RP04/05/06

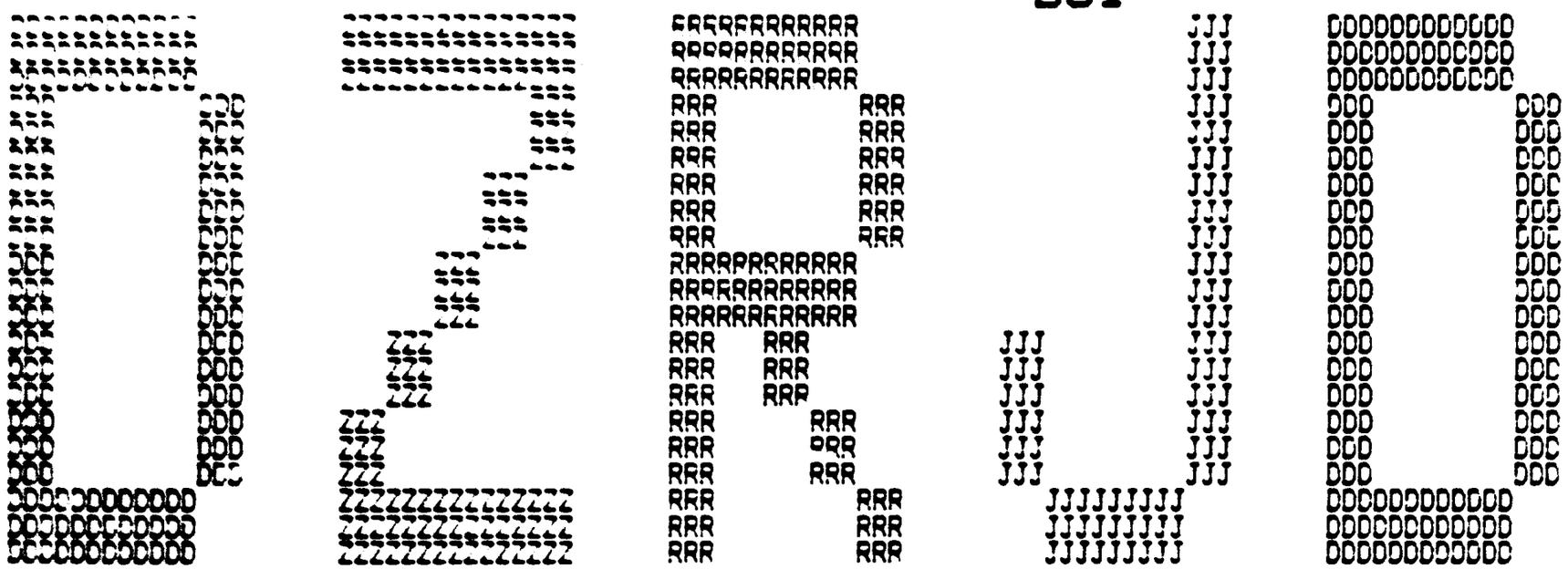
MULTI-DRIVE LOGIC EXER

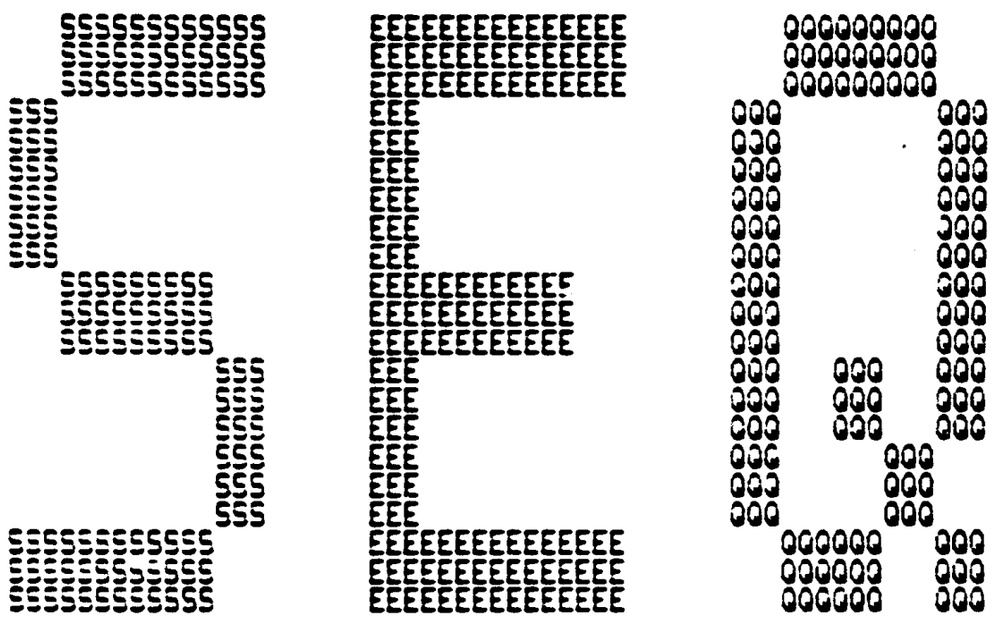
MD-11-DZRJD-A

EP-DZRJD-A-DL-A NOV 1976

FICHE 1 OF 1 MADE IN US

DZR-D
SED





LPTSPL Version 101(2111) Running on MTA140
 START User WELLINGHAM,AI[1,2] Job DZRJD Seq. 5145 Date 07-May-76 11:16:18 Monitor RV242A KI10 SYS#514 *START*
Request created: 07-May-76 11:06:04
File: RPSB:DZRJD.SEQ<055>[400,3722] Created: 03-May-76 10:15:22 Printed: 07-May-76 11:16:19
QUEUE Switches: /FILE:ASCII /COPIES:1 /SPACING:1 /LIMIT:448 FORMS:NORMAL

```
        .REM    @
```

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

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

PRODUCT NAME: RP04/5/6 MULTI-DRIVE EXERCISER PROGRAM

DATE CREATED: MAY 1976

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: C. HESS

CONTENTS

1. ABSTRACT

THE RP04/5 & MULTIDRIVE EXERCISER PROGRAM IS DESIGNED TO PERFORM AN INTERACTIVE TEST ON RF04/5/6 DISK DRIVES CONNECTED TO A MASSBUS SUBSYSTEM. THE SUBSYSTEM MAY BE COMPOSED OF INTERMIXED RP04, RP05 OR RP06 DISK DRIVES 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 SPECIFICATIONS.

THE RP04/5/6 MULTIDRIVE 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 NON DUAL 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 PROCESSING.

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.

PROGRAM/OPERATOR COMMUNICATIONS ARE THROUGH THE KEYBOARD; DYNAMIC PROGRAM OPTIONS ARE SELECTED BY SWITCH REGISTER SETTINGS. 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 RP04, RP05, OR RP06 DISK DRIVE

OPTIONAL

ADDITIONAL MEMORY TO A MAXIMUM OF 28K
1 TO 7 ADDITIONAL RP04/5/6'S ON THE SAME RH11 OR RH70

2.2 MEDIA

THE RP04/5/6 MULTIDRIVE EXERCISER PROGRAM REQUIRES FORMATTED DISK PACKS WHICH CONTAIN RANDOM OR PATTERNED DATA RECOGNIZED BY THE EXERCISER. DISK PACKS USED BY THE PROGRAM MAY BE GENERATED BY THE RP04/5/6 FORMATTER PROGRAM (MAINDEC-11-DZRJB) OR BY THE 'W' COMMAND OF THE RP04/5/6 MULTIDRIVE EXERCISER (SEE SECTION 4.4). THE PACKS MUST BE FORMATTED IN 22 SECTOR (16 BIT) MODE; THE ALTERNATE (20 SECTOR - 18 BIT) MODE IS NOT SUPPORTED.

2.3 PRELIMINARY PROGRAMS

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

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

RP04/5/6 DUAL CONTROLLER LOGIC TEST (FOR DUAL PORT DRIVE TESTING)
PART 1 (MAINDEC-11-DZRJE)
PART 2 (MAINDEC-11-DZRJF)

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.

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

3.4 ONCE THE PROGRAM IS LOADED AND STARTED, 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).

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 RP04'S, RP05'S, AND RP06'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 MAY BE DETERMINED BY EITHER OF THE FOLLOWING CONDITIONS. THE END OF PASS CONDITION USED IS DETERMINED BY PARAMETER 'ENDET'.

A. IF PARAMETER 'ENDET' 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 'ENDET' 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 'PASCNT'.
B. THE TOTAL ERRORS ACCUMULATED EXCEED 100.
C. A FATAL ERROR OCCURS: EM12 OR EM14.

3.6 RUN TIME

THE EXERCISER PROGRAM MAY BE RUN IN TWO MODES. THE MODE IS DETERMINED BY THE VALUE IN PARAMETER 'MAXDL'. IF 'MAXDL' IS ONE SECTOR, THE PROGRAM RUNS IN A SEEK HEAVY MODE; IF 'MAXDL' APPROACHES

ONE TRACK IN SIZE (5720 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 2.5 HRS (TO REACH 1.875 X 10↑8 WORDS)
TO
8 DRIVES - APPROXIMATELY 11 HRS (FOR ALL DRIVES TO REACH 1.875 X 10↑8 WORDS)

NOTE: IF SW<01> = 1 (NO SOFTWARE DATA COMPARSIONS), THE TUN TIMES ARE THE FOLLOWING VALUES, APPROXIMATELY:

1 DRIVE - 1.7 HRS (1.875 X 10↑8 WORDS READ)
ADD 1/2 HOUR FOR EACH ADDITIONAL DRIVE TESTED.

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 'MAXDL' = 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 RP04/5/6 MULTIDRIVE 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 THROUGH EACH PROCESSOR WERE RUNNING INDEPENDENTLY OF THE OTHER.

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 GROJP BEING ENTERED.

4.1 DATE & OPERATOR IDENTIFICATION

WHEN THE PROGRAM IS INITIALLY STARTED, IT 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 PERFORMED (SEE SECTION 4.4.3).

4.2 PARAMETERS

WHEN THE PROGRAM IS STARTED FROM LOCATION 200, 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.

4.2.1 KEYBOARD ENTRY PARAMETERS

NAME	BASE	DEFAULT VALUE	VALUE RANGE	FUNCTION
MAXDL	10	(SEE NOTE)		CONTROLS THE MAXIMUM BUFFER SIZE USED FOR DATA TRANSFERS
PASCNT	10	1	1 - 999	NUMBER OF PASSES TO END OF TEST.
INTRVL	10	5	0 - 256	DETERMINES THE INTERVAL (IN MINUTES) BETWEEN AUTOMATIC PERFORMANCE SUMMARY TYPEOUTS
				ERRORS PRINTED OUT IF SW<07>=0
CMPLMT	10	3	0 - 'MAXDL'	THE NUMBER OF DATA COMPARSION
WCSEL	8	000000	0 OR 1	IF PARAMETER = 0, THE DATA TRANSFER WORD COUNT IS RANDOMLY SELECTED BETWEEN 4 (10) AND THE VALUE IN 'MAXDL'. IF PARAMETER = 1, THE DATA TRANSFER WORD COUNT WILL BE THE VALUE IN 'MAXDL'
ENDET	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

AUTOCK	8	000001	0 OR 1	IF PARAMETER = 1, THE PROGRAM PERFORM WRITE CHECKS AFTER

				EACH WRITE COMMAND. IF PARAMETER = 0, THE PROGRAM WILL PERFORM WRITE CHECKS RANDOMLY.
	NOTPRT	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.

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 5980 (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
1144	$TKS	177560	TTY KEYBOARD STATUS REGISTER
1146	$TKB	177562	TTY KEYBOARD BUFFER REGISTER
1150	$TPS	177564	TTY PRINTER STATUS REGISTER
1152	$TPB	177566	TTY PRINTER BUFFER REGISTER
1174	$LKCSR	172540	ADDRESS OF KW11-P STATUS REGISTER
1176	$LKCSB	172542	ADDRESS OF KW11-P COUNTER BUFFER
1200	$LPVEC	104	KW11-P VECTOR ADDRESS
1202	$LKS	177546	ADDRESS OF KW11-L STATUS REGISTER
1204	$LLVEC	100	KW11-L VECTOR ADDRESS
1212	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).

	INITIAL	VALUE

LOC	TAG	VALUE	RANGE	FUNCTION
1412	BEGPAT	10	1 - 15	THE CODE FOR THE STARTING PATTERN. (IF A WRITE ORDER OR A WRITE CHECK ORDER IS SPECIFIED IN 'BEGCOD')
1414	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
1416	BEGSIZ	4C4	4 - MAXDL	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 PP04/5/6 INTERRUPT. THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER

IMAGE MUST BE ENTERED. LEADING ZEROS ARE NOT REQUIRED. 'RUBOUT' AND 'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING ERRORS DURING SWITCH ENTRY.

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

4.4 KEYBOARD COMMANDS

THROUGH THE KEYBOARD COMMANDS, THE OPERATOR MAY ASSIGN DRIVES FOR TEST ('T' COMMAND), WRITE AND CHECK DATA PACKS ('W' 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 '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 / RP04' (OR RP05 OR RP06)

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

NAME	BASE	DEFAULT VALUE	VALID RANGE	FUNCTION

MINCYL	10		(SEE NOTE)	THE MINIMUM CYLINDER ADDRESS
MAXCYL	10		(SEE NOTE)	THE MAXIMUM CYLINDER ADDRESS
MINTRK	10	0	0 - 18	THE MINIMUM TRACK ADDRESS
MAXTRK	10	18	0 - 18	THE MAXIMUM TRACK ADDRESS
MINSEC	10	0	0 - 21	THE MINIMUM SECTOR ADDRESS
MAXSEC	10	21	0 - 21	THE MAXIMUM SECTOR ADDRESS

NOTE: 1. THE ADDRESS LIMITS ARE IN DECIMAL

2. THE MAXIMUM VALUES OF 'MINCYL' AND 'MAXCYL' WILL BE EITHER 410 (10) OR 814 (10) DEPENDING ON THE TYPE OF DRIVE.

3. 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.

THE PROGRAM WILL THEN ASK FOR THE ADDRESSES OF KNOWN BAD SPOTS ON THE DISK PACK USED, UP TO 16 ADDRESSES MAY BE ENTERED:

'BAD TRK/SEC ADRS FOR DRV #N ?'

THE OPERATOR MAY DECLARE UP TO 16 BAD LOCATIONS ON THE PACK BEING USED. THE LOCATION MAY BE AN ENTIRE CYLINDER, A BAD TRACK, OR A SINGLE SECTOR. THE FORMATS USED ARE AS FOLLOW:

FORMAT 1: C,T,S<CR>

A. THE PROGRAM WILL INHIBIT DATA ERROR MESSAGES OR WILL IDENTIFY DATA ERRORS WHICH OCCUR AT THE SPECIFIED ADDRESS, DEPENDING ON THE VALUE OF PARAMETER 'NOTPRT'.
B. LEADING ZEROS ARE NOT REQUIRED.

FORMAT 2: C,T<CR>

A. WHEN THIS FORMAT IS USED, THE ENTIRE TRACK WILL BE CONSIDERED BAD; DATA ERRORS WILL BE HANDLED AS IN 'FORMAT 1', ABOVE.

B. LEADING ZEROS ARE NOT REQUIRED.

FORMAT 3: C<CR>

A. WHEN THIS FORMAT IS USED, THE ENTIRE CYLINDER WILL BE CONSIDERED BAD; DATA ERRORS WILL BE HANDLED AS IN 'FORMAT 1' ABOVE.
B. LEADING ZEROS ARE NOT REQUIRED.

NOTE: CYLINDER, TRACK, AND SECTOR ENTRIES ARE IN DECIMAL.

THE OPERATOR MAY TERMINATE THE BAD ADDRESS ENTRY BY ENTERING A 'PERIOD' IN RESPONSE TO THE ENTRY REQUEST OR BY TERMINATING AN ENTRY WITH A 'PERIOD' INSTEAD OF A 'CARRIAGE RETURN'.

4.4.1 'T' COMMAND

USED TO ASSIGN A DRIVE(S) FOR TEST. THIS COMMAND IS REQUIRED 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, ONLY DRIVES BEING

TESTED WILL BE DEASSIGNED - THE
ERROR MESSAGE IN (1) ABOVE WILL NOT
BE DISPLAYED.

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

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 RP04/5/6 MULTI-DRIVE 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.
W0<CR> - GENERATE A DATA PACK ON DRIVE 0.

NOTES: 1. DATA PACKS GENERATED BY THE RP04/5/6 FORMATTER PROGRAM (MD-11-DZRJB) OR BY THE RP04/5/6 MECHANICAL & READ/WRITE PROGRAM (MD-11-DZRJA), TEST 20, ARE ACCEPTABLE. (PACKS WRITTEN BY TESTS 16, 17 OR 21 OF 'DZRJA' CANNOT BE USED AND MUST BE REWRITTEN.)

2. THE 'W' COMMAND SHOULD NOT BE USED UNLESS 'MAXDL' PARAMETER IS APPROXIMATELY 1 TRACK IN SIZE - 5000 (10). IF THE BUFFER SIZE IS MUCH LESS THAN 1 TRACK, THE

TIME REQUIRED TO WRITE A DATA PACK IS TOO GREAT TO BE PRACTICAL.

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 SET SET DURING THE OPERATION OF THE 'W' COMMAND, THE DRIVE PERFORMING THE 'W' COMMAND WILL IGNORE THE SWITCH.

6. THE DATA WRITTEN IS VERIFIED BY A 'WRITE CHECK DATA' COMMAND.

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.
R0<CR> - READ THE PACK ON DRIVE 0.

NOTES: 1. THE PROGRAM WILL PERFORMA 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 GENERAL COMMAND INFORMATION

A. WHEN A COMMAND IS ENTERED, THE PROGRAM WILL TYPE OUT THE TIME

B. IF THE COMMAND ENTERED IS NOT VALID, THE PROGRAM WILL TYPE 'INVALID COMMAND'.

C. DRIVES ASSIGNED (WITH THE 'T' COMMAND) OR DEASSIGNED (WITH THE 'D' COMMAND) MAY BE ENTERED IN ANY SEQUENCE.

D. THE ERROR RESPONSES FROM THE PROGRAM ARE AS FOLLOWS

RESPONSE	COMMAND(S)
?UNIT N OFFLINE	T, W, R
?UNIT N NOT ASSIGNED	D, S
?UNIT N ALREADY ASSIGNED	T, W, R
?UNIT N NOT PRESENT	T, W, R
?UNIT N UNSAFE	T, W, R
?UNIT N NOT AN RP04/5/6	T, W, R

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' OR 'OCYL' 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 CORRECTED OR BECOMES 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 AT EACH OF THE FOLLOWING OFFSETS:

RP04/5	RP06
+400 MICRO-INCHES	+200 MICRO-INCHES
-400 MICRO-INCHES	-200 MICRO-INCHES
+800 MICRO-INCHES	+400 MICRO-INCHES
-800 MICRO-INCHES	-400 MICRO-INCHES

+1200 MICRO-INCHES +800 MICRO-INCHES
-1200 MICRO-INCHES -800 MICRO-INCHES

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

AFTER EACH WRITE OPERATION, THE DATA WRITTEN IS CHECKED WITH THE APPROPRIATE WRITE CHECK COMMAND - IF PARAMETER 'AUTOCK' IS 1. (IF 'AUTOCK' IS 0, WRITE CHECKS WILL BE PERFORMED RANDOMLY.)

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 RP04 SUBSYSTEM DOES NOT HAVE AN AUTOMATIC BAD TRACK HANDLING CAPABILTIY, THE MULTIDRIVE EXERCISER ALLOWS THE OPERATOR TO IDENTIFY UP TO 8 BAD TRACK/SECTOR LOCATIONS WHEN THE DRIVE IS ASSIGNED FOR TEST. (SEE SECTION 4.1 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 (RPAS=0) THE RH11 INTERRUPTED AND THE ATTENTION SUMMARY REGISTER (RPAS) 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 RP04 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.

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.

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:
'IXE', '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 SECTOF. THE OPERATION WILL BE RETRIED 3 TIMES.

EM33 PARITY ('PAR') ERROR AFTER OPERATION STARTED

THE 'PAR' BIT WAS SET WHEN THE OPERATION WAS COMPLETEL 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

AN INVALID ADDRESS ERROR OCCURRED DURING THE OPERATION.

EM36 WRITE LOCK ('WLE') ERROR

A WRITE OPERATION WAS ATTEMPTED BUT THE DRIVE WAS WRITE LOCKED.

EM40 RH11 OR UNIBUS TRANSFER ERROR

'TRE' IS SET IN THE RH11 CONTROL REGISTER AND NO DRIVE ERROR HAS OCCURRED. THE OPERATION WILL BE RETRIED 3 TIMES IF THE ERROR WAS CAUSED BY 'DLT', 'UPE', 'MXF', OR 'MDPE'.

EM41 BUS ADDRESS OR WORD COUNT INCORRECT

NO DRIVE ERROR OCCURRED BUT EITHER THE BUS ADDRESS INDICATES THAT AN INCORRECT NUMBER OF WORDS WERE TRANSFERED OR THE WORD COUNT REGISTER IS NOT ZERO.

EM42 DATA COMPARE ERRORS - NO DRIVE ERROR DETECTED

NO SUBSYSTEM ERROR WAS SIGNALED; HOWEVER, THE DATA DOES NOT COMPARE.

EM43 CAN'T MATCH DATA READ WITH A PATTERN

THE DATA IN THE BUFFER DOES NOT MATCH ANY OF THE STANDARD

PATTERNS.

EM44 ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11

THE OPERATION COMPLETED NORMALLY; HOWEVER, THE PROGRAM FOUND EITHER ERROR BITS IN THE RP04 SET OR ERROR BITS IN THE RH11 SET.

EM45 ECC LOGIC FAILURE

THE CONTENTS OF EITHER THE ECC POSITION REGISTER (RPEC1) OR THE CONTENTS OF ECC PATTERN REGISTER (RPEC2) ARE NOT VALID. THE POSITION REIGSTER IS EITHER'0' OR > 10041 (8) OR THE PATTERN REGISTER CONTAINS ZEROS.

EM46 BUS ADDRESS OR WORD COUNT NOT CONSISTENT

THE PROGRAM WAS PROCESSING AN ERROR AND FOUND THAT THE NUMBER OF WORDS TRANSFERED AS INDICATED BY THE BUS ADDRESS REGISTER DOES NOT AGREE WITH THE TRANSFER COUNT FROM THE WORD COUNT REGISTER.

EM50 SEEK INCOMPLETE OR OFF CYLINDER ERROR

THE DRIVE SIGNALED EITHER 'SKI' OR 'OCYL' ERROR BITS.

EM51 PROGRAM DETECTED POSITIONING ERROR

A HEADER COMPARE ERROR OCCURRED ('HCE'); HOWEVER, WHEN THE PROGRAM EXAMINED THE HEADER OF THE SECTOR IN ERROR, IT FOUND THAT THE CYLINDER FIELD DID NOT AGREE WITH THE CONTENTS OF 'RPCC' OF THE DRIVE. THE DRIVE WILL BE RECALIBRATED.

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)
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/RP04/5/6 REGISTERS IN TWO GROUPS:
RPCS1,RPCS2,RPDS1,RPER1,RPER2,RPER3,RPEC1, & RPEC2 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 RP04/5/6 REGISTERS. THE
CONTENTS OF THIS WORD IDENTIFY HOW THE ERROR WAS PROCESSED BY THE
RP04/5/6 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

RPBA = XXXX RPWC = 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

RPDA = XXXX RPCA = YYYY

THIS LINE GIVES THE CONTENTS OF THE RP04 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

RPEC1 = XXXX RPEC2 = 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 OFFSET X MICRO-INCHES

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

LINE 16

ECC CORRECTABLE AT OFFSET X MICRO-INCHES

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 COUNT 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/RP04 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 'RPEC1' 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, OCYL ERR = Z

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

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

'TOTAL SEEKS' IS THE TOTAL NUMBER OF SEEK OPERATIONS PERFORMED
BY THE DRIVE.

'TOTAL POS ERR' IS THE TOTAL NUMBER OF POSITIONING ERRORS WHICH
THE PROGRAM DETECTED FOR THE DRIVE.

'TOTAL SKI,OCYL ERR' IS THE TOTAL NUMBER OF 'SKI' OR 'OCYL' ERRORS
SIGNALED BY THE DRIVE.

8. PROGRAM DESCRIPTION

8.1 PROGRAM OPERATION

WHEN THE PROGRAM IS STARTED, 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 RP04/5/6, 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 PERFORM THE OPERATION, THE PROGRAM ISSUES A SEARCH INSTURCTION 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 (RPLA) 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 NOTE BEEN ON CYLINDER AS LONG.

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

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

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

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

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

B. EPRORS REPORTED FOR OPERATIONS WHICH COMPLETE NORMALLY.

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

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

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

BUS ADDRESS OR WORD COUNT NOT CONSISTENT - EM46

8.2 DUAL PORT OPERATION

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

WHEN THE DUAL PORT HANDLER ROUTINE IN THE MULTIDRIVE PROGRAM RECEIVES A REQUEST FOR A DRIVE, THE PROGRAM VERIFIES THAT THE DRIVE IS ONLINE. THE DRIVE IS SELECTED AND 0'S ARE WRITTEN INTO 'RPDS1': IF THE DRIVE IS IN NEUTRAL, THIS WILL SEIZE THE DRIVE. IF THE DRIVE IS SEIZED BY THE OTHER PORT, WRITING INTO 'RPDS1' WILL SET 'PORT REQUEST'. THE PROGRAM CHECKS 'DVA' IN 'RPCS1'. 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 20 SECOND TIMER FOR THE DRIVE. IF THE DRIVE HAS NOT SWITCHED TO THE REQUESTING SYSTEM WITHIN THE 20 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 18 AND 'MAXTRK' IS IS 5, THEN TRACK ADDRESS SELECTION WILL EXCLUDE TRACKS 6 - 17 FROM THE SELECTION AND SELECT AN ADDRESS FROM AMONG ADDRESSES 18, 0, 1, 2, 3, 4, 5.

B. THE BUFFER SIZE IS RANDOM SELECTED BETWEEN 4 (10) - AND THE VALUE IN 'MAXDL'. THE SIZE SELECTED IS WEIGHTED TO ENSURE THAT AT LEAST 4 WORDS ARE WRITTEN IN THE DATA AREA OF THE LAST SECTOR. 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 KEYWORDS IN THE HEADER (WHEN PERFORMING A WRITE HEADER & DATA ORDER) ARE ZERO FILLED. THE PROGRAM EXPECTS TO FIND THAT THE KEYWORDS ARE ZERO.

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 260 (10); THE PROGRAM WILL NOT PERFORM A MULTI-SECTOR FORMAT WRITE OPERATION.

E. THE FIRST ORDER PERFORMED AFTER A UNIT IS ASSIGNED WITH A 'T', '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. TO MANTAIN COMPATIABILITY WITH PACKS WRITTEN BY THE FORMAT PROGRAM (MAINDEC-11-DZRJB), THE PROGRAM WILL ACCEPT ALL ZERO'S AND AND ALL ONE'S PATTERNS; HOWEVER, ALL ZERO'S AND ALL ONE'S PATTERNS ARE NOT WRITTEN BY THE EXERCISER PROGRAM.

PATTERN '8' IS DEFINED AS THE 'WORST CASE' PATTERN.

PAT 1	PAT 2	PAT 3	PAT 4	PAT 5	PAT 6	PAT 7	PAT 8
000001	177776	000000	000000	052525	007417	026455	165555
000003	177774	000000	010421	052525	007417	026455	133333
000007	177770	000000	021042	052525	007417	026455	165555
000017	177760	177777	031463	125252	170360	151322	133333
000037	177740	177777	042104	125252	170360	151322	165555
000077	177700	177777	052525	125252	170360	151322	133333
000177	177600	000000	063146	052525	007417	026455	165555
000377	177400	000000	073567	052525	007417	026455	133333
000777	177000	177777	104210	125252	170360	151322	165555
001777	176000	177777	114631	125252	170360	151322	133333
003777	174000	000000	125252	052525	007417	026455	165555
007777	170000	177777	135673	125252	170360	151322	133333

017777	160000	000000	146314	052525	007417	026455	165555
037777	140000	177777	156735	125252	170360	151322	133333
077777	100000	000000	167356	052525	007417	026455	165555
177777	000000	177777	177777	125252	170360	151322	133333

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
000020	177757	172666	173777	153333	177777	000000
000040	177737	155555	175777	066667	177777	000000
000100	177677	172666	176777	153333	177777	000000
000200	177577	155555	177377	066667	177777	000000
000400	177377	172666	177577	153333	177777	000000
001000	176777	155555	177677	066667	177777	000000
002000	175777	172666	177737	153333	177777	000000
004000	173777	155555	177757	066667	177777	000000
010000	167777	172666	177767	153333	177777	000000
020000	157777	155555	177773	066667	177777	000000
040000	137777	172666	177775	153333	177777	000000
100000	077777	155555	177776	066667	177777	000000

9. PROGRAM LISTING

```
        .
        .END

 ERRORS DETECTED:  0

 *,DZRJDA/SOL=DZRJDA.DOC
 RUN-TIME: 6 11 0 SECONDS
 CORE USED:  3K
```

DZRJD.019 TABLE OF CONTENTS

1

```
                        .TITLE  MD-11-DZRJD-A, RP04/5/6 MULTI-DRIVE EXERCISER
                        ;*COPYRIGHT (C) 1975
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY C. HESS
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C1),MAR 24, 1976.
                        ;*
                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        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
```

```
                    RC=     %0              ;;GENERAL REGISTER
                    R1=     %1              ;;GENERAL REGISTER
                    R2=     %2              ;;GENERAL REGISTER
                    R3=     %3              ;;GENERAL REGISTER
                    R4=     %4              ;;GENERAL REGISTER
                    R5=     %5              ;;GENERAL REGISTER
                    R6=     %6              ;;GENERAL REGISTER
                    R7=     %7              ;;GENERAL REGISTER
                    .EQUIV  R6,SP           ;;STACK POINTER
                    .EQUIV  R7,PC           ;;PROGRAM COUNTER

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

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

                    ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000              BIT15=  100000
040000              BIT14=  40000
020000              BIT13=  20000
010000              BIT12=  10000
```

```
                        BIT11=  4000
                        BIT10=  2000
                        BIT09=  1000
                        BIT08=  400
                        BIT07=  200
                        BIT06=  100
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        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 "CPJ" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR

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

                        .SBTTL  RH11 REGISTERS

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

                        ;CONTROL AND STATUS REGISTER 1 (RPCS1)

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

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

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

                                ;CONTROL AND STATUS REGISTER 2 (RPCS2)

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

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


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

                                .SBTTL  RP04/5/6 REGISTERS

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

                                ;CONTRO_ AND STATUS 1 REGISTER. (#00)

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

                                ;DRIVE STATUS REGISTER (RPDS1) (#01)


                                ;DF5=   1               DRIVE FORWARD 5"/SEC.  (BIT #0)
000002                          DFF20=  2               ;DRIVE FORWARD 20"/SEC.  (BIT #1)
000004                          DIGB=   4               ;DRIVE TO INNER GUARD BAND (BIT #2)
000010                          GRV=    10              ;GO REVERSE (BIT #3)
000020                          DL64=   20              ;DIFFERENCE LESS THAN 64 (BIT #4)
000040                          DE1=    40              ;DIFFERENCE EQUALS 1 (BIT #5)
000100                          VV=     100             ;VOLUME VALID (BIT #6)
```

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

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

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

                ;MAINTAINABILITY REGISTER (RPMR)(#03)

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

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

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

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

                ;DRIVE TYPE REGISTER (RPDT) (#06)
```

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

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

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

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

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

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

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

                                ;OFFSET REGISTER (RPOF) (#11)

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

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

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

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

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

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

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

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

```
                100000          OCYL=   100000                  ;OFF CYLINDER ERROR (BIT #15)

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

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

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

                                .SBTTL  RP04/5/6 DRIVER COMMANDS

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

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

                                .SBTTL  TRAP CATCHER

                000000                  .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                000174                  .=174
000174  000000  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  004076          JMP     @#START1        ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  004066          JMP     @#START         ;CHANGE THE RH11 UNIBUS ADDRESS
                                                        ;AFTER INITIAL START

                                .SBTTL  ACT11 HOOKS

                                ;;*****************************************************************
                                ;HOOKS REQUIRED BY ACT11
                000210          $SVPC=.                 ;SAVE PC
```

```
  434            000046                  .=46
  435  000046   005310                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
  436            000052                  .=52
  437  000052   040000                  .WORD   40000           ;;2)SET LOC.52 TO 40000
  438            000210                  .=$SVPC                 ;; RESTORE PC
```

```
                                .SBTTL  COMMON TAGS

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

                    001100              .=1100
001100                          $CMTAG:                 ;;START OF COMMON TAGS
001100  000000      $PASS:  .WORD   0                   ;;CONTAINS PASS COUNT
001102     000      $TSTNM: .BYTE   0                   ;;CONTAINS THE TEST NUMBER
001103     000      $ERFLG: .BYTE   0                   ;;CONTAINS ERROR FLAG
001104  000000      $ICNT:  .WORD   0                   ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000      $LPADR: .WORD   0                   ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000      $LPERR: .WORD   0                   ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000      $ERTTL: .WORD   0                   ;;CONTAINS TOTAL ERRORS DETECTED
001114     000      $ITEMB: .BYTE   0                   ;;CONTAINS ITEM CONTROL BYTE
001115     001      $ERMAX: .BYTE   1                   ;;CONTAINS MAX. ERRORS PER TEST
001116  000000      $ERRPC: .WORD   0                   ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000      $GDADR: .WORD   0                   ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000      $BDADR: .WORD   0                   ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000      $GDDAT: .WORD   0                   ;;CONTAINS 'GOOD' DATA
001126  000000      $BDDAT: .WORD   0                   ;;CONTAINS 'BAD' DATA
001130  000000              .WORD   0                   ;;RESERVED--NOT TO BE USED
001132  000000              .WORD   0
001134     000      $AUTOB: .BYTE   0                   ;;AUTOMATIC MODE INDICATOR
001135     000      $INTAG: .BYTE   0                   ;;INTERRUPT MODE INDICATOR
001136  000000              .WORD   0
001140  177570      SWR:    .WORD   DSWR                ;;ADDRESS OF SWITCH REGISTER
001142  177570      DISPLAY: .WORD  DDISP               ;;ADDRESS OF DISPLAY REGISTER
001144  177560      $TKS:   177560                      ;;TTY KBD STATUS
001146  177562      $TKB:   177562                      ;;TTY KBD BUFFER
001150  177564      $TPS:   177564                      ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566      $TPB:   177566                      ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000      $NULL:  .BYTE   0                   ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002      $FILLS: .BYTE   2                   ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012      $FILLC: .BYTE   12                  ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157     000      $TPFLG: .BYTE   0                   ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  177607  000377 $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001164     077      $QUES:  .ASCII  /?/                ;;QUESTION MARK
001165     015      $CRLF:  .ASCII  <15>               ;;CARRIAGE RETURN
001166  000012      $LF:    .ASCIZ  <12>               ;;LINE FEED
                                ;;**********************************************************
                    000015      CR      =       15
                    000012      LF      =       12
001170  176700      $RPADR: .WORD   176700          ;FIRST ADDRESS OF RH11/RP04/5/6 REGISTERS
001172  000254      $RPVEC: .WORD   254             ;RP04 VECTOR ADDRESS
001174  172540      $LKCSR: .WORD   172540          ;ADDR OF KW11-P STATUS REGISTER
001176  172542      $LKCSB: .WORD   172542          ;ADDR OF KW11-P COUNTER BUFFER
001200  000104      $LPVEC: .WORD   104             ;ADDR OF KW11-P VECTOR
001202  177546      $LKS:   .WORD   177546          ;ADDR OF KW11-L STATUS REGISTER
001204  000100      $LLVEC: .WORD   100             ;ADDR OF KW11-L VECTOR
001206  177777      PCLOCK: .WORD   -1              ;'0' IF KW11-P IS ON SYSTEM
001210  177777      CLKFLG: .WORD   -1              ;'0' IF A CLOCK IS AVAILABLE
001212  000074      HZ:     .WORD   74              ;74 (8) IF 60 HZ SYSTEM; 62 (8) IF 50 HZ SYSTEM
```

```
001214  000000                  STATIN: .WORD   0               ;'TYPE STATISTICS' INDICATOR
001216  000000                  PACK:   .WORD   0               ;'W ' COMMAND INDICATOR
001220  000000  000000  000000  DATE:   .WORD   0,0,0,0,0       ;OPERATOR ENTERED DATE
001226  000000  000000
001232  000000  000000  000000  OPERID: .WORD   0,0,0,0         ;OPERATOR ID
001240  000000
001242  000000                  DRIVE:  .WORD   0               ;DRIVE # STORAGE: ERRORS 1-5 & 10
001244  000000                  ATTN:   .WORD   0               ;ATTN REG STORAGE: ERRORS 1-5 & 10
001246  000000                  UNIT:   .WORD   0               ;DRIVE # STORAGE FOR PRINTOUT
001250  000000                  MASK:   .WORD   0               ;ERROR RETRY REGISTER MASK
001252     000     000          RETRY:  .BYTE   0,0             ;ERROR RETRY LIMIT IN THE LOWER BYTE
                                                               ;RETRY COUNT IN THE UPPER BYTE
001254  000003                  FAIRNS: .WORD   3               ;MAXIMUM TIME IN QUEUE VALUE
001256  000000                  LSTAD:  .WORD   0               ;STORE LAST MEMORY ADDRESS HERE
001260  000000                  CHGADR: .WORD   0               ;CHANGE RH11 UNIBUS ADDRESS FLAG
001262  000000                  CFLAG:  .WORD   0               ;'CONTROL C' FLAG
001264  000000                  BADSEC: .WORD   0               ;BAD SECTOR/TRACK FLAG
001266  000000                  HOUR:   .WORD   0               ;HOUR COUNT STORED HERE (MAXIMUM - 999.)
001270  000000                  MINUTE: .WORD   0               ;MINUTE'S COUNT STORED HERE
001272  000000                  SECOND: .WORD   0               ;SECOND'S COUNT STORED HERE
001274  000000                  SIXTEE: .WORD   0               ;TIMER ROUTINE COUNTER (FOR ONE SECOND)
001276  177777                  ZROIND: .WORD   -1              ;ZERO INDICATOR FOR THE DATA COMPARE ROUTINE
001300     000                  FRSTER: .BYTE   0               ;DATA COMPARE ERROR FLAG
                                                               ;IF > 0, PROCESSING 'DCKER' OR CAN'T MATCH PATTERN
                                                               ;IF < 0, MISCOMPARSION FOUND
001301     000                          .BYTE   0               ;MISCOMPARSION OR CAN'T MATCH PATTERN FLAG
                                                               ;IF < 0, ERROR IN BUFFER
001302  000000                  SAVER1: .WORD   0               ;SAVE R1 HERE
001304  000000                  SAVER5: .WORD   0               ;SAVE R5 HERE
001306  000000                  ERCTR:  .WORD   0               ;NUMBER OF ERRORS
001310  000000                  LIMIT:  .WORD   0               ;DISPLAY LIMIT
001312  000000                  CMCNT:  .WORD   0               ;WORD COUNT
001314  000000                  CMCYL:  .WORD   0               ;CYLINDER ADDRESS
001316     000                  CMSEC:  .BYTE   0               ;SECTOR ADDRESS
001317     000                  CMTRK:  .BYTE   0               ;TRACK ADDRESS
001320  000000                  ECBIT:  .WORD   0               ;ERROR BURST BIT OFFSET
001322  000000                  ECSEC:  .WORD   0               ;ERROR BURST WORD OFFSET (RELATIVE TO SECTOR)
001324  000000                  ECMSK0: .WORD   0               ;CORRECTION MASK FOR FIRST ERROR WORD
001326  000000                  ECMSK1: .WORD   0               ;CORRECTION MASK FOR SECOND ERROR WORD
001330  000000                  ECWRD:  .WORD   0               ;LOCATION OF FIRST ERROR WORD
001332  000000                  ECGD:   .WORD   0               ;GOOD DATA, FIRST WORD
001334  000000                  ECBAD0: .WORD   0               ;BAD DATA, FIRST WORD
001336  000000                  ECWRD1: .WORD   0               ;LOCATION OF SECOND ERROR WORD
001340  000000                  ECGD1:  .WORD   0               ;GOOD DATA, SECOND WORD
001342  000000                  ECBAD1: .WORD   0               ;BAD DATA, SECOND WORD
001344  000025                  SECLMT: .WORD   21.             ;SECTOR ADDRESS LIMIT
001346  000022                  TRKLMT: .WORD   18.             ;TRACK ADDRESS LIMIT
001350  000632                  CYLIMT: .WORD   410.            ;CYLINDER ADDRESS LIMIT FOR RP04/5'S
                                                               ;(CHANGED TO 814. FOR RP06)

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

                        .SBTTL  COMMON PARAMETERS
```

```
                                ;;****************************************************************
                                
001352  002740                  ENDCON: .WORD   002740          ;1.875X10↑8 WORDS (10) [3X10↑9 BITS]
001354  005455                          .WORD   005455          ;MSW
001356  143300                  ENDSEK: .WORD   143300          ;3 X 10↑6 SEEKS  (LSW)
001360  000055                          .WORD   55              ;MSW
001362  000001                  PASCNT: .WORD   1               ;NUMBER OF PASSES TO END OF TEST
001364  000000                  MAXDL:  .WORD   0               ;MAXIMUM DATA TRANFER SIZE IN WORDS
                                                                ;(FILLED BY PROGRAM AT STARTUP OR BY OPERATOR
                                                                ;DURING PARAMETER ENTRY DIALOG.)
001366  000144                  MAXER:  .WORD   100.            ;MAXIMUM ERRORS - 100(10)
001370  000005  000000          INTRVL: .WORD   5,0             ;FIRST WORD IS THE PERFORMANCE TYPEOUT INTERVAL
                                                                ;(IN MINUTES).  SECOND WORD IS THE INTERVAL
                                                                ;COUNTER
                                                                ;COUNTER.  UPPER BYTE IS VALUE.
001374  000004                  CMPLMT: .WORD   4               ;NUMBER OF COMPARE ERRORS TYPED OUT
001376  000001                  FORMAT: .WORD   1               ;IF NOT EQ 0, ALLOW WRITE HEADER & DATA ORDERS
                                                                ;IF EQ 0, DO NOT ALLOW WRITE HEADER & DATA ORDERS
001400  000000                  WCSEL:  .WORD   0               ;IF EQ TO 0, GENERATE A RANDOM WORD COUNT
                                                                ;  FOR THE OPERATION.
                                                                ;IF NOT EQ TO 0, USE THE VALUE IN 'MAXDL' FOR
                                                                ;  THE WORD COUNT
001402  000003                  RATIO:  .WORD   3               ;READ/WRITE RATIO [RANGE 0 - 7]
                                                                ;0 - 0/8        (READ/WRITE)
                                                                ;1 - 7/1
                                                                ;2 - 6/2
                                                                ;3 - 5/3
                                                                ;4 - 4/4
                                                                ;5 - 3/5
                                                                ;6 - 2/6
                                                                ;7 - 1/7
001404  000001                  AUTOCK: .WORD   1               ;IF NOT EQ 0, DO AN APPROPRITE WRITE
                                                                ;  CHECK AFTER EACH WRITE ORDER.
                                                                ;IF EQ 0, SELECT WRITE CHECK ORDERS
                                                                ;  RANDOMLY.
001406  000001                  NOTPRT: .WORD   1               ;IF EQ 1, DO NOT PRINT DATA ERROR MESSAGES
                                                                ;  ASSOCIATED WITH OPERATOR SPECIFIED
                                                                ;  BAD PACK AREAS.
                                                                ;IF NOT EQ 0, PRINT ERROR MESSAGES RELATING TO
                                                                ;  THESE AREAS.
001410  000001                  ENDET:  .WORD   1               ;IF NOT EQ 0, END OF PASS DETERMINED
                                                                ;  BY THE 'WORDS READ' COUNT.
                                                                ;IF EQ 0, END OF PASS DETERMINED
                                                                ;  BY THE SEEK COUNT.
                                
                                ;;****************************************************************
                                
                                .SBTTL  VALUES FOR FIRST OPERATION
                                
                                ;;****************************************************************
                                
001412  000010                  BEGPAT: .WORD   10              ;STARTING PATTERN CODE [RANGE 1 - 17 (OCTAL)]
001414  000005                  BEGCOD: .WORD   5               ;STARTING COMMAND CODE [RANGE 0 - 5]
                                                                ;0 = WRITE CHECK DATA ('WCKD')
```

```
                                                                ;1 = WRITE CHECK HEADER & DATA ('WCHKHD')
                                                                ;2 = WRITE DATA ('WRTDAT')
                                                                ;3 = WRITE HEADER & DATA ('WRTHD')
                                                                ;4 = READ DATA ('RDDAT')
                                                                ;5 = READ HEADER & DATA ('RDHD')
001416  000404                  BEGSIZ: .WORD   404             ;STARTING RECORD SIZE [RANGE 4 - MAXMEM]
                                                                ;NOTE:  THE SIZE MUST BE AT LEAST 4 IF
                                                                ;WRITE DATA OR READ DATA; THE SIZE MUST
                                                                ;BE AT LEAST 8 IF WRITE HEADER AND
                                                                ;DATA OR READ HEADER AND DATA.
                                                                ;IF THE SIZE IS GREATER THAN 1 SECTOR, THE
                                                                ;SIZE MUST ALLOW FOR OVERLAPPING 4 OR 8
                                                                ;WORDS INTO THE LAST SECTOR USED.

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

                        .SBTTL  TABLES, CONSTANTS, AND VARIABLE LOCATIONS

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

001420  000000  000000  000000  ORDERQ: .WORD   0,0,0,0,0,0,0,0,0  ;LIST OF DRIVES PERFORMING COMMANDS
001426  000000  000000  000000
001434  000000  000000  000000

001442  000000                  ASNLST: .WORD   0               ;A BIT SET IS AN ASSIGNED DRIVE

001444  000000  000000  000000  DUNIT:  .WORD   0,0,0,0,0,0,0,0,0       ;ADDRESSES OF DRIVES TO BE DEASSIGNED
001452  000000  000000  000000
001460  000000  000000  000000

001466  000000  000000  000000  NEWUNT: .WORD   0,0,0,0,0,0,0,0,0       ;ADDRESSES OF NEWLY ASSIGNED DRIVES
001474  000000  000000  000000
001502  000000  000000  000000

001510  000000  000000  000000  AVAIL:  .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR BUFFERS/PARAMETERS
001516  000000  000000  000000
001524  000000  000000  000000

001532  000000  000000  000000  WAIT:   .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR BUFFERS
001540  000000  000000  000000
001546  000000  000000  000000

001554  000000  000000  000000  PARQ:   .WORD   0,0,0,0,0,0,0,0,0       ;LIST OF DRIVES WAITING FOR NEXT PARAMETERS
001562  000000  000000  000000
001570  000000  000000  000000

001576  000000                  BUFTBL: .WORD   0               ;BUFFER ALLOCATION TABLE ENTRY COUNT
001600  000000  000000                  .WORD   0,0
001604  000000  000000                  .WORD   0,0
001610  000000  000000                  .WORD   0,0
001614  000000  000000                  .WORD   0,0
001620  000000  000000                  .WORD   0,0
001624  000000  000000                  .WORD   0,0
001630  000000  000000                  .WORD   0,0
```

```
   655  001634  000000  000000                    .WORD   0,0
   656  001640  000000  000000                    .WORD   0,0
   657  001644  000000  000000                    .WORD   0,0
   658  001650  000000  000000                    .WORD   0,0
   659  001654  000000  000000                    .WORD   0,0
   660  001660  000000  000000                    .WORD   0,0
   661  001664  000000  000000                    .WORD   0,0
   662  001670  000000  000000                    .WORD   0,0
   663  001674  000000  000000                    .WORD   0,0
   664  001700  000000  000000                    .WORD   0,0
   665  001704  000000  000000                    .WORD   0,0
   666  001710  000000  000000                    .WORD   0,0
   667  001714  000000  000000                    .WORD   0,0
   668
   669  001720  041606                  BLKADR:   .WORD   DRIVE0          ;ADDRESS OF THE BLOCK FOR DRIVE 0
   670  001722  042112                            .WORD   DRIVE1          ;ADDRESS OF THE BLOCK FOR DRIVE 1
   671  001724  042416                            .WORD   DRIVE2          ;ADDRESS OF THE BLOCK FOR DRIVE 2
   672  001726  042722                            .WORD   DRIVE3          ;ADDRESS OF THE BLOCK FOR DRIVE 3
   673  001730  043226                            .WORD   DRIVE4          ;ADDRESS OF THE BLOCK FOR DRIVE 4
   674  001732  043532                            .WORD   DRIVE5          ;ADDRESS OF THE BLOCK FOR DRIVE 5
   675  001734  044036                            .WORD   DRIVE6          ;ADDRESS OF THE BLOCK FOR DRIVE 6
   676  001736  044342                            .WORD   DRIVE7          ;ADDRESS OF THE BLOCK FOR DRIVE 7
   677
   678  001740     151                  COMTBL:   .BYTE   WCKD            ;WRITE CHECK DATA
   679  001741     153                            .BYTE   WCKHD           ;WRITE CHECK HEADER AND DATA
   680  001742     161                            .BYTE   WRTDAT          ;WRITE DATA
   681  001743     163                            .BYTE   WRTHD           ;WRITE HEADER AND DATA
   682  001744     171                            .BYTE   RDDAT           ;READ DATA
   683  001745     173                            .BYTE   RDHD            ;READ HEADER AND DATA
   684
   685  001746     002                  OPTBL:    .BYTE   2               ;UNLOAD
   686  001747     004                            .BYTE   4               ;SEEK
   687  001750     006                            .BYTE   6               ;RECAL
   688  001751     010                            .BYTE   10              ;DRIVE CLEAR
   689  001752     012                            .BYTE   12              ;RELEASE
   690  001753     014                            .BYTE   14              ;OFFSET
   691  001754     016                            .BYTE   16              ;RETURN TO CENTERLINE
   692  001755     020                            .BYTE   20              ;READIN PRESET
   693  001756     022                            .BYTE   22              ;PACK ACKNOWLEDGE
   694  001757     030                            .BYTE   30              ;SEARCH
   695  001760     050                            .BYTE   50              ;WRITE CHECK DATA
   696  001761     052                            .BYTE   52              ;WRITE CHECK HEADER AND DATA
   697  001762     060                            .BYTE   60              ;WRITE DATA
   698  001763     062                            .BYTE   62              ;WRITE HEADER AND DATA
   699  001764     070                            .BYTE   70              ;READ DATA
   700  001765     072                            .BYTE   72              ;READ HEADER AND DATA
   701  001766     377                            .BYTE   -1              ;TERMINATOR
   702
   703          001770                           .EVEN
   704
   705  001770  047125  047514  042101  MNTBL:   .ASCIZ  /UNLOAD /
   706  001776  000040
   707  002000  042523  045505  020040           .ASCIZ  /SEEK   /
   708  002006  000040
```

```
002010  042522  040503  020114          .ASCIZ  /RECAL  /
002016  000040
002020  051104  041526  051114          .ASCIZ  /DRVCLR /
002026  000040
002030  042522  051514  020105          .ASCIZ  /RELSE  /
002036  000040
002040  043117  051506  052105          .ASCIZ  /OFFSET /
002046  000040
002050  052122  020103  020040          .ASCIZ  /RTC    /
002056  000040
002060  042522  042101  047111          .ASCIZ  /READIN /
002066  000040
002070  040520  045503  020040          .ASCIZ  /PACK   /
002076  000040
002100  042523  051101  044103          .ASCIZ  /SEARCH /
002106  000040
002110  041527  042113  020040          .ASCIZ  /WCKD   /
002116  000040
002120  041527  044113  020104          .ASCIZ  /WCKHD  /
002126  000040
002130  051127  042124  052101          .ASCIZ  /WRTDAT /
002136  000040
002140  051127  044124  020104          .ASCIZ  /WRTHD  /
002146  000040
002150  042122  040504  020124          .ASCIZ  /RDDAT  /
002156  000040
002160  042122  042110  020040          .ASCIZ  /RDHD   /
002166  000040
002170  047516  042516  020040          .ASCIZ  /NONE   /
002176  000040

002200     000                  OFFCOD: .BYTE   0               ;OFFSET CODE TABLE
002201     010                          .BYTE   10              ;+200 U INCHES
002202     210                          .BYTE   210             ;-200 U INCHES
002203     020                          .BYTE   20              ;+400 U INCHES
002204     220                          .BYTE   220             ;-400 U INCHES
002205     030                          .BYTE   30              ;+600 U INCHES
002206     230     000                  .BYTE   230,0           ;-600 U INCHES, TERMINATOR
002210     020                          .BYTE   20              ;+400 U INCHES
002211     220                          .BYTE   220             ;-400 U INCHES
002212     040                          .BYTE   40              ;+800 U INCHES
002213     240                          .BYTE   240             ;-800 U INCHES
002214     060                          .BYTE   60              ;+1200 U INCHES
002215     260     000                  .BYTE   260,0           ;-1200 U INCHES, TERMINATOR
        002220                  .EVEN

002220  002254                  OFMTBL: .WORD   OFMSG0          ;1ST OFFSET MESSAGE
002222  002307                          .WORD   OFMSG1          ;2ND OFFSET MESSAGE
002224  002343                          .WORD   OFMSG2          ;3RD OFFSET MESSAGE
002226  002377                          .WORD   OFMSG3          ;4TH OFFSET MESSAGE
002230  002433                          .WORD   OFMSG4          ;5TH OFFSET MESSAGE
002232  002467                          .WORD   OFMSG5          ;6TH OFFSET MESSAGE
002234  002523                          .WORD   OFMSG6          ;7TH OFFSET MESSAGE
002236  002254                          .WORD   OFMSG0          ;1ST OFFSET MESSAGE
```

```
                                                .WORD   OFMSG3          ;4TH OFFSET MESSAGE
                                                .WORD   OFMSG4          ;5TH OFFSET MESSAGE
                                                .WORD   OFMSG7          ;8TH OFFSET MESSAGE
                                                .WORD   OFMSG8          ;9TH OFFSET MESSAGE
                                                .WORD   OFMSG9          ;10TH OFFSET MESSAGE
                                                .WORD   OFMSGA          ;11TH OFFSET MESSAGE

002254  043101  042524  020122  OFMSG0: .ASCIZ  /AFTER RETRY WITHOUT OFFSET/
002262  042522  051124  020131
002270  044527  044124  052517
002276  020124  043117  051506
002304  052105      000
002307      101 020124  043117  OFMSG1: .ASCIZ  /AT OFFSET +200 MICRO-INCHES/
002314  051506  052105  025440
002322  030062  020060  044515
002330  051103  026517  047111
002336  044103  051505      000
002343      101 020124  043117  OFMSG2: .ASCIZ  /AT OFFSET -200 MICRO-INCHES/
002350  051506  052105  026440
002356  030062  020060  044515
002364  051103  026517  047111
002372  044103  051505      000
002377      101 020124  043117  OFMSG3: .ASCIZ  /AT OFFSET +400 MICRO-INCHES/
002404  051506  052105  025440
002412  030064  020060  044515
002420  051103  026517  047111
002426  044103  051505      000
002433      101 020124  043117  OFMSG4: .ASCIZ  /AT OFFSET -400 MICRO-INCHES/
002440  051506  052105  026440
002446  030064  020060  044515
002454  051103  026517  047111
002462  044103  051505      000
002467      101 020124  043117  OFMSG5: .ASCIZ  /AT OFFSET +600 MICRO-INCHES/
002474  051506  052105  025440
002502  030066  020060  044515
002510  051103  026517  047111
002516  044103  051505      000
002523      101 020124  043117  OFMSG6: .ASCIZ  /AT OFFSET -600 MICRO-INCHES/
002530  051506  052105  026440
002536  030066  020060  044515
002544  051103  026517  047111
002552  044103  051505      000
002557      101 020124  043117  OFMSG7: .ASCIZ  /AT OFFSET +800 MICRO-INCHES/
002564  051506  052105  025440
002572  030070  020060  044515
002600  051103  026517  047111
002606  044103  051505      000
002613      101 020124  043117  OFMSG8: .ASCIZ  /AT OFFSET -800 MICRO-INCHES
002620  051506  052105  026440
002626  030070  020060  044515
002634  051103  026517  047111
002642  044103  051505      000
002647      101 020124  043117  OFMSG9: .ASCIZ  /AT OFFSET +1200 MICRO-INCHES/
002654  051506  052105  025440
```

```
 817  002662  031061  030060  04[440
 818  002670  041511  047522  044...
 819  002676  041516  042510  000123
 820  002704  052101  047440  043106  OFMSGA: .ASCIZ  /AT OFFSET -1200 MICRO-INCHES/
 821  002712  042523  020124  030455
 822  002720  030062  020060  044515
 823  002726  051103  026517  047111
 824  002734  044103  051505     000
 825
 826          002742                          .EVEN
 827
 828                                  ;;*****************************************************************
 829
 830                                  .SBTTL  DATA PATTERNS
 831
 832                                  ;;*****************************************************************
 833
 834  002742  000000                  STNDAT: .WORD   0               ;STANDARD DATA PATTERN POINTER TABLE
 835  002744  003046                          .WORD   DATA1
 836  002746  003106                          .WORD   DATA1+40
 837  002750  003146                          .WORD   DATA1+100
 838  002752  003206                          .WORD   DATA1+140
 839  002754  003246                          .WORD   DATA1+200
 840  002756  003306                          .WORD   DATA1+240
 841  002760  003346                          .WORD   DATA1+300
 842  002762  003406                          .WORD   DATA1+340
 843  002764  003446                          .WORD   DATA1+400
 844  002766  003506                          .WORD   DATA1+440
 845  002770  003546                          .WORD   DATA1+500
 846  002772  003606                          .WORD   DATA1+540
 847  002774  003646                          .WORD   DATA1+600
 848  002776  003706                          .WORD   DATA1+640
 849  003000  003746                          .WORD   DATA1+700
 850  003002  003006                          .WORD   DATA0           ;ZEROES
 851  003004  003710                          .WORD   DATA1+642       ;ONES
 852
 853  003006  000000                  DATA0:  .WORD   0               ;DUMMY DATA PATTERN
 854  003010  000000                          .WORD   0
 855  003012  000000                          .WORD   0
 856  003014  000000                          .WORD   0
 857  003016  000000                          .WORD   0
 858  003020  000000                          .WORD   0
 859  003022  000000                          .WORD   0
 860  003024  000000                          .WORD   0
 861  003026  000000                          .WORD   0
 862  003030  000000                          .WORD   0
 863  003032  000000                          .WORD   0
 864  003034  000000                          .WORD   0
 865  003036  000000                          .WORD   0
 866  003040  000000                          .WORD   0
 867  003042  000000                          .WORD   0
 868  003044  000000                          .WORD   0
 869
 870  003046  000001                  DATA1:  .WORD   000001  ;STANDARD PATTERN 1
```

```
                003050  000003                  .WORD   000003
                003052  000007                  .WORD   000007
                003054  000017                  .WORD   000017
                003056  000037                  .WORD   000037
                003060  000077                  .WORD   000077
                003062  000177                  .WORD   000177
                003064  000377                  .WORD   000377
                003066  000777                  .WORD   000777
                003070  001777                  .WORD   001777
                003072  003777                  .WORD   003777
                003074  007777                  .WORD   007777
                003076  017777                  .WORD   017777
                003100  037777                  .WORD   037777
                003102  077777                  .WORD   077777
                003104  177777                  .WORD   177777

                003106  177776                  .WORD   177776  ;STANDARD PATTERN 2
                003110  177774                  .WORD   177774
                003112  177770                  .WORD   177770
                003114  177760                  .WORD   177760
                003116  177740                  .WORD   177740
                003120  177700                  .WORD   177700
                003122  177600                  .WORD   177600
                003124  177400                  .WORD   177400
                003126  177000                  .WORD   177000
                003130  176000                  .WORD   176000
                003132  174000                  .WORD   174000
                003134  170000                  .WORD   170000
                003136  160000                  .WORD   160000
                003140  140000                  .WORD   140000
                003142  100000                  .WORD   100000
                003144  000000                  .WORD   000000

                003146  000000                  .WORD   000000  ;STANDARD PATTERN 3
                003150  000000                  .WORD   000000
                003152  000000                  .WORD   000000
                003154  177777                  .WORD   177777
                003156  177777                  .WORD   177777
                003160  177777                  .WORD   177777
                003162  000000                  .WORD   000000
                003164  000000                  .WORD   000000
                003166  177777                  .WORD   177777
                003170  177777                  .WORD   177777
                003172  000000                  .WORD   000000
                003174  177777                  .WORD   177777
                003176  000000                  .WORD   000000
                003200  177777                  .WORD   177777
                003202  000000                  .WORD   000000
                003204  177777                  .WORD   177777

                003206  000000                  .WORD   000000  ;STANDARD PATTERN 4
                003210  010421                  .WORD   010421
                003212  021042                  .WORD   021042
                003214  031463                  .WORD   031463
```

```
  925  003216  042104                    .WORD   042104
  926  003220  052525                    .WORD   052525
  927  003222  063146                    .WORD   063146
  928  003224  073567                    .WORD   073567
  929  003226  104210                    .WORD   104210
  930  003230  114631                    .WORD   114631
  931  003232  125252                    .WORD   125252
  932  003234  135673                    .WORD   135673
  933  003236  146314                    .WORD   146314
  934  003240  156735                    .WORD   156735
  935  003242  167356                    .WORD   167356
  936  003244  177777                    .WORD   177777
  937
  938  003246  052525                    .WORD   052525  ;STANDARD PATTERN 5
  939  003250  052525                    .WORD   052525
  940  003252  052525                    .WORD   052525
  941  003254  125252                    .WORD   125252
  942  003256  125252                    .WORD   125252
  943  003260  125252                    .WORD   125252
  944  003262  052525                    .WORD   052525
  945  003264  052525                    .WORD   052525
  946  003266  125252                    .WORD   125252
  947  003270  125252                    .WORD   125252
  948  003272  052525                    .WORD   052525
  949  003274  125252                    .WORD   125252
  950  003276  052525                    .WORD   052525
  951  003300  125252                    .WORD   125252
  952  003302  052525                    .WORD   052525
  953  003304  125252                    .WORD   125252
  954
  955  003306  007417                    .WORD   007417  ;STANDARD PATTERN 6
  956  003310  007417                    .WORD   007417
  957  003312  007417                    .WORD   007417
  958  003314  170360                    .WORD   170360
  959  003316  170360                    .WORD   170360
  960  003320  170360                    .WORD   170360
  961  003322  007417                    .WORD   007417
  962  003324  007417                    .WORD   007417
  963  003326  170360                    .WORD   170360
  964  003330  170360                    .WORD   170360
  965  003332  007417                    .WORD   007417
  966  003334  170360                    .WORD   170360
  967  003336  007417                    .WORD   007417
  968  003340  170360                    .WORD   170360
  969  003342  007417                    .WORD   007417
  970  003344  170360                    .WORD   170360
  971
  972  003346  026455                    .WORD   026455  ;STANDARD PATTERN 7
  973  003350  026455                    .WORD   026455
  974  003352  026455                    .WORD   026455
  975  003354  151322                    .WORD   151322
  976  003356  151322                    .WORD   151322
  977  003360  151322                    .WORD   151322
  978  003362  026455                    .WORD   026455
```

```
  979  003364  026455                    .WORD   026455
  980  003366  151322                    .WORD   151322
  981  003370  151322                    .WORD   151322
  982  003372  026455                    .WORD   026455
  983  003374  151322                    .WORD   151322
  984  003376  026455                    .WORD   026455
  985  003400  151322                    .WORD   151322
  986  003402  026455                    .WORD   026455
  987  003404  151322                    .WORD   151322
  988
  989  003406  165555                    .WORD   165555  ;STANDARD PATTERN 8
  990  003410  133333                    .WORD   133333
  991  003412  165555                    .WORD   165555
  992  003414  133333                    .WORD   133333
  993  003416  165555                    .WORD   165555
  994  003420  133333                    .WORD   133333
  995  003422  165555                    .WORD   165555
  996  003424  133333                    .WORD   133333
  997  003426  165555                    .WORD   165555
  998  003430  133333                    .WORD   133333
  999  003432  165555                    .WORD   165555
 1000  003434  133333                    .WORD   133333
 1001  003436  165555                    .WORD   165555
 1002  003440  133333                    .WORD   133333
 1003  003442  165555                    .WORD   165555
 1004  003444  133333                    .WORD   133333
 1005
 1006  003446  000001                    .WORD   000001  ;STANDARD PATTERN 9
 1007  003450  000002                    .WORD   000002
 1008  003452  000004                    .WORD   000004
 1009  003454  000010                    .WORD   000010
 1010  003456  000020                    .WORD   000020
 1011  003460  000040                    .WORD   000040
 1012  003462  000100                    .WORD   000100
 1013  003464  000200                    .WORD   000200
 1014  003466  000400                    .WORD   000400
 1015  003470  001000                    .WORD   001000
 1016  003472  002000                    .WORD   002000
 1017  003474  004000                    .WORD   004000
 1018  003476  010000                    .WORD   010000
 1019  003500  020000                    .WORD   020000
 1020  003502  040000                    .WORD   040000
 1021  003504  100000                    .WORD   100000
 1022
 1023  003506  177776                    .WORD   177776  ;STANDARD PATTERN 10
 1024  003510  177775                    .WORD   177775
 1025  003512  177773                    .WORD   177773
 1026  003514  177767                    .WORD   177767
 1027  003516  177757                    .WORD   177757
 1028  003520  177737                    .WORD   177737
 1029  003522  177677                    .WORD   177677
 1030  003524  177577                    .WORD   177577
 1031  003526  177377                    .WORD   177377
 1032  003530  176777                    .WORD   176777
```

