESS
6701  026756  104401  001201            TYPE    ,$CRLF
6702  026762  000207                    RTS     PC
6703
6704                                ;DEASSIGN DRIVE IF A FATAL ERROR OCCURS
6705                                ;CALL
6706                                ;       JSR     PC,DROP
6707                                ;       RETURN
6708
6709  026764  005004      DROP:     CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
6710  026766  111004                MOVB    (R0),R4         ;MOVE DRIVE NUMBER TO R4
6711  026770  146437  034606  001544      BICB    ATABIT(R4),ASNLST  ;REMOVE DRIVE FROM ASSIGNED LIST
6712  026776  006304                ASL     R4              ;MAKE DRIVE NUMBER INTO A TABLE INDEX
6713  027000  010064  001546            MOV     R0,DUNIT(R4)    ;PUT DRIVE IN DROP LIST
6714  027004  104401  001201            TYPE    ,$CRLF
6715  027010  104401  001201            TYPE    ,$CRLF
6716  027014  104401  053703            TYPE    ,DROPNG         ;TYPE 'DROPPING DRIVE'
6717  027020  104401  054014            TYPE    ,DRNUM          ;'DRIVE #'
6718  027024  006204                    ASR     R4              ;DRIVE NUMBER
6719  027026  010446                    MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6720                                                            ;;TYPE DRIVE NUMBER
6721  027030  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
6722  027032     002                    .BYTE   2               ;;TYPE 2 DIGIT(S)
6723  027033     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
6724  027034  104401  001201            TYPE    ,$CRLF
6725  027040  105737  001544            TSTB    ASNLST          ;MORE DRIVES ACTIVE
6726  027044  001006                    BNE     1$              ;YES
6727  027046  005737  000042            TST     @#42            ;ANY MONITOR ?
6728  027052  001403                    BEQ     1$              ;NO
6729  027054  005726                    TST     (SP)+           ;CLEAR STACK
6730  027056  000137  027440            JMP     $GET42          ;GIVE CONTROL TO MONITOR
6731  027062  000207              1$:   RTS     PC
```

```
                                        ;ROUTINE TO DEASSIGN DRIVE IF ERRORS BECOMES EXCESSIVE

027064  032777  000020  152062  ABNRML: BIT     #SW04,@SWR      ;SEE IF SWITCH 4 SET
027072  001006                  BNE     1$              ;BR IF IT'S SET
027074  023760  001464  000056          CMP     MAXER,$TOTAL(R0)  ;CHECK TOTAL ERROR VALUE
027102  103002                  BHIS    1$              ;BR IF ERRORS DONOT EXCEED MAX
027104  000137  026764                  JMP     DROP            ;DEASSING THE DRIVE
027110  000207          1$:     RTS     PC              ;RETURN

                                        ;ROUTINE TO CHECK FOR END OF PASS AND END OF TEST

                                        .SBTTL  END OF PASS ROUTINE

                                        ;;*********************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO FISK

027112                          $EOP:
027112  005737  001506          EOP:    TST     ENDET           ;END OF PASS DETERMINED BY SEEKS OR WORDS ?
027116  001412                  BEQ     EOP1            ;BR IF SEEKS
027120  026037  000054  001452          CMP     $READ+2(R0),ENDCON+2  ;CHECK MSW OF WORDS READ COUNT
027126  101017                  BHI     EOP2            ;BR IF MSW GREATER THAN LIMIT
027130  103527                  BLO     EOPX            ;BR IF MSW LESS THAN LIMIT
027132  026037  000052  001450          CMP     $READ(R0),ENDCON  ;CHECK LSW AGAINST LIMIT
027140  103012                  BHIS    EOP2            ;BR IF EQUAL OR GREATER
027142  000522                  BR      EOPX            ;EXIT
027144  026037  000044  001456  EOP1:   CMP     $POSIT+2(R0),ENDSEK+2  ;CHECK MSW OF SEEK COUNT
027152  101005                  BHI     EOP2            ;BR IF MSW GREATER THAN LIMIT
027154  103515                  BLO     EOPX            ;EXIT IF MSW LESS THAN LIMIT
027156  026037  000042  001454          CMP     $POSIT(R0),ENDSEK  ;CHECK LSW OF SEEK COUNT
027164  103511                  BLO     EOPX            ;EXIT IF LSW LESS THAN LIMIT
027166  104401  001201  EOP2:   TYPE    ,$CRLF          ;CR-LF
027172  104401  053737          TYPE    ,ENDPAS         ;END OF PASS FOR THE DRIVE
027176  016046  000070          MOV     $PASSC(R0),-(SP)  ;PUT PASS COUNT ON THE STACK
027202  104405                  TYPDS                   ;CONVERT PASS COUNT TO DECIMAL AND TYPE IT
027204  111037  001344          MOVB    (R0),UNIT       ;STORE THE DRIVE NUMBER
027210  032777  000020  151736  BIT     #SW04,@SWR      ;SWITCH 4 SET ?
027216  001017                  BNE     1$              ;BR IF SET
027220  026037  000070  001460  CMP     $PASSC(R0),PASCNT  ;SEE IF AT END OF TEST
027226  103413                  BLO     1$              ;BR IF NOT
027230  104401  053753          TYPE    ,ENDTST         ;TYPE 'END OF TEST'
027234  104401  054014          TYPE    ,DRNUM          ;'DRIVE #'
027240  013746  001344          MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
                                                        ;;TYPE DRIVE NUMBER
027244  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
027246     002                  .BYTE   2               ;;TYPE 2 DIGIT(S)
027247     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
027250  104401  001201          TYPE    ,$CRLF          ;CR-LF
027254  000431                  BR      3$              ;DEASSIGN THE DRIVE
027256  104401  054014  1$:     TYPE    ,DRNUM          ;'DRIVE #'
027262  013746  001344          MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
                                                        ;;TYPE DRIVE NUMBER
027266  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
027270     002                  .BYTE   2               ;;TYPE 2 DIGIT(S)
```

```
6788  027271  000                       .BYTE   0               ;;SUPPRESS LEADING ZEROS
6789  027272  104401  001201            TYPE    $CRLF           ;CR-LF
6790  027276  004737  023122            JSR     PC,TYPEST       ;TYPE THE DRIVE'S STATISTICS
6791  027302  010346                    MOV     R3,-(SP)        ;SAVE R3
6792  027304  010446                    MOV     R4,-(SP)        ;SAVE R4
6793  027306  010004                    MOV     R0,R4           ;DRIVE'S BLOCK ADDRESS
6794  027310  062704  000036            ADD     #$OPERC,R4      ;ADD THE STARTING ADDR OF SECTIONS TO CLEAR
6795  027314  012703  000010            MOV     #8.,R3          ;NUMBER OF LOCNS TO BE CLEARED
6796                                                            ;(ERROR COUNTERS NOT CLEARED)
6797  027320  005024            2$:     CLR     (R4)+           ;CLEAR THE LOCN
6798  027322  005303                    DEC     R3              ;DECREMENT THE LOCATION COUNTER
6799  027324  001375                    BNE     2$              ;BR IF MORE TO GO
6800  027326  012604                    MOV     (SP)+,R4        ;RESTORE R4
6801  027330  012603                    MOV     (SP)+,R3        ;RESTORE R3
6802  027332  005260  000070            INC     $PASSC(R0)      ;INCREMENT THE PASS COUNT
6803  027336  000424                    BR      EOPX            ;EXIT
6804  027340  104401  001201    3$:     TYPE    $CRLF
6805  027344  005004                    CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
6806  027346  111004                    MOVB    (R0),R4         ;MOVE DRIVE NUMBER
6807  027350  146437  034606  001544    BICB    ATABIT(R4),ASNLST  ;DELETE DRIVE FROM ASSIGNED LIST
6808  027356  006304                    ASL     R4              ;MAKE DRIVE NUMBER INTO TABLE INDEX
6809  027360  010064  001546            MOV     R0,DUNIT(R4)    ;PUT BLOCK ADDRESS INTO DROP LIST
6810  027364  105737  001544            TSTB    ASNLST          ;ALL DRIVES ARE DESIGNED ?
6811  027370  001007                    BNE     EOPX            ;BRANCH IF NOT
6812  027372  005237  001214            INC     $DEVCT          ;INCREMENT DEVICE COUNT
6813  027376  005237  001212            INC     $PASS           ;INCREMENT THE PASS NUMBER FOR APT
6814  027402  042737  100000  001212    BIC     #100000,$PASS   ;AVIOD NEGATIVE NUMBER
6815  027410  000207            EOPX:   RTS     PC              ;RETURN
6816  027412  005237  001212            INC     $PASS           ;;INCREMENT THE PASS NUMBER
6817  027416  042737  100000  001212    BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
6818  027424  005327                    DEC     (PC)+           ;;LOOP?
6819  027426  000001            $EOPCT: .WORD   1
6820  027430  003013                    BGT     $DOAGN          ;;YES
6821  027432  012737                    MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
6822  027434  000001            $ENDCT: .WORD   1
6823  027436  027426                    $EOPCT
6824  027440  013700  000042    $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
6825  027444  001405                    BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
6826  027446  000005                    RESET                   ;;CLEAR THE WORLD
6827  027450  004710            $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
6828  027452  000240                    NOP                     ;;SAVE ROOM
6829  027454  000240                    NOP                     ;;FOR
6830  027456  000240                    NOP                     ;;ACT11
6831  027460                    $DOAGN:
6832  027460  000137                    JMP     @(PC)+          ;;RETURN
6833  027462  027464            $RTNAD: .WORD   FISK
6834  027464  005237  001210    FISK:   INC     $TESTN          ;INCREMENT THE TEST NUMBER IN THE MAIL BOX
6835  027470  000137  005574            JMP     MAIN1           ;RETURN TO LOOP
6836
6837                                    ;ROUTINE TO GET THE REMAINDER OF THE RANDOM NUMBER
6838                                    ;CALL
6839                                    ;       MOV     NUMBER,R5       ;DIVISOR INTO R5
6840                                    ;       JSR     PC,GETREM
6841                                    ;       RETURN                  ;REMAINDER IS IN R5
6842
6843  027474  013746  033752    GETREM: MOV     $LONUM,-(SP)    ;STORE RANDOM NUMBER ON THE STACK FOR DIVIDE
```

```
6844  027500  013746  033750                  MOV     $HINUM,-(SP)    ;UPPER PART
6845  027504  010546                          MOV     R5,-(SP)        ;PUT THE DIVISOR ONTO THE STACK
6846  027506  004737  027522                  JSR     PC,LINKDV       ;DIVIDE THE RANDOM NUMBERS
6847  027512  012605                          MOV     (SP)+,R5        ;PUT THE REMAINDER INTO R5
6848  027514  005726                          TST     (SP)+           ;ADJUST THE STACK POINTER
6849  027516  000240                          NOP                     ;FOR DEBUGGING HALT
6850  027520  000207                          RTS     PC
6851
6852                                  ;LINK ROUTINE TO THE DIVISION UTILITY SUBROUTINE
6853                                  ;       THIS ROUTINE ALLOWS THE 'SYSMAC' DIVIDE ROUTINE
6854                                  ;       CALLING SEQUENCE TO BE USED
6855
6856  027522  104412                  LINKDV: SAVREG                  ;STORE R0 - R5
6857  027524  016605  000026                  MOV     26(SP),R5       ;DIVISOR
6858  027530  005004                          CLR     R4              ;OTHER DIVISOR WORD
6859  027532  016602  000030                  MOV     30(SP),R2       ;UPPER DIVIDEND WORD
6860  027536  016603  000032                  MOV     32(SP),R3       ;LOWER DIVIDEND WORD
6861  027542  005000                          CLR     R0              ;CLEAR OTHER DIVIDEND REGISTERS
6862  027544  005001                          CLR     R1
6863  027546  004737  027570                  JSR     PC,M.DPID       ;GO TO THE DIVIDE ROUTINE
6864  027552  010166  000030                  MOV     R1,30(SP)       ;REMAINDER ON THE STACK
6865  027556  010366  000032                  MOV     R3,32(SP)       ;QUOTIENT ON THE STACK
6866  027562  104413                          RESREG                  ;RESTORE R0 - R5
6867  027564  012616                          MOV     (SP)+,(SP)      ;MOVE RETURN UP THE STACK
6868  027566  000207                          RTS     PC
6869
6870                                  ;       DIVISION UTILITY SUBROUTINE
6871                                  ;       R0-R1-R2-R3=DIVIDEND
6872                                  ;       R4-R5=DIVISOR
6873                                  ;       R0-R1=REMAINDER AFTER DIVISION
6874                                  ;       R2-R3=QUOTIENT AFTER DIVISION
6875                                  ;       ENTER WITH JSR  PC,M.DPID
6876                                  ;
6877  027570  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
6878  027574  010446                          MOV     R4,-(SP)        ;HIGH ORDER
6879  027576  010546                          MOV     R5,-(SP)        ;LOW ORDER DIVISOR TO THE STACK
6880  027600  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
6881  027604  005416                          NEG     @SP             ;VERSION OF THE DIVISOR
6882  027606  005666  000002                  SBC     2(SP)
6883  027612  061601                          ADD     @SP,R1
6884  027614  005500                          ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
6885  027616  066600  000002                  ADD     2(SP),R0
6886  027622  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
6887  027624  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
6888  027626  006103                  M.DP40: ROL     R3
6889  027630  006102                          ROL     R2
6890  027632  006101                          ROL     R1
6891  027634  006100                          ROL     R0
6892  027636  005716                          TST     @SP             ;TEST "CARRY" INDICATOR
6893  027640  001410                          BEQ     M.DP41          ;IF NO "CARRY" THEN ADD ELSE SUBTRACT
6894  027642  005016                          CLR     @SP             ;CLEAR UP FOR NEXT TIME
6895  027644  066601  000002                  ADD     2(SP),R1
6896  027650  005500                          ADC     R0              ;ADD -(DIVISOR)
6897  027652  005516                          ADC     @SP     ;  I    ;SET "CARRY"
6898  027654  066600  000004                  ADD     4(SP),R0;<-
6899  027660  000404                          BR      M.DP42
```

```
6900  027662  060501                  M.DP41: ADD     R5,R1
6901  027664  005500                          ADC     R0                      ;ADD +(DIVISOR)
6902  027666  005516                          ADC     @SP             ;_I     ;SET "CARRY"
6903  027670  060400                          ADD     R4,R0           ;<-
6904  027672  005516                  M.DP42: ADC     @SP                     ;SET "CARRY"
6905  027674  005716                          TST     @SP                     ;TEST THE UPDATE INDICATOR
6906  027676  001401                          BEQ     .+4             ;->     ;IF ZERO FORGET IT
6907  027700  005203                          INC     R3              ;  I    ;NO CARRY POSSIBLE HERE
6908  027702  005366  000006                  DEC     6(SP)           ;<-     ;DECREMENT COUNTER
6909  027706  003347                          BGT     M.DP40                  ;BRANCH IF MORE TO DO
6910  027710  006003                          ROR     R3
6911  027712  103404                          BCS     M.DP44
6912  027714  060501                          ADD     R5,R1
6913  027716  005500                          ADC     R0
6914  027720  060400                          ADD     R4,R0
6915  027722  000241                          CLC
6916  027724  006103                  M.DP44: ROL     R3
6917  027726  062706  000010                  ADD     #10,SP                  ;ADJUST STACK BY 4 WORDS
6918  027732  000242                          CLV
6919  027734  000207                          RTS     PC
6920  027736  062706  000006          M.DP50: ADD     #6,SP
6921  027742  000262                          SEV
6922  027744  000207                          RTS     PC
6923
6924
6925                                  ;ROUTINE TO REPLACE LEADING ZEROS IN A NUMERIC STRING WITH SPACES
6926                                  ;CALL
6927                                  ;       MOV     #ADR,-(SP)              ;ADDRESS OF NUMBER (IN ASCII)
6928                                  ;       JSR     R5,REPLZ
6929                                  ;       .WORD   N                       ;'N' IS NUMBER OF DIGITS TO BE TYPED
6930
6931  027746  010046                  REPLZ:  MOV     R0,-(SP)                ;SAVE R0
6932  027750  012746  000012                  MOV     #10.,-(SP)              ;MAXIMUM NUMBER OF DIGITS TO BE TYPED
6933  027754  162516                          SUB     (R5)+,(SP)              ;SUBTACT DIGITS TO FORM INDEX
6934  027756  016600  000006                  MOV     6(SP),R0                ;ADDRESS OF NUMBER TO R0
6935  027762  122710  000060          1$:     CMPB    #'0,(R0)                ;BYTE EQUAL TO ASCII '0' ?
6936  027766  001004                          BNE     2$                      ;BR IF NOT
6937  027770  112710  000040                  MOVB    #40,(R0)                ;REPLACE THE ZERO WITH A SPACE
6938  027774  005200                          INC     R0                      ;INCREMENT THE BYTE ADDRESS
6939  027776  000771                          BR      1$                      ;GO BACK AND LOOK FOR MORE LEADING ZEROS
6940  030000  105710                  2$:     TSTB    (R0)                    ;SEE IF ZERO BYTE TERMINATOR
6941  030002  001003                          BNE     3$                      ;BR IF NOT
6942  030004  005300                          DEC     R0                      ;BACKUP STRING POINTER
6943  030006  112710  000060                  MOVB    #'0,(R0)                ;PUT A ZERO BACK IN
6944  030012  016637  000006  030026  3$:     MOV     6(SP),4$                ;PUT ADDRESS IN LOCATION FOR TYPEOUT
6945  030020  062637  030026                  ADD     (SP)+,4$                ;BEGINNING OF SIGNIFICANT DIGITS
6946  030024  104401                          TYPE                            ;TYPE THE NUMBER
6947  030026  000000                  4$:     .WORD   0                       ;ADDRESS OF NUMBER
6948  030030  012600                          MOV     (SP)+,R0                ;RESTORE R0
6949  030032  012616                          MOV     (SP)+,(SP)              ;MOVE RETURN ADDRESS
6950  030034  000205                          RTS     R5                      ;RETURN
6951
6952                                  ;TYPE NUMERICAL ASCIZ STRING SUPRESS LEADING ZEROS
6953
6954                                  ;CALL
6955                                  ;       MOV     #NUMADR,-(SP)   ;FIRST ADDRESS OF ASCIZ STRING
```

```
                                        ;       JSR     PC,$SUPRS
                                        $SUPRS: MOV     R0,-(SP)        ;SAVE R0
030036  010046                                    MOV     4(SP),R0        ;PICKUP THE POINTER
030040  016600  000004                  1$:     TSTB    (R0)            ;TERMINATOR ?
030044  105710                                    BEQ     2$              ;BR IF YES
030046  001403                                    CMPB    #'0,(R0)+       ;IS THIS AN ASCII '0' ?
030050  122720  000060                            BEQ     1$              ;BR IF YES
030054  001773                          2$:     DEC     R0              ;BACKUP BY '1'
030056  005300                                    MOV     R0,3$           ;SAVE FOR TYPING
030060  010037  030066                            DISPLY                  ;GO PRINT
030064  104414                          3$:     .WORD   0               ;ASCIZ POINTER GOES HERE
030066  000000                                    MOV     (SP)+,R0        ;RESTORE R0
030070  012600                                    MOV     (SP)+,(SP)      ;RESTORE THE STACK
030072  012616                                    RTS     PC              ;RETURN
030074  000207

                                        ;ROUTINE TO TYPE AT PRIORITY 4

030076  013746  177776                  TYPRI4: MOV     @#PS,-(SP)      ;SAVE THE PRESENT STATUS
030102  012737  000200  177776                  MOV     #200,@#PS       ;CHANGE THE PRIORITY TO 4
030110  012537  030120                          MOV     (R5)+,1$        ;MESSAGE ADDRESS
030114  004737  031516                          JSR     PC,$TYPE        ;TYPE THE MESSAGE
030120  000000                          1$:     .WORD   0               ;MESSAGE ADDRESS GOES HERE
030122  000205                                  RTS     R5              ;RETURN

                                        ;ROUTINE TO TYPE ERRORS
                                        ;CALL
                                        ;       DISPLY                  ;MUST DEFINED IN 'TRAP' TABLE
                                        ;       MESADR                  ;ADDRESS OF MESSAGE
                                        ;       RETURN

030124  032777  020000  151022          $DSPLY: BIT     #BIT13,@SWR     ;INHIBIT ERROR TYPEOUT ?
030132  001004                                  BNE     1$              ;BR IF YES
030134  005037  177776                          CLR     @#PS            ;SET PRIORITY TO ZERO
030140  000137  031516                          JMP     $TYPE           ;TYPE THE MESSAGE
030144  062716  000002                  1$:     ADD     #2,(SP)         ;INCREMENT THE RETURN
030150  000002                                  RTI                     ;RETURN

                                        ;THIS ROUTINE IS USED TO CHECK IF AN
                                        ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
                                        ;CALL
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                        ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
                                        ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
                                        ;       RETURN2                 ;CHARACTER IS IN R2 AS A
                                        ;                               ;OCTAL DIGIT