```
1033  003532  175777                  .WORD   175777
1034  003534  173777                  .WORD   173777
1035  003536  167777                  .WORD   167777
1036  003540  157777                  .WORD   157777
1037  003542  137777                  .WORD   137777
1038  003544  077777                  .WORD   077777
1039
1040  003546  172666                  .WORD   172666  ;STANDARD PATTERN 11
1041  003550  155555                  .WORD   155555
1042  003552  172666                  .WORD   172666
1043  003554  155555                  .WORD   155555
1044  003556  172666                  .WORD   172666
1045  003560  155555                  .WORD   155555
1046  003562  172666                  .WORD   172666
1047  003564  155555                  .WORD   155555
1048  003566  172666                  .WORD   172666
1049  003570  155555                  .WORD   155555
1050  003572  172666                  .WORD   172666
1051  003574  155555                  .WORD   155555
1052  003576  172666                  .WORD   172666
1053  003600  155555                  .WORD   155555
1054  003602  172666                  .WORD   172666
1055  003604  155555                  .WORD   155555
1056
1057  003606  077777                  .WORD   077777  ;STANDARD PATTERN 12
1058  003610  137777                  .WORD   137777
1059  003612  157777                  .WORD   157777
1060  003614  167777                  .WORD   167777
1061  003616  173777                  .WORD   173777
1062  003620  175777                  .WORD   175777
1063  003622  176777                  .WORD   176777
1064  003624  177377                  .WORD   177377
1065  003626  177577                  .WORD   177577
1066  003630  177677                  .WORD   177677
1067  003632  177737                  .WORD   177737
1068  003634  177757                  .WORD   177757
1069  003636  177767                  .WORD   177767
1070  003640  177773                  .WORD   177773
1071  003642  177775                  .WORD   177775
1072  003644  177776                  .WORD   177776
1073
1074  003646  153333                  .WORD   153333  ;STANDARD PATTERN 13
1075  003650  066667                  .WORD   066667
1076  003652  153333                  .WORD   153333
1077  003654  066667                  .WORD   066667
1078  003656  153333                  .WORD   153333
1079  003660  066667                  .WORD   066667
1080  003662  153333                  .WORD   153333
1081  003664  066667                  .WORD   066667
1082  003666  153333                  .WORD   153333
1083  003670  066667                  .WORD   066667
1084  003672  153333                  .WORD   153333
1085  003674  066667                  .WORD   066667
1086  003676  153333                  .WORD   153333
```

```
1087  003700  066667                          .WORD   066667
1088  003702  153333                          .WORD   153333
1089  003704  066667                          .WORD   066667
1090
1091  003706  000000                          .WORD   000000  ;STANDARD PATTERN 14
1092  003710  177777                          .WORD   177777
1093  003712  177777                          .WORD   177777
1094  003714  177777                          .WORD   177777
1095  003716  177777                          .WORD   177777
1096  003720  177777                          .WORD   177777
1097  003722  177777                          .WORD   177777
1098  003724  177777                          .WORD   177777
1099  003726  177777                          .WORD   177777
1100  003730  177777                          .WORD   177777
1101  003732  177777                          .WORD   177777
1102  003734  177777                          .WORD   177777
1103  003736  177777                          .WORD   177777
1104  003740  177777                          .WORD   177777
1105  003742  177777                          .WORD   177777
1106  003744  177777                          .WORD   177777
1107
1108  003746  177777                          .WORD   177777  ;STANDARD PATTERN 15
1109  003750  000000                          .WORD   000000
1110  003752  000000                          .WORD   000000
1111  003754  000000                          .WORD   000000
1112  003756  000000                          .WORD   000000
1113  003760  000000                          .WORD   000000
1114  003762  000000                          .WORD   000000
1115  003764  000000                          .WORD   000000
1116  003766  000000                          .WORD   000000
1117  003770  000000                          .WORD   000000
1118  003772  000000                          .WORD   000000
1119  003774  000000                          .WORD   000000
1120  003776  000000                          .WORD   000000
1121  004000  000000                          .WORD   000000
1122  004002  000000                          .WORD   000000
1123  004004  000000                          .WORD   000000
1124
```

```
                                .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

004006                          $ERRTB:
                                ;ERROR 1

                                ;ERROR 1

004006  044736                          EM1                     ;RH11 INTERRUPT OCCURRED (RPAS = 0)
004010  047376                          DH1
004012  050030                          DT1
004014  000000                          0

                                ;ERROR 2

004016  045001                          EM2                     ;UNEXPECTED ATTENTION OCCURRED
004020  047403                          DH2
004022  050034                          DT2
004024  000000                          0

                                ;ERROR 3

004026  045037                          EM3                     ;MASSBUS PARITY ERROR (MCPE=1)
004030  047460                          DH3
004032  050052                          DT3
004034  000000                          0

                                ;ERROR 4

004036  045075                          EM4                     ;MASSBUS PARITY ERROR (PAR=1)
004040  04750E                          DH4
004042  050062                          DT4
004044  000000                          0

                                ;ERROR 5

004046  045132                          EM5                     ;ADDRESS PLUG BIT CHANGED
004050  047403                          DH2
004052  050034                          DT2
004054  000000                          0

                                ;ERROR 6
```

```
1179  004056  045166                          EM6                     ;RH11 DIDN'T RESPOND TO ADDRESSING
1180  004060  047545                          DH6
1181  004062  050074                          DT6
1182  004064  000000                          0
1183
1184                                  ;;**********************************************************************
1185
1186                                  .SBTTL  SETUP AND INITIALIZATION ROUTINE
1187
1188                                  ;       START ADDRESS = 200
1189                                  ;       ADDRESS TO CHANGE RH11 UNIBUS ADDRESS = 204
1190
1191                                  ;;**********************************************************************
1192
1193  004066  012737  177777  001260  START:  MOV     #-1,CHGADR      ;SET RH11 ADDRESS CHANGE FLAG
1194  004074  000402                          BR      START2          ;START THE PROGRAM
1195  004076  005037  001260          START1: CLR     CHGADR          ;CLEAR THE RH11 ADDRESS CHANGE FLAG
1196  004102  000005                  START2: RESET                   ;CLEAR THE BUS
1197                                  .SBTTL  INITIALIZE THE COMMON TAGS
1198                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1199  004104  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1200  004110  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1201  004112  022706  001140                  CMP     #SWR,R6 ;;DONE?
1202  004116  001374                          BNE     .-6             ;;LOOP BACK IF NO
1203  004120  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1204                                  ;;INITIALIZE A FEW VECTORS
1205  004124  012737  030460  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1206  004132  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1207  004140  012737  033014  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1208  004146  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
1209  004154  012737  176543  032400          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
1210  004162  012737  123456  032402          MOV     #123456,$LONUM  ;;BOTH HIGH AND LOW WORDS
1211                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1212                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
1213  004170  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
1214  004174  012737  004230  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1215  004202  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1216  004210  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1217  004216  022777  177777  174714          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1218  004224  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1219                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
1220  004226  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
1221  004230  012716  004236          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1222  004234  000002                          RTI
1223  004236  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1224  004244  012737  000174  001142          MOV     #DISPREG,DISPLAY
1225  004252  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1226
1227  004256  012737  000240  000032          MOV     #240,@#EMTVEC+2   ;CHANGE EMT PRIORITY TO 5
1228  004264  012737  000240  000036          MOV     #240,@#TRAPVEC+2  ;CHANGE TRAP PRIORITY TO 5
1229  004272  005227  177777                  INC     #-1             ;FIRST START ?
1230  004276  001013                          BNE     1$              ;BR IF NOT
1231  004300  104401  055254                  TYPE    ,TITLE          ;NAME AND MANDEC NUMBER
1232  004304  005737  000042                  TST     42              ;AUTO ACCEPT OR CHAIN MODE ?
```

```
1233  004310  001006                          BNE     1$              ;BR IF EITHER
1234  004312  122737  000011  000041          CMPB    #11,41          ;LOADED FROM AN RP04/5/6 ?
1235  004320  001002                          BNE     1$              ;BR IF NOT
1236  004322  104401  055354                  TYPE    ,LOADRV         ;INSTRUCT THE OPERATOR ON HOW TO TEST DRIVE 0
1237  004326  004737  030000          1$:     JSR     PC,$TKINT       ;TURN ON THE KEYBOARD INTERRUPT
1238                                  .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
1239  004332  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
1240  004336  001006                          BNE     67$             ;;BRANCH IF YES
1241  004340  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
1242  004346  001005                          BNE     68$             ;;BRANCH IF NO
1243  004350  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
1244  004352  000403                          BR      68$
1245  004354  112737  000001  001134  67$:     MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
1246  004362                          68$:
1247  004362  005227  177777                  INC     #-1             ;FIRST START ?
1248  004366  001012                          BNE     2$              ;BR IF NOT
1249  004370  004737  054662                  JSR     PC,BUSADR       ;CHECK RH11 BUS ADDRESS
1250  004374  013737  001170  033250          MOV     $RPADR,RPADR    ;RH11 ADDRESS
1251  004402  013737  001172  033252          MOV     $RPVEC,RPVEC    ;RH11 VECTOR ADDRESS
1252  004410  004737  054404                  JSR     PC,OPRDAT       ;GET THE DATE AND OPERATOR ID
1253  004414  005037  001214          2$:     CLR     STATIN          ;CLEAR PERFORMANCE SUMMARY TYPEOUT FLAG
1254  004420  012705  001420                  MOV     #ORDERQ,R5      ;START OF AREA TO CLEAR
1255  004424  005025                  3$:     CLR     (R5)+
1256  004426  022705  001720                  CMP     #BLKADR,R5      ;LOOK FOR END OF CLEAR AREA
1257  004432  001374                          BNE     3$              ;BR IF NOT FINISHED
1258  004434  012706  001100                  MOV     #STACK,SP       ;SETUP THE STACK POINTER
1259  004440  005037  177776                  CLR     PS              ;CLEAR THE PROCESSOR STATUS WORD
1260  004444  013737  001212  001274          MOV     HZ,SIXTEE       ;1/60 TH OR 1/50 TH SECOND COUNTER VALUE
1261  004452  005037  001266                  CLR     HOUR            ;CLEAR THE HOUR'S COUNTER
1262  004456  005037  001270                  CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
1263  004462  005037  001272                  CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
1264  004466  005037  001372                  CLR     INTRVL+2        ;CLEAR INTERVAL COUNTER
1265  004472  005037  001216                  CLR     PACK            ;CLEAR THE 'R' OR 'W' COMMAND FLAG
1266  004476  005037  001262                  CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
1267  004502  042737  170000  001366          BIC     #170000,MAXER   ;MAKE SURE ERROR LIMITS ARE NOT TOO HIGH
1268
1269                                  ;ROUTINE TO DETERMINE BUFFER AREA SIZE
1270
1271  004510  005227  177777          SIZMEM: INC     #-1             ;SEE IF TIME TO SIZE MEMORY
1272  004514  001005                          BNE     1$              ;BR IF NOT
1273  004516  004737  054564                  JSR     PC,$SIZE        ;SEE HOW MUCH MEMORY ON SYSTEM
1274  004522  013737  054660  001256          MOV     $LSTAD,LSTAD    ;SAVE THE LAST ADDRESS
1275  004530  012737  000001  001576  1$:     MOV     #1,BUFTBL       ;LOAD NUMBER OF BUFFERS
1276  004536  012737  054404  001600          MOV     #ENDPGM,BUFTBL+2  ;STARTING ADDRESS OF BUFFER
1277  004544  013737  001256  001602          MOV     LSTAD,BUFTBL+4  ;LAST ADDR TO BUFFER ALLOCATION TABLE
1278  004552  162737  054404  001602          SUB     #ENDPGM,BUFTBL+4  ;SUBTRACT PROGRAM SPACE
1279  004560  000241                          CLC                     ;CLEAR THE 'C' BIT
1280  004562  006037  001602                  ROR     BUFTBL+4        ;CONVERT TO WORD COUNT
1281  004566  162737  000144  001602          SUB     #100.,BUFTBL+4  ;SAVE ROOM FOR THE 'ABS' LOADER
1282  004574  023727  001256  100000          CMP     LSTAD,#100000   ;16K ON THE SYSTEM ?
1283  004602  103406                          BLO     3$              ;BR IF YES
1284  004604  105737  000041                  TSTB    41              ;SEE WHO LOADED THE PROGRAM
1285  004610  001403                          BEQ     3$              ;BR IF LOADED BY PAPER TAPE
1286  004612  162737  002570  001602          SUB     #1400.,BUFTBL+4  ;SUBTRACT 'XXDP' LOADER SIZE
```

```
1287  004620  005737  001364          3$:     TST     MAXDL           ;VALUE IN 'MAXDL' ?
1288  004624  001012                          BNE     4$              ;BR IF VALUE IS
1289  004626  012737  013534  001364          MOV     #5980.,MAXDL    ;ASSUME FULL TRACK + 1 SEC MAXIMUM
1290  004634  023737  001364  001602          CMP     MAXDL,BUFTBL+4  ;IS THAT TOO LARGE ?
1291  004642  103403                          BLO     4$              ;BR IF NOT
1292  004644  013737  001602  001364          MOV     BUFTBL+4,MAXDL  ;USE MAX AVAIL MEMORY AS MAX BUFFER SIZE
1293  004652  013737  001602  053374  4$:     MOV     BUFTBL+4,PARLST+2  ;VALUE FOR THE PARAMETER TABLE
1294
1295                                  ;SEE IF THE OPERATOR WANTS TO CHANGE ANY PARAMETERS
1296
1297  004660  005737  000042          LKPAR:  TST     @#42            ;'XXDP' CHAIN MODE OR 'ACT11' OPERATION ?
1298  004664  001022                          BNE     SETVEC          ;BR IF YES
1299  004666  104401  053470                  TYPE    ,ASKPAR         ;ASK FOR PARMETERS
1300  004672  104411                          RDLIN                   ;READ THE ENTRY
1301  004674  012605                          MOV     (SP)+,R5        ;ADDRESS OF ENTRY TO R5
1302  004676  122715  000131                  CMPB    #'Y,(R5)        ;WAS ENTRY A 'Y' (YES)
1303  004702  001013                          BNE     SETVEC          ;BR IF NOT 'Y'
1304
1305  004704  012703  053372          ENTPR:  MOV     #PARLST,R3      ;PARAMETER TABLE ADDRESS
1306  004710  004737  026222                  JSR     PC,PARENT       ;GET THE PARAMETER ENTRY
1307  004714  023727  001364  000004          CMP     MAXDL,#4        ;IS THE 'MAXDL' VALUE OK ?
1308  004722  103003                          BHIS    SETVEC          ;BR IF IT IS
1309  004724  012737  000004  001364          MOV     #4,MAXDL        ;SET 'MAXDL' TO THE MINIMUM VALUE
1310
1311                                  ;DISPLAY DRIVE STATUS AND SET UP THE OTHER SYSTEM DEVICES THAT
1312                                  ;       THE PROGRAM WILL USE
1313
1314  004732  004737  022342          SETVEC: JSR     PC,CKCLK        ;START THE CLOCK
1315  004736  004737  033266                  JSR     PC,RPINIT       ;INITIALIZE THE RP04/5/6 DRIVER
1316  004742  012737  177777  033210          MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
1317  004750  062727  177777  000000          ADD     #-1,#0          ;CHECK FOR FIRST START
1318  004756  103004                          BCC     11$             ;BR IF FIRST START
1319  004760  032777  000004  174152          BIT     #SW02,@SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
1320  004766  001075                          BNE     10$             ;BR IF NOT
1321  004770  012737  000340  177776  11$:    MOV     #PR7,PS         ;SET PRIORITY TO 7
1322  004776  005004                          CLR     R4              ;DRIVE TABLE POINTER
1323  005000  104401  001165                  TYPE    ,$CRLF          ;CR-LF
1324  005004  104401  052262                  TYPE    ,SYSTAT         ;TYPE STATUS HEADING
1325  005010                          1$:
1326  005010  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
1327                                                                  ;;TYPE DRIVE NUMBER
1328  005012  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
1329  005014     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
1330  005015     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
1331  005016  104401  052071                  TYPE    ,LIN4SP         ;SPACES
1332  005022  105764  033122                  TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
1333  005026  100416                          BMI     4$              ;BR IF UNSAFE
1334  005030  001020                          BNE     5$              ;BR IF ONLINE
1335  005032  105764  033132                  TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
1336  005036  001404                          BEQ     2$              ;BR IF NONEXISTENT
1337  005040  100006                          BPL     3$              ;BR IF OFFLINE
1338  005042  104401  052175                  TYPE    ,NOTRP          ;DRIVE NOT AN RP04/5/6
1339  005046  000440                          BR      9$              ;CHECK NEXT DRIVE
1340  005050  104401  052216          2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
```

```
1341  005054  000435                        BR      9$              ;CHECK NEXT DRIVE
1342  005056  104401  052104          3$:   TYPE    ,UNTOFF         ;DRIVE OFFLINE
1343  005062  000405                        BR      6$              ;PRINT DRIVE TYPE
1344  005064  104401  052252          4$:   TYPE    ,NOTSAF         ;DRIVE UNSAFE
1345  005070  000402                        BR      6$              ;PRINT DRIVE TYPE
1346  005072  104401  052115          5$:   TYPE    ,UNTON          ;DRIVE ONLINE
1347  005076  104401  052073          6$:   TYPE    ,LINSP          ;SPACES
1348  005102  012737  052302  005146        MOV     #RP04B,8$       ;ADDRESS OF RP04 MESSAGE
1349  005110  132764  000001  033132        BITB    #BIT00,DRVTYP(R4)  ;RP04 ?
1350  005116  001012                        BNE     7$              ;BR IF YES
1351  005120  012737  052307  005146        MOV     #RP05,8$        ;ADDRESS OF RP05 MESSAGE
1352  005126  132764  000002  033132        BITB    #BIT01,DRVTYP(R4)  ;RP05 ?
1353  005134  001003                        BNE     7$              ;BR IF YES
1354  005136  012737  052314  005146        MOV     #RP06,8$        ;ADDRESS OF RP06 MESSAGE
1355  005144  104401                7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
1356  005146  000000                8$:     .WORD   0               ;MESSAGE ADDRESS HERE
1357  005150  104401  001165          9$:   TYPE    ,$CRLF          ;CR-LF
1358  005154  005204                        INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
1359  005156  020427  000010                CMP     R4,#8.          ;FINISHED ?
1360  005162  001312                        BNE     1$              ;BR IF NOT
1361  005164  104401  001165          10$:  TYPE    ,$CRLF          ;CR-LF
1362  005170  005037  177776                CLR     @PS             ;SET PRIORITY BACK TO '0'
1363  005174  000137  005200                JMP     MONTR           ;CHECK FOR 'XXDP' OR 'ACT11' MONITOR
1364
1365                                ;SETUP IF 'XXDP' OR 'ACT11' OPERATION
1366
1367  005200  005737  000042        MONTR:  TST     42              ;'XXDP' CHAIN MODE OR 'ACT11' AUTO ACCEPT
1368  005204  001402                        BEQ     1$              ;BR IF NEITHER
1369  005206  004737  024224                JSR     PC,ASGN2        ;ASSIGN DRIVES
1370  005212  005227  177777          1$:   INC     #-1             ;FIRST START ?
1371  005216  001011                        BNE     2$              ;BR IF NOT
1372  005220  105737  000041                TSTB    @#41            ;LOADED FROM PAPER TAPE ?
1373  005224  001406                        BEQ     2$              ;BR IF YES
1374  005226  023727  001256  100000        CMP     LSTAD,#100000   ;MORE THAN 16K ON THE SYSTEM ?
1375  005234  103002                        BHIS    2$              ;BR IF YES
1376  005236  104401  055553                TYPE    ,NOLOAD         ;TELL THE OPERATOR THAT THE 'XXDP' LOADER
1377                                                                ;WILL BE OVERWRITTEN
1378  005242  004737  030000          2$:   JSR     PC,$TKINT       ;INITIALIZE THE KEYBOARD INTERRUPT HANDLER
1379  005246  104401  053257                TYPE    ,INTDON         ;TYPE 'INITIALIZE COMPLETE'
1380  005252  000137  005452                JMP     MAIN1           ;START THE PROGRAM
1381
1382                                ;'XXDP' OR 'ACT11' END OF TEST ROUTINE
1383
1384  005256  013700  000042        $GET42: MOV     42,R0           ;MONITOR ADDRESS
1385  005262  001002                        BNE     1$              ;ER IF MONITOR
1386  005264  000137  005452                JMP     MAIN1           ;NONE, CONTINUE
1387  005270  022700  005310          1$:   CMP     #$ENDAD,R0      ;IS MONITOR 'ACT11' ?
1388  005274  001005                        BNE     $ENDAD          ;BR IF NOT
1389  005276  022760  177777  000002        CMP     #-1,2(R0)       ;LAST 'ACT11' PASS ?
1390  005304  001005                        BNE     $DOAGN          ;NO, MAKE ANOTHER PASS
1391  005306  000005                        RESET                   ;CLEAR EVERYTHING
1392  005310  004710                $ENDAD: JSR     PC,(R0)         ;GO TO THE MONITOR
1393  005312  000240                        NOP                     ;SAVE ROOM
1394  005314  000240                        NOP                     ;FOR
```

```
1395  005316  000240                          NOP                     ;ACT11
1396  005320  000137  004066          $DOAGN: JMP     START           ;START AGAIN
1397
1398                                  ;;*******************************************************************
1399
1400                                  .SBTTL  MAIN PROGRAM
1401
1402                                  ;;*******************************************************************
1403
1404  005324  012703  000010          MAIN:   MOV     #8.,R3          ;DRIVE COUNTER
1405  005330  012705  001444                  MOV     #DUNIT,R5       ;ADDRESS OF 'DROP DRIVE' TABLE
1406  005334  005715                  1$:     TST     (R5)            ;SEE IF ENTRY AT PRESENT POSITION
1407  005336  001011                          BNE     3$              ;BR IF THERE IS ONE
1408  005340  062705  000002          2$:     ADD     #2,R5           ;INCREMENT TO NEXT TABLE POSITION
1409  005344  005303                          DEC     R3              ;DECREMENT DRIVE COUNTER
1410  005346  001372                          BNE     1$              ;BR IF MORE TO CHECK
1411  005350  005737  001442                  TST     ASNLST          ;ANY DRIVES ACTIVE ?
1412  005354  001036                          BNE     MAIN1           ;BR IF YES
1413  005356  000137  005256                  JMP     $GET42          ;CHECK FOR MONITOR RETURN
1414  005362  012701  001510          3$:     MOV     #AVAIL,R1       ;ADDRESS OF 'AVAILABLE DRIVES' TABLE
1415  005366  005711                  4$:     TST     (R1)            ;SEE IF AT END OF TABLE
1416  005370  001405                          BEQ     5$              ;BR IF AT END: GO CHECK 'WAIT' TABLE
1417  005372  021115                          CMP     (R1),(R5)       ;IS DRIVE IN 'AVAIL' THE ONE TO BE DROPPED
1418  005374  001414                          BEQ     7$              ;BR IF YES
1419  005376  062701  000002                  ADD     #2,R1           ;INCREMENT 'AVAIL' TABLE ADDRESS
1420  005402  000771                          BR      4$              ;CONTINUE LOOKING
1421  005404  012701  001532          5$:     MOV     #WAIT,R1        ;MOVE THE ADDRESS OF THE BUFFER WAIT TABLE
1422  005410  005711                  6$:     TST     (R1)            ;AT THE END OF THE 'WAIT' TABLE ?
1423  005412  001752                          BEQ     2$              ;BR IF YES: SEE IF ANY MORE 'DROP' REQUESTS
1424  005414  021115                          CMP     (R1),(R5)       ;DRIVE IN THE 'WAIT' TABLE ?
1425  005416  001403                          BEQ     7$              ;BR IF IT IS
1426  005420  062701  000002                  ADD     #2,R1           ;INCREMENT 'WAIT' TABLE ADDRESS
1427  005424  000771                          BR      6$              ;CONTINUE LOOK THROUGH THE 'WAIT' TABLE
1428  005426  011100                  7$:     MOV     (R1),R0         ;PUT THE DRIVE'S BLOCK ADDRESS IN R0
1429  005430  104401  052566                  TYPE    ,DEASSG         ;TYPE 'DRIVE DEASSIGNED'
1430  005434  004737  022626                  JSR     PC,TYPEST       ;TYPE THE DRIVE'S PERFORMANCE SUMMARY
1431  005440  005015                          CLR     (R5)            ;CLEAR THE 'DROP DRIVE' TABLE ENTRY
1432  005442  005011                          CLR     (R1)            ;REMOVE THE DRIVE FROM THE 'AVAIL' OR 'WAIT' TABLE
1433  005444  004737  017460                  JSR     PC,CMPRES       ;COMPRESS THE RESPECTIVE TABLE
1434  005450  000733                          BR      2$              ;SEE IF ANY MORE DRIVES
1435
1436                                  ;LOOK FOR DRIVES TO BE ASSIGNED
1437
1438  005452  012703  000010          MAIN1:  MOV     #8.,R3          ;DRIVE COUNT
1439  005456  005002                          CLR     R2              ;'AVAIL' INDEX
1440  005460  005004                          CLR     R4              ;ASSIGN LIST INDEX
1441  005462  005005                          CLR     R5              ;NEW DRIVE INDEX
1442  005464  005765  001466          1$:     TST     NEWUNT(R5)      ;NEW DRIVE IN THIS POSITION
1443  005470  001006                          BNE     3$              ;BR IF THERE IS
1444  005472  062705  000002          2$:     ADD     #2,R5           ;INCREMENT R5
1445  005476  005204                          INC     R4              ;INCREMENT ASSIGN INDEX
1446  005500  005303                          DEC     R3              ;DECREMENT DRIVE COUNT
1447  005502  001370                          BNE     1$              ;BR IF MORE DRIVES
1448  005504  000432                          BR      MAIN2           ;START OPERATIONS FOR THE AVAILABLE DRIVES
```

```
1449  005506  104401  052076          3$:     TYPE    ,UNTMSG         ;'DRIVE'
1450  005512  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
1451                                                                  ;;TYPE DRIVE NUMBER
1452  005514  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
1453  005516     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
1454  005517     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
1455  005520  104401  052636                  TYPE    ,ASGND          ;'ASSIGNED'
1456  005524  005762  001510          4$:     TST     $VAIL(R2)       ;AT END OF AVAILABLE TABLE
1457  005530  001403                          BEQ     5$              ;BR IF YES
1458  005532  062702  000002                  ADD     #2,R2           ;INCREMENT AVAILABLE TABLE INDEX
1459  005536  000772                          BR      4$              ;CONTINUE LOOKING FOR END OF TABLE
1460  005540  016562  001466  001510  5$:     MOV     NEWUNT(R5),AVAIL(R2)  ;MOVE ADDR OF DRIVE INTO AVAIL LST
1461  005546  005065  001466                  CLR     NEWUNT(R5)      ;TAKE DRIVE OUT OF NEW DRIVE TABLE
1462  005552  156437  033236  001442          BISB    ATABIT(R4),ASNLST ;SET DRIVE ASSIGNED INDICATOR
1463  005560  016200  001510                  MOV     AVAIL(R2),R0    ;PUT STARTING ADDRESS OF BLOCK IN R0
1464  005564  062702  000002                  ADD     #2,R2           ;INCREMENT AVAILABLE TABLE POINTER
1465  005570  000740                          BR      2$              ;LOOK FOR MORE DRIVES
1466
1467                                  ;GET PARAMETERS, BUFFER SPACE, AND START ORDERS FOR DRIVES IN
1468                                  ;       THE 'AVAILABLE' QUELE
1469
1470  005572  005737  001532          MAIN2:  TST     WAIT            ;OUTSTANDING BUFFER REQUESTS
1471  005576  001113                          BNE     MAIN3           ;BR IF THERE ARE
1472  005600  005002                          CLR     R2              ;CLEAR DRIVE TABLE POINTER
1473  005602  005762  001510          1$:     TST     AVAIL(R2)       ;ANY DRIVES WAITING FOR PARAMETERS
1474  005606  001551                          BEQ     IDLE            ;BRANCH IF NONE
1475  005610  016200  001510                  MOV     AVAIL(R2),R0    ;CONTROL BLOCK ADDR IN R0
1476  005614  005760  000104                  TST     $NEXT(R0)       ;PARAMETERS BEEN SELECTED ?
1477  005620  001021                          BNE     6$              ;BR IF THEY HAVE
1478  005622  105760  000026                  TSTB    $PACK(R0)       ;'R' OR 'W' COMMAND FOR THE DRIVE ?
1479  005626  001403                          BEQ     2$              ;BR IF NOT
1480  005630  004737  017476                  JSR     PC,WRTPK        ;GET DATA PACK PARAMETERS
1481  005634  000415                          BR      7$              ;GET THE BUFFER
1482  005636  012701  001554          2$:     MOV     #PARQ,R1        ;ADDRESS OF THE PARAMETER QUEUE
1483  005642  020011          3$:     CMP     R0,(R1)         ;IS CURRENT DRIVE IN THE QUEUE ?
1484  005644  001403                          BEQ     4$              ;BR IF IT IS
1485  005646  005721                          TST     (R1)+           ;AT END OF THE QUEUE
1486  005650  001403                          BEQ     5$              ;BR IF AT END
1487  005652  000773                          BR      3$              ;CONTINUE LOOKING
1488  005654  004737  017460          4$:     JSR     PC,CMPRES       ;COMPRESS THE TABLE
1489  005660  004737  016376          5$:     JSR     PC,SELPAR       ;SELECT THE PARAMETERS
1490  005664  004737  017252          6$:     JSR     PC,GETPAR       ;LOAD NEW PARAMETERS
1491  005670  005046                  7$:     CLR     -(SP)           ;MAKE ROOM ON THE STACK FOR THE BUFFER ADDR
1492  005672  004737  015622                  JSR     PC,GETBUF       ;GET BUFFER
1493  005676  012660  000006                  MOV     (SP)+,$BUF(R0)  ;MOVE BUFFER ADDR TO DPB
1494  005702  001424                          BEQ     8$              ;BR IF '0' ADDR (NO BUFFER)
1495  005704  004737  016172                  JSR     PC,FILBUF       ;FILL THE BUFFER
1496  005710  005060  000072                  CLR     $FAIR(R0)       ;CLEAR THE 'FAIRNESS' COUNT
1497  005714  004737  016320                  JSR     PC,GODRIV       ;PUT CURRENT DPB IN DRIVER
1498  005720  012705  001420                  MOV     #ORDERQ,R5      ;ADDRESS OF ORDER QUEUE IN R5
1499  005724  005725                          TST     (R5)+           ;END OF QUEUE ?
1500  005726  001376                          BNE     .-2             ;BR IF NOT
1501  005730  010045                          MOV     R0,-(R5)        ;PUT BLOCK ADDRESS INTO QUEUE
1502  005732  105760  000026                  TSTB    $PACK(R0)       ;'R' OR 'W' COMMAND FOR DRIVE ?
```

```
1503  005736  001025                          BNE     10$             ;BR IF EITHER
1504  005740  012705  001554                  MOV     #PARQ,R5        ;PUT BLOCK INTO THE PARAMETER QUEUE
1505  005744  005725                          TST     (R5)+           ;FIND THE END OF THE QUEUE
1506  005746  001376                          BNE     .-2             ;BR IF NOT AT END OF QUEUE
1507  005750  010045                          MOV     R0,-(R5)        ;PUT BLOCK ADDRESS INTO THE QUEUE
1508  005752  000417                          BR      10$             ;CONTINUE LOOKING
1509  005754  026037  000072  001254  8$:     CMP     $FAIR(R0),FAIRNS  ;ENTRY BEEN IN THE QUEUE LONG ENOUGH ?
1510  005762  001405                          BEQ     9$              ;BR IF YES
1511  005764  005260  000072                  INC     $FAIR(R0)       ;INCREMENT THE ENTRY COUNT
1512  005770  062702  000002                  ADD     #2,R2           ;INCREMENT THE POINTER
1513  005774  000702                          BR      1$              ;LOOK FOR SOME MORE DRIVES
1514  005776  012705  001532          9$:     MOV     #WAIT,R5        ;'WAIT' QUEUE ADDRESS
1515  006002  005725                          TST     (R5)+           ;LOOK FOR AN OPENING
1516  006004  001376                          BNE     .-2             ;BR IF NONE YET
1517  006006  016245  001510                  MOV     AVAIL(R2),-(R5)  ;MOVE DRIVE'S BLOCK ADDRESS TO QUEUE
1518  006012  012701  001510          10$:    MOV     #AVAIL,R1       ;'AVAILABLE' TABLE ADDRESS
1519  006016  060201                          ADD     R2,R1           ;FORM ADDRESS OF LAST ENTRY
1520  006020  004737  017460                  JSR     PC,CMPRES       ;COMPRESS THE TABLE
1521  006024  000666                          BR      1$              ;CONTINUE LOOKING
1522
1523                                  ;GET BUFFER ASSIGNMENTS FOR DRIVES IN THE 'BUFFER WAIT' QUEUE
1524
1525  006026  013700  001532          MAIN3:  MOV     WAIT,R0         ;MOVE THE 'WAIT' ENTRY TO R0
1526  006032  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK FOR THE BUFFER ADDR
1527  006034  004737  015622                  JSR     PC,GETBUF       ;TRY TO GET A BUFFER
1528  006040  012660  000006                  MOV     (SP)+,$BUF(R0)  ;MOVE THE BUFFER ADDR TO THE DPB
1529  006044  001002                          BNE     1$              ;BR IF A BUFFER WAS ASSIGNED
1530  006046  000137  006132                  JMP     IDLE            ;NO BUFFER AVAILABLE YET
1531  006052  004737  016172          1$:     JSR     PC,FILBUF       ;FILL THE BUFFER
1532  006056  004737  016320                  JSR     PC,GODRIV       ;PUT THE ENTRY IN THE DRIVER
1533  006062  005060  000072                  CLR     $FAIR(R0)       ;CLEAR THE 'FAIRNESS' COUNT
1534  006066  012705  001420                  MOV     #ORDERQ,R5      ;ADDRESS OF ORDER QUEUE IN R5
1535  006072  005725                          TST     (R5)+           ;AT END OF THE QUEUE
1536  006074  001376                          BNE     .-2             ;BR IF NOT
1537  006076  010045                          MOV     R0,-(R5)        ;PUT BLOCK ADDRESS IN QUEUE
1538  006100  105760  000026                  TSTB    $PACK(R0)       ;'R' OR 'W' COMMAND FOR DRIVE ?
1539  006104  001005                          BNE     2$              ;BR IF YES, DON'T PUT BLOCK INTO 'PARQ'
1540  006106  012705  001554                  MOV     #PARQ,R5        ;FIND THE END OF THE PARAMETER QUEUE
1541  006112  005725                          TST     (R5)+           ;OPEN SLOT IN THE QUEUE ?
1542  006114  001376                          BNE     .-2             ;BR IF NOT
1543  006116  010045                          MOV     R0,-(R5)        ;PUT BLOCK ADDRESS INTO THE QUEUE
1544  006120  012701  001532          2$:     MOV     #WAIT,R1        ;ADDRESS OF TABLE TO TO COMPRESS
1545  006124  004737  017460                  JSR     PC,CMPRES       ;COMPRESS THE WAIT TABLE
1546  006130  000620                          BR      MAIN2           ;LOOK FOR MORE ENTRIES
1547
1548                                  ;WAIT FOR AN ORDER TO FINISH
1549
1550  006132  012701  001420          IDLE:   MOV     #ORDERQ,R1      ;ADDRESS OF THE ORDER QUEUE IN R1
1551  006136  012100                  1$:     MOV     (R1)+,R0        ;PUT BLOCK ADDRESS INTO R0
1552  006140  001433                          BEQ     IDLE1           ;BR IF END OF QUEUE
1553  006142  005760  000016                  TST     $STATUS(R0)     ;SEE IF DRIVE FINISHED
1554  006146  001773                          BEQ     1$              ;BR IF DRIVE NOT FINISHED
1555  006150  162701  000002                  SUB     #2,R1           ;CORRECT THE QUEUE POINTER
1556  006154  010146                          MOV     R1,-(SP)        ;SAVE THE QUEUE ADDRESS
```

```
1557  006156  004737  015456              JSR     PC,STATIS       ;ACCUMULATE STATISTICS FOR DRIVE IN RC
1558  006162  000240                      NOP                     ;DEBUGGING AID
1559  006164  004737  006470              JSR     PC,PROCES       ;PROCESS END OF ORDER
1560  006170  005037  001264              CLR     BADSEC          ;CLEAR THE BAD TRK/SEC ERROR INDICATOR
1561  006174  004737  026454              JSR     PC,ABNRML       ;SEE IF ANY DRIVES HAVE TOO MANY ERRORS
1562  006200  004737  026502              JSR     PC,EOP          ;SEE IF ANY DRIVE HAS XFERED 3X10^9 BITS
1563  006204  012601                      MOV     (SP)+,R1        ;RESTORE THE ORDER TABLE INDEX
1564  006206  012705  001510              MOV     #AVAIL,R5       ;FIND THE END OF THE 'AVAILABLE' TABLE
1565  006212  005725              2$:     TST     (R5)+           ;END OF THE TABLE ?
1566  006214  001376                      BNE     2$              ;BR IF NOT AT END OF LIST
1567  006216  011145                      MOV     (R1),-(R5)      ;MOVE THE BLOCK ADDRESS INTO THE TABLE
1568  006220  004737  017460              JSR     PC,CMPRES       ;COMPRESS THE ORDER QUEUE
1569  006224  004737  015756              JSR     PC,RELBUF       ;RESTORE BUFFER
1570  006230  005737  001262      IDLE1:  TST     CFLAG           ;'CONTROL C' FLAG ENTERED ?
1571  006234  001403                      BEQ     1$              ;BR IF IT WAS
1572  006236  004737  023640              JSR     PC,KSR          ;SERVICE THE KEYBOARD
1573  006242  000733                      BR      IDLE            ;SYSTEM WAS BUSY
1574  006244  032777  000004  172666  1$: BIT     #SW02,@SWR      ;TYPE PERFORMANCE SUMMARY
1575  006252  001007                      BNE     2$              ;BR IF NOT
1576  006254  005737  001214              TST     STATIN          ;TIME TO TYPE THE PERFORMANCE SUMMARY ?
1577  006260  001404                      BEQ     2$              ;BR IF NOT
1578  006262  005037  001214              CLR     STATIN          ;CLEAR THE INDICATOR
1579  006266  004737  022544              JSR     PC,STATPR       ;TYPE THE SUMMARY
1580  006272  005737  001554      2$:     TST     PARQ            ;ENTRY IN THE PARAMETER QUEUE ?
1581  006276  001410                      BEQ     3$              ;BR IF NOT
1582  006300  013700  001554              MOV     PARQ,R0         ;PUT THE BLOCK ADDRESS INTO R0
1583  006304  004737  016376              JSR     PC,SELPAR       ;GET THE PARAMETERS FOR NEXT OPERATION
1584  006310  012701  001554              MOV     #PARQ,R1        ;SETUP TO COMPRESS THE TABLE
1585  006314  004737  017460              JSR     PC,CMPRES       ;COMPRESS THE PARAMETER QUEUE
1586  006320  000137  005324      3$:     JMP     MAIN            ;CONTINUE THE LOOP
1587
1588                                      ;SETUP TO REFORMAT AN ERROR SECTOR
1589
1590  006324  032777  000001  172606  REFMT:  BIT     #SW0,@SWR       ;READ ONLY SWITCH SET ?
1591  006332  001055                      BNE     REFMTX          ;BR IF IT IS
1592  006334  032777  000200  172576          BIT     #SW7,@SWR       ;SWITCH 7 SET ?
1593  006342  001051                      BNE     REFMTX          ;BR IF IT IS
1594  006344  005737  001376              TST     FORMAT          ;WRITE HEADER & DATA ORDERS ALLOWED ?
1595  006350  001446                      BEQ     REFMTX          ;BR IF NOT
1596  006352  016060  000272  000100      MOV     $RPCC(R0),$NCYL(R0)  ;USE PRESENT CYLINDER
1597  006360  004737  022244              JSR     PC,READDR       ;GET CORRECTED SECTOR-TRACK ADDRESSES
1598  006364  112660  000077              MOVB    (SP)+,$NTRK(R0) ;TRACK ADDR TO DPB
1599  006370  112660  000076              MOVB    (SP)+,$NSEC(R0) ;SECTOR ADDR TO DPB
1600  006374  012760  000404  000102      MOV     #260.,$NWRDL(R0)  ;WORD COUNT FOR FORMAT
1601  006402  023727  001364  000404      CMP     MAXDL,#260.     ;CAN A FULL SECTOR BE WRITTEN ?
1602  006410  103003                      BHIS    1$              ;BR IF IT CAN
1603  006412  013760  001364  000102      MOV     MAXDL,$NWRDL(R0)  ;PUT TRANSFER SIZE INTO THE DPB
1604  006420  112760  000003  000074  1$: MOVB    #3,$NCODE(R0)   ;COMMAND CODE
1605  006426  004737  017224              JSR     PC,GETPAT       ;GET A PATTERN
1606  006432  110560  000075              MOVB    R5,$NPATC(R0)   ;PATTERN CODE TO CONTROL BLOCK
1607  006436  012760  177777  000104      MOV     #-1,$NEXT(R0)   ;SET PARAMETERS SELECTED INDICATOR
1608  006444  012701  001554              MOV     #PARQ,R1        ;SETUP TO SEE IF BLOCK IN THE PARAMETER QUEUE
1609  006450  005711              2$:     TST     (R1)            ;SEE IF AT END OF TABLE
1610  006452  001405                      BEQ     REFMTX          ;BR IF AT END
```

```
1611  006454  020021                          CMP     R0,(R1)+        ;SEE IF BLOCK AT PRESENT POSITION
1612  006456  001374                          BNE     2$              ;BR IF NOT
1613  006460  005041                          CLR     -(R1)           ;CLEAR THE ENTRY
1614  006462  004737  017460                  JSR     PC,CMPRES       ;COMPRESS THE TABLE
1615  006466  000207                  REFMTX: RTS     PC              ;RETURN
1616
1617                                  ;PROCESS THE ORDER TERMINATION
1618
1619  006470  111037  001246          PROCES: MOVB    (R0),UNIT       ;DRIVE NUMBER FOR ANY ERROR MESSAGES
1620  006474  005760  000016                  TST     $TATUS(R0)      ;SEE IF DRIVER SIGNALED AN ERROR
1621  006500  100427                          BMI     ERPROC          ;BR IF ERROR
1622  006502  032760  100000  000234          BIT     #BIT15,$RPCS1(R0)  ;SEE IF 'SC' SET
1623  006510  001410                          BEQ     1$              ;BR IF NOT SET
1624  006512  032760  040000  000234          BIT     #BIT14,$RPCS1(R0)  ;SEE IF 'TRE' SET
1625  006520  001017                          BNE     ERPROC          ;BR IF SET
1626  006522  032760  040000  000246          BIT     #BIT14,$RPDS1(R0)  ;SEE IF 'ERR' SET
1627  006530  001013                          BNE     ERPROC          ;BR IF SET
1628  006532  004737  012720          1$:     JSR     PC,CKERR        ;NO ERROR, CHECK ERROR BITS ANYWAY
1629  006536  004737  013020                  JSR     PC,CKBUS        ;NO ERROR, CHECK BUS ADDR & WC
1630  006542  032777  000002  172370          BIT     #SW01,@SWR      ;DATA COMPARE ?
1631  006550  001002                          BNE     2$              ;BR IF NOT
1632  006552  004737  013104                  JSR     PC,CMPAR        ;NO ERROR, COMPARE DATA
1633  006556  000207                  2$:     RTS     PC              ;RETURN
1634
1635                                  ;ORDER TERMINATED WITH AN ERROR - PROCESS THE ERROR
1636
1637  006560  032760  000200  000016  ERPROC: BIT     #BIT07,$TATUS(R0) ;DONE BIT SET ?
1638  006566  001402                          BEQ     ERPRC1          ;BR IF ORDER DIDN'T COMPLETE NORMALLY
1639  006570  000137  007214                  JMP     DONE            ;PROCESS ERROR WITH 'DONE' BIT SET
1640
1641                                  ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE NOT' BITS
1642
1643  006574  032760  010000  000016  ERPRC1: BIT     #BIT12,$TATUS(R0) ;SEE IF DRIVE WAS UNSAFE
1644  006602  001025                          BNE     PUNSAF          ;BR IF YES
1645  006604  032760  004000  000016          BIT     #BIT11,$TATUS(R0) ;PARITY ERROR OCCURRED
1646  006612  001055                          BNE     UCPAR           ;BR IF IT DID
1647  006614  032760  002000  000016          BIT     #BIT10,$TATUS(R0) ;FATAL PARITY ERROR
1648  006622  001056                          BNE     FALPAR          ;BR IF THERE IS ONE
1649  006624  032760  001000  000016          BIT     #BIT09,$TATUS(R0) ;TIMEOUT?
1650  006632  001076                          BNE     SWTIM           ;BR IF YES
1651  006634  032760  040002  000016          BIT     #BIT14!BIT01,$TATUS(R0)  ;DRIVE WENT OFFLINE ?
1652  006642  001111                          BNE     OFLIN           ;BR IF IT DID
1653  006644  032760  000004  000016          BIT     #BIT2,$TATUS(R0)  ;PORT REQUEST TIME OUT ?
1654  006652  001141                          BNE     PRTIM           ;BR IF IT DID
1655  006654  000207                          RTS     PC              ;ERROR. RETURN
1656
1657                                  ;DRIVE IS PERSISTENTLY UNSAFE
1658
1659  006656  104401  001165          PUNSAF: TYPE    ,$CRLF          ;CR-LF
1660  006662  104401  045326                  TYPE    ,EM12           ;'DRIVE UNSAFE' MESSAGE
1661  006666  104401  052611                  TYPE    ,DRNUM          ;DRIVE NUMBER
1662  006672  013746  001246                  MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
1663                                                                  ;;TYPE DRIVE NUMBER
1664  006676  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
```

```
1665  006700  002                                 .BYTE   2               ;;TYPE 2 DIGIT(S)
1666  006701  000                                 .BYTE   0               ;;SUPPRESS LEADING ZEROS
1667  006702  104401  001165                      TYPE    ,$CRLF          ;CR-LF
1668  006706  004737  020130                      JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
1669  006712  104414  045326                      DISPLY  ,EM12           ;PERSISTENT DEVICE UNSAFE MESSAGE
1670  006716  004737  020174                      JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
1671  006722  004737  020602                      JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
1672  006726  004737  021256                      JSR     PC,LINE4        ;PRINT LINE 4 OF THE ERROR MESSAGE
1673  006732  004737  023354                      JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1674  006736  004737  021712                      JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
1675  006742  000137  026376                      JMP     DROP            ;DROP THE DRIVE
1676
1677                                      ;UNCORRECTABLE MASSBUS PARITY ERROR OCCURRED
1678
1679  006746  104401  001165              UCPAR:  TYPE    ,$CRLF          ;CR-LF
1680  006752  104401  045230                      TYPE    ,EM10           ;'UNCORRECTABLE PARITY ERROR' MESSAGE
1681  006756  000404                              BR      FALPR1          ;FINISH PROCESSING THE ERROR
1682
1683                                      ;'FATAL' MASSBUS PARITY ERROR OCCURRED
1684
1685  006760  104401  001165              FALPAR: TYPE    ,$CRLF          ;CR-LF
1686  006764  104401  045273                      TYPE    ,EM11           ;'FATAL PARITY ERROR' MESSAGE
1687  006770  104401  052611              FALPR1: TYPE    ,DRNUM          ;DRIVE NUMBER
1688  006774  013746  001246                      MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
1689                                                                      ;;TYPE DRIVE NUMBER
1690  007000  104403                              TYPOS                   ;;GO TYPE--OCTAL ASCII
1691  007002  002                                 .BYTE   2               ;;TYPE 2 DIGIT(S)
1692  007003  000                                 .BYTE   0               ;;SUPPRESS LEADING ZEROS
1693  007004  104401  001165                      TYPE    ,$CRLF          ;CR-LF
1694  007010  004737  023354                      JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1695  007014  032777  100000  172116              BIT     #SW15,@SWR      ;HALT ON ERROR ?
1696  007022  001401                              BEQ     1$              ;BR IF NOT
1697  007024  000000                              HALT                    ;ERROR HALT
1698  007026  000207                      1$:     RTS     PC
1699
1700                                      ;SOFTWARE TIMEOUT OCCURRED
1701
1702  007030  004737  020130              SWTIM:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
1703  007034  104414  045357                      DISPLY  ,EM13           ;PRINT THE TIME OUT MESSAGE
1704  007040  004737  020174                      JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
1705  007044  004737  020602                      JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
1706  007050  004737  021256                      JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
1707  007054  004737  023354                      JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1708  007060  004737  021712                      JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
1709  007064  000207                              RTS     PC              ;RETURN
1710
1711                                      ;DRIVE WENT OFFLINE
1712
1713  007066  104401  001165              OFLIN:  TYPE    ,$CRLF          ;CR-LF
1714  007072  104401  045431                      TYPE    ,EM14           ;'DRIVE WENT OFFLINE' MESSAGE
1715  007076  104401  052611                      TYPE    ,DRNUM          ;DRIVE NUMBER
1716  007102  013746  001246                      MOV     UNIT,-(SP)      ;;SAVE UNIT FOR TYPEOUT
1717                                                                      ;;TYPE DRIVE NUMBER
1718  007106  104403                              TYPOS                   ;;GO TYPE--OCTAL ASCII
```

```
1719  007110  002                                .BYTE   2               ;;TYPE 2 DIGIT'S)
1720  007111  000                                .BYTE   0               ;;SUPPRESS LEALING ZEROS
1721  007112  104401  001165                     TYPE    ,$CRLF          ;CR-LF
1722  007116  004737  020130                     JSR     PC,LINE1        ;FRINT LINE 1 OF THE ERROR MESSAGE
1723  007122  104414  045431                     DISPLY  ,EM14           ;PRINT OFFLINE MESSAGE
1724  007126  004737  020174                     JSR     PC,LINE2        ;PRINT LINE 2 OF THE ERROR MESSAGE
1725  007132  004737  020602                     JSR     PC,LINE3        ;PRINT LINE 3 OF THE ERROR MESSAGE
1726  007136  004737  021256                     JSR     PC,LINE4        ;PRINT LINE 4 OF THE ERROR MESSAGE
1727  007142  004737  023354                     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1728  007146  004737  021712                     JSR     PC,LINE7        ;PRINT LINE 7 OF THE ERROR MESSAGE
1729  007152  000137  026376                     JMP     DROP            ;DROP THE DRIVE
1730
1731                                   ;PORT REQUEST TIMEOUT ERROR
1732
1733  007156  004737  020130           PRTIM:  JSR     PC,LINE1        ;TYPE LINE 1 OF THE ERROR MESSAGE
1734  007162  104414  045454                   DISPLY  ,EM15           ;PRINT PORT TIME OUT MESSAGE
1735  007166  004737  020174                   JSR     PC,LINE2        ;TYPE LINE 2 OF THE ERROR MESSAGE
1736  007172  004737  020602                   JSR     PC,LINE3        ;TYPE LINE 3 OF THE ERROR MESSAGE
1737  007176  004737  021256                   JSR     PC,LINE4        ;TYPE LINE 4 OF THE ERROR MESSAGE
1738  007202  004737  023354                   JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1739  007206  004737  021712                   JSR     PC,LINE7        ;TYPE LINE 7 OF THE ERROR MESSAGE
1740  007212  000207                           RTS     PC              ;RETURN
1741
1742                                   ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE' BITS SET
1743
1744  007214  032760  000030  000016 DONE:   BIT     #BIT04!BIT03,$TATUS(R0) ;UNSAFE OCCURRED
1745  007222  001402                           BEQ     .+6             ;BR IF NOT
1746  007224  000137  012416                   JMP     UNSAF           ;REPORT UNSAFE
1747  007230  032760  040000  000244         BIT     #BIT14,$RPCS2(R0)  ;IS 'WCE' SET ?
1748  007236  001006                           BNE     1$              ;BR IF SET
1749  007240  032760  040000  000246         BIT     #BIT14,$RPDS1(R0) ;CHECK 'ERR'
1750  007246  001002                           BNE     1$              ;BR IF SET
1751  007250  000137  012162                   JMP     TRFER           ;PROCESS 'TRE'
1752  007254  032760  000400  000250  1$:     BIT     #BIT08,$RPER1(R0) ;'HCRC' SET?
1753  007262  001402                           BEQ     .+6             ;BR IF NOT
1754  007264  000137  010640                   JMP     HCRCER          ;PROCESS 'HCRC'
1755  007270  032760  000020  000250         BIT     #BIT04,$RPER1(R0) ;'FMT' SET?
1756  007276  001402                           BEQ     .+6             ;BR IF NOT SET
1757  007300  000137  011022                   JMP     CKFMT           ;CHECK FORMAT ERROR
1758  007304  032760  000200  000250         BIT     #BIT07,$RPER1(R0) ;'HCE' SET?
1759  007312  001402                           BEQ     .+6             ;BR IF NOT SET
1760  007314  000137  011216                   JMP     CKHCE           ;CHECK 'HCE' ERROR
1761  007320  032760  020000  000250         BIT     #BIT13,$RPER1(R0) ;'OPI' SET?
1762  007326  001402                           BEQ     .+6             ;BR IF NOT SET
1763  007330  000137  011516                   JMP     OPIER           ;REPORT 'OPI'
1764  007334  032760  000010  000250         BIT     #BIT3,$RPER1(R0) ;'PAR' SET?
1765  007342  001402                           BEQ     .+6             ;BR IF NOT SET
1766  007344  000137  011650                   JMP     PARER           ;REPORT 'PAR'
1767  007350  032760  000040  000250         BIT     #BIT5,$RPER1(R0) ;'WCF' SET?
1768  007356  001402                           BEQ     .+6             ;BR IF NOT SET
1769  007360  000137  012320                   JMP     WCFER           ;REPORT 'WCF'
1770  007364  032760  002000  000250         BIT     #BIT10,$RPER1(R0) ;'IAE' SET?
1771  007372  001402                           BEQ     .+6             ;BR IF NOT SET
1772  007374  000137  011742                   JMP     IAEER           ;REPORT 'IAE'
```

```
1773  007400  032760  004000  000250          BIT     #BIT11,$RPER1(R0) ;'WLE' SET?
1774  007406  001402                          BEQ     .+6               ;BR IF NOT SET
1775  007410  000137  011774                  JMP     WLEER             ;REPORT 'WLE'
1776  007414  032760  001000  000250          BIT     #BIT9,$RPER1(R0) ;'AOE' SET?
1777  007422  001405                          BEQ     2$                ;BR IF NOT SET
1778  007424  032760  002000  000246          BIT     #BIT10,$RPDS1(R0) ;'LST' SET?
1779  007432  001401                          BEQ     2$                ;BR IF NOT SET
1780  007434  000207                          RTS     PC                ;'AOE' & 'LST' SET, EXIT
1781  007436  032760  010000  000250  2$:     BIT     #BIT12,$RPER1(R0)  ;SEE IF 'DTE' SET
1782  007444  001402                          BEQ     .+6               ;BR IF NOT
1783  007446  000137  011626                  JMP     DTEER             ;REPORT 'DTE' ERROR
1784  007452  032760  040000  000244          BIT     #BIT14,$RPCS2(R0)  ;SEE IF 'WCK' SET
1785  007460  001402                          BEQ     .+6               ;BR IF NOT SET
1786  007462  000137  010312                  JMP     WCKER             ;REPORT 'WCK'
1787  007466  005760  000250                  TST     $RPER1(R0)        ;SEE IF 'DCK' SET
1788  007472  100002                          BPL     .+6               ;BR IF NOT
1789  007474  000137  007520                  JMP     DCKER             ;PROCESS 'DCK'
1790  007500  032760  140000  000276          BIT     #BIT15!BIT14,$RPER3(R0) ;'SKI' OR 'OCYL' SET
1791  007506  001402                          BEQ     .+6               ;BR IF NOT SET
1792  007510  000137  012262                  JMP     SKIER             ;REPORT ERROR
1793  007514  000137  010770                  JMP     DRVER             ;REPORT DRIVE ERROR
1794
1795                                  ;PROCESS DATA ('DCK') CHECK ERROR
1796
1797  007520  022760  010042  000300  DCKER:  CMP     #10042,$RPEC1(R0)  ;VALID POSITION COUNT ?
1798  007526  101406                          BLOS    1$                ;BR IF NOT VALID
1799  007530  005760  000300                  TST     $RPEC1(R0)        ;POSITION COUNT 0 ?
1800  007534  001403                          BEQ     1$                ;BR IF 0'S
1801  007536  005760  000302                  TST     $RPEC2(R0)        ;VALUE IN PATTERN REGISTER ?
1802  007542  001026                          BNE     4$                ;BR IF YES
1803  007544  004737  020130          1$:     JSR     PC,LINE1          ;TYPE FIRST LINE OF ERROR MESSAGE
1804  007550  104414  047061                  DISPLY  ,EM45             ;TYPE 'ECC LOGIC ERROR'
1805  007554  004737  020174                  JSR     PC,LINE2          ;TYPE LINE 2 OF ERROR MESSAGE
1806  007560  004737  023354                  JSR     PC,INCTOT         ;INCREMENT TOTAL ERROR COUNT
1807  007564  012737  000003  001252          MOV     #3,RETRY          ;RETRY COUNT
1808  007572  004737  015330                  JSR     PC,$RETRY         ;RETRY THE ORDER
1809  007576  000403                          BR      2$                ;RETRY WAS NOT SUCCESSFUL
1810  007600  004737  021630                  JSR     PC,LINE6C         ;TYPE LINE 6C OF ERROR MESSAGE
1811  007604  000402                          BR      3$                ;FINISH THE ERROR REPORT
1812  007606  004737  021636          2$:     JSR     PC,LINE6D         ;TYPE LINE 6D OF ERROR MESSAGE
1813  007612  004737  021712          3$:     JSR     PC,LINE7          ;TYPE LINE 7 OF ERROR MESSAGE
1814  007616  000402                          BR      5$                ;EXIT
1815  007620  004737  017772          4$:     JSR     PC,SPOTCK         ;SEE IF ERROR AT A BAD SPOT ON THE PACK
1816  007624  000207                  5$:     RTS     PC                ;IT IS, DON'T REPORT IT
1817  007626  126027  000024  000001          CMPB    $CODE(R0),#1      ;IS ORDER A WRITE CHECK ?
1818  007634  101002                          BHI     6$                ;BR IF NOT
1819  007636  000137  010312                  JMP     WCKER             ;REPORT ERROR UNDER WRITE CHECK PROCESSING
1820  007642  004737  020130          6$:     JSR     PC,LINE1          ;PRINT LINE 1 OF ERROR MESSAGE
1821  007646  104414  045531                  DISPLY  ,EM21             ;DATA CHECK ERROR
1822  007652  004737  020174          DCKER1: JSR     PC,LINE2          ;PRINT LINE 2 OF ERROR MESSAGE
1823  007656  004737  020602                  JSR     PC,LINE3          ;PRINT LINE 3 OF ERROR MESSAGE
1824  007662  004737  021256                  JSR     PC,LINE4          ;PRINT LINE 4 OF ERROR MESSAGE
1825  007666  004737  014772                  JSR     PC,PRTBAD         ;SEE IF BAD SECTOR TO BE PRINTED
1826  007672  012737  110100  001250          MOV     #BIT15!BIT12!BIT06,ERMSK  ;LOAD ERROR MASK
```

```
1827  007700  032760  010100  000250          BIT     #BIT12!BIT06,$RPER1(R0)  ;CHECK 'DTE' & 'ECH'
1828  007706  001003                          BNE     1$                      ;BR IF SET
1829  007710  004737  021602                  JSR     PC,LINE6                ;PRINT LINE 6 OF ERROR MESSAGE
1830  007714  000541                          BR      8$                      ;FINISH THE ERROR REPORT
1831  007716  012737  000020  001252  1$:     MOV     #16.,RETRY              ;RETRY COUNT
1832  007724  005001                          CLR     R1                      ;R1 IS OFFSET CODE POINTER
1833  007726  032760  000002  000262          BIT     #BIT01,$RPDT(R0)  ;IS DRIVE AN RP06 ?
1834  007734  001002                          BNE     16$                     ;BR IF IT IS
1835  007736  012701  000007                  MOV     #7,R1                   ;INCREMENT PAST RP06 OFFSET CODES
1836  007742  004737  015756          16$:    JSR     PC,RELBUF               ;RELEASE THE BUFFER
1837  007746  004737  022244                  JSR     PC,READDR               ;GET THE ADDRESS OF THE ERROR SECTOR
1838  007752  112660  000011                  MOVB    (SP)+,$TRK(R0)          ;TRACK ADDRESS OF ERROR SECTOR
1839  007756  112660  000010                  MOVB    (SP)+,$SEC(R0)          ;SECTOR ADDRESS OF ERROR SECTOR
1840  007762  016060  000272  000012          MOV     $RPCC(R0),$CYL(R0)  ;PRESENT CYLINDER
1841  007770  026060  000022  000020          CMP     $SSEC(R0),$WRDL(R0)  ;SEE IF TRANSFER LENGTH LESS THAN 1 SECTOR
1842  007776  103010                          BHIS    15$                     ;BR IF IT IS; USE PRESENT TRANSFER LENGTH
1843  010000  016060  000022  000020          MOV     $SSEC(R0),$WRDL(R0)  ;CHANGE TRANSFER SIZE TO 1 SECTOR
1844  010006  016060  000020  000004          MOV     $WRDL(R0),$WRDM(R0)  ;SETUP WORD COUNT FOR OPERATION
1845  010014  005460  000004                  NEG     $WRDM(R0)               ;CHANGE COUNT TO 2'S COMP
1846  010020  005046                  15$:    CLR     -(SP)                   ;SPACE FOR NEW BUFFER ADDRESS
1847  010022  004737  015622                  JSR     PC,GETBUF               ;GET A BUFFER
1848  010026  012660  000006                  MOV     (SP)+,$BUF(R0)          ;NEW BUFFER ADDRESS TO DPB
1849  010032  004737  016320          2$:     JSR     PC,GODRIV               ;RETRY
1850  010036  005760  000016          3$:     TST     $STATUS(R0)             ;TEST FOR DONE
1851  010042  001775                          BEQ     3$                      ;BR IF NOT DONE
1852  010044  100075                          BPL     10$                     ;BR IF NOT ERROR
1853  010046  032760  000200  000016          BIT     #BIT7,$STATUS(R0)  ;SEE IF ORDER TERMINIATED NORMALLY
1854  010054  001006                          BNE     14$                     ;BR IF NOT
1855  010056  004737  023354                  JSR     PC,INCTOT               ;INCREMENT TOTAL ERROR COUNT
1856  010062  104414  051246                  DISPLY  LIN8M                   ;'DIFFERENT ERROR DURING RETRY'
1857  010066  000137  006574                  JMP     ERPRC1                  ;SEE WHICH ERROR
1858  010072  033760  001250  000250  14$:    BIT     MASK,$RPER1(R0) ;LOOK AT CURRENT ERROR
1859  010100  001430                          BEQ     5$                      ;BR IF DIFFERENT ERROR
1860  010102  032760  010100  000250          BIT     #BIT12!BIT6,$RPER1(R0)  ;'ECH' OR 'DTE' STILL SET ?
1861  010110  001437                          BEQ     7$                      ;BR IF NEITHER SET
1862  010112  105237  001253                  INCB    RETRY+1                 ;INCREMENT RETRY COUNT
1863  010116  123737  001252  001253          CMPB    RETRY,RETRY+1           ;DONE ?
1864  010124  001342                          BNE     2$                      ;BR IF NOT
1865  010126  005201                          INC     R1                      ;INCREMENT TABLE INDEX
1866  010130  116137  002200  044647          MOVB    OFFCOD(R1),GENDPB+$FMT  ;OFFSET CODE
1867  010136  001435                          BEQ     9$                      ;BR IF END OF OFFSET TABLE
1868  010140  062737  000002  001252          ADD     #2,RETRY                ;NEW RETRY LIMIT
1869  010146  004737  015222                  JSR     PC,OFFST                ;OFFSET
1870  010152  005737  044664          4$:     TST     GENDPB+$STATUS          ;SEE IF FINISHED WITH OFFSET
1871  010156  001775                          BEQ     4$                      ;BR IF NOT
1872  010160  100324                          BPL     2$                      ;BR IF NO ERROR PERFORMING OFFSET
1873  010162  004737  022160          5$:     JSR     PC,LINE8                ;PRINT LINE 8 OF ERROR MESSAGE
1874  010166  004737  023260          6$:     JSR     PC,INCHRD               ;INCREMENT 'HARD' ERROR COUNT
1875  010172  004737  023354                  JSR     PC,INCTOT               ;INCREMENT TOTAL ERROR COUNT
1876  010176  004737  021712                  JSR     PC,LINE7                ;PRINT LINE 7 OF ERROR MESSAGE
1877  010202  004737  014772                  JSR     PC,PRTBAD               ;PRINT THE BAD SECTOR
1878  010206  000436                          BR      13$                     ;CLEAN UP AND RETURN
1879  010210  004737  021622          7$:     JSR     PC,LINE6B               ;PRINT LINE 6B OF ERROR MESSAGE
1880  010214  004737  021540                  JSR     PC,LINE5B               ;PRINT LINE 5B OF THE ERROR MESSAGE
```

```
1881  010220  004737  023234            8$:     JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
1882  010224  004737  014232                    JSR     PC,ECC          ;CORRECT THE ERROR USING ECC AND CHECK IT
1883  010230  000407                            BR      11$             ;COMPARE THE BUFFER
1884  010232  004737  021636            9$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
1885  010236  000753                            BR      6$              ;INCREMENT ERROR COUNT
1886  010240  004737  021614            10$:    JSR     PC,LINE6A       ;PRINT LINE 6A OF ERROR MESSAGE
1887  010244  004737  023234                    JSR     PC,INCSOF       ;INCREMENT 'SOFT' ERROR COUNT
1888  010250  012737  000001  001300    11$:    MOV     #1,FRSTER       ;SET PROCESSING 'DCKER' INDICATOR
1889  010256  004737  013122                    JSR     PC,CMPARD       ;COMPARE THE BUFFER
1890  010262  105737  001301                    TSTB    FRSTER+1        ;ERROR IN COMPARE ?
1891  010266  100406                            BMI     13$             ;BRANCH IF ERROR
1892  010270  004737  023354                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1893  010274  104414  051460                    DISPLY  ,LIN9G          ;'DATA COMPARE OK' MESSAGE
1894  010300  004737  021712            12$:    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
1895  010304  004737  006324            13$:    JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
1896  010310  000207                            RTS     PC              ;RETURN
1897
1898                                    ;WRITE CHECK ERROR PROCESSING
1899
1900  010312  032760  100000  000250  WCKER:  BIT     #BIT15,$RPER1(R0)  ;SEE IF 'DCK' SET ALSO
1901  010320  001034                            BNE     2$              ;BR IF IT IS
1902  010322  004737  020130                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
1903  010326  104414  045635                    DISPLY  ,EM23           ;PRINT WCE & DCK NOT
1904  010332  005037  001250                    CLR     MASK            ;CLEAR ERROR MASK
1905  010336  004737  020174                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
1906  010342  004737  020602                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
1907  010346  004737  021256                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
1908  010352  004737  021346                    JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
1909  010356  004737  023354                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
1910  010362  012737  000003  001252            MOV     #3,RETRY        ;RETRY LIMIT
1911  010370  004737  015330                    JSR     PC,$RETRY       ;RETRY THE OPERATION
1912  010374  000403                            BR      1$              ;RETRY UNSUCESSFUL
1913  010376  004737  021630                    JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
1914  010402  000502                            BR      8$              ;FINISH PROCESSING THE ERROR
1915  010404  004737  021636            1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
1916  010410  000506                            BR      10$             ;FINISH PROCESSING THE ERROR
1917  010412  004737  017772            2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
1918  010416  000507                            BR      11$             ;EXIT IF AT BAD SPOT ON PACK
1919  010420  004737  020130                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
1920  010424  012737  045562  010452            MOV     #EM22,13$       ;ASSUME THAT EM22 WILL BE PRINTED
1921  010432  032760  040000  000244            BIT     #BIT14,$RPCS2(R0)  ;DID 'WCK' ALSO SET ?
1922  010440  001003                            BNE     12$             ;BR IF IT DID
1923  010442  012737  046463  010452            MOV     #EM37,13$       ;MESSAGE FOR 'DCK' AND 'WCK' NOT DURING
1924                                            ;WRITE CHECK
1925  010450  104414                    12$:    DISPLY                  ;TYPE THE ERROR MESSAGE
1926  010452  000000                    13$:    .WORD   0               ;MESSAGE ADDRESS GOES HERE
1927  010454  004737  020174                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
1928  010460  004737  020602                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
1929  010464  004737  021256                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
1930  010470  004737  021346                    JSR     PC,LINE5        ;PRINT LINE 5 OF ERROR MESSAGE
1931  010474  032760  000100  000250            BIT     #BIT06,$RPER1(R0)  ;ECH SET ALSO ?
1932  010502  001442                            BEQ     8$              ;FINISH PROCESSING THE ERROR
1933  010504  012737  000020  001252  3$:      MOV     #16.,RETRY      ;RETRY LIMIT - 16 (10)
1934  010512  004737  016320            4$:     JSR     PC,GODRIV       ;RETRY THE ORDER
```

```
1935  010516  005760  000016          5$:     TST     $STATUS(R0)         ;ORDER FINISHED ?
1936  010522  001775                          BEQ     5$                  ;BR IF NOT
1937  010524  100405                          BMI     6$                  ;BR IF ERROR ON ORDER
1938  010526  105237  001253                  INCB    RETRY+1             ;INCREMENT RETRY COUNT
1939  010532  004737  021630                  JSR     PC,LINE6C           ;PRINT LINE 6C OF ERROR MESSAGE
1940  010536  000431                          BR      9$                  ;FINISH ERROR PROCESSING
1941  010540  105237  001253          6$:     INCB    RETRY+1             ;INCREMENT RETRY COUNT
1942  010544  123737  001252  001253        CMPB    RETRY,RETRY+1       ;DONE ?
1943  010552  001714                          BEQ     1$                  ;BR IF AT RETRY LIMIT
1944  010554  032760  100000  000250        BIT     #BIT15,$RPER1(R0)   ;'DCK' SET
1945  010562  001407                          BEQ     7$                  ;BR IF NOT - DIFFERENT ERROR
1946  010564  032760  000100  000250        BIT     #BIT06,$RPER1(R0)   ;'ECH' ALSO SET ?
1947  010572  001347                          BNE     4$                  ;BR IF IT IS, RETRY ORDER
1948  010574  004737  021630                  JSR     PC,LINE6C           ;PRINT LINE 6C OF ERROR MESSAGE
1949  010600  000403                          BR      8$                  ;FINISH PROCESSING ERROR
1950  010602  004737  022160          7$:     JSR     PC,LINE8            ;PRINT LINE 8 - 'DIFFERENT ERROR '
1951  010606  000405                          BR      9$                  ;FINISH PROCESSING ERROR
1952  010610  004737  023354          8$:     JSR     PC,INCTOT           ;INCREMENT TOTAL ERROR COUNT
1953  010614  004737  021712                  JSR     PC,LINE7            ;FINISH THE ERROR MESSAGE
1954  010620  000406                          BR      11$                 ;EXIT
1955  010622  004737  023354          9$:     JSR     PC,INCTOT           ;INCREMENT TOTAL ERROR COUNT
1956  010626  004737  021712          10$:    JSR     PC,LINE7            ;FINISH THE ERROR MESSAGE
1957  010632  004737  006324                  JSR     PC,REFMT            ;REFORMAT THE SECTOR IN ERROR
1958  010636  000207                  11$:    RTS     PC                  ;RETURN
1959
1960                                          ;REPORT 'HCRC' ERROR
1961
1962  010640  004737  017772          HCRCER: JSR     PC,SPOTCK           ;SEE IF ERROR AT PACK BAD SPOT
1963  010644  000450                          BR      3$                  ;EXIT IF IT IS
1964  010646  004737  020130                  JSR     PC,LINE1            ;PRINT LINE 1 OF ERROR MESSAGE
1965  010652  104414  045510                  DISPLY  ,EM20               ;REPORT 'HCRC'
1966  010656  004737  020174                  JSR     PC,LINE2            ;PRINT LINE 2 OF ERROR MESSAGE
1967  010662  004737  020602                  JSR     PC,LINE3            ;PRINT LINE 3 OF ERROR MESSAGE
1968  010666  004737  021256                  JSR     PC,LINE4            ;PRINT LINE 4 OF ERROR MESSAGE
1969  010672  032760  040000  000244        BIT     #BIT14,$RPCS2(R0)   ;'WCE' ERROR ALSO ?
1970  010700  001402                          BEQ     1$                  ;BR IF NOT
1971  010702  004737  021346                  JSR     PC,LINE5            ;DISPLAY WORDS WHICH CAUSED 'WCE'
1972  010706  004737  023234          1$:     JSR     PC,INCSOF           ;INCREMENT 'SOFT' ERROR COUNT
1973  010712  004737  023354                  JSR     PC,INCTOT           ;INCREMENT TOTAL ERROR COUNT
1974  010716  012737  000400  001250        MOV     #BIT8,MASK          ;SET ERROR MASK
1975  010724  012737  000003  001252        MOV     #3,RETRY            ;RETRY LIMIT
1976  010732  004737  015330                  JSR     PC,$RETRY           ;RETRY ORDER
1977  010736  000405                          BR      2$                  ;RETRY NOT SUCESSFUL
1978  010740  004737  021630                  JSR     PC,LINE6C           ;PRINT LINE 6C OF ERROR MESSAGE
1979  010744  004737  021712                  JSR     PC,LINE7            ;PRINT LINE 7 OF ERROR MESSAGE
1980  010750  000406                          BR      3$                  ;EXIT
1981  010752  004737  021636          2$:     JSR     PC,LINE6D           ;PRINT LINE 6D OF ERROR MESSAGE
1982  010756  004737  021712                  JSR     PC,LINE7            ;PRINT LINE 7 OF ERROR MESSAGE
1983  010762  004737  006324                  JSR     PC,REFMT            ;REFORMAT THE ERROR SECTOR
1984  010766  000207                  3$:     RTS     PC                  ;RETURN
1985
1986                                          ;REPORT DRIVE ERROR
1987
1988  010770  004737  020130          DRVER:  JSR     PC,LINE1            ;PRINT LINE 1 OF ERROR MESSAGE
```

```
 1989  010774  104414  046125                  DISPLY  ,EM30           ;REPORT DRIVE ERROR
 1990  011000  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
 1991  011004  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
 1992  011010  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
 1993  011014  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
 1994  011020  000207                          RTS     PC              ;RETURN
 1995
 1996                                  ;PROCESS FORMAT ('FER') ERROR
 1997
 1998  011022  032760  000400  000250  CKFMT:  BIT     #BIT8,$RPER1(R0) ;'HCRC' SET ON ORIGINAL ERROR ?
 1999  011030  001402                          BEQ     1$              ;BR IF NOT SET
 2000  011032  000137  010640                  JMP     HCRCER          ;REPORT HCRC ERROR
 2001  011036  004737  022244          1$:     JSR     PC,READDR       ;GET CORRECTED TRACK & SECTOR ADDRSSES
 2002  011042  004737  015246                  JSR     PC,READHD       ;READ HEADER
 2003  011046  032737  000400  044702          BIT     #BIT8,GENREG+RPER1 ;'HCRC' SET WHEN HEADER READ?
 2004  011054  001002                          BNE     2$              ;BR IF 'HCRC' SET
 2005  011056  000137  012022                  JMP     FMTER           ;NO, ERROR IS 'FMT' ONLY
 2006  011062  004737  017772          2$:     JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT ON THE PACK
 2007  011066  000452                          BR      5$              ;EXIT IF IT IS
 2008  011070  004737  020130                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
 2009  011074  104414  045714                  DISPLY  ,EM24           ;HEADER READ ERROR - FMT BIT DROPPED UP
 2010  011100  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
 2011  011104  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
 2012  011110  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
 2013  011114  032760  040000  000244          BIT     #BIT14,$RPCS2(R0)  ;'WCE' ERROR ALSO ?
 2014  011122  001402                          BEQ     3$              ;BR IF NOT
 2015  011124  004737  021346                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
 2016  011130  004737  021446          3$:     JSR     PC,LINE5A       ;DISPLAY HEADER
 2017  011134  004737  023234                  JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
 2018  011140  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
 2019  011144  012737  000020  001250          MOV     #BIT4,MASK      ;SET ERROR MASK
 2020  011152  012737  000003  001252          MOV     #3,RETRY        ;RETRY LIMIT
 2021  011160  004737  015330                  JSR     PC,$RETRY       ;RETRY THE ORDER
 2022  011164  000405                          BR      4$              ;RETRY NOT SUCESSFUL
 2023  011166  004737  021630                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
 2024  011172  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
 2025  011176  000406                          BR      5$              ;EXIT
 2026  011200  004737  021636          4$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
 2027  011204  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
 2028  011210  004737  006324                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
 2029  011214  000207                  5$:     RTS     PC              ;RETURN
 2030
 2031                                  ;PROCESS HEADER COMPARE ('HCE') ERROR
 2032
 2033  011216  032760  000400  000250  CKHCE:  BIT     #BIT8,$RPER1(R0) ;HCRC SET ON ORIGINAL ERROR ?
 2034  011224  001402                          BEQ     1$              ;BR IF NOT SET
 2035  011226  000137  010640                  JMP     HCRCER          ;REPORT HEADER CRC ERROR
 2036  011232  004737  022244          1$:     JSR     PC,READDR       ;GET CURRENT SECTOR & TRACK ADDRS
 2037  011236  004737  015246                  JSR     PC,READHD       ;READ HEADER OF CURRENT SECTOR
 2038  011242  032737  000400  044702          BIT     #BIT8,GENREG+RPER1 ;'HCRC' SET ?
 2039  011250  001016                          BNE     3$              ;BR IF SET
 2040  011252  042737  010000  054374          BIC     #BIT12,CYLDER   ;CLEAR FORMAT BIT FROM HEADER
 2041  011260  026037  000272  054374          CMP     $RPCC(R0),CYLDER  ;CORRECT CYLINDER ?
 2042  011266  001402                          BEQ     2$              ;BR IF IT IS
```

```
2043  011270  000137  011442                    JMP     POSER           ;REPORT POSITIONING ERROR
2044  011274  052737  010000  054374  2$:       BIS     #BIT12,CYLDER   ;RESTORE THE FORMAT BIT
2045  011302  000137  012100                    JMP     HCFF8           ;REPORT 'HCE' ERROR
2046  011306  004737  017772          3$:       JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
2047  011312  000452                            BR      6$              ;EXIT IF IT IS
2048  011314  004737  020130                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2049  011320  104414  045762                    DISPLY  ,EM25           ;HEADER READ ERROR - 'HCE' SET
2050  011324  004737  020174                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2051  011330  004737  020602                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
2052  011334  004737  021256                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2053  011340  032760  040000  000244            BIT     #BIT14,$RPCS2(R0)  ;'WCE' ERROR ALSO ?
2054  011346  001402                            BEQ     4$              ;BR IF NOT
2055  011350  004737  021346                    JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
2056  011354  004737  021446          4$:       JSR     PC,LINE5A       ;PRINT LINE 5 OF ERROR MESSAGE
2057  011360  004737  023234                    JSR     PC,INCSOF       ;INCREMENT SOFT ERROR COUNT
2058  011364  004737  023354                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2059  011370  012737  000200  001250            MOV     #BIT7,MASK      ;SET ERROR MASK
2060  011376  012737  000003  001252            MOV     #3,RETRY        ;RETRY LIMIT
2061  011404  004737  015330                    JSR     PC,$RETRY       ;RETRY THE ORDER
2062  011410  000405                            BR      5$              ;RETRY NOT SUCESSFUL
2063  011412  004737  021630                    JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
2064  011416  004737  021712                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2065  011422  000406                            BR      6$              ;EXIT
2066  011424  004737  021636          5$:       JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
2067  011430  004737  021712                    JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2068  011434  004737  006324                    JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
2069  011440  000207                  6$:       RTS     PC              ;RETURN
2070
2071                                  ;REPORT POSSIBLE POSITIONING ERROR
2072
2073  011442  004737  015170          POSER:    JSR     PC,RECALT       ;RECALIBRATE
2074  011446  004737  020130                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2075  011452  104414  047310                    DISPLY  ,EM51           ;PROGRAM DETECTED POSITIONING ERROR
2076  011456  004737  020174                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2077  011462  004737  020630                    JSR     PC,LINE3C       ;PRINT LINE 3C OF ERROR MESSAGE
2078  011466  052737  010000  054374            BIS     #BIT12,CYLDER   ;RESTORE THE FORMAT BIT
2079  011474  004737  021446                    JSR     PC,LINE5A       ;PRINT LINE 5A OF THE ERROR MESSAGE
2080  011500  004737  023330                    JSR     PC,INCMIS       ;INCREMENT MISPOSITIONING COUNT
2081  011504  004737  023354                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2082  011510  004737  022040                    JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
2083  011514  000207                            RTS     PC              ;EXIT
2084
2085                                  ;REPORT 'OPI' ERROR
2086
2087  011516  004737  017772          OPIER:    JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
2088  011522  000207                            RTS     PC              ;RETURN IF IT IS
2089  011524  004737  020130                    JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2090  011530  104414  046157                    DISPLY  ,EM31           ;'OPI' ERROR
2091  011534  004737  020174                    JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2092  011540  004737  020602                    JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
2093  011544  004737  021256                    JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2094  011550  004737  023354                    JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2095  011554  012737  020000  001250            MOV     #BIT13,MASK     ;ERROR MASK
2096  011562  012737  000003  001252  OPIER1:   MOV     #3,RETRY        ;RETRY LIMIT
```

```
2097  011570  004737  015330                JSR     PC,$RETRY       ;RETRY THE ORDER
2098  011574  000405                        BR      1$              ;RETRY UNSUCESSFUL
2099  011576  004737  021630                JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
2100  011602  004737  021712                JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2101  011606  000207                        RTS     PC              ;EXIT
2102  011610  004737  021636        1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
2103  011614  004737  021712                JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2104  011620  004737  006324                JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
2105  011624  000207                        RTS     PC              ;RETURN
2106
2107                                  ;REPORT 'DTE' ERROR
2108
2109  011626  004737  017772        DTEER:  JSR     PC,SPOTCK       ;SEE IF ERROR AT BAD SPOT
2110  011632  000207                        RTS     PC              ;RETURN IF IT IS
2111  011634  004737  020130                JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2112  011640  104414  046222                DISPLY  ,EM32           ;'DTE' ERROR
2113  011644  000137  007652                JMP     DCKER1          ;FINISH PROCESSING THE 'DTE' ERROR
2114
2115                                  ;REPORT 'PAR' ERROR
2116
2117  011650  004737  020130        PARER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2118  011654  104414  046255                DISPLY  ,EM33           ;REPORT 'PAR'
2119  011660  004737  020174                JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2120  011664  004737  020706                JSR     PC,LINE3E       ;PRINT LINE 3E OF ERROR MESSAGE
2121  011670  004737  021256                JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2122  011674  004737  023354                JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2123  011700  012737  000010  001250        MOV     #BIT03,MASK     ;ERROR MASK
2124  011706  012737  000003  001252        MOV     #3,RETRY        ;RETRY LIMIT
2125  011714  004737  015330                JSR     PC,$RETRY       ;RETRY ORDER
2126  011720  000405                        BR      2$              ;RETRY UNSUCESSFUL
2127  011722  004737  021630                JSR     PC,LINE6C       ;RETRY SUCESSFUL
2128  011726  004737  021712        .$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2129  011732  000207                        RTS     PC              ;EXIT
2130  011734  004737  021636        2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
2131  011740  000772                        BR      1$              ;FINISH ERROR MESSAGE
2132
2133
2134                                  ;REPORT 'IAE' ERROR
2135
2136  011742  004737  020130        IAEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2137  011746  104414  046374                DISPLY  ,EM35           ;REPORT 'IAE'
2138  011752  004737  020174                JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2139  011756  004737  020774                JSR     PC,LINE3F       ;PRINT LINE 3F OF ERROR MESSAGE
2140  011762  004737  023354                JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2141  011766  004737  021712                JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2142  011772  000207                        RTS     PC              ;RETURN
2143
2144
2145                                  ;REPORT 'WLE' ERROR
2146
2147  011774  004737  020130        WLEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2148  012000  104414  046432                DISPLY  ,EM36           ;REPORT 'WLE'
2149  012004  004737  020174                JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2150  012010  004737  023354                JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2151  012014  004737  021712                JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2152  012020  000207                        RTS     PC              ;RETURN
```

```
                                        ;REPORT FORMAT ERROR
                                        ;
012022  004737  020130          FMTER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
012026  104414  046043                  DISPLY  ,EM26           ;FORMAT ERROR
012032  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
012036  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
012042  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
012046  032760  040000  000244          BIT     #BIT14,$RPCS2(R0)  ;'WCE' ERROR ALSO ?
012054  001402                          BEQ     1$              ;BR IF NOT
012056  004737  021346                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
012062  004737  021446          1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
012066  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
012072  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
012076  000207                          RTS     PC
                                        ;
                                        ;REPORT HEADER COMPARE ERROR
                                        ;
012100  004737  020130          HCEER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
012104  104414  046070                  DISPLY  ,EM27           ;HEADER COMPARE ERROR
012110  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
012114  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
012120  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
012124  032760  040000  000244          BIT     #BIT14,$RPCS2(R0)  ;'WCE' ERROR ALSO ?
012132  001402                          BEQ     1$              ;BR IF NOT
012134  004737  021346                  JSR     PC,LINE5        ;DISPLAY WORDS WHICH CAUSED 'WCE'
012140  004737  021446          1$:     JSR     PC,LINE5A       ;PRINT LINE 5A OF ERROR MESSAGE
012144  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
012150  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
012154  004737  006324                  JSR     PC,REFMT        ;REFORMAT THE ERROR SECTOR
012160  000207                          RTS     PC              ;RETURN
                                        ;
                                        ;PROCESS CONTROL/INTERFACE TRANSFER ERROR
                                        ;
012162  004737  020130          TRFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
012166  104414  046545                  DISPLY  ,EM40           ;RH11 OR UNIBUS TRANSFER ERROR
012172  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
012176  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
012202  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
012206  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
012212  032760  121400  000244          BIT     #BIT15!BIT13!BIT9!BIT8,$RPCS2(R0)  ;'DLT','UPE','MXF', 'MDPE' SET ?
012220  001415                          BEQ     2$              ;BR IF NONE SET
012222  012737  000003  001252          MOV     #3,RETRY        ;RETRY LIMIT
012230  005037  001250                  CLR     MASK            ;CLEAR ERROR MASK
012234  004737  015330                  JSR     PC,$RETRY       ;RETRY THE OPERATION
012240  000403                          BR      1$              ;RETURN HERE IF RETRY UNSUCESSFUL
012242  004737  021630                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
012246  000402                          BR      2$              ;FINISH THE ERROR REPORT
012250  004737  021636          1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
012254  004737  021712          2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
012260  000207                          RTS     PC
                                        ;
                                        ;PROCESS 'SKI' OR 'OCYL' ERRORS
                                        ;
```

```
2205  012262  004737  020130          SKIER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2206  012266  104414  047221                  DISPLY  ,EM50           ;'SKI' OR 'OCYL' ERROR
2207  012272  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2208  012276  004737  020616                  JSR     PC,LINE3B       ;PRINT LINE 3B OF ERROR MESSAGE
2209  012302  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2210  012306  004737  023304                  JSR     PC,INCSKI       ;INCREMENT 'SKI' OR 'OCYL' ERROR COUNT
2211  012312  004737  022040                  JSR     PC,LINE7A       ;PRINT LINE 7A OF ERROR MESSAGE
2212  012316  000207                          RTS     PC
2213
2214                                  ;REPORT WRITE CLOCK FAILURE ('WCF')
2215
2216  012320  004737  020130          WCFER:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2217  012324  104414  046332                  DISPLY  ,EM34           ;REPORT WRITE CLOCK FAILURE
2218  012330  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2219  012334  004737  020610                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
2220  012340  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2221  012344  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2222  012350  004737  014772                  JSR     PC,PRTBAD       ;SEE IF BAD SECTOR TO BE PRINTED
2223  012354  012737  000003  001252          MOV     #3,RETRY        ;RETRY COUNT
2224  012362  012737  000040  001250          MOV     #BIT05,MASK     ;ERROR MASK
2225  012370  004737  015330                  JSR     PC,$RETRY       ;RETRY THE ORDER
2226  012374  000405                          BR      2$              ;RETURN HERE IF RETRY UNSUCESSFUL
2227  012376  004737  021630                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
2228  012402  004737  021712          1$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2229  012406  000207                          RTS     PC
2230  012410  004737  021636          2$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
2231  012414  000772                          BR      1$
2232
2233                                  ;PROCESS DRIVE UNSAFE ERROR
2234
2235  012416  004737  020130          UNSAF:  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2236  012422  104414  047353                  DISPLY  ,EM60           ;REPORT DRIVE UNSAFE
2237  012426  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2238  012432  004737  020602                  JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
2239  012436  004737  023354                  JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2240  012442  012737  000003  001252          MOV     #3,RETRY        ;RETRY COUNT
2241  012450  004737  015330                  JSR     PC,$RETRY       ;RETRY THE ORDER
2242  012454  000403                          BR      1$              ;RETRY WAS UNSUCESSFUL
2243  012456  004737  021630                  JSR     PC,LINE6C       ;PRINT LINE 6C OF ERROR MESSAGE
2244  012462  000402                          BR      2$              ;CONTINUE WITH ERROR REPORT
2245  012464  004737  021636          1$:     JSR     PC,LINE6D       ;PRINT LINE 6D OF ERROR MESSAGE
2246  012470  004737  021712          2$:     JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2247  012474  000207                          RTS     PC              ;RETURN
2248
2249                                  ;REPORT AN 'UNKNOWN' DATA PATTERN
2250
2251  012476  105737  001300          NOMTCH: TSTB    FRSTER          ;FIRST ERROR IN THE SECTOR ?
2252  012502  001013                          BNE     1$              ;BR IF NOT OR IF PROCESSING 'DCKER'
2253  012504  004737  020130                  JSR     PC,LINE1        ;TYPE LINE 1 OF ERROR MESSAGE
2254  012510  104414  046730                  DISPLY  ,EM43           ;'CAN'T MATCH DATA WITH PATTERN'
2255  012514  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2256  012520  004737  020610                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
2257  012524  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2258  012530  000404                          BR      2$              ;CONTINUE PROCESSING ERROR
```

```
2259  012532  104414  046730          1$:   DISPLY  ,EM43          ;'CAN'T MATCH DATA WITH PATTERN'
2260  012536  104414  001165                DISPLY  ,$CRLF          ;CR-LF
2261  012542  104414  051410          2$:   DISPLY  ,LIN9I          ;HEADER FOR DATA PRINTOUT
2262  012546  010146                        MOV     R1,-(SP)        ;ADDRESS OF WORD 1
2263  012550  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 1
2264  012554  104414  052073                DISPLY  ,LINSP          ;SPACES
2265  012560  012146                        MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 1
2266  012562  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 1
2267  012566  104414  001165                DISPLY  ,$CRLF          ;CR-LF
2268  012572  010146                        MOV     R1,-(SP)        ;ADDRESS OF WORD 2
2269  012574  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 2
2270  012600  104414  052073                DISPLY  ,LINSP          ;SPACES
2271  012604  012146                        MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 2
2272  012606  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 2
2273  012612  104414  001165                DISPLY  ,$CRLF          ;CR-LF
2274  012616  010146                        MOV     R1,-(SP)        ;ADDRESS OF WORD 3
2275  012620  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 3
2276  012624  104414  052073                DISPLY  ,LINSP          ;SPACES
2277  012630  012146                        MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 3
2278  012632  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 3
2279  012636  104414  001165                DISPLY  ,$CRLF          ;CR-LF
2280  012642  010146                        MOV     R1,-(SP)        ;ADDRESS OF WORD 4
2281  012644  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 4
2282  012650  104414  052073                DISPLY  ,LINSP          ;SPACES
2283  012654  012146                        MOV     (R1)+,-(SP)     ;ADDRESS OF WORD 4
2284  012656  004737  022172                JSR     PC,LINOCT       ;TYPE WORD 4
2285  012662  104414  001165                DISPLY  ,$CRLF          ;CR-LF
2286  012666  062701  000770                ADD     #(252.*2.),R1   ;INCREMENT BUFFER POINTER
2287  012672  005002                        CLR     R2              ;CLEAR 'WORDS TO COMPARE' COUNT IN R2
2288  012674  112737  000001  001300        MOVB    #1,FRSTER       ;SET 'NOT FIRST ERROR' INDICATOR
2289  012702  112737  177777  001301        MOVB    #-1,FRSTER+1    ;SET ERROR FOUND INDICATOR
2290  012710  013737  001374  001310        MOV     CMPLMT,LIMIT    ;RESET THE COMPARE ERROR TYPEOUT LIMIT
2291  012716  000207                        RTS     PC              ;RETURN
2292
2293                                  ;CHECK ERROR BITS IN THE RH11 & RP04/5/6 REGISTERS
2294
2295  012720  032760  060000  000234  CKERR:  BIT     #60000,$RPCS1(R0)  ;SEE IF 'TRE' OR 'MCPE' SET
2296  012726  001015                        BNE     1$              ;BR IT EITHER SET
2297  012730  032760  177400  000244        BIT     #177400,$RPCS2(R0)  ;SEE IF ERROR BITS IN CS2 SET
2298  012736  001011                        BNE     1$              ;BR IF ANY SET
2299  012740  005760  000250                TST     $RPER1(R0)      ;ANY BITS SET IN ER1
2300  012744  001006                        BNE     1$              ;BR IF ANY SET
2301  012746  005760  000274                TST     $RPER2(R0)      ;ANY BITS SET IN ER2 ?
2302  012752  001003                        BNE     1$              ;BR IF ANY SET
2303  012754  005760  000276                TST     $RPER3(R0)      ;ANY BITS SET IN ER3 ?
2304  012760  001416                        BEQ     2$              ;BR IF NONE SET
2305  012762  004737  020130          1$:   JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2306  012766  104414  046775                DISPLY  ,EM44           ;ERROR BITS SET, BUT 'SC' OR 'TRE' NOT SET
2307  012772  004737  020174                JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2308  012776  004737  020602                JSR     PC,LINE3        ;PRINT LINE 3 OF ERROR MESSAGE
2309  013002  004737  021256                JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2310  013006  004737  023354                JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2311  013012  004737  021712                JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2312  013016  000207                  2$:   RTS     PC              ;RETURN
```

```
2313
2314                                        ;CHECK BUS ADDRESS REGISTER & WORD COUNT REGISTER
2315
2316  013020  005760  000236          CkBUS:  TST     $RPWC(R0)           ;CHECK WORD COUNT
2317  013024  001010                          BNE     1$                  ;BR IF NOT ZERO
2318  013026  016046  000020                  MOV     $WRDL(R0),-(SP)     ;WORD LENGTH
2319  013032  006316                          ASL     (SP)                ;CHANGE INTO BYTE COUNT
2320  013034  066016  000006                  ADD     $BUF(R0),(SP)       ;ADD THE STARTING LOCATION
2321  013040  022660  000240                  CMP     (SP)+,$RPBA(R0)     ;BUFFER ADDRESS PROPER ?
2322  013044  001416                          BEQ     2$                  ;BR IF OK
2323  013046  004737  020130          1$:     JSR     PC,LINE1            ;PRINT LINE 1 OF ERROR MESSAGE
2324  013052  104414  046603                  DISPLY  ,EM41               ;BUS ADDRESS OR WORD COUNT INCORRECT
2325  013056  004737  020174                  JSR     PC,LINE2            ;PRINT LINE 2 OF ERROR MESSAGE
2326  013062  004737  020640                  JSR     PC,LINE3D           ;PRINT LINE 3D OF ERROR MESSAGE
2327  013066  004737  021256                  JSR     PC,LINE4            ;PRINT LINE 4 OF ERROR MESSAGE
2328  013072  004737  023354                  JSR     PC,INCTOT           ;INCREMENT TOTAL ERROR COUNT
2329  013076  004737  021712                  JSR     PC,LINE7            ;PRINT LINE 7 OF ERROR MESSAGE
2330  013102  000207                  2$:     RTS     PC
2331
2332                                        ;COMPARE THE BUFFER
2333
2334  013104  132760  000004  000024  CMPAR:  BITB    #BIT02,$CODE(R0)    ;SEE IF READ ORDER
2335  013112  001001                          BNE     1$                  ;BR IF IT IS
2336  013114  000207                          RTS     PC                  ;RETURN
2337  013116  005037  001300          1$:     CLR     FRSTER              ;CLEAR 'FIRST ERROR' INDICATOR
2338  013122  032777  000002  166010  CMPARD: BIT     #SW01,@SWR          ;IS SWITCH 1 SET?
2339  013130  001401                          BEQ     1$                  ;BR IF NOT
2340  013132  000207                          RTS     PC                  ;YES, DON'T COMPARE
2341  013134  005037  001306          1$:     CLR     ERCTR               ;CLEAR THE ERROR COUNTER
2342  013140  016001  000006                  MOV     $BUF(R0),R1         ;BUFFER ADDRESS
2343  013144  016037  000020  001312          MOV     $WRDL(R0),CMCNT     ;WORD COUNT TO WORKING LOCATION
2344  013152  066037  000236  001312          ADD     $RPWC(R0),CMCNT     ;CALCULATE ACTUAL WORDS TRANSFERED
2345  013160  016037  000012  001314          MOV     $CYL(R0),CMCYL      ;CYLINDER ADDRESS WORKING LOCATION
2346  013166  052737  010000  001314          BIS     #BIT12,CMCYL        ;SET FORMAT BIT
2347  013174  016037  000010  001316          MOV     $SEC(R0),CMSEC      ;SECTOR & TRACK ADDRESSES TO WORKING LOCNS
2348  013202  013737  001374  001310          MOV     CMPLMT,LIMIT        ;DISPLAY LIMIT
2349  013210  005237  001310                  INC     LIMIT               ;CONVERT PARAMETER INTO LIMIT VALUE
2350  013214  012737  177777  001276  CMSTR:  MOV     #-1,ZROIND          ;CLEAR THE 'ZERO'S' INDICATOR
2351  013222  005037  001302                  CLR     SAVER1              ;CLEAR THE R1 SAVE WORD
2352  013226  005037  001304                  CLR     SAVER5              ;CLEAR THE R5 SAVE WORD
2353  013232  023760  001312  000022          CMP     CMCNT,$SSEC(R0)     ;IS BUFFER SIZE GREATER THAN ONE SECTOR ?
2354  013240  101003                          BHI     1$                  ;BR IF IT IS
2355  013242  013702  001312                  MOV     CMCNT,R2            ;LESS THAN, USE REMAINING BUFFER
2356  013246  000402                          BR      2$                  ;
2357  013250  016002  000022          1$:     MOV     $SSEC(R0),R2        ;COMPARE SECTOR
2358  013254  166037  000022  001312  2$:     SUB     $SSEC(R0),CMCNT     ;DECREMENT WORD COUNT
2359  013262  126027  000024  000005          CMPB    $CODE(R0),#5        ;READ HEADER & DATA?
2360  013270  001036                          BNE     CMDAT               ;BR IF NOT
2361  013272  023721  001314          CMHED:  CMP     CMCYL,(R1)+         ;CHECK CYLINDER
2362  013276  001402                          BEQ     1$                  ;BR IF COMPARE OK
2363  013300  004737  013354                  JSR     PC,5$               ;REPORT ERROR
2364  013304  023721  001316          1$:     CMP     CMSEC,(R1)+         ;COMPARE SECTOR & TRACK
2365  013310  001402                          BEQ     2$                  ;BR IF EQ
2366  013312  004737  013354                  JSR     PC,5$               ;REPORT ERROR
```

```
2367  013316  005721                    2$:   TST   (R1)+          ;1ST KEY WORD ZERO?
2368  013320  001402                          BEQ   3$             ;BR IF IT IS
2369  013322  004737  013354                  JSR   PC,5$          ;REPORT ERROR
2370  013326  005721                    3$:   TST   (R1)+          ;CHECK 2ND KEY WORD
2371  013330  001402                          BEQ   4$             ;BR IF ZERO
2372  013332  004737  013354                  JSR   PC,5$          ;REPORT THE ERROR
2373  013336  162702  000004              4$:   SUB   #4,R2          ;SUBTRACT HEADER LENGTH FROM SIZE
2374  013342  003530                          BLE   CMPRX          ;BR IF FINISHED
2375  013344  022702  000004                  CMP   #4,R2          ;SEE IF AT LEAST 4 MORE WORDS TO CHECK
2376  013350  101125                          BHI   CMPRX          ;BR IF NOT
2377  013352  000405                          BR    CMDAT          ;COMPARE THE DATA PORTION
2378  013354  005237  001306              5$:   INC   ERCTR          ;INCREMENT THE ERROR COUNT
2379  013360  004737  013632                  JSR   PC,CMPRT       ;REPORT THE COMPARISON ERROR
2380  013364  000207                          RTS   PC             ;CHECK THE REST OF THE HEADER
2381  013366  004737  014154        CMDAT:    JSR   PC,MATCH       ;FIND THE PATTERN
2382  013372  000403                          BR    2$             ;FOUND A PATTERN
2383  013374  004737  012476                  JSR   PC,NOMTCH      ;RETURN HERE IF NO MATCH WITH PATTERN MADE
2384  013400  000456                          BR    8$             ;BYPASS COMPARE ROUTINE
2385  013402  011405                    2$:   MOV   (R4),R5          ;ADDRESS OF PATTERN ADDRESS IN R4
2386  013404  012703  000020                  MOV   #20,R3         ;R3 IS PATTERN POS COUNTER
2387  013410  022125                    3$:   CMP   (R1)+,(R5)+    ;COMPARE BUFFER WITH PATTERN
2388  013412  001016                          BNE   5$             ;BR IF NOT EQUAL
2389  013414  005737  001306                  TST   ERCTR          ;ERRORS DETECTED ?
2390  013420  001406                          BEQ   4$             ;BR IF NO ERRORS
2391  013422  032777  000010  165510          BIT   #SW3,@SWR      ;SWITCH 3 SET ?
2392  013430  001402                          BEQ   4$             ;BR IF NOT SET
2393  013432  004737  013632                  JSR   PC,CMPRT       ;DISPLAY THE WORD
2394  013436  005302                    4$:   DEC   R2             ;DECREMENT SIZE COUNT
2395  013440  001436                          BEQ   8$             ;BR WHEN AT END
2396  013442  005303                          DEC   R3             ;DECREMENT PATT POS COUNT
2397  013444  001361                          BNE   3$             ;BR IF NOT AT END OF PATT
2398  013446  000755                          BR    2$             ;RESTART THE PATTERN
2399  013450  005761  177776              5$:   TST   -2(R1)         ;IS MISCOMPARED CHARACTER=0
2400  013454  001410                          BEQ   6$             ;BR IF YES
2401  013456  012737  177777  001276          MOV   #-1,ZROIND     ;SET NON-ZERO MISCOMPARED INDCATOR
2402  013464  005237  001306                  INC   ERCTR          ;INCREMENT THE ERROR COUNTER
2403  013470  004737  013632                  JSR   PC,CMPRT       ;REPORT ERROR
2404  013474  000760                          BR    4$             ;CONTINUE COMPARE
2405  013476  105737  001300              6$:   TSTB  FRSTER         ;FIRST ERROR?
2406  013502  100407                          BMI   7$             ;BR IF NOT
2407  013504  005037  001276                  CLR   ZROIND         ;SET THE ZERO INDICATOR
2408  013510  010137  001302                  MOV   R1,SAVER1      ;SAVE CURRENT R1
2409  013514  010537  001304                  MOV   R5,SAVER5      ;SAVE CURRENT R5
2410  013520  000746                          BR    4$             ;CONTINUE COMPARE
2411  013522  005737  001276              7$:   TST   ZROIND         ;ANY MISCOMPARIONS NOT ZEROS ?
2412  013526  001743                          BEQ   4$             ;BR IF NONE-ALL ERRORS=ZERO
2413  013530  004737  013632                  JSR   PC,CMPRT       ;REPORT ERROR
2414  013534  000740                          BR    4$             ;CONTINUE COMPARING
2415  013536  005737  001312              8$:   TST   CMCNT          ;AT END OF BUFFER
2416  013542  003430                          BLE   CMPRX          ;BR IF AT END
2417  013544  126027  000024  000005          CMPB  $CODE(R0),#5   ;SEE IF READ HEADER & DATA
2418  013552  001220                          BNE   CMSTR          ;BR IF NOT
2419  013554  105237  001316                  INCB  CMSEC          ;INCREMENT SECTOR
2420  013560  123727  001316  000026          CMPB  CMSEC,#22.     ;SECTOR GREATER THAN MAX ?
```

```
2421  013566  103612                          BLO     CMSTR           ;BR IF NOT GREATER THAN MAX
2422  013570  105037  001316                  CLRB    CMSEC           ;CLEAR SECTOR ADDRESS
2423  013574  105237  001317                  INCB    CMTRK           ;INCREMENT TRACK
2424  013600  123727  00131   000023         CMPB    CMTRK,#19.      ;TRACK GREATER THAN MAX ?
2425  013606  103602                          BLO     CMSTR           ;BR IF NOT GREATER
2426  013610  105037  001317                  CLRB    CMTRK           ;RESET TRACK ADDRESS
2427  013614  005237  001314                  INC     CMCYL           ;INCREMENT CYLINDER ADDRESS
2428  013620  000137  013214                  JMP     CMSTR           ;CONTINUE WITH COMPARE
2429  013624  004737  014106          CMPRX:  JSR     PC,ENDCMP       ;PRINT LAST LINE IF ERRORS
2430  013630  000207                          RTS     PC
2431
2432                                  ;TYPE DATA COMPARE ERRORS
2433
2434  013632  005737  001302          CMPRT:  TST     SAVER1          ;PRINT SAVED VALUES ?
2435  013636  001010                          BNE     2$              ;BR IF NOT
2436  013640  105737  001300                  TSTB    FRSTER          ;FIRST ERROR?
2437  013644  100402                          BMI     1$              ;BR IF NOT
2438  013646  004737  013726                  JSR     PC,4$           ;PRINT INITIAL MESSAGE INFO
2439  013652  004737  014010          1$:     JSR     PC,8$           ;PRINT REMAINDER OF MESSAGE
2440  013656  000422                          BR      3$              ;EXIT
2441  013660                          2$:
2442  013660  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2443  013662  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
2444  013664  013701  001302                  MOV     SAVER1,R1       ;DISPLAY SAVED R1
2445  013670  013705  001304                  MOV     SAVER5,R5       ;DISPLAY SAVED R5
2446  013674  004737  013726                  JSR     PC,4$           ;PRINT INITIAL MESSAGE INFO
2447  013700  004737  014010                  JSR     PC,8$           ;PRINT SAVED VALUES
2448  013704  005037  001302                  CLR     SAVER1          ;CLEAR SAVED REGISTER INDICATORS
2449  013710  005037  001304                  CLR     SAVER5          ;CLEAR THE OTHER ONE
2450  013714  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
2451  013716  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
2452  013720  004737  014010                  JSR     PC,8$           ;PRINT REMAINDEF OF MESSAGE
2453  013724  000207                  3$:     RTS     PC              ;RETURN
2454  013726  105737  001300          4$:     TSTB    FRSTER          ;FIRST ERROR ?
2455  013732  100425                          BMI     7$              ;BR IF NOT
2456  013734  001013                          BNE     5$              ;BR IF FIRST ERROR AND PROCESSING 'DCK' ERROR
2457  013736  004737  020130                  JSR     PC,LINE1        ;PRINT LINE 1 OF ERROR MESSAGE
2458  013742  104414  046647                  DISPLY  ,EM42           ;DATA COMPARE ERROR
2459  013746  004737  020174                  JSR     PC,LINE2        ;PRINT LINE 2 OF ERROR MESSAGE
2460  013752  004737  020610                  JSR     PC,LINE3A       ;PRINT LINE 3A OF ERROR MESSAGE
2461  013756  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
2462  013762  000404                          BR      6$              ;GO TO TYPE HEADER
2463  013764  104414  051303          5$:     DISPLY  ,LIN9B          ;HEADER MESSAGE OF PROCESSING 'DCK' ERROR
2464  013770  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
2465  013774  104414  051332          6$:     DISPLY  ,LIN9H          ;DISPLAY HEADER
2466  014000  012737  177777  001300          MOV     #-1,FRSTER      ;SET ERROR FLAG
2467  014006  000207                  7$:     RTS     PC              ;RETURN
2468  014010  005737  001310          8$:     TST     LIMIT           ;TYPEOUT LIMIT REACHED ?
2469  014014  001403                          BEQ     9$              ;BR IF IT HAS
2470  014016  005337  001310                  DEC     LIMIT           ;DECREMENT LIMIT COUNTER
2471  014022  001005                          BNE     10$             ;BR IF NOT AT LIMIT
2472  014024  032777  000200  165106  9$:     BIT     #SW07,@SWR      ;PRINT ALL DATA COMPARE ERRORS ?
2473  014032  001001                          BNE     10$             ;BR IF YES
2474  014034  000207                          RTS     PC              ;RETURN
```

```
2475  014036  010146                  10$:    MOV     R1,-(SP)        ;BUFFER ADDRESS
2476  014040  162716  000002                  SUB     #2,(SP)         ;ADJUST ADDRESS
2477  014044  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
2478  014050  104414  052073                  DISPLY  ,LINSP          ;2 SPACES
2479  014054  016546  177776                  MOV     -2(R5),-(SP)    ;PUT GOOD DATA ON THE STACK
2480  014060  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
2481  014064  104414  052073                  DISPLY  ,LINSP          ;2 SPACES
2482  014070  016146  177776                  MOV     -2(R1),-(SP)    ;BAD DATA
2483  014074  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
2484  014100  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
2485  014104  000207                          RTS     PC              ;RETURN
2486
2487                                  ;LAST LINE OF COMPARE ERROR REPORTING
2488
2489  014106  105737  001301          ENDCMP: TSTB    FRSTER+1        ;ANY COMPARE ERRORS FOUND ?
2490  014112  001417                          BEQ     2$              ;BR IF NOT
2491  014114  005737  001306                  TST     ERCTR           ;SEE HOW MANY ERRORS
2492  014120  001410                          BEQ     1$              ;BR IF ONLY CAN'T MATCH PATTERN
2493  014122  104414  051430                  DISPLY  ,LIN9E          ;'NUMBER OF ERRORS='
2494  014126  013746  001306                  MOV     ERCTR,-(SP)     ;NUMBER OF ERRORS
2495  014132  004737  022224                  JSR     PC,LINDEC       ;TYPE IT
2496  014136  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
2497  014142  004737  023354          1$:     JSR     PC,INCTOT       ;INCREMENT TOTAL ERROR COUNT
2498  014146  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7 OF ERROR MESSAGE
2499  014152  000207                  2$:     RTS     PC              ;RETURN
2500
2501
2502                                  ;ROUTINE TO MATCH THE DATA WITH A PATTERN
2503                                  ;CALL:
2504                                  ;       MOV     #BUFFER,R1      ;BUFFER ADDRESS
2505                                  ;       JSR     PC,MATCH
2506                                  ;       RETURN1                 ;PATTERN ADDRESS IN R4
2507                                  ;       RETURN2                 ;COULDN'T MATCH PATTERN
2508
2509  014154  010146                  MATCH:  MOV     R1,-(SP)        ;SAVE R1 ON THE STACK
2510  014156  012704  000044                  MOV     #44,R4          ;PATTERN TABLE INDEX
2511  014162  011601                  1$:     MOV     (SP),R1         ;RELOAD R1
2512  014164  162704  000002                  SUB     #2,R4           ;DECREMENT INDEX
2513  014170  016405  002742                  MOV     STNDAT(R4),R5   ;ADDRESS OF PATTERN ADDRESS
2514  014174  001411                          BEQ     3$              ;BR IF ALL PATTERNS CHECKED AND NO MATCH
2515                                                                  ;FOUND
2516  014176  012703  000004                  MOV     #4,R3           ;NUMBER OF LOCATIONS TO CHECK
2517  014202  022125                  2$:     CMP     (R1)+,(R5)+     ;COMPARE THE BUFFER AGAINST THE PATTERN
2518  014204  001366                          BNE     1$              ;BR IF NOT EQUAL, TRY NEXT PATTERN
2519  014206  005303                          DEC     R3              ;FINISHED CHECKING?
2520  014210  001374                          BNE     2$              ;BR IF NOT FINISHED
2521  014212  062704  002742                  ADD     #STNDAT,R4      ;MAKE PATTERN ADDRESS ABSOLUTE
2522  014216  000403                          BR      4$              ;EXIT
2523  014220  062766  000002  000002  3$:     ADD     #2,2(SP)        ;INCREMENT RETURN ADDRESS
2524  014226  012601                  4$:     MOV     (SP)+,R1        ;RESTORE R1
2525  014230  000207                          RTS     PC              ;RETURN
2526
2527                                  ;USE ECC TO CORRECT THE DATA ERROR
2528
```

```
2529  014232  016037  000240  001322  ECC:    MOV     $RPBA(R0),ECSEC ;ADDRESS OF LAST LOCN XFERED
2530  014240  016046  000236                  MOV     $RPWC(R0),-(SP) ;ACT WORDS XFERED (2'S COMP)
2531  014244  066016  000020                  ADD     $WRDL(R0),(SP)  ;ADD WORDS REQUESTED
2532  014250  005046                          CL      -(SP)           ;CLEAR NEXT STACK LOCN
2533  014252  016046  000022                  MO      $SSEC(R0),-(SP) ;SECTOR SIZE
2534  014256  004737  027004                  JS      PC,LINKDV       ;DIVIDE WORDS XFERED BY SECTOR SIZE
2535  014262  005716                          T       (SP)            ;PARTIAL SECTOR XFERED ?
2536  014264  001413                          E       1$              ;BR IF NOT
2537  014266  006316                          .       (SP)            ;CONVERT INTO NUMBER OF BYTES
2538  014270  161637  001322                  SUB     (SP),ECSEC      ;SUBTRACT SECTOR RESIDUE
2539  014274  126027  000024  000005          CMPB    $CODE(R0),#5    ;WAS OP READ HEAD & DATA
2540  014302  001007                          BNE     2$              ;BR IF NOT
2541  014304  062737  000010  001322          ADD     #8.,ECSEC       ;ADD HEADER SIZE (IN BYTES) BACK IN
2542  014312  000403                          BR      2$              ;GO ADJUST THE STACK POINTER
2543  014314  162737  001000  001322  1$:     SUB     #1000,ECSEC     ;SUBTRACT SECTOR DATA FIELD SIZE (IN BYTES)
2544  014322  062706  000004          2$:     ADD     #4,SP           ;ADJUST THE STACK POINTER
2545  014326  016037  000300  001320          MOV     $RPEC1(R0),ECBIT  ;ECC POSITION COUNT
2546  014334  005337  001320                  DEC     ECBIT           ;ADJUST THE POSITION COUNT
2547  014340  013737  001320  001330          MOV     ECBIT,ECWRD     ;LOAD THE WORD COUNT LOCATION
2548  014346  042737  177760  001320          BIC     #^C17,ECBIT     ;SAVE THE BIT OFFSET COUNT
2549  014354  042737  000017  001330          BIC     #17,ECWRD       ;CLEAR THE BIT OFFSET
2550  014362  006237  001330                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
2551  014366  006237  001330                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
2552  014372  006237  001330                  ASR     ECWRD           ;CHANGE TO BYTE COUNT
2553  014376  104414  051507                  DISPLY  ,LIN10A         ;'ERROR BURST BEGINS AT '
2554  014402  013746  001330                  MOV     ECWRD,-(SP)     ;PUT THE WORD COUNT ON THE STACK
2555  014406  006216                          ASR     (SP)            ;CONVERT TO WORD COUNT FOR MESSAGE
2556  014410  004737  027720                  JSR     PC,$SB2D        ;CONVERT THE WORD COUNT
2557  014414  004737  027320                  JSR     PC,$SUPRS       ;PRINT IT
2558  014420  104414  051543                  DISPLY  ,LIN10B         ;' IN DATA FIELD OF ERROR SECTOR'
2559  014424  063737  001322  001330          ADD     ECSEC,ECWRD     ;FIND THE BEGINNING OF THE ERROR BURST
2560  014432  026037  000240  001330          CMP     $RPBA(R0),ECWRD  ;SEE IF BURST WAS IN DATA READ
2561  014440  101002                          BHI     .+6             ;BR IF IN DATA READ
2562  014442  000137  014760                  JMP     ECC2            ;NOT IN DATA READ - REPORT IT
2563  014446  016037  000302  001324          MOV     $RPEC2(R0),ECMSK0  ;GET THE ERROR MASK
2564  014454  005037  001326                  CLR     ECMSK1          ;CLEAR THE UPPER MASK WORD
2565  014460  005737  001320          3$:     TST     ECBIT           ;BIT OFFSET EQUAL ZERO
2566  014464  001407                          BEQ     4$              ;BR IF IT IS
2567  014466  005337  001320                  DEC     ECBIT           ;DECREMENT THE BIT OFFSET COUNT
2568  014472  006337  001324                  ASL     ECMSK0          ;SHIFT THE ERROR MASK
2569  014476  006137  001326                  ROL     ECMSK1          ;SHIFT THE LOWER INTO THE UPPER
2570  014502  000766                          BR      3$              ;CONTINUE THE SHIFT
2571  014504  017737  164620  001334  4$:     MOV     @ECWRD,ECBAD0   ;SAVE THE INCORRECT WORD
2572  014512  005037  001336                  CLR     ECWRD1          ;CLEAR SECOND INCORRECT WORD ADDRESS
2573  014516  013746  001324                  MOV     ECMSK0,-(SP)    ;PUT LOWER MASK ON STACK
2574  014522  047716  164602                  BIC     @ECWRD,(SP)     ;CLEAR ERRONEOUS ONE BITS FROM MASK
2575  014526  043777  001324  164574          BIC     ECMSK0,@ECWRD   ;CLEAR ERRONEOUS ONE BITS FROM BAD WORD
2576  014534  052677  164570                  BIS     (SP)+,@ECWRD    ;SET DROPPED BITS
2577  014540  005737  001326                  TST     ECMSK1          ;DOES BURST GO INTO NEXT WORD ?
2578  014544  001431                          BEQ     ECC1            ;BR IF BURST ONLY IN ONE WORD
2579  014546  013737  001330  001336          MOV     ECWRD,ECWRD1    ;DUPLICATE ADDRESS
2580  014554  062737  000002  001336          ADD     #2,ECWRD1       ;INCREMENT ERROR ADDRESS
2581  014562  026037  000240  001336          CMP     $RPBA(R0),ECWRD1  ;IS NEXT WORD IN THE BUFFER
2582  014570  101003                          BHI     5$              ;BR IF IT IS
```

```
2583  014572  005037  001336                  CLR     ECWRD1          ;CLEAR 2ND WORD ADDRESS
2584  014576  000414                          BR      ECC1            ;PRINT WORD CORRECTED
2585  014600  017737  164532  001342  5$:     MOV     @ECWRD1,ECBAD1  ;SAVE THE SECOND BAD WORD
2586  014606  013746  001326                  MOV     ECMSK1,-(SP)    ;PUT THE UPPER MASK ON THE STACK
2587  014612  047716  164520                  BIC     @ECWRD1,(SP)    ;CLEAR ERRONEOUS ONE BITS FROM UPPER MASK
2588  014616  043777  001326  164512          BIC     ECMSK1,@ECWRD1  ;CLEAR ERRONEOUS ONE BITS FROM DATA WORD
2589  014624  052677  164506                  BIS     (SP)+,@ECWRD1   ;SET DROPPED BITS
2590  014630  104414  051711          ECC1:   DISPLY  ,LIN10H         ;HEADER
2591  014634  013746  001330                  MOV     ECWRD,-(SP)     ;PUT ECWRD ON THE STACK
2592  014640  004737  022172                  JSR     PC,LINOCT       ;TYPE ECWRD
2593  014644  104414  052073                  DISPLY  ,LINSP          ;SPACES
2594  014650  013746  001334                  MOV     ECBAD0,-(SP)    ;PUT ECBAD0 ON THE STACK
2595  014654  004737  022172                  JSR     PC,LINOCT       ;TYPE ECBAD0
2596  014660  104414  052073                  DISPLY  ,LINSP          ;SPACES
2597  014664  017746  164440                  MOV     @ECWRD,-(SP)    ;PUT @ECWRD ON THE STACK
2598  014670  004737  022172                  JSR     PC,LINOCT       ;TYPE @ECWRD
2599  014674  104414  052073                  DISPLY  ,LINSP          ;SPACES
2600  014700  005737  001336                  TST     ECWRD1          ;PRINT THE NEXT WORD ?
2601  014704  001427                          BEQ     ECCX            ;BR IF NOT
2602  014706  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
2603  014712  013746  001336                  MOV     ECWRD1,-(SP)    ;PUT ECWRD1 ON THE STACK
2604  014716  004737  022172                  JSR     PC,LINOCT       ;TYPE ECWRD1
2605  014722  104414  052073                  DISPLY  ,LINSP          ;SPACES
2606  014726  013746  001342                  MOV     ECBAD1,-(SP)    ;PUT ECBAD1 ON THE STACK
2607  014732  004737  022172                  JSR     PC,LINOCT       ;TYPE ECBAD1
2608  014736  104414  052073                  DISPLY  ,LINSP          ;SPACES
2609  014742  017746  164370                  MOV     @ECWRD1,-(SP)   ;PUT @ECWRD1 ON THE STACK
2610  014746  004737  022172                  JSR     PC,LINOCT       ;TYPE @ECWRD1
2611  014752  104414  052073                  DISPLY  ,LINSP          ;SPACES
2612  014756  000402                          BR      ECCX            ;EXIT
2613  014760  104414  051604          ECC2:   DISPLY  ,LIN10C         ;ERROR BURST WAS NOT TRANSFERED TO MEMORY
2614  014764  104414  001165          ECCX:   DISPLY  ,$CRLF          ;CR-LF
2615  014770  000207                          RTS     PC              ;RETURN
2616
2617                                  ;ROUTINE TO DISPLAY THE SECTOR WHICH GAVE THE HARD ERROR
2618
2619  014772  032777  000010  164140  PRTBAD: BIT     #SW3,@SWR       ;PRINT THE BAD SECTOR ?
2620  015000  001460                          BEQ     6$              ;BR IF NOT
2621  015002  016001  000240                  MOV     $RPBA(R0),R1    ;PUT THE END ADDRESS INTO R1
2622  015006  016046  000020                  MOV     $WRDL(R0),-(SP) ;FIND THE BEGINNING OF THE SECTOR
2623  015012  066016  000236                  ADD     $RPWC(R0),(SP)  ;SUBTRACT THE WORDS NOT TRANSFERED
2624  015016  005046                          CLR     -(SP)           ;MAKE THE UPPER DIVIDEND 0
2625  015020  016046  000022                  MOV     $SSEC(R0),-(SP)  ;DIVDE THE WORDS TRANSFERED BY THE SECTOR SIZE
2626  015024  004737  027004                  JSR     PC,LINKDV       ;DIVIDE
2627  015030  005716                          TST     (SP)            ;REMANDER = 0 ?
2628  015032  001403                          BEQ     1$              ;BR IF IT IS - COMPLETE SECTOR TRANSFERED
2629  015034  006316                          ASL     (SP)            ;CONVERT THE RESIDUAL SECTOR SIZE INTO BYTE COUNT
2630  015036  161601                          SUB     (SP),R1         ;SUBTRACT IT FROM THE END ADDRESS
2631  015040  000410                          BR      2$              ;FINISH THE SIZING
2632  015042  162701  001000          1$:     SUB     #1000,R1        ;SUBTRACT FULL SECTOR SIZE FROM END ADDR
2633  015046  126027  000024  000005          CMPB    $CODE(R0),#5    ;WAS OPERATION READ HEADER & DATA ?
2634  015054  001002                          BNE     2$              ;BR IF NOT
2635  015056  162701  000010                  SUB     #10,R1          ;SUBTRACK HEADER SIZE FROM ADDR
2636  015062  062706  000004          2$:     ADD     #4,SP           ;RESTORE THE STACK POINTER
```

```
2637  015066  104414  051776                    DISPLY  ,LIN11H          ;PRINT THE HEADER
2638  015072  012702  000007          3$:       MOV     #7,R2            ;R2 CONTAINS THE WORDS/LINE COUNT
2639  015076  010146                            MOV     R1,-(SP)         ;PUT THE ADDRESS ON THE STACK
2640  015100  004737  022172                    JSR     PC,LINOCT        ;TYPE THE ADDRESS
2641  015104  020160  000240          4$:       CMP     R1,$RPBA(R0)     ;PRINTED ALL THE SECTOR ?
2642  015110  001412                            BEQ     5$               ;BR IF ALL PRINTED
2643  015112  104414  052073                    DISPLY  ,LINSP           ;SPACES
2644  015116  012146                            MOV     (R1)+,-(SP)      ;PUT THE DATA ON THE STACK
2645  015120  004737  022172                    JSR     PC,LINOCT        ;TYPE THE DATA
2646  015124  005302                            DEC     R2               ;DECREMENT THE HORIZONTAL COUNT
2647  015126  001366                            BNE     4$               ;BR IF NOT AT THE END OF THE LINE
2648  015130  104414  001165                    DISPLY  ,$CRLF           ;CR-LF
2649  015134  000756                            BR      3$               ;RESTORE THE WORDS/LINE COUNT
2650  015136  104414  001165          5$:       DISPLY  ,$CRLF           ;PRINT WHAT REMAINS IN THE BUFFER
2651  015142  000207                6$:       RTS     PC               ;RETURN
2652
2653                                            ;ROUTINE TO DO AN RTC - DRIVE SELECTED IN R0
2654                                            ;CALL:
2655                                            ;       MOV     #DPB,R0          ;DPB ADDRESS
2656                                            ;       JSR     PC,RTNCTR
2657                                            ;       RETURN
2658
2659  015144  111037  044646          RTNCTR: MOVB    (R0),GENDPB      ;MOVE THE DRIVE # TO THE GENERAL DPB
2660  015150  112737  000117  044650            MOVB    #RTC,GENDPB+$COMND  ;COMMAND CODE
2661  015156  004037  034036          1$:       JSR     R0,RP04          ;DRIVER ENTRANCE
2662  015162  044646                            GENDPB                   ;DPB ADDRESS FOR ORDER
2663  015164  000774                            BR      1$               ;DRIVER DIDN'T ACCEPT ORDER
2664  015166  000207                            RTS     PC               ;RETURN
2665
2666                                            ;ROUTINE TO DO A RECALIBRATE - DRIVE SELECTED IN R0
2667                                            ;CALL:
2668                                            ;       MOV     #DPB,R0          ;DPB ADDRESS
2669                                            ;       JSR     PC,RECALT
2670                                            ;       RETURN
2671                                            ;
2672                                            ;OR
2673                                            ;
2674                                            ;       MOV     #DPB,R0          ;DPB ADDRESS
2675                                            ;       MOVB    #DRIVE,GENDPB    ;DRIVE ADDRESS
2676                                            ;       JSR     PC,RECALTO
2677                                            ;       RETURN
2678
2679  015170  111037  044646          RECALT: MOVB    (R0),GENDPB      ;MOVE THE DRIVE # TO THE GENERAL DPB
2680  015174  112737  000107  044650  RECALO: MOVB    #RECAL,GENDPB+$COMND  ;RELCALIBRATE COMMAND
2681  015202  004037  034036          1$:       JSR     R0,RP04          ;DRIVER ENTRANCE
2682  015206  044646                            GENDPB                   ;DPB ADDRESS FOR ORDER
2683  015210  000774                            BR      1$               ;DRIVER DIDN'T ACCEPT THE ORDER
2684  015212  005737  044664          2$:       TST     GENDPB+$TATUS            ;SEE IF FINISHED
2685  015216  001775                            BEQ     2$               ;BR IF NOT FINISHED
2686  015220  000207                            RTS     PC               ;RETURN
2687
2688                                            ;OFFSET THE DRIVE IN R0 (OFFSET CODE PRELOADED INTO 'RPOF')
2689                                            ;CALL:
2690                                            ;       MOVB    #OFFSET,GENDPB+$FMT  ;OFFSET CODE
```

```
2691                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
2692                                    ;       JSR     PC,OFFST
2693                                    ;       RETURN
2694
2695  015222  111037  044646            OFFST:  MOVB    (R0),GENDPB     ;DRIVE # TO GENERAL DPB
2696  015226  112737  000115  044650            MOVB    #OFFSET,GENDPB+$COMND ;COMMAND
2697  015234  004037  034036            1$:     JSR     R0,RP04         ;DRIVER ENTRANCE
2698  015240  044646                            GENDPB                  ;DPB ADDRESS FOR ORDER
2699  015242  000774                            BR      1$              ;DRIVER DIDN'T ACCEPT ORDER
2700  015244  000207                            RTS     PC
2701
2702                                    ;UTILITY READ HEADER ROUTINE
2703                                    ;CALL:
2704                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
2705                                    ;       MOV     #SECTOR,-(SP)   ;SECTOR ADDRESS
2706                                    ;       MOV     #TRACK,-(SP)    ;TRACK ADDRESS
2707                                    ;       JSR     PC,READDR
2708                                    ;       RETURN
2709
2710  015246  116637  000002  044657    READHD: MOVB    2(SP),GENDPB+$TRK ;TRACK ADDRESS
2711  015254  116637  000004  044656            MOVB    4(SP),GENDPB+$SEC ;SECTOR ADDRESS
2712  015262  111037  044646                    MOVB    (R0),GENDPB     ;DRIVE NUMBER
2713  015266  016037  000272  044660            MOV     $RPCS(R0),GENDPB+$CYL ;CYLINDER ADDRESS
2714  015274  112737  000173  044650            MOVB    #RDHD,GENDPB+$COMND ;COMMAND
2715  015302  004037  034036            1$:     JSR     R0,RP04         ;DRIVER ENTRANCE
2716  015306  044646                            GENDPB                  ;DPB ADDRESS FOR ORDER
2717  015310  000774                            BR      1$              ;DRIVER DIDN'T ACCEPT COMMAND
2718  015312  005737  044664            2$:     TST     GENDPB+$TATUS   ;FINISHED?
2719  015316  001775                            BEQ     2$              ;BR IF NOT
2720  015320  012666  000002                    MOV     (SP)+,2(SP)     ;ADJUST STACK FOR RETURN
2721  015324  005726                            TST     (SP)+
2722  015326  000207                            RTS     PC              ;RETURN
2723
2724                                    ;RETRY THE PRESENT OPERATION
2725                                    ;CALL:
2726                                    ;       MOV     #COUNT,RETRY    ;RETRY COUNT
2727                                    ;       JSR     PC,$RETRY
2728                                    ;       RETURN1                 ;RETRY UNSUCESSFUL
2729                                    ;       RETURN2                 ;SUCESSFUL RETRY
2730                                    ;                               ;NOTE: IF A DIFFERENT ERROR OCCURS DURING
2731                                    ;                               ;RETRY, THE ROUTINE EXITS TO 'ERPRC1'
2732
2733  015330  004737  016320            $RETRY: JSR     PC,GODRIV       ;RE-START ORDER
2734  015334  005760  000016            1$:     TST     $TATUS(R0)      ;ORDER FINISHED?
2735  015340  001775                            BEQ     1$              ;BR IF NOT
2736  015342  100405                            BMI     2$              ;BR IF ERROR
2737  015344  105237  001253                    INCB    RETRY+1         ;INCREMENT RETRY COUNT
2738  015350  062716  000002                    ADD     #2.(SP)         ;INCREMENT RETURN
2739  015354  000425                            BR      5$              ;GO TO EXIT
2740  015356  032760  000200  000016    2$:     BIT     #BIT7,$TATUS(R0)  ;DID ORDER TERMINATE NORMALLY ?
2741  015364  001430                            BEQ     7$              ;BR IF NOT
2742  015366  005737  001250                    TST     MASK            ;IS ERROR MASK 0 ?
2743  015372  001004                            BNE     3$              ;BR IF NOT
2744  015374  005760  000250                    TST     $RPER1(R0)      ;MAKE SURE THAT THE DRIVE ERROR REG IS CLEAR
```