030152  121127  000060          CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
030156  103407                          BLO     1$              ;YES -- BRANCH
030160  121127  000067                  CMPB    (R1),#'7        ;GREATER THAN SEVEN?
030164  101004                          BHI     1$              ;YES -- BRANCH
030166  111102                          MOVB    (R1),R2         ;GET THE CHARACTER
030170  042702  177770                  BIC     #^C7,R2         ;STRIP AWAY THE ASCII
030174  005725                          TST     (R5)+           ;ADJUST FOR RETURN
030176  000205                  1$:     RTS     R5              ;RETURN
```

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

030200  121127  000060          CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
030204  103407                          BLO     1$              ;YES -- BRANCH
030206  121127  000071                  CMPB    (R1),#'9        ;GREATER THAN NINE?
030212  101004                          BHI     1$              ;YES -- BRANCH
030214  111102                          MOVB    (R1),R2         ;GET THE CHARACTER
030216  042702  000060                  BIC     #'0,R2          ;STRIP AWAY THE ASCII
030222  005725                          TST     (R5)+           ;ADJUST FOR RETURN
030224  000205                  1$:     RTS     R5              ;RETURN

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

030226  105711                  CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
030230  001417                          BEQ     3$              ;YES -- BRANCH
030232  121127  000054                  CMPB    (R1),#',        ;"COMMA"?
030236  001413                          BEQ     2$              ;YES -- BRANCH
030240  121127  000056                  CMPB    (R1),#'.        ;"PERIOD"?
030244  001407                          BEQ     1$              ;YES -- BRANCH
030246  004537  030200                  JSR     R5,CK.DEC       ;"DIGIT"?
030252  000410                          BR      4$              ;NO -- BRANCH
030254  004537  030152                  JSR     R5,CK.OCT       ;OCTAL ?
030260  005725                          TST     (R5)+           ;DIGIT BETWEEN 8-9
030262  005725                          TST     (R5)+           ;DIGIT BETWEEN 0-7
030264  005725                  1$:     TST     (R5)+           ;PERIOD
030266  005725                  2$:     TST     (R5)+           ;COMMA
030270  005725                  3$:     TST     (R5)+           ;CARRIAGE RETURN
030272  005201                          INC     R1              ;MOVE POINTER TO NEXT CHARACTER
030274  011505                  4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
030276  000205                          RTS     R5              ;RETURN

                                ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
                                ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
                                ;       JSR     R5,CK.DIG       ;CHECK DIGITS
                                ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2=0
```

```
7068                                    ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2=0
7069                                    ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
7070                                    ;       RETURN  ADR4            ;"CR" -- R2 = NUMBER
7071                                    ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
7072                                    ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
7073
7074  030300  010446                    CK.DIG: MOV     R4,-(SP)        ;SAVE R4
7075  030302  010346                            MOV     R3,-(SP)        ;SAVE R3
7076  030304  010246                            MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
7077  030306  005002                            CLR     R2              ;START WITH 0
7078  030310  005003                            CLR     R3
7079  030312  005004                            CLR     R4
7080  030314  004537  030226                    JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
7081  030320  030414                            6$                      ;ILLEGAL CHARACTER
7082  030322  030422                            9$                      ;CARRIAGE RETURN
7083  030324  030414                            6$                      ;" "
7084  030326  030416                            7$                      ;"'"
7085  030330  030334                            1$                      ;DIGIT 0-7
7086  030332  030334                            1$                      ;DIGIT 8-9
7087  030334  062705  000004            1$:     ADD     #4,R5           ;STEP RETURN POINTER PAST "CR" & "PERIOD" RETURNS
7088  030340  006303            2$:     ASL     R3              ;INPUT NUMBER *2
7089  030342  010346                    MOV     R3,-(SP)        ;SAVE *2
7090  030344  006303                    ASL     R3              ;*4
7091  030346  006303                    ASL     R3              ;*8
7092  030350  062603                    ADD     (SP)+,R3        ;(*2)+(*8) = *10
7093  030352  060203                    ADD     R2,R3           ;UPDATE THE INPUT NUMBER
7094  030354  004537  030226            JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
7095  030360  030420                    8$                      ;ILLEGAL CHARACTER
7096  030362  030404                    5$                      ;CARRIAGE RETURN
7097  030364  030402                    4$                      ;" "
7098  030366  030374                    3$                      ;"'"
7099  030370  030340                    2$                      ;DIGIT 0-7
7100  030372  030340                    2$                      ;DIGIT 8-9
7101  030374  105711            3$:     TSTB    (R1)            ;DOES A "CR" FOLLOW THE "PERIOD"
7102  030376  001010                    BNE     8$              ;BR IF NOT
7103  030400  005724                    TST     (R4)+           ;INCREMENT THE RETURN
7104  030402  005724            4$:     TST     (R4)+           ;INCREMENT THE RETURN
7105  030404  005724            5$:     TST     (R4)+           ;INCREMENT THE RETURN
7106  030406  020316                    CMP     R3,(SP)         ;CHECK THE MAGNITUDE OF THE NUMBER
7107  030410  101004                    BHI     9$              ;BR IF ENTERED NUMBER TOO LARGE
7108  030412  000402                    BR      8$              ;BYPASS INCREMENT
7109  030414  005725            6$:     TST     (R5)+           ;INCREMENT RETURN PAST INVALID RETURN
7110  030416  005725            7$:     TST     (R5)+           ;INCREMENT RETURN
7111  030420  060405            8$:     ADD     R4,R5           ;SETUP RETURN POINTER
7112  030422  010302            9$:     MOV     R3,R2           ;ENTERED VALUE
7113  030424  005726                    TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
7114  030426  012603                    MOV     (SP)+,R3        ;RESTORE R3
7115  030430  012604                    MOV     (SP)+,R4        ;RESTORE R4
7116  030432  011505                    MOV     (R5),R5         ;GET RETURN ADDRESS
7117  030434  000205                    RTS     R5              ;RETURN
7118
7119                                    ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7120                                    ;UNSIGNED DECIMAL ASCIZ NUMBER.
7121                                    ;CALL
7122                                    ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
7123                                    ;       JSR     PC,$5B2D        ;CALL
```

```
7124                                    ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
7125                                    ;
7126                                    ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2D', NOT THE VERSION ON
7127                                    ;       THE SYSMAC LIBRARY, REV C AND LATER
7128
7129  030436  016637  000002  030462  $SB2D:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
7130  030444  012746  030462          MOV     #1$,-(SP)       ;SET THE POINTER
7131  030450  004737  034050          JSR     PC,$DB2D        ;CALL THE DOUBLE LENGTH CONVERT
7132  030454  012666  000002          MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
7133  030460  000207                  RTS     PC              ;RETURN
7134  030462  000000  000000  1$:     .WORD   0,0
7135
7136                                    ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7137                                    ;UNSIGNED OCTAL ASCIZ NUMBER.
7138                                    ;CALL
7139                                    ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
7140                                    ;       JSR     PC,$SB20        ;CALL
7141                                    ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
7142                                    ;
7143                                    ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB20', NOT THE VERSION ON
7144                                    ;       THE SYSMAC LIBRARY, REV C AND LATER
7145
7146  030466  016637  000002  030512  $SB20:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
7147  030474  012746  030512          MOV     #1$,-(SP)       ;SET THE POINTER
7148  030500  004737  034244          JSR     PC,$DB20        ;CALL THE DOUBLE LENGTH CONVERT
7149  030504  012666  000002          MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
7150  030510  000207                  RTS     PC              ;RETURN
7151  030512  000000  000000  1$:     .WORD   0,0
7152
7153                                    ;KEYBOARD INTERRUPT INITIALIZATION ROUTINE
7154                                    ;CALL
7155                                    ;       JSR     PC,$TKINT
7156                                    ;       RETURN
7157
7158  030516  012737  030546  000060  $TKINT: MOV     #$TKSRV,TKVEC   ;SETUP VECTOR
7159  030524  012737  000100  000062          MOV     #100,TKVEC+2    ;PRIORITY TO 4
7160  030532  005777  150424          TST     @$TKB           ;CLEAR THE BUFFER
7161  030536  012777  000100  150414          MOV     #BIT06,@$TKS    ;SET INTERRUPT ENABLE
7162  030544  000207                  RTS     PC              ;RETURN
7163
7164                                    ;KEYBOARD INTERRUPT SERVICE ROUTINE
7165                                    ;CALL
7166                                    ;       ENTER VIA INTERRUPT
7167
7168  030546  104410          $TKSRV: RDCHR                   ;READ THE KEYBOARD
7169  030550  112637  030676          MOVB    (SP)+,5$        ;GET THE CHARACTER
7170  030554  023727  030676  000003          CMP     5$,#3           ;'CONTROL C' ?
7171  030562  001012                  BNE     1$              ;BR IF NOT
7172  030564  104401  001201          TYPE    ,$CRLF          ;CR-LF
7173  030570  104401  031170          TYPE    ,$CNTLC         ;'↑C'
7174  030574  012737  177777  001360          MOV     #-1,CFLAG       ;SET THE 'CONTROL C' FLAG
7175  030602  005077  150352          CLR     @$TKS           ;CLEAR THE TTY INTERRUPT
7176  030606  000432                  BR      4$              ;EXIT
7177  030610  023727  001154  000176  1$:     CMP     $WR,#SWREG      ;SOFTWARE SWITCH REGISTER IN USE ?
7178  030616  001024                  BNE     3$              ;BR IF NOT
7179  030620  023727  030676  000007          CMP     5$,#7           ;'CONTROL G' ?
```

```
7180  030626  001020                        BNE     3$              ;BR IF NOT
7181  030630  104401  001201                TYPE    ,$CRLF          ;CR-LF
7182  030634  104401  033623                TYPE    ,$CNTLG         ;'↑G'
7183  030640  013746  177776                MOV     PS,-(SP)        ;PUT THE STATUS WORD ON THE STACK
7184  030644  012746  030660                MOV     #2$,-(SP)       ;RETURN ADDRESS
7185  030650  005077  150304                CLR     @$TKS           ;CLEAR THE TTY INTERRUPT ENABLE
7186  030654  000137  033264                JMP     $GTSWR          ;GET THE SWITCH REGISTER ENTRY
7187  030660  012777  000100  150272  2$:   MOV     #100,@$TKS      ;ENABLE TTY KEYBOARD INTERRUPT
7188  030666  000402                        BR      4$              ;EXIT
7189  030670  104401  030676          3$:   TYPE    ,5$             ;ECHO THE CHARACTER
7190  030674  000002                  4$:   RTI                     ;RETURN
7191
7192  030676  000000                  5$:   .WORD   0               ;ENTERED CHARACTER
7193
7194                                  ;THIS ROUTINE WILL INPUT A STRING FROM THE TTY
7195                                  ;CALL:
7196                                  ;       RDLIN                   ;;INPUT A STRING FROM THE TTY
7197                                  ;       RETURN HERE             ;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
7198                                  ;                               ;TERMINATOR WILL BE A BYTE OF ALL 0'S
7199
7200  030700  010346                  $RDLIN: MOV     R3,-(SP)        ;SAVE R3
7201  030702  005046                          CLR     -(SP)           ;CLEAR THE RUBOUT KEY
7202  030704  012703  031156          1$:     MOV     #$TTYIN,R3      ;GET ADDRESS
7203  030710  022703  031170          2$:     CMP     #$TTYIN+10.,R3  ;BUFFER FULL?
7204  030714  101467                          BLOS    4$              ;BR IF YES
7205  030716  104410                          RDCHR                   ;GO READ ONE CHARACTER FROM THE TTY
7206  030720  112613                          MOVB    (SP)+,(R3)      ;GET CHARACTER
7207  030722  122713  000177                  CMPB    #177,(R3)       ;IS IT A RUBOUT
7208  030726  001022                          BNE     5$              ;BR IF NO
7209  030730  005716                          TST     (SP)            ;IS THIS THE FIRST RUBOUT?
7210  030732  001007                          BNE     6$              ;BR IF NO
7211  030734  112737  000134  031154          MOVB    #'\,9$          ;TYPE A BACK SLASH
7212  030742  104401  031154                  TYPE    ,9$
7213  030746  012716  177777                  MOV     #-1,(SP)        ;SET THE RUBOUT KEY
7214  030752  005303                  6$:     DEC     R3              ;BACKUP BY ONE
7215  030754  020327  031156                  CMP     R3,#$TTYIN      ;STACK EMPTY?
7216  030760  103445                          BLO     4$              ;BR IF YES
7217  030762  111337  031154                  MOVB    (R3),9$         ;SETUP TO TYPEOUT THE DELETED CHAR.
7218  030766  104401  031154                  TYPE    ,9$             ;GO TYPE
7219  030772  000746                          BR      2$              ;GO READ ANOTHER CHAR.
7220  030774  005716                  5$:     TST     (SP)            ;RUBOUT KEY SET?
7221  030776  001406                          BEQ     7$              ;BR IF NO
7222  031000  112737  000134  031154          MOVB    #'\,9$          ;TYPE A BACK SLASH
7223  031006  104401  031154                  TYPE    ,9$
7224  031012  005016                          CLR     (SP)            ;CLEAR THE RUBOUT KEY
7225  031014  122713  000025          7$:     CMPB    #25,(R3)        ;IS CHARACTER A CTRL U?
7226  031020  001003                          BNE     10$             ;BR IF NO
7227  031022  104401  033616                  TYPE    ,$CNTLU         ;TYPE A CONTROL "U"
7228  031026  000726                          BR      1$              ;GO START OVER
7229  031030  122713  000003          10$:    CMPB    #3,(R3)         ;IS CHARACTER A CTRL C ?
7230  031034  001006                          BNE     8$              ;BR IF NOT
7231  031036  012737  177777  001360          MOV     #-1,CFLAG       ;SET CNTRL C FLAG
7232  031044  104401  031170                  TYPE    ,$CNTLC         ;ECHO IT
7233  031050  000427                          BR      11$             ;EXIT
7234  031052  122713  000012          8$:     CMPB    #12,(R3)        ;IS CHARACTER A "LF"?
7235  031056  001011                          BNE     3$              ;BRANCH IF NO
```

```
7236  031060  105013                        CLRB    (R3)            ;CLEAR THE CHARACTER
7237  031062  104401  001201                TYPE    ,$CRLF          ;TYPE A "CR" & "LF"
7238  031066  104401  031156                TYPE    ,$TTYIN         ;TYPE THE INPUT STRING
7239  031072  000706                        BR      2$              ;GO PICKUP ANOTHER CHACTER
7240  031074  104401  001200        4$:     TYPE    ,$QUES          ;TYPE A '?'
7241  031100  000701                        BR      1$              ;CLEAR THE BUFFER AND LOOP
7242  031102  111337  031154        3$:     MOVB    (R3),9$         ;ECHO THE CHARACTER
7243  031106  104401  031154                TYPE    ,9$
7244  031112  122723  000015                CMPB    #15,(R3)+       ;CHECK FOR RETURN
7245  031116  001274                        BNE     2$              ;LOOP IF NOT RETURN
7246  031120  105063  177777                CLRB    -1(R3)          ;CLEAR RETURN (THE 15)
7247  031124  104401  001202                TYPE    ,$LF            ;TYPE A LINE FEED
7248  031130  005726                11$:    TST     (SP)+           ;CLEAN RUBOUT KEY FROM THE STACK
7249  031132  012603                        MOV     (SP)+,R3        ;RESTORE R3
7250  031134  011646                        MOV     (SP),-(SP)      ;ADJUST THE STACK AND PUT ADDRESS OF THE
7251  031136  016666  000004  000002        MOV     4(SP),2(SP)     ;       FIRST ASCII CHARACTER ON IT
7252  031144  012766  031156  000004        MOV     #$TTYIN,4(SP)
7253  031152  000002                        RTI                     ;RETURN
7254  031154     000                9$:     .BYTE   0               ;STORAGE FOR ASCII CHAR. TO TYPE
7255  031155     000                        .BYTE   0               ;TERMINATOR
7256  031156  000012                $TTYIN: .BLKB   10.             ;RESERVE 10 BYTES FOR TTY INPUT
7257  031170  041536  005015  000   $CNTLC: .ASCIZ  /^C/<CR><LF>    ;CONTROL "C"
7258
7259          031176                        .EVEN
7260
7261
7262
7263                                ;;**********************************************************************
7264
7265                                .SBTTL  MACRO ROUTINES
7266
7267                                .SBTTL  ERROR HANDLER ROUTINE
7268
7269                                ;;**********************************************************************
7270                                ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
7271                                ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
7272                                ;*AND GO TO $ERRTYP ON ERROR
7273                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
7274                                ;*SW15=1         HALT ON ERROR
7275                                ;*SW13=1         INHIBIT ERROR TYPEOUTS
7276                                ;*SW10=1         BELL ON ERROR
7277                                ;*CALL
7278                                ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
7279
7280  031176                        $ERROR:
7281  031176  104407                        CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
7282  031200  010337  001342                MOV     R3,ATTN         ;SAVE THE ATTENTION REGISTER CONTENTS
7283  031204  010137  001216                MOV     R1,DRIVE        ;DRIVE NUMBER
7284  031210  032777  020000  147736        BIT     #SW13,@SWR      ;INHIBIT PRINTOUTS ?
7285  031216  001002                        BNE     .+6             ;BR IF YES
7286  031220  004737  023670                JSR     PC,$TIME        ;TYPE THE TIME
7287  031224  105237  001117        7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
7288  031230  001775                        BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
7289  031232  013777  001116  147716        MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
7290  031240  032777  002000  147706        BIT     #BIT10,@SWR     ;;BELL ON ERROR?
7291  031246  001402                        BEQ     1$              ;;NO - SKIP
```

```
7292  031250  104401  001174          TYPE    ,$BELL          ;;RING BELL
7293  031254  005237  001126  1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
7294  031260  011637  001132          MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
7295  031264  162737  000002  001132  SUB     #2,$ERRPC
7296  031272  117737  147634  001130  MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
7297  031300  032777  020000  147646  BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
7298  031306  001004                  BNE     20$             ;;SKIP TYPEOUTS
7299  031310  004737  031362          JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
7300  031314  104401  001201          TYPE    ,$CRLF
7301  031320                  20$:
7302  031320  122737  000001  001224  CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
7303  031326  001007                  BNE     2$              ;;NO,SKIP APT ERROR REPORT
7304  031330  113737  001130  031342  MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
7305  031336  004737  032016          JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
7306  031342     000  21$:    .BYTE   0
7307  031343     000          .BYTE   0
7308  031344  000777  22$:    BR      22$             ;;APT ERROR LOOP
7309  031346  005777  147602  2$:     TST     @SWR            ;;HALT ON ERROR
7310  031352  100002                  BPL     3$              ;;SKIP IF CONTINUE
7311  031354  000000                  HALT                    ;;HALT ON ERROR!
7312  031356  104407                  CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
7313  031360                  3$:
7314  031360  000002                  RTI                     ;;RETURN
7315
7316                          .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
7317
7318                          ;;**************************************************************
7319                          ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
7320                          ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
7321                          ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
7322
7323  031362          $ERRTYP:
7324  031362  104401  001201          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7325  031366  010046                  MOV     R0,-(SP)        ;;SAVE R0
7326  031370  005000                  CLR     R0              ;;PICKUP THE ITEM INDEX
7327  031372  153700  001130          BISB    @#$ITEMB,R0
7328  031376  001004                  BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
7329                                                          ;;TYPE THE PC OF THE ERROR
7330  031400  013746  001132          MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
7331                                                          ;;ERROR ADDRESS
7332  031404  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7333  031406  000426                  BR      6$              ;;GET OUT
7334  031410  005300          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
7335  031412  006300                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
7336  031414  006300                  ASL     R0
7337  031416  006300                  ASL     R0
7338  031420  062700  003542          ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
7339  031424  012037  031434          MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
7340  031430  001404                  BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
7341  031432  104401                  TYPE                    ;;TYPE THE "ERROR MESSAGE"
7342  031434  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
7343  031436  104401  001201          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7344  031442  012037  031452  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
7345  031446  001404                  BEQ     5$              ;;SKIP TYPEOUT IF 0
7346  031450  104401                  TYPE                    ;;TYPE THE "DATA HEADER"
7347  031452  000000          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
```

```
 7348  031454  104401  001201            TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 7349  031460  011000              5$:   MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
 7350  031462  001004                    BNE     7$              ;;GO TYPE THE DATA
 7351  031464  012600              6$:   MOV     (SP)+,R0        ;;RESTORE R0
 7352  031466  104401  001201            TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 7353  031472  000207                    RTS     PC              ;;RETURN
 7354  031474                      7$:
 7355  031474  013046                    MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
 7356  031476  104402                    TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 7357  031500  005710                    TST     (R0)            ;;IS THERE ANOTHER NUMBER?
 7358  031502  001770                    BEQ     6$              ;;BR IF NO
 7359  031504  104401  031512            TYPE    ,8$             ;;TYPE TWO(2) SPACES
 7360  031510  000771                    BR      7$              ;;LOOP
 7361  031512  020040      000     8$:   .ASCIZ  /  /            ;;TWO(2) SPACES
 7362          031516                    .EVEN
 7363
 7364                              .SBTTL  TYPE ROUTINE
 7365
 7366                              ;;**************************************************************
 7367                              ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 7368                              ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 7369                              ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 7370                              ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 7371                              ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 7372                              ;*
 7373                              ;*CALL:
 7374                              ;*1) USING A TRAP INSTRUCTION
 7375                              ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 7376                              ;*OR
 7377                              ;*      TYPE
 7378                              ;*      MESADR
 7379                              ;*
 7380
 7381  031516  105737  001173  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 7382  031522  100002                    BPL     1$              ;;BR IF YES
 7383  031524  000000                    HALT                    ;;HALT HERE IF NO TERMINAL
 7384  031526  000430                    BR      3$              ;;LEAVE
 7385  031530  010046              1$:   MOV     R0,-(SP)        ;;SAVE R0
 7386  031532  017600  000002            MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 7387  031536  122737  000001  001224    CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 7388  031544  001011                    BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 7389  031546  132737  000100  001225    BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 7390  031554  001405                    BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 7391  031556  010037  031566            MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 7392  031562  004737  032006            JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 7393  031566  000000              61$:  .WORD   0               ;;MESSAGE ADDRESS
 7394  031570  132737  000040  001225  62$:   BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 7395  031576  001003                    BNE     60$             ;;YES,SKIP TYPE OUT
 7396  031600  112046              2$:   MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 7397  031602  001005                    BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 7398  031604  005726                    TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 7399  031606  012600              60$:  MOV     (SP)+,R0        ;;RESTORE R0
 7400  031610  062716  000002      3$:   ADD     #2,(SP)         ;;ADJUST RETURN PC
 7401  031614  000002                    RTI                     ;;RETURN
 7402  031616  122716  000011      4$:   CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 7403  031622  001430                    BEQ     8$
```

```
7404  031624  122716  000200            CMPB    #CRLF,(SP)          ;;BRANCH IF NOT <CRLF>
7405  031630  001006                    BNE     5$
7406  031632  005726                    TST     (SP)+               ;;POP  <CR><LF> EQUIV
7407  031634  104401                    TYPE                        ;;TYPE A CR AND LF
7408  031636  001201                    $CRLF
7409  031640  105037  031774            CLRB    $CHARCNT            ;;CLEAR CHARACTER COUNT
7410  031644  000755                    BR      2$                  ;;GET NEXT CHARACTER
7411  031646  004737  031730    5$:     JSR     PC,$TYPEC           ;;GO TYPE THIS CHARACTER
7412  031652  123726  001172    6$:     CMPB    $FILLC,(SP)+        ;;IS IT TIME FOR FILLER CHARS.?
7413  031656  001350                    BNE     2$                  ;;IF NO GO GET NEXT CHAR.
7414  031660  013746  001170            MOV     $NULL,-(SP)         ;;GET # OF FILLER CHARS. NEEDED
7415                                                                ;;AND THE NULL CHAR.
7416  031664  105366  000001    7$:     DECB    1(SP)               ;;DOES A NULL NEED TO BE TYPED?
7417  031670  002770                    BLT     6$                  ;;BR IF NO--GO POP THE NULL OFF OF STACK
7418  031672  004737  031730            JSR     PC,$TYPEC           ;;GO TYPE A NULL
7419  031676  105337  031774            DECB    $CHARCNT            ;;DO NOT COUNT AS A COUNT
7420  031702  000770                    BR      7$                  ;;LOOP
7421
7422                                    ;HORIZONTAL TAB PROCESSOR
7423
7424  031704  112716  000040    8$:     MOVB    #' ,(SP)            ;;REPLACE TAB WITH SPACE
7425  031710  004737  031730    9$:     JSR     PC,$TYPEC           ;;TYPE A SPACE
7426  031714  132737  000007  031774    BITB    #7,$CHARCNT         ;;BRANCH IF NOT AT
7427  031722  001372                    BNE     9$                  ;;TAB STOP
7428  031724  005726                    TST     (SP)+               ;;POP SPACE OFF STACK
7429  031726  000724                    BR      2$                  ;;GET NEXT CHARACTER
7430  031730  105777  147230    $TYPEC: TSTB    @$TPS               ;;WAIT UNTIL PRINTER IS READY
7431  031734  100375                    BPL     $TYPEC
7432  031736  116677  000002  147222    MOVB    2(SP),@$TPB         ;;LOAD CHAR TO BE TYPED INTO DATA REG.
7433  031744  122766  000015  000002    CMPB    #CR,2(SP)           ;;IS CHARACTER A CARRIAGE RETURN?
7434  031752  001003                    BNE     1$                  ;;BRANCH IF NO
7435  031754  105037  031774            CLRB    $CHARCNT            ;;YES--CLEAR CHARACTER COUNT
7436  031760  000406                    BR      $TYPEX              ;;EXIT
7437  031762  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
7438  031770  001402                    BEQ     $TYPEX              ;;BRANCH IF YES
7439  031772  105227                    INCB    (PC)+               ;;COUNT THE CHARACTER
7440  031774  000000            $CHARCNT:.WORD  0                   ;;CHARACTER COUNT STORAGE
7441  031776  000207            $TYPEX: RTS     PC
7442
7443
7444                                    .SBTTL  APT COMMUNICATIONS ROUTINE
7445
7446                                    ;;**************************************************************************
7447  032000  112737  000001  032244  $ATY1:   MOVB    #1,$FFLG            ;;TO REPORT FATAL ERROR
7448  032006  112737  000001  032242  $ATY3:   MOVB    #1,$MFLG            ;;TO TYPE A MESSAGE
7449  032014  000403                    BR      $ATYC
7450  032016  112737  000001  032244  $ATY4:   MOVB    #1,$FFLG            ;;TO ONLY REPORT FATAL ERROR
7451  032024                            $ATYC:
7452  032024  010046                    MOV     R0,-(SP)            ;;PUSH R0 ON STACK
7453  032026  010146                    MOV     R1,-(SP)            ;;PUSH R1 ON STACK
7454  032030  105737  032242            TSTB    $MFLG               ;;SHOULD TYPE A MESSAGE?
7455  032034  001450                    BEQ     5$                  ;;IF NOT:  BR
7456  032036  122737  000001  001224    CMPB    #APTENV,$ENV        ;;OPERATING UNDER APT?
7457  032044  001031                    BNE     3$                  ;;IF NOT:  BR
7458  032046  132737  000100  001225    BITB    #APTSPOOL,$ENVM     ;;SHOULD SPOOL MESSAGES?
7459  032054  001425                    BEQ     3$                  ;;IF NOT:  BR
```

```
7460  032056  017600  000004          MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
7461  032062  062766  000002  000004  ADD     #2,4(SP)        ;;BUMP RETURN ADDR.
7462  032070  005737  001204  1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
7463  032074  001375          BNE     1$              ;;IF NOT:  WAIT
7464  032076  010037  001220          MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
7465  032102  105720          2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
7466  032104  001376          BNE     2$
7467  032106  163700  001220          SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
7468  032112  006200          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
7469  032114  010037  001222          MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
7470  032120  012737  000004  001204  MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
7471  032126  000413          BR      5$
7472  032130  017637  000004  032154  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
7473  032136  062766  000002  000004  ADD     #2,4(SP)        ;;BUMP RETURN ADDRESS
7474  032144  013746  177776          MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
7475  032150  004737  031516          JSR     PC,$TYPE        ;;CALL TYPE MACRO
7476  032154  000000          4$:     .WORD   0
7477  032156          5$:
7478  032156  105737  032244  10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
7479  032162  001416          BEQ     12$             ;;IF NOT:  BR
7480  032164  005737  001224          TST     $ENV            ;;RUNNING UNDER APT?
7481  032170  001413          BEQ     12$             ;;IF NOT:  BR
7482  032172  005737  001204  11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
7483  032176  001375          BNE     11$             ;;IF NOT:  WAIT
7484  032200  017637  000004  001206  MOV     @4(SP),$FATAL   ;;GET ERROR #
7485  032206  062766  000002  000004  ADD     #2,4(SP)        ;;BUMP RETURN ADDR.
7486  032214  005237  001204          INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
7487  032220  105037  032244  12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
7488  032224  105037  032243          CLRB    $LFLG           ;;CLEAR LOG FLAG
7489  032230  105037  032242          CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
7490  032234  012601          MOV     (SP)+,R1        ;;POP STACK INTO R1
7491  032236  012600          MOV     (SP)+,R0        ;;POP STACK INTO R0
7492  032240  000207          RTS     PC              ;;RETURN
7493  032242     000  $MFLG:   .BYTE   0               ;;MESSG. FLAG
7494  032243     000  $LFLG:   .BYTE   0               ;;LOG FLAG
7495  032244     000  $FFLG:   .BYTE   0               ;;FATAL FLAG
7496          032246          .EVEN
7497          000200  APTSIZE=200
7498          000001  APTENV=001
7499          000100  APTSPOOL=100
7500          000040  APTCSUP=040
7501
7502                  .SBTTL  POWER DOWN AND UP ROUTINES
7503
7504                  ;;*****************************************************************
7505                  ;POWER DOWN ROUTINE
7506  032246  012737  032412  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
7507  032254  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
7508  032262  010046          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7509  032264  010146          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7510  032266  010246          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7511  032270  010346          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7512  032272  010446          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
7513  032274  010546          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
7514  032276  017746  146652          MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
7515  032302  010637  032416          MOV     SP,$SAVR6       ;;SAVE SP
```

```
7516  032306  012737  032320  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
7517  032314  000000                          HALT
7518  032316  000776                          BR      .-2              ;;HANG UP
7519
7520                                  ;;*****************************************************************
7521                                  ;POWER UP ROUTINE
7522  032320  012737  032412  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
7523  032326  013706  032416                  MOV     $SAVR6,SP        ;;GET SP
7524  032332  005037  032416                  CLR     $SAVR6           ;;WAIT LOOP FOR THE TTY
7525  032336  005237  032416          1$:     INC     $SAVR6           ;;WAIT FOR THE INC
7526  032342  001375                          BNE     1$               ;;OF  WORD
7527  032344  012677  146604                  MOV     (SP)+,@SWR       ;;POP STACK INTO @SWR
7528  032350  012605                          MOV     (SP)+,R5         ;;POP STACK INTO R5
7529  032352  012604                          MOV     (SP)+,R4         ;;POP STACK INTO R4
7530  032354  012603                          MOV     (SP)+,R3         ;;POP STACK INTO R3
7531  032356  012602                          MOV     (SP)+,R2         ;;POP STACK INTO R2
7532  032360  012601                          MOV     (SP)+,R1         ;;POP STACK INTO R1
7533  032362  012600                          MOV     (SP)+,R0         ;;POP STACK INTO R0
7534  032364  012737  032246  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
7535  032372  012737  000340  000026          MOV     #340,@#PWRVEC+2  ;;PRIO:7
7536  032400  104401                          TYPE                     ;REPORT THE POWER FAILURE
7537  032402  032420          $PWRMG: .WORD   $POWER                   ;;POWER FAIL MESSAGE POINTER
7538  032404  012716                  MOV     (PC)+,(SP)               ;;RESTART AT SATPOW
7539  032406  032430          $PWRAD: .WORD   SATPOW                   ;;RESTART ADDRESS
7540  032410  000002                  RTI
7541  032412  000000          $ILLUP: HALT                             ;;THE POWER UP SEQUENCE WAS STARTED
7542  032414  000776                  BR      .-2                      ;;  BEFORE THE POWER DOWN WAS COMPLETE
7543  032416  000000          $SAVR6: 0                                ;;PUT THE SP HERE
7544  032420  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
7545  032426  000122
7546                                  .EVEN
7547
7548                                                                   ;POW UP ROUTINE , WAIT
7549                                                                   ;FIVE MINUTS, THEN AUTO STARTS AT SETVEC
7550
7551  032430  000005          SATPOW: RESET                            ;CLEAR THE BUS
7552  032432  005037  177776          CLR     @#PS                     ;CLEAR PSW
7553  032436  005037  001364          CLR     HOUR                     ;RESET THE HOUR COUNT
7554  032442  005037  001366          CLR     MINUTE                   ;RESET THE MINUTS COUNT
7555  032446  005037  001370          CLR     SECOND                   ;RESET THE SECOND COUNT
7556  032452  005037  001470          CLR     INTRVL+2                 ;RESET THE INTERVAL COUNT
7557  032456  004737  022632          JSR     PC,CKCLK                 ;CHECK THE CLOCK
7558  032462  022737  000005  001470  1$:     CMP     #5,INTRVL+2      ;FIVE MINUTES YET ?
7559  032470  101374                  BHI     1$                       ;WAIT IF NOT
7560  032472  005037  001470          CLR     INTRVL+2                 ;RESET INTERVAL COUNT
7561  032476  005037  001370          CLR     SECOND                   ;RESET TIMER
7562  032502  005037  001366          CLR     MINUTE                   ;
7563  032506  012737  000400  001356  MOV     #400,CHGADR              ;FORGE THE AUTO START
7564  032514  012705  001522          MOV     #ORDERQ,R5               ;CLEAR UP THE QUEUE AND BUFFER
7565  032520  005025          2$:     CLR     (R5)+
7566  032522  022705  002102          CMP     #BLKADR,R5               ;ALL DONE ?
7567  032526  001374                  BNE     2$                       ;BRANCH IF NOT
7568  032530  012737  007070  001264  MOV     #7070,$CDW1              ;FLAG FROM POWER FAIL