```
2745  015400  001014                          BNE     6$              ;BR IF NOT
2746  015402  000404                          BR      4$              ;CONTINUE RETRY
2747  015404  033760  001250  000250  3$:     BIT     MASK,$RPER1(R0) ;SAME ERROR?
2748  015412  001407                          BEQ     6$              ;BR IF NOT
2749  015414  105237  001253          4$:     INCB    RETRY+1         ;INCREMENT RETRY COUNT
2750  015420  123737  001252  001253          CMPB    RETRY,RETRY+1   ;DONE ?
2751  015426  001340                          BNE     $RETRY          ;BR IF NOT DONE
2752  015430  000207                  5$:     RTS     PC              ;RETURN
2753  015432  004737  022160          6$:     JSR     PC,LINE8        ;REPORT DIFFERENT ERROR
2754  015436  004737  021712                  JSR     PC,LINE7        ;PRINT LINE 7
2755  015442  005726                          TST     (SP)+           ;ADJUST STACK POINTER FOR DIRECT RETURN
2756  015444  000207                          RTS     PC              ;RETURN
2757  015446  104414  051246          7$:     DISPLY  ,LIN8M          ;'DIFFERENT ERROR DURING RETRY'
2758  015452  000137  006574                  JMP     ERPRC1          ;REPORT THE ERROR
2759
2760                                  ;ROUTINE TO UPDATE THE PERFORMANCE SUMMARY STATISTICS
2761                                  ;CALL:
2762                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
2763                                  ;       JSR     PC,STATIS
2764                                  ;       RETURN
2765
2766  015456  032760  000300  000016  STATIS: BIT     #BIT07!BIT06,$STATUS(R0) ;CHECK FOR DATA TERMINATION
2767  015464  001454                          BEQ     3$              ;BR IF NOT DATA TERMINATION
2768  015466  016037  000240  015620          MOV     $RPBA(R0),FACTOR ;STORE THE FINAL BUFFER ADDRESS
2769  015474  166037  000006  015620          SUB     $BUF(R0),FACTOR ;SUBTRACT THE INITIAL ADDRESS
2770  015502  001434                          BEQ     2$              ;BR IF NO DATA TRANSFER
2771  015504  006237  015620                  ASR     FACTOR          ;CONVERT TO A WORD COUNT
2772  015510  063760  015620  000046          ADD     FACTOR,$TRANS(R0) ;UPDATE WORD COUNT
2773  015516  005560  000050                  ADC     $TRANS+2(R0)    ;ADD ANY CARRY
2774  015522  132760  000002  000024          BITB    #BIT01,$CODE(R0) ;SEE IF ORDER READ OR WRITE
2775  015530  001021                          BNE     2$              ;BRANCH IF ORDER WRITE
2776  015532  005737  001404                  TST     AUTOCK          ;AUTO WRITE CHECKS BEING PERFORMED
2777  015536  001411                          BEQ     1$              ;BR IF NOT
2778  015540  126027  000024  000001          CMPB    $CODE(R0),#1    ;PRESENT OPERATION AN AUTOMATIC WRITE CHECK ?
2779  015546  101005                          BHI     1$              ;BR IF NOT
2780  015550  066060  000020  000046          ADD     $WRDL(R0),$TRANS(R0) ;ADD WORDS WRITTEN
2781  015556  005560  000050                  ADC     $TRANS+2(R0)    ;ADD A CARRY
2782  015562  063760  015620  000052  1$:     ADD     FACTOR,$READ(R0) ;UPDATE THE READ WORD COUNT
2783  015570  005560  000054                  ADC     $READ+2(R0)     ;ADD ANY CARRY
2784  015574  026060  000012  000270  2$:     CMP     $CYL(R0),$RPCA(R0) ;DID MID-TRANSFER SEEK OCCUR
2785  015602  001405                          BEQ     3$              ;BR IF NOT
2786  015604  062760  000001  000042          ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
2787  015612  005560  000044                  ADC     $POSIT+2(R0)    ;ADD CARRY TO UPPER WORD
2788  015616  000207                  3$:     RTS     PC
2789
2790  015620  000000                  FACTOR: .WORD   0               ;USED FOR WORDS TRANSFERED
2791
2792                                  ;ROUTINE TO GET A BUFFER
2793                                  ;CALL:
2794                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
2795                                  ;       CLR     -(SP)           ;CLEAR THE STACK
2796                                  ;       JSR     PC,GETBUF
2797                                  ;       RETURN                  ;BUFFER ADDRESS WILL BE ON THE STACK
2798                                  ;                               ;STACK WILL BE ZERO IF NO BUFFER AVAILABLE
```

```
2799
2800  015622  010146                    GETBUF: MOV     R1,-(SP)        ;SAVE R1
2801  015624  010246                            MOV     R2,-(SP)        ;SAVE R2
2802  015626  010346                            MOV     R3,-(SP)        ;SAVE R3
2803  015630  013702  001576                    MOV     BUFTBL,R2       ;NUMBER OF SEPARATE BUFFERS
2804  015634  001444                            BEQ     6$              ;BR IF NONE AVAILABLE
2805  015636  012701  001600                    MOV     #BUFTBL+2,R1    ;FIRST ADDRESS OF ALLOCATION TABLE
2806  015642  026061  000020  000002  1$:       CMP     $WRDL(R0),2(R1) ;SEE IF THERE IS A BLOCK LARGE ENOUGH
2807  015650  101405                            BLOS    3$              ;BRANCH IF IT IS
2808  015652  005302                            DEC     R2              ;DECREMENT TABLE COUNT
2809  015654  001434                            BEQ     6$              ;BR IF THROUGH TABLE
2810  015656  062701  000004                    ADD     #4,R1           ;INCREMENT TABLE POINTER
2811  015662  000767                            BR      1$              ;CONTINUE LOOKING
2812  015664  011166  000010          3$:       MOV     (R1),10(SP)     ;BUFFER ADDRESS TO STACK
2813  015670  166061  000020  000002            SUB     $WRDL(R0),2(R1) ;ADJUST BUFFER SIZE
2814  015676  001407                            BEQ     4$              ;BR IF DIFFERENCE IS ZERO
2815  015700  006360  000020                    ASL     $WRDL(R0)       ;CONVERT # WORDS TO BYTES
2816  015704  066011  000020                    ADD     $WRDL(R0),(R1)  ;MAKE NEW STARTING ADDRESS
2817  015710  006260  000020                    ASR     $WRDL(R0)       ;RETURN # BYTES TO WORDS
2818  015714  000414                            BR      6$              ;RETURN
2819  015716  005337  001576          4$:       DEC     BUFTBL          ;DECREMENT ENTRIES COUNT
2820  015722  001411                            BEQ     6$              ;BR IF ALLOCATION TABLE EMPTY
2821  015724  005302                            DEC     R2              ;DECREMENT TABLE COUNT
2822  015726  001407                            BEQ     6$              ;BR IF ITEM WERE LAST ENTRY
2823  015730  010103                            MOV     R1,R3           ;MOVE TABLE POINTER
2824  015732  062703  000004                    ADD     #4,R3           ;POINT TO NEXT ENTRY
2825  015736  012321                  5$:       MOV     (R3)+,(R1)+     ;MOVE ITEMS
2826  015740  012321                            MOV     (R3)+,(R1)+
2827  015742  005302                            DEC     R2              ;DECREMENT TABLE COUNT
2828  015744  001374                            BNE     5$              ;CONTINUE IF NOT AT END OF TABLE
2829  015746  012603                  6$:       MOV     (SP)+,R3        ;RESTORE R3
2830  015750  012602                            MOV     (SP)+,R2        ;RESTORE R2
2831  015752  012601                            MOV     (SP)+,R1        ;RESTORE R1
2832  015754  000207                            RTS     PC              ;RETURN
2833
2834
2835                                    ;ROUTINE TO PUT BUFFER BACK IN TABLE
2836                                    ;CALL:
2837                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
2838                                    ;       JSR     PC,RELBUF
2839                                    ;       RETURN
2840
2841  015756  010146                    RELBUF: MOV     R1,-(SP)        ;SAVE R1
2842  015760  012701  001600                    MOV     #BUFTBL+2,R1    ;BEGINNING OF TABLE
2843  015764  013702  001576                    MOV     BUFTBL,R2       ;ENTRY COUNT
2844  015770  001424                            BEQ     2$              ;BR IF EMPTY TABLE
2845  015772  016003  000020                    MOV     $WRDL(R0),R3    ;TRIAL ADDRESS
2846  015776  006303                            ASL     R3              ;CHANGE TO BYTE COUNT
2847  016000  066003  000006                    ADD     $BUF(R0),R3     ;ADDRESS OF HIGHER ADJACENT BLOCK
2848  016004  021103                  1$:       CMP     (R1),R3         ;UPPER ADJACENT BLOCK
2849  016006  001424                            BEQ     4$              ;BR IF YES
2850  016010  062701  000004                    ADD     #4,R1           ;INCREMENT POINTER
2851  016014  005302                            DEC     R2              ;DECREMENT ENTRY COUNT
2852  016016  001372                            BNE     1$              ;CONTINUE SEARCHING
```

```
 2853  016020  016011  000006                    MOV     $BUF(R0),(R1)   ;PUT THE BUFFER BLOCK INTO THE TABLE
 2854  016024  016061  000020  000002            MOV     $WRDL(R0),2(R1)  ;BLOCK SIZE
 2855  016032  005237  001576                    INC     BUFTBL          ;INCREMENT ENTRY COUNT
 2856  016036  005202                            INC     R2              ;INCREMENT R2 FOR USE LATER
 2857  016040  000414                            BR      5$              ;SEE IF A LOWER ADJACENT BLOCK IS IN THE TABLE
 2858  016042  016021  000006            2$:     MOV     $BUF(R0),(R1)+  ;BLOCK ADDRESS TO TABLE
 2859  016046  016021  000020                    MOV     $WRDL(R0),(R1)+ ;SIZE TO TABLE
 2860  016052  005237  001576                    INC     BUFTBL          ;INCREMENT ENTRY COUNT
 2861  016056  000443                            BR      10$             ;EXIT
 2862  016060  016011  000006            4$:     MOV     $BUF(R0),(R1)   ;RELEASED BUFFER IS LOWER ADJACENT
 2863  016064  066061  000020  000002            ADD     $WRDL(R0),2(R1) ;INCREMENTED SIZE
 2864  016072  010246                    5$:     MOV     R2,-(SP)        ;SAVE R2
 2865  016074  013702  001576                    MOV     BUFTBL,R2       ;ENTRY COUNT
 2866  016100  012705  001600                    MOV     #BUFTBL+2,R5    ;BEGINNING OF TABLE
 2867  016104  016504  000002            6$:     MOV     2(R5),R4        ;BLOCK SIZE (IN WORDS)
 2868  016110  006304                            ASL     R4              ;CHANGE TO BYTE COUNT
 2869  016112  061504                            ADD     (R5),R4         ;ADD BLOCK BEGINNING ADDRESS
 2870  016114  020411                            CMP     R4,(R1)         ;R1 STILL POINTS TO INSERTED ENTRY
 2871  016116  001406                            BEQ     8$              ;LOWER ADJACENT IN TABLE
 2872  016120  062705  000004                    ADD     #4,R5           ;INCREMENT POINTER
 2873  016124  005302                            DEC     R2              ;DECREMENT ENTRY COUNT
 2874  016126  001366                            BNE     6$              ;CONTINUE LOOKING
 2875  016130  005726                            TST     (SP)+           ;RESTORE STACK POINTER
 2876  016132  000415                            BR      10$             ;END
 2877  016134  012602                    8$:     MOV     (SP)+,R2        ;RESTORE R2
 2878  016136  066165  000002  000002            ADD     2(R1),2(R5)     ;INCREMENT LOWER BLOCK LENGTH
 2879  016144  005337  001576                    DEC     BUFTBL          ;DECREMENT ENTRY COUNT
 2880  016150  010105                            MOV     R1,R5           ;GET READY TO COMPRESS
 2881  016152  062705  000004                    ADD     #4,R5           ;INCREMENT TO NEXT ENTRY
 2882  016156  012521                    9$:     MOV     (R5)+,(R1)+     ;COMPRESS TABLE
 2883  016160  012521                            MOV     (R5)+,(R1)+     ;MOVE SIZE FIELD DOWN
 2884  016162  005302                            DEC     R2              ;DECREMENT ENTRY COUNT
 2885  016164  001374                            BNE     9$              ;BR IF NOT FINISHED
 2886  016166  012601                    10$:    MOV     (SP)+,R1        ;RESTORE R1
 2887  016170  000207                            RTS     PC              ;RETURN
 2888
 2889
 2890                                    ;FILL THE ASSIGNED BUFFER (IF WRITE OR WRITE CHECK ORDER)
 2891                                    ;CALL:
 2892                                    ;       MOV     #DPB,R0         ;DPB ADDRESS
 2893                                    ;       MOV     #BUFADR,$BUF(R0)  ;LOAD BUFFER ADDRESS INTO THE DPB
 2894                                    ;       MOVB    #PATTERN,$PATTC(R0)  ;PATTERN CODE
 2895                                    ;       JSR     PC,FILBUF
 2896                                    ;       RETURN
 2897
 2898  016172  104412                    FILBUF: SAVREG                  ;SAVE THE REGISTERS
 2899  016174  132760  000004  000024            BITB    #BIT02,$CODE(R0)  ;SEE IF READ ORDER
 2900  016202  001044                            BNE     4$              ;BR IF READ
 2901  016204  016001  000006            1$:     MOV     $BUF(R0),R1     ;BUFFER ADDRESS
 2902  016210  016002  000020                    MOV     $WRDL(R0),R2    ;POSITIVE WORD COUNT
 2903  016214  132760  000001  000024            BITB    #BIT00,$CODE(R0)  ;SEE IF WRITE HEADER TYPE ORDER
 2904  016222  001413                            BEQ     2$              ;BR IF NOT
 2905  016224  016011  000012                    MOV     $CYL(R0),(R1)   ;CYLINDER ADDRESS
 2906  016230  052721  010000                    BIS     #BIT12,(R1)+    ;SET FMT22 BIT
```

```
2907  016234  016021  000010                  MOV     $SEC(R0),(R1)+  ;MOVE SECTOR & TRACK
2908  016240  005021                          CLR     (R1)+           ;CLEAR FIRST KEY WORD
2909  016242  005021                          CLR     (R1)+           ;CLEAR THE SECOND
2910  016244  162702  000004                  SUB     #4,R2           ;ADJUST THE WORD COUNT
2911  016250  003421                          BLE     4$              ;BR IF END OF PATTERN
2912  016252  005004                  2$:     CLR     R4              ;CLEAR R4
2913  016254  116004  000030                  MOVB    $PATTC(R0),R4   ;RELATIVE PATTERN ADDRESS
2914  016260  016405  002742                  MOV     STNDAT(R4),R5   ;PATTERN ADDRESS
2915  016264  012703  000020                  MOV     #20,R3          ;PATTERN COUNT
2916  016270  012521                  3$:     MOV     (R5)+,(R1)+     ;MOVE THE PATTERN INTO THE BUFFER
2917  016272  005302                          DEC     R2              ;DECREMENT THE WORD COUNT
2918  016274  001407                          BEQ     4$              ;BR IF DONE (WORD COUNT = 0)
2919  016276  005303                          DEC     R3              ;DECREMENT THE PATTERN COUNT
2920  016300  001373                          BNE     3$              ;BR IF MORE PATTERN
2921  016302  012703  000020                  MOV     #20,R3          ;RESTORE PATTERN COUNT
2922  016306  016405  002742                  MOV     STNDAT(R4),R5   ;RESTORE THE ADDRESS
2923  016312  000766                          BR      3$              ;CONTINUE DISTRIBUTING THE PATTERN
2924  016314  104413                  4$:     RESREG                  ;RESTORE THE REGISTERS
2925  016316  000207                          RTS     PC              ;RETURN
2926
2927                                  ;START THE ORDER FOR THE DPB IN R0
2928                                  ;CALL:
2929                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
2930                                  ;       JSR     PC,GODRIV
2931                                  ;       RETURN
2932
2933  016320  010046                  GODRIV: MOV     R0,-(SP)        ;SAVE R0
2934  016322  010037  016332                  MOV     R0,2$           ;CURRENT DPB ADDRESS
2935  016326  004037  034036          1$:     JSR     R0,RP04         ;CALL THE DRIVE HANDLER
2936  016332  000000                  2$:     .WORD   0               ;DRIVE BLOCK ADDRESS GOES HERE
2937  016334  000000                          HALT                    ;DRIVER REJECTED REQUEST
2938  016336  012600                          MOV     (SP)+,R0        ;RESTORE R0
2939  016340  062760  000001  000036          ADD     #1,$OPERC(R0)   ;INCREMENT THE OPERATION COUNT
2940  016346  005560  000040                  ADC     $OPERC+2(R0)
2941  016352  026060  000034  000012          CMP     $PREVA+2(R0),$CYL(R0)  ;DID ORDER REQUIRE A CYLINDER CHANGE
2942  016360  001405                          BEQ     3$              ;BR IF NOT
2943  016362  062760  000001  000042          ADD     #1,$POSIT(R0)   ;INCREMENT SEEK COUNT
2944  016370  005560  000044                  ADC     $POSIT+2(R0)    ;ADD ANY CARRY
2945  016374  000207                  3$:     RTS     PC
2946
2947                                  ;GENERATE PARAMETERS FOR THE OPERATION
2948                                  ;CALL:
2949                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
2950                                  ;       JSR     PC,SELPAR
2951                                  ;       RETURN
2952
2953  016376  004737  032302          SELPAR: JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
2954  016402  032777  000001  162530          BIT     #SWO,@SWR       ;SEE IF SWO SET
2955  016410  001012                          BNE     2$              ;BR IF SET - READ ONLY
2956  016412  012705  000010          1$:     MOV     #10,R5          ;READ/WRITE SELECTION DIVISOR
2957  016416  004737  026756                  JSR     PC,GETREM       ;GET SELECTION VALUE
2958  016422  020537  001402                  CMP     R5,RATIO        ;DETERMINE IF READ OR WRITE
2959  016426  103003                          BHIS    2$              ;BR IF READ
2960  016430  004737  017120                  JSR     PC,RANWRT       ;SELECT A WRITE ORDER
```

```
2961  016434  000406                    BR      3$                      ;CONTINUE WITH THE SELECTION
2962  016436  013705  032402    2$:     MOV     $LONUM,R5               ;SELECT READ OPERATION CODE
2963  016442  042705  177776            BIC     #^C1,R5                 ;MASK OUT ALL BUT BIT 0
2964  016446  062705  000004            ADD     #4,R5                   ;TABLE OFFSET FOR READ CODE
2965  016452  110560  000074    3$:     MOVB    R5,$NCODE(R0)           ;ORDER SELECTION CODE TO CONTROL BLOCK
2966
2967                                    ;GENERATE A RANDOM SECTOR ADDRESS BETWEEN VALUES 'MINSEC' & 'MAXSEC'
2968
2969  016456  016005  000116    RANSEC: MOV     MAXSEC(R0),R5           ;GET MAXIMUM SECTOR ADDRESS
2970  016462  026005  000120            CMP     MINSEC(R0),R5           ;'MINSEC' AND 'MAXSEC' THE SAME ?
2971  016466  001417                    BEQ     2$                      ;BR IF THEY ARE
2972  016470  166005  000120            SUB     MINSEC(R0),R5           ;SUBTRACT MINIMUM SECTOR ADDRESS
2973  016474  100002                    BPL     1$                      ;BR IF MAX LARGER THAN MIN
2974  016476  062705  000026            ADD     #22.,R5                 ;CORRECT THE NUMBER
2975  016502  005205            1$:     INC     R5                      ;INCREMENT DIFFERENCE TO USE AS DIVISOR
2976  016504  004737  026756            JSR     PC,GETREM               ;GET THE RANDOM AUGMENT
2977  016510  066005  000120            ADD     MINSEC(R0),R5           ;NEW ADDRESS
2978  016514  020527  000025            CMP     R5,#21.                 ;IS VALUE TOO LARGE ?
2979  016520  101402                    BLOS    2$                      ;BR IF NOT
2980  016522  162705  000026            SUB     #22.,R5                 ;CORRECT VALUE
2981  016526  110560  000076    2$:     MOVB    R5,$NSEC(R0)            ;STORE SECTOR ADDRESS IN DPB
2982
2983                                    ;GENERATE A RANDOM TRACK ADDRESS BETWEEN VALUES 'MINTRK' & 'MAXTRK'
2984
2985  016532  016005  000112    RANTRK: MOV     MAXTRK(R0),R5           ;GET MAXIMUM TRACK ADDRESS
2986  016536  026005  000114            CMP     MINTRK(R0),R5           ;'MINTRK' AND 'MAXTRK' THE SAME ?
2987  016542  001417                    BEQ     2$                      ;BR IF THEY ARE
2988  016544  166005  000114            SUB     MINTRK(R0),R5           ;SUBTRACT MINIMUM TRACK ADDRESS
2989  016550  100002                    BPL     1$                      ;BR IF MAX LARGER THAN MIN
2990  016552  062705  000023            ADD     #19.,R5                 ;CORRECT THE NUMBER
2991  016556  005205            1$:     INC     R5                      ;INCREMENT DIFFERENCE TO USE AS DIVISOR
2992  016560  004737  026756            JSR     PC,GETREM               ;GET THE RANDOM AUGMENT
2993  016564  066005  000114            ADD     MINTRK(R0),R5           ;NEW TRACK ADDRESS
2994  016570  020527  000022            CMP     R5,#18.                 ;IS VALUE TOO LARGE ?
2995  016574  101402                    BLOS    2$                      ;BR IF NOT
2996  016576  162705  000023            SUB     #19.,R5                 ;CORRECT VALUE
2997  016602  110560  000077    2$:     MOVB    R5,$NTRK(R0)            ;STORE TRACK ADDRESS IN DPB
2998
2999                                    ;GENERATE A RANDOM CYLINDER ADDRESS BETWEEN VALUES 'MINCYL' & 'MAXCYL'
3000
3001  016606  012737  000633  001350            MOV     #411.,CYLIMT    ;ASSUME AN RP04/5
3002  016614  032760  000002  000262            BIT     #BIT01,$RPDT(R0)  ;SEE IF RP06
3003  016622  001403                            BEQ     RANCYL          ;BR IF NOT
3004  016624  012737  001457  001350            MOV     #815.,CYLIMT    ;CHANGE CYLINDER LIMIT
3005  016632  016005  000106    RANCYL: MOV     MAXCYL(R0),R5           ;GET MAXIMUM CYLINDER ADDRESS
3006  016636  026005  000110            CMP     MINCYL(R0),R5           ;'MINCYL' AND 'MAXCYL' THE SAME ?
3007  016642  001417                    BEQ     2$                      ;BR IF THEY ARE
3008  016644  166005  000110            SUB     MINCYL(R0),R5           ;SUBTRACT MINIMUM CYLINDER ADDRESS
3009  016650  100002                    BPL     1$                      ;BR IF MAX LARGER THAN MIN
3010  016652  063705  001350            ADD     CYLIMT,R5               ;CORRECT THE NUMBER
3011  016656  005205            1$:     INC     R5                      ;INCREMENT DIFFERENCE TO USE AS DIVISOR
3012  016660  004737  026756            JSR     PC,GETREM               ;GET THE RANDOM AUGMENT
3013  016664  066005  000110            ADD     MINCYL(R0),R5           ;NEW CYLINDER ADDRESS
3014  016670  023705  001350            CMP     CYLIMT,R5               ;IS VALUE TOO LARGE ?
```

```
3015  016674  101002                          BHI     2$              ;BR IF NOT
3016  016676  163705  001350                  SUB     CYLIMT,R5       ;CORRECT VALUE
3017  016702  010560  000100          2$:     MOV     R5,$NCYL(R0)    ;STORE CYLINDER ADDRESS IN DPB
3018  016706  122760  000003  000074          CMPB    #3,$NCODE(R0)   ;WRITE HEADER & DATA ?
3019  016714  001013                          BNE     RANSIZ          ;BR IF NOT
3020  016716  012760  000404  000102          MOV     #260.,$NWRDL(R0)  ;CHANGE WORD LENGTH TO 260 FOR WRTHD ORDER
3021  016724  023727  001364  000404          CMP     MAXDL,#260.     ;CAN A FULL SECTOR BE WRITTEN ?
3022  016732  103062                          BHIS    RANPAT          ;BR IF IT CAN
3023  016734  013760  001364  000102          MOV     MAXDL,$NWRDL(R0)  ;CHANGE TRANSFER SIZE
3024  016742  000456                          BR      RANPAT          ;CONTINUE WITH THE SELECTION
3025
3026                                  ;GENERATE A RANDOM BUFFER LENGTH BETWEEN 4 & THE VALUE IN 'MAXDL'
3027
3028  016744  013705  001364          RANSIZ: MOV     MAXDL,R5        ;GET BUFFER SIZE
3029  016750  005737  001400                  TST     WCSEL           ;SELECT A RANDOM WORD COUNT ?
3030  016754  001010                          BNE     1$              ;BR IF NOT
3031  016756  005205                          INC     R5              ;INCREMENT THE MAXIMUM SIZE
3032  016760  004737  026756                  JSR     PC,GETREM       ;DIVIDE BY MAX VALUE
3033  016764  005705                          TST     R5              ;IS THE REMAINDER 0 ?
3034  016766  001003                          BNE     1$              ;NOT 0, CONTINUE
3035  016770  004737  032302                  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
3036  016774  000763                          BR      RANSIZ          ;TRY AGAIN
3037  016776  010560  000102          1$:     MOV     R5,$NWRDL(R0)   ;WORD LENGTH TO CONTROL BLOCK
3038  017002  010546                          MOV     R5,-(SP)        ;NEW WORD LENGTH ON STACK FOR CHECK
3039  017004  005046                          CLR     -(SP)           ;MAKE UPPER DIVIDEND ZERO
3040  017006  012746  000400                  MOV     #256.,-(SP)     ;SECTOR SIZE IS THE DIVISOR
3041  017012  132760  000001  000074          BITB    #1,$NCODE(R0)   ;SEE IF NEXT ORDER IS A HEADER ORDER
3042  017020  001402                          BEQ     2$              ;BR IF NOT
3043  017022  062716  000004                  ADD     #4,(SP)         ;ADD HEADER SIZE TO SECTOR SIZE
3044  017026  004737  027004          2$:     JSR     PC,LINKDV       ;DIVIDE BUFFER SIZE BY SECTOR SIZE
3045  017032  012616                          MOV     (SP)+,(SP)      ;MOV REMAINDER UP THE STACK
3046  017034  021627  000004                  CMP     (SP),#4 ;SEE IF REMAINDER LESS THAN 4
3047  017040  103012                          BHIS    4$              ;BR IF NOT
3048  017042  005737  001400                  TST     WCSEL           ;SELECTING RANDOM TRANSFER SIZES ?
3049  017046  001403                          BEQ     3$              ;BR IF YES
3050  017050  161660  000102                  SUB     (SP),$NWRDL(R0)  ;ADJUST WORD LENGTH DOWNWARD
3051  017054  000404                          BR      4$              ;CONTINUE
3052  017056  005726                  3$:     TST     (SP)+           ;CORRECT THE STACK POINTER
3053  017060  004737  032302                  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
3054  017064  000727                          BR      RANSIZ          ;TRY AGAIN
3055  017066  005726                  4$:     TST     (SP)+           ;CORRECT THE STACK POINTER
3056  017070  122760  000002  000074          CMPB    #2,$NCODE(R0)   ;SEE IF WRITE DATA
3057  017076  001004                          BNE     RANXIT          ;BR IF NOT WRITE DATA
3058
3059                                  ;GET A RANDOM PATTERN NUMBER
3060
3061  017100  004737  017224          RANPAT: JSR     PC,GETPAT       ;GET PATTERN CODE
3062  017104  110560  000075                  MOVB    R5,$NPATC(R0)   ;MOVE PATTERN CODE TO CONTROL BLOCK
3063  017110  012760  177777  000104  RANXIT: MOV     #-1,$NEXT(R0)  ;SET PARAMETERS SELECTED INDICATOR
3064  017116  000207                          RTS     PC              ;RETURN
3065
3066                                  ;ROUTINE TO SELECT A WRITE (OR WRITE CHECK) OPERATION
3067
3068  017120  012705  000004          RANWRT: MOV     #4,R5           ;WRITE OPERATION SELECTION DIVISOR
```

```
3069  017124  004737  026756                  JSR     PC,GETREM       ;GET SELECTION CODE
3070  017130  005737  001404                  TST     AUTOCK          ;ARE WRITE CHECK ORDERS TO BE SELECTED
3071                                                                  ;RANDOMLY ?
3072  017134  001403                          BEQ     1$              ;BR IF THEY ARE
3073  017136  152705  000002                  BISB    #2,R5           ;SET CODE TO EXCLUDE WRITE CHECK ORDERS
3074  017142  000420                          BR      3$              ;COMPLETE SELECTION
3075  017144  020527  000001          1$:     CMP     R5,#1           ;WRITE CHECK SELECTED ?
3076  017150  101015                          BHI     3$              ;BR IF NOT
3077  017152  132760  000002  000024          BITB    #2,$CODE(R0)    ;PREVIOUS WRITE OPERATION ?
3078  017160  001407                          BEQ     2$              ;BR IF PREVIOUS WAS READ OR WRITE CHECK
3079  017162  116060  000024  000074          MOVB    $CODE(R0),$NCODE(R0)  ;MOVE CODE TO 'NEXT CODE'
3080  017170  142760  000002  000074          BICB    #2,$NCODE(R0)   ;CHANGE WRITE TO WRITE CHECK
3081  017176  000411                          BR      5$              ;EXIT
3082  017200  052705  000002          2$:     BIS     #2,R5           ;CHANGE WRITE CHECK TO WRITE
3083  017204  005737  001376          3$:     TST     FORMAT          ;WRITE HEADER ORDERS ALLOWED ?
3084  017210  001002                          BNE     4$              ;BR IF THEY ARE
3085  017212  042705  000001                  BIC     #1,R5           ;ALTER POSSIBLE WRITE HEADER
3086  017216  110560  000074          4$:     MOVB    R5,$NCODE(R0)   ;SETUP 'NEXT' CODE
3087  017222  000207                  5$:     RTS     PC              ;RETURN
3088
3089                                  ;ROUTINE TO SELECT A PATTERN
3090
3091  017224  012705  000020          GETPAT: MOV     #20,R5          ;SELECT PATTERN
3092  017230  004737  026756                  JSR     PC,GETREM       ;GET CODE
3093  017234  005705                          TST     R5              ;WAS PATTERN ZERO SELECTED ?
3094  017236  001003                          BNE     1$              ;BR IF NOT ZERO
3095  017240  004737  032302                  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
3096  017244  000767                          BR      GETPAT          ;TRY AGAIN
3097  017246  006305                  1$:     ASL     R5              ;MAKE CODE INTO TABLE INDEX
3098  017250  000207                          RTS     PC
3099
3100                                  ;ROUTINE TO GET THE PREVIOUSLY SELECTED PARAMETER VALUES
3101                                  ;CALL:
3102                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
3103                                  ;       JSR     PC,SELPAR       ;SELECT THE PARAMETERS
3104                                  ;       JSR     PC,GETPAR
3105                                  ;       RETURN
3106
3107  017252  010546                  GETPAR: MOV     R5,-(SP)        ;SAVE R5
3108  017254  116060  000234  000027          MOVB    $RPCS1(R0),$PREVO(R0)  ;SAVE CURRENT PARAMETERS
3109  017262  032760  000006  000074          BIT     #6,$NCODE(R0)   ;SEE IF NEXT OPERATION IS READ OR WRITE
3110  017270  001007                          BNE     1$              ;BR IF EITHER
3111  017272  016060  000012  000034          MOV     $CYL(R0),$PREVA+2(R0)  ;SAVE STARTING CYLINDER
3112  017300  016060  000010  000032          MOV     $SEC(R0),$PREVA(R0)  ;SAVE STARTING SECTOR AND TRACK
3113  017306  000411                          BR      2$
3114  017310  004737  022244          1$:     JSR     PC,READDR       ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
3115  017314  112660  000033                  MOVB    (SP)+,$PREVA+1(R0)  ;TRACK ADDRESS
3116  017320  112660  000032                  MOVB    (SP)+,$PREVA(R0)  ;SECTOR ADDRESS
3117  017324  016060  000272  000034          MOV     $RPCC(R0),$PREVA+2(R0)  ;CURRENT CYLINDER
3118  017332  032777  000100  161600  2$:     BIT     #SW06,@SWR      ;SWITCH 6 SET ?
3119  017340  001043                          BNE     3$              ;BR IF SET
3120  017342  116060  000074  000024          MOVB    $NCODE(R0),$CODE(R0)  ;LOGICAL CODE FOR OPERATION
3121  017350  116005  000074                  MOVB    $NCODE(R0),R5   ;LOAD R5 FOR USE AS TABLE INDEX
3122  017354  116560  001740  000002          MOVB    COMTBL(R5),$COMND(R0)  ;RP04 COMMAND CODE
```

```
3123  017362  116060  000075  000030          MOVB    $NPATC(R0),$PATTC(R0)  ;PATTERN CODE
3124  017370  016060  000076  000010          MOV     $NSEC(R0),$SEC(R0)  ;TRACK AND SECTOR ADDRESSES
3125  017376  016060  000100  000012          MOV     $NCYL(R0),$CYL(R0)  ;CYLINDER ADDRESS
3126  017404  016060  000102  000020          MOV     $NWRDL(R0),$WRDL(R0)  ;BUFFER SIZE
3127  017412  016060  000102  000004          MOV     $NWRDL(R0),$WRDM(R0)  ;WORD COUNT FOR THE RH11
3128  017420  005460  000004                  NEG     $WRDM(R0)           ;COMPLEMENT IT
3129  017424  012760  000400  000022          MOV     #256.,$SSEC(R0) ;INITIAL VALUE OF SECTOR SIZE
3130  017432  032760  000001  000024          BIT     #1,$CODE(R0)        ;HEADER OPERATION ?
3131  017440  001403                          BEQ     3$                  ;BR IF NOT
3132  017442  062760  000004  000022          ADD     #4,$SSEC(R0)        ;ADD HEADER SIZE
3133  017450  005060  000104          3$:     CLR     $NEXT(R0)           ;RESET 'PARAMETERS LOADED' INDICATOR
3134  017454  012605                          MOV     (SP)+,R5            ;RESTORE R5
3135  017456  000207                          RTS     PC                  ;RETURN
3136
3137                                  ;ROUTINE TO COMPRESS A LIST
3138                                  ;CALL:
3139                                  ;       MOV     #ADDRS,R1           ;COMPRESS LIST STARTING AT THIS ADDRESS
3140                                  ;       JSR     PC,CMPRES
3141                                  ;       RETURN
3142
3143  017460  016111  000002          CMPRES: MOV     2(R1),(R1)          ;COMPRESS THE TABLE IN R1
3144  017464  001403                          BEQ     1$                  ;BR WHEN ZERO FOUND
3145  017466  062701  000002                  ADD     #2,R1               ;INCREMENT R1
3146  017472  000772                          BR      CMPRES              ;CONTINUE COMPRESSING TABLE
3147  017474  000207          1$:     RTS     PC                  ;RETURN
3148
3149                                  ;ROUTINE TO SETUP PARAMETERS FOR A SEQUENTIAL READ OR WRITE OF THE DISK
3150                                  ;CALL:
3151                                  ;       MOV     #DPB,R0             ;DPB ADDRESS
3152                                  ;       MOV     #-1,$PACK(R0)       ;'WRITE PACK' FLAG
3153                                  ;  OR
3154                                  ;       MOV     #1,$PACK(R0)        ;'READ PACK' FLAG
3155                                  ;       JSR     PC,WRTPK
3156                                  ;       RETURN
3157
3158  017476  004737  032302          WRTPK   JSR     PC,$RAND            ;CYCLE THE RANDOM NUMBER GENERATOR
3159  017502  005760  000040                  TST     $OPERC+2(R0)        ;SEE IF FIRST OPERATION
3160  017506  001007                          BNE     WRTPK1              ;BR IF UPPER WORD OF COUNTER NOT ZERO
3161  017510  005760  000036                  TST     $OPERC(R0)          ;LOWER WORD ZERO ?
3162  017514  001004                          BNE     WRTPK1              ;BR IF NOT 1ST OPERATION
3163  017516  105760  000026                  TSTB    $PACK(R0)           ;SEE WHICH - 'R' OR 'W'
3164  017522  100503                          BMI     WRTPK3              ;BR IF 'W'
3165  017524  000470                          BR      WRTPK2              ;'R' OPERATION
3166  017526  116060  000234  000027  WRTPK1: MOVB    $RPCS1(R0),$PREVO(R0)  ;SAVE CURRENT PARAMETERS
3167  017534  004737  022244                  JSR     PC,READDR           ;GET THE DECREMENTED SECTOR AND TRACK ADDRESSES
3168  017540  112660  000033                  MOVB    (SP)+,$PREVA+1(R0)  ;TRACK ADDRESS
3169  017544  112660  000032                  MOVB    (SP)+,$PREVA(R0)  ;SECTOR ADDRESS
3170  017550  016060  000272  000034          MOV     $RPCC(R0),$PREVA+2(R0)  ;CURRENT CYLINDER
3171  017556  016060  000242  000010          MOV     $RPDA(R0),$SEC(R0)  ;NEW SECTOR & TRACK ADDRESS
3172  017564  016060  000270  000012          MOV     $RPCA(R0),$CYL(R0)  ;NEW CYLINDER ADDRESS
3173  017572  026060  000012  000106          CMP     $CYL(R0),MAXCYL(R0)  ;SEE IF AT END
3174  017600  103427                          BLO     2$                  ;BR IF LESS THAN 'MAXCYL'
3175  017602  101004                          BHI     1$                  ;BR IF GREATER THAN 'MAXCYL'
3176  017604  126060  000011  000112          CMPB    $TRK(R0),MAXTRK(R0)  ;SEE IF AT MAX TRACK
```

```
3177  017612  101422                          BLOS    2$              ;BR IF NOT GREATER
3178  017614  116060  000114  000011  1$:     MOVB    MINTRK(R0),$TRK(R0)  ;RESET TRACK ADDRESS
3179  017622  116060  000120  000010          MOVB    MINSEC(R0),$SEC(R0)  ;RESET SECTOR ADDRESS
3180  017630  016060  000110  000012          MOV     MINCYL(R0),$CYL(R0)  ;RESET CYLINDER ADDRESS
3181  017636  004737  026555                  JSR     PC,EOP2         ;DROP THE DRIVE (NORMAL TERMINATION)
3182  017642  032777  000020  161270          BIT     #SW04,@SWR      ;IS SWITCH 4 SET ?
3183  017650  001003                          BNE     2$              ;BR IF SET
3184  017652  005726                          TST     (SP)+           ;INCREMENT THE STACK POINTER
3185  017654  000137  005324                  JMP     MAIN            ;RETURN DIRECTLY TO 'MAIN'
3186  017660  013760  001364  000020  2$:     MOV     MAXDL,$WRDL(R0)  ;BUFFER SIZE IS MAXIMUM
3187  017666  013760  001364  000004          MOV     MAXDL,$WRDM(R0)  ;WORD COUNT
3188  017674  005460  000004                  NEG     $WRDM(R0)       ;CHANGE WORD COUNT TO 2'S COMPLEMENT
3189  017700  105760  000026                  TSTB    $PACK(R0)       ;READ OR WRITE ?
3190  017704  100412                          BMI     WRTPK3          ;BR IF WRITE
3191  017706  012760  000404  000022  WRTPK2: MOV     #260.,$SSEC(R0)  ;SECTOR SIZE FOR READ
3192  017714  112760  000005  000024          MOVB    #5,$CODE(R0)    ;CODE FOR READ HEADER & DATA
3193  017722  112760  000173  000002          MOVB    #RDHD,$COMND(R0)  ;DRIVE CODE FOR OPERATION
3194  017730  000415                          BR      WRTPK4          ;SET UP FOR EXIT
3195  017732  012760  000400  000022  WRTPK3: MOV     #256.,$SSEC(R0) ;SECTOR SIZE
3196  017740  112760  000002  000024          MOVB    #2,$CODE(R0)    ;CODE FOR WRTDAT
3197  017746  112760  000161  000002          MOVB    #WRTDAT,$COMND(R0)  ;OP CODE
3198  017754  004737  017224                  JSR     PC,GETPAT       ;GET PATTERN CODE
3199  017760  110560  000030                  MOVB    R5,$PATTC(R0)   ;PATTERN CODE
3200  017764  005060  000104          WRTPK4: CLR     $NEXT(R0)       ;CLEAR 'PARAMETER SELECTED' INDICATOR
3201  017770  000207                          RTS     PC              ;RETURN
3202
3203                                  ;ROUTINE TO DETERMINE OF ERROR IS AT A LOCATION ON THE PACK DEFINED
3204                                  ;       IN THE BAD TRACK/SECTOR TABLE FOR THE DRIVE.
3205                                  ;CALL:
3206                                  ;       JSR     PC,SPOTCK
3207                                  ;       RETURN1                 ;ERROR AT AN ADDRESS IN TABLE
3208                                  ;       RETURN2                 ;NO TABLE ENTRY FOR ERROR ADDRESS OR
3209                                  ;                               ;PARAMETER 'NOTPRT' IS 0
3210
3211  017772                          SPOTCK:
3212  017772  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
3213  017774  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
3214  017776  012701  000124                  MOV     #$BDSEC,R1      ;INCREMENT FOR BAD SECTOR TABLE
3215  020002  060001                          ADD     R0,R1           ;ADD THE BLOCK'S STARTING ADDRESS
3216  020004  012702  000010                  MOV     #8.,R2          ;BAD SECTOR TABLE SIZE COUNT
3217  020010  021160  000272          1$:     CMP     (R1),$RPCC(R0)  ;IS CYLINDER IN THE TABLE ?
3218  020014  001022                          BNE     4$              ;BR IF NOT
3219  020016  105761  000003                  TSTB    3(R1)           ;TRACK ENTRY ?
3220  020022  100426                          BMI     5$              ;BR IF NOT
3221  020024  004737  022244                  JSR     PC,READDR       ;DECREMENT THE SECTOR/TRACK ADDRESS
3222  020030  122661  000003                  CMPB    (SP)+,3(R1)     ;COMPARE THE TRACK ADDRESS
3223  020034  001011                          BNE     3$              ;BR IF IT IS NOT EQUAL
3224  020036  105761  000002                  TSTB    2(R1)           ;IS A SECTOR ADDRESS IN THE TABLE ?
3225  020042  100002                          BPL     2$              ;BR IF ONE IS
3226  020044  005726                          TST     (SP)+           ;INCREMENT THE STACK POINTER
3227  020046  000414                          BR      5$              ;DISPLAY THE MESSAGE
3228  020050  122661  000002          2$:     CMPB    (SP)+,2(R1)     ;COMPARE THE SECTOR ADDRESS
3229  020054  001002                          BNE     4$              ;BR IF NOT EQUAL
3230  020056  000410                          BR      5$              ;CHECK 'NOTPRT'
```

```
3231  020060  005726                    3$:     TST     (SP)+           ;INCREMENT THE STACK POINTER
3232  020062  062701  000004            4$:     ADD     #4,R1           ;GO TO THE NEXT LOCATION IN THE TABLE
3233  020066  005711                            TST     (R1)            ;PAST THE TABLE ENTRIES ?
3234  020070  100411                            BMI     6$              ;BR IF PAST
3235  020072  005302                            DEC     R2              ;DECREMENT THE MAXIMUM ENTRY COUNT
3236  020074  001345                            BNE     1$              ;BR IF MORE TO CHECK
3237  020076  000406                            BR      6$              ;END, EXIT
3238  020100  005737  001406          5$:     TST     NOTPRT          ;PRINT THE ERROR ANYWAY ?
3239  020104  001006                            BNE     7$              ;BR IF NOT
3240  020106  012737  177777  001264          MOV     #-1,BADSEC      ;SET THE INDICATOR FOR THE IDENTIFICATION TYPE
3241  020114  062766  000002  000004  6$:     ADD     #2,4(SP)        ;INCREMENT THE RETURN
3242  020122                            7$:
3243  020122  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
3244  020124  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
3245  020126  000207                            RTS     PC              ;RETURN
3246
3247                                    ;;**************************************************************
3248
3249                                    .SBTTL  ERROR MESSAGE GENERATION ROUTINES
3250
3251                                    ;;**************************************************************
3252
3253                                    ;PRINT LINE 1 OF ERROR MESSAGE:
3254                                    ;'HH:MM:SS'
3255
3256  020130  032777  002000  161002  LINE1:  BIT     #SW10,@SWR      ;SWITCH 10 SET ?
3257  020136  001402                            BEQ     1$              ;BR IF NOT
3258  020140  104401  001160                    TYPE    ,$BELL          ;RING THE BELL
3259  020144  032777  020000  160766  1$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT ?
3260  020152  001403                            BEQ     2$              ;BR IF NOT
3261  020154  104414  001165                    DISPLY  ,$CRLF          ;CR-LF
3262  020160  000404                            BR      3$              ;EXIT
3263  020162  004737  023400          2$:     JSR     PC,$TIME        ;TYPE THE TIME
3264  020166  104414  052074                    DISPLY  ,LINSPC         ;SPACES
3265  020172  000207                    3$:     RTS     PC              ;RETURN & TYPE DESCRIPTION
3266
3267                                    ;PRINT LINE 2 OF ERROR MESSAGE
3268                                    ;'PRESENT ORDER = XXXX  PREVIOUS ORDER = XXXX'
3269                                    ;'* ERROR AT BAD TRACK/SECTOR'
3270                                    ;'DRV RPCS1   RPCS2   RPDS1   RPER1   RPER2   RPER3   RPEC1   RPEC2'
3271                                    ;'RPWC    RPBA    RPDA    RPAS    RPLA    RPD8   RPMR   RPDT'
3272                                    ;'RPSN    RPOF    RPCA    RPCC    STATUS'
3273                                    ;'BUS ADDRESS OR WORD COUNT NOT CONSISTENT'
3274                                    ;'RPBA = XXXXXX   RPWC = XXXXXX'
3275                                    ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'
3276
3277  020174                            LINE2:
3278  020174  010346                            MOV     R3,-(SP)        ;;PUSH R3 ON STACK
3279  020176  010446                            MOV     R4,-(SP)        ;;PUSH R4 ON STACK
3280  020200  010546                            MOV     R5,-(SP)        ;;PUSH R5 ON STACK
3281  020202  104414  001165                    DISPLY  ,$CRLF          ;CR-LF
3282  020206  005037  020334                    CLR     4$              ;CLEAR MESSAGE ADDRESS STORAGE
3283  020212  005004                            CLR     R4              ;WORKING REGISTER
3284  020214  012737  050160  020334            MOV     #LIN2C,4$       ;ADDRESS OF 'PRESENT ORDER = ' MSG
```

```
3285  020222  116004  000234                  MOVB    $RPCS1(R0),R4   ;GET THE OPCODE
3286  020226  042704  177701                  BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
3287  020232  004737  020270                  JSR     PC,1$           ;TYPE THE FIRST MNEMONIC
3288  020236  005737  020340                  TST     5$              ;SEE IF MNEMONIC ENTRY FOUND
3289  020242  001440                          BEQ     LINE2A          ;BR IF NOT
3290  020244  012737  050201  020334          MOV     #LIN2P,4$       ;ADDRESS OF 'PREVIOUS ORDER = ' MSG
3291  020252  116004  000027                  MOVB    $PREVO(R0),R4   ;PREVIOUS OPERATION CODE
3292  020256  042704  177701                  BIC     #^C76,R4        ;SAVE ONLY SIGNIFICANT BITS
3293  020262  004737  020270                  JSR     PC,1$           ;TYPE THE PREVIOUS MNEMONIC
3294  020266  000426                          BR      LINE2A          ;CONTINUE
3295  020270  005005                  1$:     CLR     R5              ;CLEAR THE TABLE INDEX
3296  020272  126504  001746          2$:     CMPB    OPTBL(R5),R4    ;LOOK FOR THE OPCODE
3297  020276  001405                          BEQ     3$              ;BR WHEN OPCODE COUNT EQUALS OPCODE
3298  020300  105765  001746                  TSTB    OPTBL(R5)       ;LOOK FOR END OF TABLE
3299  020304  100402                          BMI     3$              ;BR IF END
3300  020306  005205                          INC     R5              ;INCREMENT THE POINTER
3301  020310  000770                          BR      2$              ;CONTINUE - NOT END OF TABLE
3302  020312  006305                  3$:     ASL     R5              ;SHIFT INDEX
3303  020314  006305                          ASL     R5              ;SHIFT THE INDEX
3304  020316  006305                          ASL     R5              ;SHIFT THE INDEX
3305  020320  012737  001770  020340          MOV     #MNTBL,5$       ;ADDRESS OF ASCII TEXT TABLE
3306  020326  060537  020340                  ADD     R5,5$           ;ADD THE INDEX
3307  020332  104414                          DISPLY                  ;TYPE IT
3308  020334  000000                  4$:     .WORD   0               ;ADDRESS OF 'PRESENT' OR 'PREVIOUS' MESSAGE
3309  020336  104414                          DISPLY                  ;TYPE THE OPERATION MNEMONIC
3310  020340  000000                  5$:     .WORD   0               ;ADDRESS OF MESSAGE
3311  020342  000207                          RTS     PC              ;RETURN TO MAIN ROUTINE
3312  020344  005737  001264          LINE2A: TST     BADSEC          ;PRINT THE BAD SECTOR LINE ?
3313  020350  001404                          BEQ     LINE2B          ;BR IF NOT
3314  020352  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
3315  020356  104414  050225                  DISPLY  ,LIN2S          ;ERROR ADDRESS DEFINED AS BAD AREA
3316  020362  104414  001165          LINE2B: DISPLY  ,$CRLF          ;CR-LF
3317  020366  104414  047554                  DISPLY  ,DH14           ;STANDARD RP04/5/6 REGISTER HEADER
3318  020372  104414  052074                  DISPLY  ,LINSP0         ;TYPE A SPACE
3319  020376  013746  001246                  MOV     UNIT,-(SP)      ;PUT THE DRIVE NUMBER ON THE STACK
3320  020402  004737  022224                  JSR     PC,LINDEC       ;TYPE DRIVE NUMBER
3321  020406  104414  052073                  DISPLY  ,LINSP          ;SPACES
3322  020412  012705  050100                  MOV     #DT14,R5        ;REGISTER INDEXES
3323  020416  004737  020546                  JSR     PC,3$           ;PRINT THE REGISTERS
3324  020422  032777  000040  160510          BIT     #SW05,@SWR      ;PRINT THE OPTIONAL REGISTERS ?
3325  020430  001014                          BNE     1$              ;BR IF NOT
3326  020432  104414  047660                  DISPLY  ,DH15
3327  020436  012705  050122                  MOV     #DT15,R5        ;SECOND DATA LINE
3328  020442  004737  020546                  JSR     PC,3$           ;PRINT THEM
3329  020446  104414  047757                  DISPLY  ,DH16
3330  020452  012705  050144                  MOV     #DT16,R5        ;THIRD DATA LINE
3331  020456  004737  020546                  JSR     PC,3$           ;PRINT THE REGISTERS
3332  020462  032760  000100  000016  1$:     BIT     #BIT6,$STATUS(R0)  ;DATA ERROR ?
3333  020470  001422                          BEQ     2$              ;BR IF NO
3334  020472  016046  000020                  MOV     $WRDL(R0),-(SP) ;TRANSFER SIZE
3335  020476  066016  000236                  ADD     $RPWC(R0),(SP)  ;ADD REMAINING WORD COUNT
3336  020502  006316                          ASL     (SP)            ;CONVERT TO AN BYTE INCREMENT
3337  020504  066016  000006                  ADD     $BUF(R0),(SP)   ;BUFFER STARTING ADDRESS
3338  020510  022660  000240                  CMP     (SP)+,$RPBA(R0) ;CORRECT BUFFER ADDRESS ?
```

```
3339  020514  001410                          BEQ     2$              ;BR IF YES
3340  020516  104414  047147                  DISPLY  ,EM46           ;'BUS ADDRESS AND WORD COUNT ARE NOT CONSISTENT'
3341  020522  104414  001165                  DISPLY  ,$CRLF          ;CR-LF
3342  020526  004737  020640                  JSR     PC,LINE3D       ;PRINT LINE 3D OF ERROR MESSAGE
3343  020532  004737  021256                  JSR     PC,LINE4        ;PRINT LINE 4 OF ERROR MESSAGE
3344  020536                          2$:
3345  020536  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
3346  020540  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
3347  020542  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
3348  020544  000207                          RTS     PC              ;RETURN TO ERROR PROCESSING ROUTINE
3349  020546  012546                  3$:     MOV     (R5)+,-(SP)     ;PUT THE REGISTER INDEX ON THE STACK
3350  020550  060016                          ADD     R0,(SP)         ;ADD DRIVE'S TABLE ADDRESS
3351  020552  017646  000000                  MOV     @(SP),-(SP)     ;VALUE
3352  020556  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
3353  020562  005726                          TST     (SP)+           ;CORRECT THE STACK POINTER
3354  020564  104414  052073                  DISPLY  ,LINSP          ;PRINT 2 SPACES
3355  020570  005715                          TST     (R5)            ;AT END OF LINE ?
3356  020572  001365                          BNE     3$              ;BR IF NOT
3357  020574  104414  001165          4$:     DISPLY  ,$CRLF          ;CR-LF
3358  020600  000207                          RTS     PC              ;RETURN
3359
3360                                  ;PRINT LINE 3 OF ERROR MESSAGE
3361                                  ;'ERROR AT CCC TT SS   PREVIOUS ADR = CCC TT SS'
3362
3363  020602  104414  050261          LINE3:  DISPLY  ,LINM3          ;LINE 3 ENTRANCE
3364  020606  000517                          BR      LIN3.1          ;FINISH PRINTOUT
3365
3366                                  ;PRINT LINE 3A OF ERROR MESSAGE
3367                                  ;'START CYL = CCC   END CYL = CCC'
3368
3369  020610  104414  050277          LINE3A: DISPLY  ,LINN3          ;LINE 3A ENTRANCE
3370  020614  000514                          BR      LIN3.1          ;FINISH ERROR LINE
3371
3372                                  ;PRINT LINE 3B OF ERROR MESSAGE
3373                                  ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC'
3374
3375  020616  004737  021160          LINE3B: JSR     PC,LIN3.3       ;LINE 3B ENTRANCE
3376  020622  104414  001165                  DISPLY  ,$CRLF
3377  020626  000207                          RTS     PC
3378
3379                                  ;PRINT LINE 3C OF ERROR MESSAGE
3380                                  ;'START CYL = CCC   END CYL = CCC   ACTUAL CYL = CCC   TRK = TT'
3381
3382  020630  004737  021160          LINE3C: JSR     PC,LIN3.3       ;LINE 3C ENTRANCE
3383  020634  000137  021212                  JMP     LIN3.4          ;FINISH MESSAGE
3384
3385                                  ;PRINT LINE 3D OF ERROR MESSAGE
3386                                  ;'RPBA = XXXXXX   RPWC = XXXXXX'
3387
3388  020640  032777  000040  160272  LINE3D: BIT     #SW05,@SWR      ;SWITCH 5 SET ?
3389  020646  001416                          BEQ     1$              ;BR IF IT IS
3390  020650  104414  050450                  DISPLY  ,LINB3          ;'RPBA = '
3391  020654  016046  000240                  MOV     $RPBA(R0),-(SP) ;BUFFER ADDR REG CONTENTS
3392  020660  004737  022172                  JSR     PC,LINOCT       ;CONVERT TO OCTAL AND TYPE IT
```

```
3393  020664  104414  050460                  DISPLY  LINW3           ;'  RPWC = '
3394  020670  016046  000236                  MOV     $RPWC(R0),-(SP) ;WORD COUNT REGISTER CONTENTS
3395  020674  004737  022172                  JSR     PC,LINOCT       ;CONVERT TO OCTAL AND TYPE IT
3396  020700  104414  001165                  DISPLY  $CRLF
3397  020704  000207                  1$:     RTS     PC
3398
3399                                  ;PRINT LINE 3E OF ERROR MESSAGE
3400                                  ;'START CYL = CCC   START TRK = TT   START SEC = SS'
3401
3402  020706  104414  050344          LINE3E: DISPLY  LINS3           ;'START CYL = '
3403  020712  016046  000012                  MOV     $CYL(R0),-(SP)  ;MOVE CYL TO STACK
3404  020716  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
3405  020722  104414  052073                  DISPLY  ,LINSP          ;SPACES
3406  020726  104414  050472                  DISPLY  ,LINST3         ;'START TRK = '
3407  020732  005046                          CLR     -(SP)           ;CLEAR STACK
3408  020734  116016  000011                  MOVB    $TRK(R0),(SP)   ;TRACK TO STACK
3409  020740  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
3410  020744  104414  052073                  DISPLY  ,LINSP          ;SPACES
3411  020750  104414  050507                  DISPLY  ,LINSS3         ;'START SEC = '
3412  020754  005046                          CLR     -(SP)           ;CLEAR STACK
3413  020756  116016  000010                  MOVB    $SEC(R0),(SP)   ;SECTOR ADDR TO STACK
3414  020762  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
3415  020766  104414  001165                  DISPLY  $CRLF
3416  020772  000207                          RTS     PC
3417
3418                                  ;PRINT LINE 3F OF ERROR MESSAGE
3419                                  ;'RPDA = XXXXXX   RPCA = XXXXXX'
3420
3421  020774  032777  000040  160136  LINE3F: BIT     #SW5,@SWR       ;SWITCH 5 SET ?
3422  021002  001420                          BEQ     1$              ;BR IF NOT
3423  021004  104414  050440                  DISPLY  ,LINDA3         ;'RPDA = '
3424  021010  016046  000242                  MOV     $RPDA(R0),-(SP) ;PUT SECTOR/TRACK ADDRESS ON THE STACK
3425  021014  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
3426  021020  104414  052073                  DISPLY  ,LINSP          ;SPACES
3427  021024  104414  050427                  DISPLY  ,LINCA3         ;' RPCA = '
3428  021030  016046  000270                  MOV     $RPCA(R0),-(SP) ;PUT DESIRED CYLINDER ADDRESS ON THE STACK
3429  021034  004737  022172                  JSR     PC,LINOCT       ;TYPE IT
3430  021040  104414  001165                  DISPLY  $CRLF
3431  021044  000207                  1$:     RTS     PC
3432
3433                                  ;'CCC TT SS   PREV ADR = CCC TT SS'
3434
3435  021046  016046  000272          LIN3.1: MOV     $RPCC(R0),-(SP) ;PUT CYLINDER ADDR ON STACK
3436  021052  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
3437  021056  104414  050274                  DISPLY  ,T              ;PRINT ' T'
3438  021062  004737  022244                  JSR     PC,READDR       ;DECREMENT TRACK AND SECTOR ADDRESSES
3439  021066  004737  022224                  JSR     PC,LINDEC       ;TYPE TRACK IN DECIMAL
3440  021072  104414  050320                  DISPLY  ,S              ;PRINT ' S'
3441  021076  004737  022224                  JSR     PC,LINDEC       ;TYPE SECTOR ADDRESS
3442  021102  104414  050323                  DISPLY  ,LINP3          ;PRINT 'PREV ADDR'
3443  021106  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
3444  021112  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
3445  021116  104414  050274                  DISPLY  ,T              ;PRINT ' T'
3446  021122  005046                          CLR     -(SP)           ;MAKE ROOM ON THE STACK
```

```
3447  021124  116016  000033                  MOVB    $PREVA+1(R0),(SP)  ;PREVIOUS TRACK ADDRESS
3448  021130  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3449  021134  104414  050320                  DISPLY  .S                 ;PRINT ' S'
3450  021140  005046                          CLR     -(SP)              ;MAKE ROOM ON THE STACK
3451  021142  116016  000032                  MOVB    $PREVA(R0),(SP)    ;PREVIOUS SECTOR DDRESS
3452  021146  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3453  021152  104414  001165                  DISPLY  .$CRLF
3454  021156  000207                          RTS     PC
3455
3456                                  ;'START CYL = CCC   END CYL = CCC'
3457
3458  021160  104414  050344          LIN3.3: DISPLY  .LINS3             ;LINE '3B & 3C' ENTRANCE
3459  021164  016046  000034                  MOV     $PREVA+2(R0),-(SP) ;PREVIOUS CYLINDER
3460  021170  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3461  021174  104414  050361                  DISPLY  .LINEN3            ;PRINT 'END CYL'
3462  021200  016046  000272                  MOV     $RPCC(R0),-(SP)    ;PRESENT CYLINDER
3463  021204  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3464  021210  000207                          RTS     PC
3465
3466                                  ;'ACTUAL CYL = CCC   TRK = TT'
3467
3468  021212  104414  050376          LIN3.4: DISPLY  .LINA3             ;PRINT 'ACTUAL'
3469  021216  013746  054374                  MOV     CYLDER,-(SP)       ;ACTUAL CYLINDER
3470  021222  042716  010000                  BIC     #BIT12,(SP)        ;CLEAR THE FORMAT BIT
3471  021226  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3472  021232  104414  050416                  DISPLY  .LINT3             ;PRINT TRACK
3473  021236  005046                          CLR     -(SP)              ;CLEAR STACK WORD
3474  021240  116016  000243                  MOVB    $RPDA+1(R0),(SP)   ;PUT TRACK ON STACK
3475  021244  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3476  021250  104414  001165                  DISPLY  .$CRLF
3477  021254  000207                          RTS     PC
3478
3479                                  ;PRINT LINE 4 OF ERROR MESSAGE
3480                                  ;'BUFFER ADR = XXXXXX   SIZE = XXXX   ACTUAL NMBR WRDS XFRD = XXX'
3481
3482  021256  032760  000100  000016  LINE4:  BIT     #BIT06,$STATUS(R0)  ;DATA ERROR ?
3483  021264  001427                          BEQ     1$                 ;BR IF NOT
3484  021266  104414  050524                  DISPLY  .LINM4             ;'PRINT BUFFER'
3485  021272  016046  000006                  MOV     $BUF(R0),-(SP)     ;BUFFER ADDR ON STACK
3486  021276  004737  022172                  JSR     PC,LINOCT          ;CONVERT TO OCTAL & PRINT
3487  021302  104414  050543                  DISPLY  .LINS4             ;PRINT 'SIZE'
3488  021306  016046  000020                  MOV     $WRDL(R0),-(SP)    ;BUFFER SIZE
3489  021312  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3490  021316  104414  050555                  DISPLY  .LINX4             ;'ACTUAL NMBR WRDS XFRD = '
3491  021322  016046  000240                  MOV     $RPBA(R0),-(SP)    ;VALUE IN BUFFER ADDR REGISTER
3492  021326  166016  000006                  SUB     $BUF(R0),(SP)      ;SUBTRACT STARTING ADDRESS
3493  021332  006216                          ASR     (SP)               ;CONVERT INTO A WORD COUNT
3494  021334  004737  022224                  JSR     PC,LINDEC          ;TYPE IT IN DECIMAL
3495  021340  104414  001165                  DISPLY  .$CRLF             ;CR-LF
3496  021344  000207                  1$:     RTS     PC                 ;RETURN
3497
3498                                  ;PRINT LINE 5 OF ERROR MESSAGE
3499                                  ;'GOOD DATA = XXXXXX   BAD DATA = XXXXXX   SECT POS = XXX'
3500
```

```
 3521  021346  104414  050610          LINES:  DISPLY  ,LIND5           ;PRINT 'GOOD DATA'
 3522  021352  162760  000002  000240          SUB     #2,$RPBA(R0       ;BACK THE ADDRESS UP
 3523  021360  016046  000240                  MOV     @$RPBA(R0),-(SP)  ;'GOOD' DATA - AT THE BUFFER LOCATION
 3524  021364  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3525  021370  104414  050625                  DISPLY  ,LINB5            ;PRINT 'BAD DATA'
 3526  021374  016046  000256                  MOV     $RPDB(R0),-(SP)   ;BAD DATA FROM BUFFER
 3527  021400  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3528  021404  016046  000236                  MOV     $RPWC(R0),-(SP)   ;WORD LENGTH ON STACK
 3529  021410  066016  000020                  ADD     $WRDL(R0),(SP)    ;MAKE INTO A POSITIVE NUMBER
 3530  021414  005046                          CLR     -(SP)             ;UPPER DIVIDEND TO ZERO
 3531  021416  016046  000022                  MOV     $SSEC(R0),-(SP)   ;SECTOR SIZE ON THE STACK
 3532  021422  004737  027004                  JSR     PC,LINKDV         ;DIVIDE WORDS XFERED BY SECTOR SIZE
 3533  021426  012616                          MOV     (SP)+,(SP)        ;MOVE REMAINDER UP THE STACK
 3534  021430  104414  050643                  DISPLY  ,LINP5            ;PRINT 'SECT POS'
 3535  021434  004737  022224                  JSR     PC,LINDEC         ;TYPE THE POSITION
 3536  021440  104414  001165                  DISPLY  ,$CRLF
 3537  021444  000207                          RTS     PC
 3538
 3539                                  ;PRINT LINE 5A OF THE ERROR MESSAGE
 3540                                  ;'HEADER FROM ERROR SECTOR  XXXXXX  XXXXXX  XXXXXX  XXXXXX'
 3541
 3542  021446  104414  050661          LINE5A: DISPLY  ,LIN55            ;'HEADER CONTENTS OF ERROR SECTOR'
 3543  021452  013746  054374                  MOV     CYLDER,-(SP)      ;HEADER POSITION
 3544  021456  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3545  021462  104414  052073                  DISPLY  ,LINSP            ;SPACES
 3546  021466  013746  054376                  MOV     CYLDER+2,-(SP)    ;HEADER POSITION +2
 3547  021472  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3548  021476  104414  052073                  DISPLY  ,LINSP            ;SPACES
 3549  021502  013746  054400                  MOV     CYLDER+4,-(SP)    ;HEADER POSITION +4
 3550  021506  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3551  021512  104414  052073                  DISPLY  ,LINSP            ;SPACES
 3552  021516  013746  054402                  MOV     CYLDER+6,-(SP)    ;HEADER POSITION +6
 3553  021522  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3554  021526  104414  052073                  DISPLY  ,LINSP            ;SPACES
 3555  021532  104414  001165                  DISPLY  ,$CRLF
 3556  021536  000207                          RTS     PC
 3557
 3558                                  ;PRINT LINE 5B OF ERROR MESSAGE
 3559                                  ;'RPEC1 = XXXXXX   RPEC2 = XXXXXX'
 3560
 3561  021540  104414  050715          LINE5B: DISPLY  ,LINP5            ;'RPEC1 = '
 3562  021544  016046  000300                  MOV     $RPEC1(R0),-(SP)  ;PUT REGISTER CONTENTS ON THE STACK
 3563  021550  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3564  021554  104414  052073                  DISPLY  ,LINSP            ;SPACES
 3565  021560  104414  050726                  DISPLY  ,LINE5            ;' RPEC2 = '
 3566  021564  016046  000302                  MOV     $RPEC2(R0),-(SP)  ;PUT REGISTER CONTENTS ON THE STACK
 3567  021570  004737  022172                  JSR     PC,LINOCT         ;TYPE IT
 3568  021574  104414  001165                  DISPLY  ,$CRLF
 3569  021600  000207                          RTS     PC                ;RETURN
 3570
 3571                                  ;PRINT LINE 6 OF ERROR MESSAGE
 3572                                  ;'SECTOR IS ECC CORRECTABLE'
 3573
 3574  021602  104414  050740          LINE6:  DISPLY  ,LINB6            ;ECC CORRECTABLE
```