7569  032536  000137  004410          JMP     SIZMEM                   ;LOOP BACK
7570
7571
```

```
                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                        ;;*****************************************************************
                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                        ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                        ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                        ;*      TYPOS                   ;;CALL FOR TYPEOUT
                        ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                        ;*      .BYTE   M               ;;M=1 OR 0
                        ;*                                      ;;1=TYPE LEADING ZEROS
                        ;*                                      ;;0=SUPPRESS LEADING ZEROS
                        ;*
                        ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                        ;*$TYPOS OR $TYPOC
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                        ;*      TYPON                   ;;CALL FOR TYPEOUT
                        ;*
                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                        ;*      TYPOC                   ;;CALL FOR TYPEOUT

032542  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
032546  116637  000001  032765          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
032554  112637  032767          MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
032560  062716  000002          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
032564  000406                  BR      $TYPON
032566  112737  000001  032765  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
032574  112737  000006  032767          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
032602  112737  000005  032764  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
032610  010346                  MOV     R3,-(SP)        ;;SAVE R3
032612  010446                  MOV     R4,-(SP)        ;;SAVE R4
032614  010546                  MOV     R5,-(SP)        ;;SAVE R5
032616  113704  032767          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
032622  005404                  NEG     R4
032624  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
032630  110437  032766          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
032634  113704  032765          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
032640  016605  000012          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
032644  005003                  CLR     R3              ;;CLEAR THE OUTPUT WORD
032646  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
032650  000404                  BR      3$              ;;GO DO MSB
032652  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
032654  006105                  ROL     R5
032656  006105                  ROL     R5
032660  010503                  MOV     R5,R3
032662  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
032664  105337  032766          DECB    $OMODE          ;;TYPE THIS DIGIT?
032670  100016                  BPL     7$              ;;BR IF NO
032672  042703  177770          BIC     #177770,R3      ;;GET RID OF JUNK
032676  001002                  BNE     4$              ;;TEST FOR 0
032700  005704                  TST     R4              ;;SUPPRESS THIS 0?
032702  001403                  BEQ     5$              ;;BR IF YES
```

```
7628  032704  005204                    4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
7629  032706  052703  000060            5$:     BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
7630  032712  052703  000040                    BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
7631  032716  110337  032762                    MOVB    R3,8$           ;;SAVE FOR TYPING
7632  032722  104401  032762                    TYPE    ,8$             ;;GO TYPE THIS DIGIT
7633  032726  105337  032764            7$:     DECB    $OCNT           ;;COUNT BY 1
7634  032732  003347                            BGT     2$              ;;BR IF MORE TO DO
7635  032734  002402                            BLT     6$              ;;BR IF DONE
7636  032736  005204                            INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
7637  032740  000744                            BR      2$              ;;GO DO THE LAST DIGIT
7638  032742  012605                    6$:     MOV     (SP)+,R5        ;;RESTORE R5
7639  032744  012604                            MOV     (SP)+,R4        ;;RESTORE R4
7640  032746  012603                            MOV     (SP)+,R3        ;;RESTORE R3
7641  032750  016666  000002  000004            MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
7642  032756  012616                            MOV     (SP)+,(SP)
7643  032760  000002                            RTI                     ;;RETURN
7644  032762     000            8$:     .BYTE   0                       ;;STORAGE FOR ASCII DIGIT
7645  032763     000                    .BYTE   0                       ;;TERMINATOR FOR TYPE ROUTINE
7646  032764     000            $OCNT:  .BYTE   0                       ;;OCTAL DIGIT COUNTER
7647  032765     000            $OFILL: .BYTE   0                       ;;ZERO FILL SWITCH
7648  032766  000000            $OMODE: .WORD   0                       ;;NUMBER OF DIGITS TO TYPE
7649
7650                            .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
7651
7652                            ;;**************************************************************
7653                            ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
7654                            ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
7655                            ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
7656                            ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
7657                            ;*REPLACED WITH SPACES.
7658                            ;*CALL:
7659                            ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
7660                            ;*      TYPDS                   ;;GO TO THE ROUTINE
7661
7662  032770                    $TYPDS:
7663  032770  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7664  032772  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7665  032774  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7666  032776  010346                    MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7667  033000  010546                    MOV     R5,-(SP)        ;;PUSH R5 ON STACK
7668  033002  012746  020200            MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
7669  033006  016605  000020            MOV     20(SP),R5       ;;GET THE INPUT NUMBER
7670  033012  100004                    BPL     1$              ;;BR IF INPUT IS POS.
7671  033014  005405                    NEG     R5              ;;MAKE THE BINARY NUMBER POS.
7672  033016  112766  000055  000001    MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
7673  033024  005000            1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
7674  033026  012703  033204            MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
7675  033032  112723  000040            MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
7676  033036  005002            2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
7677  033040  016001  033174            MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
7678  033044  160105            3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
7679  033046  002402                    BLT     4$              ;;BR IF DONE
7680  033050  005202                    INC     R2              ;;INCREASE THE BCD DIGIT BY 1
7681  033052  000774                    BR      3$
7682  033054  060105            4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
7683  033056  005702                    TST     R2              ;;CHECK IF BCD DIGIT=0
```

```
7684  033060  001002                        BNE     5$              ;;FALL THROUGH IF 0
7685  033062  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
7686  033064  100407                        BMI     7$              ;;BR IF YES
7687  033066  106316                5$:     ASLB    (SP)            ;;MSD?
7688  033070  103003                        BCC     6$              ;;BR IF NO
7689  033072  116663  000001 177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
7690  033100  052702  000060        6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
7691  033104  052702  000040        7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
7692  033110  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
7693  033112  005720                        TST     (R0)+           ;;JUST INCREMENTING
7694  033114  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
7695  033120  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
7696  033122  003002                        BGT     8$              ;;GO TO EXIT
7697  033124  010502                        MOV     R5,R2           ;;GET THE LSD
7698  033126  000764                        BR      6$              ;;GO CHANGE TO ASCII
7699  033130  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
7700  033132  100003                        BPL     9$              ;;BR IF NO
7701  033134  116663  177777 177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
7702  033142  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
7703  033144  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
7704  033146  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
7705  033150  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
7706  033152  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
7707  033154  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
7708  033156  104401  033204                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
7709  033162  016666  000002 000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
7710  033170  012616                        MOV     (SP)+,(SP)
7711  033172  000002                        RTI                     ;;RETURN TO USER
7712  033174  023420                $DTBL:  10000.
7713  033176  001750                        1000.
7714  033200  000144                        100.
7715  033202  000012                        10.
7716  033204  000004                $DBLK:  .BLKW   4
7717
7718                                 .SBTTL  TTY INPUT ROUTINE
7719
7720                                 ;;**********************************************************************
7721                                 .ENABL  LSB
7722
7723                                 ;;**********************************************************************
7724                                 ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
7725                                 ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
7726                                 ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
7727                                 ;*WHEN OPERATING IN TTY FLAG MODE.
7728  033214  022737  000176 001154 $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
7729  033222  001074                        BNE     15$             ;;BRANCH IF NO
7730  033224  105777  145730                TSTB    @$TKS           ;;CHAR THERE?
7731  033230  100071                        BPL     15$             ;;IF NO, DON'T WAIT AROUND
7732  033232  117746  145724                MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
7733  033236  042716  177600                BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
7734  033242  022726  000007                CMP     #7,(SP)+        ;;IS IT A CONTROL G?
7735  033246  001062                        BNE     15$             ;;NO, RETURN TO USER
7736  033250  123727  001150 000001        CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
7737  033256  001456                        BEQ     15$             ;;BRANCH IF YES
7738
7739  033260  104401  033623                TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
```

```
7740  033264  104401  033630          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
7741  033270  013746  000176                  MOV     @SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
7742  033274  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7743  033276  104401  033641                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
7744  033302  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
7745  033304  005046                          CLR     -(SP)           ;;THE NEW SWR
7746  033306  105777  145646          7$:     TSTB    @$TKS           ;;CHAR THERE?
7747  033312  100375                          BPL     7$              ;;IF NOT TRY AGAIN
7748
7749  033314  117746  145642                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
7750  033320  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
7751
7752
7753
7754  033324  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
7755  033330  001005                          BNE     10$             ;;BRANCH IF NOT
7756  033332  104401  033616                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
7757  033336  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
7758  033342  000757                          BR      19$             ;;LET'S TRY IT AGAIN
7759
7760
7761  033344  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
7762  033350  001022                          BNE     16$             ;;BRANCH IF NO
7763  033352  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
7764  033356  001403                          BEQ     11$             ;;BRANCH IF YES
7765  033360  016677  000002  145566          MOV     2(SP),@SWR      ;;SAVE NEW SWR
7766  033366  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
7767  033372  104401  001201          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
7768  033376  123727  001151  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
7769  033404  001003                          BNE     15$             ;;BRANCH IF NOT
7770  033406  012777  000100  145544          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
7771  033414  000002                  15$:    RTI                     ;;RETURN
7772  033416  004737  031730          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
7773  033422  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
7774  033426  002420                          BLT     18$             ;;BRANCH IF YES
7775  033430  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
7776  033434  003015                          BGT     18$             ;;BRANCH IF YES
7777  033436  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
7778  033442  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
7779  033446  001403                          BEQ     17$             ;;BRANCH IF YES
7780  033450  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
7781  033452  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
7782  033454  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
7783  033456  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
7784  033462  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
7785  033466  000707                          BR      7$              ;;GET THE NEXT ONE
7786  033470  104401  001200          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
7787  033474  000720                          BR      20$             ;;SIMULATE CONTROL-U
7788                                  .DSABL  LSB
7789
7790
7791                                  ;;*****************************************************************
7792                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
7793                                  ;*CALL:
7794                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
7795                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
```

```
                                        ;*                                  ;;WITH PARITY BIT STRIPPED OFF
                                        ;
                                $RDCHR: MOV     (SP),-(SP)                  ;;PUSH DOWN THE PC
                                        MOV     4(SP),2(SP)                 ;;SAVE THE PS
                                1$:     TSTB    @$TKS                       ;;WAIT FOR
                                        BPL     1$                          ;;A CHARACTER
                                        MOVB    @$TKB,4(SP)                 ;;READ THE TTY
                                        BIC     #^C<177>,4(SP)              ;;GET RID OF JUNK IF ANY
                                        CMP     4(SP),#23                   ;;IS IT A CONTROL-S?
                                        BNE     3$                          ;;BRANCH IF NO
                                2$:     TSTB    @$TKS                       ;;WAIT FOR A CHARACTER
                                        BPL     2$                          ;;LOOP UNTIL ITS THERE
                                        MOVB    @$TKB,-(SP)                 ;;GET CHARACTER
                                        BIC     #^C177,(SP)                 ;;MAKE IT 7-BIT ASCII
                                        CMP     (SP)+,#21                   ;;IS IT A CONTROL-Q?
                                        BNE     2$                          ;;IF NOT DISCARD IT
                                        BR      1$                          ;;YES, RESUME
                                3$:     CMP     4(SP),#140                  ;;IS IT UPPER CASE?
                                        BLT     4$                          ;;BRANCH IF YES
                                        CMP     4(SP),#175                  ;;IS IT A SPECIAL CHAR?
                                        BGT     4$                          ;;BRANCH IF YES
                                        BIC     #40,4(SP)                   ;;MAKE IT UPPER CASE
                                4$:     RTI                                 ;;GO BACK TO USER
                                $CNTLU: .ASCIZ  /^U/<15><12>                ;;CONTROL "U"
                                $CNTLG: .ASCIZ  /^G/<15><12>                ;;CONTROL "G"
                                $MSWR:  .ASCIZ  <15><12>/SWR = /
                                $MNEW:  .ASCIZ  /  NEW = /

                                .SBTTL  RANDOM NUMBER GENERATOR ROUTINE

                                ;;*****************************************************************
                                ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
                                ;*WITH A RANGE OF 0 TO 2(+33)-1.
                                ;*CALL:
                                ;*      JSR     PC,$RAND                    ;;CALL THE ROUTINE
                                ;*      RETURN                              ;;RETURN HERE THE RANDOM
                                ;*                                          ;;NUMBER WILL BE IN
                                ;*                                          ;;$HINUM,$LONUM

                                $RAND:
                                        MOV     R0,-(SP)                    ;;PUSH R0 ON STACK
                                        MOV     R1,-(SP)                    ;;PUSH R1 ON STACK
                                        MOV     R2,-(SP)                    ;;PUSH R2 ON STACK
                                        MOV     $LONUM,R0                   ;;SET R0 WITH LOW
                                        MOV     $HINUM,R1                   ;;SET R1 WITH HIGH
                                        MOV     #-7,R2                      ;;SET SHIFT COUNT
                                1$:     ASL     R0                          ;;SHIFT R0 LEFT AND
                                        ROL     R1                          ;;ROTATE CARRY INTO R1 AND
                                        INC     R2                          ;;CHECK FOR DONE
                                        BNE     1$                          ;;CONTINUE SHIFT LOOP
                                        ADD     $LONUM,R0                   ;;ADD NUMBER TO MAKE X 129
                                        ADC     R1                          ;;PROPOGATE CARRY
                                        ADD     $HINUM,R1                   ;;ADD NUMBER TO MAKE X 129
```

```
7852   033716  062700  001057          ADD     #1057,R0        ;;ADD LOW CONSTANT
7853   033722  005501                  ADC     R1              ;;PROPOGATE CARRY
7854   033724  062701  047401          ADD     #47401,R1       ;;ADD HIGH CONSTANT
7855   033730  010037  033752          MOV     R0,$LONUM       ;;SAVE R0
7856   033734  010137  033750          MOV     R1,$HINUM       ;;SAVE R1
7857   033740  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
7858   033742  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
7859   033744  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
7860   033746  000207                  RTS     PC              ;;RETURN
7861   033750  176543          $HINUM: .WORD   176543
7862   033752  123456          $LONUM: .WORD   123456
7863
7864                           .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
7865
7866                           ;;*****************************************************************
7867                           ;*SAVE R0-R5
7868                           ;*CALL:
7869                           ;*      SAVREG
7870                           ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
7871                           ;*
7872                           ;*TOP---(+16)
7873                           ;* +2---(+18)
7874                           ;* +4---R5
7875                           ;* +6---R4
7876                           ;* +8---R3
7877                           ;*+10---R2
7878                           ;*+12---R1
7879                           ;*+14---R0
7880
7881   033754                  $SAVREG:
7882   033754  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7883   033756  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7884   033760  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7885   033762  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7886   033764  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
7887   033766  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
7888   033770  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
7889   033774  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
7890   034000  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
7891   034004  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
7892   034010  000002                  RTI
7893
7894                           ;*RESTORE R0-R5
7895                           ;*CALL:
7896                           ;*      RESREG
7897   034012                  $RESREG:
7898   034012  012666  000022          MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
7899   034016  012666  000022          MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
7900   034022  012666  000022          MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
7901   034026  012666  000022          MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
7902   034032  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
7903   034034  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
7904   034036  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
7905   034040  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
7906   034042  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
7907   034044  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
```

```
 7908  034046  000002                        RTI
 7909
 7910                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
 7911
 7912                                  ;;*****************************************************************
 7913                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
 7914                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
 7915                                  ;*POSITIVE.
 7916                                  ;*CALL
 7917                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 7918                                  ;*      JSR     PC,@#$DB2D
 7919                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
 7920                                                                  ;;IS ON THE STACK
 7921
 7922
 7923  034050  104412                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
 7924  034052  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
 7925  034056  012700  034230                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
 7926  034062  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
 7927  034066  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
 7928  034070  012202                          MOV     (R2)+,R2
 7929  034072  012737  000012  034146          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
 7930  034100  012704  034160                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
 7931  034104  012705  034162                  MOV     #$TNPWR+2,R5
 7932  034110  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
 7933  034112  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
 7934  034114  005602                          SBC     R2
 7935  034116  161502                          SUB     (R5),R2
 7936  034120  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
 7937  034122  005203                          INC     R3              ;;ADD 1 TO PARTIAL
 7938  034124  000772                          BR      2$              ;;LOOP
 7939  034126  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
 7940  034130  005502                          ADC     R2
 7941  034132  062402                          ADD     (R4)+,R2
 7942  034134  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
 7943  034136  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
 7944  034142  110320                          MOVB    R3,(R0)+        ;;SAVE IT
 7945  034144  005327                          DEC     (PC)+           ;;DONE?
 7946  034146  000000                  4$:     .WORD   0
 7947  034150  001357                          BNE     1$              ;;BR IF NO
 7948  034152  105020                          CLRB    (R0)+           ;;TERMINATOR
 7949  034154  104413                          RESREG                  ;;RESTORE REGISTERS
 7950  034156  000207                          RTS     PC              ;;RETURN
 7951  034160  145000                  $TNPWR: 145000                  ;;1.0E09
 7952  034162  035632                          35632
 7953  034164  160400                          160400                  ;;1.0E08
 7954  034166  002765                          2765
 7955  034170  113200                          113200                  ;;1.0E07
 7956  034172  000230                          230
 7957  034174  041100                          041100                  ;;1.0E06
 7958  034176  000017                          17
 7959  034200  103240                          103240                  ;;1.0E05
 7960  034202  000001                          1
 7961  034204  023420                          23420                   ;;1.0E04
 7962  034206  000000                          0
 7963  034210  001750                          1750                    ;;1.0E03
```

```
7964  034212  000000                          0
7965  034214  000144                          144                     ;;1.0E02
7966  034216  000000                          0
7967  034220  000012                          12                      ;;1.0E01
7968  034222  000000                          0
7969  034224  000001                          1                       ;;1.0E00
7970  034226  000000                          0
7971  034230  000014              $DECVL: .BLKB   12.                 ;;RESERVE STORAGE FOR ASCIZ STRING
7972
7973                              .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
7974
7975                              ;;*****************************************************************
7976                              ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
7977                              ;*UNSIGNED OCTAL ASCIZ NUMBER.
7978                              ;*CALL
7979                              ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7980                              ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
7981                              ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
7982
7983
7984  034244  104412              $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
7985  034246  016601  000002              MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
7986  034252  012705  034363              MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
7987  034256  012704  000014              MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
7988  034262  012703  177770              MOV     #^C7,R3         ;;MASK
7989  034266  012100                      MOV     (R1)+,R0        ;;LOWER WORD
7990  034270  012101                      MOV     (R1)+,R1        ;;HIGH WORD
7991  034272  005002                      CLR     R2              ;;TERMINATOR
7992  034274  110245              1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
7993  034276  010002                      MOV     R0,R2           ;;GET THIS DIGIT
7994  034300  005304                      DEC     R4              ;;COUNT THIS CHARACTER
7995  034302  003007                      BGT     3$              ;;BR IF NOT THE LAST DIGIT
7996  034304  001405                      BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
7997  034306  005205                      INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
7998  034310  010566  000002              MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
7999  034314  104413                      RESREG                  ;;RESTORE ALL REGISTERS
8000  034316  000207                      RTS     PC              ;;RETURN TO USER
8001  034320  006203              2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
8002  034322  006001              3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
8003  034324  006000                      ROR     R0              ;;      THE NEXT OCTAL DIGIT
8004  034326  006001                      ROR     R1
8005  034330  006000                      ROR     R0
8006  034332  006001                      ROR     R1
8007  034334  006000                      ROR     R0
8008  034336  040302                      BIC     R3,R2           ;;MASK OUT ALL JUNK
8009  034340  062702  000060              ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
8010  034344  000753                      BR      1$              ;;GO PUT IT IN THE DATA TABLE
8011  034346  000016              $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
8012
8013                              .SBTTL  TRAP DECODER
8014
8015                              ;;*****************************************************************
8016                              ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
8017                              ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
8018                              ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
8019                              ;*GO TO THAT ROUTINE.
```

```
8020
8021  034364  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
8022  034366  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
8023  034372  005740                          TST     -(R0)           ;;BACKUP BY 2
8024  034374  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
8025  034376  006300                          ASL     R0              ;;POSITION FOR INDEXING
8026  034400  016000  034420                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
8027  034404  000200                          RTS     R0              ;;GO TO ROUTINE
8028
8029
8030                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
8031
8032  034406  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
8033  034410  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
8034  034416  000002                          RTI                     ;;RESTORE THE PSW
8035
8036                                  .SBTTL  TRAP TABLE
8037
8038                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
8039                                  ;*BY THE "TRAP" INSTRUCTION.
8040
8041                                  ;       ROUTINE
8042                                  ;       -------
8043  034420  034406                  $TRPAD: .WORD   $TRAP2
8044  034422  031516                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
8045  034424  032566                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
8046  034426  032542                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
8047  034430  032602                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
8048  034432  032770                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
8049
8050  034434  033264                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
8051
8052  034436  033214                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
8053  034440  033476                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
8054  034442  030700                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
8055  034444  033754                          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
8056  034446  034012                          $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
8057  034450  030124                          $DSPLY  ;;CALL=DISPLY   TRAP+14(104414) ROUTINE TO TYPE ERROR MESSAGES
8058           000032                  $TERM=.-$TRPAD
8059
8060                                  ;;**************************************************************
8061
8062
8063
8064                                  .SBTTL  SINGLE/DUAL PORT RH70/RM03 DRIVER (REV 5.1)-24-AUG-77
8065                                  ;NEW DRIVE TYPE ID FOR RM02 **********
8066                                  ; 10-AUG-77 ***********
8067
8068                                  ;COPYRIGHT (C) 1977
8069                                  ;DIGITAL EQUIPMENT CORP.
8070                                  ;MAYNARD, MA 01754
8071                                  ;AUTHOR(S): JIM LACEY/CHUCK HESS/C. CHEN
8072
8073                                  ;;**************************************************************
8074
8075                                  ;STORAGE FOR RMDS, RMER1, RMER2, AND RMMR2 ON AN ERROR "2"
```

```
                                        ;RMERRS    = RMDS
                                        ;RMERRS+2  = RMER1
                                        ;RMERRS+4  = RMER2
                                        ;RMERRS+6  = RMMR2

034452  000000  000000  000000  RMERRS: .WORD   0,0,0,0
034460  000000

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

034462      000                 DRVACT: .BYTE   0               ;DRIVE 0
034463      000                         .BYTE   0               ;DRIVE 1
034464      000                         .BYTE   0               ;DRIVE 2
034465      000                         .BYTE   0               ;DRIVE 3
034466      000                         .BYTE   0               ;DRIVE 4
034467      000                         .BYTE   0               ;DRIVE 5
034470      000                         .BYTE   0               ;DRIVE 6
034471      000                         .BYTE   0               ;DRIVE 7

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

034472      000                 DRVSTA: .BYTE   0               ;DRIVE 0
034473      000                         .BYTE   0               ;DRIVE 1
034474      000                         .BYTE   0               ;DRIVE 2
034475      000                         .BYTE   0               ;DRIVE 3
034476      000                         .BYTE   0               ;DRIVE 4
034477      000                         .BYTE   0               ;DRIVE 5
034500      000                         .BYTE   0               ;DRIVE 6
034501      000                         .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                        ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                        ;DRVTYP=5 IF DRIVE IS RM02 ******
                                        ;DRVTYP=4 IF DRIVE IS RM03
                                        ;DRVTYP=-1 IF NOT RM03

034502      000                 DRVTYP: .BYTE   0               ;DRIVE 0
034503      000                         .BYTE   0               ;DRIVE 1
034504      000                         .BYTE   0               ;DRIVE 2
034505      000                         .BYTE   0               ;DRIVE 3
034506      000                         .BYTE   0               ;DRIVE 4
034507      000                         .BYTE   0               ;DRIVE 5
034510      000                         .BYTE   0               ;DRIVE 6
034511      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

034512      000                 DPINT:  .BYTE   0               ;DRIVE 0
```

```
8132  034513  000                     .BYTE   0               ;DRIVE 1
8133  034514  000                     .BYTE   0               ;DRIVE 2
8134  034515  000                     .BYTE   0               ;DRIVE 3
8135  034516  000                     .BYTE   0               ;DRIVE 4
8136  034517  000                     .BYTE   0               ;DRIVE 5
8137  034520  000                     .BYTE   0               ;DRIVE 6
8138  034521  000                     .BYTE   0               ;DRIVE 7
8139
8140                          ;TABLE OF PENDING DUAL PORT REQUESTS
8141                                  ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
8142                                  ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
8143
8144  034522  000             DPRQS:  .BYTE   0               ;DRIVE 0
8145  034523  000                     .BYTE   0               ;DRIVE 1
8146  034524  000                     .BYTE   0               ;DRIVE 2
8147  034525  000                     .BYTE   0               ;DRIVE 3
8148  034526  000                     .BYTE   0               ;DRIVE 4
8149  034527  000                     .BYTE   0               ;DRIVE 5
8150  034530  000                     .BYTE   0               ;DRIVE 6
8151  034531  000                     .BYTE   0               ;DRIVE 7
8152
8153                          ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
8154                                  ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
8155                                  ;"DPB" OF THE I/O OPERATION.
8156
8157  034532  000000          TRNSWT: .WORD   0
8158
8159                          ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
8160                                  ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
8161                                  ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
8162                                  ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
8163                                  ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
8164
8165  034534  000000          SRCHWT: .WORD   0
8166
8167                          ;RM03 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
8168                                  ;ACTDRV=0 IF DRIVER IS INACTIVE
8169                                  ;ACTDRV>0 IF DRIVER IS ACTIVE
8170
8171  034536  000             ACTDRV: .BYTE   0
8172
8173                          ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
8174                                  ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
8175                                  ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
8176
8177  034537  000             ACTSTR: .BYTE   0
8178
8179                          ;UNLOAD FLAG (ULDFLG=8 BYTES)
8180                                  ;ULDFLG=0 IF NO UNLOAD COMMAND
8181                                  ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
8182                                  ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
8183
8184  034540  000             ULDFLG: .BYTE   0               ;DRIVE 0
8185  034541  000                     .BYTE   0               ;DRIVE 1
8186  034542  000                     .BYTE   0               ;DRIVE 2
8187  034543  000                     .BYTE   0               ;DRIVE 3
```

```
8188  034544  000                       .BYTE   0               ;DRIVE 4
8189  034545  000                       .BYTE   0               ;DRIVE 5
8190  034546  000                       .BYTE   0               ;DRIVE 6
8191  034547  000                       .BYTE   0               ;DRIVE 7
8192
8193                                ;LOOK AHEAD COUNT (LACNT=8 BYTES)
8194                                        ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
8195
8196  034550  000                   LACNT:  .BYTE   0               ;DRIVE 0
8197  034551  000                           .BYTE   0               ;DRIVE 1
8198  034552  000                           .BYTE   0               ;DRIVE 2
8199  034553  000                           .BYTE   0               ;DRIVE 3
8200  034554  000                           .BYTE   0               ;DRIVE 4
8201  034555  000                           .BYTE   0               ;DRIVE 5
8202  034556  000                           .BYTE   0               ;DRIVE 6
8203  034557  000                           .BYTE   0               ;DRIVE 7
8204
8205                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
8206                                        ;SAVEFG <0 IF SAVE THE RH70/RM03 REGISTERS WHEN THE
8207                                        ;OPERATION IS COMPLETED AS PER (DPB+14).
8208                                        ;SAVEFG=0 IF SAVE THE RH70/RM03 REGISTERS, AS PER
8209                                        ;(DPB+14), AFTER AN ERROR.
8210
8211  034560  000000                SAVEFG: .WORD   0
8212
8213                                ;SEEK FLAG (SEEKFG=1 WORD)
8214                                        ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
8215                                        ;FOR A DATA TRANSFER START A SEARCH COMMAND
8216                                        ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
8217                                        ;DISREGARD THE WINDOW
8218
8219  034562  177777                SEEKFG: .WORD   -1
8220
8221                                ;TIMEOUT TABLE (TIMER=8 WORDS)
8222                                        ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
8223
8224  034564  177777                TIMER:  .WORD   -1              ;DRIVE 0
8225  034566  177777                        .WORD   -1              ;DRIVE 1
8226  034570  177777                        .WORD   -1              ;DRIVE 2
8227  034572  177777                        .WORD   -1              ;DRIVE 3
8228  034574  177777                        .WORD   -1              ;DRIVE 4
8229  034576  177777                        .WORD   -1              ;DRIVE 5
8230  034600  177777                        .WORD   -1              ;DRIVE 6
8231  034602  177777                        .WORD   -1              ;DRIVE 7
8232
8233                                ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
8234                                        ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
8235                                        ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
8236
8237  034604  177777                DTUW:   .WORD   -1
8238
8239                                ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
8240                                        ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
8241                                        ;ATTENTION BIT
8242
8243  034606  001                   ATABIT: .BYTE   1               ;DRIVE 0
```

```
8244  034607  002                     .BYTE   2       ;DRIVE 1
8245  034610  004                     .BYTE   4       ;DRIVE 2
8246  034611  010                     .BYTE   10      ;DRIVE 3
8247  034612  020                     .BYTE   20      ;DRIVE 4
8248  034613  040                     .BYTE   40      ;DRIVE 5
8249  034614  100                     .BYTE   100     ;DRIVE 6
8250  034615  200                     .BYTE   200     ;DRIVE 7
8251
8252                          ;FSRM03 TO RH70 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
8253                          ;CALLING IT FATAL (MCPEMX=1 WORD)
8254
8255  034616  000003          MCPEMX: .WORD   3
8256
8257                          ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH70/RM03),
8258                          ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).
8259
8260  034620  176700          RMADR:  .WORD   176700
8261  034622  000254  000240  RMVEC:  .WORD   254,5*32.
8262
8263                          ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
8264
8265  034626  000004          MXLACT: .WORD   4
8266                          ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
8267
8268  034630  001000          MXDLTA: .WORD   8.*64.
8269                          ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
8270
8271  034632  000200          MNDLTA: .WORD   2*64.
8272                          ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
8273
8274  034634  000005          MXWNDW: .WORD   5
8275
8276                          ;DEFINITIONS OF THE RH70/RM03 ADDRESS INDEXES
8277
8278  000000          RMCS1=0         ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
8279  000002          RMWC=2          ;WORD COUNT REGISTER (NOT A DRIVE REG)
8280  000004          RMBA=4          ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
8281  000006          RMDA=6          ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
8282  000010          RMCS2=10        ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
8283  000012          RMDS=12         ;DRIVE STATUS REGISTER (DRIVE REG 01)
8284  000014          RMER1=14        ;ERROR REGISTER #1 (DRIVE REG. 02)
8285  000016          RMAS=16         ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
8286  000020          RMLA=20         ;LOOK AHEAD REGISTER (DRIVE REG. 07)
8287  000022          RMDB=22         ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
8288  000024          RMMR1=24        ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
8289  000026          RMDT=26         ;DRIVE TYPE REGISTER (DRIVE REG. 06)
8290  000030          RMSN=30         ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
8291  000032          RMOF=32         ;OFFSET REGISTER (DRIVE REG. 11)
8292  000034          RMDC=34         ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
8293  000036          RMHR=36         ;DUMMY  ADDRESS REGISTER (DRIVE REG. 13)
8294  000040          RMMR2=40        ;MAINTENANCE REGISTER #2
8295  000042          RMER2=42        ;ERROR REGISTER #2 (DRIVE REG. 15)
8296  000044          RMEC1=44        ;ECC POSITION REGISTER (DRIVE REG. 16)
8297  000046          RMEC2=46        ;ECC PATTERN REGISTER (DRIVE REG.  17)
8298
8299                          ;RH70/RM03 DRIVER INITIALIZATION CODE
```

```
8300                                            ;THIS ROUTINE WILL DETERMINE WHICH RM03 DRIVES ARE
8301                                            ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
8302                                            ;TO THE PROPER STATE FOR EACH DRIVE.
8303                                            ;NOTE: THIS ROUTINE CALLS DRVINT
8304                                            ;
8305                                            ;CALL
8306                                            ;
8307                                            ;       JSR     PC,RMINIT
8308                                            ;       RETURN
8309                                            ;
8310                                            ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
8311                                            ;
8312  034636  104412                           RMINIT: SAVREG                  ;SAVE R0 - R5
8313  034640  013746  177776                           MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
8314  034644  012737  000240  177776                   MOV     #<5*32.),@#PS   ;CHANGE THE PRIORITY TO 5
8315  034652  004737  042560                          JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
8316  034656  012701  034452                          MOV     #RMERRS,R1      ;FIRST ADDRESS TO BE CLEARED
8317  034662  012702  034562                          MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
8318  034666  005021                           1$:     CLR     (R1)+           ;CLEAR
8319  034670  020102                                   CMP     R1,R2           ;ARE WE DONE?
8320  034672  103775                                   BLO     1$              ;BRANCH IF NO
8321  034674  012702  034604                          MOV     #DTUW,R2        ;LAST ADDRESS
8322  034700  012721  177777                   2$:     MOV     #-1,(R1)+       ;INITIALIZE
8323  034704  020102                                   CMP     R1,R2           ;DONE?
8324  034706  101774                                   BLOS    2$              ;LOOP IF NO
8325  034710  005037  034472                          CLR     DRVSTA          ;SET ALL DRIVES TO OFFLINE
8326  034714  005037  034474                          CLR     DRVSTA+2
8327  034720  005037  034476                          CLR     DRVSTA+4
8328  034724  005037  034500                          CLR     DRVSTA+6
8329  034730  013703  034622                          MOV     RMVEC,R3        ;SETUP THE RH70/RM03 VECTOR
8330  034734  012723  037450                          MOV     #ISR,(R3)+
8331  034740  013713  034624                          MOV     RMVEC+2,(R3)
8332  034744  013704  034620                          MOV     RMADR,R4        ;FIRST ADDRESS OF RH70/RM03
8333  034750  012764  000040  000010                  MOV     #BIT05,RMCS2(R4)  ;MASSBUS INIT
8334  034756  005001                                   CLR     R1              ;START WITH DRIVE 0
8335  034760  004037  035050                   3$:     JSR     R0,DRVINT       ;INIT THE DRIVE
8336  034764  000401                                   BR      4$              ;'DVA' NOT SET OR PARITY ERROR
8337  034766  000402                                   BR      5$              ;NORMAL RETURN
8338  034770  105061  034472                   4$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
8339  034774  005201                           5$:     INC     R1              ;GO TO NEXT DRIVE
8340  034776  042701  177770                          BIC     #^C7,R1         ;MASK OUT UNUSED BITS
8341  035002  001366                                   BNE     3$              ;BR IF MORE DRIVES TO GO
8342  035004  012701  000007                          MOV     #7,R1           ;START WITH DRIVE 7
8343  035010  005037  177776                          CLR     @#PS            ;CLEAR THE PROCESSOR STATUS
8344  035014  105761  034512                   6$:     TSTB    DPINT(R1)       ;WAITING FOR DRIVE TO SWITCH PORTS ?
8345  035020  001405                                   BEQ     8$              ;BR NOT WAITING
8346  035022  004737  042214                          JSR     PC,SET.IE       ;SET INTERRUPT
8347  035026  105761  034512                   7$:     TSTB    DPINT(R1)       ;DRIVE SWITCHED PORTS ?
8348  035032  001375                                   BNE     7$              ;BR IF NOT
8349  035034  005301                           8$:     DEC     R1              ;GO TO THE NEXT DRIVE
8350  035036  100366                                   BPL     6$              ;CHECK NEXT DRIVE
8351  035040  012637  177776                          MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
8352  035044  104413                                   RESREG                  ;RESTORE R0 - R5
8353  035046  000207                                   RTS     PC              ;BYE-BYE
8354
8355                                            ;DRIVE INITILIZATION ROUTINE
```

```
8356                                    ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
8357                                    ;AN RM03. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
8358                                    ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
8359                                    ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
8360                                    ;DRVSTA IS SET TO THE PROPER CONDITION.
8361                                ;CALL
8362                                ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
8363                                ;       MOV     RMADR,R4        ;UNIBUS ADDRESS OF RH70/RM03 (RMCS1)
8364                                ;       JSR     R0,DRVINT       ;CALLED BY A JSR
8365                                ;       RETURN1                 ;ERROR OCCURRED (PARITY)
8366                                ;       RETURN2                 ;NORMAL RETURN
8367                                ;
8368
8369  035050  010546            DRVINT: MOV     R5,-(SP)        ;SAVE R5
8370  035052  105061  034472     DULP:   CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
8371  035056  105061  034502             CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
8372  035062  105061  034540             CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
8373  035066  010164  000010             MOV     R1,RMCS2(R4)    ;SELECT A DRIVE
8374  035072  112764  000111  000000     MOVB    #111,RMCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
8375  035100  032764  010000  000010     BIT     #BIT12,RMCS2(R4) ;NONEXISTENT DRIVE?
8376  035106  001403                     BEQ     1$              ;NO---BRANCH
8377  035110  004737  042214             JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
8378  035114  000507                     BR      6$              ;LEAVE THIS ROUTINE
8379  035116  105061  034472     1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
8380  035122  032764  004000  000000     BIT     #BIT11,RMCS1(R4)  ;SEE IF DRIVE AVAILABLE
8381  035130  001750                     BEQ     DULP            ;BR IF DRIVE NOT AVAILABLE
8382  035132  004037  041534             JSR     R0,RD.RM        ;READ THE DRIVE TYPE REG.
8383  035136  000026                     RMDT
8384  035140  035360                     8$                      ;ERROR RETURN ADDRESS
8385  035142  012605                     MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
8386  035144  112761  000004  034502     MOVB    #4,DRVTYP(R1)   ;SET RM03 INDICATOR
8387  035152  022705  020024             CMP     #20024,R5       ;SINGLE PORT RM03 ?
8388  035156  001420                     BEQ     2$              ;BR IF YES
8389  035160  022705  024024             CMP     #24024,R5       ;DUAL PORT RM03 ?
8390  035164  001415                     BEQ     2$              ;BR IF YES
8391  035166  112761  000005  034502     MOVB    #5,DRVTYP(R1)   ;SET RM02 INDICATOR
8392  035174  022705  020025             CMP     #20025,R5       ;SINGLE PPRT RM02 ?
8393  035200  001407                     BEQ     2$              ;BRANCH IF SO
8394  035202  022705  024025             CMP     #24025,R5       ;DUAL PORT RM02 ?
8395  035206  001404                     BEQ     2$              ;BRANCH IF SO
8396  035210  112761  177777  034502     MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
8397  035216  000446                     BR      6$              ;EXIT
8398  035220  012746  000121     2$:     MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
8399  035224  004037  041710             JSR     R0,WRT.RM
8400  035230  000000                     RMCS1
8401  035232  035360                     8$
8402  035234  012746  010000             MOV     #BIT12,-(SP)    ;SET FMT22=1
8403  035240  004037  041710             JSR     R0,WRT.RM
8404  035244  000032                     RMOF
8405  035246  035360                     8$
8406  035250  004037  041534             JSR     R0,RD.RM        ;READ RMDS
8407  035254  000012                     RMDS
8408  035256  035360                     8$
8409  035260  012605                     MOV     (SP)+,R5        ;AND SAVE IT IN R5
8410  035262  100015                     BPL     4$              ;BRANCH IF ATA=0
8411  035264  116164  034606  000016     MOVB    ATABIT(R1),RMAS(R4) ;CLEAR ATTENTION BIT
```

```
8412  035272  004037  041534          JSR     R0,RD.RM        ;FIND OUT WHY ATA=1
8413  035276  000014                  RMER1
8414  035300  035360                  8$
8415  035302  006126                  ROL     (SP)+           ;IS IT UNSAFE?
8416  035304  100004                  BPL     4$              ;BR IF NOT
8417  035306  112761  177777  034472  MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
8418  035314  000407                  BR      6$              ;EXIT
8419  035316  005105              4$: COM     R5              ;CHECK MOL, DPR, DRY, AND VV
8420  035320  042705  167077          BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
8421  035324  001003                  BNE     6$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
8422  035326  112761  000001  034472  MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
8423  035334  005720              6$: TST     (R0)+           ;STEP OVER THE ERROR RETURN
8424  035336  000410                  BR      8$              ;EXIT
8425  035340  006301              7$: ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
8426  035342  012761  060000  034564  MOV     #60000,TIMER(R1)  ;START 2 SEC TIMER
8427  035350  006201                  ASR     R1              ;RESTORE R1
8428  035352  112761  177777  034512  MOVB    #-1,DPINT(R1)   ;SET PORT INITIALIZE INIDICATOR
8429  035360  012605              8$: MOV     (SP)+,R5        ;RESTORE R5
8430  035362  000200                  RTS     R0              ;EXIT
8431
8432                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
8433                                  ;
8434                                  ;CALL
8435                                  ;
8436                                  ;       JSR     R0,@#RM03       ;CALL THE RM03 DRIVER
8437                                  ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
8438                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
8439                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
8440                                                                  ;IS AN ERROR CONDITION
8441
8442  035364  013746  177776      RM03: MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
8443  035370  013737  034624  177776  MOV     RMVEC+2,@#PS    ;DON'T ALLOW ANY RM03 INTERRUPTS
8444  035376  112737  000001  034536  MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
8445  035404  104412                  SAVREG                  ;SAVE R0 - R5
8446  035406  011002                  MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
8447  035410  005062  000016          CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
8448  035414  111201                  MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
8449  035416  013704  034620          MOV     RMADR,R4        ;UNIBUS ADDRESS OF RMCS1
8450  035422  105761  034472          TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
8451  035426  003014                  BGT     1$              ;BRANCH IF ONLINE
8452  035430  105761  034540          TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
8453  035434  001036                  BNE     3$              ;BRANCH IF YES
8454  035436  105761  034512          TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
8455  035442  001042                  BNE     5$              ;BR IF YES
8456  035444  004037  035050          JSR     R0,DRVINT       ;GO INIT. THE DRIVE
8457  035450  000434                  BR      4$              ;ERROR RETURN
8458  035452  105761  034472          TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
8459  035456  003445                  BLE     6$              ;BR IF NOT
8460  035460  105761  034522      1$: TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
8461  035464  001031                  BNE     5$              ;BR IF YES
8462  035466  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
8463  035472  004037  042656          JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
8464  035476  000460                  BR      9$              ;QUEUE IS FULL
8465  035500  122762  000103  000002  CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
8466  035506  001003                  BNE     2$              ;BR IF NO
8467  035510  112761  177777  034540  MOVB    #-1,ULDFLG(R1)  ;SET THE "UNLOAD IN QUEUE" FLAG
```

```
8468  035516  105761  034462          2$:     TSTB    DRVACT(R1)          ;IS THIS DRIVE ACTIVE?
8469  035522  001043                          BNE     8$                  ;BR IF YES
8470  035524  004737  035656                  JSR     PC,OPT              ;CALL THE OPTIMIZER
8471  035530  000440                          BR      8$
8472  035532  012762  120000  000016  3$:     MOV     #BIT15!BIT13,16(R2) ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
8473  035540  000434                          BR      8$                  ;EXIT
8474  035542  004737  036736          4$:     JSR     PC,CI7              ;GO HANDLE THE PARITY ERROR
8475  035546  000431                          BR      8$
8476  035550  004037  042656          5$:     JSR     R0,DRVQUE           ;PUT REQUEST IN QUEUE
8477  035554  000431                          BR      9$                  ;QUEUE IS FULL
8478  035556  032714  000100                  BIT     #BIT06,(R4)         ;IE BIT SET ?
8479  035562  001023                          BNE     8$                  ;YES
8480  035564  004737  042214                  JSR     PC,SET.IE           ;SET THE INTERRUPT
8481  035570  000420                          BR      8$                  ;RETURN
8482  035572  105761  034472          6$:     TSTB    DRVSTA(R1)          ;SEE IF DRIVE OFFLINE OR UNSAFE
8483  035576  002412                          BLT     7$                  ;BR IF UNSAFE
8484  035600  012762  140000  000016          MOV     #BIT15!BIT14,16(R2) ;SET OFFLINE ERROR INDICATOR
8485  035606  105761  034502                  TSTB    DRVTYP(R1)          ;SEE IF OFFLINE OR NONEXISTENT
8486  035612  001007                          BNE     8$                  ;BR IF OFFLINE
8487  035614  012762  100002  000016          MOV     #BIT15!BIT01,16(R2) ;REPORT DRIVE NONEXISTENT
8488  035622  000403                          BR      8$                  ;GO TO EXIT
8489  035624  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2) ;DRIVE IS UNSAFE
8490  035632  104413                  8$:     RESREG                      ;RESTORE R0 - R5
8491  035634  005720                          TST     (R0)+               ;SETUP FOR NORMAL RETURN
8492  035636  000401                          BR      10$                 ;FINISH UP, THEN EXIT
8493  035640  104413                  9$:     RESREG                      ;RESTORE R0 - R5
8494  035642  005720                  10$:    TST     (R0)+               ;CORRECT THE RETURN ADDRESS
8495  035644  105037  034536                  CLRB    ACTDRV              ;CLEAR "ACTIVE DRIVER" FLAG
8496  035650  012637  177776                  MOV     (SP)+,@#PS          ;RETURN "PS" TO USER LEVEL
8497  035654  000200                          RTS     R0                  ;RETURN TO CALLER
8498
8499                                  ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
8500                                  ;
8501                                  ;CALL
8502                                  ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
8503                                  ;       JSR     PC,OPT              ;SETUP A COMMAND
8504                                  ;
8505  035656  104412                  OPT:    SAVREG                      ;SAVE R0 - R5
8506  035660  013746  177776                  MOV     @#PS,-(SP)          ;SAVE PROC. STATUS
8507  035664  146137  034606  034534          BICB    ATABIT(R1),SRCHWT           ;CLEAR LA SEACH FLAG
8508  035672  105061  034522                  CLRB    DPRQS(R1)           ;RESET THE PORT REQ FLAG ****
8509  035676  004737  042732                  JSR     PC,GETREQ           ;GET "DPB" POINTER OF REQUEST
8510  035702  005702                          TST     R2                  ;IS THERE A REQUEST IN QUEUE?
8511  035704  001472                          BEQ     7$                  ;NO--BRANCH TO EXIT
8512  035706  010164  000010                  MOV     R1,RMCS2(R4)        ;LOAD THE DRIVE ADDRESS *******
8513  035712  012764  000111  000000          MOV     #111,RMCS1(R4)      ;CLEAR THE DRIVE
8514  035720  032764  004000  000000          BIT     #BIT11,RMCS1(R4)            ;DVA SET ?
8515  035726  001446                          BEQ     5$                  ;TO PROT REQUEST ,IF NOT
8516  035730  105761  034472          10$:    TSTB    DRVSTA(R1)          ;IS DRIVE ONLINE?
8517  035734  003014                          BGT     1$                  ;YES--BRANCH
8518  035736  004737  042754                  JSR     PC,POPQUE           ;NO--REMOVE REQUEST FROM QUEUE
8519  035742  012762  140000  000016          MOV     #BIT15!BIT14,16(R2) ;SET OFFLINE STATUS/ERROR INDICATOR
8520  035750  105761  034472                  TSTB    DRVSTA(R1)          ;IS DRIVE UNSAFE ?
8521  035754  100053                          BPL     8$                  ;BR TO EXIT IF NOT
8522  035756  012762  110000  000016          MOV     #BIT15!BIT12,16(R2) ;SET UNSAFE STATUS/ERROR INDICATOR
8523  035764  000447                          BR      8$                  ;BRANCH TO EXIT
```

```
8524   035766                                  1$:
8525                                           ;       MOV     #111,-(SP)      ;LOAD COMMAND ONTO THE STACK
8526                                           ;       JSR     R0,WRT.RM       ;LOAD THE REGISTER
8527                                           ;       RMCS1                   ;REGISTER INCREMENT
8528                                           ;       6$                      ;ERROR RETURN ADDRESS
8529                                           ;       BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
8530                                           ;       BEQ     9$              ;BR IF NOT
8531   035766  122762  000150  000002                 CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
8532   035774  002403                                 BLT     2$              ;YES--BRANCH
8533   035776  004737  036322                         JSR     PC,CI4          ;CALL THE COMMAND INITIATOR
8534   036002  000440                                 BR      8$              ;BRANCH TO EXIT
8535   036004  005737  034604          2$:            TST     DTUW            ;DATA TRANSFER UNDERWAY?
8536   036010  002012                                 BGE     4$              ;YES--GO START A SEARCH
8537   036012  005737  034562                         TST     SEEKFG          ;DO IMPLIED SEEKS?
8538   036016  100404                                 BMI     3$              ;YES---BRANCH
8539   036020  004037  037274                         JSR     R0,LA           ;NO--DO LOOK AHEAD
8540   036024  000427                                 BR      8$              ;RETURN HERE ON A PARITY ERROR
8541   036026  000403                                 BR      4$              ;GO START A SEARCH
8542   036030  004737  036114          3$:            JSR     PC,CI1          ;START A DATA TRANSFER
8543   036034  000423                                 BR      8$
8544   036036  004737  036222          4$:            JSR     PC,CI3          ;START A SEARCH
8545   036042  000420                                 BR      8$              ;GO TO THE EXIT
8546   036044  112761  177777  034522  5$:            MOVB    #-1,DPRQS(R1)   ;SET PORT REQUEST INDICATOR
8547   036052  010103                                 MOV     R1,R3           ;SET UP TO ADDRESS WORDS
8548   036054  006303                                 ASL     R3              ;CONVERT TO WORD INDEX
8549   036056  012763  060000  034564                 MOV     #60000,TIMER(R3)  ;START 10 SEC TIMER
8550   036064  000402                                 BR      7$              ;EXIT
8551   036066  004737  036736          6$:            JSR     PC,CI7          ;PROCESS THE PARITY ERROR
8552   036072  032714  000100          7$:            BIT     #BIT06,(R4)     ;SEE IF 'IE' ALREADY SET
8553   036076  001002                                 BNE     8$              ;BR IF SET
8554   036100  004737  042214                         JSR     PC,SET.IE       ;SET "IE" WITHOUT A "TRE"
8555   036104  012637  177776          8$:            MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
8556   036110  104413                                 RESREG                  ;RESTORE R0 - R5
8557   036112  000207                                 RTS     PC
8558
8559                                           ;COMMAND INITIATOR
8560                                           ;
8561                                           ;CALL
8562                                           ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
8563                                           ;       MOV     #DPB,R2         ;ADDRESS OF DPB
8564                                           ;       JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
8565                                           ;                               ;WHERE:
8566                                           ;                               ;CI1=DATA TRANSFER
8567                                           ;                               ;CI2=SEARCH REQUESTED BY DATA XFER
8568                                           ;                               ;CI4=NOT DATA TRANSFER
8569
8570   036114  004737  042754          CI1:           JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
8571   036120  010237  034532                         MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
8572   036124  010203                                 MOV     R2,R3           ;DPB ADDRESS TO R3
8573   036126  013704  034620                         MOV     RMADR,R4        ;RMCS1 ADDRESS
8574   036132  010164  000010                         MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8575   036136  062703  000004                         ADD     #4,R3           ;DESIRED WORD COUNT
8576   036142  062704  000002                         ADD     #2,R4           ;RMWC ADDRESS
8577   036146  012324                                 MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
8578   036150  012324                                 MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
8579   036152  012346                                 MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
```

```
8580  036154  004037  041710                  JSR     R0,WRT.RM       ;CALL THE LOAD(WRITE) ROUTINE
8581  036160  000006                          RMDA                    ;INDEX OF REGISTER TO LOAD
8582  036162  036736                          CI7                     ;ERROR RETURN ADDRESS
8583  036164  012346                          MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
8584  036166  004037  041710                  JSR     R0,WRT.RM
8585  036172  000034                          RMDC
8586  036174  036736                          CI7
8587  036176  016246  000002                  MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
8588  036202  004037  041710                  JSR     R0,WRT.RM
8589  036206  000000                          RMCS1
8590  036210  036736                          CI7
8591  036212  010137  034604                  MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
8592  036216  000137  036700                  JMP     CI5
8593  036222  013704  034620          CI3:    MOV     RMADR,R4        ;RMCS1 ADDRESS
8594  036226  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8595  036232  016246  000012                  MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
8596  036236  004037  041710                  JSR     R0,WRT.RM
8597  036242  000034                          RMDC
8598  036244  036736                          CI7
8599  036246  116203  000010                  MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
8600                                  ;       SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
8601                                  ;       BGE     1$
8602                                  ;       ADD     #32.,R3
8603  036252  010346                  1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
8604  036254  042716  177740                  BIC     #177740,(SP)    ;CHOP OF ALL EXENTED BITS ,IF ANY
8605  036260  116266  000011  000001          MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
8606  036266  004037  041710                  JSR     R0,WRT.RM       ;LOAD DESIRED TRACK & SECTOR
8607  036272  000006                          RMDA
8608  036274  036736                          CI7
8609  036276  012746  000131                  MOV     #131,-(SP)      ;START A SEARCH
8610  036302  004037  041710                  JSR     R0,WRT.RM
8611  036306  000000                          RMCS1
8612  036310  036736                          CI7
8613  036312  156137  034606  034534          BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
8614  036320  000567                          BR      CI5
8615  036322  013704  034620          CI4:    MOV     RMADR,R4        ;RMCS1 ADDRESS
8616  036326  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
8617  036332  116203  000002                  MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
8618  036336  122703  000131                  CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
8619  036342  001007                          BNE     1$              ;BRANCH IF NO
8620  036344  016246  000010                  MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
8621  036350  004037  041710                  JSR     R0,WRT.RM
8622  036354  000006                          RMDA
8623  036356  036736                          CI7
8624  036360  000403                          BR      2$              ;GO LOAD CYLINDER
8625  036362  122703  000105          1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
8626  036366  001007                          BNE     3$              ;BRANCH IF NO
8627  036370  016246  000012          2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
8628  036374  004037  041710                  JSR     R0,WRT.RM
8629  036400  000034                          RMDC
8630  036402  036736                          CI7
8631  036404  000546                          BR      CI6
8632  036406  122703  000115          3$:     CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
8633  036412  001013                          BNE     4$              ;BR IF NO
8634  036414  004037  041534                  JSR     R0,RD.RM        ;MERGE THE OFFSET VALUE INTO RMOF
8635  036420  000032                          RMOF                    ;BUT DON'T CHANGE THE UPPER
```

```
8636  036422  036736                          CI7
8637  036424  116216  000001                  MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
8638  036430  004037  041710                  JSR     R0,WRT.RM       ;REGISTER (RMOF)
8639  036434  000032                          RMOF
8640  036436  036736                          CI7
8641  036440  000530                          BR      CI6             ;GO START THE COMMAND
8642  036442  122703  000107          4$:     CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
8643  036446  001525                          BEQ     CI6             ;BRANCH IF YES
8644  036450  122703  000117                  CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
8645  036454  001522                          BEQ     CI6             ;BRANCH IF YES
8646  036456  122703  000103                  CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
8647  036462  001016                          BNE     5$              ;BRANCH IF NO
8648  036464  112761  000001  034462          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
8649  036472  105061  034472                  CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
8650  036476  112761  000001  034540          MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
8651  036504  010346                          MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
8652  036506  004037  041710                  JSR     R0,WRT.RM
8653  036512  000000                          RMCS1
8654  036514  036736                          CI7
8655  036516  000207                          RTS     PC              ;RETURN TO USER
8656  036520  122703  000143          5$:     CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
8657  036524  001014                          BNE     6$              ;BRANCH IF NO
8658  036526  004037  041534                  JSR     R0,RD.RM        ;READ THE OFFSET REGISTER
8659  036532  000032                          RMOF
8660  036534  036736                          CI7
8661  036536  116266  000001  000001          MOVB    1(R2),1(SP)     ;COMBINE "FMT22", "ECI", AND "HCI"
8662  036544  004037  041710                  JSR     R0,WRT.RM       ;LOAD "FMT22", "ECI", AND/OR "HCI".
8663  036550  000032                          RMOF
8664  036552  036736                          CI7
8665  036554  000436                          BR      12$
8666  036556  122703  000141          6$:     CMPB    #141,R3         ;IS IT A "GET REGISTER" COMMAND?
8667  036562  001023                          BNE     10$             ;BRANCH IF NO
8668  036564  016203  000006          7$:     MOV     6(R2),R3        ;POINTS TO 1ST ADDRESS OF WHERE
8669                                                                  ;TO PUT THE REGISTER(S)
8670  036570  116237  000010  036606          MOVB    10(R2),9$       ;INIT. THE INDEX FOR THE FIRST REG.
8671  036576  116205  000011                  MOVB    11(R2),R5       ;INDEX OF LAST REG. TO MOVE
8672  036602  004037  041534          8$:     JSR     R0,RD.RM        ;READ RH70/RM03 REGISTER
8673  036606  000000          9$:     RMCS1                           ;INDEX OF REG. TO READ
8674  036610  036736                          CI7
8675  036612  012623                          MOV     (SP)+,(R3)+     ;GET THE CONTENTS OF RH70//RM03 REG.
8676  036614  023705  036606                  CMP     9$,R5           ;LAST REG. BEEN READ?
8677  036620  001414                          BEQ     12$             ;GET OUT IF YES
8678  036622  062737  000002  036606          ADD     #2,9$           ;INCREASE THE INDEX BY 2
8679  036630  000764                          BR      8$              ;LOOP--MORE TO READ
8680  036632  122703  000145          10$:    CMPB    #145,R3         ;IS IT A "SELECT DRIVE" COMMAND?
8681  036636  001405                          BEQ     12$             ;BRANCH IF YES
8682  036640  010346                  11$:    MOV     R3,-(SP)        ;LOAD THE COMMAND
8683  036642  004037  041710                  JSR     R0,WRT.RM
8684  036646  000000                          RMCS1
8685  036650  036736                          CI7
8686  036652  004737  042754          12$:    JSR     PC,POPQUE       ;REMOVE REQ. FROM QUEUE
8687  036656  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET THE "DONE" BIT
8688  036664  005737  034560                  TST     SAVEFG          ;SAVE THE RH70/RM03 REGISTERS?
8689  036670  100002                          BPL     13$             ;BRANCH IF NO
8690  036672  004737  042076                  JSR     PC,SVRH70       ;YES--GO SAVE THE REGISTERS
8691  036676  000207                  13$:    RTS     PC              ;RETURN TO USER
```

```
8692  036700  006301                  CI5:    ASL     R1
8693  036702  012761  060000  034564          MOV     #60000,TIMER(R1)        ;SET A ONE SECOND TIMER
8694  036710  006201                          ASR     R1
8695  036712  112761  000001  034462          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE
8696  036720  000207                          RTS     PC              ;RETURN TO THE USER
8697  036722  010346                  CI6:    MOV     R3,-(SP)        ;LOAD THE COMMAND
8698  036724  004037  041710                  JSR     R0,WRT.RM
8699  036730  000000                          RMCS1
8700  036732  036736                          CI7
8701  036734  000761                          BR      CI5
8702  036736  032764  010000  000010  CI7:    BIT     #BIT12,RMCS2(R4)  ;DRIVE NON-EXISTENT ?
8703                                  ;       BNE     CI8             ;BR IF YES
8704  036744  005702                  1$:     TST     R2              ;ANYTHING IN QUEUE ?
8705                                  ;       BEQ     CI7B            ;BR IF NOT
8706  036746  001001                          BNE     2$              ;BRANCH IF QUEUE IS THERE
8707  036750  000207                          RTS     PC              ;OTHERWISE EXIT
8708  036752  012762  104000  000016  2$:     MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
8709                                  ;       JSR     PC,SVRH70       ;GO SAVE THE RH70/RM03 REGISTERS
8710  036760  012746  000111          CI7B:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
8711  036764  004037  041710                  JSR     R0,WRT.RM