```
021606  104414  001165                  DISPLY  ,$CRLF
021612  000207                          RTS     PC

                                ;PRINT LINE 6A OF THE ERROR MESSAGE
                                ;'SECTOR READ CORRECTLY AT OFFSET N'

021614  104414  050773          LINE6A: DISPLY  ,LINC6          ;PRINT 'READ CORRECTLY AT OFFSET N'
021620  000411                          BR      LIN6.1          ;TYPE THE REST OF THE LINE

                                ;PRINT LINE 6B OF THE ERROR MESSAGE
                                ;'SECTOR IS ECC CORRECTABLE AT OFFSET N'

021622  104414  050740          LINE6B: DISPLY  ,LINB6          ;PRINT 'SECTOR IS ECC CORRECTABLE '
021626  000406                          BR      LIN6.1

                                ;PRINT LINE 6C OF THE ERROR MESSAGE
                                ;'CORRECTED ON NTH RETRY'

021630  104414  051022          LINE6C: DISPLY  ,LING6          ;'CORRECTED ON NTH RETRY'
021634  000414                          BR      LIN6.2          ;TYPE THE REST OF THE LINE

                                ;PRINT LINE 6D OF THE ERROR MESSAGE
                                ;'UNCORRECTABLE AFTER N RETRIES'

021636  104414  051051          LINE6D: DISPLY  ,LINU06         ;'UNCORRECTABLE AFTER N RETRIES'
021642  000411                          BR      LIN6.2          ;FINISH

                                ;TYPE THE OFFSET VALUE IN MICRO-INCHES

021644  006301                  LIN6.1: ASL     R1              ;DOUBLE THE OFFSET TABLE INDEX
021646  016137  002220  021656          MOV     OFMTBL(R1),1$   ;ADDRESS OF OFFSET POSITION MESSAGE
021654  104414                          DISPLY
021656  000000                  1$:     .WORD   0               ;OFFSET VALUE
021660  104414  001165                  DISPLY  ,$CRLF
021664  000207                          RTS     PC

                                ;RETRY COUNT TYPEOUT

021666  005046                  LIN6.2: CLR     -(SP)           ;CLEAR STACK
021670  113716  001253                  MOVB    RETRY+1,(SP)    ;RETRY COUNT
021674  004737  022224                  JSR     PC,LINDEC       ;TYPE IT IN DECIMAL
021700  104414  051040                  DISPLY  ,LINR6          ;'RETRY'
021704  104414  001165                  DISPLY  ,$CRLF
021710  000207                          RTS     PC

                                ;PRINT LINE 7 OF THE ERROR MESSAGE
                                ;'ORDERS:XXXXX   TOTAL ERRORS:XXX   WRDS XFRD:XXXX)XX   WRDS READ:XXXXXXX'

021712  104414  051124          LINE7:  DISPLY  ,LIN70          ;PRINT ORDER COUNT
021716  012746  000036                  MOV     #$OPERC,-(SP)   ;TO STACK
021722  060016                          ADD     R0,(SP)         ;ADD THE BASE ADDRESS
021724  004737  032500                  JSR     PC,$DB2D        ;CONVERT IT
021730  004737  027320                  JSR     PC,$SUPRS       ;PRINT IT
021734  104414  051203                  DISPLY  ,LIN7T          ;TOTAL ERRORS
```

```
3609  021740  016046  000056                  MOV     $TOTAL(R0),-(SP)        ;TO STACK
3610  021744  004737  022224                  JSR     PC,LINDEC               ;TYPE IT IN DECIMAL
3611  021750  104414  051215                  DISPLY  .LIN7X                  ;PRINT 'WRDS XFR'
3612  021754  012746  000046                  MOV     #$TRANS,-(SP)           ;ADDRESS OF LOW WORD ON STACK
3613  021760  060016                          ADD     R0,(SP)
3614  021762  004737  032500                  JSR     PC,$DB2D                ;CONVERT
3615  021766  004737  027320                  JSR     PC,$SUPRS               ;PRINT
3616  021772  104414  051231                  DISPLY  .LIN7R                  ;'BITS READ'
3617  021776  012746  000052                  MOV     #$READ,-(SP)            ;LOW WORD ADDRESS
3618  022002  060016                          ADD     R0,(SP)
3619  022004  004737  032500                  JSR     PC,$DB2D                ;CONVERT
3620  022010  004737  027320                  JSR     PC,$SUPRS               ;PRINT
3621  022014  104414  001165                  DISPLY  .$CRLF
3622  022020  104414  001165                  DISPLY  .$CRLF
3623  022024  032777  100000  157136          BIT     #SW15,@SWR              ;SEE IF 'HALT ON ERROR' - SWITCH 15
3624  022032  001401                          BEQ     1$                      ;BR IF NOT
3625  022034  000000                          HALT                            ;SWITCH 15 HALT
3626  022036  000207                  1$:     RTS     PC
3627
3628                                  ;PRINT LINE 7A OF ERROR MESSAGE
3629                                  ;'ORDERS:XXXXX   TOTAL SEEKS=XXXXX   TOTAL MISPOS ERR = XXX   TOTAL SKI.OCYL ERR = XXX'
3630
3631  022040  104414  051124          LINE7A: DISPLY  .LIN7O                  ;'ORDERS = '
3632  022044  012746  000036                  MOV     #$OPERC,-(SP)           ;ORDER COUNT INCREMENT
3633  022050  060016                          ADD     R0,(SP)                 ;ADD BASE ADDRESS
3634  022052  004737  032500                  JSR     PC,$DB2D                ;CONVERT THE COUNT
3635  022056  004737  027320                  JSR     PC,$SUPRS               ;PRINT IT
3636  022062  104414  051134                  DISPLY  .LIN7P                  ;'TOTAL SEEKS = '
3637  022066  012746  000042                  MOV     #$POSIT,-(SP)           ;TOTAL SEEKS
3638  022072  060016                          ADD     R0,(SP)                 ;DEVICE TABLE ADDRESS
3639  022074  004737  032500                  JSR     PC,$D32D                ;CONVERT THE SEEK COUNT
3640  022100  004737  027320                  JSR     PC,$SUPRS               ;PRINT IT
3641  022104  104414  051076                  DISPLY  .LIN7M                  ;'  TOTAL MISPOS ERR = '
3642  022110  016046  000066                  MOV     $MISPO(R0),-(SP)        ;TOTAL ERRORS
3643  022114  004737  022224                  JSR     PC,LINDEC               ;TYPE IT IN DECIMAL
3644  022120  104414  051154                  DISPLY  .LIN7S                  ;'  TOTAL SKI.OCYL ERR = '
3645  022124  016046  000064                  MOV     $SKI(R0),-(SP)          ;CONVERT & PRINT IT
3646  022130  004737  022224                  JSR     PC,LINDEC               ;TYPE IT IN DECIMAL
3647  022134  104414  001165                  DISPLY  .$CRLF
3648  022140  104414  001165                  DISPLY  .$CRLF
3649  022144  032777  100000  156766          BIT     #SW15,@SWR              ;SEE IF HALT ON ERROR - SWITCH 15 SET
3650  022152  001401                          BEQ     1$                      ;BR IF NOT
3651  022154  000000                          HALT                            ;SWITCH 15 HALT
3652  022156  000207                  1$:     RTS     PC
3653
3654                                  ;PRINT LINE 8 OF THE ERROR MESSAGE
3655                                  ;'DIFFERENT ERROR DURING RETRY'
3656
3657  022160  104414  051246          LINE8:  DISPLY  .LIN8M
3658  022164  004737  020174                  JSR     PC,LINE2                ;PRINT LINE 2 OF ERROR MESSAGE
3659  022170  000207                          RTS     PC
3660
3661                                  ;OCTAL TYPEOUT ROUTINE
3662                                  ;CALL:
```

```
                                        ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
                                        ;       JSR     PC,LINOCT
                                        ;       RETURN

022172  016646  000002          LINOCT: MOV     2.SP),-(SP)     ;PUT NUMBER IN PROPER LOCATION ON STACK
022176  004737  027750                  JSR     PC,$S820        ;CONVERT THE NUMBER TO OCTAL
022202  012637  022216                  MOV     (SP)+,1$        ;GET THE ADDRESS OF THE ASCII STRING
022206  062737  000005  022216          ADD     #5.,1$          ;ADDRESS THE LAST 6 ASCII DIGITS
022214  104414                          DISPLY                  ;TYPE IT
022216  000000                  1$:     .WORD   0               ;ADDRESS
022220  012616                          MOV     (SP)+,(SP)      ;CORRECT THE STACK
022222  000207                          RTS     PC              ;RETURN

                                        ;ROUTINE TO CONVERT THE INPUT NUMBER TO DECIMAL AND TYPE IT WITH
                                        ;LEADING ZERO SUPRESSION
                                        ;CALL:
                                        ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
                                        ;       JSR     PC,LINDEC
                                        ;       RETURN

022224  016646  000002          LINDEC: MOV     2(SP),-(SP)     ;SET UP STACK FOR CONVERT
022230  004737  027720                  JSR     PC,$S82D        ;CONVERT IT TO DECIMAL
022234  004737  027320                  JSR     PC,$SUPRS       ;TYPE IT (WITH LEADING ZEROS SUPRESSED)
022240  012616                          MOV     (SP)+,(SP)      ;RESTORE STACK POINTER
022242  000207                          RTS     PC

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

                                        .SBTTL  GENERAL SUPPORT SUBROUTINES

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

                                        ;DECREMENT THE SECTOR-TRACK ADDRESS
                                        ;CALL:
                                        ;       MOV     #DPB,R0         ;DPB ADDRESS
                                        ;       JSR     PC,READDR
                                        ;       RETURN
                                        ;       (SP) CONTAINS THE TRACK ADDRESS
                                        ;       2(SP) CONTAINS THE SECTOR ADDRESS

022244  162706  000004          READDR: SUB     #4,SP           ;DECREMENT THE STACK POINTER
022250  016616  000004                  MOV     4(SP),(SP)      ;MOVE THE RETURN ADDR DOWN THE STACK
022254  005066  000004                  CLR     4(SP)           ;CLEAR STACK FOR SECTOR
022260  005066  000002                  CLR     2(SP)           ;CLEAR STACK FOR TRACK
022264  116066  000242  000004          MOVB    $RPDA(R0),4(SP)  ;INCREMENTED SECTOR ON STACK
022272  005366  000004                  DEC     4(SP)           ;DECREMENT THE SECTOR ADDRESS
022276  100015                          BPL     1$              ;BR IF SECTOR GREATER THAN 0
022300  012766  000025  000004          MOV     #21.,4(SP)      ;JAM SECTOR ADDRESS TO 21(10)
022306  116066  000243  000002          MOVB    $RPDA+1(R0),2(SP)  ;TRACK ADDRESS
022314  005366  000002                  DEC     2(SP)           ;DECREMENT TRACK ADDRESS
022320  100007                          BPL     2$              ;BR IF IT DIDN'T GO NEG
022322  012766  000022  000002          MOV     #18.,2(SP)      ;RESET TRACK TO 18(10)
022330  000403                          BR      2$
022332  116066  000243  000002  1$:     MOVB    $RPDA+1(R0),2(SP)  ;TRACK ADDRESS
```

```
3717  022340  000207                    2$:     RTS     PC              ;RETURN
3718
3719                                    ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
3720
3721  022342  012737  177777  001210  CKCLK:  MOV     #-1,CLKFLG      ;CLEAR CLOCK AVAILABILITY FLAG
3722  022350  012737  177777  001206          MOV     #-1,PCLOCK      ;CLEAR KW11-P CLOCK AVAILABILITY FLAG
3723  022356  012737  022436  000004          MOV     #CKCLK1,ERRVEC  ;SET UP VECTOR FOR CLOCK CHECK
3724  022364  005037  000006                  CLR     @#ERRVEC+2        ;NEW PSW
3725  022370  005777  156600                  TST     @$LKCSR         ;CHECK FOR KW11-P
3726  022374  005037  001210                  CLR     CLKFLG          ;SET CLOCK AVAILABILITY FLAG
3727  022400  005037  001206                  CLR     PCLOCK          ;SET KW11-P CLOCK FLAG
3728  022404  013701  001200                  MOV     $LPVEC,R1       ;KW11-P VECTOR ADDRESS
3729  022410  012721  023476                  MOV     #CLOCK,(R1)+    ;SET UP KW11-P VECTOR
3730  022414  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
3731  022420  012777  174575  156550          MOV     #-1667.,@$LKCSB ;LOAD COUNTER BUFFER WITH 16.67
3732  022426  012777  000131  156540          MOV     #131,@$LKCSR    ;SET CLOCK - CNT UP, 10US, CONT INT
3733  022434  000437                          BR      CKCLK3
3734  022436  062706  000004          CKCLK1: ADD     #4,SP           ;RESTORE THE STACK POINTER
3735  022442  012737  022504  000004          MOV     #CKCLK2,@#ERRVEC  ;CHANGE ERROR VECTOR TO CHECK FOR KW11-L
3736  022450  005777  156526                  TST     @$LKS           ;LOOK FOR KW11-L
3737  022454  005037  001210                  CLR     CLKFLG          ;SET CLOCK FLAG
3738  022460  013701  001204                  MOV     $LLVEC,R1       ;KW11-L VECTOR ADDRESS
3739  022464  012721  023476                  MOV     #CLOCK,(R1)+    ;SET UP KW11-L VECTOR
3740  022470  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
3741  022474  012777  000100  156500          MOV     #100,@$LKS      ;SET KW11-L INTERRUPT
3742  022502  000414                          BR      CKCLK3
3743  022504  062706  000004          CKCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
3744  022510  104401  052651                  TYPE    ,NEDCLK         ;'P OR L CLOCK MUST BE ON SYSTEM'
3745  022514  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
3746  022520  001402                          BEQ     1$              ;BR IF NOT
3747  022522  000137  005256                  JMP     $GET42          ;ABORT PROGRAM
3748  022526  000000                  1$:     HALT                    ;HALT
3749  022530  000137  004066                  JMP     START           ;TRY AGAIN
3750  022534  012737  000006  000004  CKCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
3751  022542  000207                          RTS     PC
3752
3753                                    ;ROUTINE TO DISPLAY STATISTICS FOR ALL DRIVES ASSIGNED
3754                                    ;CALL:
3755                                    ;       JSR     PC,STATPR
3756                                    ;       RETURN
3757
3758  022544  010046                  STATPR: MOV     R0,-(SP)        ;SAVE R0
3759  022546  010446                          MOV     R4,-(SP)        ;SAVE R4
3760  022550  005737  001442                  TST     ASNLST          ;ANY DRIVES ASSIGNED ?
3761  022554  001421                          BEQ     3$              ;BR IF NOT
3762  022556  004737  022654                  JSR     PC,SHDTYP       ;TYPE THE HEADING
3763  022562  005004                          CLR     R4              ;CLEAR THE DRIVE INDEX
3764  022564  006304                  1$:     ASL     R4              ;CHANGE TO INDEX WORDS
3765  022566  016400  001720                  MOV     BLKADR(R4),R0   ;GET THE DRIVE'S BLOCK ADDRESS
3766  022572  006204                          ASR     R4              ;RESTORE R4
3767  022574  136437  033236  001442          BITB    ATABIT(R4),ASNLST  ;IS THIS DRIVE ASSIGNED ?
3768  022602  001402                          BEQ     2$              ;BR IF NOT
3769  022604  004737  022676                  JSR     PC,SDETAL       ;TYPE THE PERFORMANCE SUMMARY
3770  022610  005204                  2$:     INC     R4              ;INCREMENT THE INDEX
```

```
3771  022612  020427  000010                  CMP     R4,#8.          ;FINISHED ?
3772  022616  001362                          BNE     1$              ;BR IF NOT
3773  022620  012604                  3$:     MOV     (SP)+,R4        ;RESTORE R4
3774  022622  012600                          MOV     (SP)+,R0        ;RESTORE R0
3775  022624  000207                          RTS     PC              ;RETURN
3776
3777                                  ;ROUTINE TO TYPE STATISTICS FOR AN INDIVIDUAL DRIVE
3778                                  ;CALL:
3779                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
3780                                  ;       JSR     PC,TYPEST
3781                                  ;       RETURN
3782
3783  022626  010046                  TYPEST: MOV     R0,-(SP)        ;SAVE R0
3784  022630  010446                          MOV     R4,-(SP)        ;SAVE R4
3785  022632  004737  022654                  JSR     PC,SHDTYP       ;TYPE THE HEADING
3786  022636  005004                          CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
3787  022640  111004                          MOVB    (R0),R4         ;DRIVE NUMBER
3788  022642  004737  022676                  JSR     PC,SDETAL       ;TYPE THE STATISTICS
3789  022646  012604                          MOV     (SP)+,R4        ;RESTORE R4
3790  022650  012600                          MOV     (SP)+,R0        ;RESTORE R0
3791  022652  000207                          RTS     PC              ;RETURN
3792
3793                                  ;TYPE THE HEADER FOR THE DRIVE PERFORMANCE SUMMARY TYPEOUT.
3794                                  ;CALL:
3795                                  ;       JSR     PC,SHDTYP
3796                                  ;       RETURN
3797
3798  022654  004737  023400          SHDTYP: JSR     PC,$TIME        ;TYPE THE TIME OF DAY
3799  022660  004537  027360                  JSR     R5,TYPRI4       ;TYPE AT PRIORITY 4
3800  022664  001165                          $CRLF                   ;CR-LF
3801  022666  004537  027360                  JSR     R5,TYPRI4       ;TYPE THE HEADER
3802  022672  052321                          STATHD                  ;HEADER
3803  022674  000207                          RTS     PC              ;RETURN
3804
3805                                  ;TYPE THE PERFORMANCE SUMMARY DATE LINE
3806                                  ;CALL:
3807                                  ;       MOV     #DRIVE,R4       ;DRIVE NUMBER
3808                                  ;       MOV     #DPB,R0         ;DPB ADDRESS
3809                                  ;       RETURN
3810
3811  022676  010246                  SDETAL: MOV     R2,-(SP)        ;SAVE R2
3812  022700  010002                          MOV     R0,R2           ;DPB ADDRESS
3813  022702  062702  000036                  ADD     #$CPERC,R2      ;FIRST STATISTICAL FIELD
3814  022706  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
3815                                                                  ;;TYPE DRIVE NUMBER
3816  022710  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3817  022712     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3818  022713     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3819  022714  104401  052073                  TYPE    ,LINSP          ;SPACES
3820  022720  016046  000070                  MOV     $PASSC(R0),-(SP)  ;PUT THE PASS COUNT ON THE STACK
3821  022724  004737  027720                  JSR     PC,$S32D        ;CONVERT IT
3822  022730  004537  027230                  JSR     R5,REPLZ        ;TYPE IT
3823  022734  000003                          .WORD   3               ;TYPE 3 DIGITS
3824  022736  104401  052073                  TYPE    ,LINSP          ;SPACES
```

```
3825  022742  010246                  MOV     R2,-(SP)        ;PUT $OPERC ON THE STACK
3826  022744  004737  032500          JSR     PC,$DB2D        ;CONVERT IT
3827  022750  004537  027230          JSR     R5,REPLZ        ;TYPE $OPERC
3828  022754  000006                  .WORD   6               ;TYPE 6 DIGITS
3829  022756  104401  052073          TYPE    ,LINSP          ;SPACES
3830  022762  062702  000004          ADD     #4,R2           ;INCREMENT R2
3831  022766  010246                  MOV     R2,-(SP)        ;PUT $POSIT ON THE STACK
3832  022770  004737  032500          JSR     PC,$DB2D        ;CONVERT IT
3833  022774  004537  027230          JSR     R5,REPLZ        ;TYPE $POSIT
3834  023000  000006                  .WORD   6               ;TYPE 6 DIGITS
3835  023002  104401  052073          TYPE    ,LINSP          ;SPACES
3836  023006  062702  000004          ADD     #4,R2           ;INCREMENT R2
3837  023012  010246                  MOV     R2,-(SP)        ;PUT $TRANS ON THE STACK
3838  023014  004737  032500          JSR     PC,$DB2D        ;CONVERT $TRANS
3839  023020  004537  027230          JSR     R5,REPLZ        ;TYPE IT
3840  023024  000012                  .WORD   10.             ;TYPE 10 DIGITS
3841  023026  104401  052073          TYPE    ,LINSP          ;SPACES
3842  023032  062702  000004          ADD     #4,R2           ;INCREMENT R2
3843  023036  010246                  MOV     R2,-(SP)        ;PUT $READ ON THE STACK
3844  023040  004737  032500          JSR     PC,$DB2D        ;CONVERT $READ
3845  023044  004537  027230          JSR     R5,REPLZ        ;TYPE IT
3846  023050  000012                  .WORD   10.             ;TYPE 10 DIGITS
3847  023052  104401  052074          TYPE    ,LINSP0         ;1 SPACE
3848  023056  062702  000004          ADD     #4,R2           ;INCREMENT R2
3849  023062  062702  000002          ADD     #2,R2           ;INCREMENT R2 AGAIN
3850  023066  012246                  MOV     (R2)+,-(SP)     ;PUT $SOFT ON THE STACK
3851  023070  004737  027720          JSR     PC,$SB2D        ;CONVERT $SOFT
3852  023074  004537  027230          JSR     R5,REPLZ        ;TYPEOUT $SOFT
3853  023100  000004                  .WORD   4               ;TYPE 4 DIGITS
3854  023102  104401  052074          TYPE    ,LINSP0         ;SPACES
3855  023106  012246                  MOV     (R2)+,-(SP)     ;PUT $HARD ON THE STACK
3856  023110  004737  027720          JSR     PC,$SB2D        ;CONVERT $HARD
3857  023114  004537  027230          JSR     R5,REPLZ        ;TYPEOUT $HARD
3858  023120  000004                  .WORD   4               ;TYPE 4 DIGITS
3859  023122  104401  052074          TYPE    ,LINSP0         ;SPACES
3860  023126  012246                  MOV     (R2)+,-(SP)     ;PUT $SKI ON THE STACK
3861  023130  004737  027720          JSR     PC,$SB2D        ;CONVERT $SKI
3862  023134  004537  027230          JSR     R5,REPLZ        ;TYPEOUT $SKI
3863  023140  000004                  .WORD   4               ;TYPE 4 DIGITS
3864  023142  104401  052074          TYPE    ,LINSP0         ;SPACES
3865  023146  012246                  MOV     (R2)+,-(SP)     ;PUT $MISPO ON THE STACK
3866  023150  004737  027720          JSR     PC,$SB2D        ;CONVERT $MISPO
3867  023154  004537  027230          JSR     R5,REPLZ        ;TYPEOUT $MISPO
3868  023160  000004                  .WORD   4               ;TYPE 4 DIGITS
3869  023162  104401  052074          TYPE    ,LINSP0         ;SPACES
3870  023166  016046  000056          MOV     $TOTAL(R0),-(SP)  ;CALCULATE NUMBER OF OTHER ERRORS
3871  023172  166016  000060          SUB     $SOFT(R0),(SP)  ;SUBTRACT $SOFT FROM $TOTAL
3872  023176  166016  000062          SUB     $HARD(R0),(SP)  ;SUBTRACT $HARD FROM $TOTAL
3873  023202  166016  000064          SUB     $SKI(R0),(SP)   ;SUBTRACT $SKI FROM $TOTAL
3874  023206  166016  000066          SUB     $MISPO(R0),(SP) ;SUBTRACT $MISPO FROM $TOTAL
3875  023212  004737  027720          JSR     PC,$SB2D        ;CONVERT 'OTHER' COUNT
3876  023216  004537  027230          JSR     R5,REPLZ        ;TYPE IT
3877  023222  000004                  .WORD   4               ;TYPE 4 DIGITS
3878  023224  104401  001165          TYPE    ,$CRLF
```

```
3879  023230  012602                          MOV     (SP)+,R2        ;RESTORE R2
3880  023232  000207                          RTS     PC
3881
3882
3883
3884                                  ;ROUTINE TO INCREMENT $SOFT
3885                                  ;
3886                                  ;NOTE:  $SOFT WILL NOT BE INCREMENTED BEYOND 9999 (10)
3887
3888  023234  005737  001264          INCSOF: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
3889  023240  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
3890  023242  026027  000060  023417          CMP     $SOFT(R0),#9999.  ;IS $SOFT ALREADY AT MAXIMUM ?
3891  023250  103002                          BHIS    1$              ;BR IF IT IS
3892  023252  005260  000060                  INC     $SOFT(R0)               ;INCREMENT $SOFT
3893  023256  000207                  1$:     RTS     PC              ;RETURN
3894
3895
3896                                  ;ROUTINE TO INCREMENT $HARD
3897                                  ;
3898                                  ;NOTE:  $HARD WILL NOT BE INCREMENTED BEYOND 9999 (10)
3899
3900  023260  005737  001264          INCHRD: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
3901  023264  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
3902  023266  026027  000062  023417          CMP     $HARD(R0),#9999.  ;IS $HARD ALREADY AT MAXIMUM ?
3903  023274  103002                          BHIS    1$              ;BR IF IT IS
3904  023276  005260  000062                  INC     $HARD(R0)               ;INCREMENT $HARD
3905  023302  000207                  1$:     RTS     PC              ;RETURN
3906
3907
3908                                  ;ROUTINE TO INCREMENT $SKI
3909                                  ;
3910                                  ;NOTE:  $SKI WILL NOT BE INCREMENTED BEYOND 9999 (10)
3911
3912  023304  005737  001264          INCSKI: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
3913  023310  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
3914  023312  026027  000064  023417          CMP     $SKI(R0),#9999.  ;IS $SKI ALREADY AT MAXIMUM ?
3915  023320  103002                          BHIS    1$              ;BR IF IT IS
3916  023322  005260  000064                  INC     $SKI(R0)                ;INCREMENT $SKI
3917  023326  000207                  1$:     RTS     PC              ;RETURN
3918
3919
3920                                  ;ROUTINE TO INCREMENT $MISPO
3921                                  ;
3922                                  ;NOTE:  $MISPO WILL NOT BE INCREMENTED BEYOND 9999 (10)
3923
3924  023330  005737  001264          INCMIS: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
3925  023334  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
3926  023336  026027  000066  023417          CMP     $MISPO(R0),#9999.  ;IS $MISPO ALREADY AT MAXIMUM
3927  023344  103002                          BHIS    1$              ;BR IF IT IS
3928  023346  005260  000066                  INC     $MISPO(R0)              ;INCREMENT $MISPO
3929  023352  000207                  1$:     RTS     PC              ;RETURN
3930
3931
3932                                  ;ROUTINE TO INCREMENT $TOTAL
```

```
3933                                        ;
3934                                        ;NOTE:  $TOTAL WILL NOT BE INCREMENTED BEYOND 9999 (10)
3935
3936  023354  005737  001264          INCTOT: TST     BADSEC          ;SEE IF BAD TRK/SEC INDICATOR SET
3937  023360  001006                          BNE     1$              ;BR IF IT'S SET, DON'T INCREMENT COUNT
3938  023362  026027  000056  023417          CMP     $TOTAL(R0),#9999.  ;IS $TOTAL ALREADY AT MAXIMUM ?
3939  023370  103002                          BHIS    1$              ;BR IF IT IS
3940  023372  005260  000056                  INC     $TOTAL(R0)              ;INCREMENT $TOTAL
3941  023376  000207                  1$:     RTS     PC              ;RETURN
3942
3943
3944                                        ;ROUTINE TO TYPE THE TIME
3945
3946  023400  005737  001210          $TIME:  TST     CLKFLG          ;CLOCK ON THE SYSTEM ?
3947  023404  001033                          BNE     1$              ;BR IF NOT
3948  023406  104401  001165                  TYPE    ,$CRLF          ;CR-LF
3949  023412  013746  001266                  MOV     HOUR,-(SP)      ;PUT 'HOURS' ON THE STACK
3950  023416  004737  027720                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
3951  023422  004537  027230                  JSR     R5,REPLZ        ;TYPE IT
3952  023426  000002                          .WORD   2               ;TYPE 2 DIGITS
3953  023430  104401  053125                  TYPE    ,COLON          ;':'
3954  023434  013746  001270                  MOV     MINUTE,-(SP)    ;PUT 'MINUTES' ON THE STACK
3955  023440  004737  027720                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
3956  023444  004537  027230                  JSR     R5,REPLZ        ;TYPE IT
3957  023450  000002                          .WORD   2               ;TYPE 2 DIGITS
3958  023452  104401  053125                  TYPE    ,COLON          ;':'
3959  023456  013746  001272                  MOV     SECOND,-(SP)    ;PUT SECONDS ON THE STACK
3960  023462  004737  027720                  JSR     PC,$SB2D        ;CONVERT TO DECIMAL
3961  023466  004537  027230                  JSR     R5,REPLZ        ;TYPE IT
3962  023472  000002                          .WORD   2               ;TYPE 2 DIGITS
3963  023474  000207                  1$:     RTS     PC
3964
3965                                        ;CLOCK HANDLER ROUTINE
3966
3967  023476  005337  001274          CLOCK:  DEC     SIXTEE          ;INCREMENT THE 1/60 SECOND COUNTER
3968  023502  001035                          BNE     1$              ;BR IF A SECOND NOT COUNTED
3969  023504  013737  001212  001274          MOV     HZ,SIXTEE       ;RESTORE THE VALUE
3970  023512  005237  001272                  INC     SECOND          ;COUNT THE SECOND
3971  023516  022737  000074  001272          CMP     #60.,SECOND     ;AT MAXIMUM ?
3972  023524  001024                          BNE     1$              ;BR IF NOT
3973  023526  005037  001272                  CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
3974  023532  005237  001372                  INC     INTRVL+2        ;COUNT THE PERFORMANCE SUMMARY INTERVAL
3975  023536  005237  001270                  INC     MINUTE          ;COUNT THE MINUTE
3976  023542  022737  000074  001270          CMP     #60.,MINUTE     ;AT MAXIMUM ?
3977  023550  001012                          BNE     1$              ;BR IF NOT
3978  023552  005037  001270                  CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
3979  023556  005237  001266                  INC     HOUR            ;COUNT THE HOURS
3980  023562  022737  001747  001266          CMP     #999.,HOUR      ;AT MAXIMUM
3981  023570  103002                          BHIS    1$              ;BR IF NOT
3982  023572  005037  001266                  CLR     HOUR            ;CLEAR THE HOURS
3983  023576  012746  000021          1$:     MOV     #17.,-(SP)      ;17 MS ON THE STACK
3984  023602  004737  037576                  JSR     PC,RPTMR        ;DRIVER TIMER ROUTINE
3985  023606  005737  001370                  TST     INTRVL          ;DISPLAY THE PERFORMANCE SUMMARY ?
3986  023612  001411                          BEQ     2$              ;BR IF NOT
```

```
 3987  023614  023737  001370  001372          CMP     INTRVL,INTRVL+2 ;DISPLAY INTERVAL FINISHED ?
 3988  023622  001005                          BNE     2$              ;BR IF NOT
 3989  023624  012737  177777  001214          MOV     #-1,STATIN      ;SET PERFORMANCE SUMMARY DISPLAY FLAG
 3990  023632  005037  001372                  CLR     INTRVL+2        ;CLEAR THE PERFORMANCE INTERVAL COUNTER
 3991  023636  000002                  2$:     RTI                     ;RETURN
 3992
 3993                                  ;COMMAND DECODE ROUTINE
 3994                                  ;CALL:
 3995                                  ;       MOV     #-1,CFLAG       ;'CFLAG' IS NORMALLY SET BY THE TTY SERVICE
 3996                                  ;                               ;ROUTINE IN INTERRUPT MODE
 3997                                  ;       JSR     PC,KSR
 3998                                  ;       RETURN1                 ;SYSTEM BUSY RETURN
 3999                                  ;       RETURN2                 ;RETURN AFTER KEYBOARD SERVICED
 4000
 4001  023640  005737  001420          KSR:    TST     ORDERQ          ;ANY OPERATIONS ACTIVE ?
 4002  023644  001003                          BNE     1$              ;BR IF SOME ARE
 4003  023646  005037  023672                  CLR     3$              ;CLEAR THE LOOP COUNTER
 4004  023652  000410                          BR      KSR1            ;PROCESS THE KEYBOARD REQUEST
 4005  023654  062737  000001  023672  1$:     ADD     #1,3$           ;COUNT THE TIMES THROUGH THE LOOP
 4006  023662  001002                          BNE     2$              ;BR IF NOT ENOUGH
 4007  023664  104401  053236                  TYPE    ,BUSY           ;'SYSTEM BUSY...'
 4008  023670  000207                  2$:     RTS     PC              ;PROCESS ANY COMPLETED DRIVES
 4009  023672  000000                  3$:     .WORD   0               ;LOOP COUNTER
 4010  023674  104412                  KSR1:   SAVREG                  ;SAVE THE REGISTERS
 4011  023676  012737  000200  177776          MOV     #PR4,PS         ;SET PRIORITY TO 4
 4012  023704  005037  001262                  CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
 4013  023710  004737  023400                  JSR     PC,$TIME        ;TYPE THE TIME
 4014  023714  005777  155226                  TST     @$TKB           ;CLEAR ANY GARBAGE IN THE TTY BUFFER
 4015  023720  104401  052751                  TYPE    ,ENTCOM         ;'ENTER COMMANDS'
 4016  023724  104411                          RDLIN                   ;READ THE KEYBOARD
 4017  023726  012605                          MOV     (SP)+,R5        ;GET ADDRESS OF INPUT STRING
 4018  023730  005737  001262                  TST     CFLAG           ;CHECK THE CONTROL C FLAG
 4019  023734  001065                          BNE     7$              ;EXIT IF 'CONTROL C' ENTERED
 4020  023736  005205                          INC     R5              ;POINT TO SECOND CHARACTER
 4021  023740  122715  000101                  CMPB    #'A,(R5)        ;EQ TO AN 'A'
 4022  023744  001410                          BEQ     1$              ;BR IF IT IS
 4023  023746  121527  000067                  CMPB    (R5),#'7        ;DRIVE NUMBER GREATER THAN AN ASCII 7 ?
 4024  023752  101054                          BHI     6$              ;BR IF IT IS
 4025  023754  121527  000060                  CMPB    (R5),#'0        ;DRIVE NUMBER LESS THAN AN ASCII 0 ?
 4026  023760  103451                          BLO     6$              ;BR IF IT IS
 4027  023762  042715  177770                  BICB    #^C7,(R5)       ;LEAVE ONLY LOWER 3 BITS IF CHAR NOT 'A'
 4028  023766  122765  000124  177777  1$:     CMPB    #'T,-1(R5)      ;EQ TO 'T'
 4029  023774  001003                          BNE     2$              ;BR IF NOT EQ
 4030  023776  004737  024502                  JSR     PC,NEWASN       ;ASSIGN DRIVE FOR TEST
 4031  024002  000442                          BR      7$              ;EXIT
 4032  024004  122765  000104  177777  2$:     CMPB    #'D,-1(R5)      ;EQ TO 'D' ?
 4033  024012  001003                          BNE     3$              ;BR IF NOT EQ
 4034  024014  004737  024512                  JSR     PC,DEASGN       ;DEASSIGN DRIVE
 4035  024020  000433                          BR      7$              ;EXIT
 4036  024022  122765  000123  177777  3$:     CMPB    #'S,-1(R5)      ;EQ TO 'S'
 4037  024030  001003                          BNE     4$              ;BR IF NOT EQ
 4038  024032  004737  024620                  JSR     PC,SCMND        ;TYPE STATISTICS
 4039  024036  000424                          BR      7$              ;EXIT
 4040  024040  122765  000127  177777  4$:     CMPB    #'W,-1(R5)      ;EQ TO 'W'
```

```
4041  024046  001007                          BNE     5$              ;BR IF NOT EQ
4042  024050  032777  000001  155062          BIT     #SW0,@SWR       ;IS SWITCH 0 SET ?
4043  024056  001012                          BNE     6$              ;BR IF SET, CAN'T DO 'W' COMMAND
4044  024060  004737  025070                  JSR     PC,DATAPK       ;WRITE A DATA PACK
4045  024064  000411                          BR      7$              ;EXIT
4046  024066  122765  000122  177777  5$:     CMPB    #'R,-1(R5)      ;EQ TO 'R' ?
4047  024074  001003                          BNE     6$              ;BR IF NOT EQ
4048  024076  004737  025102                  JSR     PC,REDAPK       ;READ A DATA PACK
4049  024102  000402                          BR      7$              ;EXIT
4050  024104  104401  052727          6$:     TYPE    ,INVLD          ;TYPE 'INVALID COMMAND' MESSAGE
4051  024110  104413                  7$:     RESREG                  ;RESTORE R0 - R5
4052  024112  062716  000002                  ADD     #2,(SP)         ;INCREMENT THE RETURN ADDRESS
4053  024116  005777  155024                  TST     @$TKB           ;CLEAR THE TTY BUFFER
4054  024122  052777  000100  155014          BIS     #BIT06,@$TKS    ;SET TTY INTERRUPT ENABLE
4055  024130  005037  177776                  CLR     PS              ;SET PRIORITY BACK TO ZERO
4056  024134  000207                          RTS     PC              ;RETURN
4057
4058                                  ;ROUTINE TO PROCESS THE ASSIGN REQUEST ('T', 'R', OR 'W' COMMANDS)
4059
4060  024136  122715  000101          ASSIGN: CMPB    #'A,(R5)        ;ASSIGN ALL DRIVES?
4061  024142  001430                          BEQ     ASGN2           ;BR IF ALL DRIVES
4062  024144  111504                  ASGN1:  MOVB    (R5),R4         ;PUT DRIVE # IN R4
4063  024146  012737  052147  026366          MOV     #UNTASN,ASNMSG  ;'DRIVE ASSIGNED' MESSAGE ADDRESS
4064  024154  012703  000001                  MOV     #1,R3           ;RELOAD R3 FOR 1 UNIT
4065  024160  136437  033236  001442          BITB    ATABIT(R4),ASNLST  ;DRIVE ALREADY ASSIGNED ?
4066  024166  001013                          BNE     2$              ;BR IF IT IS
4067  024170  005704                          TST     R4              ;TRYING TO ASSIGN DRIVE 0 ?
4068  024172  001007                          BNE     1$              ;BR IF NOT
4069  024174  012737  052233  026366          MOV     #NOTAVL,ASNMSG  ;'NOT AVAILABLE' MESSAGE ADDRESS
4070  024202  122737  000011  000041          CMPB    #11,41          ;SEE IF LOADED FROM AN RP0/4/5/6
4071  024210  001402                          BEQ     2$              ;BR IF RP04/5/6 IS THE LOAD DEVICE
4072  024212  004737  024276          1$:     JSR     PC,ASGN3        ;SEE IF DRIVE ON THE SYSTEM
4073  024216  000137  026346          2$:     JMP     ASNERR          ;RETURN HERE IF DRIVE NOT AVAIL
4074  024222  000207                          RTS     PC              ;EXIT
4075  024224  122737  000011  000041  ASGN2:  CMPB    #11,41          ;LOADED FROM AN RP04/5/6 ?
4076  024232  001005                          BNE     1$              ;BR IF NOT
4077  024234  012704  000001                  MOV     #1,R4           ;START WITH DRIVE 1
4078  024240  012703  000007                  MOV     #7.,R3          ;SETUP FOR ONLY 7 DRIVES
4079  024244  000403                          BR      2$              ;CONTINUE
4080  024246  005004                  1$:     CLR     R4              ;START WITH DRIVE 0
4081  024250  012703  000010                  MOV     #8.,R3          ;DRIVE COUNT FOR 8 DRIVES
4082  024254  004737  024276          2$:     JSR     PC,ASGN3        ;ASSIGN ALL UNASSIGNED, AVAIL DRIVES
4083  024260  000137  024266          3$:     JMP     4$              ;DRIVE NOT ON SYSTEM
4084  024264  000207                          RTS     PC              ;RETURN
4085  024266  012746  024260          4$:     MOV     #3$,-(SP)       ;PUT RETURN ADDRESS ON THE STACK
4086  024272  000137  024414                  JMP     ASGN4           ;LOOK FOR MORE DRIVES
4087  024276  136437  033236  001442  ASGN3:  BITB    ATABIT(R4),ASNLST  ;DRIVE ALREADY ASSIGNED ?
4088  024304  001043                          BNE     ASGN4           ;BR IF IT IS
4089  024306  005737  033234          1$:     TST     DTUW            ;DATA TRANSFER UNDER WAY ?
4090  024312  100375                          BPL     1$              ;BR IF IT IS
4091  024314  110437  044646                  MOVB    R4,GENDPB       ;DRIVE NUMBER
4092  024320  004737  015174                  JSR     PC,RECALO       ;RECALIBRATE DRIVE
4093  024324  105764  033122                  TSTB    DRVSTA(R4)      ;DRIVE AVAILABLE?
4094  024330  001444                          BEQ     ASGN7           ;BR IF DRIVE OFFLINE OR NONEXISTENT
```

```
 4095  024332  100437                          BMI     ASGN6             ;BR IF DRIVE UNSAFE
 4096  024334  006304                          ASL     R4                ;MAKE R4 INTO WORD INDEX
 4097  024336  016464  001720  001466          MOV     BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
 4098  024344  016400  001720                  MOV     BLKADR(R4),R0     ;PUT BLOCK'S ADDR INTO R0
 4099  024350  004737  025114                  JSR     PC,CLRDPB         ;CLEAR BLOCK FOR DRIVE JUST ASSIGNED
 4100  024354  004737  025310                  JSR     PC,DRVPRM         ;GET THE DRIVE'S ADDRESS LIMITS
 4101  024360  004737  025572                  JSR     PC,GETID          ;GET DRIVE I.D.
 4102  024364  004737  025702                  JSR     PC,GETADR         ;GET BAD SECTOR ADDRESSES
 4103  024370  012760  000001  000070          MOV     #1,$PASSC(R0)     ;PRESET PASS COUNT TO 1
 4104  024376  005737  001216                  TST     PACK              ;WRITE DATA PACK ?
 4105  024402  001403                          BEQ     2$                ;BR IF NOT
 4106  024404  113760  001216  000026          MOVB    PACK,$PACK(R0)    ;SET READ/WRITE DATA PACK INDICATOR
 4107  024412  006204                  2$:     ASR     R4                ;RESTORE DRIVE ADDRESS
 4108  024414  005303                  ASGN4:  DEC     R3                ;DECREMENT DRIVE COUNT
 4109  024416  001402                          BEQ     ASGN5             ;BR IF FINISHED
 4110  024420  005204                          INC     R4                ;INCREMENT DRIVE NUMBER
 4111  024422  000725                          BR      ASGN3             ;CONTINUE
 4112  024424  062716  000004          ASGN5:  ADD     #4,(SP)           ;INCREMENT RETURN
 4113  024430  000207                          RTS     PC                ;RETURN
 4114  024432  012737  052252  026366  ASGN6:  MOV     #NOTSAF,ASNMSG    ;'UNSAFE' MESSAGE ADDRESS
 4115  024440  000207                          RTS     PC                ;RETURN
 4116  024442  105764  033132          ASGN7:  TSTB    DRVTYP(R4)        ;DRIVE PRESENT?
 4117  024446  001405                          BEQ     1$                ;BR IF NOT
 4118  024450  100010                          BPL     2$                ;BR IF DRIVE OFFLINE
 4119  024452  012737  052175  026366          MOV     #NOTRP,ASNMSG     ;ADDRESS OF 'NOT RP04/5/6' MSG
 4120  024460  000407                          BR      3$                ;EXIT
 4121  024462  012737  052215  026366  1$:     MOV     #NOTPRS,ASNMSG    ;ADDRESS OF 'NOT PRESENT' MSG
 4122  024470  000403                          BR      3$                ;EXIT
 4123  024472  012737  052104  026366  2$:     MOV     #UNTOFF,ASNMSG    ;ADDRESS OF 'DRIVE OFFLINE' MESSAGE
 4124  024500  000207                  3$:     RTS     PC                ;ERROR RETURN
 4125
 4126                                  ;'T' COMMAND (ROUTINE TO ASSIGN A DRIVE)
 4127
 4128  024502  005037  001216          NEWASN: CLR     PACK              ;CLEAR 'W' COMMAND INDICATOR
 4129  024506  000137  024136                  JMP     ASSIGN            ;GO TO THE ASSIGN ROUTINE
 4130
 4131                                  ;'D' COMMAND (ROUTINE TO DEASSIGN A DRIVE)
 4132
 4133  024512  005004                  DEASGN: CLR     R4
 4134  024514  122715  000101                  CMPB    #'A,(R5)          ;DEASSIGN ALL DRIVES ?
 4135  024520  001434                          BEQ     5$                ;BR IF YES
 4136  024522  012703  000001                  MOV     #BIT00,R3         ;SET R3 FOR ONE UNIT
 4137  024526  111504                          MOVB    (R5),R4           ;GET DRIVE NUMBER
 4138  024530  136437  033236  001442  1$:     BITB    ATABIT(R4),ASNLST ;DRIVE ASSIGNED ?
 4139  024536  001414                          BEQ     3$                ;BR IF NOT
 4140  024540  146437  033236  001442          BICB    ATABIT(R4),ASNLST ;DELETE THE DRIVE FROM THE ASSIGNED LIST
 4141  024546  006304                          ASL     R4                ;MAKE ADDR INTO A WORD INDEX
 4142  024550  016464  001720  001444          MOV     BLKADR(R4),DUNIT(R4) ;PUT ADDRESS IN DEASSIGN LIST
 4143  024556  006204                          ASR     R4
 4144  024560  005303                  2$:     DEC     R3                ;ANY MORE DRIVES ?
 4145  024562  001412                          BEQ     4$                ;BR IF NOT
 4146  024564  005204                          INC     R4
 4147  024566  000760                          BR      1$
 4148  024570  122715  000101          3$:     CMPB    #'A,(R5)          ;DEASSIGN ALL DRIVES ?
```

```
4149  024574  001771                          BEQ     2$                ;BR IF YES
4150  024576  012737  052125  026366          MOV     #UNTNOT,ASNMSG    ;ADDR OF 'NOT ASSIGNED' MESSAGE
4151  024604  004737  026346                  JSR     PC,ASNERR         ;REPORT IT
4152  024610  000207                  4$:     RTS     PC
4153  024612  012703  000010          5$:     MOV     #8.,R3            ;SET UNIT COUNT TO 8
4154  024616  000744                          BR      1$
4155
4156                                  ;'S' COMMAND (ROUTINE TO TYPE DRIVE PERFORMANCE SUMMARY)
4157
4158  024620  005004                  SCMND:  CLR     R4
4159  024622  122715  000101                  CMPB    #'A,(R5)          ;ALL STATISTICS ?
4160  024626  001421                          BEQ     2$                ;BR IF YES
4161  024630  111504                          MOVB    (R5),R4           ;GET DRIVE NUMBER
4162  024632  136437  033236  001442          BITB    ATABIT(R4),ASNLST ;SEE IF DRIVE ASSIGNED
4163  024640  001406                          BEQ     1$                ;BR IF NOT
4164  024642  006304                          ASL     R4                ;MAKE DRIVE ADDR INTO WORD INDEX
4165  024644  016400  001720                  MOV     BLKADR(R4),R0     ;ADDR OF BLOCK
4166  024650  004737  022626                  JSR     PC,TYPEST         ;TYPE DRIVE STATISTICS
4167  024654  000504                          BR      9$                ;EXIT
4168  024656  012737  052125  026366  1$:     MOV     #UNTNOT,ASNMSG    ;ADDR OF 'NOT ASSIGNED' MSG
4169  024664  004737  026346                  JSR     PC,ASNERR         ;TYPE ERROR MESSAGE
4170  024670  000476                          BR      9$                ;EXIT
4171  024672  012703  000010          2$:     MOV     #8.,R3            ;DRIVE COUNT
4172  024676  136437  033236  001442  3$:     BITB    ATABIT(R4),ASNLST ;SEE IF DRIVE ASSIGNED
4173  024704  001004                          BNE     4$                ;BR IF YES
4174  024706  005204                          INC     R4                ;INCREMENT DRIVE ADDRESS
4175  024710  005303                          DEC     R3                ;DECREMENT COUNTER
4176  024712  001371                          BNE     3$                ;MORE TO CHECK
4177  024714  000464                          BR      9$                ;NONE ASSINGED, RETURN
4178  024716  004737  022544          4$:     JSR     PC,STATPR         ;TYPE ALL STATISTICS
4179  024722  105737  001220                  TSTB    DATE              ;SEE IF 'DATE' ENTERED
4180  024726  001404                          BEQ     11$               ;BR IF NOT
4181  024730  104401  053127                  TYPE    ,DATEIS           ;'DATE: '
4182  024734  104401  001220                  TYPE    ,DATE             ;THE OPERATOR ENTERED DATE
4183  024740  105737  001232          11$:    TSTB    OPERID            ;SEE IF OPERATOR I.D. ENTERED
4184  024744  001404                          BEQ     12$               ;BR IF NOT
4185  024746  104401  053140                  TYPE    ,IDIS             ;'OPERATOR I.D.: '
4186  024752  104401  001232                  TYPE    ,OPERID           ;THE OPERATOR I.D.
4187  024756  104401  053162          12$:    TYPE    ,HEDLIN           ;HEADER LINE
4188  024762  012737  042032  025036          MOV     #DRIVE0+$DRVID,6$  ;DRIVE I.D. FIELD ADDRESS
4189  024770  005004                          CLR     R4                ;DRIVE ADDRESS
4190  024772  012703  000010                  MOV     #8.,R3            ;COUNTER
4191  024776  136437  033236  001442  5$:     BITB    ATABIT(R4),ASNLST ;SEE IF DRIVE ASSIGNED
4192  025004  001417                          BEQ     7$                ;BR IF NOT ASSIGNED
4193  025006  010446                          MOV     R4,-(SP)          ;;SAVE R4 FOR TYPEOUT
4194                                                                    ;;TYPE DRIVE NUMBER
4195  025010  104403                          TYPOS                     ;;GO TYPE--OCTAL ASCII
4196  025012     002                          .BYTE   2                 ;;TYPE 2 DIGIT(S)
4197  025013     000                          .BYTE   0                 ;;SUPPRESS LEADING ZEROS
4198  025014  104401  052071                  TYPE    ,LIN4SP           ;4 SPACES
4199  025020  105777  000012                  TSTB    @6$               ;SEE IF DRIVE I.D. ENTERED
4200  025024  001003                          BNE     10$               ;BR IF DRIVE I.D. PRESENT
4201  025026  104401  053205                  TYPE    ,NONE             ;TYPE 'NONE'
4202  025032  000404                          BR      7$                ;CONTINUE
```

```
                                10$:    TYPE                    ;TYPE THE DRIVE I.D.
                                6$:     .WORD   0               ;ADDRESS OF DRIVE I.D. FIELD HERE
                                        TYPE    ,$CRLF          ;CR-LF
                                7$:     DEC     R3              ;DECREMENT THE COUNTER
                                        BEQ     9$              ;BR IF AT END
                                        ADD     #$RPEC2+2,6$    ;INCREMENT THE MESSAGE FIELD ADDRESS
                                        INC     R4              ;INCREMENT DRIVE ADDRESS
                                        BR      5$              ;CONTINUE
                                8$:     TYPE    ,$CRLF          ;CR-LF
                                9$:     RTS     PC

                                ;'W' COMMAND (ROUTINE TO WRITE A DATA PACK)

                                DATAPK: MOV     #-1,PACK        ;SET THE 'W' COMMAND INDICATOR
                                        JMP     ASSIGN          ;ASSIGN REQUESTED DRIVE

                                ;'R' COMMAND (ROUTINE TO READ A DATA PACK)

                                REDAPK: MOV     #1,PACK         ;SET THE 'READ' INDICATOR
                                        JMP     ASSIGN          ;ASSIGN THE REQUESTED DRIVE

                                ;ROUTINE TO CLEAR THE DPB FOR THE ASSIGNED DRIVE
                                ;CALL:
                                ;       MOV     #DPB,R0         ;DPB ADDRESS
                                ;       JSR     PC,CLRDPB
                                ;       RETURN

                                CLRDPB:
                                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
                                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
                                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
                                        MOV     R0,R4           ;GET THE DPB ADDRESS
                                        ADD     #2,R4           ;ADDRESS OF FIRST LOCN TO BE CLEARED
                                        MOV     #5,R3           ;NUMBER OF LOCNS TO BE CLEARED
                                1$:     CLR     (R4)+           ;CLEAR THE LOCATION
                                        DEC     R3              ;DECREMENT THE COUNTER
                                        BNE     1$              ;BR IF NOT FINISHED
                                        ADD     #2,R4           ;MOVE THE ADDRESS PAST THE 'REG' ADDR
                                        MOV     #$NEXT-$REG,R3  ;NUMBER OF LOCNS TO BE CLEARED
                                2$:     CLR     (R4)+           ;CLEAR
                                        SUB     #2,R3           ;DECREMENT THE LOCN COUNTER
                                        BNE     2$              ;BR IF NOT FINISHED
                                        ADD     #12.,R4         ;MOVE PAST ADDRESS LIMITS
                                        MOV     #$RPEC2-MINSEC,R3  ;NUMBER OF LOCNS TO BE CLEARED
                                3$:     CLR     (R4)+           ;CLEAR A LOCATION
                                        SUB     #2,R3           ;DECREMENT THE COUNTER
                                        BNE     3$              ;BR IF NOT DONE
                                        MOVB    BEGCOD,$CODE(R0)  ;INITIAL COMMAND CODE
                                        MOV     BEGCOD,R1       ;GET THE ACTUAL OP CODE
                                        MOVB    COMTBL(R1),$COMND(R0)  ;OPERATION CODE
                                        MOVB    BEGPAT,$PATTC(R0)  ;PATTERN CODE
                                        ASLB    $PATTC(R0)      ;CONVERT CODE TO A TABLE INDEX
                                        MOV     BEGSIZ,$WRDL(R0)  ;BEGINNING RECORD SIZE
```

```
 4257  025242  013760  001416  000004          MOV     BEGSIZ,$WRDM(R0)  ;VALUE FOR DATA TRANSFER
 4258  025250  005460  000004                  NEG     $WRDM(R0)         ;MAKE IT INTO 2'S COMPLEMENT
 4259  025254  012760  000400  000022          MOV     #256.,$SSEC(R0)   ;INITIAL VALUE OF SECTOR SIZE
 4260  025262  132760  000001  000024          BITB    #1,$CODE(R0)      ;HEADER ORDER ?
 4261  025270  001403                          BEQ     4$                ;BR IF NOT
 4262  025272  062760  000004  000022          ADD     #4,$SSEC(R0)      ;ADD HEADER SIZE TO SECTOR SIZE
 4263  025300                          4$:
 4264  025300  012605                          MOV     (SP)+,R5          ;;POP STACK INTO R5
 4265  025302  012604                          MOV     (SP)+,R4          ;;POP STACK INTO R4
 4266  025304  012603                          MOV     (SP)+,R3          ;;POP STACK INTO R3
 4267  025306  000207                          RTS     PC                ;RETURN
 4268
 4269                                  ;ROUTINE TO GET ADDRESS LIMITS FROM THE OPERATOR
 4270
 4271  025310  010346                  DRVPRM: MOV     R3,-(SP)          ;SAVE R3
 4272  025312  010446                          MOV     R4,-(SP)          ;SAVE R4
 4273  025314  005737  000042                  TST     @42               ;RUNNING UNDER MONITOR CONTROL
 4274  025320  001035                          BNE     3$                ;BR IF YES
 4275  025322  104401  053023                  TYPE    ,ENTLMT           ;'ENTER ADDRESSES'
 4276  025326  006204                          ASR     R4                ;CONVERT INDEX TO DRIVE NUMBER
 4277  025330  010446                          MOV     R4,-(SP)          ;;SAVE R4 FOR TYPEOUT
 4278                                          ;;TYPE DRIVE NUMBER
 4279  025332  104403                          TYPOS                     ;;GO TYPE--OCTAL ASCII
 4280  025334     002                          .BYTE   2                 ;;TYPE 2 DIGIT(S)
 4281  025335     000                          .BYTE   0                 ;;SUPPRESS LEADING ZEROS
 4282  025336  104401  053514                  TYPE    ,SLASH            ;'/'
 4283  025342  012737  052302  025406          MOV     #RP04B,2$         ;ADDRESS OF 'RP04' MESSAGE
 4284  025350  132764  000001  033132          BITB    #BIT00,DRVTYP(R4)  ;RP04 ?
 4285  025356  001012                          BNE     1$                ;BR IF YES
 4286  025360  012737  052307  025406          MOV     #RP05,2$          ;ADDRESS OF 'RP05' MESSAGE
 4287  025366  132764  000002  033132          BITB    #BIT01,DRVTYP(R4)  ;RP05 ?
 4288  025374  001003                          BNE     1$                ;BR IF YES
 4289  025376  012737  052314  025406          MOV     #RP06,2$          ;ADDRESS OF 'RP06' MESSAGE
 4290  025404  104401                  1$:     TYPE                      ;TYPE THE MESSAGE WHICH FOLLOWS
 4291  025406  000000                  2$:     .WORD   0                 ;MESSAGE ADDRESS
 4292  025410  104401  001165                  TYPE    ,$CRLF            ;CR-LF
 4293  025414  012737  000632  001350  3$:     MOV     #410.,CYLIMT      ;ASSUME AN RP04/5
 4294  025422  132764  000004  033132          BITB    #BIT02,DRVTYP(R4)  ;SEE IF RP06
 4295  025430  001403                          BEQ     4$                ;BR IF NOT
 4296  025432  012737  001456  001350          MOV     #814.,CYLIMT      ;CHANGE LIMIT TO 814
 4297  025440  062760  177777  000122  4$:     ADD     #-1,$FIRST(R0)    ;SEE IF FIRST TIME STARTED
 4298  025446  103417                          BCS     5$                ;BR IF NOT
 4299  025450  013760  001350  000106          MOV     CYLIMT,MAXCYL(R0)  ;LOAD MAXIMUM CYLINDER
 4300  025456  005060  000110                  CLR     MINCYL(R0)        ;CLEAR MINIMUM CYLINDER
 4301  025462  013760  001346  000112          MOV     TRKLMT,MAXTRK(R0)  ;LOAD MAXIMUM TRACK
 4302  025470  005060  000114                  CLR     MINTRK(R0)        ;CLEAR MINIMUM TRACK
 4303  025474  013760  001344  000116          MOV     SECLMT,MAXSEC(R0)  ;LOAD MAXIMUM SECTOR
 4304  025502  005060  000120                  CLR     MINSEC(R0)        ;CLEAR MINIMUM SECTOR
 4305  025506  006304                  5$:     ASL     R4                ;SETUP TO ADDRESS WORDS
 4306  025510  016403  053674                  MOV     TABLE(R4),R3      ;PARAMETER TABLE ADDRESS
 4307  025514  013763  001350  000002          MOV     CYLIMT,2(R3)      ;LOAD CYLINDER LIMIT FOR LAST CYLINDER
 4308  025522  013763  001350  000010          MOV     CYLIMT,10(R3)     ;LOAD CYLINDER LIMIT FOR STARTING CYLINDER
 4309  025530  005737  000042                  TST     @42               ;UNDER MONITOR CONTROL ?
 4310  025534  001002                          BNE     6$                ;BR IF YES
```

```
 4311  025536  004737  026222                 JSR     PC,PARENT       ;GET THE DRIVE'S PARAMETERS
 4312  025542  116060  000120  000010  6$:    MOVB    MINSEC(R0),$SEC(R0)  ;INITIAL SECTOR VALUE
 4313  025550  116060  000114  000011         MOVB    MINTRK(R0),$TRK(R0)  ;INITIAL TRACK VALUE
 4314  025556  016060  000110  000012         MOV     MINCYL(R0),$CYL(R0)  ;INITIAL CYLINDER VALUE
 4315  025564  012604                         MOV     (SP)+,R4        ;RESTORE R4
 4316  025566  012603                         MOV     (SP)+,R3        ;RESTORE R3
 4317  025570  000207                         RTS     PC              ;RETURN
 4318
 4319                                 ;ROUTINE TO GET THE DRIVE I.D. FROM THE OPERATOR
 4320
 4321  025572  010546                 GETID:  MOV     R5,-(SP)        ;SAVE R5
 4322  025574  005737  000042                 TST     42              ;UNDER MONITOR CONTROL ?
 4323  025600  001036                         BNE     2$              ;BR IF NOT
 4324  025602  005037  001262         1$:     CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
 4325  025606  104401  052776                 TYPE    ,ENTDRV         ;'ENTER DRV I.D.: '
 4326  025612  005046                         CLR     -(SP)           ;CLEAR THE STACK
 4327  025614  111016                         MOVB    (R0),(SP)       ;PUT THE DRIVE NUMBER ON THE STACK
 4328  025616  104403                         TYPOS                   ;TYPE THE DRIVE NUMBER
 4329  025620     002                         .BYTE   2               ;TYPE 2 DIGITS
 4330  025621     000                         .BYTE   0               ;SUPRESS LEADING ZEROS
 4331  025622  104401  001165                 TYPE    ,$CRLF          ;CR-LF
 4332  025626  104411                         RDLIN                   ;READ THE ENTRY
 4333  025630  012605                         MOV     (SP)+,R5        ;GET THE ENTRY ADDRESS
 4334  025632  005737  001262                 TST     CFLAG           ;'CONTROL C' ENTERED ?
 4335  025636  001361                         BNE     1$              ;BR IF IT WAS
 4336  025640  121527  000056                 CMPB    (R5),#'.        ;PERIOD ENTERED ?
 4337  025644  001414                         BEQ     2$              ;BR IF YES
 4338  025646  112560  000224                 MOVB    (R5)+,$DRVID(R0)  ;STORE THE I.D.
 4339  025652  112560  000225                 MOVB    (R5)+,$DRVID+1(R0)  ;STORE THE I.D.
 4340  025656  112560  000226                 MOVB    (R5)+,$DRVID+2(R0)  ;STORE THE I.D.
 4341  025662  112560  000227                 MOVB    (R5)+,$DRVID+3(R0)  ;STORE THE I.D.
 4342  025666  112560  000230                 MOVB    (R5)+,$DRVID+4(R0)  ;STORE THE I.D.
 4343  025672  112560  000231                 MOVB    (R5)+,$DRVID+5(R0)  ;STORE THE I.D.
 4344  025676  012605                 2$:     MOV     (SP)+,R5        ;RESTORE R5
 4345  025700  000207                         RTS     PC              ;RETURN
 4346
 4347                                 ;ROUTINE TO GET THE ADDRESSES OF ANY BAD SECTORS (UP TO A MAX OF 16)
 4348
 4349  025702                         GETADR:
 4350  025702  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4351  025704  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 4352  025706  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 4353  025710  010446                         MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 4354  025712  005737  000042                 TST     42              ;UNDER MONITOR CONTROL ?
 4355  025716  001012                         BNE     15$             ;BR IF YES
 4356  025720  005037  001262         14$:    CLR     CFLAG           ;CLEAR 'CONTROL C' FLAG
 4357  025724  104401  053064                 TYPE    ,ENTADR         ;ENTER SECTOR ADDRESSES
 4358  025730  005046                         CLR     -(SP)           ;CLEAR THE STACK
 4359  025732  111016                         MOVB    (R0),(SP)       ;PUT THE DRIVE NUMBER ON THE STACK
 4360  025734  104403                         TYPOS                   ;TYPE THE DRIVE NUMBER
 4361  025736     002                         .BYTE   2               ;TYPE 2 DIGITS
 4362  025737     000                         .BYTE   0               ;SUPRESS LEADING ZEROS
 4363  025740  104401  001165                 TYPE    ,$CR_F          ;CR-LF
 4364  025744  012703  000040         15$:    MOV     #32.,R3         ;NUMBER OF LOCATIONS IN THE TABLE TO PRESET
```

```
4365  025750  012704  000124                MOV     #$BDSEC,R4      ;TABLE INCREMENT
4366  025754  060004                        ADD     R0,R4           ;BLOCK STARTING ADDRESS
4367  025756  012724  177777        1$:     MOV     #-1,(R4)+       ;SET LOCATION TO 1'S
4368  025762  005303                        DEC     R3              ;DECREMENT TABLE SIZE COUNT
4369  025764  001374                        BNE     1$              ;BR IF NOT FINISHED WITH TABLE
4370  025766  005737  000042                TST     42              ;UNDER MONITOR CONTROL ?
4371  025772  001106                        BNE     13$             ;BR IF YES
4372  025774  162704  000100                SUB     #64.,R4         ;SET POINTER TO BEGINNING OF TABLE
4373  026000  012703  000020                MOV     #16.,R3         ;NUMBER OF ADDRESSES IN TABLE
4374  026004  104411                2$:     RDLIN                   ;GET ADDRESS FROM OPERATOR
4375  026006  012601                        MOV     (SP)+,R1        ;TEXT POINTER
4376  026010  005737  001262                TST     CFLAG           ;'CONTROL C' ENTERED ?
4377  026014  001341                        BNE     14$             ;BR IF IT WAS
4378  026016  013702  001350                MOV     CYLIMT,R2       ;UPPER LIMIT OF INPUT
4379  026022  004537  027562                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
4380  026026  026170                        12$                     ;CARRIAGE RETURN ONLY ENTERED
4381  026030  026210                        13$                     ;PERIOD ONLY ENTERED
4382  026032  026170                        12$                     ;ILLEGAL INPUT
4383  026034  026046                        4$                      ;TERMINATED WITH A CARRIAGE RETURN
4384  026036  026052                        5$                      ;TERMINATED WITH A ":"
4385  026040  026042                        3$                      ;TERMINATED WITH A "."
4386  026042  010214                3$:     MOV     R2,(R4)         ;CYLINDER ADDRESS
4387  026044  000461                        BR      13$             ;EXIT, PERIOD ENTERED
4388  026046  010214                4$:     MOV     R2,(R4)         ;CYLINDER ADDRESS
4389  026050  000442                        BR      11$             ;FINISHED WITH THIS ADDRESS, 'CR' ENTERED
4390  026052  010214                5$:     MOV     R2,(R4)         ;CYLINDER ADDRESS
4391  026054  013702  001346                MOV     TRKLMT,R2       ;UPPER LIMIT OF INPUT
4392  026060  004537  027562                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
4393  026064  026170                        12$                     ;CARRIAGE RETURN ONLY ENTERED
4394  026066  026210                        13$                     ;PERIOD ONLY ENTERED
4395  026070  026170                        12$                     ;ILLEGAL INPUT
4396  026072  026106                        7$                      ;TERMINATED WITH A CARRIAGE RETURN
4397  026074  026114                        8$                      ;TERMINATED WITH A ":"
4398  026076  026100                        6$                      ;TERMINATED WITH A "."
4399  026100  110264  000003        6$:     MOVB    R2,3(R4)        ;TRACK ADDRESS
4400  026104  000441                        BR      13$             ;EXIT, ENTRY TERMINATED BY PERIOD
4401  026106  110264  000003        7$:     MOVB    R2,3(R4)        ;TRACK ADDRESS
4402  026112  000421                        BR      11$             ;FINISHED WITH THIS ADDRESS, 'CR' ENTERED
4403  026114  110264  000003        8$:     MOVB    R2,3(R4)        ;TRACK ADDRESS
4404  026120  013702  001344                MOV     SECLMT,R2       ;UPPER LIMIT OF INPUT
4405  026124  004537  027562                JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
4406  026130  026170                        12$                     ;CARRIAGE RETURN ONLY ENTERED
4407  026132  026210                        13$                     ;PERIOD ONLY ENTERED
4408  026134  026170                        12$                     ;ILLEGAL INPUT
4409  026136  026152                        10$                     ;TERMINATED WITH A CARRIAGE RETURN
4410  026140  026170                        12$                     ;TERMINATED WITH A ":"
4411  026142  026144                        9$                      ;TERMINATED WITH A "."
4412  026144  110264  000002        9$:     MOVB    R2,2(R4)        ;SECTOR ADDRESS
4413  026150  000417                        BR      13$             ;EXIT, ENTRY TERMINATED BY PERIOD
4414  026152  110264  000002        10$:    MOVB    R2,2(R4)        ;SECTOR ADDRESS
4415  026156  005303                11$:    DEC     R3              ;MORE ENTRIES ?
4416  026160  001413                        BEQ     13$             ;BR IF NOT
4417  026162  062704  000004                ADD     #4,R4           ;INCREMENT THE TABLE POINTER
4418  026166  000706                        BR      2$              ;CONTINUE
```