8712  036770  000000                          RMCS1
8713  036772  037036                          CI8
8714  036774  004737  042636          2$:     JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
8715  037000  105061  034522                  CLRB    DPRQS(R1)       ;CLEAR THE PORT REQUEST FLAG
8716  037004  105061  034540                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
8717  037010  105061  034462                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
8718  037014  020237  034532                  CMP     R2,TRNSWT       ;IF THIS DRIVE HAD AN I/O REQUEST
8719                                  ;       CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
8720  037020  001005                          BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
8721  037022  005037  034532                  CLR     TRNSWT
8722  037026  012737  177777  034604          MOV     #-1,DTUW
8723  037034  000207                  1$:     RTS     PC
8724  037036  104412                  CI8:    SAVREG                  ;SAVE R0 - R5
8725  037040  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;IS 'NED' SET ?
8726                                  ;       BNE     1$              ;BR IF YES
8727  037046  005001                          CLR     R1
8728  037050  005003                          CLR     R3
8729  037052  105761  034462          1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
8730                                  ;       BEQ     5$              ;BRANCH IF NO
8731  037056  001003                          BNE     22$             ;BRANCH IF IN ACTIVE
8732  037060  105761  034522                  TSTB    DPRQS(R1)       ;PORT REQUEST
8733  037064  001443                          BEQ     5$              ;BRANCH IF NOT
8734  037066  013702  034532          22$:    MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
8735  037072  020137  034604                  CMP     R1,DTIJW        ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
8736  037076  001402                          BEQ     2$              ;BRANCH IF YES
8737  037100  004737  042732                  JSR     PC,GETREQ       ;GET THE DPB POINTER
8738  037104  005702                  2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
8739  037106  001413                          BEQ     4$              ;BR IF NOT
8740  037110  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;'NED' SET ?
8741  037116  001404                          BEQ     3$              ;BR IF NOT
8742  037120  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;SET 'DRIVE NON-EXISTENT' INDICATOR
8743  037126  000403                          BR      4$              ;CONTINUE
8744  037130  012762  102000  000016  3$:     MOV     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
8745                                  ;       JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8746  037136  012763  177777  034564  4$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8747  037144  105061  034462                  CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
```

```
8748  037150  105061  034522                  CLRB    DPRQS(R1)           ;CLEAR PORT REQUEST FLAG
8749  037154  020137  034604                  CMP     R1,DTUW             ;IS THIS DRIVE SETUP FOR A TRANSFER
8750  037160  001005                          BNE     5$                  ;BR IF NOT
8751  037162  012737  177777  034604          MOV     #-1,DTUW            ;RESET THE INDICATOR
8752  037170  005037  034532                  CLR     TRNSWT              ;CLEAR THE TRANSFER QUEUE
8753  037174  105061  034540          5$:     CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
8754  037200  032764  010000  000010          BIT     #BIT12,RMCS2(R4)    ;'NED' SET ?
8755                                  ;       BNE     6$                  ;BR IF YES
8756  037206  005201                          INC     R1                  ;MOVE TO THE NEXT DRIVE
8757  037210  062703  000002                  ADD     #2,R3
8758  037214  042701  177770                  BIC     #^C7,R1
8759  037220  001314                          BNE     1$                  ;BRANCH IF MORE DRIVES
8760  037222  012737  177777  034604          MOV     #-1,DTUW            ;NO DATA TRANSFERS UNDERWAY
8761  037230  005037  034532                  CLR     TRNSWT              ;CLEAR THE 'TRANSFER WAIT' QUEUE
8762  037234  004737  042560                  JSR     PC,CLRQUE           ;CLEAR ALL OF THE REQUEST QUEUES
8763  037240  012764  000040  000010          MOV     #BIT05,RMCS2(R4)    ;DO A MASSBUS INIT.
8764  037246  000406                          BR      7$                  ;CONTINUE
8765  037250  004737  042636          6$:     JSR     PC,EMPTYQ           ;CLEAR THE DRIVE'S QUEUE
8766  037254  105061  034472                  CLRB    DRVSTA(R1)          ;SET DRIVE TO OFFLINE
8767  037260  105061  034502                  CLRB    DRVTYP(R1)          ;CLEAR THE DRIVE TYPE INDICATOR
8768  037264  004737  042214          7$:     JSR     PC,SET.IE           ;SET "IE" WITHOUT "TRE"
8769  037270  104413                          RESREG                      ;RESTORE R0 - R5
8770  037272  000207                          RTS     PC                  ;RETURN
8771
8772                                  ;LOOK AHEAD ROUTINE
8773                                  ;
8774                                  ;CALL
8775                                  ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER
8776                                  ;       MOV     #DPB,R2             ;POINT TO DPB
8777                                  ;       JSR     R0,LA               ;GO CHECK THE WINDOW
8778                                  ;       RETURN1                     ;ERROR RETURN
8779                                  ;       RETURN2                     ;START A SEARCH
8780                                  ;       RETURN3                     ;START A DATA TRANSFER
8781
8782  037274  013704  034620          LA:     MOV     RMADR,R4            ;GET RMCS1'S ADDRESS
8783  037300  010164  000010                  MOV     R1,RMCS2(R4)        ;SELECT DRIVE
8784  037304  004037  041534                  JSR     R0,RD.RM            ;READ DRIVE STATUS
8785  037310  000012                          RMDS
8786  037312  037442                          4$                          ;ERROR RETURN ADDRESS
8787  037314  042716  157577                  BIC     #^C020200,(SP)      ;ON CYLINDER ?
8788  037320  022726  000200                  CMP     #200,(SP)+          ;PIP=0,DRY=1?
8789  037324  001044                          BNE     3$                  ;NO
8790  037326  105261  034550                  INCB    LACNT(R1)           ;INCREMENT THE LOOK AHEAD COUNT
8791  037332  126137  034550  034626          CMPB    LACNT(R1),MXLACT    ;EXCEED MAX?
8792  037340  003033                          BGT     2$                  ;BRANCH IF YES
8793  037342  116203  000010                  MOVB    10(R2),R3           ;GET DESIRED SECTOR ADDRESS AND
8794  037346  000303                          SWAB    R3                  ;MULT. BY 64--ALIGN WITH
8795  037350  006203                          ASR     R3                  ;LOOK AHEAD REGISTER
8796  037352  006203                          ASR     R3
8797  037354  012737  000340  177776          MOV     #340,@#PS           ;PRIORITY LEVEL "7"
8798  037362  004037  041534          6$:     JSR     R0,RD.RM            ;READ LOOK AHEAD REGISTER
8799  037366  000020                          RMLA
8800  037370  037442                          4$
8801  037372  021664  000020                  CMP     (SP),RMLA(R4)       ;CORRECT LA NUMBER ?
8802  037376  001402                          BEQ     7$                  ;YES
8803  037400  005726                          TST     (SP)+               ;NO,CLEAR STACK
```

```
8804  037402  000415                        BR      3$
8805  037404  162603                7$:     SUB     (SP)+,R3        ;CALCULATE THE DELTA
8806  037406  002002                        BGE     1$
8807  037410  062703  004000                ADD     #<32.*64.>,R3   ;MAKE THE DELTA POSITIVE
8808  037414  023703  034630        1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
8809  037420  002406                        BLT     3$              ;IF IT IS WITHIN THE
8810  037422  023703  034632                CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
8811  037426  002003                        BGE     3$              ;THE LOOK AHEAD COUNT
8812  037430  105061  034550        2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
8813  037434  005720                        TST     (R0)+
8814  037436  005720                3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
8815  037440  000402                        BR      5$              ;EXIT
8816  037442  004737  036736        4$:     JSR     PC,CI7          ;PROCESS THE ERROR
8817  037446  000200                5$:     RTS     R0              ;RETURN
8818
8819                                ;INTERRUPT SERVICE ROUTINE
8820
8821  037450  112737  000001  034536  ISR:  MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
8822  037456  104412                        SAVREG                  ;SAVE R0 - R5
8823  037460  013704  034620                MOV     RMADR,R4        ;ADDRESS OF RHSCS1
8824  037464  013701  034604                MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
8825  037470  002403                        BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
8826  037472  004737  037514                JSR     PC,TD           ;CALL TRANSFER DONE
8827  037476  000402                        BR      2$              ;EXIT
8828  037500  004737  037770        1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
8829  037504  104413                2$:     RESREG                  ;RESTORE R0 - R5
8830  037506  105037  034536                CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
8831  037512  000002                        RTI                     ;RETURN
8832
8833                                ;TRANSFER DONE ROUTINE
8834
8835  037514  105061  034462        TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
8836  037520  012737  177777  034604        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8837  037526  006301                        ASL     R1
8838  037530  012761  177777  034564        MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
8839  037536  006201                        ASR     R1
8840  037540  013702  034532                MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
8841  037544  005037  034532                CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
8842  037550  052762  000200  000016        BIS     #BIT07,16(R2)   ;SET DONE
8843  037556  010164  000010                MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
8844  037562  004037  041534                JSR     R0,RD.RM        ;TRANSFER ERROR(TRE=1)?
8845  037566  000000                        RMCS1
8846  037570  036736                        CI7
8847  037572  006126                        ROL     (SP)+
8848  037574  100421                        BMI     3$              ;BR IF YES
8849  037576  005737  034560                TST     SAVEFG          ;SAVE THE RH70/RM03 REGISTERS?
8850  037602  100002                        BPL     1$              ;BRANCH IF NO
8851  037604  004737  042076                JSR     PC,SVRH70       ;YES--SAVE THE REGISTERS
8852  037610  004737  037670        1$:     JSR     PC,WC.HK                ;SEE IF WRITE CHECK TO BE PUT IN QUEUE
8853  037614  004737  042732                JSR     PC,GETREQ       ;GET DPB POINTER
8854  037620  005702                        TST     R2              ;ENTRY FOR DRIVE ?
8855  037622  001403                        BEQ     2$              ;BR IF NOT
8856  037624  004737  035656                JSR     PC,OPT          ;CALL OPTIMIZER
8857  037630  000457                        BR      SC              ;CHECK OTHER DRIVES
8858                                ;THE RELEASE DRIVE COMMAND IS FORECD TO ENTER FOR DUAL PORT OPERATION
8859  037632  012714  000113        2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
```

```
8860  037636  000454                        BR      SC                      ;CHECK FOR OTHER DRIVES
8861  037640  052762  100100  000016  3$:   BIS     #BIT15!BIT06,16(R2)     ;SET DATA ERROR FLAG
8862  037646  004737  042636                JSR     PC,EMPTYQ               ;EMPTY THE "DRIVE'S WAIT" QUEUE
8863  037652  004737  042076                JSR     PC,SVRH70               ;SAVE THE RH70/RM03 REGISTERS
8864  037656  012714  040111                MOV     #40111,(R4)             ;ISSUE A "DRIVE CLEAR"
8865  037662  012714  000113                MOV     #113,(R4)               ;ISSUE A RELEASE TO THE DRIVE
8866  037666  000440                        BR      SC                      ;CHECK FOR OTHER DRIVES
8867
8868
8869  037670  122762  000002  000024  WC.HK:  CMPB    #2,$CODE(R2)            ;LAST OPERATION WRITE DATA ?
8870  037676  001404                        BEQ     1$                      ;BR IF IT WAS
8871  037700  122762  000003  000024        CMPB    #3,$CODE(R2)            ;LAST OPERATION WRITE HEADER & DATA ?
8872  037706  001027                        BNE     2$                      ;BR IF NOT
8873  037710  004037  042656          1$:   JSR     R0,DRVQUE               ;PUT THE OPERATION IN THE QUEUE
8874  037714  000424                        BR      2$                      ;QUEUE IS FULL
8875  037716  005062  000016                CLR     16(R2)                  ;CLEAR 'DONE' BIT IN DPB
8876  037722  116262  000234  000027        MOVB    $RMCS1(R2),$PREVO(R2)   ;SAVE WRITE OPERATION CODE
8877  037730  016262  000012  000034        MOV     $CYL(R2),$PREVA+2(R2)   ;SAVE CYLINDER
8878  037736  016262  000010  000032        MOV     $SEC(R2),$PREVA(R2)     ;SAVE SECTOR AND TRACK ADDRESSES
8879  037744  142762  000002  000024        BICB    #2,$CODE(R2)            ;CHANGE WRITE TO CHECK
8880  037752  142762  000020  000002        BICB    #20,$COMND(R2)          ;CHANGE DRIVER CODE TO WRITE CHECK
8881  037760  152762  000010  000002        BISB    #10,$COMND(R2)          ;FINISH CHANGING CODE TO WRITE CHECK
8882  037766  000207                  2$:   RTS     PC                      ;EXIT
8883
8884                                  ;SPECIAL CONDITION ROUTINE
8885
8886  037770  116403  000016          SC:   MOVB    RMAS(R4),R3             ;READ "RMAS"
8887  037774  001012                        BNE     2$                      ;BRANCH IF ANY 'ATA' BITS SET
8888  037776  004037  041534                JSR     R0,RD.RM                ;READ CONTROL AND STATUS REGISTER
8889  040002  000000                        RMCS1
8890                                  ;       CIB
8891  040004  040020                        1$                              ;EXIT IF FAIL TO READ
8892  040006  106126                        ROLB    (SP)+                   ;IS "IE"=1?
8893  040010  100403                        BMI     1$                      ;YES, NO DRIVES TO CHECK
8894  040012  104001                        ERROR   1                       ;REPORT AN ILLEGAL INTERRUPT
8895  040014  004737  042214                JSR     PC,SET.IE               ;SET INTERRUPT ENABLE
8896  040020  000207                  1$:   RTS     PC                      ;RETURN
8897  040022  005046                  2$:   CLR     -(SP)                   ;PROCESS ALL DRIVES THAT HAVE
8898  040024  110316                        MOVB    R3,(SP)                 ;AN "ATA"=1
8899  040026  012703  000001                MOV     #1,R3
8900  040032  005001                        CLR     R1
8901  040034  030316                  SC3:  BIT     R3,(SP)                 ;ATA=1?
8902  040036  001005                        BNE     SC5                     ;YES--BRANCH
8903  040040  005201                  SC4:  INC     R1                      ;MOVE TO THE NEXT DRIVE
8904  040042  106303                        ASLB    R3
8905  040044  001373                        BNE     SC3                     ;BRANCH IF MORE TO CHECK?
8906  040046  005726                        TST     (SP)+                   ;CLEAN OFF THE STACK
8907  040050  000207                        RTS     PC                      ;RETURN TO USER
8908  040052  105761  034512          SC5:  TSTB    DPINT(R1)               ;INITIALIZING THE DRIVE ?
8909  040056  001402                        BEQ     1$                      ;BR IF NOT
8910  040060  000137  040764                JMP     SC13                    ;PROCESS THE DRIVE
8911  040064  105761  034522          1$:   TSTB    DPRQS(R1)               ;PORT REQUEST OUTSTANDING ?
8912  040070  001402                        BEQ     2$                      ;BR IF NOT
8913  040072  000137  040764                JMP     SC13                    ;START THE OUTSTANDING COMMAND
8914  040076  105761  034472          2$:   TSTB    DRVSTA(R1)              ;CHECK THE DRIVE STATUS
8915  040102  003025                        BGT     5$                      ;BRANCH IF ONLINE
```

```
8916  040104  105761  034540                  TSTB    ULDFLG(R1)          ;UNLOAD IN PROGRESS?
8917  040110  003422                          BLE     5$                  ;BRANCH IF NOT
8918  040112  004737  042732                  JSR     PC,GETREQ           ;GET DPB POINTER
8919  040116  004737  042076                  JSR     PC,SVRH70           ;SAVE THE RH70/RM03 REGISTERS
8920  040122  004737  040722                  JSR     PC,SC12             ;SAVE RMDS, RMER1, RMER2, AND RMMR2
8921                                                                      ;ALSO DO A DRIVE INIT (DRVINT)
8922  040126  105761  034472                  TSTB    DRVSTA(R1)          ;DID DRIVE COME ONLINE?
8923  040132  003416                          BLE     6$                  ;NO---BRANCH
8924  040134  032737  040000  034452          BIT     #BIT14,RMERRS       ;WAS THERE AN ERROR?
8925  040142  001002                          BNE     3$                  ;BR IF ERROR
8926  040144  000137  040612                  JMP     SC11                ;NO ERROR
8927  040150  013705  034454          3$:     MOV     RMERRS+2,R5         ;YES -- PICKUP RMER1 AND
8928  040154  000500                          BR      SC6A                ;GO PROCESS THE ERROR
8929  040156  105761  034462          5$:     TSTB    DRVACT(R1)          ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
8930  040162  001027                          BNE     SC6                 ;BR IF EITHER
8931  040164  004737  040722                  JSR     PC,SC12             ;SAVE RMDS, RMER1, RMER2, AND RMMR2
8932                                                                      ;ALSO DO A DRVINT
8933  040170  105761  034512          6$:     TSTB    DPINT(R1)           ;TRYING TO INIT THE DRIVE ?
8934  040174  001321                          BNE     SC4                 ;BR IF YES, CHECK ON MORE DRIVES
8935  040176  105761  034472                  TSTB    DRVSTA(R1)          ;CHECK ON DRIVE'S STATUS
8936  040202  100412                          BMI     7$                  ;BR IF UNSAFE
8937  040204  032737  020000  034456          BIT     #BIT13,RMERRS+4     ;ADDRESS PLUG CHANGED ?
8938  040212  001011                          BNE     8$                  ;BR IF YES
8939                                  ;       MOV     #113,-(SP)          ;RELEASE COMMAND
8940  040214  012746  000111                  MOV     #111,-(SP)          ;DRIVE CLEAR
8941  040220  004037  041710                  JSR     R0,WRT.RM           ;WRITE THE COMMAND INTO RMCS1
8942  040224  000000                          RMCS1                       ;REGISTER INDEX
8943  040226  040562                          SC8                         ;PARITY EXIT ADDRESS
8944  040230  011605          7$:     MOV     (SP),R5             ;PICKUP (RMAS) BEFORE THE ERROR CALL
8945  040232  104002                  ERROR   2                   ;REPORT THE UNEXPECTED ATTENTION
8946  040234  000701                  BR      SC4                 ;GO CHECK FOR MORE ATA'S
8947  040236                  8$:
8948  040236  104005                  ERROR   5                   ;REPORT THE ADDRESS PLUG CHANGE
8949  040240  000677                  BR      SC4                 ;CHECK FOR MORE DRIVES
8950  040242  006301          SC6:    ASL     R1                  ;SETUP TO ADDRESS WORDS
8951  040244  012761  177777  034564  MOV     #-1,TIMER(R1)       ;STOP THE TIMER
8952  040252  006201                  ASR     R1                  ;RESTORE THE DRIVE ADDRESS
8953  040254  004737  042732          JSR     PC,GETREQ           ;GET THE DPB POINTER FROM THE QUEUE
8954  040260  010164  000010          MOV     R1,RMCS2(R4)        ;SELECT DRIVE
8955  040264  000137  040612          JMP     SC11                ;PROCESS THE SEARCH
8956  040270  004037  041534          JSR     R0,RD.RM            ;READ THE RM03'S STATUS REG.
8957  040274  000012                  RMDS
8958  040276  040562                  SC8
8959  040300  011605                  MOV     (SP),R5             ;AND PUT IT IN R5
8960  040302  006126                  ROL     (SP)+               ;WAS THERE AN ERROR?
8961  040304  100407                  BMI     1$                  ;BR IF ERROR
8962  040306  105761  034462          TSTB    DRVACT(R1)          ;CHECK DRIVE'S STATE
8963  040312  003137                  BGT     SC11                ;BR IF DRIVE ACTIVE WITH ORDER
8964  040314  052762  100210  000016  BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
8965  040322  000470                  BR      SC7
8966  040324  004037  041534  1$:     JSR     R0,RD.RM            ;READ ERROR REGISTER #1
8967  040330  000014                  RMER1
8968  040332  040562                  SC8
8969  040334  012605                  MOV     (SP)+,R5            ;AND SAVE IT IN R5
8970  040336  004737  042076          JSR     PC,SVRH70           ;SAVE RH70/RM03 REGISTERS
8971  040342  012746  000111          MOV     #111,-(SP)          ;ISSUE A DRIVE CLEAR
```

```
8972  040346  004037  041710              JSR     R0,WRT.RM
8973  040352  000000                      RMCS1
8974  040354  040562                      SC8
8975  040356  006105              SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
8976  040360  100406                      BMI     1$              ;BRANCH IF YES
8977  040362  005702                      TST     R2              ;ANYTHING IN QUEUE ?
8978  040364  001447                      BEQ     SC7             ;BR IF NOT
8979  040366  052762  100240  000016      BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
8980  040374  000443                      BR      SC7
8981  040376  004037  041534      1$:     JSR     R0,RD.RM        ;READ DRIVE STATUS REG. #1
8982  040402  000012                      RMDS
8983  040404  040562                      SC8
8984  040406  011605                      MOV     (SP),R5         ;SAVE RMDS IN R5
8985  040410  006126                      ROL     (SP)+           ;"ERR"=1?
8986  040412  100011                      BPL     2$              ;BR IF NO--UNSAFE CLEARED
8987  040414  112761  177777  034472      MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
8988  040422  004737  042076              JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8989  040426  052762  110000  000016      BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
8990  040434  000423                      BR      SC7
8991  040436  032705  010000      2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
8992  040442  001015                      BNE     3$              ;BR IF YES
8993  040444  112761  177777  034462      MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
8994  040452  112761  000001  034472      MOVB    #1,DRVSTA(R1)   ;ONLINE
8995  040460  006301                      ASL     R1
8996  040462  012761  072460  034564      MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
8997  040470  006201                      ASR     R1
8998  040472  000137  040040              JMP     SC4
8999  040476  052762  100220  000016  3$: BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
9000  040504  105061  034462      SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
9001                              ;       JSR     PC,EMPTYQ       ;DUMP THE QUEUE
9002  040510  004737  042754              JSR     PC,POPQUE       ;REMOVE THE QUEUE
9003  040514  105761  034540              TSTB    ULDFLG(R1)      ;UNLOAD IN RMOGRESS OR QUEUE?
9004  040520  003002                      BGT     1$              ;BR IF NOT
9005  040522  105061  034540              CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
9006  040526  116164  034606  000016  1$: MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
9007  040534  105761  034472              TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
9008  040540  100406                      BMI     2$              ;BR IF IT IS
9009                              ;       MOV     #113,-(SP)      ;RELEASE COMMAND
9010  040542  012746  000111              MOV     #111,-(SP)      ;DRIVE CLEAR COMMAND
9011  040546  004037  041710              JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RPCS1
9012  040552  000000                      RMCS1                   ;REGISTER INDEX
9013  040554  040562                      SC8                     ;PARITY EXIT ADDRESS
9014  040556  000137  040040      2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
9015  040562  105761  034462      SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
9016  040566  001405                      BEQ     1$              ;YES--BRANCH
9017  040570  004737  042732              JSR     PC,GETREQ       ;GET DPB POINTER
9018  040574  004737  036736              JSR     PC,CI7          ;PROCESS THE PARITY ERROR
9019  040600  000402                      BR      2$              ;CONTINUE
9020  040602                      1$:
9021                              ;       JSR     PC,CI7          ;PROCESS THE PARITY ERROR
9022  040602  004737  036760              JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
9023  040606  000137  040040      2$:     JMP     SC4             ;CHECK MORE DRIVES
9024  040612  105761  034540      SC11:   TSTB    ULDFLG(R1)      ;"UNLOAD IN PROGRESS"?
9025  040616  003402                      BLE     1$              ;BRANCH IF NO
9026  040620  105061  034540              CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
9027  040624  105061  034462      1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
```

```
 9028  040630  136137  034606  034534          BITB    ATABIT(R1),SRCHWT  ;DOING A SEARCH OPERATION FOR
 9029                                                                       ;AN I/O COMMAND?
 9030  040636  001012                          BNE     2$                 ;BRANCH IF YES
 9031  040640  004737  042754                  JSR     PC,POPQUE          ;REMOVE REQUEST FROM QUEUE
 9032  040644  052762  000200  000016          BIS     #BIT07,16(R2)      ;SET "DONE" BIT
 9033  040652  005737  034560                  TST     SAVEFG             ;SAVE THE REGISTERS?
 9034  040656  100002                          BPL     2$                 ;BRANCH IF NO
 9035  040660  004737  042076                  JSR     PC,SVRH70          ;YES--SAVE ALL OF THE RH70/RM03 REG'S
 9036  040664  116164  034606  000016  2$:     MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
 9037  040672  146137  034606  034534          BICB    ATABIT(R1),SRCHWT      ;CLEAR IMPLIED SEEK SET
 9038  040700  006301                          ASL     R1                 ;WORD INDEX
 9039  040702  012761  177777  034564          MOV     #-1,TIMER(R1)      ;STOP CLOCK
 9040  040710  006201                          ASR     R1                 ;RESTORE R1
 9041  040712  004737  035656                  JSR     PC,OPT             ;START A REQUEST
 9042  040716  000137  040040                  JMP     SC4                ;CHECK FOR MORE DRIVES
 9043  040722  010164  000010          SC12:   MOV     R1,RMCS2(R4)       ;SELECT DRIVE
 9044  040726  016437  000012  034452          MOV     RMDS(R4),RMERRS    ;SAVE THE FOUR REGISTERS THAT
 9045  040734  016437  000014  034454          MOV     RMER1(R4),RMERRS+2       ;WILL TELL US SOMETHING
 9046  040742  016437  000042  034456          MOV     RMER2(R4),RMERRS+4
 9047  040750  016437  000040  034460          MOV     RMMR2(R4),RMERRS+6
 9048                                  ;       JSR     R0,DRVINT          ;INIT. THE STATE OF THE DRIVE
 9049                                  ;       BR      1$                 ;TAKE ERROR EXIT
 9050  040756  000207                          RTS     PC                 ;RETURN
 9051  040760  005726                  1$:     TST     (SP)+              ;POP PC OFF OF THE STACK
 9052  040762  000677                          BR      SC8                ;PROCESS THE PARITY ERROR
 9053  040764  006301                  SC13:   ASL     R1                 ;SETUP TO ADDRESS WORDS
 9054  040766  012761  177777  034564          MOV     #-1,TIMER(R1)      ;STOP THE TIMER
 9055  040774  006201                          ASR     R1                 ;
 9056  040776  010164  000010                  MOV     R1,RMCS2(R4)       ;SELECT THE DRIVE
 9057  041002  116164  034606  000016          MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR THE ATTENTION BIT
 9058  041010  105761  034512          1$:     TSTB    DPINT(R1)          ;INITIALIZING THE DRIVE ?
 9059  041014  001424                          BEQ     2$                 ;BR IF NOT
 9060  041016  105061  034512                  CLRB    DPINT(R1)          ;CLEAR THE INIT INDICATOR
 9061  041022  004037  035050                  JSR     R0,DRVINT          ;GO INIT THE DRIVE
 9062  041026  000240                          NOP                        ;DUMMY PARITY ERROR RETURN
 9063  041030  105761  034472                  TSTB    DRVSTA(R1)         ;DRIVE ONLINE ?
 9064  041034  003014                          BGT     2$                 ;BR IF YES -- START ORDER
 9065  041036  005702                          TST     R2                 ;QUEUE ENTRY FOR THE DRIVE
 9066  041040  001426                          BEQ     3$                 ;BR IF NOT
 9067  041042  004737  042732                  JSR     PC,GETREQ          ;GET DPB ADDRESS
 9068  041046  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM USER THAT DRIVE OFFLINE
 9069  041054  004737  042076                  JSR     PC,SVRH70          ;SAVE THE REGISTERS
 9070                                  ;       JSR     PC,EMPTYQ          ;EMPTY THE REQUEST QUEUE
 9071  041060  004737  042754                  JSR     PC,POPQUE          ;REMOVE THE QUEUE
 9072  041064  000414                          BR      3$
 9073  041066  032764  004000  000000  2$:     BIT     #BIT11,RMCS1(R4)         ;DVA SET ?
 9074  041074  001006                          BNE     4$                 ;SET THEN CALL OPT
 9075  041076  006301                          ASL     R1
 9076  041100  012761  060000  034564          MOV     #60000,TIMER(R1)
 9077  041106  006201                          ASR     R1
 9078  041110  000402                          BR      3$
 9079  041112  004737  035656          4$:     JSR     PC,OPT             ;START THE PENDING REQUEST
 9080  041116  000137  040040          3$:     JMP     SC4                ;PROCESS OTHER DRIVES
 9081
 9082                                  ;/RM03 TIMER ROUTINE
 9083                                  ;CALL
```

```
9084                                        ;       MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
9085                                        ;       JSR     PC,RPTMR        ;CALL RM03 TIME ROUTINE
9086
9087  041122  005737  034536                RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
9088  041126  001027                                BNE     4$              ;IF NON ZERO EXIT
9089  041130  112737  000001  034537                MOVB    #1,ACTSTR       ;SET "ACTSTR"
9090  041136  104412                                SAVREG                  ;SAVE R0 - R5
9091  041140  005001                                CLR     R1              ;START WITH DRIVE 0
9092  041142  005003                                CLR     R3
9093  041144  005763  034564                1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
9094  041150  002406                                BLT     2$              ;BRANCH IF NO
9095  041152  166663  000002  034564                SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
9096  041160  003002                                BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
9097  041162  004737  041212                        JSR     PC,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
9098  041166  005201                        2$:     INC     R1              ;MOVE TO NEXT DRIVE
9099  041170  005723                                TST     (R3)+
9100  041172  022701  000010                        CMP     #8.,R1          ;OUT OF DRIVES?
9101  041176  003362                                BGT     1$              ;BRANCH IF NO
9102  041200  104413                        3$:     RESREG                  ;RESTORE R0 - R5
9103  041202  105037  034537                        CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
9104  041206  012616                        4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
9105  041210  000207                                RTS     PC              ;RETURN
9106
9107                                        ;SOFTWARE TIMEOUT ROUTINE
9108                                        ;
9109                                        ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
9110                                        ;       OR GREATER
9111                                        ;
9112                                        ;CALL:  STO
9113                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
9114                                        ;       JSR     PC,STO          ;CALL
9115                                        ;       RETURN
9116
9117  041212  010146                        STO:    MOV     R1,-(SP)        ;SAVE R1
9118  041214  010246                                MOV     R2,-(SP)        ;SAVE R2
9119  041216  010346                                MOV     R3,-(SP)        ;SAVE R3
9120  041220  010446                                MOV     R4,-(SP)        ;SAVE R4
9121  041222  013704  034620                        MOV     RMADR,R4        ;GET ADDRESS OF "RMCS1"
9122  041226  010164  000010                        MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
9123  041232  004037  041534                        JSR     R0,RD.RM        ;READ "DRIVE STATUS REG"
9124  041236  000012                                RMDS
9125                                        ;       STO5
9126  041240  041522                                STO9
9127  041242  105726                                TSTB    (SP)+           ;IS "DRY"=1?
9128  041244  100436                                BMI     STO2            ;BR IF YES
9129  041246  105761  034512                STO1:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
9130  041252  001033                                BNE     STO2            ;BR IF YES
9131  041254  105761  034522                        TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
9132  041260  001030                                BNE     STO2            ;BR IF YES
9133  041262  013702  034532                        MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
9134  041266  020137  034604                        CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
9135  041272  001404                                BEQ     1$              ;BRANCH IF YES
9136  041274  000137  041522                        JMP     STO9            ;IF NOT DON'T BOTHER DRIVES
9137  041300  004737  042732                        JSR     PC,GETREQ       ;GET DPB ADDRESS
9138  041304  052762  101000  000016        1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
9139  041312  004737  042076                        JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
```

```
9140                                        ;       MOV     #BIT05,RMCS2(R4) ;"INIT" THE MASS BUS
9141  041316  105061  034462                        CLRB    DRVACT(R1)      ;DRIVE IS IDLE
9142  041322  105061  034540                        CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
9143  041326  005037  034532                        CLR     TRNSWT          ;CLEAR DPB ADDRESS
9144  041332  012737  177777  034604                MOV     #-1,DTUW        ;CLEAR THE TRANSFER DRIVE #
9145  041340  000470                                BR      ST09            ;DON'T BOTHER OTHER DRIVES
9146  041342  116405  000016          ST02:         MOVB    RMAS(R4),R5     ;READ ATTENTION REG
9147  041346  136105  034606                        BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
9148  041352  001007                                BNE     ST03            ;YES--BRANCH
9149  041354  105761  034512                        TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
9150  041360  001021                                BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
9151  041362  105761  034522                        TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
9152  041366  001035                                BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
9153  041370  000454                                BR      ST09            ;OTHER WISE EXIT
9154  041372  105761  034512          ST03:         TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
9155  041376  001003                                BNE     1$              ;BR IF INIT PENDING
9156  041400  105761  034522                        TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
9157  041404  001446                                BEQ     ST09            ;BR IF NOT
9158  041406  012763  177777  034564  1$:           MOV     #-1,TIMER(R3)   ;STOP THE TIMER
9159  041414  000442                                BR      ST09            ;EXIT
9160  041416  004737  037036          ST05:         JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
9161  041422  000437                                BR      ST09
9162  041424  105061  034512          ST06:         CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
9163  041430  105061  034472                        CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
9164  041434  012763  177777  034564                MOV     #-1,TIMER(R3)   ;STOP THE TIMER
9165  041442  004737  042732                        JSR     PC,GETREQ       ;GET THE DPB ADDRESS
9166  041446  005702                                TST     R2              ;REQUEST IN QUEUE ?
9167  041450  001424                                BEQ     ST09            ;BR IF NOT
9168  041452  052762  140000  000016                BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
9169  041460  000414                                BR      ST08            ;FINISH
9170  041462  012763  177777  034564  ST07:         MOV     #-1,TIMER(R3)   ;STOP THE TIMER
9171  041470  105061  034522                        CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
9172  041474  004737  042732                        JSR     PC,GETREQ       ;GET DPB ADDRESS
9173  041500  005702                                TST     R2              ;QUEUE ENTRY FOR DRIVE ?
9174  041502  001407                                BEQ     ST09            ;BR IF NONE
9175  041504  012762  100004  000016                MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
9176  041512  004737  042636          ST08:         JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
9177  041516  004737  042076                        JSR     PC,SVRH70       ;SAVE THE REGISTERS
9178  041522  012604                    ST09:       MOV     (SP)+,R4        ;RESTORE R4
9179  041524  012603                                MOV     (SP)+,R3        ;RESTORE R3
9180  041526  012602                                MOV     (SP)+,R2        ;RESTORE R2
9181  041530  012601                                MOV     (SP)+,R1        ;RESTORE R1
9182  041532  000207                                RTS     PC              ;RETURN
9183
9184                                        ;ROUTINE TO READ A RH70/RM03 REGISTER
9185                                        ;
9186                                        ;CALL
9187                                        ;       JSR     R0,RD.RM        ;GO READ A REGISTER
9188                                        ;       INDEX                   ;REG. INDEX FROM BASE
9189                                        ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
9190                                        ;                               ;AT THIS ADDRESS
9191                                        ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
9192                                        ;
9193  041534  013737  034616  041676  RD.RM:       MOV     MCPEMX,RD.RM2   ;MAX. RETRYS ALLOWED
9194  041542  011646                              MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
9195  041544  013737  034620  041560              MOV     RMADR,RD.ADR    ;FORM THE DESIRED ADDRESS
```

```
 9196  041552  062037  041560                ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
 9197  041556  013727                RD.RM1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RM03
 9198  041560  000000                RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
 9199  041562  000000                RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
 9200  041564  013766  041562  000002        MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
 9201  041572  013746  034620                MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
 9202  041576  062716  000010                ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
 9203  041602  032736  010000                BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
 9204  041606  001035                        BNE     RD.RM3          ;BR IF DRIVE NON-EXISTENT
 9205  041610  017746  173004                MOV     @RMADR,-(SP)    ;READ RMCS1
 9206  041614  032716  020000                BIT     #BIT13,(SP)     ;DID MCPE SET?
 9207  041620  001002                        BNE     1$              ;BRANCH IF YES
 9208  041622  022620                        CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
 9209  041624  000430                        BR      RD.RM4          ;EXIT
 9210  041626                        1$:
 9211  041626  104003                        ERROR   3               ;REPORT "MCPE" ERROR
 9212  041630  005737  034604                TST     DTUW            ;DATA TRANSFER UNDERWAY?
 9213  041634  100405                        BMI     2$              ;NO--BRANCH
 9214  041636  032716  040000                BIT     #BIT14,(SP)     ;NO--"TRE"=1?
 9215  041642  001402                        BEQ     2$              ;NO--BRANCH
 9216  041644  005726                        TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
 9217  041646  000415                        BR      RD.RM3          ;TAKE THE FATAL ERROR EXIT
 9218  041650  052716  040000        2$:     BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
 9219  041654  000316                        SWAB    (SP)            ;POSITION BEFORE WRITING
 9220  041656  013737  034620  041672        MOV     RMADR,3$        ;FORM ADDRESS OF HIGH BYTE
 9221  041664  005237  041672                INC     3$
 9222  041670  112637                        MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RMCS1
 9223  041672  000000                3$:     .WORD   0               ;ADDRESS STORAGE
 9224  041674  005327                        DEC     (PC)+           ;EXCEEDED MAX. RETRYS
 9225  041676  000003                RD.RM2: .WORD   3
 9226  041700  002326                        BGE     RD.RM1          ;BRANCH IF NO
 9227  041702  011000                RD.RM3: MOV     (R0),R0         ;FATAL ERROR EXIT
 9228  041704  012616                        MOV     (SP)+,(SP)
 9229  041706  000200                RD.RM4: RTS     R0
 9230
 9231                                ;ROUTINE TO WRITE A REGISTER
 9232                                ;
 9233                                ;CALL
 9234                                ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
 9235                                ;       JSR     R0,WRT.RM       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
 9236                                ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
 9237                                ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
 9238                                ;       RETURN                  ;ERROR FREE RETURN
 9239
 9240  041710  013737  034616  042062  WRT.RM: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
 9241  041716  016637  000002  041776          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
 9242  041724  012616                        MOV     (SP)+,(SP)      ;ADJUST THE STACK
 9243  041726  012037  042000                MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
 9244  041732  001015                        BNE     1$              ;BRANCH IF NOT RMCS1
 9245  041734  122737  000150  041776        CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
 9246  041742  002411                        BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
 9247  041744  004037  041534                JSR     R0,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
 9248  041750  000000                        RMCS1                   ;THE COMMAND BEFORE SENDING IT TO
 9249  041752  042066                        WRT.R3                  ;THE RH70/RM03
 9250  041754  000316                        SWAB    (SP)
 9251  041756  042716  177770                BIC     #^C7,(SP)
```

```
9252  041762  112637  041777                 MOVB    (SP)+,WRT.WD+1
9253  041766  063737  034620  042000  1$:    ADD     RMADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
9254  041774  012737                 WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
9255  041776  000000                 WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
9256  042000  000000                 WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
9257  042002  013746  034620                 MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
9258  042006  062716  000010                 ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
9259  042012  032736  010000                 BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
9260  042016  001023                 BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
9261  042020  004037  041534                 JSR     R0,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
9262  042024  000014                 RMER1
9263  042026  042066                 WRT.R3
9264  042030  032726  000010                 BIT     #BIT03,(SP)+
9265  042034  001416                 BEQ     WRT.R4          ;BRANCH IF "PAR=0"
9266  042036  016037  177776  042050        MOV     -2(R0),1$       ;PICKUP THE INDEX
9267  042044  004037  041534                 JSR     R0,RD.RM        ;READ THE REG.
9268  042050  000000          1$:    .WORD   0               ;REG. INDEX
9269  042052  042066                 WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
9270  042054  104004                 ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
9271  042056  005726                 TST     (SP)+           ;CLEAR OFF THE STACK
9272  042060  005327                 DEC     (PC)+           ;DECREMENT THE ERROR COUNT
9273  042062  000003          WRT.R2: .WORD   3               ;RETRY COUNTER
9274  042064  002343                 BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
9275  042066  011000          WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
9276  042070  000401                 BR      WRT.R5          ;EXIT
9277  042072  005720          WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
9278  042074  000200          WRT.R5: RTS     R0
9279
9280                          ;ROUTINE TO SAVE THE RH70/RP04/5/RM03 REGISTERS AS PER DPB+14
9281                          ;
9282                          ;CALL
9283                          ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
9284                          ;       JSR     PC,SVRH70       ;SAVE THE DRIVES REG'S
9285
9286  042076  104412          SVRH70: SAVREG                  ;SAVE R0 - R5
9287  042100  005702                 TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
9288  042102  001442                 BEQ     6$              ;BR IF NONE
9289  042104  013704  034620         MOV     RMADR,R4
9290  042110  111264  000010         MOVB    (R2),RMCS2(R4)  ;SELECT DRIVE
9291  042114  016203  000014         MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
9292  042120  001433                 BEQ     6$              ;EXIT IF NO ADDRESS
9293  042122  005037  042156         CLR     3$              ;COUNTER & POINTER
9294  042126  023727  042156  000022  1$:    CMP     3$,#RMDB        ;REACHED THE BUFFER REGISTER ?
9295  042134  001006                 BNE     2$              ;BR IF NOT
9296  042136  032764  000200  000010         BIT     #BIT07,RMCS2(R4)  ;'OR' SET ?
9297  042144  001002                 BNE     2$              ;BR IF SET
9298  042146  005023                 CLR     (R3)+           ;STORE RMDB AS ZEROES
9299  042150  000405                 BR      4$              ;CONTINUE
9300  042152  004037  041534          2$:    JSR     R0,RD.RM        ;READ THE SELECTED REGISTER
9301  042156  000000          3$:    .WORD   0               ;REGISTER INDEX
9302  042160  042204                 5$                      ;ERROR RETURN ADDRESS
9303  042162  012623                 MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
9304  042164  023727  042156  000046  4$:    CMP     3$,#RMEC2       ;REACHED THE END ?
9305  042172  001406                 BEQ     6$              ;BR IF YES
9306  042174  062737  000002  042156         ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
9307  042202  000751                 BR      1$              ;CONTINUE READING THE REGISTERS
```

```
9308  042204  004737  036736          5$:     JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
9309  042210  104413                  6$:     RESREG                  ;RESTORE R0 - R5
9310  042212  000207                          RTS     PC              ;RETURN
9311
9312                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
9313                                  ;CALL
9314                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
9315                                  ;       JSR     PC,SET.IE       ;SET "IE"
9316                                  ;       RETURN
9317
9318  042214  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
9319  042216  013704  034620                  MOV     RMADR,R4        ;PICKUP ADDRESS OF RMCS1
9320  042222  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
9321  042226  011446                          MOV     (R4),-(SP)      ;READ RMCS1
9322  042230  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
9323  042234  000316                          SWAB    (SP)            ;ADJUST FOR DATO
9324  042236  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
9325  042242  032764  010000  000010          BIT     #BIT12,RMCS2(R4) ;IS "NED"=1?
9326  042250  001002                          BNE     1$              ;YES--CLEAR "TRE"
9327  042252  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
9328  042254  000402                          BR      2$
9329  042256  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
9330  042262  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
9331  042264  000207                          RTS     PC              ;RETURN TO CALLER
9332
9333                                  ;QUEUE COUNT
9334  042266      000                 QCNT:   .BYTE   0               ;DRIVE 0
9335  042267      000                         .BYTE   0               ;DRIVE 1
9336  042270      000                         .BYTE   0               ;DRIVE 2
9337  042271      000                         .BYTE   0               ;DRIVE 3
9338  042272      000                         .BYTE   0               ;DRIVE 4
9339  042273      000                         .BYTE   0               ;DRIVE 5
9340  042274      000                         .BYTE   0               ;DRIVE 6
9341  042275      000                         .BYTE   0               ;DRIVE 7
9342
9343                                  ;QUEUE INPUT POINTERS
9344
9345  042276  042360                  QINPT:  .WORD   QDRV0            ;DRIVE 0
9346  042300  042400                          .WORD   QDRV1           ;DRIVE 1
9347  042302  042420                          .WORD   QDRV2           ;DRIVE 2
9348  042304  042440                          .WORD   QDRV3           ;DRIVE 3
9349  042306  042460                          .WORD   QDRV4           ;DRIVE 4
9350  042310  042500                          .WORD   QDRV5           ;DRIVE 5
9351  042312  042520                          .WORD   QDRV6           ;DRIVE 6
9352  042314  042540                          .WORD   QDRV7           ;DRIVE 7
9353
9354                                  ;QUEUE OUTPUT POINTERS
9355
9356  042316  042360                  QOUTPT: .WORD   QDRV0            ;DRIVE 0
9357  042320  042400                          .WORD   QDRV1           ;DRIVE 1
9358  042322  042420                          .WORD   QDRV2           ;DRIVE 2
9359  042324  042440                          .WORD   QDRV3           ;DRIVE 3
9360  042326  042460                          .WORD   QDRV4           ;DRIVE 4
9361  042330  042500                          .WORD   QDRV5           ;DRIVE 5
9362  042332  042520                          .WORD   QDRV6           ;DRIVE 6
9363  042334  042540                          .WORD   QDRV7           ;DRIVE 7
```

```
 9364
 9365  042336  042360                  QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
 9366  042340  042400                  QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 9367  042342  042420                          .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
 9368  042344  042440                          .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
 9369  042346  042460                          .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
 9370  042350  042500                          .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
 9371  042352  042520                          .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
 9372  042354  042540                          .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
 9373  042356  042560                          .WORD   QTERM           ;STOP DRIVE 7
 9374
 9375                                  ;DRIVE REQUEST QUEUES
 9376
 9377  042360  000010                  QDRV0:  .BLKW   10
 9378  042400  000010                  QDRV1:  .BLKW   10
 9379  042420  000010                  QDRV2:  .BLKW   10
 9380  042440  000010                  QDRV3:  .BLKW   10
 9381  042460  000010                  QDRV4:  .BLKW   10
 9382  042500  000010                  QDRV5:  .BLKW   10
 9383  042520  000010                  QDRV6:  .BLKW   10
 9384  042540  000010                  QDRV7:  .BLKW   10
 9385          042560                  QTERM=.
 9386
 9387                                  ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
 9388                                  ;
 9389                                  ;CALL
 9390                                  ;       JSR     PC,CLRQUE
 9391
 9392  042560  104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
 9393  042562  012702  042266                  MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
 9394  042566  005022                          CLR     (R2)+           ;DRIVES 0 & 1
 9395  042570  005022                          CLR     (R2)+           ;DRIVES 2 & 3
 9396  042572  005022                          CLR     (R2)+           ;DRIVES 4 & 5
 9397  042574  005022                          CLR     (R2)+           ;DRIVES 6 & 7
 9398  042576  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING
 9399  042602  012701  042336                  MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
 9400  042606  012122                  1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
 9401  042610  005303                          DEC     R3
 9402  042612  001375                          BNE     1$
 9403  042614  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
 9404  042620  012701  042336                  MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
 9405  042624  012122                  2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
 9406  042626  005303                          DEC     R3
 9407  042630  001375                          BNE     2$
 9408  042632  104413                          RESREG                  ;RESTORE R0 - R5
 9409  042634  000207                          RTS     PC
 9410
 9411                                  ;EMPTY THE QUEUE SPECIFIED BY R1
 9412                                  ;
 9413                                  ;CALL
 9414                                  ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
 9415                                  ;       JSR     PC,EMPTYQ
 9416
 9417  042636  105061  042266          EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
 9418  042642  006301                          ASL     R1
 9419  042644  016161  042276  042316          MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
```

```
9420  042652  006201                          ASR     R1
9421  042654  000207                          RTS     PC
9422
9423                                  ;ROUTINE TO PUT A REQUEST IN QUEUE
9424                                  ;
9425                                  ;CALL
9426                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
9427                                  ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
9428                                  ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
9429                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
9430                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
9431
9432  042656  122761  000010  042266  DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
9433  042664  001421                          BEQ     2$              ;BR IF YES-TAKE RETURN1
9434  042666  105261  042266                  INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
9435  042672  006301                          ASL     R1
9436  042674  010271  042276                  MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
9437  042700  062761  000002  042276          ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
9438  042706  026161  042276  042340          CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
9439  042714  001003                          BNE     1$              ;BRANCH IF NO
9440  042716  016161  042336  042276          MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
9441  042724  006201                  1$:     ASR     R1
9442  042726  005720                          TST     (R0)+           ;TAKE RETURN 2
9443  042730  000200                  2$:     RTS     R0              ;RETURN TO USER
9444
9445                                  ;ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUEUE
9446                                  ;
9447                                  ;CALL
9448                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
9449                                  ;       JSR     PC,GETREQ       ;GO GET THE REQUEST
9450                                  ;       RETURN                  ;R2="DPB" ADDRESS OF THE REQUEST
9451                                  ;                               ;R2=0 IF NO REQUEST IN QUEUE
9452
9453  042732  005002                  GETREQ: CLR     R2
9454  042734  105761  042266                  TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
9455  042740  001404                          BEQ     2$              ;NO---BRANCH
9456  042742  006301                  1$:     ASL     R1
9457  042744  017102  042316                  MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
9458  042750  006201                          ASR     R1
9459  042752  000207                  2$:     RTS     PC              ;RETURN TO USER
9460
9461                                  ;ROUTINE TO "POP" THE REQUEST FROM QUEUE
9462                                  ;
9463                                  ;CALL
9464                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
9465                                  ;       JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
9466                                  ;       RETURN                  ;R2=ADDRESS OF DPB REMOVED
9467
9468  042754  105361  042266          POPQUE: DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
9469  042760  006301                          ASL     R1
9470  042762  017102  042316                  MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
9471  042766  005071  042316                  CLR     @QOUTPT(R1)     ;REMOVE DPB ADDRESS FROM THE QUEUE
9472  042772  062761  000002  042316          ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
9473  043000  026161  042316  042340          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
9474  043006  001003                          BNE     1$              ;NO--BRANCH TO EXIT
9475  043010  016161  042336  042316          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
```

```
9476  043016  006201                  1$:     ASR     R1
9477  043020  000207                          RTS     PC              ;RETURN TO USER
9478
9479
9480                                  ;;*****************************************************************
9481
9482                                  .SBTTL  DATA, CONTROL, & STATUS BLOCKS
9483
9484                                  ;;*****************************************************************
9485
9486                                  ;BLOCK LOCATION EQUATE STATEMENTS
9487
9488          000001                  $FMT    =       1               ;FMT,HCI,ECI OR OFFSET CODE
9489          000002                  $COMND  =       $FMT+1          ;OPERATION CODE
9490          000003                  $PSEL   =       $FMT+2          ;PORT SELECT & BITS A16, A17
9491          000004                  $WRDM   =       $FMT+3          ;WORD COUNT (2'S COMP)
9492          000006                  $BUF    =       $FMT+5          ;BUFFER ADDR OR REGISTER TABLE POINTER
9493          000010                  $SEC    =       $FMT+7          ;SECTOR ADDRESS OR 1ST REG ADDR
9494          000011                  $TRK    =       $FMT+10         ;TRACK ADDRESS OF LAST REG ADDR
9495          000012                  $CYL    =       $FMT+11         ;CYLINDER ADDR
9496          000014                  $REG    =       $FMT+13         ;REGISTER STORAGE (IF ERROR)
9497          000016                  $STATUS =       $FMT+15         ;STATUS WORD (SET BY DRIVER)
9498
9499                                  ;DRIVE'S HISTORY AND CURRENT INDICATOR STORAGE EQUATES
9500
9501          000020                  $WRDL   =       $FMT+17         ;WORD COUNT (NOT 2'S COMP)
9502          000022                  $SSEC   =       $WRDL+2         ;SECTOR SIZE FOR CURRENT OPERATION
9503          000024                  $CODE   =       $WRDL+4         ;PRESENT COMMAND SELECTION CODE
9504          000026                  $PACK   =       $WRDL+6         ;WRITE DATA PACK INDICATOR
9505          000027                  $PREVO  =       $WRDL+7         ;PREVIOUS COMMAND SELECTION CODE
9506          000030                  $PATTC  =       $WRDL+10        ;PATTERN CODE
9507          000032                  $PREVA  =       $WRDL+12        ;PREVIOUS ADDRESS - TRACK, SECTOR, CYLINDER
9508          000036                  $OPERC  =       $WRDL+16        ;OPERATION COUNT
9509          000042                  $POSIT  =       $WRDL+22        ;SEEK COUNT
9510          000046                  $TRANS  =       $WRDL+26        ;TOTAL BITS XFERED COUNT (R & W)
9511          000052                  $READ   =       $WRDL+32        ;TOTAL BITS READ COUNT
9512          000056                  $TOTAL  =       $WRDL+36        ;TOTAL ERRORS (ALL TYPES) COUNT
9513          000060                  $SOFT   =       $WRDL+40        ;'SOFT' ERROR COUNT
9514          000062                  $HARD   =       $WRDL+42        ;'HARD' ERROR COUNT
9515          000064                  $SKI    =       $WRDL+44        ;'SKI' OR 'OCYL' ERROR COUNT
9516          000066                  $MISPO  =       $WRDL+46        ;PROG DETECTED MISPOSITIONING ERROR S COUNT
9517          000070                  $PASSC  =       $WRDL+50        ;PASS COUNTER
9518          000072                  $FAIR   =       $WRDL+52        ;OPERATION QUEUE 'FAIRNESS' COUNT
9519
9520                                  ;INDEX EQUATES TO THE NEXT OPERATION PARAMETERS
9521
9522          000074                  $NCODE  =       $WRDL+54        ;NEXT OPERATION CODE
9523          000075                  $NPATC  =       $NCODE+1        ;NEXT PATTERN
9524          000076                  $NSEC   =       $NCODE+2        ;NEXT SECTOR
9525          000077                  $NTRK   =       $NCODE+3        ;NEXT TRACK
9526          000100                  $NCYL   =       $NCODE+4        ;NEXT CYLINDER
9527          000102                  $NWRDL  =       $NCODE+6        ;NEXT BUFFER SIZE
9528          000104                  $NEXT   =       $NCODE+10       ;PARAMETER SELECTION INDICATOR
9529
9530                                  ;INDEX EQUATES FOR MAXIMUM/MINIMUM ADDRESSES
9531
```

```
                                ;MAXIMUM CYLINDER ADDRESS
                                ;MINIMUM CYLINDER ADDRESS
                                ;MAXIMUM TRACK ADDRESS
                                ;MINIMUM TRACK ADDRESS
                                ;MAXIMUM SECTOR ADDRESS
                                ;MINIMUM SECTOR ADDRESS
                                ;FIRST OPERATION INDICATOR

                                ;BAD SECTOR/TRACK ADDRESS STORAGE AREA INDEX EQUATE

                                ;BAD SECTOR STORAGE TABLE

                                ;DRIVE ID AREA INDEX EQUATE

                                ;DRIVE ID

                                ;RH11/RM03 REGISTER EQUATES

                                ;RM03 REGISTER STORAGE

                                ;BLOCK FOR DRIVE 0

                                ;DRIVE NUMBER

                                ;BLOCK FOR DRIVE 1

                                ;DRIVE NUMBER
```

```
9588                                    ;BLOCK FOR DRIVE 2
9589
9590  043632    002     000             DRIVE2: .BYTE   2,0             ;DRIVE NUMBER
9591  043634  000005                            .BLKW   5
9592  043646  044066                            .WORD   .+$RMCS1-$REG
9593  043650  000266                            .BLKB   $RMEC2-$REG
9594
9595
9596                                    ;BLOCK FOR DRIVE 3
9597
9598  044136    003     000             DRIVE3: .BYTE   3,0             ;DRIVE NUMBER
9599  044140  000005                            .BLKW   5
9600  044152  044372                            .WORD   .+$RMCS1-$REG
9601  044154  000266                            .BLKB   $RMEC2-$REG
9602
9603
9604                                    ;BLOCK FOR DRIVE 4
9605
9606  044442    004     000             DRIVE4: .BYTE   4,0             ;DRIVE NUMBER
9607  044444  000005                            .BLKW   5
9608  044456  044676                            .WORD   .+$RMCS1-$REG
9609  044460  000266                            .BLKB   $RMEC2-$REG
9610
9611
9612                                    ;BLOCK FOR DRIVE 5
9613
9614  044746    005     000             DRIVE5: .BYTE   5,0             ;DRIVE NUMBER
9615  044750  000005                            .BLKW   5
9616  044762  045202                            .WORD   .+$RMCS1-$REG
9617  044764  000266                            .BLKB   $RMEC2-$REG
9618
9619
9620                                    ;BLOCK FOR DRIVE 6
9621
9622  045252    006     000             DRIVE6: .BYTE   6,0             ;DRIVE NUMBER
9623  045254  000005                            .BLKW   5
9624  045266  045506                            .WORD   .+$RMCS1-$REG
9625  045270  000266                            .BLKB   $RMEC2-$REG
9626
9627
9628                                    ;BLOCK FOR DRIVE 7
9629
9630  045556    007     000             DRIVE7: .BYTE   7,0             ;DRIVE NUMBER
9631  045560  000005                            .BLKW   5
9632  045572  046012                            .WORD   .+$RMCS1-$REG
9633  045574  000266                            .BLKB   $RMEC2-$REG
9634
9635
9636                                    ;GENERAL PURPOSE DPB - USED BY 'READHD', 'RECALT', 'OFFSET',&'RTNCTR'
9637
9638  046062  000000  000000  177776  GENDPB: .WORD   0,0,-2,CYLDER
9639  046070  056512
9640  046072  000000  000000  046102          .WORD   0,0,GENREG,0
9641  046100  000000
9642  046102  000024                  GENREG: .BLKW   24              ;REGISTER STORAGE IF ERROR
9643
```

```
9644                            ;;*****************************************************************
9645
9646                            .SBTTL  ERROR MESSAGES
9647
9648                            ;;*****************************************************************
9649
9650                            .NLIST  BEX
046152 044122 030067 030450 EM1:    .ASCIZ  /RH70(11) INTERRUPT OCCURRED (RMAS = 0)/
046221    125 042516 050130 EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
046257    115 051501 041123 EM3:    .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
046315    115 051501 041123 EM4:    .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)/
046352 042101 051104 051505 EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
046406 044122 030067 030450 EM6:    .ASCIZ  /RH70(11) DIDN'T RESPOND TO ADDRESSING/
046454 047125 047503 051122 EM10:   .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR/
046517    106 052101 046101 EM11:   .ASCIZ  /FATAL MASSBUS PARITY ERROR/
046552 042520 051522 051511 EM12:   .ASCIZ  /PERSISTENT DEVICE UNSAFE/
046603    117 042520 040522 EM13:   .ASCIZ  /OPERATION NOT COMPLETED WITHIN TIME LIMIT/
046655    104 044522 042526 EM14:   .ASCIZ  /DRIVE WENT OFFLINE/
046700 047516 051040 051505 EM15:   .ASCIZ  /NO RESPONSE TO PORT REQUEST/
046734 042510 042101 051105 EM20:   .ASCIZ  /HEADER CRC ERROR/
046755    104 052101 020101 EM21:   .ASCIZ  /DATA CHECK ('DCK') ERROR/
047006 051127 052111 020105 EM22:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') SET/
047061    127 044522 042524 EM23:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') NOT SET/
047140 042510 042101 051105 EM24:   .ASCIZ  /HEADER READ ERROR - 'FMT' BIT DROPPED/
047206 042510 042101 051105 EM25:   .ASCIZ  /HEADER READ ERROR - HEADER COMPARE ('HCE') ERROR/
047267    106 051117 040515 EM26:   .ASCIZ  /FORMAT ERROR ('FER')/
047314 042510 042101 051105 EM27:   .ASCIZ  /HEADER COMPARE ('HCE') ERROR/
047351    115 051511 042503 EM30:   .ASCIZ  /MISCELLANEOUS DRIVE ERROR/
047403    117 042520 040522 EM31:   .ASCIZ  /OPERATION INCOMPLETE ('OPI') ERROR/
047446 051104 053111 020105 EM32:   .ASCIZ  /DRIVE TIMING ('DTE') ERROR/
047501    120 051101 052111 EM33:   .ASCIZ  /PARITY ('PAR') ERROR AFTER OPERATION STARTED/
```

```
047556  051127  052111  020105  EM34:   .ASCIZ  /WRITE CLOCK FAILURE ('WCF') ERROR/
047620  047111  040526  044514  EM35:   .ASCIZ  /INVALID ADDRESS ('IAE') ERROR/
047656  051127  052111  020105  EM36:   .ASCIZ  /WRITE LOCK ('WLE') ERROR/
047707     104  052101  020101  EM37:   .ASCIZ  /DATA CHECK ('DCK') SET DURING WRITE CHECK COMMAND/
047771     122  030510  020061  EM40:   .ASCIZ  /RH11 OR UNIBUS TRANSFER ERROR/
050027     102  051525  040440  EM41:   .ASCIZ  /BUS ADDRESS OR WORD COUNT INCORRECT/
050073     104  052101  020101  EM42:   .ASCIZ  /DATA COMPARE ERRORS - NO OTHER ERROR(S) DETECTED/
050154  040503  023516  020124  EM43:   .ASCIZ  /CAN'T MATCH DATA READ WITH A PATTERN/
050221     105  051122  051117  EM44:   .ASCIZ  /ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11/
050305     105  041503  046040  EM45:   .ASCIZ  /ECC LOGIC FAILURE - POSITION REGISTER VALUE NOT VALID/
050373     102  051525  040440  EM46:   .ASCIZ  /BUS ADDRESS AND WORD COUNT NOT CONSISTENT/
050445     123  042505  020113  EM50:   .ASCIZ  /SEEK INCOMPLETE ('SKI') ERROR/
050503     120  047522  051107  EM51:   .ASCIZ  /PROGRAM DETECTED POSITIONING ERROR/
050546  051104  053111  020105  EM60:   .ASCIZ  /DRIVE UNSAFE ERROR/
050571     122  040515  000123  DH1:    .ASCIZ  /RMAS/
050576  051104  053111  020105  DH2:    .ASCIZ  /DRIVE   RMDS    RMER1   RMER2  RMMR2   RMAS/
050652  051104  053111  020105  DH3:    .ASCIZ  /DRIVE   REG ADR  DATA/
050700  051104  053111  020105  DH4:    .ASCIZ  /DRIVE   REG ADR    GOOD    BAD/
050737     044  046522  042101  DH6:    .ASCIZ  /$RMADR/
050746  051104  020126  046522  DH14:   .ASCII  /DRV RMCS1   RMCS2   RMDS    RMER1   /
051012  046522  051115  020062          .ASCIZ  /RMMR2  RMER2   RMEC1   RMEC2/<CR><LF>
051051     122  053515  020103  DH15:   .ASCII  /RMWC    RMBA    RMDA    RMAS    RMLA    /
051121     122  042115  020102          .ASCIZ  /RMDB    RMMR1   RMDT/<CR><LF>
051150  046522  047123  020040  DH16:   .ASCIZ  /RMSN    RMOF    RMDC    RMHR    STATUS/<CR><LF>
        051222                          .EVEN
                                .LIST   BEX
9651
9652    051222  001342  000000  DT1:    .WORD   ATTN,0
9653
9654    051226  001216  034452  034454  DT2:    .WORD   DRIVE,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6,ATTN,0
9655    051234  034456  034460  001342
9656    051242  000000
9657
```

```
 9658  051244  001216  041560  041562  DT3:    .WORD   DRIVE,RD.ADR,RD.WRD,0
 9659  051252  000000
 9660
 9661  051254  001216  042000  041776  DT4:    .WORD   DRIVE,WRT.AD,WRT.WD,RD.WRD,0
 9662  051262  041562  000000
 9663
 9664  051266  001270  000000          DT6:    .WORD   $RMADR,0
 9665
 9666  051272  000234  000244  000246  DT14:   .WORD   $RMCS1,$RMCS2,$RMDS,$RMER1,$RMMR2,$RMER2,$RMEC1,$RMEC2,0
 9667  051300  000250  000274  000276
 9668  051306  000300  000302  000000
 9669
 9670  051314  000236  000240  000242  DT15:   .WORD   $RMWC,$RMBA,$RMDA,$RMAS,$RMLA,$RMDB,$RMMR1,$RMDT,0
 9671  051322  000252  000254  000256
 9672  051330  000260  000262  000000
 9673
 9674  051336  000264  000266  000270  DT16:   .WORD   $RMSN,$RMOF,$RMDC,$RMHR,$STATUS,0
 9675  051344  000272  000016  000000
 9676
 9677
 9678                                  .NLIST  BEX

       051352  051120  051505  047105  LIN2C:  .ASCIZ  /PRESENT ORDER = /
       051373     040  050040  042522  LIN2P:  .ASCIZ  /  PREVIOUS ORDER = /
       051417     052  042440  051122  LIN2S:  .ASCIZ  @* ERROR AT BAD TRACK/SECTOR@
       051453     105  051122  051117  LINM3:  .ASCIZ  /ERROR AT C/
       051466  052040     000  T:      .ASCIZ  / T/
       051471     120  042522  042523  LINN3:  .ASCIZ  /PRESENT ADDR = C/
       051512  051440     000  S:      .ASCIZ  / S/
       051515     040  020040  051120  LINP3:  .ASCIZ  /   PREV ADDR = C/
       051536  052123  051101  020124  LINS3:  .ASCIZ  /START CYL = /
       051553     040  042440  042116  LINEN3: .ASCIZ  /  END CYL = /
       051570  020040  041501  052524  LINA3:  .ASCIZ  /  ACTUAL CYL = /
       051610  020040  051124  020113  LINT3:  .ASCIZ  /  TRK = /
       051621     040  046522  041504  LINCA3: .ASCIZ  / RMDC = /
       051632  046522  040504  036440  LINDA3: .ASCIZ  /RMDA = /
       051642  046522  040502  036440  LINB3:  .ASCIZ  /RMBA = /
       051652  020040  046522  041527  LINW3:  .ASCIZ  /  RMWC = /
       051664  052123  051101  020124  LINST3: .ASCIZ  /START TRK = /
       051701     123  040524  052122  LINSS3: .ASCIZ  /START SEC = /
       051716  052502  043106  051105  LINM4:  .ASCIZ  /BUFFER ADDR = /
       051735     040  051440  055111  LINS4:  .ASCIZ  /  SIZE = /
       051747     040  040440  052103  LINX4:  .ASCIZ  /  ACTUAL NMBR WRDS XFRD = /
       052002  047507  042117  042040  LIND5:  .ASCIZ  /GOOD DATA = /
       052017     040  041040  042101  LINB5:  .ASCIZ  /  BAD DATA = /
       052035     040  053440  051117  LINP5:  .ASCIZ  /  WORD POS = /
       052053     110  040505  042504  LINS5:  .ASCIZ  /HEADER FROM ERROR SECTOR = /
       052107     122  042515  030503  LINEP5: .ASCIZ  /RMEC1 = /
       052120  051040  042515  031103  LINE05: .ASCIZ  / RMEC2 = /
       052132  042523  052103  051117  LIN86:  .ASCIZ  /SECTOR IS ECC CORRECTABLE /
       052165     123  041505  047524  LINC6:  .ASCIZ  /SECTOR READ CORRECTLY /
       052214  047503  051122  041505  LING6:  .ASCIZ  /CORRECTED ON /
       052232  051040  052105  044522  LINR6:  .ASCIZ  / RETRIES/
       052243     125  041516  051117  LINU06: .ASCIZ  /UNCORRECTABLE AFTER /
       052270  020040  047524  040524  LIN7M:  .ASCIZ  /  TOTAL MISPOS ERR = /
       052316  051117  042504  051522  LIN70:  .ASCIZ  /ORDERS:/
```

```
052326  052040  052117  046101  LIN7P:   .ASCIZ  / TOTAL SEEKS = /
052346  052040  052117  046101  LIN7S:   .ASCIZ  / TOTAL SKI ERR = /
052370  020040  051105  047522  LIN7T:   .ASCIZ  /  ERRORS:/
052402  020040  051127  051504  LIN7X:   .ASCIZ  /  WRDS XFR:/
052416  020040  051127  051504  LIN7R:   .ASCIZ  /  WRDS READ:/
052433     105  051122  051117  LIN8M:   .ASCIZ  /ERROR DURING RETRY/
052456  040504  040524  041440  LIN9B:   .ASCIZ  /DATA COMPARISON ERRORS/
052505     040  020040  020040  LIN9H:   .ASCII  /          GOOD    BAD/<CR><LF>
052533     114  041517  020040           .ASCIZ  /LOC       DATA    DATA/<CR><LF>
052563     114  041517  020040  LIN9I:   .ASCIZ  /LOC       DATA/<CR><LF>
052603     124  052117  046101  LIN9E:   .ASCIZ  /TOTAL COMPARE ERRORS = /
052633     124  042510  042040  LIN9G:   .ASCIZ  /THE DATA COMPARED OK/<CR><LF>
052662  051105  047522  020122  LIN10A:  .ASCIZ  /ERROR BURST BEGINS AT WORD /
052716  044440  020116  040504  LIN10B:  .ASCIZ  / IN DATA FIELD OF ERROR SECTOR/<CR><LF>
052757     105  051122  051117  LIN10C:  .ASCII  /ERROR WAS NOT IN THE DATA READ - /<CR><LF>
053022  041505  020103  047503           .ASCIZ  /ECC CORRECTION CAN'T BE PERFORMED/
053064  041505  020103  047503  LIN10H:  .ASCII  /ECC CORRECTION RESULTS/<CR><LF>
053114  042101  051104  020040           .ASCIZ  /ADDR    BAD     CORRECTED /<CR><LF>
053151     103  047117  042524  LIN11H:  .ASCIZ  /CONTENTS OF ERROR SECTOR (REPORTED ABOVE)/<CR><LF>
053225     101  042104  020122           .ASCIZ  /ADDR    DATA/<CR><LF>
053244  020040                   LIN4SP:  .ASCII  /  /
053246     040                   LINSP:   .ASCII  / /
053247     040     000           LINSP0:  .ASCIZ  / /
053251     122  052105  044522  LINX5:  .ASCIZ   /RETRIEVED BY A RDHD COMMAND/

                                .SBTTL  TELETYPE MESSAGES

053305     104  044522  042526  UNTMSG:  .ASCIZ  /DRIVE/
053313     040  043117  046106  UNTOFF:  .ASCIZ  / OFFLINE/
053324  047440  046116  047111  UNTON:   .ASCIZ  / ONLINE/
053334  047040  052117  041040  UNTNOT:  .ASCIZ  / NOT BEING TESTED/
053356  040440  051114  040505  UNTASN:  .ASCIZ  / ALREADY BEING TESTED/
053404  047040  052117  040440  NOTRM:   .ASCIZ  @ NOT AN RM03/RM02@
053426  047040  052117  050040  NOTPRS:  .ASCIZ  / NOT PRESENT/
053443     040  047516  020124  NOTAVL:  .ASCIZ  / NOT AVAILABLE/
053462  052440  051516  043101  NOTSAF:  .ASCIZ  / UNSAFE/
053472  047125  052111  051440  SYSTAT:  .ASCIZ  /UNIT STATUS:/<CR><LF><LF>
053512  046522  031460     000  RM03A:   .ASCIZ  /RM03/
053517     122  030115  000062  RM03B:   .ASCIZ  /RM02/
053524  051104  053111  020105  STATH:   .ASCII  /DRIVE PERFORMANCE SUMMARY/<CR><LF>
053557     104  053122  050040           .ASCII  /DRV PASS ORDERS   SEEKS   WRDS XFER   WRDS READ /
053637     123  043117  020124           .ASCIZ  /SOFT HARD  SKI MISP OTHER/<CR><LF>
053673     104  047117  006505  PDONE:   .ASCIZ  /DONE/<CR><LF><LF>
053703     007  043077  052101  DROPNG:  .ASCIZ  <07>/?FATAL OR EXCESSIVE ERRORS/
053737     105  042116  047440  ENDPAS:  .ASCIZ  /END OF PASS/
053753     015  042412  042116  ENDTST:  .ASCIZ  <CR><LF>/END OF TEST/
053771     015  042012  044522  DEASSG:  .ASCIZ  <CR><LF>/DRIVE DEASSIGNED/
054014  005015  025052  025052  DRNUM:   .ASCIZ  <CR><LF>/********** DRIVE #/
054041     040  052123  051101  ASGND:   .ASCIZ  / STARTED/<CR><LF>
054054  005015  020077  046047  NEDCLK:  .ASCIZ  <CR><LF>/? 'L' OR 'P' CLOCK REQUIRED ON SYSTEM/<CR><LF>
054126  000056                   PERIOD:  .ASCIZ  /./
054130  000077                   QUES:    .ASCIZ  /?/
054132  047111  040526  044514  INVLD:   .ASCIZ  /INVALID COMMAND/<CR><LF>
054154  005015  047105  042524  ENTCOM:  .ASCIZ  <CR><LF>/ENTER COMMANDS: /<CR><LF>
054201     105  052116  051105  ENTDRV:  .ASCIZ  /ENTER I.D. FOR DRV #/
054226  005015  047105  042524  ENTLMT:  .ASCIZ  <CR><LF>/ENTER ADDRESS LIMITS FOR DRV #/
```

```
054267  105  052116  051105  ENTADR: .ASCIZ  @ENTER BAD TRK/SEC ADRS FOR DRV #@
054330  000072                COLON:  .ASCIZ  /:/
054332  005015  040504  042524  DATEIS: .ASCIZ  <CR><LF>/DATE: /
054343  015  047412  042520  IDIS:   .ASCIZ  <CR><LF>/OPERATOR I.D.: /
054365  015  005012  051104  HEDLIN: .ASCIZ  <CR><LF><LF>/DRV  DRV I.D./<CR><LF>
054410  047516  042516  005015  NONE:   .ASCIZ  /NONE/<CR><LF>
054417  077  044440  053116  BADENT: .ASCIZ  /? INVALID ENTRY/<CR><LF>
054441  123  051531  042524  BUSY:   .ASCIZ  /SYSTEM BUSY.../<CR><LF>
054462  005015  051120  043517  INTDON: .ASCII  <CR><LF>/PROGRAM INITIALIZATION COMPLETE/
054523  015  052012  050131          .ASCIZ  <CR><LF>/TYPE A 'CONTROL C' TO ENTER COMMANDS/<CR><LF><LF>