```
4419  026170  012714  177777          12$:    MOV     #-1,(R4)        ;CLEAR PRESENT TABLE ENTRY
4420  026174  012764  177777  000002          MOV     #-1,2(R4)       ;CLEAR PRESENT TABLE ENTRY
4421  026202  104401  053214                  TYPE    ,BADENT         ;'INVALID ENTRY'
4422  026206  000676                          BR      2$              ;TRY AGAIN
4423  026210                          13$:
4424  026210  012604                          MOV     (SP)+,R4        ;:POP STACK INTO R4
4425  026212  012603                          MOV     (SP)+,R3        ;:POP STACK INTO R3
4426  026214  012602                          MOV     (SP)+,R2        ;:POP STACK INTO R2
4427  026216  012601                          MOV     (SP)+,R1        ;:POP STACK INTO R1
4428  026220  000207                          RTS     PC              ;RETURN
4429
4430                                  ;PARAMETER ENTRY ROUTINE
4431                                  ;CALL
4432                                  ;       MOV     #ADR,R3         ;PARAMETER TABLE ADDRESS
4433                                  ;       JSR     PC,PARENT       ;GET THE PARAMETERS
4434
4435  026222  010346                  PARENT: MOV     R3,-(SP)        ;SAVE THE PARAMETER TABLE ADDRESS
4436  026224  005037  001262                  CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
4437  026230  012337  026240          1$:     MOV     (R3)+,3$        ;ADDRESS OF PARAMETER NAME
4438  026234  001442                          BEQ     9$              ;BR IF AT END OF TABLE
4439  026236  104401                          TYPE                    ;TYPE THE PARAMETER NAME
4440  026240  000000                  3$:     .WORD   0               ;ADDRESS OF PARAMETER NAME TEXT
4441  026242  012302                          MOV     (R3)+,R2        ;MAXIMUM PARAMETER VALUE
4442  026244  012305                          MOV     (R3)+,R5        ;ADDRESS OF PARAMETER
4443  026246  011546                          MOV     (R5),-(SP)      ;CURRENT VALUE OF PARAMETER
4444  026250  104405                          TYPDS                   ;TYPE THE CURRENT VALUE OF THE PARAMETER
4445  026252  104401  053514                  TYPE    .SLASH          ;'/'
4446  026256  104411                          RDLIN                   ;READ THE KEYBOARD
4447  026260  012601                          MOV     (SP)+,R1        ;INPUT ASCII STRING ADDRESS
4448  026262  005737  001262                  TST     CFLAG           ;'CONTROL C' ENTERED ?
4449  026266  001021                          BNE     8$              ;BR IF IT WAS
4450  026270  004537  027562                  JSR     R5,CK.DIG       ;CHECK THE DIGIT(S)
4451  026274  026230                          1$                      ;CARRIAGE RETURN ONLY ENTERED
4452  026276  026342                          9$                      ;PERIOD ONLY ENTERED
4453  026300  026314                          6$                      ;ILLEGAL INPUT
4454  026302  026310                          5$                      ;TERMINATED WITH A CARRIAGE RETURN
4455  026304  026314                          6$                      ;TERMINATED WITH A ";"
4456  026306  026326                          7$                      ;TERMINATED WITH A ":"
4457  026310  010215                  5$:     MOV     R2,(R5)         ;MOVE NEW VALUE TO PARAMETER LOCATION
4458  026312  000746                          BR      1$              ;GET MORE PARAMETERS
4459  026314  104401  053214          6$:     TYPE    ,BADENT         ;'BAD ENTRY'
4460  026320  162703  000006                  SUB     #6,R3           ;DECREMENT THE TABLE POINTER
4461  026324  000741                          BR      1$              ;TRY AGAIN
4462  026326  010215                  7$:     MOV     R2,(R5)         ;NEW VALUE
4463  026330  000404                          BR      9$              ;EXIT
4464  026332  005037  001262          8$:     CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
4465  026336  011603                          MOV     (SP),R3         ;RELOAD THE PARAMETER TABLE ADDRESS
4466  026340  000733                          BR      1$              ;TRY AGAIN
4467  026342  005726                  9$:     TST     (SP)+           ;CORRECT THE STACK POINTER
4468  026344  000207                          RTS     PC              ;RETURN
4469
4470                                  ;TYPEOUT ASSIGN/DEASSIGN ERROR MESSAGE
4471                                  ;CALL
4472                                  ;       MOV     #MESADR,ASNMSG  ;ERROR MESSAGE ADDRESS
```

```
                                        ;       JSR     PC,ASNERR
                                        ;       RETURN
026346  104401  052725        ASNERR: TYPE    .QUES           ;QUESTION MARK
026352  104401  052076                TYPE    .UNTMSG         ;TYPE 'DRIVE'
026356  010446                        MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
                                                                ;;TYPE DRIVE NUMBER
026360  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
026362     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
026363     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
026364  104401                        TYPE                    ;TYPE SPECIFIC MESSAGE
026366  000000        ASNMSG: .WORD   0               ;MESSAGE ADDRESS
026370  104401  001165                TYPE    .$CRLF
026374  000207                        RTS     PC

                                ;DEASSIGN DRIVE IF A FATAL ERROR OCCURS
                                ;CALL
                                ;       JSR     PC,DROP
                                ;       RETURN

026376  005004                DROP:   CLR     R4              ;CLEAR R4 FOR DRIVE NUMBER
026400  111004                        MOVB    (R0),R4         ;MOVE DRIVE NUMBER TO R4
026402  146437  033236  001442        BICB    ATABIT(R4),ASNLST  ;REMOVE DRIVE FROM ASSIGNED LIST
026410  006304                        ASL     R4              ;MAKE DRIVE NUMBER INTO A TABLE INDEX
026412  010064  001444                MOV     R0,DUNIT(R4)    ;PUT DRIVE IN DROP LIST
026416  104401  001165                TYPE    .$CRLF
026422  104401  001165                TYPE    .$CRLF
026426  104401  052500                TYPE    .DROPNG         ;TYPE 'DROPPING DRIVE'
026432  104401  052611                TYPE    .DRNUM          ;'DRIVE #'
026436  006204                        ASR     R4              ;DRIVE NUMBER
026440  010446                        MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
                                                                ;;TYPE DRIVE NUMBER
026442  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
026444     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
026445     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
026446  104401  001165                TYPE    .$CRLF
026452  000207                        RTS     PC

                                ;ROUTINE TO DEASSIGN DRIVE IF ERRORS BECOMES EXCESSIVE

026454  032777  000020  152456  ABNRML: BIT     #SW04,@SWR      ;SEE IF SWITCH 4 SET
026462  001006                        BNE     1$              ;BR IF IT'S SET
026464  023760  001366  000056        CMP     MAXER,$TOTAL(R0)  ;CHECK TOTAL ERROR VALUE
026472  103002                        BHIS    1$              ;BR IF ERRORS DONOT EXCEED MAX
026474  000137  026376                JMP     DROP            ;DEASSING THE DRIVE
026500  000207                1$:     RTS     PC              ;RETURN

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

026502  005737  001410        EOP:    TST     ENDET           ;END OF PASS DETERMINED BY SEEKS OR WORDS ?
026506  001412                        BEQ     EOP1            ;BR IF SEEKS
026510  026037  000054  001354        CMP     $READ+2(R0),ENDCON+2  ;CHECK MSW OF WORDS READ COUNT
026516  101017                        BHI     EOP2            ;BR IF MSW GREATER THAN LIMIT
026520  103405                        BLO     EOP1            ;BR IF MSW LESS THAN LIMIT
```

```
4527  026522  026037  000052  001352          CMP     $READ(R0),ENDCON  ;CHECK LSW AGAINST LIMIT
4528  026530  103012                          BHIS    EOP2              ;BR IF EQUAL OR GREATER
4529  026532  000510                          BR      EOPX              ;EXIT
4530  026534  026037  000044  001360  EOP1:   CMP     $POSIT+2(R0),ENDSEK+2  ;CHECK MSW OF SEEK COUNT
4531  026542  101005                          BHI     EOP2              ;BR IF MSW GREATER THAN LIMIT
4532  026544  103503                          BLO     EOPX              ;EXIT IF MSW LESS THAN LIMIT
4533  026546  026037  000042  001356          CMP     $POSIT(R0),ENDSEK  ;CHECK LSW OF SEEK COUNT
4534  026554  103477                          BLO     EOPX              ;EXIT IF LSW LESS THAN LIMIT
4535  026556  104401  001165          EOP2:   TYPE    ,$CRLF            ;CR-LF
4536  026562  104401  052534                  TYPE    ,ENDPAS           ;END OF PASS FOR THE DRIVE
4537  026566  016046  000070                  MOV     $PASSC(R0) -(SP)  ;PUT PASS COUNT ON THE STACK
4538  026572  104405                          TYPDS                     ;CONVERT PASS COUNT TO DECIMAL AND TYPE IT
4539  026574  111037  001246                  MOVB    (R0),UNIT         ;STORE THE DRIVE NUMBER
4540  026600  032777  000020  152332          BIT     #SW04,@SWR        ;SWITCH 4 SET ?
4541  026606  001017                          BNE     1$                ;BR IF SET
4542  026610  026037  000070  001362          CMP     $PASSC(R0),PASCNT  ;SEE IF AT END OF TEST
4543  026616  103413                          BLO     1$                ;BR IF NOT
4544  026620  104401  052550                  TYPE    ,ENDTST           ;TYPE 'END OF TEST'
4545  026624  104401  052611                  TYPE    ,DRNUM            ;'DRIVE #'
4546  026630  013746  001246                  MOV     UNIT,-(SP)        ;;SAVE UNIT FOR TYPEOUT
4547                                                                    ;;TYPE DRIVE NUMBER
4548  026634  104403                          TYPOS                     ;;GO TYPE--OCTAL ASCII
4549  026636     002                          .BYTE   2                 ;;TYPE 2 DIGIT(S)
4550  026637     000                          .BYTE   0                 ;;SUPPRESS LEADING ZEROS
4551  026640  104401  001165                  TYPE    ,$CRLF            ;CR-LF
4552  026644  000431                          BR      3$                ;DEASSIGN THE DRIVE
4553  026646  104401  052611          1$:     TYPE    ,DRNUM            ;'DRIVE #'
4554  026652  013746  001246                  MOV     UNIT,-(SP)        ;;SAVE UNIT FOR TYPEOUT
4555                                                                    ;;TYPE DRIVE NUMBER
4556  026656  104403                          TYPOS                     ;;GO TYPE--OCTAL ASCII
4557  026660     002                          .BYTE   2                 ;;TYPE 2 DIGIT(S)
4558  026661     000                          .BYTE   0                 ;;SUPPRESS LEADING ZEROS
4559  026662  104401  001165                  TYPE    ,$CRLF            ;CR-LF
4560  026666  004737  022626                  JSR     PC,TYPEST         ;TYPE THE DRIVE'S STATISTICS
4561  026672  010346                          MOV     R3,-(SP)          ;SAVE R3
4562  026674  010446                          MOV     R4,-(SP)          ;SAVE R4
4563  026676  010004                          MOV     R0,R4             ;DRIVE'S BLOCK ADDRESS
4564  026700  062704  000036                  ADD     #$OPERC,R4        ;ADD THE STARTING ADDR OF SECTIONS TO CLEAR
4565  026704  012703  000010                  MOV     #8.,R3            ;NUMBER OF LOCNS TO BE CLEARED
4566                                                                    ;(ERROR COUNTERS NOT CLEARED)
4567  026710  005024                  2$:     CLR     (R4)+             ;CLEAR THE LOCN
4568  026712  005303                          DEC     R3                ;DECREMENT THE LOCATION COUNTER
4569  026714  001375                          BNE     2$                ;BR IF MORE TO GO
4570  026716  012604                          MOV     (SP)+,R4          ;RESTORE R4
4571  026720  012603                          MOV     (SP)+,R3          ;RESTORE R3
4572  026722  005260  000070                  INC     $PASSC(R0)        ;INCREMENT THE PASS COUNT
4573  026726  000412                          BR      EOPX              ;EXIT
4574  026730  104401  001165          3$:     TYPE    ,$CRLF
4575  026734  005004                          CLR     R4                ;CLEAR R4 FOR DRIVE NUMBER
4576  026736  111004                          MOVB    (R0),R4           ;MOVE DRIVE NUMBER
4577  026740  146437  033236  001442          BICB    ATABIT(R4),ASNLST  ;DELETE DRIVE FROM ASSIGNED LIST
4578  026746  006304                          ASL     R4                ;MAKE DRIVE NUMBER INTO TABLE INDEX
4579  026750  010064  001444                  MOV     R0,DUNIT(R4)      ;PUT BLOCK ADDRESS INTO DROP LIST
4580  026754  000207                  EOPX:   RTS     PC                ;RETURN
```

```
4581
4582                                    ;ROUTINE TO GET THE REMAINDER OF THE RANDOM NUMBER
4583                                    ;CALL
4584                                    ;       MOV     NUMBER,R5       ;DIVISOR INTO R5
4585                                    ;       JSR     PC,GETREM
4586                                    ;       RETURN                  ;REMAINDER IS IN R5
4587
4588  026756  013746  032402      GETREM: MOV     $LONUM,-(SP)    ;STORE RANDOM NUMBER ON THE STACK FOR DIVIDE
4589  026762  013746  032400              MOV     $HINUM,-(SP)    ;UPPER PART
4590  026766  010546                      MOV     R5,-(SP)        ;PUT THE DIVISOR ONTO THE STACK
4591  026770  004737  027004              JSR     PC,LINKDV       ;DIVIDE THE RANDOM NUMBERS
4592  026774  012605                      MOV     (SP)+,R5        ;PUT THE REMAINDER INTO R5
4593  026776  005726                      TST     (SP)+           ;ADJUST THE STACK POINTER
4594  027000  000240                      NOP                     ;FOR DEBUGGING HALT
4595  027002  000207                      RTS     PC
4596
4597                                    ;LINK ROUTINE TO THE DIVISION UTILITY SUBROUTINE
4598                                    ;       THIS ROUTINE ALLOWS THE 'SYSMAC' DIVIDE ROUTINE
4599                                    ;       CALLING SEQUENCE TO BE USED
4600
4601  027004  104412                LINKDV: SAVREG                  ;STORE R0 - R5
4602  027006  016605  000026              MOV     26(SP),R5       ;DIVISOR
4603  027012  005004                      CLR     R4              ;OTHER DIVISOR WORD
4604  027014  016602  000030              MOV     30(SP),R2       ;UPPER DIVIDEND WORD
4605  027020  016603  000032              MOV     32(SP),R3       ;LOWER DIVIDEND WORD
4606  027024  005000                      CLR     R0              ;CLEAR OTHER DIVIDEND REGISTERS
4607  027026  005001                      CLR     R1
4608  027030  004737  027052              JSR     PC,M.DPID       ;GO TO THE DIVIDE ROUTINE
4609  027034  010166  000030              MOV     R1,30(SP)       ;REMAINDER ON THE STACK
4610  027040  010366  000032              MOV     R3,32(SP)       ;QUOTIENT ON THE STACK
4611  027044  104413                      RESREG                  ;RESTORE R0 - R5
4612  027046  012616                      MOV     (SP)+,(SP)      ;MOVE RETURN UP THE STACK
4613  027050  000207                      RTS     PC
4614
4615                                    ;       DIVISION UTILITY SUBROUTINE
4616                                    ;       R0-R1-R2-R3=DIVIDEND
4617                                    ;       R4-R5=DIVISOR
4618                                    ;       R0-R1=REMAINDER AFTER DIVISION
4619                                    ;       R2-R3=QUOTIENT AFTER DIVISION
4620                                    ;       ENTER WITH JSR  PC,M.DPID
4621                                    ;
4622  027052  012746  000040        M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
4623  027056  010446                      MOV     R4,-(SP)        ;HIGH ORDER
4624  027060  010546                      MOV     R5,-(SP)        ;LOW ORDER DIVISOR TO THE STACK
4625  027062  005466  000002              NEG     2(SP)           ;FORM NEGATIVE
4626  027066  005416                      NEG     @SP             ;VERSION OF THE DIVISOR
4627  027070  005666  000002              SBC     2(SP)
4628  027074  061601                      ADD     @SP,R1
4629  027076  005500                      ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
4630  027100  066600  000002              ADD     2(SP),R0
4631  027104  103445                      BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
4632  027106  005046                      CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
4633  027110  006103                M.DP40: ROL     R3
4634  027112  006102                      ROL     R2
```

```
4635  027114  006101                          ROL     R1
4636  027116  006100                          ROL     R0
4637  027120  005716                          TST     @SP             ;TEST "CARRY" INDICATOR
4638  027122  001410                          BEQ     M.DP41          ;IF NO "CARRY" THEN ADD ELSE SUBTRACT
4639  027124  005016                          CLR     @SP             ;CLEAR UP FOR NEXT TIME
4640  027126  066601  000002                  ADD     2(SP),R1
4641  027132  005500                          ADC     R0              ;ADD -(DIVISOR)
4642  027134  005516                          ADC     @SP     ;  I    ;SET "CARRY"
4643  027136  066600  000004                  ADD     4(SP),R0;<-
4644  027142  000404                          BR      M.DP42
4645  027144  060501                  M.DP41: ADD     R5,R1
4646  027146  005500                          ADC     R0              ;ADD +(DIVISOR)
4647  027150  005516                          ADC     @SP     ;  I    ;SET "CARRY"
4648  027152  060400                          ADD     R4,R0   ;<-
4649  027154  005516                  M.DP42: ADC     @SP             ;SET "CARRY"
4650  027156  005716                          TST     @SP             ;TEST THE UPDATE INDICATOR
4651  027160  001401                          BEQ     .+4     ;->     ;IF ZERO FORGET IT
4652  027162  005203                          INC     R3      ;  I    ;NO CARRY POSSIBLE HERE
4653  027164  005366  000006                  DEC     6(SP)   ;<-     ;DECREMENT COUNTER
4654  027170  003347                          BGT     M.DP40          ;BRANCH IF MORE TO DO
4655  027172  006003                          ROR     R3
4656  027174  103404                          BCS     M.DP44
4657  027176  060501                          ADD     R5,R1
4658  027200  005500                          ADC     R0
4659  027202  060400                          ADD     R4,R0
4660  027204  000241                          CLC
4661  027206  006103                  M.DP44: ROL     R3
4662  027210  062706  000010                  ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
4663  027214  000242                          CLV
4664  027216  000207                          RTS     PC
4665  027220  062706  000006          M.DP50: ADD     #6,SP
4666  027224  000262                          SEV
4667  027226  000207                          RTS     PC
4668
4669
4670                                  ;ROUTINE TO REPLACE LEADING ZEROS IN A NUMERIC STRING WITH SPACES
4671                                  ;CALL
4672                                  ;       MOV     #ADR,-(SP)      ;ADDRESS OF NUMBER (IN ASCII)
4673                                  ;       JSR     R5,REPLZ
4674                                  ;       .WORD   N               ;'N' IS NUMBER OF DIGITS TO BE TYPED
4675
4676  027230  010046                  REPLZ:  MOV     R0,-(SP)        ;SAVE R0
4677  027232  012746  000012                  MOV     #10.,-(SP)      ;MAXIMUM NUMBER OF DIGITS TO BE TYPED
4678  027236  162516                          SUB     (R5)+,(SP)      ;SUBTACT DIGITS TO FORM INDEX
4679  027240  016600  000006                  MOV     6(SP),R0        ;ADDRESS OF NUMBER TO R0
4680  027244  122710  000060          1$:     CMPB    #'0,(R0)        ;BYTE EQUAL TO ASCII '0' ?
4681  027250  001004                          BNE     2$              ;BR IF NOT
4682  027252  112710  000040                  MOVB    #40,(R0)        ;REPLACE THE ZERO WITH A SPACE
4683  027256  005200                          INC     R0              ;INCREMENT THE BYTE ADDRESS
4684  027260  000771                          BR      1$              ;GO BACK AND LOOK FOR MORE LEADING ZEROS
4685  027262  105710                  2$:     TSTB    (R0)            ;SEE IF ZERO BYTE TERMINATOR
4686  027264  001003                          BNE     3$              ;BR IF NOT
4687  027266  005300                          DEC     R0              ;BACKUP STRING POINTER
4688  027270  112710  000060                  MOVB    #'0,(R0)        ;PUT A ZERO BACK IN
```

```
4689  027274  016637  000006  027310  3$:     MOV     6(SP),4$        ;PUT ADDRESS IN LOCATION FOR TYPEOUT
4690  027302  062637  027310                  ADD     (SP)+,4$        ;BEGINNING OF SIGNIFICANT DIGITS
4691  027306  104401                          TYPE                    ;TYPE THE NUMBER
4692  027310  000000                  4$:     .WORD   0               ;ADDRESS OF NUMBER
4693  027312  012600                          MOV     (SP)+,R0        ;RESTORE R0
4694  027314  012616                          MOV     (SP)+,(SP)      ;MOVE RETURN ADDRESS
4695  027316  000205                          RTS     R5              ;RETURN
4696
4697                                  ;TYPE NUMERICAL ASCIZ STRING SUPRESS LEADING ZEROS
4698
4699                                  ;CALL
4700                                  ;       MOV     #NUMADR,-(SP)   ;FIRST ADDRESS OF ASCIZ STRING
4701                                  ;       JSR     PC,$SUPRS
4702
4703  027320  010046                  $SUPRS: MOV     R0,-(SP)        ;SAVE R0
4704  027322  016600  000004                  MOV     4(SP),R0        ;PICKUP THE POINTER
4705  027326  105710                  1$:     TSTB    (R0)            ;TERMINATOR ?
4706  027330  001403                          BEQ     2$              ;BR IF YES
4707  027332  122720  000060                  CMPB    #'0,(R0)+       ;IS THIS AN ASCII '0' ?
4708  027336  001773                          BEQ     1$              ;BR IF YES
4709  027340  005300                  2$:     DEC     R0              ;BACKUP BY '1'
4710  027342  010037  027350                  MOV     R0,3$           ;SAVE FOR TYPING
4711  027346  104414                          DISPLY                  ;GO PRINT
4712  027350  000000                  3$:     .WORD   0               ;ASCIZ POINTER GOES HERE
4713  027352  012600                          MOV     (SP)+,R0        ;RESTORE R0
4714  027354  012616                          MOV     (SP)+,(SP)      ;RESTORE THE STACK
4715  027356  000207                          RTS     PC              ;RETURN
4716
4717                                  ;ROUTINE TO TYPE AT PRIORITY 4
4718
4719  027360  013746  177776          TYPRI4: MOV     @#PS,-(SP)      ;SAVE THE PRESENT STATUS
4720  027364  012737  000200  177776          MOV     #200,@#PS       ;CHANGE THE PRIORITY TO 4
4721  027372  012537  027402                  MOV     (R5)+,1$        ;MESSAGE ADDRESS
4722  027376  004737  030752                  JSR     PC,$TYPE        ;TYPE THE MESSAGE
4723  027402  000000                  1$:     .WORD   0               ;MESSAGE ADDRESS GOES HERE
4724  027404  000205                          RTS     R5              ;RETURN
4725
4726                                  ;ROUTINE TO TYPE ERRORS
4727                                  ;CALL
4728                                  ;       DISPLY                  ;MUST DEFINED IN 'TRAP' TABLE
4729                                  ;       MESADR                  ;ADDRESS OF MESSAGE
4730                                  ;       RETURN
4731
4732  027406  032777  020000  151524  $DSPLY: BIT     #BIT13,@SWR     ;INHIBIT ERROR TYPEOUT ?
4733  027414  001004                          BNE     1$              ;BR IF YES
4734  027416  005037  177776                  CLR     @#PS            ;SET PRIORITY TO ZERO
4735  027422  000137  030752                  JMP     $TYPE           ;TYPE THE MESSAGE
4736  027426  062716  000002          1$:     ADD     #2,(SP)         ;INCREMENT THE RETURN
4737  027432  000002                          RTI                     ;RETURN
4738
4739                                  ;THIS ROUTINE IS USED TO CHECK IF AN
4740                                  ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
4741                                  ;CALL
4742                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
```

```
4743                                        ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
4744                                        ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
4745                                        ;       RETURN2                 ;CHARACTER IS IN R2 AS A
4746                                        ;                               ;OCTAL DIGIT
4747
4748  027434  121127  000060        CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
4749  027440  103407                        BLO     1$              ;YES -- BRANCH
4750  027442  121127  000067                CMPB    (R1),#'7        ;GREATER THAN SEVEN?
4751  027446  101004                        BHI     1$              ;YES -- BRANCH
4752  027450  111102                        MOVB    (R1),R2         ;GET THE CHARACTER
4753  027452  042702  177770                BIC     #^C7,R2         ;STRIP AWAY THE ASCII
4754  027456  005725                        TST     (R5)+           ;ADJUST FOR RETURN
4755  027460  000205                1$:     RTS     R5              ;RETURN
4756
4757                                        ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
4758                                        ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
4759                                        ;CALL
4760                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
4761                                        ;       JSR     R5,CK.DEC       ;CHECK THE CHARACTER
4762                                        ;       RETURN1                 ;NOT BETWEEN 0 AND 9
4763                                        ;       RETURN2                 ;BETWEEN 0 AND 9
4764                                        ;                               ;R2 = DIGIT
4765
4766  027462  121127  000060        CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
4767  027466  103407                        BLO     1$              ;YES -- BRANCH
4768  027470  121127  000071                CMPB    (R1),#'9        ;GREATER THAN NINE?
4769  027474  101004                        BHI     1$              ;YES -- BRANCH
4770  027476  111102                        MOVB    (R1),R2         ;GET THE CHARACTER
4771  027500  042702  000060                BIC     #'0,R2          ;STRIP AWAY THE ASCII
4772  027504  005725                        TST     (R5)+           ;ADJUST FOR RETURN
4773  027506  000205                1$:     RTS     R5              ;RETURN
4774
4775                                        ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
4776                                        ;DETERMINE WHAT IT IS.
4777                                        ;CALL
4778                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
4779                                        ;       JSR     R5,CK.CHR       ;CHECK CHARACTER
4780                                        ;       RETURN  ADR1            ;UNKNOWN CHARACTER
4781                                        ;       RETURN  ADR2            ;CARRIAGE RETURN * (R1)=ADR+1
4782                                        ;       RETURN  ADR3            ;COMMA * (R1)=ADR+1
4783                                        ;       RETURN  ADR4            ;PERIOD * (R1)=ADR+1
4784                                        ;       RETURN  ADR5            ;DIGIT BETWEEN 0 AND 7.
4785                                        ;       RETURN  ADR6            ;DIGIT BETWEEN 8 AND 9.
4786                                        ;                               ;R2 = DIGIT * (R1)=ADR+1
4787
4788  027510  105711                CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
4789  027512  001417                        BEQ     3$              ;YES -- BRANCH
4790  027514  121127  000054                CMPB    (R1),#',        ;"COMMA"?
4791  027520  001413                        BEQ     2$              ;YES -- BRANCH
4792  027522  121127  000056                CMPB    (R1),#'.        ;"PERIOD"?
4793  027526  001407                        BEQ     1$              ;YES -- BRANCH
4794  027530  004537  027462                JSR     R5,CK.DEC       ;"DIGIT"?
4795  027534  000410                        BR      4$              ;NO -- BRANCH
4796  027536  004537  027434                JSR     R5,CK.OCT       ;OCTAL ?
```

```
4797  027542  005725                          TST     (R5)+           ;DIGIT BETWEEN 8-9
4798  027544  005725                          TST     (R5)+           ;DIGIT BETWEEN 0-7
4799  027546  005725                  1$:     TST     (R5)+           ;PERIOD
4800  027550  005725                  2$:     TST     (R5)+           ;COMMA
4801  027552  005725                  3$:     TST     (R5)+           ;CARRIAGE RETURN
4802  027554  005201                          INC     R1              ;MOVE POINTER TO NEXT CHARACTER
4803  027556  011505                  4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
4804  027560  000205                          RTS     R5              ;RETURN
4805
4806                                  ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
4807                                  ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
4808                                  ;CALL
4809                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
4810                                  ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
4811                                  ;       JSR     R5,CK.DIG       ;CHECK DIGITS
4812                                  ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2=0
4813                                  ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2=0
4814                                  ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
4815                                  ;       RETURN  ADR4            ;"CR" -- R2 = NUMBER
4816                                  ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
4817                                  ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
4818
4819  027562  010446                  CK.DIG: MOV     R4,-(SP)        ;SAVE R4
4820  027564  010346                          MOV     R3,-(SP)        ;SAVE R3
4821  027566  010246                          MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
4822  027570  005002                          CLR     R2              ;START WITH 0
4823  027572  005003                          CLR     R3
4824  027574  005004                          CLR     R4
4825  027576  004537  027510                  JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
4826  027602  027676                          6$                      ;ILLEGAL CHARACTER
4827  027604  027704                          9$                      ;CARRIAGE RETURN
4828  027606  027676                          6$                      ;" "
4829  027610  027700                          7$                      ;"'"
4830  027612  027616                          1$                      ;.
4831  027614  027616                          1$                      ;DIGIT 0-7
4832  027616  062705  000004          1$:     ADD     #4,R5           ;DIGIT 8-9
4833  027622  006303                  2$:     ASL     R3              ;STEP RETURN POINTER PAST "CR" & "PERIOD" RETURNS
4834  027624  010346                          MOV     R3,-(SP)        ;INPUT NUMBER *2
4835  027626  006303                          ASL     R3              ;SAVE *2
4836  027630  006303                          ASL     R3              ;*4
4837  027632  062603                          ADD     (SP)+,R3        ;*8
4838  027634  060203                          ADD     R2,R3           ;(*2)+(*8) = *10
4839  027636  004537  027510                  JSR     R5,CK.CHR       ;UPDATE THE INPUT NUMBER
4840  027642  027702                          8$                      ;CHECK ONE CHARACTER
4841  027644  027666                          5$                      ;ILLEGAL CHARACTER
4842  027646  027664                          4$                      ;CARRIAGE RETURN
4843  027650  027656                          3$                      ;" "
4844  027652  027622                          2$                      ;"'"
4845  027654  027622                          2$                      ;.
4846  027656  105711                  3$:     TSTB    (R1)            ;DIGIT 0-7
4847  027660  001010                          BNE     8$              ;DIGIT 8-9
4848  027662  005724                          TST     (R4)+           ;DOES A "CR" FOLLOW THE "PERIOD"
4849  027664  005724                  4$:     TST     (R4)+           ;BR IF NOT
4850  027666  005724                  5$:     TST     (R4)+           ;INCREMENT THE RETURN
                                                                      ;INCREMENT THE RETURN
                                                                      ;INCREMENT THE RETURN
```

```
4851  027670  020316                          CMP     R3,(SP)         ;CHECK THE MAGNITUDE OF THE NUMBER
4852  027672  101004                          BHI     9$              ;BR IF ENTERED NUMBER TOO LARGE
4853  027674  000402                          BR      8$              ;BYPASS INCREMENT
4854  027676  005725                  6$:     TST     (R5)+           ;INCREMENT RETURN PAST INVALID RETURN
4855  027700  005725                  7$:     TST     (R5)+           ;INCREMENT RETURN
4856  027702  060405                  8$:     ADD     R4,R5           ;SETUP RETURN POINTER
4857  027704  010302                  9$:     MOV     R3,R2           ;ENTERED VALUE
4858  027706  005726                          TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
4859  027710  012603                          MOV     (SP)+,R3        ;RESTORE R3
4860  027712  012604                          MOV     (SP)+,R4        ;RESTORE R4
4861  027714  011505                          MOV     (R5),R5         ;GET RETURN ADDRESS
4862  027716  000205                          RTS     R5              ;RETURN
4863
4864                                  ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
4865                                  ;UNSIGNED DECIMAL ASCIZ NUMBER.
4866                                  ;CALL
4867                                  ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
4868                                  ;       JSR     PC,$SB2D        ;CALL
4869                                  ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
4870                                  ;
4871                                  ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2D', NOT THE VERSION ON
4872                                  ;       THE SYSMAC LIBRARY, REV C AND LATER
4873
4874  027720  016637  000002  027744  $SB2D:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
4875  027726  012746  027744                  MOV     #1$,-(SP)       ;SET THE POINTER
4876  027732  004737  032500                  JSR     PC,$DB2D        ;CALL THE DOUBLE LENGTH CONVERT
4877  027736  012666  000002                  MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
4878  027742  000207                          RTS     PC              ;RETURN
4879  027744  000000  000000          1$:     .WORD   0,0
4880
4881                                  ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
4882                                  ;UNSIGNED OCTAL ASCIZ NUMBER.
4883                                  ;CALL
4884                                  ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
4885                                  ;       JSR     PC,$SB2O        ;CALL
4886                                  ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
4887                                  ;
4888                                  ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2O', NOT THE VERSION ON
4889                                  ;       THE SYSMAC LIBRARY, REV C AND LATER
4890
4891  027750  016637  000002  027774  $SB2O:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
4892  027756  012746  027774                  MOV     #1$,-(SP)       ;SET THE POINTER
4893  027762  004737  032674                  JSR     PC,$DB2O        ;CALL THE DOUBLE LENGTH CONVERT
4894  027766  012666  000002                  MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
4895  027772  000207                          RTS     PC              ;RETURN
4896  027774  000000  000000          1$:     .WORD   0,0
4897
4898                                  ;KEYBOARD INTERRUPT INITIALIZATION ROUTINE
4899                                  ;CALL
4900                                  ;       JSR     PC,$TKINT
4901                                  ;       RETURN
4902
4903  030000  012737  030030  000060  $TKINT: MOV     #$TKSRV,TKVEC   ;SETUP VECTOR
4904  030006  012737  000240  000062          MOV     #PR5,TKVEC+2    ;PRIORITY TO 5
```

```
                                        ;CLEAR THE BUFFER
                                        ;SET INTERRUPT ENABLE
                                        ;RETURN


                        ;KEYBOARD INTERRUPT SERVICE ROUTINE
                        ;CALL
                        ;       ENTER VIA INTERRUPT

                        $TKSRV: RDCHR                   ;READ THE KEYBOARD
                                MOVB    (SP)+,5$        ;GET THE CHARACTER
                                CMP     5$,#3           ;'CONTROL C' ?
                                BNE     1$              ;BR IF NOT
                                TYPE    ,$CRLF          ;CR-LF
                                TYPE    ,$CNTLC         ;'↑C'
                                MOV     #-1,CFLAG       ;SET THE 'CONTROL C' FLAG
                                CLR     @$TKS           ;CLEAR THE TTY INTERRUPT
                                BR      4$              ;
                        1$:     CMP     SWR,#SWREG      ;SOFTWARE SWITCH REGISTER IN USE ?
                                BNE     3$              ;BR IF NOT
                                CMP     5$,#7           ;'CONTROL G' ?
                                BNE     3$              ;BR IF NOT
                                TYPE    ,$CRLF          ;CR-LF
                                TYPE    ,$CNTLG         ;'↑G'
                                MOV     PS,-(SP)        ;PUT THE STATUS WORD ON THE STACK
                                MOV     #2$,-(SP)       ;RETURN ADDRESS
                                CLR     @$TKS           ;CLEAR THE TTY INTERRUPT ENABLE
                                JMP     $GTSWR          ;GET THE SWITCH REGISTER ENTRY
                        2$:     MOV     #100,@$TKS      ;ENABLE TTY KEYBOARD INTERRUPT
                                BR      4$              ;EXIT
                        3$:     TYPE    ,5$             ;ECHO THE CHARACTER
                        4$      RTI                     ;RETURN

                        5$:     .WORD   0               ;ENTERED CHARACTER

                        ;THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                        ;CALL:
                        ;       RDLIN                   ;;INPUT A STRING FROM THE TTY
                        ;       RETURN HERE             ;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                        ;                               ;TERMINATOR WILL BE A BYTE OF ALL 0'S

                        $RDLIN: MOV     R3,-(SP)        ;SAVE R3
                                CLR     -(SP)           ;CLEAR THE RUBOUT KEY
                        1$:     MOV     #$TTYIN,R3      ;GET ADDRESS
                        2$:     CMP     #$TTYIN+10.,R3  ;BUFFER FULL?
                                BLOS    4$              ;BR IF YES
                                RDCHR                   ;GO READ ONE CHARACTER FROM THE TTY
                                MOVB    (SP)+,(R3)      ;GET CHARACTER
                                CMPB    #177,(R3)       ;IS IT A RUBOUT
                                BNE     5$              ;BR IF NO
                                TST     (SP)            ;IS THIS THE FIRST RUBOUT?
                                BNE     6$              ;BR IF NO
                                MOVB    #'\,9$          ;TYPE A BACK SLASH
                                TYPE    ,9$
                                MOV     #-1,(SP)        ;SET THE RUBOUT KEY
```

```
 4959  030234  005303                  6$:     DEC     R3              ;BACKUP BY ONE
 4960  030236  020327  030440                  CMP     R3,#$TTYIN      ;STACK EMPTY?
 4961  030242  103445                          BLO     4$              ;BR IF YES
 4962  030244  111337  030436                  MOVB    (R3),9$         ;SETUP TO TYPEOUT THE DELETED CHAR.
 4963  030250  104401  030436                  TYPE    ,9$             ;GO TYPE
 4964  030254  000746                          BR      2$              ;GO READ ANOTHER CHAR.
 4965  030256  005716                  5$:     TST     (SP)            ;RUBOUT KEY SET?
 4966  030260  001406                          BEQ     7$              ;BR IF NO
 4967  030262  112737  000134  030436          MOVB    #'\,9$          ;TYPE A BACK SLASH
 4968  030270  104401  030436                  TYPE    ,9$
 4969  030274  005016                          CLR     (SP)            ;CLEAR THE RUBOUT KEY
 4970  030276  122713  000025          7$:     CMPB    #25,(R3)        ;IS CHARACTER A CTRL U?
 4971  030302  001003                          BNE     10$             ;BR IF NO
 4972  030304  104401  032246                  TYPE    ,$CNTLU         ;TYPE A CONTROL "U"
 4973  030310  000726                          BR      1$              ;GO START OVER
 4974  030312  122713  000003          10$:    CMPB    #3,(R3)         ;IS CHARACTER A CTRL C ?
 4975  030316  001006                          BNE     8$              ;BR IF NOT
 4976  030320  012737  177777  001262          MOV     #-1,CFLAG       ;SET CNTRL C FLAG
 4977  030326  104401  030452                  TYPE    ,$CNTLC         ;ECHO IT
 4978  030332  000427                          BR      11$             ;EXIT
 4979  030334  122713  000012          8$:     CMPB    #12,(R3)        ;IS CHARACTER A "LF"?
 4980  030340  001011                          BNE     3$              ;BRANCH IF NO
 4981  030342  105013                          CLRB    (R3)            ;CLEAR THE CHARACTER
 4982  030344  104401  001165                  TYPE    ,$CRLF          ;TYPE A "CR" & "LF"
 4983  030350  104401  030440                  TYPE    ,$TTYIN         ;TYPE THE INPUT STRING
 4984  030354  000706                          BR      2$              ;GO PICKUP ANOTHER CHACTER
 4985  030356  104401  001164          4$:     TYPE    ,$QUES          ;TYPE A '?'
 4986  030362  000701                          BR      1$              ;CLEAR THE BUFFER AND LOOP
 4987  030364  111337  030436          3$:     MOVB    (R3),9$         ;ECHO THE CHARACTER
 4988  030370  104401  030436                  TYPE    ,9$
 4989  030374  122723  000015                  CMPB    #15,(R3)+       ;CHECK FOR RETURN
 4990  030400  001274                          BNE     2$              ;LOOP IF NOT RETURN
 4991  030402  105063  177777                  CLRB    -1(R3)          ;CLEAR RETURN (THE 15)
 4992  030406  104401  001166                  TYPE    ,$LF            ;TYPE A LINE FEED
 4993  030412  005726                  11$:    TST     (SP)+           ;CLEAN RUBOUT KEY FROM THE STACK
 4994  030414  012603                          MOV     (SP)+,R3        ;RESTORE R3
 4995  030416  011646                          MOV     (SP),-(SP)      ;ADJUST THE STACK AND PUT ADDRESS OF THE
 4996  030420  016666  000004  000002          MOV     4(SP),2(SP)     ;       FIRST ASCII CHARACTER ON IT
 4997  030426  012766  030440  000004          MOV     #$TTYIN,4(SP)
 4998  030434  000002                          RTI                     ;RETURN
 4999  030436     000          9$:     .BYTE   0               ;STORAGE FOR ASCII CHAR. TO TYPE
 5000  030437     000                  .BYTE   0               ;TERMINATOR
 5001  030440  000012          $TTYIN: .BLKB   10.             ;RESERVE 10 BYTES FOR TTY INPUT
 5002  030452  041536  005015  000    $CNTLC: .ASCIZ  /^C/<CR><LF>    ;CONTROL "C"
 5003
 5004          030460                  .EVEN

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

                                       .SBTTL  MACRO ROUTINES

                                       .SBTTL  ERROR HANDLER ROUTINE

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

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

030460                                  $ERROR:
030460  104407                                CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
030462  010337  001244                        MOV     R3,ATTN         ;SAVE THE ATTENTION REGISTER CONTENTS
030466  010137  001242                        MOV     R1,DRIVE        ;DRIVE NUMBER
030472  032777  020000  150440                BIT     #SW13,@SWR      ;INHIBIT PRINTOUTS ?
030500  001002                                BNE     .+6             ;BR IF YES
030502  004737  023400                        JSR     PC,$TIME        ;TYPE THE TIME
030506  105237  001103                7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
030512  001775                                BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
030514  013777  001102  150420                MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
030522  032777  002000  150410                BIT     #BIT10,@SWR     ;;BELL ON ERROR?
030530  001402                                BEQ     1$              ;;NO - SKIP
030532  104401  001160                        TYPE    ,$BELL          ;;RING BELL
030536  005237  001112                1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
030542  011637  001116                        MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
030546  162737  000002  001116                SUB     #2,$ERRPC
030554  117737  150336  001114                MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
030562  032777  020000  150350                BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
030570  001004                                BNE     20$             ;;SKIP TYPEOUTS
030572  004737  030616                        JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
030576  104401  001165                        TYPE    ,$CRLF
030602                                  20$:
030602  005777  150332                2$:     TST     @SWR            ;;HALT ON ERROR
030606  100002                                BPL     3$              ;;SKIP IF CONTINUE
030610  000000                                HALT                    ;;HALT ON ERROR!
030612  104407                                CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
030614                                  3$:
030614  000002                                RTI                     ;;RETURN

                                        .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                        ;;**************************************************************
                                        ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                        ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                        ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

030616                                  $ERRTYP:
030616  104401  001165                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
030622  010046                                MOV     R0,-(SP)        ;;SAVE R0
030624  005000                                CLR     R0              ;;PICKUP THE ITEM INDEX
030626  153700  001114                        BISB    @#$ITEMB,R0
030632  001004                                BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                        ;;TYPE THE PC OF THE ERROR
030634  013746  001116                        MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
```

```
5067
5068  030640  104402                          TYPOC                   ;;ERROR ADDRESS
5069  030642  000426                          BR      6$              ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
5070  030644  005300                  1$:     DEC     R0              ;;GET OUT
5071  030646  006300                          ASL     R0              ;;ADJUST THE INDEX SO THAT IT WILL
5072  030650  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
5073  030652  006300                          ASL     R0
5074  030654  062700  004006                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
5075  030660  012037  030670                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
5076  030664  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
5077  030666  104401                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
5078  030670  000000                  2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
5079  030672  104401  001165                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
5080  030676  012037  030706          3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
5081  030702  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
5082  030704  104401                          TYPE                    ;;TYPE THE "DATA HEADER"
5083  030706  000000                  4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
5084  030710  104401  001165                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
5085  030714  011000                  5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
5086  030716  001004                          BNE     7$              ;;GO TYPE THE DATA
5087  030720  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
5088  030722  104401  001165                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
5089  030726  000207                          RTS     PC              ;;RETURN
5090  030730                          7$:
5091  030730  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
5092  030732  104402                          TYPOC                   ;;GO TYPE--OCTAL PSCII(ALL DIGITS)
5093  030734  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
5094  030736  001770                          BEQ     6$              ;;BR IF NO
5095  030740  104401  030746                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
5096  030744  000771                          BR      7$              ;;LOOP
5097  030746  020040      000         8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
5098          030752                          .EVEN
5099
5100                                  .SBTTL  TYPE ROUTINE
5101
5102                                  ;;**************************************************************
5103                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
5104                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
5105                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
5106                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
5107                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
5108                                  ;*
5109                                  ;*CALL:
5110                                  ;*1) USING A TRAP INSTRUCTION
5111                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
5112                                  ;*OR
5113                                  ;*      TYPE
5114                                  ;*      MESADR
5115                                  ;*
5116
5117  030752  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
5118  030756  100002                          BPL     1$              ;;BR IF YES
5119  030760  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
5120  030762  000407                          BR      3$              ;;LEAVE
```

```
5121  030764  010046                1$:     MOV     RO,-(SP)        ;;SAVE RO
5122  030766  017600  000002                MOV     @2(SP),RO       ;;GET ADDRESS OF ASCIZ STRING
5123  030772  112046                2$:     MOVB    (RO)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
5124  030774  001005                        BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
5125  030776  005726                        TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
5126  031000  012600                60$:    MOV     (SP)+,RO        ;;RESTORE RO
5127  031002  062716  000002        3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
5128  031006  000002                        RTI                     ;;RETURN
5129  031010  122716  000011        4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
5130  031014  001430                        BEQ     8$
5131  031016  122716  000200                CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
5132  031022  001006                        BNE     5$
5133  031024  005726                        TST     (SP)+           ;;POP  <CR><LF> EQUIV
5134  031026  104401                        TYPE                    ;;TYPE A CR AND LF
5135  031030  001165                        $CRLF
5136  031032  105037  031166                CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
5137  031036  000755                        BR      2$              ;;GET NEXT CHARACTER
5138  031040  004737  031122        5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
5139  031044  123726  001156        6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
5140  031050  001350                        BNE     2$              ;;IF NO GO GET NEXT CHAR.
5141  031052  013746  001154                MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
5142                                                                ;;AND THE NULL CHAR.
5143  031056  105366  000001        7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
5144  031062  002770                        BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
5145  031064  004737  031122                JSR     PC,$TYPEC       ;;GO TYPE A NULL
5146  031070  105337  031166                DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
5147  031074  000770                        BR      7$              ;;LOOP
5148
5149                                ;HORIZONTAL TAB PROCESSOR
5150
5151  031076  112716  000040        8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
5152  031102  004737  031122        9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
5153  031106  132737  000007  031166        BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
5154  031114  001372                        BNE     9$              ;;TAB STOP
5155  031116  005726                        TST     (SP)+           ;;POP SPACE OFF STACK
5156  031120  000724                        BR      2$              ;;GET NEXT CHARACTER
5157  031122  105777  150022        $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
5158  031126  100375                        BPL     $TYPEC
5159  031130  116677  000002  150014        MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
5160  031136  122766  000015  000002        CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
5161  031144  001003                        BNE     1$              ;;BRANCH IF NO
5162  031146  105037  031166                CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
5163  031152  000406                        BR      $TYPEX          ;;EXIT
5164  031154  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
5165  031162  001402                        BEQ     $TYPEX          ;;BRANCH IF YES
5166  031164  105227                        INCB    (PC)+           ;;COUNT THE CHARACTER
5167  031166  000000        $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
5168  031170  000207        $TYPEX: RTS     PC
5169
5170
5171                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
5172
5173                                ;;**************************************************************
5174                                ;*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
                                        
031172  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
031176  116637  000001  031415          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
031204  112637  031417                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
031210  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
031214  000406                          BR      $TYPON
031216  112737  000001  031415  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
031224  112737  000006  031417          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
031232  112737  000005  031414  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
031240  010346                          MOV     R3,-(SP)        ;;SAVE R3
031242  010446                          MOV     R4,-(SP)        ;;SAVE R4
031244  010546                          MOV     R5,-(SP)        ;;SAVE R5
031246  113704  031417                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
031252  005404                          NEG     R4
031254  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
031260  110437  031416                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
031264  113704  031415                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
031270  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
031274  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
031276  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
031300  000404                          BR      3$              ;;GO DO MSB
031302  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
031304  006105                          ROL     R5
031306  006105                          ROL     R5
031310  010503                          MOV     R5,R3
031312  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
031314  105337  031416                  DECB    $OMODE          ;;TYPE THIS DIGIT?
031320  100016                          BPL     7$              ;;BR IF NO
031322  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
031326  001002                          BNE     4$              ;;TEST FOR 0
031330  005704                          TST     R4              ;;SUPPRESS THIS 0?
031332  001403                          BEQ     5$              ;;BR IF YES
031334  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
031336  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
```

```
5229  031342  052703  000040          5$:     BIS     #'  ,R3         ;;MAKE ASCII IF NOT ALREADY
5230  031346  110337  031412                  MOVB    R3,8$           ;;SAVE FOR TYPING
5231  031352  104401  031412                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
5232  031356  105337  031414          7$:     DECB    $OCNT           ;;COUNT BY 1
5233  031362  003347                          BGT     2$              ;;BR IF MORE TO DO
5234  031364  002402                          BLT     6$              ;;BR IF DONE
5235  031366  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
5236  031370  000744                          BR      2$              ;;GO DO THE LAST DIGIT
5237  031372  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
5238  031374  012604                          MOV     (SP)+,R4        ;;RESTORE R4
5239  031376  012603                          MOV     (SP)+,R3        ;;RESTORE R3
5240  031400  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
5241  031406  012616                          MOV     (SP)+,(SP)
5242  031410  000002                          RTI                     ;;RETURN
5243  031412     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
5244  031413     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
5245  031414     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
5246  031415     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
5247  031416  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
5248
5249                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
5250
5251                                  ;;**************************************************************
5252                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
5253                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
5254                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
5255                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
5256                                  ;*REPLACED WITH SPACES.
5257                                  ;*CALL:
5258                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
5259                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
5260
5261  031420                          $TYPDS:
5262  031420  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5263  031422  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5264  031424  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5265  031426  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5266  031430  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5267  031432  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
5268  031436  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
5269  031442  100004                          BPL     1$              ;;BR IF INPUT IS POS.
5270  031444  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
5271  031446  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
5272  031454  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
5273  031456  012703  031634                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
5274  031462  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
5275  031466  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
5276  031470  016001  031624                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
5277  031474  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
5278  031476  002402                          BLT     4$              ;;BR IF DONE
5279  031500  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
5280  031502  000774                          BR      3$
5281  031504  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
5282  031506  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
```

```
5283  031510  001002                          BNE     5$              ;;FALL THROUGH IF 0
5284  031512  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
5285  031514  100407                          BMI     7$              ;;BR IF YES
5286  031516  106316                  5$:     ASLB    (SP)            ;;MSD?
5287  031520  103003                          BCC     6$              ;;BR IF NO
5288  031522  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
5289  031530  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
5290  031534  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
5291  031540  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
5292  031542  005720                          TST     (R0)+           ;;JUST INCREMENTING
5293  031544  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
5294  031550  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
5295  031552  003002                          BGT     8$              ;;GO TO EXIT
5296  031554  010502                          MOV     R5,R2           ;;GET THE LSD
5297  031556  000764                          BR      6$              ;;GO CHANGE TO ASCII
5298  031560  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
5299  031562  100003                          BPL     9$              ;;BR IF NO
5300  031564  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
5301  031572  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
5302  031574  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
5303  031576  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
5304  031600  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5305  031602  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5306  031604  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
5307  031606  104401  031634                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
5308  031612  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
5309  031620  012616                          MOV     (SP)+,(SP)
5310  031622  000002                          RTI                     ;;RETURN TO USER
5311  031624  023420                  $DTBL:  10000.
5312  031626  001750                          1000.
5313  031630  000144                          100.
5314  031632  000012                          10.
5315  031634  000004                  $DBLK:  .BLKW   4
5316
5317                                          .SBTTL  TTY INPUT ROUTINE
5318
5319                                          ;;**********************************************************************
5320                                          .ENABL  LSB
5321
5322                                          ;;**********************************************************************
5323                                          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
5324                                          ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
5325                                          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
5326                                          ;*WHEN OPERATING IN TTY FLAG MODE.
5327  031644  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
5328  031652  001074                          BNE     15$             ;;BRANCH IF NO
5329  031654  105777  147264                  TSTB    @$TKS           ;;CHAR THERE?
5330  031660  100071                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
5331  031662  117746  147260                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
5332  031666  042716  177600                  BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
5333  031672  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
5334  031676  001062                          BNE     15$             ;;NO, RETURN TO USER
5335  031700  123727  001134  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
5336  031706  001456                          BEQ     15$             ;;BRANCH IF YES
```

```
5337
5338  031710  104401  032253                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (↑G)
5339  031714  104401  032260          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
5340  031720  013746  000176                  MOV     $WREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
5341  031724  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
5342  031726  104401  032271                  TYPE    .$MNEW          ;;PROMPT FOR NEW SWR
5343  031732  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
5344  031734  005046                          CLR     -(SP)           ;;THE NEW SWR
5345  031736  105777  147202          7$:     TSTB    @$TKS           ;;CHAR THERE?
5346  031742  100375                          BPL     7$              ;;IF NOT TRY AGAIN
5347
5348  031744  117746  147176                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
5349  031750  042716  177600                  BIC     #↑C177,(SP)     ;;MAKE IT 7-BIT ASCII
5350
5351
5352
5353  031754  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
5354  031760  001005                          BNE     10$             ;;BRANCH IF NOT
5355  031762  104401  032246                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (↑U)
5356  031766  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
5357  031772  000757                          BR      19$             ;;LET'S TRY IT AGAIN
5358
5359
5360  031774  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
5361  032000  001022                          BNE     16$             ;;BRANCH IF NO
5362  032002  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
5363  032006  001403                          BEQ     11$             ;;BRANCH IF YES
5364  032010  016677  000002  147122          MOV     2(SP),@SWR      ;;SAVE NEW SWR
5365  032016  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
5366  032022  104401  001165          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
5367  032026  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
5368  032034  001003                          BNE     15$             ;;BRANCH IF NOT
5369  032036  012777  000100  147100          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
5370  032044  000002                  15$:    RTI                     ;;RETURN
5371  032046  004737  031122          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
5372  032052  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
5373  032056  002420                          BLT     18$             ;;BRANCH IF YES
5374  032060  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
5375  032064  003015                          BGT     18$             ;;BRANCH IF YES
5376  032066  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
5377  032072  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
5378  032076  001403                          BEQ     17$             ;;BRANCH IF YES
5379  032100  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
5380  032102  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
5381  032104  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
5382  032106  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
5383  032112  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
5384  032116  000707                          BR      7$              ;;GET THE NEXT ONE
5385  032120  104401  001164          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
5386  032124  000720                          BR      20$             ;;SIMULATE CONTROL-U
5387                                  .DSABL  LSB
5388
5389
5390                                  ;;*****************************************************************
```

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

032126  011646                 $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
032130  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
032136  105777  147002          1$:     TSTB    @$TKS           ;;WAIT FOR
032142  100375                          BPL     1$              ;;A CHARACTER
032144  117766  146776  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
032152  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
032160  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
032166  001013                          BNE     3$              ;;BRANCH IF NO
032170  105777  146750          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
032174  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
032176  117746  146744                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
032202  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
032206  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
032212  001366                          BNE     2$              ;;IF NOT DISCARD IT
032214  000750                          BR      1$              ;;YES, RESUME
032216  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
032224  002407                          BLT     4$              ;;BRANCH IF YES
032226  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
032234  003003                          BGT     4$              ;;BRANCH IF YES
032236  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
032244  000002                  4$:     RTI                     ;;GO BACK TO USER
032246  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
032253     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
032260  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
032266  020075     000
032271     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
032276  036440  000040

                                        .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

032302                          $RAND:
032302  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
032304  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
032306  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
032310  013700  032402                  MOV     $LONUM,R0       ;;SET R0 WITH LOW
032314  013701  032400                  MOV     $HINUM,R1       ;;SET R1 WITH HIGH
032320  012702  177771                  MOV     #-7,R2          ;;SET SHIFT COUNT
032324  006300                  1$:     ASL     R0              ;;SHIFT R0 LEFT AND
```

```
5445  032326  006101                          ROL     R1              ;;ROTATE CARRY INTO R1 AND
5446  032330  005202                          INC     R2              ;;CHECK FOR DONE
5447  032332  001374                          BNE     1$              ;;CONTINUE SHIFT LOOP
5448  032334  063700  032402                  ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
5449  032340  005501                          ADC     R1              ;;PROPOGATE CARRY
5450  032342  063701  032400                  ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
5451  032346  062700  001057                  ADD     #1057,R0        ;;ADD LOW CONSTANT
5452  032352  005501                          ADC     R1              ;;PROPOGATE CARRY
5453  032354  062701  047401                  ADD     #47401,R1       ;;ADD HIGH CONSTANT
5454  032360  010037  032402                  MOV     R0,$LONUM       ;;SAVE R0
5455  032364  010137  032400                  MOV     R1,$HINUM       ;;SAVE R1
5456  032370  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5457  032372  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5458  032374  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
5459  032376  000207                          RTS     PC              ;;RETURN
5460  032400  176543                  $HINUM: .WORD   176543
5461  032402  123456                  $LONUM: .WORD   123456
5462
5463                                  .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
5464
5465                                  ;;**************************************************************
5466                                  ;*SAVE R0-R5
5467                                  ;*CALL:
5468                                  ;*      SAVREG
5469                                  ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
5470                                  ;*
5471                                  ;*TOP---(+16)
5472                                  ;* +2---(+18)
5473                                  ;* +4---R5
5474                                  ;* +6---R4
5475                                  ;* +8---R3
5476                                  ;*+10---R2
5477                                  ;*+12---R1
5478                                  ;*+14---R0
5479
5480  032404                          $SAVREG:
5481  032404  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5482  032406  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5483  032410  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5484  032412  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5485  032414  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
5486  032416  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5487  032420  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
5488  032424  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
5489  032430  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
5490  032434  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
5491  032440  000002                          RTI
5492
5493                                  ;*RESTORE R0-R5
5494                                  ;*CALL:
5495                                  ;*      RESREG
5496  032442                          $RESREG:
5497  032442  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
5498  032446  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
```

```
5499  032452  012666  000022                    MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
5500  032456  012666  000022                    MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
5501  032462  012605                            MOV     (SP)+,R5        ;;POP STACK INTO R5
5502  032464  012604                            MOV     (SP)+,R4        ;;POP STACK INTO R4
5503  032466  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
5504  032470  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
5505  032472  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
5506  032474  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
5507  032476  000002                            RTI
5508
5509                                    .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
5510
5511                                    ;;**********************************************************************
5512                                    ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
5513                                    ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
5514                                    ;*POSITIVE.
5515                                    ;*CALL
5516                                    ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
5517                                    ;*      JSR     PC,@#$DB2D
5518                                    ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
5519                                                                    ;;IS ON THE STACK
5520
5521
5522  032500  104412                    $DB2D:  SAVREG                  ;;SAVE REGISTERS
5523  032502  016602  000002                    MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
5524  032506  012700  032660                    MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
5525  032512  010066  000002                    MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
5526  032516  012201                            MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
5527  032520  012202                            MOV     (R2)+,R2
5528  032522  012737  000012  032576            MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
5529  032530  012704  032610                    MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
5530  032534  012705  032612                    MOV     #$TNPWR+2,R5
5531  032540  005003                    1$:     CLR     R3              ;;CLEAR PARTIAL
5532  032542  161401                    2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
5533  032544  005602                            SBC     R2
5534  032546  161502                            SUB     (R5),R2
5535  032550  002402                            BLT     3$              ;;BR IF TEN POWER TO LARGE
5536  032552  005203                            INC     R3              ;;ADD 1 TO PARTIAL
5537  032554  000772                            BR      2$              ;;LOOP
5538  032556  062401                    3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
5539  032560  005502                            ADC     R2
5540  032562  062402                            ADD     (R4)+,R2
5541  032564  022525                            CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
5542  032566  052703  000060                    BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
5543  032572  110320                            MOVB    R3,(R0)+        ;;SAVE IT
5544  032574  005327                            DEC     (PC)+           ;;DONE?
5545  032576  000000                    4$:     .WORD   0
5546  032600  001357                            BNE     1$              ;;BR IF NO
5547  032602  105020                            CLRB    (R0)+           ;;TERMINATOR
5548  032604  104413                            RESREG                  ;;RESTORE REGISTERS
5549  032606  000207                            RTS     PC              ;;RETURN
5550  032610  145000                    $TNPWR: 145000                  ;;1.0E09
5551  032612  035632                            35632
5552  032614  160400                            160400                  ;;1.0E08
```

```
5553  032616  002765                          2765
5554  032620  113200                          113200                  ;;1.0E07
5555  032622  000230                          230
5556  032624  041100                          041100                  ;;1.0E06
5557  032626  000017                          17
5558  032630  103240                          103240                  ;;1.0E05
5559  032632  000001                          1
5560  032634  023420                          23420                   ;;1.0E04
5561  032636  000000                          0
5562  032640  001750                          1750                    ;;1.0E03
5563  032642  000000                          0
5564  032644  000144                          144                     ;;1.0E02
5565  032646  000000                          0
5566  032650  000012                          12                      ;;1.0E01
5567  032652  000000                          0
5568  032654  000001                          1                       ;;1.0E00
5569  032656  000000                          0
5570  032660  000014              $DECVL: .BLKB   12.                 ;;RESERVE STORAGE FOR ASCIZ STRING
5571
5572                            .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
5573
5574                            ;;**************************************************************
5575                            ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
5576                            ;*UNSIGNED OCTAL ASCIZ NUMBER.
5577                            ;*CALL
5578                            ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
5579                            ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
5580                            ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
5581
5582
5583  032674  104412              $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
5584  032676  016601  000002              MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
5585  032702  012705  033013              MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
5586  032706  012704  000014              MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
5587  032712  012703  177770              MOV     #^C7,R3         ;;MASK
5588  032716  012100                      MOV     (R1)+,R0        ;;LOWER WORD
5589  032720  012101                      MOV     (R1)+,R1        ;;HIGH WORD
5590  032722  005002                      CLR     R2              ;;TERMINATOR
5591  032724  110245              1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
5592  032726  010002                      MOV     R0,R2           ;;GET THIS DIGIT
5593  032730  005304                      DEC     R4              ;;COUNT THIS CHARACTER
5594  032732  003007                      BGT     3$              ;;BR IF NOT THE LAST DIGIT
5595  032734  001405                      BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
5596  032736  005205                      INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
5597  032740  010566  000002              MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
5598  032744  104413                      RESREG                  ;;RESTORE ALL REGISTERS
5599  032746  000207                      RTS     PC              ;;RETURN TO USER
5600  032750  006203              2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
5601  032752  006001              3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
5602  032754  006000                      ROR     R0              ;;      THE NEXT OCTAL DIGIT
5603  032756  006001                      ROR     R1
5604  032760  006000                      ROR     R0
5605  032762  006001                      ROR     R1
5606  032764  006000                      ROR     R0
```

```
                                                BIC     R3,R2           ;;MASK OUT ALL JUNK
                                                ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
                                                BR      1$              ;;GO PUT IT IN THE DATA TABLE
                                        $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE

                                                .SBTTL  TRAP DECODER

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

033014  010046                          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
033016  016600  000002                          MOV     2(SP),R0        ;;GET TRAP ADDRESS
033022  005740                                  TST     -(R0)           ;;BACKUP BY 2
033024  111000                                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
033026  006300                                  ASL     R0              ;;POSITION FOR INDEXING
033030  016000  033050                          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
033034  000200                                  RTS     R0              ;;GO TO ROUTINE


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

033036  011646                          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
033040  016666  000004  000002                  MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
033046  000002                                  RTI                     ;;RESTORE THE PSW

                                                .SBTTL  TRAP TABLE

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

                                                ;       ROUTINE
                                                ;       -------

033050  033036                          $TRPAD: .WORD   $TRAP2
033052  030752                                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
033054  031216                                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
033056  031172                                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
033060  031232                                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
033062  031420                                  $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

033064  031714                                  $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

033066  031644                                  $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
033070  032126                                  $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
033072  030162                                  $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
033074  032404                                  $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
033076  032442                                  $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
033100  027406                                  $DSPLY  ;;CALL=DISPLY   TRAP+14(104414) ROUTINE TO TYPE ERROR MESSAGES
        000032                          $TERM=.-$TRPAD

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

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

                                        ;COPYRIGHT (C) 1976
                                        ;DIGITAL EQUIPMENT CORP.
                                        ;MAYNARD, MA 01754
                                        ;AUTHOR(S): JIM LACEY/CHUCK HESS

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

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

033102 000000 000000 000000  RPERRS: .WORD   0,0,0,0
033110 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

033112  000                     DRVACT: .BYTE   0               ;DRIVE 0
033113  000                             .BYTE   0               ;DRIVE 1
033114  000                             .BYTE   0               ;DRIVE 2
033115  000                             .BYTE   0               ;DRIVE 3
033116  000                             .BYTE   0               ;DRIVE 4
033117  000                             .BYTE   0               ;DRIVE 5
033120  000                             .BYTE   0               ;DRIVE 6
033121  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

033122  000                     DRVSTA: .BYTE   0               ;DRIVE 0
033123  000                             .BYTE   0               ;DRIVE 1
033124  000                             .BYTE   0               ;DRIVE 2
033125  000                             .BYTE   0               ;DRIVE 3
033126  000                             .BYTE   0               ;DRIVE 4
033127  000                             .BYTE   0               ;DRIVE 5
033130  000                             .BYTE   0               ;DRIVE 6
033131  000                             .BYTE   0               ;DRIVE 7

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

```
                                DRVTYP: .BYTE   0               ;DRIVE 0
033132  000                             .BYTE   0               ;DRIVE 1
033133  000                             .BYTE   0               ;DRIVE 2
033134  000                             .BYTE   0               ;DRIVE 3
033135  000                             .BYTE   0               ;DRIVE 4
033136  000                             .BYTE   0               ;DRIVE 5
033137  000                             .BYTE   0               ;DRIVE 6
033140  000                             .BYTE   0               ;DRIVE 7
033141  000

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

                                DPINT:  .BYTE   0               ;DRIVE 0
033142  000                             .BYTE   0               ;DRIVE 1
033143  000                             .BYTE   0               ;DRIVE 2
033144  000                             .BYTE   0               ;DRIVE 3
033145  000                             .BYTE   0               ;DRIVE 4
033146  000                             .BYTE   0               ;DRIVE 5
033147  000                             .BYTE   0               ;DRIVE 6
033150  000                             .BYTE   0               ;DRIVE 7
033151  000

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

                                DPRQS:  .BYTE   0               ;DRIVE 0
033152  000                             .BYTE   0               ;DRIVE 1
033153  000                             .BYTE   0               ;DRIVE 2
033154  000                             .BYTE   0               ;DRIVE 3
033155  000                             .BYTE   0               ;DRIVE 4
033156  000                             .BYTE   0               ;DRIVE 5
033157  000                             .BYTE   0               ;DRIVE 6
033160  000                             .BYTE   0               ;DRIVE 7
033161  000

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

033162  000000                  TRNSWT: .WORD   0

                                ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
                                        ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
                                        ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
                                        ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
                                        ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.