054575  015  043012  044501  MERR1:  .ASCIZ  <CR><LF>/FAIL TO RETRIEVE BAD SPOT FILE ON  /
054643  015  047412  042526  MERR2:  .ASCIZ  <CR><LF>/OVER 16 BAD SECTORS ARE DETECTED ON  /

        054714                  .EVEN

                                .LIST  BEX

 9679
 9680
 9681                           ;PARAMETER ENTRY TABLE
 9682
 9683  054714  055042  020000  001462  PARLST: .WORD   PAR1,8192.,MAXDL
 9684  054722  055052  177777  001466          .WORD   PAR2,-1,INTRVL
 9685  054730  055222  177777  001460          .WORD   PAR19,-1,PASCNT
 9686  054736  055062  000017  001510          .WORD   PAR3,15.,PATTEN
 9687  054744  055162  000001  001476          .WORD   PAR11,1,WCSEL
 9688  054752  055172  000007  001500          .WORD   PAR14,7,RATIO
 9689  054760  055212  000001  001506          .WORD   PAR16,1,ENDET
 9690  054766  055152  000001  001474          .WORD   PAR10,1,FORMAT
 9691                          ;               .WORD   PAR15,1,AUTOCK
 9692  054774  055232  000001  001504          .WORD   PAR20,1,NOTPRT
 9693  055002  055242  000001  001512          .WORD   PAR21,1,HEADER  ;RANDOM ADDRESS FLAG
 9694  055010  000000                          .WORD   0               ;TABLE TERMINATOR
 9695
 9696
 9697                                .NLIST  BEX

055012  047105  042524  020122  ASKPAR: .ASCIZ  /ENTER PARAMETERS:  /
055036  027440  000040          SLASH:  .ASCIZ  @ / @

055042  044523  042532  020040  PAR1:   .ASCIZ  /SIZE   /
055052  044515  052516  042524  PAR2:   .ASCIZ  /MINUTE /
055062  040520  052124  051105  PAR3:   .ASCIZ  /PATTERN/
055072  040515  041530  046131  PAR4:   .ASCIZ  /MAXCYL /
055102  044515  041516  046131  PAR5:   .ASCIZ  /MINCYL /
055112  040515  052130  045522  PAR6:   .ASCIZ  /MAXTRK /
055122  044515  052116  045522  PAR7:   .ASCIZ  /MINTRK /
055132  040515  051530  041505  PAR8:   .ASCIZ  /MAXSEC /
055142  044515  051516  041505  PAR9:   .ASCIZ  /MINSEC /
055152  047506  046522  052101  PAR10:  .ASCIZ  /FORMAT /
055162  040522  042116  046517  PAR11:  .ASCIZ  /RANDOM /
055172  040522  044524  020117  PAR14:  .ASCIZ  /RATIO  /
055202  044103  041505  020113  PAR15:  .ASCIZ  /CHECK  /
055212  047105  044504  043516  PAR16:  .ASCIZ  /ENDING /
055222  040520  051523  051505  PAR19:  .ASCIZ  /PASSES /
055232  042515  051523  043501  PAR20:  .ASCIZ  /MESSAGE/
055242  042510  042101  051105  PAR21:  .ASCIZ  /HEADER /
```

```
                                        .EVEN

                                        .LIST   BEX

9698
9699
9700                                    ;PARAMETER TABLE POINTERS FOR ADDRESS LIMITS
9701
9702  055252  055272                   TABLE:  .WORD   TABLE0          ;PARAMETER TABLE FOR DRIVE 0
9703  055254  055340                           .WORD   TABLE1          ;PARAMETER TABLE FOR DRIVE 1
9704  055256  055406                           .WORD   TABLE2          ;PARAMETER TABLE FOR DRIVE 2
9705  055260  055454                           .WORD   TABLE3          ;PARAMETER TABLE FOR DRIVE 3
9706  055262  055522                           .WORD   TABLE4          ;PARAMETER TABLE FOR DRIVE 4
9707  055264  055570                           .WORD   TABLE5          ;PARAMETER TABLE FOR DRIVE 5
9708  055266  055636                           .WORD   TABLE6          ;PARAMETER TABLE FOR DRIVE 6
9709  055270  055704                           .WORD   TABLE7          ;PARAMETER TABLE FOR DRIVE 7
9710
9711                                    ;PARAMETER TABLE FOR ADDRESS LIMITS
9712
9713  055272  055102  000000  043132   TABLE0: .WORD   PAR5,0,MINCYL+DRIVE0
9714  055300  055072  000000  043130           .WORD   PAR4,0,MAXCYL+DRIVE0
9715  055306  055122  000004  043136           .WORD   PAR7,4.,MINTRK+DRIVE0
9716  055314  055112  000004  043134           .WORD   PAR6,4.,MAXTRK+DRIVE0
9717  055322  055142  000037  043142           .WORD   PAR9,31.,MINSEC+DRIVE0
9718  055330  055132  000037  043140           .WORD   PAR8,31.,MAXSEC+DRIVE0,0
9719  055336  000000
9720
9721  055340  055102  000000  043436   TABLE1: .WORD   PAR5,0,MINCYL+DRIVE1
9722  055346  055072  000000  043434           .WORD   PAR4,0,MAXCYL+DRIVE1
9723  055354  055122  000004  043442           .WORD   PAR7,4.,MINTRK+DRIVE1
9724  055362  055112  000004  043440           .WORD   PAR6,4.,MAXTRK+DRIVE1
9725  055370  055142  000037  043446           .WORD   PAR9,31.,MINSEC+DRIVE1
9726  055376  055132  000037  043444           .WORD   PAR8,31.,MAXSEC+DRIVE1,0
9727  055404  000000
9728
9729  055406  055102  000000  043742   TABLE2: .WORD   PAR5,0,MINCYL+DRIVE2
9730  055414  055072  000000  043740           .WORD   PAR4,0,MAXCYL+DRIVE2
9731  055422  055122  000004  043746           .WORD   PAR7,4.,MINTRK+DRIVE2
9732  055430  055112  000004  043744           .WORD   PAR6,4.,MAXTRK+DRIVE2
9733  055436  055142  000037  043752           .WORD   PAR9,31.,MINSEC+DRIVE2
9734  055444  055132  000037  043750           .WORD   PAR8,31.,MAXSEC+DRIVE2,0
9735  055452  000000
9736
9737  055454  055102  000000  044246   TABLE3: .WORD   PAR5,0,MINCYL+DRIVE3
9738  055462  055072  000000  044244           .WORD   PAR4,0,MAXCYL+DRIVE3
9739  055470  055122  000004  044252           .WORD   PAR7,4.,MINTRK+DRIVE3
9740  055476  055112  000004  044250           .WORD   PAR6,4.,MAXTRK+DRIVE3
9741  055504  055142  000037  044256           .WORD   PAR9,31.,MINSEC+DRIVE3
9742  055512  055132  000037  044254           .WORD   PAR8,31.,MAXSEC+DRIVE3,0
9743  055520  000000
9744
9745  055522  055102  000000  044552   TABLE4: .WORD   PAR5,0,MINCYL+DRIVE4
9746  055530  055072  000000  044550           .WORD   PAR4,0,MAXCYL+DRIVE4
9747  055536  055122  000004  044556           .WORD   PAR7,4.,MINTRK+DRIVE4
9748  055544  055112  000004  044554           .WORD   PAR6,4.,MAXTRK+DRIVE4
```

```
 9749  055552  055142  000037  044562            .WORD   PAR9,31.,MINSEC+DRIVE4
 9750  055560  055132  000037  044560            .WORD   PAR8,31.,MAXSEC+DRIVE4,0
 9751  055566  000000
 9752
 9753  055570  055102  000000  045056  TABLE5:   .WORD   PAR5,0,MINCYL+DRIVE5
 9754  055576  055072  000000  045054            .WORD   PAR4,0,MAXCYL+DRIVE5
 9755  055604  055122  000004  045062            .WORD   PAR7,4.,MINTRK+DRIVE5
 9756  055612  055112  000004  045060            .WORD   PAR6,4.,MAXTRK+DRIVE5
 9757  055620  055142  000037  045066            .WORD   PAR9,31.,MINSEC+DRIVE5
 9758  055626  055132  000037  045064            .WORD   PAR8,31.,MAXSEC+DRIVE5,0
 9759  055634  000000
 9760
 9761  055636  055102  000000  045362  TABLE6:   .WORD   PAR5,0,MINCYL+DRIVE6
 9762  055644  055072  000000  045360            .WORD   PAR4,0,MAXCYL+DRIVE6
 9763  055652  055122  000004  045366            .WORD   PAR7,4.,MINTRK+DRIVE6
 9764  055660  055112  000004  045364            .WORD   PAR6,4.,MAXTRK+DRIVE6
 9765  055666  055142  000037  045372            .WORD   PAR9,31.,MINSEC+DRIVE6
 9766  055674  055132  000037  045370            .WORD   PAR8,31.,MAXSEC+DRIVE6,0
 9767  055702  000000
 9768
 9769  055704  055102  000000  045666  TABLE7:   .WORD   PAR5,0,MINCYL+DRIVE7
 9770  055712  055072  000000  045664            .WORD   PAR4,0,MAXCYL+DRIVE7
 9771  055720  055122  000004  045672            .WORD   PAR7,4.,MINTRK+DRIVE7
 9772  055726  055112  000004  045670            .WORD   PAR6,4.,MAXTRK+DRIVE7
 9773  055734  055142  000037  045676            .WORD   PAR9,31.,MINSEC+DRIVE7
 9774  055742  055132  000037  045674            .WORD   PAR8,31.,MAXSEC+DRIVE7,0
 9775  055750  000000
 9776
 9777
 9778
 9779                                  ;;*****************************************************************
 9780
 9781                                  ;ROUTINE TO GET THE DATE AND THE OPERATOR FROM THE OPERATOR
 9782                                  ;CALL:
 9783                                  ;       JSR     PC,OPRDAT
 9784                                  ;       RETURN
 9785                                  ;
 9786                                  ;NOTE: THIS ROUTINE IS ENTERED ONLY AT INITIAL START
 9787
 9788  055752  104401  056074  OPRDAT: TYPE    ,ENTDAT         ;'ENTER DATE'
 9789  055756  104411                   RDLIN                   ;READ THE ENTRY
 9790  055760  012605                   MOV     (SP)+,R5        ;PUT THE ENTRY ADDRESS INTO R5
 9791  055762  112537  001320           MOVB    (R5)+,DATE      ;STORE THE DATE
 9792  055766  112537  001321           MOVB    (R5)+,DATE+1    ;STORE THE DATE
 9793  055772  112537  001322           MOVB    (R5)+,DATE+2    ;STORE THE DATE
 9794  055776  112537  001323           MOVB    (R5)+,DATE+3    ;STORE THE DATE
 9795  056002  112537  001324           MOVB    (R5)+,DATE+4    ;STORE THE DATE
 9796  056006  112537  001325           MOVB    (R5)+,DATE+5    ;STORE THE DATE
 9797  056012  112537  001326           MOVB    (R5)+,DATE+6    ;STORE THE DATE
 9798  056016  112537  001327           MOVB    (R5)+,DATE+7    ;STORE THE DATE
 9799  056022  005037  001330           CLR     DATE+8.         ;SET TERMINATOR
 9800  056026  104401  056113           TYPE    ,ENTID          ;'ENTER OPERATOR I.D.'
 9801  056032  104411                   RDLIN                   ;READ THE ENTRY
 9802  056034  012605                   MOV     (SP)+,R5        ;ENTRY ADDRESS
 9803  056036  112537  001332           MOVB    (R5)+,OPERID    ;STORE THE I.D.
 9804  056042  112537  001333           MOVB    (R5)+,OPERID+1  ;STORE THE I.D.
```

```
 9805  056046  112537  001334                MOVB    (R5)+,OPERID+2  ;STORE THE I.D.
 9806  056052  112537  001335                MOVB    (R5)+,OPERID+3  ;STORE THE I.D.
 9807  056056  112537  001336                MOVB    (R5)+,OPERID+4  ;STORE THE I.D.
 9808  056062  112537  001337                MOVB    (R5)+,OPERID+5  ;STORE THE I.D.
 9809  056066  005037  001340                CLR     OPERID+6        ;SET TERMINTOR
 9810  056072  000207                        RTS     PC              ;RETURN
 9811
 9812  056074  005015  047105  042524  ENTDAT: .ASCIZ  <CR><LF>/ENTER DATE: /
 9813  056102  020122  040504  042524
 9814  056110  020072     000
 9815  056113     105  052116  051105  ENTID:  .ASCIZ  /ENTER OPERATOR I.D.: /
 9816  056120  047440  042520  040522
 9817  056126  047524  020122  027111
 9818  056134  027104  020072     000
 9819          056142                  .EVEN
 9820
 9821                                  .SBTTL  ROUTINE TO SIZE MEMORY
 9822
 9823                                  ;;******************************************************************
 9824                                  ;*CALL:
 9825                                  ;*      JSR     PC,$SIZE
 9826                                  ;*      RETURN
 9827                                  ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
 9828
 9829  056142  010046                  $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
 9830  056144  010146                          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
 9831  056146  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
 9832  056152  013746  000006                  MOV     @#ERRVEC+2,-(SP)
 9833  056156  010600                          MOV     SP,R0           ;;SAVE THE STACK POINTER
 9834                                  ;;SET THE ERRVEC PS TO THE PRESENT PS
 9835  056160  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
 9836  056162  012637  000006                  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
 9837  056166  012737  056206  000004          MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
 9838  056174  012701  020000                  MOV     #20000,R1       ;;FIRST ADDRESS
 9839  056200  005711                  1$:     TST     (R1)            ;;TEST THIS ADDRESS
 9840  056202  005721                          TST     (R1)+           ;;STEP TO NEXT ADDRESS
 9841  056204  000775                          BR      1$              ;;TRY ANOTHER
 9842  056206  162701  000002          2$:     SUB     #2,R1           ;;DROP BACK
 9843  056212  010006                          MOV     R0,SP           ;;RESTORE THE STACK
 9844  056214  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
 9845  056220  012637  000004                  MOV     (SP)+,@#ERRVEC
 9846  056224  010137  056236                  MOV     R1,$LSTAD       ;;LAST ADDRESS
 9847  056230  012601                          MOV     (SP)+,R1        ;;RESTORE R1
 9848  056232  012600                          MOV     (SP)+,R0        ;;RESTORE R0
 9849  056234  000207                          RTS     PC
 9850  056236  000000                  $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
 9851
 9852                                  .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH11
 9853                                  ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
 9854                                  ;OF THE RH11 IS SETUP FOR THE PROPER ADDRESS.
 9855                                  ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 9856                                  ;REQUIRED.
 9857                                  ;NOTE: THIS ROUTINE DESTROYS R0-R4
 9858                                  ;CALL
 9859                                  ;
 9860                                  ;       JSR     PC,BUSADR
```

```
                                        ;       RETURN
                                        ;
056240  005737  001356                 BUSADR: TST     CHGADR          ;INPUT FROM TTY REQUESTED?
056244  002036                                 BGE     3$              ;NO--BRANCH
056246  005037  001356                         CLR     CHGADR          ;YES--CLEAR THE REQUEST FLAG
056252  104401  001201                         TYPE    ,$CRLF          ;TYPE A CR-LF
056256  012700  001270                 1$:     MOV     #$RMADR,R0      ;FIRST ADDRESS
056262  104401  056360                         TYPE    ,MRMCS1         ;"RMCS1="
056266  011046                                 MOV     @R0),-(SP)      ;PRESENT RMCS1 ADDRESS
056270  104402                                 TYPOC                   ;TYPE IT
056272  104401  053246                         TYPE    ,LINSP          ;2 SPACES
056276  104411                                 RDLIN                   ;GET THE ENTRY
056300  012601                                 MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
056302  004537  056402                         JSR     R5,CK.NUM       ;ENTER AND STORE THE NEW ADDRESS
056306  000763                                 BR      1$              ;ERROR EXIT
056310  012700  001272                 2$:     MOV     #$RMVEC,R0      ;VECTOR ADDRESS
056314  104401  056371                         TYPE    ,MRHVEC         ;"RHVEC="
056320  011046                                 MOV     @R0),-(SP)      ;PRESENT RH11 VECTOR ADDRESS ON THE STACK
056322  104402                                 TYPOC                   ;TYPE IT
056324  104401  053246                         TYPE    ,LINSP          ;2 SPACES
056330  104411                                 RDLIN                   ;READ THE ENTRY
056332  012601                                 MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
056334  004537  056402                         JSR     R5,CK.NUM       ;ENTER AND STORE NEW ADDRESS
056340  000763                                 BR      2$              ;ERROR EXIT
056342  012700  001270                 3$:     MOV     #$RMADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
056346  012701  034620                         MOV     #RMADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
056352  012021                                 MOV     @R0)+,@R1)+     ;BUS ADDRESS
056354  012021                                 MOV     @R0)+,@R1)+     ;VECTOR ADDRESS
056356  000207                                 RTS     PC              ;RETURN
                                        ;
056360  046522  051503  020061   MRMCS1: .ASCIZ  @RMCS1 = @
056366  020075      000
056371      122 053110  041505   MRHVEC: .ASCIZ  @RHVEC = @
056376  036440  000040
                                        ;
                                        .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
                                        ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
                                        ;AND FORMS AN OCTAL NUMBER IN R2
                                        ;CALL:
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                        ;       JSR     R5,CK.NUM       ;R5 CHANGED
                                        ;       RET                     ;ERROR EXIT
                                        ;       RET                     ;NORMAL EXIT
                                        ;
056402  010246                  CK.NUM: MOV     R2,-(SP)        ;SAVE R2
056404  010346                          MOV     R3,-(SP)        ;SAVE R3
056406  010446                          MOV     R4,-(SP)        ;SAVE R4
056410  012703  000006                  MOV     #6,R3           ;MAX OCTAL DIGITS IN THE NUMBER
056414  005002                          CLR     R2              ;FINAL OCTAL VALUE
056416  112104                  1$:     MOVB    (R1)+,R4        ;GET CURRENT POINTED BYTE
056420  001424                          BEQ     3$              ;BRANCH IF TERMINATOR DETECTED
056422  120427  000060                  CMPB    R4,#'0          ;SMALLER THAN ASCII-0 ?
056426  103425                          BLO     5$              ;YES,ERROR EXIT
056430  120427  000067                  CMPB    R4,#'7          ;LARGER THAN ASCII-7 ?
056434  101022                          BHI     5$              ;YES,ERROR EXIT
056436  006302                          ASL     R2              ;SHIFT LEFT
056440  103420                          BCS     5$              ;
```

```
9917  056442  006302                  ASL     R2              ;ONE
9918  056444  103416                  BCS     5$              ;
9919  056446  006302                  ASL     R2              ;OCTAL DIGIT
9920  056450  103414                  BCS     5$              ;ERROR IF CARRY BIT SET
9921  056452  042704  177770          BIC     #177770,R4      ;CHOP OFF HIGHER BITS
9922  056456  060402                  ADD     R4,R2           ;APPENDING CURRENT DIGIT TO NUMBER
9923  056460  005303                  DEC     R3              ;DECREMENT BYTE COUNT
9924  056462  001401                  BEQ     2$              ;BRANCH IF LAST BYTE
9925  056464  000754                  BR      1$              ;LOOPING BACK
9926  056466  112104          2$:     MOVB    (R1)+,R4        ;CHECK TERMINATOR
9927  056470  001004                  BNE     5$              ;ERROR EXIT
9928  056472  005702          3$:     TST     R2              ;FINAL VALUE = 0
9929  056474  001401                  BEQ     4$              ;YES,THEN NOT REPLACE THE ORIGINAL VALUE
9930  056476  010210                  MOV     R2,(R0)         ;REPLACE THE ORIGINAL VALUE
9931  056500  005725          4$:     TST     (R5)+           ;ADJUST FOR NORMAL RETURN
9932  056502  012604          5$:     MOV     (SP)+,R4        ;RESTORE R4
9933  056504  012603                  MOV     (SP)+,R3        ;RESTORE R3
9934  056506  012602                  MOV     (SP)+,R2        ;RESTORE R2
9935  056510  000205                  RTS     R5              ;EXIT
9936
9937  056512  000400          CYLDER: .BLKW   256.            ;ONE SECTOR WORD CTR MAX SIZE
9938          057512          ENDPGM  =       .
9939
9940
9941
9942                          .NLIST  BEX

      057512  005015  055103  046522  TITLE:  .ASCII  <CR><LF>/CZRMBB0/<CR><LF>
      057525     122  030115  027463          .ASCIZ  @RM03/RM02 PERFORMANCE EXERCISER @<CR><LF><LF>
      057571     015  052012  020117  LOADRV: .ASCII  <CR><LF>/TO TEST DRIVE 0, REPLACE THE 'XXDP' PACK ON DRIVE 0/<CR><LF>
      057660  044527  044124  040440          .ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40,/<CR><LF>
      057736  047101  020104  042522          .ASCIZ  /AND RESTART THE PROGRAM/<CR><LF>
      057770  005015  054523  052123  NOLOAD: .ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR><L

9943                          .LIST   BEX
9944          000001                  .END
```

```
ABASE = 176700           2271#   2561     2602
ABNRML  027064           3702    6735#
ACDW1 = 000000           2561    2604
ACDW2 = 000000           2561    2605
ACK   = 000123           2456#
ACPUOP= 000000           2561    2576
ACTDRV  034536           8171#   8444*   8495*   8821*   9830*   9087
ACTSTR  034537           8177#   9089*   9103*
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           7394    7500#
APTENV= 000001           7302    7387    7456    7498#
APTSIZ= 000200           3312    7497#
APTSPO= 000100           7389    7458    7499#
ASGND   054041           3598    9678#
ASGN1   024470           6264#
ASGN2   024544           3480    6263    6276#
ASGN3   024626           6273    6284    6291#
ASGN4   024740           6292    6314#
```

```
ASGN6   024742          6299    6315#
ASGN7   024754          6298    6317#
ASKPAR  055012          3410    9697#
ASNERR  026734          6275    6289    6316    6326    6352    6372    6692#
ASNLST  001544          2751#   3554    3605*   5956    5963    6266    6282    6291    6341    6343*   6365    6374    6388
                        6711*   6725    6807*   6810
ASNMSG  026754          6265*   6270*   6281*   6315*   6320*   6322*   6324*   6351*   6371*   6700#
ASSIGN  024462          6262#   6331    6414    6419    6423
ASWREG= 000000          2561    2574
ATA     = 100000        2348#
ATABIT  034606          3605    5963    6266    6282    6291    6341    6343    6365    6388    6711    6807    8243#   8411
                        8507    8613    9006    9028    9036    9037    9057    9147
ATESTN= 000000          2561    2565
ATTN    001342          2627#   7282*   9652    9654
ATO     = 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#   3557    3599    3603*   3645    3648    3681    3705
AVECT1= 000254          2272#   2561    2600
AVECT2= 000000          2561    2601
A16     = 000400        2284#
A17     = 001000        2285#
BADENT  054417          6675    9678#
BADSEC  001362          2636#   3701*   5429*   5503    6084    6096    6108    6120    6132
BAI     = 000010        2302#
BEGCOD  001516          2732#   6452    6453
BEGPAT  001514          2731#   6455
BEGSIZ  001520          2739#   6457    6458
BIT0    = 000001        2256#   6588    6617
BIT00   = 000001        2246#   2256    4403    5041    5162    6339
BIT01   = 000002        2245#   2255    3778    4908    8487    8742
BIT02   = 000004        2244#   2254    4452    5037    5190    5197    6494
BIT03   = 000010        2243#   2253    3871    4238    8964    9264
BIT04   = 000020        2242#   2252    3871    3883    8999
BIT05   = 000040        2241#   2251    4339    8333    8763    8979
BIT06   = 000100        2240#   2250    3952    3953    4043    4058    4900    5674    6256    7161    8420    8478    8552
                        8861    9324
BIT07   = 000200        2239#   2249    3764    3886    4900    8420    8687    8842    8964    8979    8999    9032    9296
BIT08   = 000400        2238#   2248    3860    8420
BIT09   = 001000        2237#   2247    3776    9138
BIT1    = 000002        2255#   6613    6627
BIT10   = 002000        2236#   3774    3898    3906    7290    8744
BIT11   = 004000        2235#   3772    3901    8380    8514    8708    9073
BIT12   = 010000        2234#   3770    3909    3952    3953    3972    4464    5044    5662    8375    8402    8420    8489
                        8522    8702    8725    8740    8754    8989    8991    9203    9259    9325
BIT13   = 020000        2233#   3889    3915    4210    4306    6987    7297    8472    8937    9206
BIT14   = 040000        2232#   3751    3753    3778    3874    3877    3915    4033    4084    4128    4168    4274    4289
                        4481    4551    8484    8519    8924    9068    9168    9214    9218    9322
```

```
BIT15 = 100000          2231#  3749  3917  3952  4012  4056  4306  4481  4551  8472  8484  8487  8489
                        8519   8522  8708  8742  8744  8861  8964  8979  8989  8999  9068  9138  9168
                        9175
BIT2  = 000004          2254#  3780  9175
BIT3  = 000010          2253#  3892
BIT4  = 000020          2252#  4134
BIT5  = 000040          2251#  3895
BIT6  = 000100          2250#  3972  5523
BIT7  = 000200          2249#  3965  4174  4874
BIT8  = 000400          2248#  4089  4113  4118  4148  4153  4306
BIT9  = 001000          2247#  3904  4306
BLKADR  002102          2807#  3361  3508  5961  6302  6308  6345  6368  7566
BPTVEC= 000014          2263#
BUFTBL  001700          2773#  3380*  3381*  3382*  3385*  3386*  3388*  3389*  3392*  3396  3398  3399  4935
                        4937   4951*  4977   4978   4990*  4995*  5000   5001   5014*
BUSADR  056240          3352   9863#
BUSY    054441          6199   9678#
CFLAG   001360          2635#  3371*  3540   6202*  6208   6525*  6535   6652*  6664   6680*  7174*  7231*
CHGADR  001356          2634#  3272*  3274*  3478   3497   7563*  9863   9865*
CHKADR  017172          3736   5167   5213#
CI1     036114          8542   8570#
CI3     036222          8544   8593#
CI4     036322          8533   8615#
CI5     036700          8592   8614   8692#  8701
CI6     036722          8631   8641   8643   8645   8697#
CI7     036736          8474   8551   8582   8586   8590   8598   8608   8612   8623   8630   8636   8640   8654
                        8660   8664   8674   8685   8700   8702#  8816   8846   9018   9308
CI7B    036760          8710#  9022
CI8     037036          8713   8724#  9160
CKBUS   012732          3756   4434#
CKCLK   022632          3424   5917#  7557
CKCLK1  022726          5919   5930#
CKCLK2  022774          5931   5939#
CKCLK3  023024          5929   5938   5946#
CKERR   012640          3755   4415#
CKFMT   010712          3885   4113#
CKHCE   011106          3888   4148#
CKSWR = 104407          7281   7312   8052#
CK.CHR  030226          7043#  7080   7094
CK.DEC  030200          7021#  7049
CK.DIG  030300          6666   7074#
CK.NUM  056402          9874   9883   9904#
CK.OCT  030152          7003#  7051
CLKFLG  001310          2618#  5917*  5922*  5933*  6142
CLOCK   023766          5925   5935   6163#
CLR   = 000040          2304#
CLRDPB  025432          3509   6303   6431#
CLRQUE  042560          8315   8762   9392#
CMCNT   001410          2651#  4402*  4406*  4461*  4462*  4472   4474   4475*  4478*  4528   4532   4535*  4558*
CMCYL   001412          2652#  4463*  4464*  4465*  4482   4547*  4548   4552
CMDAT   013270          4480   4490   4494#  4536   4538
CMHED   013216          4481#
CMPAR   013016          3759   4452#
CMPARD  013034          4001   4456#
CMPLMT  001472          2688#  4410   4467
CMPRES  017666          3576   3634   3683   3709   5324#  5327
```

```
CMPRT   013636          4492    4506    4516    4526    4567#
CMPRX   013630          4489    4529    4534    4550    4559    4562#
CMSEC   001414          2653#   4466*   4485    4539*   4540    4542*   4555
CMSTR   013134          4469#
CMSTR2  013256          4484    4487    4491#   4554    4557
CMTRK   001415          2654#   4543*   4544    4546*
COLON   054330          6149    6154    9678#
COMTBL  002122          2816#   5290    6454
CR    = 000015          2171#   2608#   7257    7433    7443    9650    9678    9812    9942
CRLF  = 000200          2172#   7404    7443
CYLDER  056512          4155*   4156    4159*   4193*   5661    5716    5719    6593    9638    9937#
CYLIMT  001446          2667#   3517    5148*   5154    5158    6493*   6500    6508    6509
DATAPK  025370          6236    6413#
DATA0   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#   6378    6381    9791*   9792*   9793*   9794*   9795*   9796*   9797*   9798*   9799*
DATEIS  054332          6380    9678#
DCK   = 100000          2367#
DCKER   007512          3914    3925#
DCKER1  007632          3948#   4228
DDISP = 177570          2178#   2544    3300
DEASGN  025026          6226    6335#
DEASSG  053771          3572    9678#
DH1     050571          3224    9650#
DH14    050746          5508    9650#
DH15    051051          5517    9650#
DH16    051150          5520    9650#
DH2     050576          3231    3252    9650#
DH3     050652          3238    9650#
DH4     050700          3245    9650#
DH6     050737          3259    9650#
DISPLA  001156          2544#   3300*   3308*   7289*
DISPLY= 104414          3796    3830    3850    3861    3933    3947    3968    4005    4015    4037    4079    4104    4124
                        4164    4190    4205    4227    4233    4251    4261    4270    4285    4301    4321    4332    4351
                        4369    4374    4375    4376    4379    4382    4385    4388    4391    4394    4397    4400    4424
                        4442    4591    4596    4597    4598    4611    4614    4617    4626    4629    4685    4690    4722
                        4725    4728    4731    4734    4737    4740    4743    4745    4746    4769    4775    4780    4782
                        4891    5450    5451    5452    5455    5472    5498    5500    5505    5506    5507    5508    5509
                        5512    5517    5520    5531    5532    5545    5548    5554    5560    5567    5581    5584    5587
                        5593    5596    5597    5601    5602    5606    5614    5617    5618    5621    5629    5632    5634
                        5637    5641    5645    5650    5653    5660    5664    5668    5676    5679    5682    5687    5693
                        5697    5706    5708    5715    5718    5721    5722    5723    5729    5732    5733    5736    5742
                        5743    5749    5755    5761    5767    5774    5776    5784    5785    5791    5796    5799    5804
                        5809    5810    5819    5824    5829    5832    5835    5836    5845    5859    6966    8057#
DISPRE  000174          2475#   3308
DLT   = 100000          2314#
DONE    007204          3766    3871#
DPE   = 020000          2433#
DPINT   034512          8131#   8344    8347    8428*   8454    8908    8933    9058    9060*   9129    9149    9154    9162*
DPR   = 000400          2341#
DPRQS   034522          8144#   8460    8508*   8546*   8715*   8732    8748*   8911    9131    9151    9156    9171*
DRIVE = 001216          2626#   7283*   9654    9658    9661
DRIVE0  043022          2807    6387    9574#   9713    9714    9715    9716    9717    9718
DRIVE1  043326          2808    9582#   9721    9722    9723    9724    9725    9726
DRIVE2  043632          2809    9590#   9729    9730    9731    9732    9733    9734
```

```
DRIVE3  044136  2810  9598# 9737  9738  9739  9740  9741  9742
DRIVE4  044442  2811  9606# 9745  9746  9747  9748  9749  9750
DRIVE5  044746  2812  9614# 9753  9754  9755  9756  9757  9758
DRIVE6  045252  2813  9622# 9761  9762  9763  9764  9765  9766
DRIVE7  045556  2814  9630# 9769  9770  9771  9772  9773  9774
DRNUM   054014  3788  3814  3842  6717  6775  6783  9678#
DROP    026764  3802  3856  6709# 6739
DROPNG  053703  6716  9678#
DRQ   = 004000  2397#
DRVACT  034462  8089# 8468  8648* 8695* 8717* 8729  8747* 8835* 8929  8962  8993* 9000* 9015
                9027# 9141#
DRVCLR= 000111  2451#
DRVER   010660  3919  4103#
DRVINT  035050  8335  8369# 8456  9061
DRVPRM  025632  6304  6473#
DRVQUE  042656  8463  8476  8873  9432#
DRVSTA  034472  3441  3506  6297  8103# 8325* 8326* 8327* 8328* 8338* 8370* 8379* 8417* 8422*
                8450  8458  8482  8516  8520  8649* 8766* 8914  8922  8935  8987* 8994* 9007
                9063  9163#
DRVTYP  034502  3444  3458  3461  6317  6494  6497  8118# 8371* 8386* 8391* 8396* 8485  8767*
DRY   = 000200  2340#
DSWR  = 177570  2177#
DTE   = 010000  2364#
DTEER   011516  3911  4224#
DTUW    034604  8237# 8321  8535  8591* 8722* 8735  8749  8751* 8760* 8824  8836* 9134  9144*
                9212
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     051222  3225  9652#
DT14    051272  5513  9666#
DT15    051314  5518  9670#
DT16    051336  5521  9674#
DT2     051226  3232  3253  9654#
DT3     051244  3239  9658#
DT4     051254  3246  9661#
DT6     051266  3260  9664#
DULP    035052  8370# 8381
DUNIT   001546  2753# 3548  6345* 6713* 6809*
DVA   = 004000  2334#
DVC   = 000200  2429#
ECBAD0  001432  2661# 4703* 4726
ECBAD1  001440  2664# 4717* 4738
ECBIT   001416  2655# 4677* 4678* 4679  4680* 4697  4699*
ECC     014236  3994  4661#
ECCX    014770  4733  4744  4746#
ECC1    014634  4710  4716  4722#
ECC2    014764  4694  4745#
ECGD    001430  2660#
ECGD1   001436  2663#
```

```
ECH    = 000100            2358#
ECI    = 004000            2417#
ECMSK0   001422            2657#  4695*  4700*  4705   4707
ECMSK1   001424            2658#  4696*  4701*  4709   4718   4720
ECSEC    001420            2656#  4661*  4670*  4673*  4675*  4691
ECWRD    001426            2659#  4679*  4681*  4682*  4683*  4684*  4686   4691*  4692   4703   4706   4707*  4708*
                           4711   4723   4729
ECWRD1   001434            2662#  4704*  4711*  4712*  4713   4715*  4717   4719   4720*  4721*  4732   4735   4741
EMPTYQ   042636            8714   8765   8862   9176   9417#
EMTVEC=  000030            2266#  3287*  3288*  3316*
EM1      046152            3223   9650#
EM10     046454            3807   9650#
EM11     046517            3813   9650#
EM12     046552            3787   3796   9650#
EM13     046603            3830   9650#
EM14     046655            3841   3850   9650#
EM15     046700            3861   9650#
EM2      046221            3230   9650#
EM20     046734            4079   9650#
EM21     046755            3947   9650#
EM22     047006            4032   9650#
EM23     047061            4015   9650#
EM24     047140            4124   9650#
EM25     047206            4164   9650#
EM26     047267            4270   9650#
EM27     047314            4285   9650#
EM3      046257            3237   9650#
EM30     047351            4104   9650#
EM31     047403            4205   9650#
EM32     047446            4227   9650#
EM33     047501            4233   9650#
EM34     047556            4332   9650#
EM35     047620            4251   9650#
EM36     047656            4261   9650#
EM37     047707            4035   9650#
EM4      046315            3244   9650#
EM40     047771            4301   9650#
EM41     050027            4442   9650#
EM42     050073            4591   9650#
EM43     050154            4369   4374   9650#
EM44     050221            4424   9650#
EM45     050305            3933   9650#
EM46     050373            5531   9650#
EM5      046352            3251   9650#
EM50     050445            4321   9650#
EM51     050503            4190   9650#
EM6      046406            3258   9650#
EM60     050546            4351   9650#
ENDCMP   014112            4562   4622#
ENDCON   001450            2675#  3494*  3495*  6754   6757
ENDET    001506            2713#  6752   9689
ENDPAS   053737            6766   9678#
ENDPGM=  057512            3381   3386   9938#
ENDSEK   001454            2677#  6760   6763
ENDTST   053753            6774   9678#
ENTADR   054267            9678#
```

```
ENTCOM  054154          6205    9678#
ENTDAT  056074          9788    9812#
ENTDRV  054201          6526    9678#
ENTID   056113          9800    9815#
ENTLMT  054226          6477    9678#
ENTPR   004634          3415#
EOP     027116          3703    6752#
EOPX    027410          6756    6759    6762    6764    6803    6811    6815#
EOP1    027144          6753    6760#
EOP2    027166          5365    6755    6758    6761    6765#
ERCTR   001404          2649#   4459*   4491*   4502    4515*   4624    4627
ERPRC1  006564          3765    3770#   3969    4892
ERPROC  006550          3748    3752    3754    3764#
ERR     =  040000       2347#
ERRVEC= 000004          2259#   3297    3298*   3309*   5919*   5920*   5931*   5946*   9831    9832    9836*   9837*   9844*
                        9845*
FACTOR  015626          4902*   4903*   4905*   4906    4914    4922#
FAIRNS  001352          2632#
FALPAR  006750          3775    3812#
FALPR1  006760          3808    3814#
FER     =  000020       2356#
FILBUF  016214          3626    3661    5036#
FISK    027464          6833    6834#
FMTER   011712          4120    4269#
FMT16 =  010000         2418#
FORMAT  001474          2689#   3726    5243    9690
FOWT1   005172          3491#
FOWT2   005232          3496    3499#
FOWT3   005410          3498    3530#
FRSTER  001376          2642#   4000*   4002    4366    4408*   4409*   4455*   4518    4569    4587    4599*   4622
F0      =  000002       2329#
F1      =  000004       2330#
F2      =  000010       2331#
F3      =  000020       2332#
F4      =  000040       2333#
GENDPB  046062          3978*   3982    4791*   4792*   4794    4811*   4812*   4814    4816    4827*   4828*   4830    4843*
                        4844*   4845*   4846*   4847*   4848*   4850    4852    6295*   6567*   6568*   6569*   6570*   6571*
                        6578*   6580    6582    6585*   6586    6615*   9638#
GENREG  046102          4118    4153    9640    9642#
GETADR  026154          3510    6316    6556#
GETBUF  015630          3622    3658    4932#
GETID   026044          6305    6522#
GETPAR  017374          3656    5273#
GETPAT  017332          3739    5201    5253#   5262    5388
GETREG= 000141          2458#
GETREM  027474          5094    5123    5139    5156    5178    5258    6843#
GETREQ  042732          8509    8737    8853    8918    8953    9017    9067    9137    9165    9172    9453#
GNS     =  ****** U     2474    8044    8045    8046    8047    8048    8050    8052    8053    8054    8055    8056    8057
GO      =  000001       2328#
GODRIV  016342          3627    3663    3961    4046    4867    5070#
GTSWR =  104406         3335    8050#
HCE     =  000200       2359#
HCEER   011770          4160    4284#
HCI     =  002000       2416#
HCRC    =  000400       2360#
HCRCER  010514          3832    4074#   4115    4150
```

```
HEADER  001512          2720#   5103    9693
HEDLIN  054365          6386    9678#
HOUR    001364          2637#   3366*   6145    6175*   6176    6178*   7553*
HT    = 000011          2169#   7402    7443
HZ      001312          2619#   3365    6165
IAE   = 002000          2362#
IAEER   011632          3900    4250#
IDIS    054343          6384    9678#
IDLE    006206          3544    3647    3691#
IDLE1   006304          3693    3711#
IE    = 000100          2282#
ILF   = 000001          2352#
ILR   = 000002          2353#
INCHRD  023550          3986    6096#
INCMIS  023620          4195    6120#
INCSKI  023574          4325    6108#
INCSOF  023524          3993    3999    4087    4132    4172    6084#
INCTOT  023644          3800    3821    3834    3854    3865    3935    3967    3987    4004    4021    4064    4067    4088
                        4107    4133    4173    4196    4209    4237    4254    4263    4278    4293    4305    4324    4336
                        4354    4428    4446    4630    6132#
INTDON  054462          3530    9678#
INTRVL  001466          2684#   3369*   6170*   6181    6183    6186*   7556*   7558    7560*   9684
INVLD   054132          6253    9678#
IOTVEC= 000020          2264#
IR    = 000100          2305#
ISR     037450          8330    8821#
IVC   = 010000          2432#
KIPARD= ****** U        9827
KSR     024130          3545    6197#
KSR1    024142          6198    6200#
LA      037274          8539    8782#
LACNT   034550          8196#   8790*   8791    8812*
LBC   = 002000          2430#
LBT   = 002000          2343#
LF    = 000012          2170#   2609#   7257    7437    7443    9650    9678    9812    9942
LIMIT   001406          2650#   4410*   4467*   4468*   4601    4603*
LINA3   051570          5660    9678#
LINB3   051642          5581    9678#
LINB5   052017          5697    9678#
LINB6   052132          5742    5755    9678#
LINCA3  051621          5618    9678#
LINC6   052165          5749    9678#
LINDA3  051632          5614    9678#
LINDEC  022462          4628    5511    5595    5600    5605    5628    5631    5633    5636    5640    5644    5652    5655
                        5663    5667    5681    5686    5707    5783    5798    5831    5834    5871#
LIND5   052002          5693    9678#
LINEN3  051553          5653    9678#
LINE05  052120          5733    9678#
LINEP5  052107          5729    9678#
LINE1   020406          3795    3829    3849    3860    3932    3946    4014    4031    4078    4103    4123    4163    4189
                        4204    4226    4232    4250    4260    4269    4284    4300    4320    4331    4350    4368    4423
                        4441    4590    5445#
LINE2   020462          3797    3831    3851    3862    3934    3948    4017    4039    4080    4105    4125    4165    4191
                        4206    4234    4252    4262    4271    4286    4302    4322    4333    4352    4370    4425    4443
                        4592    5468#   5846
LINE2A  020632          5480    5485    5503#
```

LINE2B	020650	5504	5507#										
LINE3	021070	3798	3832	3852	3863	3949	4018	4040	4081	4106	4126	4166	4207	4272
		4287	4303	4353	4426	5554#								
LINE3A	021076	4334	4371	4593	5560#									
LINE3B	021104	4323	5566#											
LINE3C	021116	4192	5573#											
LINE3D	021126	4444	5533	5579#										
LINE3E	021174	4235	5593#											
LINE3F	021262	4253	5612#											
LINE4	021540	3799	3833	3853	3864	3950	4019	4041	4082	4127	4167	4208	4236	4273
		4288	4304	4335	4372	4427	4445	4594	5534	5674#				
LINE5	021630	4020	4042	4086	4130	4170	4276	4291	5693#					
LINE5A	021730	4083	4131	4171	4194	4277	4292	5714#						
LINE5B	021776	3992	5729#											
LINE6	022040	3955	5742#											
LINE6A	022052	3998	5749#											
LINE6B	022060	3991	5755#											
LINE6C	022066	3939	4025	4051	4060	4093	4138	4178	4214	4242	4312	4342	4358	5761#
LINE6D	022074	3941	3996	4027	4096	4141	4181	4217	4245	4314	4345	4360	5767#	
LINE7	022150	3801	3835	3855	3866	3942	3988	4006	4065	4068	4094	4097	4108	4139
		4142	4179	4182	4215	4218	4243	4255	4264	4279	4294	4315	4343	4361
		4429	4447	4631	4888	5791#								
LINE7A	022276	4197	4326	5819#										
LINE8	022416	3985	4062	4887	5845#									
LING6	052214	5761	9678#											
LINKDV	027522	4666	4758	5704	6846	6856#								
LINM3	051455	5554	9678#											
LINM4	051716	5676	9678#											
LINN3	051471	5560	9678#											
LINOCT	022430	4378	4381	4384	4387	4390	4393	4396	4399	4610	4613	4616	4724	4727
		4730	4736	4739	4742	4772	4777	5543	5583	5586	5616	5620	5678	5696
		5699	5717	5720	5731	5735	5855#							
LINP3	051515	5634	9678#											
LINP5	052035	5706	9678#											
LINR6	052232	5784	9678#											
LINSP	053246	3456	4379	4385	4391	4397	4611	4614	4725	4728	4731	4737	4740	4743
		4775	5512	5545	5596	5601	5617	5718	5721	5732	6016	6021	6026	6032
		6038	9678#	9871	9880									
LINSP0	053247	5455	5509	6044	6051	6056	6061	6066	9678#					
LINSS3	051701	5602	9678#											
LINST3	051664	5597	9678#											
LINS3	051536	5593	5650	9678#										
LINS4	051735	5679	9678#											
LINS5	052053	5715	9678#											
LINT3	051610	5664	9678#											
LINU06	052243	5767	9678#											
LINW3	051652	5584	9678#											
LINX4	051747	5682	9678#											
LINX5	053251	5722	9678#											
LIN10A	052662	4685	9678#											
LIN10B	052716	4690	9678#											
LIN10C	052757	4745	9678#											
LIN10H	053064	4722	9678#											
LIN11H	053151	4769	9678#											
LIN2C	051352	5475	9678#											
LIN2P	051373	5481	9678#											

```
LIN2S   051417          5506    9678#
LIN3.1  021334          5555    5561    5627#
LIN3.3  021442          5566    5573    5650#
LIN3.4  021474          5574    5660#
LIN4SP  053244          3440    6395    9678#
LIN6.1  022102          5750    5756    5772#
LIN6.2  022124          5762    5768    5781#
LIN7M   052270          5829    9678#
LIN7O   052316          5791    5819    9678#
LIN7P   052326          5824    9678#
LIN7R   052416          5804    9678#
LIN7S   052346          5832    9678#
LIN7T   052370          5796    9678#
LIN7X   052402          5799    9678#
LIN8M   052433          3968    4891    5845    9678#
LIN9B   052456          4596    9678#
LIN9E   052603          4626    9678#
LIN9G   052633          4005    9678#
LIN9H   052505          4598    9678#
LIN9I   052563          4376    9678#
LKPAR   004566          3403#
LOADRV  057571          3325    9942#
LSC     =  004000       2431#
LSTAD   001354          2633#   3379*   3382    3383    3485
MAIN    005420          3540#   3718    5369    5395
MAINDA  005446          3547#
MAIN1   005574          3529    3531    3555    3581#   6835
MAIN2   005710          3591    3612#
MAIN3   006016          3619    3641#
MASK    001346          2629#   3952*   3970    4016*   4089*   4134*   4174*   4210*   4238*   4309*   4339*   4876    4881
MATCH   014160          4494    4642#
MAXCYL= 000106          3517*   5107    5148    5149    5354    6500*   9532#   9533    9534    9535    9536    9537    9538
                        9542    9714    9722    9730    9738    9746    9754    9762    9770
MAXDL   001462          2680#   3393    3395*   3396    3398*   3417    3419*   5174    5187    5189    5370    5372    9683
MAXER   001464          2683#   3372*   6737
MAXSEC= 000116          3519*   5116    6504*   9536#   9718    9726    9734    9742    9750    9758    9766    9774
MAXTRK= 000112          3518*   5132    5357    6502*   9534#   9716    9724    9732    9740    9748    9756    9764    9772
MCPE    =  020000       2287#
MCPEMX  034616          8255#   9193    9240
MDPE    =  000400       2307#
MERR1   054575          6619    9678#
MERR2   054643          6629    9678#
MINCYL= 000110          3520#   5109    5150    5152    5157    5160    5361    6501*   6515    9533#   9713    9721    9729
                        9737    9745    9753    9761    9769
MINSEC= 000120          3522*   5110    5117    5119    5124    5360    6448    6505*   6513    9537#   9717    9725    9733
                        9741    9749    9757    9765    9773
MINTRK= 000114          3521*   5111    5133    5135    5140    5359    6503*   6514    9535#   9715    9723    9731    9739
                        9747    9755    9763    9771
MINUTE  001366          2638#   3367*   6150    6171*   6172    6174*   7554*   7562*
MNDLTA  034632          8271#   8810
MNTBL   002152          2844#   5496
MOH     =  020000       2398#
MOL     =  010000       2345#
MONTR   005116          3476#
MRHVEC  056371          9877    9893#
MRMCS1  056360          9868    9891#
```

```
MXDLTA  034630          8268#   8808
MXF     = 001000        2308#
MXLACT  034626          8265#   8791
MXWNDW  034634          8274#
M.DPID  027570          6863    6877#
M.DP40  027626          6888#   6909
M.DP41  027662          6893    6900#
M.DP42  027672          6899    6904#
M.DP44  027724          6911    6916#
M.DP50  027736          6886    6920#
NED     = 010000        2311#
NEDCLK  054054          5940    9678#
NEM     = 004000        2310#
NEWASN  025016          6222    6330#
NEXT    001570          2757#   3512*   3585    3603    3604*   6308*
NOLOAD  057770          3487    9942#
NOMTCH  012366          4366#   4496
NONE    054410          6398    9678#
NOTAVL  053443          6270    9678#
NOTPRS  053426          3449    6322    9678#
NOTPRT  001504          2708#   5427    9692
NOTRM   053404          3447    6320    9678#
NOTSAF  053462          3453    6315    9678#
NSA     = 100000        2400#
OFFCOD  002464          2896#   3978
OFFDIR= 000001          2415#
OFFON   = 000001        2338#
OFFSET= 000115          2453#   4828
OFFST   015226          3981    4827#
OFLIN   007056          3779    3840#
OFMSG0  002362          2880#   2902
OFMSG1  002415          2885#   2903
OFMSG2  002440          2889#   2904
OFMTBL  002470          2902#   5773
OPE     = 000010        2428#
OPERID  001332          2624#   6382    6385    9803*   9804*   9805*   9806*   9807*   9808*   9809*
OPI     = 020000        2365#
OPIER   011406          3891    4202#
OPIER1  011452          4211#
OPRDAT  055752          3357    9788#
OPT     035656          8470    8505#   8856    9041    9079
OPTBL   002130          2823#   5487    5489
OR      = 000200        2306#
ORDERQ  001522          2747#   3359    3542    3628    3664    3691    6197    7564
PACK    001316          2621#   3370*   3528*   5392*   6310    6312    6330*   6413*   6418*   6422*
PAR     = 000010        2355#
PARENT  026610          3416    6512    6651#
PARER   011540          3894    4232#
PARLST  054714          3399*   3415    9683#
PARQ    001656          2769#
PAR1    055042          9683    9697#
PAR10   055152          9690    9697#
PAR11   055162          9687    9697#
PAR14   055172          9688    9697#
PAR15   055202          9697#
PAR16   055212          9689    9697#
```

```
PAR19   055222          9685    9697#
PAR2    055052          9684    9697#
PAR20   055232          9692    9697#
PAR21   055242          9693    9697#
PAR3    055062          9686    9697#
PAR4    055072          9697#   9714    9722    9730    9738    9746    9754    9762    9770
PAR5    055102          9697#   9713    9721    9729    9737    9745    9753    9761    9769
PAR6    055112          9697#   9716    9724    9732    9740    9748    9756    9764    9772
PAR7    055122          9697#   9715    9723    9731    9739    9747    9755    9763    9771
PAR8    055132          9697#   9718    9726    9734    9742    9750    9758    9766    9774
PAR9    055142          9697#   9717    9725    9733    9741    9749    9757    9765    9773
PASCNT  001460          2679#   6772    9685
PAT   = 000020          2303#
PATTEN  001510          2717#   5254    5256    9686
PCLOCK  001306          2617#   5918#   5923#
PDONE   053673          9678#
PERIOD  054126          9678#
PGE   = 002000          2309#
PGM   = 001000          2342#
PIP   = 020000          2346#
PIRQ  = 177772          2176#
PIRQVE= 000240          2270#
POPQUE  042754          8518    8570    8686    9002    9031    9071    9468#
POSER   011332          4158    4188#
PROCES  006460          3700    3746#
PRTBAD  014776          3951    3989    4337    4751#
PRTIM   007146          3781    3860#
PR0   = 000000          2193#
PR1   = 000040          2194#
PR2   = 000100          2195#
PR3   = 000140          2196#
PR4   = 000200          2197#   6201
PR5   = 000240          2198#
PR6   = 000300          2199#
PR7   = 000340          2200#
PS    = 177776          2173#   2174    3364#   3471#   6201#   6257#   6974    6975#   6989#   7183    7552#   8313    8314#
                        8343#   8351#   8442    8443#   8496#   8506    8555#   8797#
PSEL  = 002000          2286#
PSW   = 177776          2174#
PUNSAF  006646          3771    3786#
PWRVEC= 000024          2265#   3291#   3292#   7506#   7507#   7516#   7522#   7534#   7535#
QCNT    042266          9334#   9393    9417#   9432    9434#   9454    9468#
QDRV0   042360          9345    9356    9365    9377#
QDRV1   042400          9346    9357    9366    9378#
QDRV2   042420          9347    9358    9367    9379#
QDRV3   042440          9348    9359    9368    9380#
QDRV4   042460          9349    9360    9369    9381#
QDRV5   042500          9350    9361    9370    9382#
QDRV6   042520          9351    9362    9371    9383#
QDRV7   042540          9352    9363    9372    9384#
QINPT   042276          9345#   9419    9436#   9437#   9438    9440#
QOUTPT  042316          9356#   9419#   9457    9470    9471#   9472#   9473    9475#
QSTART  042336          9365#   9399    9404    9440    9475
QSTOP   042340          9366#   9438    9473
QTERM = 042560          9373    9385#
QUES    054130          6692    9678#
```

```
RANCYL  016716  5149#
RANPAT  017152  5169  5201#
RANSEC  016560  5104  5116#
RANSIZ  017032  5163  5174#  5182
RANTRK  016634  5132#
RANWRT  017276  5097  5242#
RANXIT  017162  5166  5198  5203#
RATIO   001500  2695#  3493#  5095  9688
RDCHR = 104410  7168  7205  8053#
RDDAT = 000171  2465#  2820  6567
RDHD  = 000173  2466#  2821  4847  5383
RDLIN = 104411  3411  6206  6533  6662  8054#  9789  9801  9872  9881
RDY   = 000200  2283#
RD.ADR  041560  9195#  9196#  9198#  9658
RD.RM   041534  8382  8406  8412  8634  8658  8672  8784  8798  8844  8888  8956  8966  8981
                9123  9193#  9247  9261  9267  9300
RD.RM1  041556  9197#  9226
RD.RM2  041676  9193#  9225#
RD.RM3  041702  9204  9217  9227#
RD.RM4  041706  9209  9229#
RD.WRD  041562  9199#  9200  9658  9661
READDR  022502  3730  4076  4116  4151  5281  5348  5411  5627  5892#
READHD  015252  4077  4117  4152  4843#
READIN= 000121  2455#
RECAL = 000107  2450#  4812
RECALT  015174  4188  4811#
RECALO  015200  4812#  6296
REDAPK  025420  6240  6422#
REFMT   006336  3722#  4007  4069  4098  4143  4183  4219  4295
REFMTX  006456  3723  3725  3727  3729  3738  3742#
RELBUF  015764  3710  4973#
RELSE = 000113  2452#
REPLZ   027746  6019  6024  6030  6036  6042  6049  6054  6059  6064  6073  6147  6152  6157
                6931#
RESREG= 104413  5061  6254  6866  7949  7999  8056#  8352  8490  8493  8556  8769  8829  9102
                9309  9408
RESVEC= 000010  2260#
RETRY   001350  2630#  3936#  3957#  3974#  3975  3980#  4022#  4045#  4050#  4053#  4054  4090#  4135#
                4175#  4211#  4239#  4308#  4338#  4355#  4871#  4883#  4884  5782
RMADR   034620  3347#  3353#  8260#  8332  8449  8573  8593  8615  8782  8823  9121  9195  9201
                9205  9220  9253  9257  9289  9319  9886
RMAS  = 000016  8285#  8411#  8886  9006#  9036#  9057#  9146
RMBA  = 000004  8280#
RMCS1 = 000000  8278#  8374#  8380  8400  8513#  8514  8589  8611  8653  8673  8684  8699  8712
                8845  8889  8942  8973  9012  9073  9248
RMCS2 = 000010  8282#  8333#  8373#  8375  8462#  8512#  8574#  8594#  8616#  8702  8725  8740  8754
                8763#  8783#  8843#  8954#  9043#  9056#  9122#  9202  9258  9290#  9296  9320#  9325
RMDA  = 000006  8281#  8591  8607  8622
RMDB  = 000022  8287#  9294
RMDC  = 000034  8292#  8585  8597  8629
RMDS  = 000012  8283#  8407  8785  8957  8982  9044  9124
RMDT  = 000026  8289#  8383
RMEC1 = 000044  8296#
RMEC2 = 000046  8297#  9304
RMERRS  034452  8081#  8316  8924  8927  8937  9044#  9045#  9046#  9047#  9654
RMER1 = 000014  4118  4153  8284#  8413  8967  9045  9262
```

```
RMER2  = 000042  8295#  9046
RMHR   = 000036  8293#
RMINIT   034636  3425    8312#
RMLA   = 000020  8286#  6799    8801
RMMR1  = 000024  8288#
RMMR2  = 000040  8294#  9047
RMOF   = 000032  8291#  8404    8635    8639    8659    8663
RMR    = 000004  2354#
RMSN   = 000030  8290#
RMVEC    034622  3348*  3354*   8261#   8329    8331    8443
RMWC   = 000002  8279#
RM03     035364  4793    4813    4829    4849    5072    6579    8442#
RM03A    053512  3457    9678#
RM03B    053517  3460    9678#
RNOP   = 000101  2448#
RPTMR    041122  6180    9087#
RTC    = 000117  2454#  4792
RTNCTR   015150  4791#
S        051512  5632    5641    9678#
SATPOW   032430  7539    7551#
SAVEFG   034560  3426*  8211#   8688    8849    9033
SAVER1   001400  2647#  4470*   4521*   4567    4577    4581*
SAVER5   001402  2648#  4471*   4522*   4578    4582*
SAVREG=  104412  5036    6200    6856    7923    7984    8055#   8312    8445    8505    8724    8822    9090    9236
                 9392
SC       037770  8828    8857    8860    8866    8886#
SCMND    025136  6230    6360#
SC04   = 000400  2406#
SC1    = 000100  2404#
SC10   = 001000  2407#
SC11     040612  8926    8955    8963    9024#
SC12     040722  8920    8931    9043#
SC13     040764  8910    8913    9053#
SC2    = 000200  2405#
SC20   = 002000  2408#
SC3      040034  8901#  8905
SC4      040040  8903#  8934    8946    8949    8998    9014    9023    9042    9080
SC5      040052  8902    8908#
SC6      040242  8930    8950#
SC6A     040356  8928    8975#
SC7      040504  8965    8978    8980    8990    9000#
SC8      040562  8943    8958    8968    8974    8983    9013    9015#   9052
SDETAL   023172  5965    5985    6008#
SEARCH=  000131  2457#
SECLMT   001442  2665#  3519    6504
SECOND   001370  2639#  3368*   6155    6166*   6167    6169*   7555*   7561*
SEEK   = 000105  2449#
SEEKFG   034562  8219#  8317    8537
SELDRV=  000145  2460#
SELPAR   016420  3655    5090#   5170
SETFMT=  000143  2459#
SETVEC   004662  3404    3406    3408    3414    3418    3424#
SET.IE   042214  8346    8377    8480    8554    8768    8895    9318#
SHDTYP   023150  5958    5982    5995#
SIXTEE   001372  2640#  3365*   6163*   6165*
SIZMEM   004410  3376#  7569
```

```
SKI    = 040000  2434#
SKIER    012152  3920  4320#
SLASH    055036  6661  9697#
SPOTCK   020270  3944  4029  4074  4121  4161  4202  4224  5405#
SRCHWT   034534  8165#  8507*  8613*  9028  9037*
STACK  = 001100  2164#  3285  3363  3472
START    003622  2479  3272#  5945
START1   003632  2478  3274#
START2   003650  3273  3278#
STATHD   053524  5999  9678#
STATIN   001314  2620#  3358*  3714  3716*  6185*
STATIS   015472  3698  4900#
STATPR   023034  3717  5954#  6377
STKLMT= 177774  2175#
STNDAT   002476  2913#  4647  4653  5051  5059
STO      041212  9097  9117#
STO1     041246  9129#
STO2     041342  9128  9130  9132  9146#
STO3     041372  9148  9154#
STO5     041416  9160#
STO6     041424  9150  9162#
STO7     041462  9152  9170#
STO8     041512  9169  9176#
STO9     041522  9126  9136  9145  9153  9157  9159  9161  9167  9174  9178#
SVRH70   042076  8690  8851  8863  8919  8970  8988  9035  9069  9139  9177  9286#
SWR      001154  2543#  3283  3299*  3301  3307*  3314*  3333  3429  3712  3722  3724  3757  3822
                 4456  4504  4605  4751  5091  5286  5366  5445  5448  5515  5579  5612  5811
                 5837  6234  6735  6770  6987  7177  7284  7290  7297  7309  7514  7527*  7728
                 7765*
SWREG    000176  2476#  3307  3333  7177  7728  7741
SWTIM    007020  3777  3829#
SW0    = 000001  2228#  3722  5091  6234
SW00   = 000001  2218#  2228
SW01   = 000002  2217#  2227  3757  4456
SW02   = 000004  2216#  2226  3429  3712
SW03   = 000010  2215#  2225
SW04   = 000020  2214#  2224  5366  6735  6770
SW05   = 000040  2213#  2223  5515  5579
SW06   = 000100  2212#  2222  5286
SW07   = 000200  2211#  2221  4605
SW08   = 000400  2210#  2220
SW09   = 001000  2209#  2219
SW1    = 000002  2227#
SW10   = 002000  2208#  5445
SW11   = 004000  2207#
SW12   = 010000  2206#
SW13   = 020000  2205#  5448  7284
SW14   = 040000  2204#
SW15   = 100000  2203#  3822  5811  5837
SW2    = 000004  2226#
SW3    = 000010  2225#  4504  4751
SW4    = 000020  2224#
SW5    = 000040  2223#  5612
SW6    = 000100  2222#
SW7    = 000200  2221#  3724
SW8    = 000400  2220#
```

```
SW9    = 001000  2219#
SYSTAT   053472  3433  9678#
T        051466  5629  5637  9678#
TABLE    055252  6507  9702#
TABLE0   055272  9702  9713#
TABLE1   055340  9703  9721#
TABLE2   055406  9704  9729#
TABLE3   055454  9705  9737#
TABLE4   055522  9706  9745#
TABLE5   055570  9707  9753#
TABLE6   055636  9708  9761#
TABLE7   055704  9709  9769#
TAB.XY=  001114  2515#  2522
TAP    = 040000  2399#
TBITVE=  000014  2261#
TD       037514  8826  8835#
THEAD    016500  5098  5103#
TIMER    034564  8224#  8426#  8549#  8693#  8746#  8838#  8951#  8996#  9039#  9054#  9076#  9093  9095#
                 9158#  9164#  9170#
TITLE    057512  3320  9942#
TKVEC  = 000060  2268#  7158#  7159#
TPVEC  = 000064  2269#
TRAPVE=  000034  2267#  3289#  3290#  3317#
TRE    = 040000  2288#
TRFER    012052  3879  4300#
TRKLMT   001444  2666#  3518  6502
TRNSWT   034532  8157#  8571#  8718  8721#  8734  8752#  8761#  8840  8841#  9133  9143#
TRTVEC=  000014  2262#
TST1     003640  3276#
TYPDS  = 104405  6660  6768  8048#
TYPE   = 104401  3320  3325  3409  3410  3432  3433  3440  3447  3449  3451  3453  3455  3456
                 3464  3466  3470  3487  3530  3572  3592  3598  3786  3787  3788  3794  3806
                 3807  3812  3813  3814  3820  3840  3841  3842  3848  5447  5940  5966  6016
                 6021  6026  6032  6038  6044  6051  6056  6061  6066  6144  6149  6154  6199
                 6205  6253  6355  6380  6381  6384  6385  6386  6395  6398  6400  6402  6408
                 6477  6492  6526  6532  6619  6620  6625  6629  6630  6635  6655  6661  6675
                 6692  6693  6699  6701  6714  6715  6716  6717  6724  6765  6766  6774  6775
                 6781  6783  6789  6804  6946  7172  7173  7181  7182  7189  7212  7218  7223
                 7227  7232  7237  7238  7240  7243  7247  7292  7300  7324  7341  7343  7346
                 7348  7352  7359  7407  7536  7632  7708  7739  7740  7743  7756  7767  7786
                 8044#  9788  9800  9866  9868  9871  9877  9880
TYPEST   023122  3573  5980#  6369  6790
TYPOC  = 104402  7332  7356  7742  8045#  9870  9879
TYPON  = 104404  8047#
TYPOS  = 104403  3437  3595  3791  3817  3845  6013  6392  6481  6529  6622  6632  6696  6721
                 6778  6786  8046#
TYPRI4   030076  5996  5998  6974#
UCPAR    006736  3773  3806#
ULDFLG   034540  8184#  8372#  8452  8467#  8650#  8716#  8753#  8916  9003  9005#  9024  9026#  9142#
UNIT     001344  2628#  3746#  3789  3815  3843  5510  6769#  6776  6784
UNS    = 040000  2366#
UNSAF    012306  3873  4350#
UNTASN   053356  6265  6281  9678#
UNTMSG   053305  3592  6620  6630  6693  9678#
UNTNOT   053334  6351  6371  9678#
UNTOFF   053313  3451  6324  9678#
```

```
UNTON   053324          3455    9678#
UPE     = 020000        2312#
US1     = 000001        2299#
US2     = 000002        2300#
US4     = 000004        2301#
VV      = 000100        2339#
WAIT    001634          2765#   3564    3618    3620    3632    3673
WATPAK  025402          6251    6417#
WCE     = 040000        2313#
WCF     = 000040        2357#
WCFER   012210          3897    4331#
WCKD    = 000151        2461#   2816
WCKER   010166          3876    4012#
WCKHD   = 000153        2462#   2817
WCSEL   001476          2691#   5175    9687
WC.HK   037670          8852    8869#
WLE     = 004000        2363#
WLEER   011664          3903    4260#
WRL     = 004000        2344#
WRTDAT= 000161          2463#   2818    5387
WRTHD   = 000163        2464#   2819
WRTPK   017704          3523    3653    5339#
WRTPK1  017734          5341    5343    5347#
WRTPK2  020166          5346    5381#
WRTPK3  020212          5345    5380    5385#
WRTPK4  020244          5384    5390#
WRTPK5  020252          5364    5392#
WRT.AD  042000          9243*   9253*   9256#   9661
WRT.RM  041710          8399    8403    8580    8584    8588    8596    8606    8610    8621    8628    8638    8652    8662
                        8683    8698    8711    8941    8972    9011    9240#
WRT.R1  041774          9254#   9274
WRT.R2  042062          9240*   9273#
WRT.R3  042066          9249    9260    9263    9269    9275#
WRT.R4  042072          9265    9277#
WRT.R5  042074          9276    9278#
WRT.WD  041776          9241*   9245    9252*   9255#   9661
XWCNT   016772          5108    5112    5162#
ZROIND  001374          2641#   4469*   4514*   4520*   4524
$APTHD  001100          2502    2508#
$ASTAT= ****** U        7478    7493
$ATYC   032024          7449    7451#
$ATY1   032000          7447#
$ATY3   032006          7392    7448#
$ATY4   032016          7305    7450#
$AUTOB  001150          2540#   3337*   3350    3403    3491    3514    7736    7826
$BASE   001260          2602#   3344    3346
$BDADR  001136          2535#
$BDDAT  001142          2537#
$BDSEC= 000124          5219    5408    6562    6591    9542#   9546
$BELL   001174          2553#   5447    7292    7315
$BUF    = 000006        3623#   3659*   4438    4460    4903    4982    4988    4993    4997    5039    5528    5677    5684
                        9492#
$CDW1   001264          2604#   3405    6572*   6588*   6613*   6617    6627    6636    7568*
$CDW2   001266          2605#   6577*   6586    6614*
$CHARC  031774          7409*   7419*   7426    7435*   7440#
$CKSWR  033214          7728#   8052
```

```
$CMTAG  001114          2523#  3280   3281   3295
$CM3  = 000000          2553#
$CNTLC  031170          7173   7232   7257#
$CNTLG  033623          7182   7739   7821#
$CNTLU  033616          7227   7756   7820#
$CODE = 000024          4403   4452   4479   4530   4671   4765   4908   4910   5037   5041   5245   5288*  5296*
                        5311   5362*  5382*  5386*  6452*  6461   8869   8871   8879*  9503#
$COMND= 000002          4792*  4812*  4826*  4847*  5290*  5291   5295*  5298   5383*  5387*  6454*  6567*  8880*
                        8881#  9489#
$CPUOP  001232          2576#
$CRLF   001201          2555#  3409   3432   3466   3470   3786   3794   3806   3812   3820   3840   3848   4375
                        4382   4388   4394   4400   4597   4617   4629   4734   4746   4780   4782   5450   5451
                        5452   5472   5505   5507   5532   5548   5567   5587   5606   5621   5645   5668   5687
                        5708   5723   5736   5743   5776   5785   5809   5810   5835   5836   5966   5997   6144
                        6355   6402   6408   6492   6532   6625   6635   6701   6714   6715   6724   6765   6781
                        6789   6804   7172   7181   7237   7300   7315   7324   7343   7348   7352   7408   7443
                        7767   9866
$CYL  = 000012          4463   4845*  4916   5043   5078   5278   5306*  5353*  5354   5361*  5594   6515*  6568*
                        8877   9495#
$DBLK   033204          7674   7708   7716#
$DB2D   034050          5794   5802   5807   5822   5827   6023   6029   6035   6041   7131   7923#
$DB2O   034244          7148   7984#
$DECVL  034230          7925   7971#
$DEVCT  001214          2567#  6812*
$DEVM   001262          2603#
$DOAGN  027460          6820   6825   6831#
$DRVID= 000224          6387   6539*  6540*  6541*  6542*  6543*  6544*  9546#  9550
$DSPLY  030124          6987#  8057
$DTBL   033174          7677   7712#
$ENDAD  027450          2488   6827#
$ENDCT  027434          6822#
$ENV    001224          2572#  3331   3339   3407   7302   7387   7456   7480
$ENVM   001225          2573#  3312   7389   7394   7458
$EOP    027112          6751#
$EOPCT  027426          6819#  6823
$ERFLG  001117          2526#  7287*  7315
$ERMAX  001131          2532#
$ERROR  031176          3287   7280#
$ERRPC  001132          2533#  7294*  7295*  7296   7315   7330
$ERRTB  003542          3218#  7338
$ERRTY  031362          7299   7323#
$ERTTL  001126          2530#  7293*  7315
$ESCAP= ****** U        8894   8945   8948   9211   9270   9479
$ETABL  001224          2571#
$ETEND  001270          2514   2606#
$FAIR = 000072          3625*  3662*  3670*  3671   9518#
$FATAL  001206          2564#  7484*
$FFLG   032244          7447*  7450*  7478   7487*  7495#
$FILLC  001172          2551#  7412   7443
$FILLS  001171          2550#  7443
$FIRST= 000122          6498*  9538#
$FMT  = 000001          3978*  9488#  9489   9490   9491   9492   9493   9494   9495   9496   9497   9501
$GDADR  001134          2534#
$GDDAT  001140          2536#
$GET42  027440          3556   5943   6730   6824#
$GTSWR  033264          7186   7740#  8050
```

```
$HARD =  000062  6069  6098  6100* 9514#
$HD   =  000000  2139
$HIBTS   001100  2509#
$HINUM   033750  3293* 6844  7843  7851  7856* 7861#
$ICNT    001120  2527#
$ILLUP   032412  7506  7522  7541#
$INTAG   001151  2541# 7768  7826
$ITEMB   001130  2531# 7296* 7304  7315  7327
$LF      001202  2556# 7247  7315  7443
$LFLG    032243  7488* 7494#
$LKCSB   001276  2613# 5927*
$LKCSR   001274  2612# 5921  5928*
$LKS     001302  2615# 5932  5937*
$LLVEC   001304  2616# 5934
$LONUM   033752  3294* 5099  6843  7842  7849  7855* 7862#
$LPADR   001122  2528#
$LPERR   001124  2529#
$LPVEC   001300  2614# 5924
$LSTAD   056236  3379  9846* 9850#
$MADR1   001236  2589#
$MADR2   001242  2593#
$MADR3   001246  2596#
$MADR4   001252  2599#
$MAIL    001204  2510  2514  2562# 3277  3311  3331  7302  7387
$MAMS1   001234  2583#
$MAMS2   001240  2591#
$MAMS3   001244  2594#
$MAMS4   001250  2597#
$MBADR   001102  2510#
$MFLG    032242  7448* 7454  7489* 7493#
$MISPO=  000066  5830  6071  6122  6124* 9516#
$MNCW    033641  7743  7824#
$MSGAD   001220  2569# 7464* 7467
$MSGLG   001222  2570# 7469*
$MSGTY   001204  2563# 7462  7470* 7482  7486*
$MSWR    033630  7740  7822#
$MTYP1   001235  2584#
$MTYP2   001241  2592#
$MTYP3   001245  2595#
$MTYP4   001251  2598#
$NCODE=  000074  3735* 5102* 5162  5165  5190  5197  5248* 5276  5288  5289  9522# 9523  9524
                 9525  9526  9527  9528  9532
$NCYL =  000100  3731* 5106* 5107  5109* 5161* 5222  5306  9526#
$NEXT =  000104  3649  3741* 5203* 5314* 5390* 6443  9528#
$NPATC=  000075  3740* 5202* 5304  9523#
$NSEC =  000076  3733* 5105* 5110* 5128* 5305  9524#
$NTRK =  000077  3732* 5111* 5144* 9525#
$NULL    001170  2549# 7414  7443
$NWRDL=  000102  3734* 5164* 5196* 5307  5308  9527#
$NWTST=  000000  3275#
$OCNT    032764  7604* 7633* 7646#
$OCTVL   034346  7986  8011#
$OMODE   032766  7599* 7603* 7608  7611* 7622* 7648#
$OPERC=  000036  5076* 5077* 5340  5342  5792  5820  6010  6794  9508#
$PACK =  000026  3513* 3516* 3651  5344  5363  5379  5393* 6312* 9504#
$PASS    001212  2565# 3311* 6813* 6814* 6816* 6817* 6834
```

```
$PASSC= 000070          6017    6309*   6767    6772    6802*   9517#
$PASTM  001106          2512#
$PATTC= 000030          5050    5304*   5389*   6455*   6456*   9506#
$POSIT= 000042          4918*   4919*   5080*   5081*   5825    6760    6763    9509#
$POWER  032420          7537    7544#
$PREVA= 000032          5078    5278*   5279*   5282*   5283*   5284*   5349*   5350*   5351*   5635    5639    5643    5651
                        8877*   8878*   9507#
$PREVO= 000027          5274*   5275*   5293    5300    5347*   5482    8876*   9505#
$PSEL = 000003          9490#
$PWRAD  032406          7539#
$PWRDN  032246          3291    7506#   7534
$PWRMG  032402          7537#
$PWRUP  032320          7516    7522#
$QUES   001200          2554#   7240    7315    7443    7786
$RAND   033652          5090    5181    5261    5339    7838#
$RDCHR  033476          7799#   8053
$RDDEC= ****** U        8055
$RDLIN  030700          7200#   8054
$RDOCT= ****** U        8055
$RDSZ = 000001          7820#
$READ = 000052          4914*   4915*   5805    6754    6757    9511#
$REG  = 000014          6443    9496#   9576    9577    9584    9585    9592    9593    9600    9601    9608    9609    9616
                        9617    9624    9625    9632    9633
$RESRE  034012          7897#   8056
$RETRY  015344          3937    4023    4091    4136    4176    4212    4240    4310    4340    4356    4867#   4885
$RMADR  001270          2610#   3346*   3347    3353    9664    9867    9885
$RMAS = 000252          9557#   9670
$RMBA = 000240          4439    4661    4692    4713    4753    4773    4902    5529    5582    5683    5694*   5695    9552#
                        9670
$RMCS1= 000234          3749    3751    4415    5274    5347    5476    8876    9550#   9551    9552    9553    9554    9555
                        9556    9557    9558    9559    9560    9561    9562    9563    9564    9565    9566    9567    9568
                        9569    9576    9584    9592    9600    9608    9616    9624    9632    9666
$RMCS2= 000244          3874    4033    4084    4128    4168    4274    4289    4306    4417    9554#   9666
$RMDA = 000242          5105    5352    5615    5666    5897    5898    9553#   9670
$RMDB = 000256          5698    9559#   9670
$RMDC = 000270          3728    4156    4916    5106    5353    5619    5654    5899    9564#   9674
$RMDS = 000246          3753    3877    3906    9555#   9666
$RMDT = 000262          6497*   9561#   9670
$RMEC1= 000300          3925    3927    4677    5730    9568#   9666
$RMEC2= 000302          3929    4695    5734    6405    6448    9569#   9577    9585    9593    9601    9609    9617    9625
                        9633    9666
$RMER1= 000250          3880    3883    3886    3889    3892    3895    3898    3901    3904    3909    3912    3953    3970
                        3972    4012    4043    4056    4058    4113    4148    4419    4878    4881    9556#   9666
$RMER2= 000276          3915    3917    4421    9567#   9666
$RMHR = 000272          9565#   9674
$RMLA = 000254          9558#   9670
$RMMR1= 000260          9560#   9670
$RMMR2= 000274          9566#   9666
$RMOF = 000266          9563#   9674
$RMSN = 000264          9562#   9674
$RMVEC  001272          2611#   3343*   3348    3354    9876
$RMWC = 000236          4434    4462    4662    4755    5526    5585    5700    9551#   9670
$RTNAD  027462          6833#
$R2A  = ****** U        8057
$SAVRE  033754          7881#   8055
$SAVR6  032416          7515*   7523    7524*   7525*   7543#
```

```
$SB20   030436          4688    5872    6018    6048    6053    6058    6063    6072    6146    6151    6156    7129#
$SB20   030466          5856    7146#
$SEC  = 000010          4466    4844#   5046    5226    5279    5305#   5352#   5360#   5604    6513#   6578#   6585#   6586
                        6615#   8878    9493#
$SETUP= 000156          3263#   3286    3287    3289    3291    3293    3295    3328    6816    7281    7312    7314    7723
                        7826
$SIZE   056142          3378    9829#
$SKI  = 000064          5833    6070    6110    6112#   9515#
$SOFT = 000060          6068    6086    6088#   9513#
$SSEC = 000022          4472    4477    4478    4665    4757    5310#   5313#   5381#   5385#   5703    6460#   6463#   9502#
$STUP = 177777          3263#
$SUPRS  030036          4689    5795    5803    5808    5823    5828    5873    6958#
$SVPC = 000210          2486#   2491
$SWR  = 122000          2128#   2139    2143    2144    2145    2146    2553    3277    3295    6748    6816    6826    6832
                        6834    7273    7274    7275    7276    7277    7290    7297    7309    7313    7315    7540
$SWREG  001226          2574#   3314
$STATUS= 000016         3694    3747    3764    3770    3772    3774    3776    3778    3780    3871    3962    3965    3982
                        4047    4816    4852    4868    4874    4900    5523    5674    6582    9497#   9674
$TERM = 000032          8058#
$TESTN  001210          2565#   3277#   6834#
$TIME   023670          5454    5995    6142#   6203    7286
$TKB    001162          2546#   6204    6255    7160    7721    7732    7749    7803    7809
$TKINT  030516          3327    3489    7158#
$TKS    001160          2545#   6256#   7161#   7175#   7185#   7187#   7721    7730    7746    7770#   7801    7807
$TKSRV  030546          7158    7168#
$TN   = 000002          2128#   2139    3275    3277#
$TNPWR  034160          7930    7931    7951#
$TOTAL= 000056          5797    6067    6134    6136#   6737    9512#
$TPB    001166          2548#   7432#   7443
$TPFLG  001173          2552#   7381    7443
$TPS    001164          2547#   7430    7443
$TRANS= 000046          4906#   4907#   4912#   4913#   5800    9510#
$TRAP   034364          3289    8021#
$TRAP2  034406          8032#   8043
$TRK  = 000011          4843#   5224    5357    5359#   5599    6514#   6569#   9494#
$TRP  = 000015          8036#   8045#   8046#   8047#   8048#   8049#   8050    8051#   8052    8053#   8054#   8055#   8056#
                        8057#   8058#
$TRPAD  034420          8026    8043#   8058
$TSTM   001104          2511#
$TSTNM  001116          2525#   7289    7315
$TTYIN  031156          7202    7203    7215    7238    7252    7256#
$TYPBN= ****** U        8049
$TYPOS  032770          7662#   8048
$TYPE   031516          6977    6990    7381#   7475    8036    8044
$TYPEC  031730          7411    7418    7425    7430#   7431    7772
$TYPEX  031776          7436    7438    7441#
$TYPOC  032566          7602#   8045
$TYPON  032602          7601    7604#   8047
$TYPOS  032542          7597#   8046
$UNIT   001216          2568#   2626
$UNITM  001110          2513#
$USWR   001230          2575#
$VECT1  001254          2600#   3341    3343
$VECT2  001256          2601#
$WRDL = 000020          4436    4461    4563    4754    4912    4938    4945    4947*   4948    4949*   4980    4989    4994
                        4998    5040    5307#   5370#   5371#   5377#   5525    5680    5701    6457#   9501#   9502    9503
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
                        9504    9505    9506    9507    9508    9509    9510    9511    9512    9513    9514    9515    9516
                        9517    9518    9522
$WRDM = 000004          4848#   5308#   5309#   5372#   5373#   5374    5376#   5378#   6458#   6459#   6570#   9491#
$$GET4= 000000          6826#
$OFILL  032765          7598#   7602#   7612    7617#
$4OCAT= ****** U        7299
.     = 060065          2470#   2474#   2486    2487#   2489#   2491#   2492#   2498    2499#   2501#   2503#   2515    2522#
                        2557    2841#   2894#   2900#   3284    3342    3345    3515    3630    3646    3666    3675    3872
                        3875    3881    3884    3887    3890    3893    3896    3899    3902    3910    3913    4693    6834
                        6906    7256#   7259#   7285    7315    7362#   7443    7496#   7518    7542    7716#   7721    7826
                        7971#   8011#   8058    9377#   9378#   9379#   9380#   9381#   9382#   9383#   9384#   9385    9575#
                        9576    9577#   9583#   9584    9585#   9591#   9592    9593#   9599#   9600    9601#   9607#   9608
                        9609#   9615#   9616    9617#   9623#   9624    9625#   9631#   9632    9633#   9642#   9650#   9678#
                        9819#   9937#   9938
.$ASTA= ****** U        7448    7451
.$X   = 001100          2498#   2503
```

```
A       6078#  6079   6091   6103   6115   6127
CKCHR   2128#  7080   7094
CKDIG   2128#  6666
CKNUM   2128#
COMMEN  2271#
ENDCOM  2271#
ERENTR  7267#  7282
ERRCAL  8062#  8894   8945   8947   9210   9270
ERROR   2165#  8894   8945   8948   9211   9270
ESCAPE  2271#
GETPRI  2271#  9835
GETSWR  2128#  2271#  3328
MORETA  2492#  2608
MULT    2271#
NEWTST  2271#  3275
POP     2271#  4583   5234   5431   5535   6464   6639   7490   7491   7527   7528   7703   7857   7902
PUSH    2271#  4574   5213   5405   5468   6431   6556   7451   7453   7474   7508   7514   7662   7838   7882
REPORT  2271#
RM03.D     1#  8062
SCOPE   2166#
SETPRI  2271#
SETTRA  8036#  8045   8046   8047   8048   8050   8052   8053   8054   8055   8056   8057
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   3534   3538   5436   5440   5877
        5881   6746   7263   7269   7318   7366   7446   7504   7520   7574   7652   7720   7723   7791   7829
        7866   7912   7975   8015   8060   8073   9480   9484   9644   9648   9779   9823
SWRSU   2271#  3295#
TRMTRP  8036#  8058
TYPBIN  2271#
TYPDEC  2271#
TYPNAM  2271#
TYPNUM  2271#
TYPOCS  2271#  3434   3593   3789   3815   3843   6011   6390   6479   6694   6719   6776   6784
TYPOCT  2271#  7330   7354   7741
TYPTXT  2271#
XXEP    6744#  6752
$$CMRE  2516#
$$CMTM  2516#
$$ESCA  2271#
$$NEWT  2271#  3275
$$SET   8036#  8045   8046   8047   8048   8050   8052   8053   8054   8055   8056   8057
$$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
.$ACTI  2128#  2482
.$APTB  2128#  2558#
.$APTH  2128#  2493
.$APTY  2128#  7444
```

```
.$CATC   2128#   2468
.$CMTA   2128#   2516
.$DB2D   2128#   7910
.$DB2O   2128#   7973
.$EOP    2128#   6744
.$ERRO   2128#   7267
.$ERRT   2128#   7316
.$POWE   2128#   7502
.$RAND   2128#   7827
.$READ   2128#   7718
.$SAVE   2128#   7864
.$SIZE   2128#   9821
.$TRAP   2128#   8013
.$TYPD   2128#   7650
.$TYPE   2128#   7364
.$TYPO   2128#   7572

. ABS.   060065     000

 ERRORS DETECTED:  0

 RM03:CZRMB8,RM03:CZRMB8.SEQ/NL:MD:MC:CND:TOC/DOC/SOL/CRF=RM03:RMDRV5.P11,RM03:CZRMB8.P11
 RUN-TIME:  34 27 2 SECONDS
 RUN-TIME RATIO:  2633/64=40.7
 CORE USED:  42K  (83 PAGES)

 DOCUMENT PAGES:  211
```