033164  000000                  SRCHWT: .WORD   0

                                ;RP04/5/6 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
                                        ;ACTDRV=0 IF DRIVER IS INACTIVE
                                        ;ACTDRV>0 IF DRIVER IS ACTIVE
```

```
5769  033166  000                 ACTDRV: .BYTE   0
5770
5771                              ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
5772                                      ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
5773                                      ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
5774
5775  033167  000                 ACTSTR: .BYTE   0
5776
5777                              ;UNLOAD FLAG (ULDFLG=8 BYTES)
5778                                      ;ULDFLG=0 IF NO UNLOAD COMMAND
5779                                      ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
5780                                      ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
5781
5782  033170  000                 ULDFLG: .BYTE   0               ;DRIVE 0
5783  033171  000                         .BYTE   0               ;DRIVE 1
5784  033172  000                         .BYTE   0               ;DRIVE 2
5785  033173  000                         .BYTE   0               ;DRIVE 3
5786  033174  000                         .BYTE   0               ;DRIVE 4
5787  033175  000                         .BYTE   0               ;DRIVE 5
5788  033176  000                         .BYTE   0               ;DRIVE 6
5789  033177  000                         .BYTE   0               ;DRIVE 7
5790
5791                              ;LOOK AHEAD COUNT (LACNT=8 BYTES)
5792                                      ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
5793
5794  033200  000                 LACNT:  .BYTE   0               ;DRIVE 0
5795  033201  000                         .BYTE   0               ;DRIVE 1
5796  033202  000                         .BYTE   0               ;DRIVE 2
5797  033203  000                         .BYTE   0               ;DRIVE 3
5798  033204  000                         .BYTE   0               ;DRIVE 4
5799  033205  000                         .BYTE   0               ;DRIVE 5
5800  033206  000                         .BYTE   0               ;DRIVE 6
5801  033207  000                         .BYTE   0               ;DRIVE 7
5802
5803                              ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
5804                                      ;SAVEFG <0 IF SAVE THE RH11/RP04/5/6 REGISTERS WHEN THE
5805                                      ;OPERATION IS COMPLETED AS PER (DPB+14).
5806                                      ;SAVEFG=0 IF SAVE THE RH11/RP04/5/6 REGISTERS, AS PER
5807                                      ;(DPB+14), AFTER AN ERROR.
5808
5809  033210  000000              SAVEFG: .WORD   0
5810
5811                              ;SEEK FLAG (SEEKFG=1 WORD)
5812                                      ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
5813                                      ;FOR A DATA TRANSFER START A SEARCH COMMAND
5814                                      ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
5815                                      ;DISREGARD THE WINDOW
5816
5817  033212  000000              SEEKFG: .WORD   0
5818
5819                              ;TIMEOUT TABLE (TIMER=8 WORDS)
5820                                      ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
5821
5822  033214  177777              TIMER:  .WORD   -1      ;DRIVE 0
```

```
5823  033216  177777                          .WORD   -1      ;DRIVE 1
5824  033220  177777                          .WORD   -1      ;DRIVE 2
5825  033222  177777                          .WORD   -1      ;DRIVE 3
5826  033224  177777                          .WORD   -1      ;DRIVE 4
5827  033226  177777                          .WORD   -1      ;DRIVE 5
5828  033230  177777                          .WORD   -1      ;DRIVE 6
5829  033232  177777                          .WORD   -1      ;DRIVE 7
5830
5831                                  ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
5832                                          ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
5833                                          ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
5834
5835  033234  177777                  DTUW:   .WORD   -1
5836
5837                                  ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
5838                                          ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
5839                                          ;ATTENTION BIT
5840
5841  033236  001                     ATABIT: .BYTE   1       ;DRIVE 0
5842  033237  002                             .BYTE   2       ;DRIVE 1
5843  033240  004                             .BYTE   4       ;DRIVE 2
5844  033241  010                             .BYTE   10      ;DRIVE 3
5845  033242  020                             .BYTE   20      ;DRIVE 4
5846  033243  040                             .BYTE   40      ;DRIVE 5
5847  033244  100                             .BYTE   100     ;DRIVE 6
5848  033245  200                             .BYTE   200     ;DRIVE 7
5849
5850                                  ;RP04/5/6 TO RH11 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
5851                                  ;CALLING IT FATAL (MCPEMX=1 WORD)
5852
5853  033246  000003                  MCPEMX: .WORD   3
5854
5855                                  ;STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04/5/6),
5856                                  ;RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5)).
5857
5858  033250  176700                  RPADR:  .WORD   176700
5859  033252  000254  000240          RPVEC:  .WORD   254,5*32.
5860
5861                                  ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
5862
5863  033256  000004                  MXLACT: .WORD   4
5864                                  ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
5865
5866  033260  001000                  MXDLTA: .WORD   8.*64.
5867                                  ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
5868
5869  033262  000200                  MNDLTA: .WORD   2*64.
5870                                  ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
5871
5872  033264  000005                  MXWNDW: .WORD   5
5873
5874                                  ;DEFINITIONS OF THE RH11/RP04/5/6 ADDRESS INDEXES
5875
5876          000000                  RPCS1=0                         ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
```

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

                                    ;RH11/RP04/5/6 DRIVER INITIALIZATION CODE
                                            ;THIS ROUTINE WILL DETERMINE WHICH RP04/5/6 DRIVES ARE
                                            ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
                                            ;TO THE PROPER STATE FOR EACH DRIVE.
                                            ;NOTE: THIS ROUTINE CALLS DRVINT
                                    ;
                                    ;CALL
                                    ;
                                    ;       JSR     PC,RPINIT
                                    ;       RETURN
                                    ;
                                    ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                    ;
033266  104412                      RPINIT: SAVREG                  ;SAVE R0 - R5
033270  013746  177776                      MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
033274  012737  000240  177776              MOV     #<5*32.>,@#PS   ;CHANGE THE PRIORITY TO 5
033302  004737  041350                      JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
033306  012701  033102                      MOV     #RPERRS,R1      ;FIRST ADDRESS TO BE CLEARED
033312  012702  033212                      MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
033316  005021                      1$:     CLR     (R1)+           ;CLEAR
033320  020102                              CMP     R1,R2           ;ARE WE DONE?
033322  101775                              BLOS    1$              ;BRANCH IF NO
033324  012702  033234                      MOV     #DTUW,R2        ;LAST ADDRESS
033330  012721  177777              2$:     MOV     #-1,(R1)+       ;INITIALIZE
033334  020102                              CMP     R1,R2           ;DONE?
033336  101774                              BLOS    2$              ;LOOP IF NO
033340  005037  033122                      CLR     DRVSTA          ;SET ALL DRIVES TO OFFLINE
033344  005037  033124                      CLR     DRVSTA+2
033350  005037  033126                      CLR     DRVSTA+4
033354  005037  033130                      CLR     DRVSTA+6
033360  013703  033252                      MOV     RPVEC,R3        ;SETUP THE RH11 RP04/5/6 VECTOR
033364  012723  036132                      MOV     #ISR,(R3)+
033370  013713  033254                      MOV     RPVEC+2,(R3)
033374  013704  033250                      MOV     RPADR,R4        ;FIRST ADDRESS OF RH11 RP04
```

```
5931  033400  012764  000040  000010          MOV     #BIT05,RPCS2(R4)  ;MASSBUS INIT
5932  033406  005001                          CLR     R1                ;START WITH DRIVE 0
5933  033410  004037  033500          3$:     JSR     R0,DRVINT         ;INIT THE DRIVE
5934  033414  000401                          BR      4$                ;'DVA' NOT SET OR PARITY ERROR
5935  033416  000402                          BR      5$                ;NORMAL RETURN
5936  033420  105061  033122          4$:     CLRB    DRVSTA(R1)        ;SET DRIVE STATUS TO OFFLINE
5937  033424  005201                  5$:     INC     R1                ;GO TO NEXT DRIVE
5938  033426  042701  177770                  BIC     #^C7,R1           ;MASK OUT UNUSED BITS
5939  033432  001366                          BNE     3$                ;BR IF MORE DRIVES TO GO
5940  033434  012701  000007                  MOV     #7,R1             ;START WITH DRIVE 7
5941  033440  005037  177776                  CLR     @#PS              ;CLEAR THE PROCESSOR STATUS
5942  033444  105761  033142          6$:     TSTB    DPINT(R1)         ;WAITING FOR DRIVE TO SWITCH PORTS ?
5943  033450  001405                          BEQ     8$                ;BR NOT WAITING
5944  033452  004737  041004                  JSR     PC,SET.IE         ;SET INTERRUPT
5945  033456  105761  033142          7$:     TSTB    DPINT(R1)         ;DRIVE SWITCHED PORTS ?
5946  033462  001375                          BNE     7$                ;BR IF NOT
5947  033464  005301                  8$:     DEC     R1                ;GO TO THE NEXT DRIVE
5948  033466  100366                          BPL     6$                ;CHECK NEXT DRIVE
5949  033470  012637  177776                  MOV     (SP)+,@#PS        ;RESTORE THE PROCESSOR STATUS
5950  033474  104413                          RESREG                    ;RESTORE R0 - R5
5951  033476  000207                          RTS     PC                ;BYE-BYE
5952
5953                                  ;DRIVE INITILIZATION ROUTINE
5954                                          ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
5955                                          ;AN RP04/5/6. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
5956                                          ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
5957                                          ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
5958                                          ;DRVSTA IS SET TO THE PROPER CONDITION.
5959                                  ;CALL
5960                                  ;       MOV     #DRVNUM,R1        ;DRIVE NUMBER TO R1
5961                                  ;       MOV     RPADR,R4          ;UNIBUS ADDRESS OF RH11/RP04/5/6 (RPCS1)
5962                                  ;       JSR     R0,DRVINT         ;CALLED BY A JSR
5963                                  ;       RETURN1                   ;ERROR OCCURRED (PARITY)
5964                                  ;       RETURN2                   ;NORMAL RETURN
5965                                  ;
5966
5967  033500  010546                  DRVINT: MOV     R5,-(SP)          ;SAVE R5
5968  033502  105061  033122                  CLRB    DRVSTA(R1)        ;START DRIVE STATUS AS OFFLINE
5969  033506  105061  033132                  CLRB    DRVTYP(R1)        ;CLEAR THE DRIVE TYPE INDICATOR
5970  033512  105061  033170                  CLRB    ULDFLG(R1)        ;CLEAR THE UNLOAD FLAG
5971  033516  010164  000010                  MOV     R1,RPCS2(R4)      ;SELECT A DRIVE
5972  033522  112764  000111  000000          MOVB    #111,RPCS1(R4)    ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
5973  033530  032764  010000  000010          BIT     #BIT12,RPCS2(R4)  ;NONEXISTENT DRIVE?
5974  033536  001403                          BEQ     1$                ;NO---BRANCH
5975  033540  004737  041004                  JSR     PC,SET.IE         ;GO SET "IE" WITHOUT A "TRE"
5976  033544  000520                          BR      6$                ;LEAVE THIS ROUTINE
5977  033546  105061  033122          1$:     CLRB    DRVSTA(R1)        ;SET DRIVE STATUS TO OFFLINE
5978  033552  032764  004000  000000          BIT     #BIT11,RPCS1(R4)  ;SEE IF DRIVE AVAILABLE
5979  033560  001514                          BEQ     7$                ;BR IF DRIVE NOT AVAILABLE
5980  033562  004037  040324                  JSR     R0,RD.RP          ;READ THE DRIVE TYPE REG.
5981  033566  000026                          RPDT
5982  033570  034032                          8$                        ;ERROR RETURN ADDRESS
5983  033572  012605                          MOV     (SP)+,R5          ;PUT DRIVE TYPE IN R5
5984  033574  112761  000001  033132          MOVB    #1,DRVTYP(R1)     ;SET RP04 INDICATOR
```

```
 5985  033602  022705  020020                      CMP     #20020,R5       ;IS IT A SINGLE PORT RP04?
 5986  033606  001431                              BEQ     2$              ;BRANCH IF YES
 5987  033610  022705  024020                      CMP     #24020,R5       ;IS IT A DUAL PORT RP04?
 5988  033614  001426                              BEQ     2$              ;BR IF YES
 5989  033616  112761  000002  033132              MOVB    #2,DRVTYP(R1)   ;SET RP05 INDICATOR
 5990  033624  022705  020021                      CMP     #20021,R5       ;SINGLE PORT RP05 ?
 5991  033630  001420                              BEQ     2$              ;BR IF YES
 5992  033632  022705  024021                      CMP     #24021,R5       ;DUAL PORT RP05 ?
 5993  033636  001415                              BEQ     2$              ;BR IF YES
 5994  033640  112761  000004  033132              MOVB    #4,DRVTYP(R1)   ;SET RP06 INDICATOR
 5995  033646  022705  020022                      CMP     #20022,R5       ;SINGLE PORT RP06 ?
 5996  033652  001407                              BEQ     2$              ;BR IF YES
 5997  033654  022705  024022                      CMP     #24022,R5       ;DUAL PORT RP06 ?
 5998  033660  001404                              BEQ     2$              ;BR IF YES
 5999  033662  112761  177777  033132              MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
 6000  033670  000446                              BR      6$              ;EXIT
 6001  033672  012746  000121          2$:         MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
 6002  033676  004037  040500                      JSR     R0,WRT.RP
 6003  033702  000000                              RPCS1
 6004  033704  034032                              8$
 6005  033706  012746  010000                      MOV     #BIT12,-(SP)    ;SET FMT22=1
 6006  033712  004037  040500                      JSR     R0,WRT.RP
 6007  033716  000032                              RPOF
 6008  033720  034032                              8$
 6009  033722  004037  040324                      JSR     R0,RD.RP        ;READ RPDS1
 6010  033726  000012                              RPDS1
 6011  033730  034032                              8$
 6012  033732  012605                              MOV     (SP)+,R5        ;AND SAVE IT IN R5
 6013  033734  100015                              BPL     4$              ;BRANCH IF ATA=0
 6014  033736  116164  033236  000016              MOVB    ATABIT(R1),RPAS(R4) ;CLEAR ATTENTION BIT
 6015  033744  004037  040324                      JSR     R0,RD.RP        ;FIND OUT WHY ATA=1
 6016  033750  000014                              RPER1
 6017  033752  034032                              8$
 6018  033754  006126                              ROL     (SP)+           ;IS IT UNSAFE?
 6019  033756  100004                              BPL     4$              ;BR IF NOT
 6020  033760  112761  177777  033122              MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
 6021  033766  000407                              BR      6$              ;EXIT
 6022  033770  005105                  4$:         COM     R5              ;CHECK MOL, DPR, DRY, AND VV
 6023  033772  042705  167077                      BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
 6024  033776  001003                              BNE     6$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
 6025  034000  112761  000001  033122              MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
 6026  034006  005720                  6$:         TST     (R0)+           ;STEP OVER THE ERROR RETURN
 6027  034010  000410                              BR      8$              ;EXIT
 6028  034012  006301                  7$:         ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
 6029  034014  012761  003720  033214              MOV     #2000.,TIMER(R1)  ;START 2 SEC TIMER
 6030  034022  006201                              ASR     R1              ;RESTORE R1
 6031  034024  112761  177777  033142              MOVB    #-1,DPINT(R1)   ;SET PORT INITIALIZE INIDICATOR
 6032  034032  012605                  8$:         MOV     (SP)+,R5        ;RESTORE R5
 6033  034034  000200                              RTS     R0              ;EXIT
 6034
 6035                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
 6036                                  ;
 6037                                  ;CALL
 6038                                  ;
```

```
 6039                                           ;       JSR     R0,@#RP04       ;CALL THE RP04/5/6 DRIVER
 6040                                           ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
 6041                                           ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
 6042                                           ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
 6043                                                                           ;IS AN ERROR CONDITION
 6044
 6045  034036  013746  177776                  RP04:   MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
 6046  034042  013737  033254  177776                  MOV     RPVEC+2,@#PS    ;DON'T ALLOW ANY RP04/5/6 INTERRUPTS
 6047  034050  112737  000001  033166                  MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
 6048  034056  104412                                  SAVREG                  ;SAVE R0 - R5
 6049  034060  011002                                  MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
 6050  034062  005062  000016                          CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
 6051  034066  111201                                  MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
 6052  034070  013704  033250                          MOV     RPADR,R4        ;UNIBUS ADDRESS OF RPCS1
 6053  034074  105761  033122                          TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
 6054  034100  003014                                  BGT     1$              ;BRANCH IF ONLINE
 6055  034102  105761  033170                          TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
 6056  034106  001036                                  BNE     3$              ;BRANCH IF YES
 6057  034110  105761  033142                          TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
 6058  034114  001042                                  BNE     5$              ;BR IF YES
 6059  034116  004037  033500                          JSR     R0,DRVINT       ;GO INIT. THE DRIVE
 6060  034122  000434                                  BR      4$              ;ERROR RETURN
 6061  034124  105761  033122                          TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
 6062  034130  003445                                  BLE     6$              ;BR IF NOT
 6063  034132  105761  033152                  1$:     TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 6064  034136  001031                                  BNE     5$              ;BR IF YES
 6065  034140  010164  000010                          MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
 6066  034144  004037  041446                          JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
 6067  034150  000460                                  BR      9$              ;QUEUE IS FULL
 6068  034152  122762  000103  000002                  CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
 6069  034160  001003                                  BNE     2$              ;BR IF NO
 6070  034162  112761  177777  033170                  MOVB    #-1,ULDFLG(R1)  ;SET THE "UNLOAD IN QUEUE" FLAG
 6071  034170  105761  033112                  2$:     TSTB    DRVACT(R1)      ;IS THIS DRIVE ACTIVE?
 6072  034174  001043                                  BNE     8$              ;BR IF YES
 6073  034176  004737  034330                          JSR     PC,OPT          ;CALL THE OPTIMIZER
 6074  034202  000440                                  BR      8$
 6075  034204  012762  120000  000016          3$:     MOV     #BIT15!BIT13,16(R2) ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
 6076  034212  000434                                  BR      8$              ;EXIT
 6077  034214  004737  035440                  4$:     JSR     PC,CI7          ;GO HANDLE THE PARITY ERROR
 6078  034220  000431                                  BR      8$
 6079  034222  004037  041446                  5$:     JSR     R0,DRVQUE       ;PUT REQUEST IN QUEUE
 6080  034226  000431                                  BR      9$              ;QUEUE IS FULL
 6081  034230  032714  000100                          BIT     #BIT06,(R4)     ;IS 'IE' SET ALREADY ?
 6082  034234  001023                                  BNE     8$              ;BR IF IT IS
 6083  034236  004737  041004                          JSR     PC,SET.IE       ;SET INTERRUPT
 6084  034242  000420                                  BR      8$              ;RETURN, REQUEST IN QUEUE
 6085  034244  105761  033122                  6$:     TSTB    DRVSTA(R1)      ;SEE IF DRIVE OFFLINE OR UNSAFE
 6086  034250  002412                                  BLT     7$              ;BR IF UNSAFE
 6087  034252  012762  140000  000016                  MOV     #BIT15!BIT14,16(R2) ;SET OFFLINE ERROR INDICATOR
 6088  034260  105761  033132                          TSTB    DRVTYP(R1)      ;SEE IF OFFLINE OR NONEXISTENT
 6089  034264  001007                                  BNE     8$              ;BR IF OFFLINE
 6090  034266  012762  100002  000016                  MOV     #BIT15!BIT01,16(R2) ;REPORT DRIVE NONEXISTENT
 6091  034274  000403                                  BR      8$              ;GO TO EXIT
 6092  034276  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2) ;DRIVE IS UNSAFE
```

```
 6093  034304  104413                  5$:     RESREG                          ;RESTORE R0 - R5
 6094  034306  005720                          TST     (R0)+                   ;SETUP FOR NORMAL RETURN
 6095  034310  000401                          BR      10$                     ;FINISH UP, THEN EXIT
 6096  034312  104413                  9$:     RESREG                          ;RESTORE R0 - R5
 6097  034314  005720                  10$:    TST     (R0)+                   ;CORRECT THE RETURN ADDRESS
 6098  034316  105037  033166                  CLRB    ACTDRV                  ;CLEAR "ACTIVE DRIVER" FLAG
 6099  034322  012637  177776                  MOV     (SP)+,@#PS              ;RETURN "PS" TO USER LEVEL
 6100  034326  000200                          RTS     R0                      ;RETURN TO CALLER
 6101
 6102                                  ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
 6103                                  ;
 6104                                  ;CALL
 6105                                  ;       MOV     #DRVNUM,R1              ;DRIVE NUMBER TO R1
 6106                                  ;       JSR     PC,OPT                  ;SETUP A COMMAND
 6107                                  ;
 6108  034330  104412                  OPT:    SAVREG                          ;SAVE R0 - R5
 6109  034332  013746  177776                  MOV     @#PS,-(SP)              ;SAVE PROC. STATUS
 6110  034336  146137  033236  033164          BICB    ATABIT(R1),SRCHWT       ;CLEAR "SEARCH WAIT" KEY
 6111  034344  004737  041522                  JSR     PC,GETREQ               ;GET "DPB" POINTER OF REQUEST
 6112  034350  005702                          TST     R2                      ;IS THERE A REQUEST IN QUEUE?
 6113  034352  001505                          BEQ     7$                      ;NO--BRANCH TO EXIT
 6114  034354  032764  010000  000012          BIT     #BIT12,RPDS1(R4)        ;IS MOL STILL SET ?
 6115  034362  001404                          BEQ     9$                      ;BR IF NOT
 6116  034364  032764  000100  000012          BIT     #BIT6,RPDS1(R4)         ;IS VV SET ?
 6117  034372  001003                          BNE     10$                     ;BR IF IT IS
 6118  034374  004037  033500          9$:     JSR     R0,DRVINT               ;SEE IF DRIVE STILL ONLINE ?
 6119  034400  000470                          BR      6$                      ;PARITY OR 'DVA' NOT SET
 6120  034402  105761  033122          10$:    TSTB    DRVSTA(R1)              ;IS DRIVE ONLINE?
 6121  034406  003014                          BGT     1$                      ;YES--BRANCH
 6122  034410  004737  041544                  JSR     PC,POPQUE               ;NO--REMOVE REQUEST FROM QUEUE
 6123  034414  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)     ;SET OFFLINE STATUS/ERROR INDICATOR
 6124  034422  105761  033122                  TSTB    DRVSTA(R1)              ;IS DRIVE UNSAFE ?
 6125  034426  100064                          BPL     8$                      ;BR TO EXIT IF NOT
 6126  034430  012762  110000  000016          MOV     #BIT15!BIT12,16(R2)     ;SET UNSAFE STATUS/ERROR INDICATOR
 6127  034436  000460                          BR      8$                      ;BRANCH TO EXIT
 6128  034440  012746  000111          1$:     MOV     #111,-(SP)              ;LOAD COMMAND ONTO THE STACK
 6129  034444  004037  040500                  JSR     R0,WRT.RP               ;LOAD THE REGISTER
 6130  034450  000000                          RPCS1                           ;REGISTER INCREMENT
 6131  034452  034562                          6$                              ;ERROR RETURN ADDRESS
 6132  034454  032714  004000                  BIT     #BIT11,(R4)             ;DRIVE AVAILABLE ?
 6133  034460  001427                          BEQ     5$                      ;BR IF NOT
 6134  034462  122762  000150  000002          CMPB    #150,2(R2)              ;IS THE REQUEST FOR I/O?
 6135  034470  002403                          BLT     2$                      ;YES--BRANCH
 6136  034472  004737  035024                  JSR     PC,CI4                  ;CALL THE COMMAND INITIATOR
 6137  034476  000440                          BR      8$                      ;BRANCH TO EXIT
 6138  034500  005737  033234          2$:     TST     DTUW                    ;DATA TRANSFER UNDERWAY?
 6139  034504  002012                          BGE     4$                      ;YES--GO START A SEARCH
 6140  034506  005737  033212                  TST     SEEKFG                  ;DO IMPLIED SEEKS?
 6141  034512  100404                          BMI     3$                      ;YES---BRANCH
 6142  034514  004037  035774                  JSR     R0,LA                   ;NO--DO LOOK AHEAD
 6143  034520  000427                          BR      8$                      ;RETURN HERE ON A PARITY ERROR
 6144  034522  000403                          BR      4$                      ;GO START A SEARCH
 6145  034524  004737  034610          3$:     JSR     PC,CI1                  ;START A DATA TRANSFER
 6146  034530  000423                          BR      8$
```

```
 6147  034532  004737  034716          4$:     JSR     PC,CI3          ;START A SEARCH
 6148  034536  000420                          BR      8$              ;GO TO THE EXIT
 6149  034540  112761  177777  033152  5$:     MOVB    #-1,DPRQS(R1)   ;SET PORT REQUEST INDICATOR
 6150  034546  010103                          MOV     R1,R3           ;SET UP TO ADDRESS WORDS
 6151  034550  006303                          ASL     R3              ;CONVERT TO WORD INDEX
 6152  034552  012763  023420  033214          MOV     #10000.,TIMER(R3)  ;START 10 SEC TIMER
 6153  034560  000402                          BR      7$              ;EXIT
 6154  034562  004737  035440          6$:     JSR     PC,CI7          ;PROCESS THE PARITY ERROR
 6155  034566  032714  000100          7$:     BIT     #BIT06,(R4)     ;SEE IF 'IE' ALREADY SET
 6156  034572  001002                          BNE     8$              ;BR IF SET
 6157  034574  004737  041004                  JSR     PC,SET.IE       ;SET "IE" WITHOUT A "TRE"
 6158  034600  012637  177776          8$:     MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
 6159  034604  104413                          RESREG                  ;RESTORE R0 - R5
 6160  034606  000207                          RTS     PC
 6161
 6162                                  ;COMMAND INITIATOR
 6163                                  ;
 6164                                  ;CALL
 6165                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
 6166                                  ;       MOV     #DPB,R2         ;ADDRESS OF DPB
 6167                                  ;       JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
 6168                                  ;                               ;WHERE:
 6169                                  ;                               ;CI1=DATA TRANSFER
 6170                                  ;                               ;CI2=SEARCH REQUESTED BY DATA XFER
 6171                                  ;                               ;CI4=NOT DATA TRANSFER
 6172
 6173  034610  004737  041544          CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
 6174  034614  010237  033162                  MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
 6175  034620  010203                          MOV     R2,R3           ;DPB ADDRESS TO R3
 6176  034622  013704  033250                  MOV     RPADR,R4        ;RPCS1 ADDRESS
 6177  034626  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 6178  034632  062703  000004                  ADD     #4,R3           ;DESIRED WORD COUNT
 6179  034636  062704  000002                  ADD     #2,R4           ;RPWC ADDRESS
 6180  034642  012324                          MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
 6181  034644  012324                          MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
 6182  034646  012346                          MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
 6183  034650  004037  040500                  JSR     R0,WRT.RP       ;CALL THE LOAD(WRITE) ROUTINE
 6184  034654  000006                          RPDA                    ;INDEX OF REGISTER TO LOAD
 6185  034656  035440                          CI7                     ;ERROR RETURN ADDRESS
 6186  034660  012346                          MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
 6187  034662  004037  040500                  JSR     R0,WRT.RP
 6188  034666  000034                          RPCA
 6189  034670  035440                          CI7
 6190  034672  016246  000002                  MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
 6191  034676  004037  040500                  JSR     R0,WRT.RP
 6192  034702  000000                          RPCS1
 6193  034704  035440                          CI7
 6194  034706  010137  033234                  MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
 6195  034712  000137  035402                  JMP     CI5
 6196  034716  013704  033250          CI3:    MOV     RPADR,R4        ;RPCS1 ADDRESS
 6197  034722  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 6198  034726  016246  000012                  MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
 6199  034732  004037  040500                  JSR     R0,WRT.RP
 6200  034736  000034                          RPCA
```

```
6201  034740  035440                          CI7
6202  034742  116203  000010                  MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
6203  034746  163703  033264                  SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
6204  034752  002002                          BGE     1$
6205  034754  062703  000026                  ADD     #22.,R3
6206  034760  010346                  1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
6207  034762  116266  000011  000001          MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
6208  034770  004037  040500                  JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
6209  034774  000006                          RPDA
6210  034776  035440                          CI7
6211  035000  012746  000131                  MOV     #131,-(SP)      ;START A SEARCH
6212  035004  004037  040500                  JSR     R0,WRT.RP
6213  035010  000000                          RPCS1
6214  035012  035440                          CI7
6215  035014  156137  033236  033164          BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
6216  035022  000567                          BR      CI5
6217  035024  013704  033250          CI4:    MOV     RPADR,R4        ;RPCS1 ADDRESS
6218  035030  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
6219  035034  116203  000002                  MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
6220  035040  122703  000131                  CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
6221  035044  001007                          BNE     1$              ;BRANCH IF NO
6222  035046  016246  000010                  MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
6223  035052  004037  040500                  JSR     R0,WRT.RP
6224  035056  000006                          RPDA
6225  035060  035440                          CI7
6226  035062  000403                          BR      2$              ;GO LOAD CYLINDER
6227  035064  122703  000105          1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
6228  035070  001007                          BNE     3$              ;BRANCH IF NO
6229  035072  016246  000012          2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
6230  035076  004037  040500                  JSR     R0,WRT.RF
6231  035102  000034                          RPCA
6232  035104  035440                          CI7
6233  035106  000546                          BR      CI6
6234  035110  122703  000115          3$:     CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
6235  035114  001013                          BNE     4$              ;BR IF NO
6236  035116  004037  040324                  JSR     R0,RD.RP        ;MERGE THE OFFSET VALUE INTO RPOF
6237  035122  000032                          RPOF                    ;BUT DON'T CHANGE THE UPPER
6238  035124  035440                          CI7
6239  035126  116216  000001                  MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
6240  035132  004037  040500                  JSR     R0,WRT.RP       ;REGISTER (RPOF)
6241  035136  000032                          RPOF
6242  035140  035440                          CI7
6243  035142  000530                          BR      CI6             ;GO START THE COMMAND
6244  035144  122703  000107          4$:     CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
6245  035150  001525                          BEQ     CI6             ;BRANCH IF YES
6246  035152  122703  000117                  CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
6247  035156  001522                          BEQ     CI6             ;BRANCH IF YES
6248  035160  122703  000103                  CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
6249  035164  001016                          BNE     5$              ;BRANCH IF NO
6250  035166  112761  000001  033112          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
6251  035174  105061  033122                  CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
6252  035200  112761  000001  033170          MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
6253  035206  010346                          MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
6254  035210  004037  040500                  JSR     R0,WRT.RP
```

```
 6255  035214  000000                          RPCS1
 6256  035216  035440                          CI7
 6257  035220  000207                          RTS     PC              ;RETURN TO USER
 6258  035222  122703  000143          5$:     CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
 6259  035226  001014                          BNE     6$              ;BRANCH IF NO
 6260  035230  004037  040324                  JSR     R0,RD.RP        ;READ THE OFFSET REGISTER
 6261  035234  000032                          RPOF
 6262  035236  035440                          CI7
 6263  035240  116266  000001  000001        MOVB    1(R2),1(SP)     ;COMBINE "FMT22","ECI", AND "HCI"
 6264  035246  004037  040500                  JSR     R0,WRT.RP       ;LOAD "FMT22", "ECI", AND/OR "HCI".
 6265  035252  000032                          RPOF
 6266  035254  035440                          CI7
 6267  035256  000436                          BR      12$
 6268  035260  122703  000141          6$:     CMPB    #141,R3         ;IS IT A "GET REGISTER" COMMAND?
 6269  035264  001023                          BNE     10$             ;BRANCH IF NO
 6270  035266  016203  000006          7$:     MOV     6(R2),R3        ;POINTS TO 1ST ADDRESS OF WHERE
 6271                                                                  ;TO PUT THE REGISTER(S)
 6272  035272  116237  000010  035310        MOVB    10(R2),9$       ;INIT. THE INDEX FOR THE FIRST REG.
 6273  035300  116205  000011                MOVB    11(R2),R5       ;INDEX OF LAST REG. TO MOVE
 6274  035304  004037  040324          8$:     JSR     R0,RD.RP        ;READ RP04/5/6 REGISTER
 6275  035310  000000          9$:     RPCS1                           ;INDEX OF REG. TO READ
 6276  035312  035440                          CI7
 6277  035314  012623                          MOV     (SP)+,(R3)+     ;GET THE CONTENTS OF RH11/RP04/5/6 REG.
 6278  035316  023705  035310                  CMP     9$,R5           ;LAST REG. BEEN READ?
 6279  035322  001414                          BEQ     12$             ;GET OUT IF YES
 6280  035324  062737  000002  035310        ADD     #2,9$           ;INCREASE THE INDEX BY 2
 6281  035332  000764                          BR      8$              ;LOOP--MORE TO READ
 6282  035334  122703  000145          10$:    CMPB    #145,R3         ;IS IT A "SELECT DRIVE" COMMAND?
 6283  035340  001405                          BEQ     12$             ;BRANCH IF YES
 6284  035342  010346          11$:    MOV     R3,-(SP)        ;LOAD THE COMMAND
 6285  035344  004037  040500                  JSR     R0,WRT.RP
 6286  035350  000000                          RPCS1
 6287  035352  035440                          CI7
 6288  035354  004737  041544          12$:    JSR     PC,POPQUE       ;REMOVE REQ. FROM QUEUE
 6289  035360  052762  000200  000016        BIS     #BIT07,16(R2)   ;SET THE "DONE" BIT
 6290  035366  005737  033210                  TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
 6291  035372  100002                          BPL     13$             ;BRANCH IF NO
 6292  035374  004737  040666                  JSR     PC,SVRH11       ;YES--GO SAVE THE REGISTERS
 6293  035400  000207          13$:    RTS     PC              ;RETURN TO USER
 6294  035402  006301          CI5:    ASL     R1
 6295  035404  012761  001750  033214        MOV     #1000.,TIMER(R1)        ;SET A ONE SECOND TIMER
 6296  035412  006201                          ASR     R1
 6297  035414  112761  000001  033112        MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE
 6298  035422  000207                          RTS     PC              ;RETURN TO THE USER
 6299  035424  010346          CI6:    MOV     R3,-(SP)        ;LOAD THE COMMAND
 6300  035426  004037  040500                  JSR     R0,WRT.RP
 6301  035432  000000                          RPCS1
 6302  035434  035440                          CI7
 6303  035436  000761                          BR      CI5
 6304  035440  032764  010000  000010  CI7:    BIT     #BIT12,RPCS2(R4)  ;DRIVE NON-EXISTENT ?
 6305  035446  001034                          BNE     CI8             ;BR IF YES
 6306  035450  005702                  1$:     TST     R2              ;ANYTHING IN QUEUE ?
 6307  035452  001405                          BEQ     CI7B            ;BR IF NOT
 6308  035454  012762  104000  000016        MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
```

```
 6309  035462  004737  040666                    JSR     PC,SVRH11       ;GO SAVE THE RH11/RP04/5/6 REGISTERS
 6310  035466  012746  000111            CIT8:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
 6311  035472  004037  040500                    JSR     R0,WRT.RP
 6312  035476  000000                            RPCS1
 6313  035500  035540                            CIB
 6314  035502  004737  041426                    JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
 6315  035506  105061  033170                    CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
 6316  035512  105061  033112                    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
 6317  035516  020137  033234                    CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
 6318  035522  001005                            BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
 6319  035524  005037  033162                    CLR     TRNSWT
 6320  035530  012737  177777  033234            MOV     #-1,DTUW
 6321  035536  000207                    1$:     RTS     PC
 6322  035540  104412                    CIB:    SAVREG                  ;SAVE R0 - R5
 6323  035542  032764  010000  000010            BIT     #BIT12,RPCS2(R4)  ;IS 'NED' SET ?
 6324  035550  001002                            BNE     1$              ;BR IF YES
 6325  035552  005001                            CLR     R1
 6326  035554  005003                            CLR     R3
 6327  035556  105761  033112            1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
 6328  035562  001443                            BEQ     5$              ;BRANCH IF NO
 6329  035564  013702  033162                    MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
 6330  035570  020137  033234                    CMP     R1,DTUW         ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
 6331  035574  001402                            BEQ     2$              ;BRANCH IF YES
 6332  035576  004737  041522                    JSR     PC,GETREQ       ;GET THE CPB POINTER
 6333  035602  005702                    2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
 6334  035604  001415                            BEQ     4$              ;BR IF NOT
 6335  035606  032764  010000  000010            BIT     #BIT12,RPCS2(R4)  ;'NED' SET ?
 6336  035614  001404                            BEQ     3$              ;BR IF NOT
 6337  035616  012762  100002  000016            MOV     #BIT15!BIT01,16(R2)  ;SET 'DRIVE NON-EXISTENT' INDICATOR
 6338  035624  000405                            BR      4$              ;CONTINUE
 6339  035626  012762  102000  000016    3$:     MOV     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
 6340  035634  004737  040666                    JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
 6341  035640  012763  177777  033214    4$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 6342  035646  105061  033112                    CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
 6343  035652  020137  033234                    CMP     R1,DTUW         ;IS THIS DRIVE SETUP FOR A TRANSFER
 6344  035656  001005                            BNE     5$              ;BR IF NOT
 6345  035660  012737  177777  033234            MOV     #-1,DTUW        ;RESET THE INDICATOR
 6346  035666  005037  033162                    CLR     TRNSWT          ;CLEAR THE TRANSFER QUEUE
 6347  035672  105061  033170            5$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
 6348  035676  032764  010000  000010            BIT     #BIT12,RPCS2(R4)  ;'NED' SET ?
 6349  035704  001021                            BNE     6$              ;BR IF YES
 6350  035706  005201                            INC     R1              ;MOVE TO THE NEXT DRIVE
 6351  035710  062703  000002                    ADD     #2,R3
 6352  035714  042701  177770                    BIC     #^C7,R1
 6353  035720  001316                            BNE     1$              ;BRANCH IF MORE DRIVES
 6354  035722  012737  177777  033234            MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
 6355  035730  005037  033162                    CLR     TRNSWT          ;CLEAR THE 'TRANSFER WAIT' QUEUE
 6356  035734  004737  041350                    JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
 6357  035740  012764  000040  000010            MOV     #BIT05,RPCS2(R4) ;DO A MASSBUS INIT.
 6358  035746  000406                            BR      7$              ;CONTINUE
 6359  035750  004737  041426            6$:     JSR     PC,EMPTYQ       ;CLEAR THE DRIVE'S QUEUE
 6360  035754  105061  033122                    CLRB    DRVSTA(R1)      ;SET DRIVE TO OFFLINE
 6361  035760  105061  033132                    CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
 6362  035764  004737  041004            7$:     JSR     PC,SET.IE       ;SET "IE" WITHOUT "TRE"
```

```
6363  035770  104413                        RESREG                  ;RESTORE R0 - R5
6364  035772  000207                        RTS     PC              ;RETURN
6365
6366                                  ;LOOK AHEAD ROUTINE
6367                                  ;
6368                                  ;CALL
6369                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
6370                                  ;       MOV     #DPB,R2         ;POINT TO DPB
6371                                  ;       JSR     RC,LA           ;GO CHECK THE WINDOW
6372                                  ;       RETURN1                 ;ERROR RETURN
6373                                  ;       RETURN2                 ;START A SEARCH
6374                                  ;       RETURN3                 ;START A DATA TRANSFER
6375
6376  035774  013704  033250          LA:     MOV     RPADR,R4        ;GET RPCS1'S ADDRESS
6377  036000  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
6378  036004  004037  040324                  JSR     R0,RD.RP        ;READ CURRENT CYLINDER
6379  036010  000036                          RPCC
6380  036012  036124                          4$                      ;ERROR RETURN ADDRESS
6381  036014  022662  000012                  CMP     (SP)+,12(R2)    ;IS CURRENT CYLINDER=DESIRED
6382                                                                  ;CYLINDER?
6383  036020  001037                          BNE     3$              ;EXIT IF NO
6384  036022  105261  033200                  INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
6385  036026  126137  033200  033256          CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
6386  036034  003026                          BGT     2$              ;BRANCH IF YES
6387  036036  116203  000010                  MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
6388  036042  000303                          SWAB    R3              ;MULT. BY 64--ALIGN WITH
6389  036044  006203                          ASR     R3              ;LOOK AHEAD REGISTER
6390  036046  006203                          ASR     R3
6391  036050  012737  000340  177776          MOV     #340,@#PS       ;PRIORITY LEVEL "7"
6392  036056  004037  040324                  JSR     R0,RC.PP        ;READ LOOK AHEAD REGISTER
6393  036062  000020                          RPLA
6394  036064  036124                          4$
6395  036066  162603                          SUB     (SP)+,R3        ;CALCULATE THE DELTA
6396  036070  002002                          BGE     1$
6397  036072  062703  002600                  ADD     #<22.*64.>,R3   ;MAKE THE DELTA POSITIVE
6398  036076  023703  033260          1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
6399  036102  002406                          BLT     3$              ;IF IT IS WITHIN THE
6400  036104  023703  033262                  CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
6401  036110  002003                          BGE     3$              ;THE LOOK AHEAD COUNT
6402  036112  105061  033200          2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
6403  036116  005720                          TST     (R0)+
6404  036120  005720                  3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
6405  036122  000402                          BR      5$              ;EXIT
6406  036124  004737  035440          4$:     JSR     PC,CI7          ;PROCESS THE ERROR
6407  036130  000200                  5$:     RTS     R0              ;RETURN
6408
6409                                  ;INTERRUPT SERVICE ROUTINE
6410
6411  036132  112737  000001  033166  ISR:    MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
6412  036140  104412                          SAVREG                  ;SAVE R0 - R5
6413  036142  013704  033250                  MOV     RPADR,R4        ;ADDRESS OF RHSCS1
6414  036146  013701  033234                  MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
6415  036152  002403                          BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
6416  036154  004737  036176                  JSR     PC,TD           ;CALL TRANSFER DONE
```

```
6417  036160  000402                          BR      2$              ;EXIT
6418  036162  004737  036460          1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
6419  036166  104413                  2$:     RESREG                  ;RESTORE R0 - R5
6420  036170  105037  033166                  CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
6421  036174  000002                          RTI                     ;RETURN
6422
6423                                  ;TRANSFER DONE ROUTINE
6424
6425  036176  105061  033112          TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
6426  036202  012737  177777  033234          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
6427  036210  006301                          ASL     R1
6428  036212  012761  177777  033214          MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
6429  036220  006201                          ASR     R1
6430  036222  013702  033162                  MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
6431  036226  005037  033162                  CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
6432  036232  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET DONE
6433  036240  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
6434  036244  004037  040324                  JSR     R0,RD.RP        ;TRANSFER ERROR(TRE=1)?
6435  036250  000000                          RPCS1
6436  036252  035440                          CI7
6437  036254  006126                          ROL     (SP)+
6438  036256  100421                          BMI     3$              ;BR IF YES
6439  036260  005737  033210                  TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
6440  036264  100002                          BPL     1$              ;BRANCH IF NO
6441  036266  004737  040666                  JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
6442  036272  004737  036352          1$:     JSR     PC,WC           ;SEE IF WRITE CHECK TO BE PUT IN QUEUE
6443  036276  004737  041522                  JSR     PC,GETREQ       ;GET DPB POINTER
6444  036302  005702                          TST     R2              ;ENTRY FOR DRIVE ?
6445  036304  001403                          BEQ     2$              ;BR IF NOT
6446  036306  004737  034330                  JSR     PC,OPT          ;CALL OPTIMIZER
6447  036312  000462                          BR      SC              ;CHECK OTHER DRIVES
6448  036314  012714  000113          2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
6449  036320  000457                          BR      SC              ;CHECK FOR OTHER DRIVES
6450  036322  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
6451  036330  004737  041426                  JSR     PC,EMPTYQ       ;EMPTY THE "DRIVE'S WAIT" QUEUE
6452  036334  004737  040666                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
6453  036340  012714  040111                  MOV     #40111,(R4)     ;ISSUE A "DRIVE CLEAR"
6454  036344  012714  000113                  MOV     #113,(R4)       ;ISSUE A RELEASE TO THE DRIVE
6455  036350  000443                          BR      SC              ;CHECK FOR OTHER DRIVES
6456
6457                                  ;FORCED WRITE CHECK ROUTINE
6458
6459  036352  005737  001404          WC:     TST     AUTOCK          ;AUTOMATIC WRITE CHECKS ?
6460  036356  001437                          BEQ     2$              ;BR IF NOT
6461  036360  122762  000002  000024          CMPB    #2,$CODE(R2)    ;LAST OPERATION WRITE DATA ?
6462  036366  001404                          BEQ     1$              ;BR IF IT WAS
6463  036370  122762  000003  000024          CMPB    #3,$CODE(R2)    ;LAST OPERATION WRITE HEADER & DATA ?
6464  036376  001027                          BNE     2$              ;BR IF NOT
6465  036400  004037  041446          1$:     JSR     R0,DRVQUE       ;PUT THE OPERATION IN THE QUEUE
6466  036404  000424                          BR      2$              ;QUEUE IS FULL
6467  036406  005062  000016                  CLR     16(R2)          ;CLEAR 'DONE' BIT IN DPB
6468  036412  116262  000234  000027          MOVB    $RPCS1(R2),$PREV0(R2)   ;SAVE WRITE OPERATION CODE
6469  036420  016262  000012  000034          MOV     $CYL(R2),$PREVA+2(R2)   ;SAVE CYLINDER
6470  036426  016262  000010  000032          MOV     $SEC(R2),$PREVA(R2)     ;SAVE SECTOR AND TRACK ADDRESSES
```

```
 6471  036434  142762  000002  000024          BICB    #2,$CODE(R2)      ;CHANGE WRITE TO CHECK
 6472  036442  142762  000020  000002          BICB    #20,$COMND(R2)    ;CHANGE DRIVER CODE TO WRITE CHECK
 6473  036450  152762  000010  000002          BISB    #10,$COMND(R2)    ;FINISH CHANGING CODE TO WRITE CHECK
 6474  036456  000207                  2$:     RTS     PC                ;EXIT
 6475
 6476                                  ;SPECIAL CONDITION ROUTINE
 6477
 6478  036460  116403  000016          SC:     MOVB    RPAS(R4),R3       ;READ "RPAS"
 6479  036464  001012                          BNE     2$                ;BRANCH IF ANY 'ATA' BITS SET
 6480  036466  004037  040324                  JSR     R0,RD.RP          ;READ CONTROL AND STATUS REGISTER
 6481  036472  000000                          RPCS1
 6482  036474  035540                          CIB
 6483  036476  106126                          ROLB    (SP)+             ;IS "IE"=1?
 6484  036500  100403                          BMI     1$                ;YES, NO DRIVES TO CHECK
 6485  036502  104001                          ERROR   1                 ;REPORT AN ILLEGAL INTERRUPT
 6486  036504  004737  041004                  JSR     PC,SET.IE         ;SET INTERRUPT ENABLE
 6487  036510  000207                  1$:     RTS     PC                ;RETURN
 6488  036512  005046                  2$:     CLR     -(SP)             ;PROCESS ALL DRIVES THAT HAVE
 6489  036514  110316                          MOVB    R3,(SP)           ;AN "ATA"=1
 6490  036516  012703  000001                  MOV     #1,R3
 6491  036522  005001                          CLR     R1
 6492  036524  030316                  SC3:    BIT     R3,(SP)           ;ATA=1?
 6493  036526  001005                          BNE     SC5               ;YES--BRANCH
 6494  036530  005201                  SC4:    INC     R1                ;MOVE TO THE NEXT DRIVE
 6495  036532  106303                          ASLB    R3
 6496  036534  001373                          BNE     SC3               ;BRANCH IF MORE TO CHECK?
 6497  036536  005726                          TST     (SP)+             ;CLEAN OFF THE STACK
 6498  036540  000207                          RTS     PC                ;RETURN TO USER
 6499  036542  105761  033142          SC5:    TSTB    DPINT(R1)         ;INITIALIZING THE DRIVE ?
 6500  036546  001402                          BEQ     1$                ;BR IF NOT
 6501  036550  000137  037436                  JMP     SC13              ;PROCESS THE DRIVE
 6502  036554  105761  033152          1$:     TSTB    DPRQS(R1)         ;PORT REQUEST OUTSTANDING ?
 6503  036560  001402                          BEQ     2$                ;BR IF NOT
 6504  036562  000137  037436                  JMP     SC13              ;START THE OUTSTANDING COMMAND
 6505  036566  105761  033122          2$:     TSTB    DRVSTA(R1)        ;CHECK THE DRIVE STATUS
 6506  036572  003025                          BGT     5$                ;BRANCH IF ONLINE
 6507  036574  105761  033170                  TSTB    ULDFLG(R1)        ;UNLOAD IN PROGRESS?
 6508  036600  002422                          BLE     5$                ;BRANCH IF NOT
 6509  036602  004737  041522                  JSR     PC,GETREQ         ;GET DPB POINTER
 6510  036606  004737  040666                  JSR     PC,SVR.11         ;SAVE THE RH11/RP04/5/6 REGISTERS
 6511  036612  004737  037366                  JSR     PC,SC12           ;SAVE RPDS1, RPER1, RPER2, AND RPER3
 6512                                          ;ALSO DO A DRIVE INIT (DRVINT)
 6513  036616  105761  033122                  TSTB    DRVSTA(R1)        ;DID DRIVE COME ONLINE?
 6514  036622  003416                          BLE     6$                ;NO---BRANCH
 6515  036624  032737  040000  033102          BIT     #BIT14,RPERRS     ;WAS THERE AN ERROR?
 6516  036632  001002                          BNE     3$                ;BR IF ERROR
 6517  036634  000137  037276                  JMP     SC11              ;NO ERROR
 6518  036640  013705  033104          3$:     MOV     RPERRS+2,R5       ;YES -- PICKUP RPER1 AND
 6519  036644  000476                          BR      SC6A              ;GO PROCESS THE ERROR
 6520  036646  105761  033112          5$:     TSTB    DRVACT(R1)        ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
 6521  036652  001027                          BNE     SC6               ;BR IF EITHER
 6522  036654  004737  037366                  JSR     PC,SC12           ;SAVE RPDS1, RPER1, RPER2, AND RPER3
 6523                                          ;ALSO DO A DRVINT
 6524  036660  105761  033142          6$:     TSTB    DPINT(R1)         ;TRYING TO INIT THE DRIVE ?
```

```
6525  036664  001321                          BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
6526  036666  105761  033122                  TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
6527  036672  100412                          BMI     7$              ;BR IF UNSAFE
6528  036674  032737  020000  033110          BIT     #BIT13,RPERR5+6 ;ADDRESS PLUG CHANGED ?
6529  036702  001011                          BNE     9$              ;BR IF YES
6530  036704  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
6531  036710  004037  040500                  JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
6532  036714  000000                          RPCS1                   ;REGISTER INDEX
6533  036716  037246                          SC8                     ;PARITY EXIT ADDRESS
6534  036720  011605                  7$:     MOV     (SP),R5         ;PICKUP (RPAS) BEFORE THE ERROR CALL
6535  036722  104002                          ERROR   2               ;REPORT THE UNEXPECTED ATTENTION
6536  036724  000701                          BR      SC4             ;GO CHECK FOR MORE ATA'S
6537  036726                          8$:
6538  036726  104005                          ERROR   5               ;REPORT THE ADDRESS PLUG CHANGE
6539  036730  000677                          BR      SC4             ;CHECK FOR MORE DRIVES
6540  036732  006301                  SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
6541  036734  012761  177777  033214          MOV     #-1,TIMER(R1)   ;STOP THE TIMER
6542  036742  006201                          ASR     R1              ;RESTORE THE DRIVE ADDRESS
6543  036744  004737  041522                  JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
6544  036750  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
6545  036754  004037  040324                  JSR     R0,RD.RP        ;READ THE RP04'S STATUS REG.
6546  036760  000012                          RPDS1
6547  036762  037246                          SC8
6548  036764  011605                          MOV     (SP),R5         ;AND PUT IT IN R5
6549  036766  006126                          ROL     (SP)+           ;WAS THERE AN ERROR?
6550  036770  100407                          BMI     1$              ;BR IF ERROR
6551  036772  105761  033112                  TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
6552  036776  003137                          BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
6553  037000  052762  100210  000016          BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
6554  037006  000470                          BR      SC7
6555  037010  004037  040324          1$:     JSR     R0,RD.RP        ;READ ERROR REGISTER #1
6556  037014  000014                          RPER1
6557  037016  037246                          SC8
6558  037020  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
6559  037022  004737  040666                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
6560  037026  012746  000111                  MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
6561  037032  004037  040500                  JSR     R0,WRT.RP
6562  037036  000000                          RPCS1
6563  037040  037246                          SC8
6564  037042  006105                  SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
6565  037044  100406                          BMI     1$              ;BRANCH IF YES
6566  037046  005702                          TST     R2              ;ANYTHING IN QUEUE ?
6567  037050  001447                          BEQ     SC7             ;BR IF NOT
6568  037052  052762  100240  000016          BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
6569  037060  000443                          BR      SC7
6570  037062  004037  040324          1$:     JSR     R0,RD.RP        ;READ DRIVE STATUS REG. #1
6571  037066  000012                          RPDS1
6572  037070  037246                          SC8
6573  037072  011605                          MOV     (SP),R5         ;SAVE RPDS1 IN R5
6574  037074  006126                          ROL     (SP)+           ;"ERR"=1?
6575  037076  100011                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
6576  037100  112761  177777  033122          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
6577  037106  004737  040666                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
6578  037112  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
```

```
6579  037120  000423                          BR      SC7
6580  037122  032705  010000          2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
6581  037126  001015                          BNE     3$              ;BR IF YES
6582  037130  112761  177777  033112          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
6583  037136  112761  000001  033122          MOVB    #1,DRVSTA(R1)   ;ONLINE
6584  037144  006301                          ASL     R1
6585  037146  012761  072460  033214          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
6586  037154  006201                          ASR     R1
6587  037156  000137  036530                  JMP     SC4
6588  037162  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
6589  037170  105061  033112          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
6590  037174  004737  041426                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
6591  037200  105761  033170                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS OR QUEUE?
6592  037204  003002                          BGT     1$              ;BR IF NOT
6593  037206  105061  033170                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
6594  037212  116164  033236  000016  1$:     MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
6595  037220  105761  033122                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
6596  037224  100406                          BMI     2$              ;BR IF IT IS
6597  037226  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
6598  037232  004037  040500                  JSR     R0,WRT.RP       ;WRITE THE COMMAND INTO RPCS1
6599  037236  000000                          RPCS1                   ;REGISTER INDEX
6600  037240  037246                          SC8                     ;PARITY EXIT ADDRESS
6601  037242  000137  036530          2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
6602  037246  105761  033112          SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
6603  037252  001405                          BEQ     1$              ;YES--BRANCH
6604  037254  004737  041522                  JSR     PC,GETREQ       ;GET DPB POINTER
6605  037260  004737  035440                  JSR     PC,CI7          ;PROCESS THE PARITY ERROR
6606  037264  000402                          BR      2$              ;CONTINUE
6607  037266  004737  035466          1$:     JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
6608  037272  000137  036530          2$:     JMP     SC4             ;CHECK MORE DRIVES
6609  037276  105761  03317C          SC11:   TSTB    ULDFLG(R1)      ;"UNLOAD IN PROGRESS"?
6610  037302  003402                          BLE     1$              ;BRANCH IF NO
6611  037304  105061  033170                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
6612  037310  105061  033112          1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
6613  037314  136137  033236  033164          BITB    ATABIT(R1),SRCHWT  ;DOING A SEARCH OPERATION FOR
6614                                                                  ;AN I/O COMMAND?
6615  037322  001012                          BNE     2$              ;BRANCH IF YES
6616  037324  004737  041544                  JSR     PC,POPQUE       ;REMOVE REQUEST FROM QUEUE
6617  037330  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET "DONE" BIT
6618  037336  005737  033210                  TST     SAVEFG          ;SAVE THE REGISTERS?
6619  037342  100002                          BPL     2$              ;BRANCH IF NO
6620  037344  004737  040666                  JSR     PC,SVRH11       ;YES--SAVE ALL OF THE RH11/RP04/5/6 REG'S
6621  037350  116164  033236  000016  2$:     MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
6622  037356  004737  034330                  JSR     PC,OPT          ;START A REQUEST
6623  037362  000137  036530                  JMP     SC4             ;CHECK FOR MORE DRIVES
6624  037366  010164  000010          SC12:   MOV     R1,RPCS2(R4)    ;SELECT DRIVE
6625  037372  016437  000012  033102          MOV     RPDS1(R4),RPERRS        ;SAVE THE FOUR REGISTERS THAT
6626  037400  016437  000014  033104          MOV     RPER1(R4),RPERRS+2      ;WILL TELL US SOMETHING
6627  037406  016437  000040  033106          MOV     RPER2(R4),RPERRS+4
6628  037414  016437  000042  033110          MOV     RPER3(R4),RPERRS+6
6629  037422  004037  033500                  JSR     R0,DRVINT       ;INIT. THE STATE OF THE DRIVE
6630  037426  000401                          BR      1$              ;TAKE ERROR EXIT
6631  037430  000207                          RTS     PC              ;RETURN
6632  037432  005726                  1$:     TST     (SP)+           ;POP PC OFF OF THE STACK
```

```
6633  037434  000704                          BR      SC8             ;PROCESS THE PARITY ERROR
6634  037436  006301                  SC13:   ASL     R1              ;SETUP TO ADDRESS WORDS
6635  037440  012761  177777  033214          MOV     #-1,TIMER(R1)   ;STOP THE TIMER
6636  037446  006201                          ASR     R1              ;
6637  037450  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
6638  037454  116164  033236  000016          MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR THE ATTENTION BIT
6639  037462  032714  004000                  BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
6640  037466  001006                          BNE     1$              ;BR IF AVAILABLE
6641  037470  006301                          ASL     R1
6642  037472  012761  023420  033214          MOV     #10000.,TIMER(R1)  ;START 10 SEC TIMER AGAIN
6643  037500  006201                          ASR     R1
6644  037502  000433                          BR      3$              ;EXIT
6645  037504  105761  033142          1$:     TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
6646  037510  001424                          BEQ     2$              ;BR IF NOT
6647  037512  105061  033142                  CLRB    DPINT(R1)       ;CLEAR THE INIT INDICATOR
6648  037516  004037  033500                  JSR     R0,DRVINT       ;GO INIT THE DRIVE
6649  037522  000240                          NOP                     ;DUMMY PARITY ERROR RETURN
6650  037524  105761  033122                  TSTB    DRVSTA(R1)      ;DRIVE ONLINE ?
6651  037530  003014                          BGT     2$              ;BR IF YES -- START ORDER
6652  037532  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE
6653  037534  001416                          BEQ     3$              ;BR IF NOT
6654  037536  004737  041522                  JSR     PC,GETREQ       ;GET DPB ADDRESS
6655  037542  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM USER THAT DRIVE OFFLINE
6656  037550  004737  040666                  JSR     PC,SVRH11       ;SAVE THE REGISTERS
6657  037554  004737  041426                  JSR     PC,EMPTYQ       ;EMPTY THE REQUEST QUEUE
6658  037560  000404                          BR      3$
6659  037562  105061  033152          2$:     CLRB    DPRQS(R1)       ;CLEAR THE PORT REQUEST INDICATOR
6660  037566  004737  034330                  JSR     PC,OPT          ;START THE PENDING REQUEST
6661  037572  000137  036530          3$:     JMP     SC4             ;PROCESS OTHER DRIVES
6662
6663                                  ;RP04/5/6 TIMER ROUTINE
6664                                  ;CALL
6665                                  ;       MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
6666                                  ;       JSR     PC,RPTMR        ;CALL RP04/5/6 TIME ROUTINE
6667
6668  037576  005737  033166          RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
6669  037602  001030                          BNE     4$              ;IF NON ZERO EXIT
6670  037604  112737  000001  033167          MOVB    #1,ACTSTR       ;SET "ACTSTR"
6671  037612  104412                          SAVREG                  ;SAVE R0 - R5
6672  037614  005001                          CLR     R1              ;START WITH DRIVE 0
6673  037616  005003                          CLR     R3
6674  037620  005763  033214          1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
6675  037624  002407                          BLT     2$              ;BRANCH IF NO
6676  037626  166663  000002  033214          SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
6677  037634  003003                          BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
6678  037636  004737  037670                  JSR     PC,STC          ;CALL SOFTWARE TIMEOUT ROUTINE
6679  037642  000405                          BR      3$              ;GO TO THE EXIT
6680  037644  005201                  2$:     INC     R1              ;MOVE TO NEXT DRIVE
6681  037646  005723                          TST     (R3)+
6682  037650  022701  000010                  CMP     #8.,R1          ;OUT OF DRIVES?
6683  037654  003361                          BGT     1$              ;BRANCH IF NO
6684  037656  104413                  3$:     RESREG                  ;RESTORE R0 - R5
6685  037660  105037  033167                  CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
6686  037664  012616                  4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
```

```
 6687  037666  000207                          RTS     PC              ;RETURN
 6688
 6689                                  ;SOFTWARE TIMEOUT ROUTINE
 6690                                  ;
 6691                                  ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
 6692                                  ;      OR GREATER
 6693                                  ;
 6694                                  ;CALL: STO
 6695                                  ;      MOV     #DRVNUM,R1      ;DRIVE NUMBER
 6696                                  ;      JSR     PC,STO          ;CALL
 6697                                  ;      RETURN
 6698
 6699  037670  010146                  STO:    MOV     R1,-(SP)        ;SAVE R1
 6700  037672  010346                          MOV     R3,-(SP)        ;SAVE R3
 6701  037674  013704  033250                  MOV     RPADR,R4        ;GET ADDRESS OF "RPCS1"
 6702  037700  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
 6703  037704  004037  040324                  JSR     R0,RD.RP        ;READ "DRIVE STATUS REG"
 6704  037710  000012                          RPDS1
 6705  037712  040212                          STO5
 6706  037714  105726                          TSTB    (SP)+           ;IS "DRY"=1?
 6707  037716  100477                          BMI     STO2            ;BR IF YES
 6708  037720  105761  033142          STO1:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
 6709  037724  001074                          BNE     STO2            ;BR IF YES
 6710  037726  105761  033152                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 6711  037732  001071                          BNE     STO2            ;BR IF YES
 6712  037734  013702  033162                  MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
 6713  037740  020137  033234                  CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
 6714  037744  001402                          BEQ     1$              ;BRANCH IF YES
 6715  037746  004737  041522                  JSR     PC,GETREQ       ;GET DPB ADDRESS
 6716  037752  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
 6717  037760  004737  040666                  JSR     PC,SVRH11       ;SAVE RH11/RP04/5/6 REGISTERS
 6718  037764  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ;"INIT" THE MASS BUS
 6719  037772  105061  033112                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
 6720  037776  105061  033170                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
 6721  040002  005001                          CLR     R1              ;START WITH DRIVE 0
 6722  040004  005003                          CLR     R3
 6723  040006  004037  033500          2$:     JSR     R0,DRVINT       ;INIT. THIS DRIVE
 6724  040012  000477                          BR      STO5            ;PARITY ERROR RETURN
 6725  040014  105761  033112                  TSTB    DRVACT(R1)      ;DRIVE IDLE BEFORE THE INIT.?
 6726  040020  001414                          BEQ     4$              ;YES--BRANCH
 6727  040022  013702  033162                  MOV     TRNSWT,R2       ;GET TRANSFER WAIT QUEUE
 6728  040026  023701  033234                  CMP     DTUW,R1         ;WAS THERE I/O ON THIS DRIVE?
 6729  040032  001402                          BEQ     3$              ;YES--BRANCH
 6730  040034  004737  041522                  JSR     PC,GETREQ       ;GET THE DPB POINTER FROM QUEUE
 6731  040040  052762  100400  000016  3$:     BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT.
 6732  040046  105061  033112                  CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE TO IDLE
 6733  040052  105061  033170          4$:     CLRB    ULDFLG(R1)      ;NO UNLOAD
 6734  040056  012763  177777  033214          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 6735  040064  005723                          TST     (R3)+           ;UPDATE THE INDEX
 6736  040066  005201                          INC     R1              ;INCREMENT THE DRIVE NUMBER
 6737  040070  022701  000010                  CMP     #8.,R1          ;LAST DRIVE BEEN CHECKED?
 6738  040074  003344                          BGT     2$              ;NO--LOOP
 6739  040076  012737  177777  033234          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
 6740  040104  005037  033162                  CLR     TRNSWT          ;CLEAR TRANSFER WAIT QUEUE
```

```
6741  040110  004737  041350              JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
6742  040114  000500                      BR      ST09            ;EXIT
6743  040116  116405  000016      ST02:   MOVB    RPAS(R4),R5     ;READ ATTENTION REG
6744  040122  136105  033236              BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
6745  040126  001017                      BNE     ST03            ;YES--BRANCH
6746  040130  105761  033142              TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
6747  040134  001031                      BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
6748  040136  105761  033152              TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
6749  040142  001045                      BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
6750  040144  020137  033234              CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
6751  040150  001263                      BNE     ST01            ;BR IF NO
6752  040152  004037  040324              JSR     R0,RD.RP        ;YES--CHECK "RDY"
6753  040156  000000                      RPCS1
6754  040160  040212                      ST05
6755  040162  105726                      TSTB    (SP)+
6756  040164  100255                      BPL     ST01            ;BR IF "RDY"=0
6757  040166  105761  033142      ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
6758  040172  001003                      BNE     1$              ;BR IF INIT PENDING
6759  040174  105761  033152              TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
6760  040200  001446                      BEQ     ST09            ;BR IF NOT
6761  040202  012763  177777  033214  1$: MOV     #-1,TIMER(R3)   ;STOP THE TIMER
6762  040210  000442                      BR      ST09            ;EXIT
6763  040212  004737  035540      ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
6764  040216  000437                      BR      ST09
6765  040220  105061  033142      ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
6766  040224  105061  033122              CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
6767  040230  012763  177777  033214      MOV     #-1,TIMER(R3)   ;STOP THE TIMER
6768  040236  004737  041522              JSR     PC,GETREQ       ;GET THE DPB ADDRESS
6769  040242  005702                      TST     R2              ;REQUEST IN QUEUE ?
6770  040244  001424                      BEQ     ST09            ;BR IF NOT
6771  040246  052762  140000  000016      BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
6772  040254  000414                      BR      ST08            ;FINISH
6773  040256  012763  177777  033214  ST07: MOV     #-1,TIMER(R3)   ;STOP THE TIMER
6774  040264  105061  033152              CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
6775  040270  004737  041522              JSR     PC,GETREQ       ;GET DPB ADDRESS
6776  040274  005702                      TST     R2              ;QUEUE ENTRY FOR DRIVE ?
6777  040276  001407                      BEQ     ST09            ;BR IF NONE
6778  040300  012762  100004  000016      MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
6779  040306  004737  041426      ST08:   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
6780  040312  004737  040666              JSR     PC,SVRH11       ;SAVE THE REGISTERS
6781  040316  012603              ST09:   MOV     (SP)+,R3        ;RESTORE R3
6782  040320  012601                      MOV     (SP)+,R1        ;RESTORE R1
6783  040322  000207                      RTS     PC              ;RETURN
6784
6785                              ;ROUTINE TO READ A RH11/RP04/5/6 REGISTER
6786                              ;
6787                              ;CALL
6788                              ;       JSR     R0,RD.RP        ;GO READ A REGISTER
6789                              ;       INDEX                   ;REG. INDEX FROM BASE
6790                              ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
6791                              ;                               ;AT THIS ADDRESS
6792                              ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
6793                              ;
6794  040324  013737  033246  040466  RD.RP: MOV     MCPEMX,RD.RP2   ;MAX. RETRYS ALLOWED
```

```
6795  040332  011646                          MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
6796  040334  013737  033250  040350          MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
6797  040342  062037  040350                  ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
6798  040346  013727                  RD.RP1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RP04
6799  040350  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
6800  040352  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
6801  040354  013766  040352  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
6802  040362  013746  033250                  MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
6803  040366  062716  000010                  ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
6804  040372  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
6805  040376  001035                          BNE     RD.RP3          ;BR IF DRIVE NON-EXISTENT
6806  040400  017746  172644                  MOV     @RPADR,-(SP)    ;READ RPCS1
6807  040404  032716  020000                  BIT     #BIT13,(SP)     ;DID MCPE SET?
6808  040410  001002                          BNE     1$              ;BRANCH IF YES
6809  040412  022620                          CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
6810  040414  000430                          BR      RD.RP4          ;EXIT
6811  040416                           1$:
6812  040416  104003                          ERROR   3               ;REPORT "MCPE" ERROR
6813  040420  005737  033234                  TST     DTUW            ;DATA TRANSFER UNDERWAY?
6814  040424  100405                          BMI     2$              ;NO--BRANCH
6815  040426  032716  040000                  BIT     #BIT14,(SP)     ;NO--"TRE"=1?
6816  040432  001402                          BEQ     2$              ;NO--BRANCH
6817  040434  005726                          TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
6818  040436  000415                          BR      RD.RP3          ;TAKE THE FATAL ERROR EXIT
6819  040440  052716  040000           2$:    BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
6820  040444  000316                          SWAB    (SP)            ;POSITION BEFORE WRITING
6821  040446  013737  033250  040462          MOV     RPADR,3$        ;FORM ADDRESS OF HIGH BYTE
6822  040454  005237  040462                  INC     3$
6823  040460  112637                          MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RPCS1
6824  040462  000000                   3$:    .WORD   0               ;ADDRESS STORAGE
6825  040464  005327                          DEC     (PC)+           ;EXCEEDED MAX. RETRYS
6826  040466  000003                  RD.RP2: .WORD   3
6827  040470  002326                          BGE     RD.RP1          ;BRANCH IF NO
6828  040472  011000                  RD.RP3: MOV     (R0),R0         ;FATAL ERROR EXIT
6829  040474  012616                          MOV     (SP)+,(SP)
6830  040476  000200                  RD.RP4: RTS     R0
6831
6832                                  ;ROUTINE TO WRITE A REGISTER
6833                                  ;
6834                                  ;CALL
6835                                  ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
6836                                  ;       JSR     R0,WRT.RP       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
6837                                  ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
6838                                  ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
6839                                  ;       RETURN                  ;ERROR FREE RETURN
6840
6841  040500  013737  033246  040650  WRT.RP: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
6842  040506  016637  000002  040566          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
6843  040514  012616                          MOV     (SP)+,(SP)      ;ADJUST THE STACK
6844  040516  012037  040570                  MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
6845  040522  001015                          BNE     1$              ;BRANCH IF NOT RPCS1
6846  040524  122737  000150  040566          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
6847  040532  002411                          BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
6848  040534  004037  040324                  JSR     R0,RD.RP        ;NO---COMBINE A16&A17, & PSEL WITH
```

```
6849  040540  000000                          RPCS1                   ;THE COMMAND BEFORE SENDING IT TO
6850  040542  040656                          WRT.R3                  ;THE RH11/RP04
6851  040544  000316                          SWAB    (SP)
6852  040546  042716  177770                  BIC     #^C7,(SP)
6853  040552  112637  040567                  MOVB    (SP)+,WRT.WD+1
6854  040556  063737  033250  040570  1$:     ADD     RPADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
6855  040564  012737                  WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
6856  040566  000000                  WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
6857  040570  000000                  WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
6858  040572  013746  033250                  MOV     RPADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
6859  040576  062716  000010                  ADD     #RPCS2,(SP)     ;FORM THE ADDRESS OF RPCS2
6860  040602  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
6861  040606  001023                          BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
6862  040610  004037  040324                  JSR     R0,RD.RP        ;CHECK FOR PARITY ERROR ON WRITE
6863  040614  000014                          RPER1
6864  040616  040656                          WRT.R3
6865  040620  032726  000010                  BIT     #BIT03,(SP)+
6866  040624  001416                          BEQ     WRT.R4          ;BRANCH IF "PAR=0"
6867  040626  016037  177776  040640          MOV     -2(R0),1$       ;PICKUP THE INDEX
6868  040634  004037  040324                  JSR     R0,RD.RP        ;READ THE REG.
6869  040640  000000                  1$:     .WORD   0               ;REG. INDEX
6870  040642  040656                          WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
6871  040644  104004                          ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
6872  040646  005327                          DEC     (PC)+           ;DECREMENT THE ERROR COUNT
6873  040650  000003                  WRT.R2: .WORD   3               ;RETRY COUNTER
6874  040652  002344                          BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
6875  040654  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
6876  040656  011000                  WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
6877  040660  000401                          BR      WRT.R5          ;EXIT
6878  040662  005720                  WRT.44: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
6879  040664  000200                  WRT.R5: RTS     R0
6880
6881                                  ;ROUTINE TO SAVE THE RH11/RP04/5/6 REGISTERS AS PER DPB+14
6882                                  ;
6883                                  ;CALL
6884                                  ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
6885                                  ;       JSR     PC,SVRH11       ;SAVE THE DRIVES REG'S
6886
6887  040666  104412                  SVRH11: SAVREG                  ;SAVE R0 - R5
6888  040670  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
6889  040672  001430                          BEQ     4$              ;BR IF NONE
6890  040674  013704  033250                  MOV     RPADR,R4
6891  040700  111264  000010                  MOVB    (R2),RPCS2(R4)  ;SELECT DRIVE
6892  040704  016203  000014                  MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
6893  040710  001433                          BEQ     6$              ;EXIT IF NO ADDRESS
6894  040712  005037  040746                  CLR     3$              ;COUNTER & POINTER
6895  040716  023727  040746  000022  1$:     CMP     3$,#RPDB        ;REACHED THE BUFFER REGISTER ?
6896  040724  001006                          BNE     2$              ;BR IF NOT
6897  040726  032764  000200  000010          BIT     #BIT07,RPCS2(R4)  ;'OR' SET ?
6898  040734  001002                          BNE     2$              ;BR IF SET
6899  040736  005023                          CLR     (R3)+           ;STORE RPDB AS ZEROES
6900  040740  000405                          BR      4$              ;CONTINUE
6901  040742  004037  040324          2$:     JSR     R0,RD.RP        ;READ THE SELECTED REGISTER
6902  040746  000000                  3$:     .WORD   0               ;REGISTER INDEX
```

```
 6903  040750  040774                          5$                      ;ERROR RETURN ADDRESS
 6904  040752  012623                          MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
 6905  040754  023727  040746  000046  4$:     CMP     3$,#RPEC2       ;REACHED THE END ?
 6906  040762  001406                          BEQ     6$              ;BR IF YES
 6907  040764  062737  000002  040746          ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
 6908  040772  000751                          BR      1$              ;CONTINUE READING THE REGISTERS
 6909  040774  004737  035440          5$:     JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 6910  041000  104413                  6$:     RESREG                  ;RESTORE R0 - R5
 6911  041002  000207                          RTS     PC              ;RETURN
 6912
 6913                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
 6914                                  ;CALL
 6915                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 6916                                  ;       JSR     PC,SET.IE       ;SET "IE"
 6917                                  ;       RETURN
 6918
 6919  041004  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
 6920  041006  013704  033250                  MOV     RPADR,R4        ;PICKUP ADDRESS OF RPCS1
 6921  041012  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 6922  041016  011446                          MOV     (R4),-(SP)      ;READ RPCS1
 6923  041020  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
 6924  041024  000316                          SWAB    (SP)            ;ADJUST FOR DATO
 6925  041026  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
 6926  041032  032764  010000  000010          BIT     #BIT12,RPCS2(R4) ;IS "NED"=1?
 6927  041040  001002                          BNE     1$              ;YES--CLEAR "TRE"
 6928  041042  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 6929  041044  000402                          BR      2$
 6930  041046  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 6931  041052  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
 6932  041054  000207                          RTS     PC              ;RETURN TO CALLER
 6933
 6934                                  ;QUEUE COUNT
 6935  041056      000                 QCNT:   .BYTE   0               ;DRIVE 0
 6936  041057      000                         .BYTE   0               ;DRIVE 1
 6937  041060      000                         .BYTE   0               ;DRIVE 2
 6938  041061      000                         .BYTE   0               ;DRIVE 3
 6939  041062      000                         .BYTE   0               ;DRIVE 4
 6940  041063      000                         .BYTE   0               ;DRIVE 5
 6941  041064      000                         .BYTE   0               ;DRIVE 6
 6942  041065      000                         .BYTE   0               ;DRIVE 7
 6943
 6944                                  ;QUEUE INPUT POINTERS
 6945
 6946  041066  041150                  QINPT:  .WORD   QDRV0            ;DRIVE 0
 6947  041070  041170                          .WORD   QDRV1           ;DRIVE 1
 6948  041072  041210                          .WORD   QDRV2           ;DRIVE 2
 6949  041074  041230                          .WORD   QDRV3           ;DRIVE 3
 6950  041076  041250                          .WORD   QDRV4           ;DRIVE 4
 6951  041100  041270                          .WORD   QDRV5           ;DRIVE 5
 6952  041102  041310                          .WORD   QDRV6           ;DRIVE 6
 6953  041104  041330                          .WORD   QDRV7           ;DRIVE 7
 6954
 6955                                  ;QUEUE OUTPUT POINTERS
 6956
```

```
 6957  041106  041150                  QOUTPT: .WORD   QDRV0           ;DRIVE 0
 6958  041110  041170                          .WORD   QDRV1           ;DRIVE 1
 6959  041112  041210                          .WORD   QDRV2           ;DRIVE 2
 6960  041114  041230                          .WORD   QDRV3           ;DRIVE 3
 6961  041116  041250                          .WORD   QDRV4           ;DRIVE 4
 6962  041120  041270                          .WORD   QDRV5           ;DRIVE 5
 6963  041122  041310                          .WORD   QDRV6           ;DRIVE 6
 6964  041124  041330                          .WORD   QDRV7           ;DRIVE 7
 6965
 6966  041126  041150                  QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
 6967  041130  041170                  QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 6968  041132  041210                          .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
 6969  041134  041230                          .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
 6970  041136  041250                          .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
 6971  041140  041270                          .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
 6972  041142  041310                          .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
 6973  041144  041330                          .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
 6974  041146  041350                          .WORD   QTERM           ;STOP DRIVE 7
 6975
 6976                                  ;DRIVE REQUEST QUEUES
 6977
 6978  041150  000010                  QDRV0:  .BLKW   10
 6979  041170  000010                  QDRV1:  .BLKW   10
 6980  041210  000010                  QDRV2:  .BLKW   10
 6981  041230  000010                  QDRV3:  .BLKW   10
 6982  041250  000010                  QDRV4:  .BLKW   10
 6983  041270  000010                  QDRV5:  .BLKW   10
 6984  041310  000010                  QDRV6:  .BLKW   10
 6985  041330  000010                  QDRV7:  .BLKW   10
 6986          041350                  QTERM=.
 6987
 6988                                  ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
 6989                                  ;
 6990                                  ;CALL
 6991                                  ;       JSR     PC,CLRQUE
 6992
 6993  041350  104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
 6994  041352  012702  041056                  MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
 6995  041356  005022                          CLR     (R2)+           ;DRIVES 0 & 1
 6996  041360  005022                          CLR     (R2)+           ;DRIVES 2 & 3
 6997  041362  005022                          CLR     (R2)+           ;DRIVES 4 & 5
 6998  041364  005022                          CLR     (R2)+           ;DRIVES 6 & 7
 6999  041366  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING
 7000  041372  012701  041126                  MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
 7001  041376  012122                  1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
 7002  041400  005303                          DEC     R3
 7003  041402  001375                          BNE     1$
 7004  041404  012703  000010                  MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
 7005  041410  012701  041126                  MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
 7006  041414  012122                  2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
 7007  041416  005303                          DEC     R3
 7008  041420  001375                          BNE     2$
 7009  041422  104413                          RESREG                  ;RESTORE R0 - R5
 7010  041424  000207                          RTS     PC
```

```
                                        ;EMPTY THE QUEUE SPECIFIED BY R1
                                        ;
                                        ;CALL
                                        ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,EMPTYQ
 ;26  105061  041056            EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
041432  006301                            ASL     R1
041434  016161  041066  041106            MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
041442  006201                            ASR     R1
041444  000207                            RTS     PC

                                        ;ROUTINE TO PUT A REQUEST IN QUELE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
                                        ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
                                        ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
                                        ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE

041446  122761  000010  041056  DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
041454  001421                            BEQ     2$              ;BR IF YES-TAKE RETURN1
041456  105261  041056                    INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
041462  006301                            ASL     R1
041464  010271  041066                    MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
041470  062761  000002  041066            ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
041476  026161  041066  041130            CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
041504  001003                            BNE     1$              ;BRANCH IF NO
041506  016161  041126  041066            MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
041514  006201                    1$:     ASR     R1
041516  005720                            TST     (R0)+           ;TAKE RETURN 2
041520  000200                    2$:     RTS     R0              ;RETURN TO USER

                                        ;ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUELE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,GETREQ       ;GO GET THE REQUEST
                                        ;       RETURN                  ;R2="DPB" ADDRESS OF THE REQUEST
                                        ;                               ;R2=0 IF NO REQUEST IN QUEUE

041522  005002                    GETREQ: CLR     R2
041524  105761  041056                    TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUELE?
041530  001404                            BEQ     2$              ;NO---BRANCH
041532  006301                    1$:     ASL     R1
041534  017102  041106                    MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
041540  006201                            ASR     R1
041542  000207                    2$:     RTS     PC              ;RETURN TO USER

                                        ;ROUTINE TO "POP" THE REQUEST FROM QUEUE
                                        ;
                                        ;CALL
```

```
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R
                                        ;       JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
                                        ;       RETURN                  ;R2=ADDRESS OF DPB REMOVED

041544  105361  041056        POPQUE: DECB    QCNT(R1)                ;DECREMENT QUEUE COUNT
041550  006301                        ASL     R1
041552  017102  041106                MOV     @QOUTPT(R1),R2          ;GET THE "DPB" POINTER
041556  062761  000002  041106        ADD     #2,QOUTPT(R1)           ;UPDATE THE QUEUE POINTER
041564  026161  041106  041130        CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
041572  001003                        BNE     1$                      ;NO--BRANCH TO EXIT
041574  016161  041126  041106        MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
041602  006201                1$:     ASR     R1
041604  000207                        RTS     PC                      ;RETURN TO USER


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

                                .SBTTL  DATA, CONTROL, & STATUS BLOCKS

                                   ******************************************************************

                                ;BLOCK LOCATION EQUATE STATEMENTS

000001                          $FMT    =       1                       ;FMT,HCI,ECI OR OFFSET CODE
000002                          $COMND  =       $FMT+1                  ;OPERATION CODE
000003                          $PSEL   =       $FMT+2                  ;PORT SELECT & BITS A16, A17
000004                          $WRDM   =       $FMT+3                  ;WORD COUNT (2'S COMP)
000006                          $BUF    =       $FMT+5                  ;BUFFER ADDR OR REGISTER TABLE POINTER
000010                          $SEC    =       $FMT+7                  ;SECTOR ADDRESS OR 1ST REG ADDR
000011                          $TRK    =       $FMT+10                 ;TRACK ADDRESS OF LAST REG ADDR
000012                          $CYL    =       $FMT+11                 ;CYLINDER ADDR
000014                          $REG    =       $FMT+13                 ;REGISTER STORAGE (IF ERROR)
000016                          $STATUS =       $FMT+15                 ;STATUS WORD (SET BY DRIVER)

                                ;DRIVE'S HISTORY AND CURRENT INDICATOR STORAGE EQUATES

000020                          $WRDL   =       $FMT+17                 ;WORD COUNT (NOT 2'S COMP)
000022                          $SSEC   =       $WRDL+2                 ;SECTOR SIZE FOR CURRENT OPERATION
000024                          $CODE   =       $WRDL+4                 ;PRESENT COMMAND SELECTION CODE
000026                          $PACK   =       $WRDL+6                 ;WRITE DATA PACK INDICATOR
000027                          $PREVO  =       $WRDL+7                 ;PREVIOUS COMMAND SELECTION CODE
000030                          $PATTC  =       $WRDL+10                ;PATTERN CODE
000032                          $PREVA  =       $WRDL+12                ;PREVIOUS ADDRESS - TRACK, SECTOR, CYLINDER
000036                          $OPERC  =       $WRDL+16                ;OPERATION COUNT
000042                          $POSIT  =       $WRDL+22                ;SEEK COUNT
000046                          $TRANS  =       $WRDL+26                ;TOTAL BITS XFERED COUNT (R & W)
000052                          $READ   =       $WRDL+32                ;TOTAL BITS READ COUNT
000056                          $TOTAL  =       $WRDL+36                ;TOTAL ERRORS (ALL TYPES) COUNT
000060                          $SOFT   =       $WRDL+40                ;'SOFT' ERROR COUNT
000062                          $HARD   =       $WRDL+42                ;'HARD' ERROR COUNT
000064                          $SKI    =       $WRDL+44                ;'SKI' OR 'OCYL' ERROR COUNT
000066                          $MISPO  =       $WRDL+46                ;PROG DETECTED MISPOSITIONING ERROR S COUNT
000070                          $PASSC  =       $WRDL+50                ;PASS COUNTER
000072                          $FAIR   =       $WRDL+52                ;OPERATION QUEUE 'FAIRNESS' COUNT
```

```
                                ;INDEX EQUATES TO THE NEXT OPERATION PARAMETERS

000074                  $NCODE  =       $WRDL+54        ;NEXT OPERATION CODE
000075                  $NPATC  =       $NCODE+1        ;NEXT PATTERN
000076                  $NSEC   =       $NCODE+2        ;NEXT SECTOR
000077                  $NTRK   =       $NCODE+3        ;NEXT TRACK
000100                  $NCYL   =       $NCODE+4        ;NEXT CYLINDER
000102                  $NWRDL  =       $NCODE+6        ;NEXT BUFFER SIZE
000104                  $NEXT   =       $NCODE+10       ;PARAMETER SELECTION INDICATOR

                                ;INDEX EQUATES FOR MAXIMUM/MINIMUM ADDRESSES

000106                  MAXCYL  =       $NCODE+12       ;MAXIMUM CYLINDER ADDRESS
000110                  MINCYL  =       MAXCYL+2        ;MINIMUM CYLINDER ADDRESS
000112                  MAXTRK  =       MAXCYL+4        ;MAXIMUM TRACK ADDRESS
000114                  MINTRK  =       MAXCYL+6        ;MINIMUM TRACK ADDRESS
000116                  MAXSEC  =       MAXCYL+10       ;MAXIMUM SECTOR ADDRESS
000120                  MINSEC  =       MAXCYL+12       ;MINIMUM SECTOR ADDRESS
000122                  $FIRST  =       MAXCYL+14       ;FIRST OPERATION INDICATOR

                                ;BAD SECTOR/TRACK ADDRESS STORAGE AREA INDEX EQUATE

000124                  $BDSEC  =       MAXCYL+16       ;BAD SECTOR STORAGE TABLE

                                ;DRIVE ID AREA INDEX EQUATE

000224                  $DRVID  =       $BDSEC+100      ;DRIVE ID

                                ;RH11/RP04/5/6 REGISTER EQUATES

000234                  $RPCS1  =       $DRVID+10       ;RP04 REGISTER STORAGE
000236                  $RPWC   =       $RPCS1+2
000240                  $RPBA   =       $RPCS1+4
000242                  $RPDA   =       $RPCS1+6
000244                  $RPCS2  =       $RPCS1+10
000246                  $RPDS1  =       $RPCS1+12
000250                  $RPER1  =       $RPCS1+14
000252                  $RPAS   =       $RPCS1+16
000254                  $RPLA   =       $RPCS1+20
000256                  $RPDB   =       $RPCS1+22
000260                  $RPMR   =       $RPCS1+24
000262                  $RPDT   =       $RPCS1+26
000264                  $RPSN   =       $RPCS1+30
000266                  $RPOF   =       $RPCS1+32
000270                  $RPCA   =       $RPCS1+34
000272                  $RPCC   =       $RPCS1+36
000274                  $RPER2  =       $RPCS1+40
000276                  $RPER3  =       $RPCS1+42
000300                  $RPEC1  =       $RPCS1+44
000302                  $RPEC2  =       $RPCS1+46


                                ;BLOCK FOR DRIVE 0
```

```
7173
7174  041606  000      000          DRIVE0: .BYTE   0,0             ;DRIVE NUMBER
7175  041610  000005                       .BLKW   5
7176  041622  042042                       .WORD   .+$RPCS1-$REG
7177  041624  000266                       .BLKB   $RPEC2-$REG
7178
7179
7180                                 ;BLOCK FOR DRIVE 1
7181
7182  042112  001      000          DRIVE1: .BYTE   1,0             ;DRIVE NUMBER
7183  042114  000005                       .BLKW   5
7184  042126  042346                       .WORD   .+$RPCS1-$REG
7185  042130  000266                       .BLKB   $RPEC2-$REG
7186
7187
7188                                 ;BLOCK FOR DRIVE 2
7189
7190  042416  002      000          DRIVE2: .BYTE   2,0             ;DRIVE NUMBER
7191  042420  000005                       .BLKW   5
7192  042432  042652                       .WORD   .+$RPCS1-$REG
7193  042434  000266                       .BLKB   $RPEC2-$REG
7194
7195
7196                                 ;BLOCK FOR DRIVE 3
7197
7198  042722  003      000          DRIVE3: .BYTE   3,0             ;DRIVE NUMBER
7199  042724  000005                       .BLKW   5
7200  042736  043156                       .WORD   .+$RPCS1-$REG
7201  042740  000266                       .BLKB   $RPEC2-$REG
7202
7203
7204                                 ;BLOCK FOR DRIVE 4
7205
7206  043226  004      000          DRIVE4: .BYTE   4,0             ;DRIVE NUMBER
7207  043230  000005                       .BLKW   5
7208  043242  043462                       .WORD   .+$RPCS1-$REG
7209  043244  000266                       .BLKB   $RPEC2-$REG
7210
7211
7212                                 ;BLOCK FOR DRIVE 5
7213
7214  043532  005      000          DRIVE5: .BYTE   5,0             ;DRIVE NUMBER
7215  043534  000005                       .BLKW   5
7216  043546  043766                       .WORD   .+$RPCS1-$REG
7217  043550  000266                       .BLKB   $RPEC2-$REG
7218
7219
7220                                 ;BLOCK FOR DRIVE 6
7221
7222  044036  006      000          DRIVE6: .BYTE   6,0             ;DRIVE NUMBER
7223  044040  000005                       .BLKW   5
7224  044052  044272                       .WORD   .+$RPCS1-$REG
7225  044054  000266                       .BLKB   $RPEC2-$REG
7226
```

```
                                        ;BLOCK FOR DRIVE 7

044342    007     000           DRIVE7: .BYTE   7,0             ;DRIVE NUMBER
044344  000005                          .BLKW   5
044356  044576                          .WORD   .+$RPCS1-$REG
044360  000266                          .BLKB   $RPEC2-$REG


                                        ;GENERAL PURPOSE DPB - USED BY 'READHD', 'RECALT', 'OFFSET',&'RTNCTR'

044646  000000  000000  177774  GENDPE. .WORD   0,0,-4,CYLDER
044654  054374
044656  000000  000000  044666          .WORD   0,0,GENREG,0
044664  000000
044666  000024                  GENREG: .BLKW   24              ;REGISTER STORAGE IF ERROR

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

                                        .SBTTL  ERROR MESSAGES

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

044736  044122  030461  044440  EM1:    .ASCIZ  /RH11 INTERRUPT OCCURRED (RPAS = 0)/
044744  052116  051105  052522
044752  052120  047440  041503
044760  051125  042522  020104
044766  051050  040520  020123
044774  020075  024460     000

045001     125  042516  050130  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
045006  041505  042524  020104
045014  052101  042524  052116
045022  047511  020116  041517
045030  052503  051122  042105
045036     000

045037     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
045044  051525  050040  051101
045052  052111  020131  051105
045060  047522  020122  046450
045066  050103  036505  024461
045074     000

045075     115  051501  041123  EM4:    .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)/
045102  051525  050040  051101
045110  052111  020131  051105
045116  047522  020122  050050
045124  051101  030475  000051

045132  042101  051104  051505  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
045140  020123  046120  043525
045146  041440  040510  043516
045154  020105  044502  020124
```

```
7281  045162  042523  000124
7282
7283  045166  044122  030461  042040  EM6:    .ASCIZ  /RH11 DIDN'T RESPOND TO ADDRESSING/
7284  045174  043111  023516  020124
7285  045202  042522  050123  047117
7286  045210  020104  047524  040440
7287  045216  042104  042522  051523
7288  045224  047111  000107
7289
7290  045230  047125  047503  051122  EM10:   .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR/
7291  045236  041505  040524  046102
7292  045244  020105  040515  051523
7293  045252  052502  020123  040520
7294  045260  044522  054524  042440
7295  045266  051122  051117     000
7296
7297  045273     106  052101  046101  EM11:   .ASCIZ  /FATAL MASSBUS PARITY ERROR/
7298  045300  046440  051501  041123
7299  045306  051525  050040  051101
7300  045314  052111  020131  051105
7301  045322  047522  000122
7302
7303  045326  042520  051522  051511  EM12:   .ASCIZ  /PERSISTENT DEVICE UNSAFE/
7304  045334  042524  052116  042040
7305  045342  053105  041511  020105
7306  045350  047125  040523  042506
7307  045356     000
7308
7309  045357     117  042520  040522  EM13:   .ASCIZ  /OPERATION NOT COMPLETED WITHIN TIME LIMIT/
7310  045364  044524  047117  047040
7311  045372  052117  041440  046517
7312  045400  046120  052105  042105
7313  045406  053440  052111  044510
7314  045414  020116  044524  042515
7315  045422  046040  046511  052111
7316  045430     000
7317
7318  045431     104  044522  042526  EM14:   .ASCIZ  /DRIVE WENT OFFLINE/
7319  045436  053440  047105  020124
7320  045444  043117  046106  047111
7321  045452  000105
7322
7323  045454  047516  051040  051505  EM15:   .ASCIZ  /NO RESPONSE TO PORT REQUEST/
7324  045462  047520  051516  020105
7325  045470  047524  050040  051117
7326  045476  020124  042522  052521
7327  045504  051505  000124
7328
7329  045510  042510  042101  051105  EM20:   .ASCIZ  /HEADER CRC ERROR/
7330  045516  041440  041522  042440
7331  045524  051122  051117     000
7332
7333  045531     104  052101  020101  EM21:   .ASCIZ  /DATA CHECK ('DCK') ERROR/
7334  045536  044103  041505  020113
```

```
 7335  045544  023450  041504  023513
 7336  045552  020051  051105  047522
 7337  045560  000122
 7338
 7339  045562  051127  052111  020105  EM22:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') SET/
 7340  045570  044103  041505  020113
 7341  045576  051105  047522  020122
 7342  045604  020055  040504  040524
 7343  045612  041440  042510  045503
 7344  045620  024040  042047  045503
 7345  045626  024447  051440  052105
 7346  045634     000
 7347
 7348  045635     127  044522  042524  EM23:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') NOT SET/
 7349  045642  041440  042510  045503
 7350  045650  042440  051122  051117
 7351  045656  026440  042040  052101
 7352  045664  020101  044103  041505
 7353  045672  020113  023450  041504
 7354  045700  023513  020051  047516
 7355  045706  020124  042523  000124
 7356
 7357  045714  042510  042101  051105  EM24:   .ASCIZ  /HEADER READ ERROR - 'FMT' BIT DROPPED/
 7358  045722  051040  040505  020104
 7359  045730  051105  047522  020122
 7360  045736  020055  043047  052115
 7361  045744  020047  044502  020124
 7362  045752  051104  050117  042520
 7363  045760  000104
 7364
 7365  045762  042510  042101  051105  EM25:   .ASCIZ  /HEADER READ ERROR - HEADER COMPARE ('HCE') ERROR/
 7366  045770  051040  040505  020104
 7367  045776  051105  047522  020122
 7368  046004  020055  042510  042101
 7369  046012  051105  041440  046517
 7370  046020  040520  042522  024040
 7371  046026  044047  042503  024447
 7372  046034  042440  051122  051117
 7373  046042     000
 7374
 7375  046043     106  051117  040515  EM26:   .ASCIZ  /FORMAT ERROR ('FER')/
 7376  046050  020124  051105  047522
 7377  046056  020122  023450  042506
 7378  046064  023522  000051
 7379
 7380  046070  042510  042101  051105  EM27:   .ASCIZ  /HEADER COMPARE ('HCE') ERROR/
 7381  046076  041440  046517  040520
 7382  046104  042522  024040  044047
 7383  046112  042503  024447  042440
 7384  046120  051122  051117     000
 7395
 7386  046125     115  051511  042503  EM30:   .ASCIZ  /MISCELLANEOUS DRIVE ERROR/
 7387  046132  046114  047101  047505
 7388  046140  051525  042040  044522
```

```
 7389  046146  042526  042440  051122
 7390  046154  051117     000
 7391
 7392  046157     117  042520  040522  EM31:   .ASCIZ  /OPERATION INCOMPLETE ('OPI') ERROR/
 7393  046164  044524  047117  044440
 7394  046172  041516  046517  046120
 7395  046200  052105  020105  023450
 7396  046206  050117  023511  020051
 7397  046214  051105  047522  000122
 7398
 7399  046222  051104  053111  020105  EM32:   .ASCIZ  /DRIVE TIMING ('DTE') ERROR/
 7400  046230  044524  044515  043516
 7401  046236  024040  042047  042524
 7402  046244  024447  042440  051122
 7403  046252  051117     000
 7404
 7405  046255     120  051101  052111  EM33:   .ASCIZ  /PARITY ('PAR') ERROR AFTER OPERATION STARTED/
 7406  046262  020131  023450  040520
 7407  046270  023522  020051  051105
 7408  046276  047522  020122  043101
 7409  046304  042524  020122  050117
 7410  046312  051105  052101  047511
 7411  046320  020116  052123  051101
 7412  046326  042524  000104
 7413
 7414  046332  051127  052111  020105  EM34:   .ASCIZ  /WRITE CLOCK FAILURE ('WCF') ERROR/
 7415  046340  046103  041517  020113
 7416  046346  040506  046111  051125
 7417  046354  020105  023450  041527
 7418  046362  023506  020051  051105
 7419  046370  047522  000122
 7420
 7421  046374  047111  040526  044514  EM35:   .ASCIZ  /INVALID ADDRESS ('IAE') ERROR/
 7422  046402  020104  042101  051104
 7423  046410  051505  020123  023450
 7424  046416  040511  023505  020051
 7425  046424  051105  047522  000122
 7426
 7427  046432  051127  052111  020105  EM36:   .ASCIZ  /WRITE LOCK ('WLE') ERROR/
 7428  046440  047514  045503  024040
 7429  046446  053447  042514  024447
 7430  046454  042440  051122  051117
 7431  046462     000
 7432
 7433  046463     104  052101  020101  EM37:   .ASCIZ  /DATA CHECK ('DCK') SET DURING WRITE CHECK COMMAND/
 7434  046470  044103  041505  020113
 7435  046476  023450  041504  023513
 7436  046504  020051  042523  020124
 7437  046512  052504  044522  043516
 7438  046520  053440  044522  042524
 7439  046526  041440  042510  045503
 7440  046534  041440  046517  040515
 7441  046542  042116     000
 7442
```

```
7443  046545     122  030510  020061  EM40:   .ASCIZ  /RH11 OR UNIBUS TRANSFER ERROR/
7444  046552  051117  052440  044516
7445  046560  052502  020123  051124
7446  046566  047101  043123  051105
7447  046574  042440  051122  051117
7448  046602     000
7449
7450  046603     102  051525  040440  EM41:   .ASCIZ  /BUS ADDRESS OR WORD COUNT INCORRECT/
7451  046610  042104  042522  051523
7452  046616  047440  020122  047527
7453  046624  042122  041440  052517
7454  046632  052116  044440  041516
7455  046640  051117  042522  052103
7456  046646     000
7457
7458  046647     104  052101  020101  EM42:   .ASCIZ  /DATA COMPARE ERRORS - NO OTHER ERROR(S) DETECTED/
7459  046654  047503  050115  051101
7460  046662  020105  051105  047522
7461  046670  051522  026440  047040
7462  046676  020117  052117  042510
7463  046704  020122  051105  047522
7464  046712  024122  024523  042040
7465  046720  052105  041505  042524
7466  046726  000104
7467
7468  046730  040503  023516  020124  EM43:   .ASCIZ  /CAN'T MATCH DATA READ WITH A PATTERN/
7469  046736  040515  041524  020110
7470  046744  040504  040524  051040
7471  046752  040505  020104  044527
7472  046760  044124  040440  050040
7473  046766  052101  042524  047122
7474  046774     000
7475
7476  046775     105  051122  051117  EM44:   .ASCIZ  /ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH11/
7477  047002  041040  052111  051450
7478  047010  020051  042523  026124
7479  047016  041040  052125  047040
7480  047024  020117  051105  047522
7481  047032  020122  044523  047107
7482  047040  046101  042105  041040
7483  047046  020131  044124  020105
7484  047054  044122  030461     000
7485
7486  047061     105  041503  046040  EM45:   .ASCIZ  /ECC LOGIC FAILURE - POSITION REGISTER VALUE TOO LARGE/
7487  047066  043517  041511  043040
7488  047074  044501  052514  042522
7489  047102  026440  050040  051517
7490  047110  052111  047511  020116
7491  047116  042522  044507  052123
7492  047124  051105  053040  046101
7493  047132  042525  052040  047517
7494  047140  046040  051101  042507
7495  047146     000
7496
```

```
7497  047147     102  051525  040440  EM46:   .ASCIZ  /BUS ADDRESS AND WORD COUNT NOT CONSISTENT/
7498  047154  042104  042522  051523
7499  047162  040440  042116  053440
7500  047170  051117  020104  047503
7501  047176  047125  020124  047516
7502  047204  020124  047503  051516
7503  047212  051511  042524  052116
7504  047220     000
7505
7506  047221     123  042505  020113  EM50:   .ASCIZ  /SEEK INCOMPLETE ('SKI') OR OFF CYLINDER ('OCYL') ERROR/
7507  047226  047111  047503  050115
7508  047234  042514  042524  024040
7509  047242  051447  044513  024447
7510  047250  047440  020122  043117
7511  047256  020106  054503  044514
7512  047264  042116  051105  024040
7513  047272  047447  054503  023514
7514  047300  020051  051105  047522
7515  047306  000122
7516
7517  047310  051120  043517  040522  EM51:   .ASCIZ  /PROGRAM DETECTED POSITIONING ERROR/
7518  047316  020115  042504  042524
7519  047324  052103  042105  050040
7520  047332  051517  052111  047511
7521  047340  044516  043516  042440
7522  047346  051122  051117     000
7523
7524  047353     104  044522  042526  EM60:   .ASCIZ  /DRIVE UNSAFE ERROR/
7525  047360  052440  051516  043101
7526  047366  020105  051105  047522
7527  047374  000122
7528
7529  047376  050122  051501     000  DH1:    .ASCIZ  /RPAS/
7530
7531  047403     104  044522  042526  DH2:    .ASCIZ  /DRIVE   RPDS1   RPER1   RPER2   RPER3   RPAS/
7532  047410  020040  051040  042120
7533  047416  030523  020040  051040
7534  047424  042520  030522  020040
7535  047432  051040  042520  031122
7536  047440  020040  051040  042520
7537  047446  031522  020040  051040
7538  047454  040520  000123
7539
7540  047460  051104  053111  020105  DH3:    .ASCIZ  /DRIVE   REG ADR  DATA/
7541  047466  020040  042522  020107
7542  047474  042101  020122  042040
7543  047502  052101  000101
7544
7545  047506  051104  053111  020105  DH4:    .ASCIZ  /DRIVE   REG ADR    GOOD    BAD/
7546  047514  020040  042522  020107
7547  047522  042101  020122  020040
7548  047530  043440  047517  020104
7549  047536  020040  041040  042101
7550  047544     000
```

```
7551
7552  047545     044  050122  042101  DH6:    .ASCIZ  /$RPADR/
7553  047552  000122
7554
7555  047554  051104  020126  050122  DH14:   .ASCII  /DRV RPCS1   RPCS2   RPDS1   RPER1   /
7556  047562  051503  020061  020040
7557  047570  050122  051503  020062
7558  047576  020040  050122  051504
7559  047604  020061  020040  050122
7560  047612  051105  020061  020040
7561  047620  050122  051105  020062          .ASCIZ  /RPER2   RPER3   RPEC1   RPEC2/<CR><LF>
7562  047626  020040  050122  051105
7563  047634  020063  020040  050122
7564  047642  041505  020061  020040
7565  047650  050122  041505  006462
7566  047656  000012
7567
7568  047660  050122  041527  020040  DH15:   .ASCII  /RPWC    RPBA    RPDA    RPAS    RPLA    /
7569  047666  020040  050122  040502
7570  047674  020040  020040  050122
7571  047702  040504  020040  020040
7572  047710  050122  051501  020040
7573  047716  020040  050122  040514
7574  047724  020040  020040
7575  047730  050122  041104  020040          .ASCIZ  /RPDB    RPMR    RPDT/<CR><LF>
7576  047736  020040  050122  051115
7577  047744  020040  020040  050122
7578  047752  052104  005015     000
7579
7580  047757     122  051520  020116  DH16:   .ASCIZ  /RPSN    RPOF    RPCA    RPCC    STATUS/<CR><LF>
7581  047764  020040  051040  047520
7582  047772  020106  020040  051040
7583  050000  041520  020101  020040
7584  050006  051040  041520  020103
7585  050014  020040  051440  040524
7586  050022  052524  006523  000012
7587
7588                                          .EVEN
7589
7590  050030  001244  000000          DT1:    .WORD   ATTN,0
7591
7592  050034  001242  033102  033104  DT2:    .WORD   DRIVE,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6,ATTN,0
7593  050042  033106  033110  001244
7594  050050  000000
7595
7596  050052  001242  040350  040352  DT3:    .WORD   DRIVE,RD.ADR,RD.WRD,0
7597  050060  000000
7598
7599  050062  001242  040570  040566  DT4:    .WORD   DRIVE,WRT.AD,WRT.WD,RD.WRD,0
7600  050070  040352  000000
7601
7602  050074  001170  000000          DT6:    .WORD   $RPADR,0
7603
7604  050100  000234  000244  000246  DT14:   .WORD   $RPCS1,$RPCS2,$RPDS1,$RPER1,$RPER2,$RPER3,$RPEC1,$RPEC2,0
```

```
 7605  050106  000250  000274  000276
 7606  050114  000300  000302  000000
 7607
 7608  050122  000236  000240  000242  DT15:   .WORD   $RPWC,$RPBA,$RPDA,$RPAS,$RPLA,$RPDB,$RPMR,$RPDT,0
 7609  050130  000252  000254  000256
 7610  050136  000260  000262  000000
 7611
 7612  050144  000264  000266  000270  DT16:   .WORD   $RPSN,$RPOF,$RPCA,$RPCC,$STATUS,0
 7613  050152  000272  000016  000000
 7614
 7615  050160  051120  051505  047105  LIN2C:  .ASCIZ  /PRESENT ORDER = /
 7616  050166  020124  051117  042504
 7617  050174  020122  020075     000
 7618  050201     040  050040  042522  LIN2P:  .ASCIZ  /  PREVIOUS ORDER = /
 7619  050206  044526  052517  020123
 7620  050214  051117  042504  020122
 7621  050222  020075     000
 7622  050225     052  042440  051122  LIN2S:  .ASCIZ  @* ERROR AT BAD TRACK/SECTOR@
 7623  050232  051117  040440  020124
 7624  050240  040502  020104  051124
 7625  050246  041501  027513  042523
 7626  050254  052103  051117     000
 7627  050261     105  051122  051117  LINM3:  .ASCIZ  /ERROR AT C/
 7628  050266  040440  020124  000103
 7629  050274  052040     000          T:      .ASCIZ  / T/
 7630  050277     120  042522  042523  LINN3:  .ASCIZ  /PRESENT ADDR = C/
 7631  050304  052116  040440  042104
 7632  050312  020122  020075  000103
 7633  050320  051440     000          S:      .ASCIZ  / S/
 7634  050323     040  020040  051120  LINP3:  .ASCIZ  /   PREV ADDR = C/
 7635  050330  053105  040440  042104
 7636  050336  020122  020075  000103
 7637  050344  052123  051101  020124  LINS3:  .ASCIZ  /START CYL = /
 7638  050352  054503  020114  020075
 7639  050360     000
 7640  050361     040  042440  042116  LINEN3: .ASCIZ  /  END CYL = /
 7641  050366  041440  046131  036440
 7642  050374  000040
 7643  050376  020040  041501  052524  LINA3:  .ASCIZ  /  ACTUAL CYL = /
 7644  050404  046101  041440  046131
 7645  050412  036440  000040
 7646  050416  020040  051124  020113  LINT3:  .ASCIZ  /  TRK = /
 7647  050424  020075     000
 7648  050427     040  050122  040503  LINCA3: .ASCIZ  / RPCA = /
 7649  050434  036440  000040
 7650  050440  050122  040504  036440  LINDA3: .ASCIZ  /RPDA = /
 7651  050446  000040
 7652  050450  050122  040502  036440  LINB3:  .ASCIZ  /RPBA = /
 7653  050456  000040
 7654  050460  020040  050122  041527  LINW3:  .ASCIZ  /  RPWC = /
 7655  050466  036440  000040
 7656  050472  052123  051101  020124  LINST3: .ASCIZ  /START TRK = /
 7657  050500  051124  020113  020075
 7658  050506     000
```

```
 7659  050507     123  040524  052122  LINSS3: .ASCIZ  /START SEC = /
 7660  050514  051440  041505  036440
 7661  050522  000040
 7662  050524  052502  043106  051105  LINM4:  .ASCIZ  /BUFFER ADDR = /
 7663  050532  040440  042104  020122
 7664  050540  020075     000
 7665  050543     040  051440  055111  LINS4:  .ASCIZ  /  SIZE = /
 7666  050550  020105  020075     000
 7667  050555     040  040440  052103  LINX4:  .ASCIZ  /  ACTUAL NMBR WRDS XFRD = /
 7668  050562  040525  020114  046516
 7669  050570  051102  053440  042122
 7670  050576  020123  043130  042122
 7671  050604  036440  000040
 7672  050610  047507  042117  042040  LIND5:  .ASCIZ  /GOOD DATA = /
 7673  050616  052101  020101  020075
 7674  050624     000
 7675  050625     040  041040  042101  LINB5:  .ASCIZ  /  BAD DATA = /
 7676  050632  042040  052101  020101
 7677  050640  020075     000
 7678  050643     040  051440  041505  LINP5:  .ASCIZ  /  SECT POS = /
 7679  050650  020124  047520  020123
 7680  050656  020075     000
 7681  050661     110  040505  042504  LINS5:  .ASCIZ  /HEADER FROM ERROR SECTOR = /
 7682  050666  020122  051106  046517
 7683  050674  042440  051122  051117
 7684  050702  051440  041505  047524
 7685  050710  020122  020075     000
 7686  050715     122  042520  030503  LINEP5: .ASCIZ  /RPEC1 = /
 7687  050722  036440  000040
 7688  050726  051040  042520  031103  LINE05: .ASCIZ  / RPEC2 = /
 7689  050734  036440  000040
 7690  050740  042523  052103  051117  LINB6:  .ASCIZ  /SECTOR IS ECC CORRECTABLE /
 7691  050746  044440  020123  041505
 7692  050754  020103  047503  051122
 7693  050762  041505  040524  046102
 7694  050770  020105     000
 7695  050773     123  041505  047524  LINC6:  .ASCIZ  /SECTOR READ CORRECTLY /
 7696  051000  020122  042522  042101
 7697  051006  041440  051117  042522
 7698  051014  052103  054514  000040
 7699  051022  047503  051122  041505  LING6:  .ASCIZ  /CORRECTED ON /
 7700  051030  042524  020104  047117
 7701  051036  000040
 7702  051040  051040  052105  044522  LINR6:  .ASCIZ  / RETRIES/
 7703  051046  051505     C00
 7704  051051     125  041516  051117  LINU06: .ASCIZ  /UNCORRECTABLE AFTER /
 7705  051056  042522  052103  041101
 7706  051064  042514  040440  052106
 7707  051072  051105  000040
 7708  051076  020040  047524  040524  LIN7M:  .ASCIZ  /  TOTAL MISPOS ERR = /
 7709  051104  020114  044515  050123
 7710  051112  051517  042440  051122
 7711  051120  036440  000040
 7712  051124  051117  042504  051522  LIN70:  .ASCIZ  /ORDERS:/
```

```
 7713  051132  000072
 7714  051134  052040  052117  046101  LIN7P:  .ASCIZ  / TOTAL SEEKS = /
 7715  051142  051440  042505  051513
 7716  051150  036440  000040
 7717  051154  052040  052117  046101  LIN7S:  .ASCIZ  / TOTAL SkI,OCYL ERR = /
 7718  051162  051440  044513  047454
 7719  051170  054503  020114  051105
 7720  051176  020122  020075     000
 7721  051203     040  042440  051122  LIN7T:  .ASCIZ  /  ERRORS:/
 7722  051210  051117  035123     000
 7723  051215     040  053440  042122  LIN7X:  .ASCIZ  / WRDS XFR:/
 7724  051222  020123  043130  035122
 7725  051230     000
 7726  051231     040  053440  042122  LIN7R:  .ASCIZ    WRDS READ:/
 7727  051236  020123  042522  042101
 7728  051244  000072
 7729  051246  044504  043106  051105  LIN8M:  .ASCIZ  .DIFFERENT ERROR DURING RETRY/
 7730  051254  047105  020124  051105
 7731  051262  047522  020122  052504
 7732  051270  044522  043516  051040
 7733  051276  052105  054522     000
 7734  051303     104  052101  020101  LIN9B:  .ASCIZ  /DATA COMPARISON ERRORS/
 7735  051310  047503  050115  051101
 7736  051316  051511  047117  042440
 7737  051324  051122  051117  000123
 7738  051332  020040  020040  020040  LIN9H:  .ASCII  /          GOOD     BAD/<CR><LF>
 7739  051340  020040  043440  047517
 7740  051346  020104  020040  041040
 7741  051354  042101  005015
 7742  051360  047514  020103  020040          .ASCIZ  /LOC      DATA     DATA/<CR><LF>
 7743  051366  020040  042040  052101
 7744  051374  020101  020040  042040
 7745  051402  052101  006501  000012
 7746  051410  047514  020103  020040  LIN9I:  .ASCIZ  /LOC      DATA/<CR><LF>
 7747  051416  020040  042040  052101
 7748  051424  006501  000012
 7749  051430  047524  040524  020114  LIN9E:  .ASCIZ  /TOTAL COMPARE ERRORS = /
 7750  051436  047503  050115  051101
 7751  051444  020105  051105  047522
 7752  051452  051522  036440  000040
 7753  051460  044124  020105  040504  LIN9G:  .ASCIZ  /THE DATA COMPARED Ok/<CR><LF>
 7754  051466  040524  041440  046517
 7755  051474  040520  042522  020104
 7756  051502  045517  005015     000
 7757  051507     105  051122  051117  LIN10A: .ASCIZ  /ERROR BURST BEGINS AT WORD /
 7758  051514  041040  051125  052123
 7759  051522  041040  043505  047111
 7760  051530  020123  052101  053440
 7761  051536  051117  020104     000
 7762  051543     040  047111  042040  LIN10B: .ASCIZ  / IN DATA FIELD OF ERROR SECTOR <CR><LF>
 7763  051550  052101  020101  044506
 7764  051556  046105  020104  043117
 7765  051564  042440  051122  051117
 7766  051572  051440  041505  047524
```

```
 7787  051600  006522  000012
 7788  051604  051105  047522  020122  LIN1OC: .ASCII  /ERROR WAS NOT IN THE DATA READ - /<CR><LF>
 7789  051612  040527  020123  047516
 7790  051620  020124  047111  052040
 7791  051626  042510  042040  052101
 7792  051634  020101  042522  042101
 7793  051642  026440  006440     012
 7794  051647     105  041503  041440          .ASCIZ  /ECC CORRECTION CAN'T BE PERFORMED/
 7795  051654  051117  042522  052103
 7796  051662  047511  020116  040503
 7797  051670  023516  020124  042502
 7798  051676  050040  051105  047506
 7799  051704  046522  042105     000
 7800  051711     105  041503  041440  LIN1OH: .ASCII   ECC CORRECTION RESULTS/<CR><LF>
 7801  051716  051117  042522  052103
 7802  051724  047511  020116  042522
 7803  051732  052523  052114  006523
 7804  051740     012
 7805  051741     101  042104  020122          .ASCIZ  /ADDR    BAD     CORRECTED /<CR><LF>
 7806  051746  020040  041040  042101
 7807  051754  020040  020040  041440
 7808  051762  051117  042522  052103
 7809  051770  042105  006440  000012
 7810  051776  047503  052116  047105  LIN11H: .ASCIZ  /CONTENTS OF ERROR SECTOR (REPORTED ABOVE)/<CR><LF>
 7811  052004  051524  047440  020106
 7812  052012  051105  047522  020122
 7813  052020  042523  052103  051117
 7814  052026  024040  042522  047520
 7815  052034  052122  042105  040440
 7816  052042  047502  042526  006451
 7817  052050  000012
 7818  052052  042101  051104  020040          .ASCIZ  /ADDR    DATA/<CR><LF>
 7819  052060  020040  040504  040524
 7820  052066  005015     000
 7821  052071     040     040          LIN4SP: .ASCII  /  /
 7822  052073     040                  LINSP:  .ASCII  / /
 7823  052074  000040                  LINSPO: .ASCIZ  / /
 7824
 7825                                  .SBTTL  TELETYPE MESSAGES
 7826
 7827  052076  051104  053111  000105  UNTMSG: .ASCIZ  /DRIVE/
 7828  052104  047440  043106  044514  UNTOFF: .ASCIZ  / OFFLINE/
 7829  052112  042516     000
 7830  052115     040  047117  044514  UNTON:  .ASCIZ  / ONLINE/
 7831  052122  042516     000
 7832  052125     040  047516  020124  UNTNOT: .ASCIZ  / NOT BEING TESTED/
 7833  052132  042502  047111  020107
 7834  052140  042524  052123  042105
 7835  052146     000
 7836  052147     040  046101  042522  UNTASN: .ASCIZ  / ALREADY BEING TESTED/
 7837  052154  042101  020131  042502
 7838  052162  047111  020107  042524
 7839  052170  053123  042105     000
 7840  052175     040  047516  020124  NOTRP:   ASCIZ  @ NOT AN RP04 5/6@
```

```
 7821  052202  047101  051040  030120
 7822  052210  027464  027465  000066
 7823  052216  047040  052117  050040  NOTPRS: .ASCIZ  / NOT PRESENT/
 7824  052224  042522  042523  052116
 7825  052232     000
 7826  052233     040  047516  020124  NOTAVL: .ASCIZ  / NOT AVAILABLE/
 7827  052240  053101  044501  040514
 7828  052246  046102  000105
 7829  052252  052440  051516  043101  NOTSAF: .ASCIZ  / UNSAFE/
 7830  052260  000105
 7831  052262  047125  052111  051440  SYSTAT: .ASCIZ  /UNIT STATUS:/<CR><LF><LF>
 7832  052270  040524  052524  035123
 7833  052276  005015  000012
 7834  052302  050122  032060     000  RP04B:  .ASCIZ  /RP04/
 7835  052307     122  030120  000065  RP05:   .ASCIZ  /RP05/
 7836  052314  050122  033060     000  RP06:   .ASCIZ  /RP06/
 7837  052321     104  044522  042526  STATHD: .ASCII  /DRIVE PERFORMANCE SUMMARY/<CR><LF>
 7838  052326  050040  051105  047506
 7839  052334  046522  047101  042503
 7840  052342  051440  046525  040515
 7841  052350  054522  005015
 7842  052354  051104  020126  040520          .ASCII  /DRV PASS ORDERS   SEEKS   WRDS XFER   WRDS READ /
 7843  052362  051523  047440  042122
 7844  052370  051105  020123  020040
 7845  052376  042523  045505  020123
 7846  052404  020040  051127  051504
 7847  052412  054040  042506  020122
 7848  052420  020040  051127  051504
 7849  052426  051040  040505  020104
 7850  052434  047523  052106  044040          .ASCIZ  /SOFT HARD  SKI MISP OTHER/<CR><LF>
 7851  052442  051101  020104  051440
 7852  052450  044513  046440  051511
 7853  052456  020120  052117  042510
 7854  052464  006522  000012
 7855  052470  047504  042516  005015  PDONE:  .ASCIZ  /DONE/<CR><LF><LF>
 7856  052476  000012
 7857  052500  037407  040506  040524  DRCPNG: .ASCIZ  <07>/?FATAL OR EXCESSIVE ERRORS/
 7858  052506  020114  051117  042440
 7859  052514  041530  051505  044523
 7860  052522  042526  042440  051122
 7861  052530  051117  000123
 7862  052534  047105  020104  043117  ENDPAS: .ASCIZ  /END OF PASS/
 7863  052542  050040  051501  000123
 7864  052550  005015  047105  020104  ENDTST: .ASCIZ  <CR><LF>/END OF TEST/
 7865  052556  043117  052040  051505
 7866  052564  000124
 7867  052566  005015  051104  053111  DEASSG: .ASCIZ  <CR><LF>/DRIVE DEASSIGNED/
 7868  052574  020105  042504  051501
 7869  052602  044523  047107  042105
 7870  052610     000
 7871  052611     015  025012  025052  DRNUM:  .ASCIZ  <CR><LF>/********** DRIVE #
 7872  052616  025052  025052  025052
 7873  052624  020052  051104  053111
 7874  052632  020105  000043
```

```
 7875  052636  051440  040524  052122  ASGND:  .ASCIZ  / STARTED/<CR><LF>
 7876  052644  042105  005015     000
 7877  052651     015  037412  023440  NEDCLK: .ASCIZ  <CR><LF>/? 'L' OR 'P' CLOCK REQUIRED ON SYSTEM/<CR><LF>
 7878  052656  023514  047440  020122
 7879  052664  050047  020047  046103
 7880  052672  041517  020113  042522
 7881  052700  052521  051111  042105
 7882  052706  047440  020116  054523
 7883  052714  052123  046505  005015
 7884  052722     000
 7885  052723     056     000          PERIOD: .ASCIZ  /./
 7886  052725     077     000          QUES:   .ASCIZ  /?/
 7887  052727     111  053116  046101  INVLD:  .ASCIZ  /INVALID COMMAND/<CR><LF>
 7888  052734  042111  041440  046517
 7889  052742  040515  042116  005015
 7890  052750     000
 7891  052751     015  042412  052116  ENTCOM: .ASCIZ  <CR><LF>/ENTER COMMANDS: /<CR><LF>
 7892  052756  051105  041440  046517
 7893  052764  040515  042116  035123
 7894  052772  006440  000012
 7895  052776  047105  042524  020122  ENTDRV: .ASCIZ  /ENTER I.D. FOR DRV #/
 7896  053004  027111  027104  043040
 7897  053012  051117  042040  053122
 7898  053020  021440     000
 7899  053023     015  042412  052116  ENTLMT: .ASCIZ  <CR><LF>/ENTER ADDRESS LIMITS FOR DRV #/
 7900  053030  051105  040440  042104
 7901  053036  042522  051523  046040
 7902  053044  046511  052111  020123
 7903  053052  047506  020122  051104
 7904  053060  020126  000043
 7905  053064  047105  042524  020122  ENTADR: .ASCIZ  @ENTER BAD TRK/SEC ADRS FOR DRV #@
 7906  053072  040502  020104  051124
 7907  053100  027513  042523  020103
 7908  053106  042101  051522  043040
 7909  053114  051117  042040  053122
 7910  053122  021440     000
 7911  053125     072     000          COLON:  .ASCIZ  /:/
 7912  053127     015  042012  052101  DATEIS: .ASCIZ  <CR><LF>/DATE: /
 7913  053134  035105  000040
 7914  053140  005015  050117  051105  IDIS:   .ASCIZ  <CR><LF>/OPERATOR I.D.: /
 7915  053146  052101  051117  044440
 7916  053154  042056  035056  000040
 7917  053162  005015  042012  053122  HEDLIN: .ASCIZ  <CR><LF><LF>/DRV  DRV I.D./<CR><LF>
 7918  053170  020040  051104  020126
 7919  053176  027111  027104  005015
 7920  053204     000
 7921  053205     116  047117  006505  NONE:   .ASCIZ  /NONE/<CR><LF>
 7922  053212  000012
 7923  053214  020077  047111  040526  BADENT: .ASCIZ  /? INVALID ENTRY/<CR><LF>
 7924  053222  044514  020104  047105
 7925  053230  051124  006531  000012
 7926  053236  054523  052123  046505  BUSY:   .ASCIZ  /SYSTEM BUSY.../<CR><LF>
 7927  053244  041040  051525  027131
 7928  053252  027056  005015     000
```

```
 7929  053257  000015  050012  047522  INTDON: .ASCII  <CR><LF>/PROGRAM INITIALIZATION COMPLETE/
 7930  053264  051107  046501  044440
 7931  053272  044516  044524  046101
 7932  053300  055111  052101  047511
 7933  053306  020116  047503  050115
 7934  053314  042514  042524
 7935  053320  005015  054524  042520          .ASCIZ  <CR><LF>/TYPE A 'CONTROL C' TO ENTER COMMANDS/<CR><LF><LF>
 7936  053326  040440  023440  047503
 7937  053334  052116  047522  020114
 7938  053342  023503  052040  020117
 7939  053350  047105  042524  020122
 7940  053356  047503  046515  047101
 7941  053364  051504  005015  000012
 7942
 7943                                  .EVEN
 7944
 7945                                  ;PARAMETER ENTRY TABLE
 7946
 7947  053372  053520  000000  001364  PAR_ST: .WORD   PAR1,0,MAXDL
 7948  053400  053526  177777  001370          .WORD   PAR2,-1,INTRVL
 7949  053406  053656  177777  001362          .WORD   PAR19,-1,PASCNT
 7950  053414  053535  177777  001374          .WORD   PAR3,-1,CMPLMT
 7951  053422  053625  000001  001400          .WORD   PAR11,1,WCSEL
 7952  053430  053633  000007  001402          .WORD   PAR14,7,RATIO
 7953  053436  053650  000001  001410          .WORD   PAR16,1,ENDET
 7954  053444  053616  000001  001376          .WORD   PAR10,1,FORMAT
 7955  053452  053641  000001  001404          .WORD   PAR15,1,AUTOCK
 7956  053460  053665  000001  001406          .WORD   PAR20,1,NOTPRT
 7957  053466  000000                          .WORD   0               ;TABLE TERMINATOR
 7958
 7959  053470  047105  042524  020122  ASKPAR: .ASCIZ  /F'ITER PARAMETERS:  /
 7960  053476  040520  040522  042515
 7961  053504  042524  051522  020072
 7962  053512  000040
 7963  053514  027440  000040          SLASH:  .ASCIZ  @ / @
 7964
 7965  053520  040515  042130  000114  PAR1:   .ASCIZ  /MAXDL/
 7966  053526  047111  051124  046126  PAR2:   .ASCIZ  /INTRVL/
 7967  053534     000
 7968  053535     103  050115  046514  PAR3:   .ASCIZ  /CMPLMT/
 7969  053542  000124
 7970  053544  040515  041530  046131  PAR4:   .ASCIZ  /MAXCYL/
 7971  053552     000
 7972  053553     115  047111  054503  PAR5:   .ASCIZ  /MINCYL/
 7973  053560  000114
 7974  053562  040515  052130  045522  PAR6:   .ASCIZ  /MAXTRK/
 7975  053570     000
 7976  053571     115  047111  051124  PAR7:   .ASCIZ  /MINTRK/
 7977  053576  000113
 7978  053600  040515  051530  041505  PAR8:   .ASCIZ  /MAXSE.
 7979  053606     000
 7980  053607     115  047111  042523  PAR9:   .ASCIZ  /MINSEC/
 7981  053614  000103
 7982  053616  047506  046522  052101  PAR10:  .ASCIZ  /FORMAT/
```

```
7983  053624  000
7984  053625  127  051503  046105  PAR11:  .ASCIZ  /WCSEL/
7985  053632  000
7986  053633  122  052101  047511  PAR14:  .ASCIZ  /RATIO/
7987  053640  000
7988  053641  101  052125  041517  PAR15:  .ASCIZ  /AUTOCK/
7989  053646  000113
7990  053650  047105  042504  000124  PAR16:  .ASCIZ  /ENDET/
7991  053656  040520  041523  052116  PAR19:  .ASCIZ  /PASCNT/
7992  053664  000
7993  053665  116  052117  051120  PAR20:  .ASCIZ  /NOTPRT/
7994  053672  000124
7995
7996                                  .EVEN
7997
7998                          ;PARAMETER TABLE POINTERS FOR ADDRESS LIMITS
7999
8000  053674  053714          TABLE:  .WORD   TABLE0          ;PARAMETER TABLE FOR DRIVE 0
8001  053676  053762                  .WORD   TABLE1          ;PARAMETER TABLE FOR DRIVE 1
8002  053700  054030                  .WORD   TABLE2          ;PARAMETER TABLE FOR DRIVE 2
8003  053702  054076                  .WORD   TABLE3          ;PARAMETER TABLE FOR DRIVE 3
8004  053704  054144                  .WORD   TABLE4          ;PARAMETER TABLE FOR DRIVE 4
8005  053706  054212                  .WORD   TABLE5          ;PARAMETER TABLE FOR DRIVE 5
8006  053710  054260                  .WORD   TABLE6          ;PARAMETER TABLE FOR DRIVE 6
8007  053712  054326                  .WORD   TABLE7          ;PARAMETER TABLE FOR DRIVE 7
8008
8009                          ;PARAMETER TABLE FOR ADDRESS LIMITS
8010
8011  053714  053553  000000  041716  TABLE0: .WORD   PAR5,0,MINCYL+DRIVE0
8012  053722  053544  000000  041714          .WORD   PAR4,0,MAXCYL+DRIVE0
8013  053730  053571  000022  041722          .WORD   PAR7,18.,MINTRK+DRIVE0
8014  053736  053562  000022  041720          .WORD   PAR6,18.,MAXTRK+DRIVE0
8015  053744  053607  000025  041726          .WORD   PAR9,21.,MINSEC+DRIVE0
8016  053752  053600  000025  041724          .WORD   PAR8,21.,MAXSEC+DRIVE0,0
8017  053760  000000
8018
8019  053762  053553  000000  042222  TABLE1: .WORD   PAR5,0,MINCYL+DRIVE1
8020  053770  053544  000000  042220          .WORD   PAR4,0,MAXCYL+DRIVE1
8021  053776  053571  000022  042226          .WORD   PAR7,18.,MINTRK+DRIVE1
8022  054004  053562  000022  042224          .WORD   PAR6,18.,MAXTRK+DRIVE1
8023  054012  053607  000025  042232          .WORD   PAR9,21.,MINSEC+DRIVE1
8024  054020  053600  000025  042230          .WORD   PAR8,21.,MAXSEC+DRIVE1,0
8025  054026  000000
8026
8027  054030  053553  000000  042526  TABLE2: .WORD   PAR5,0,MINCYL+DRIVE2
8028  054036  053544  000000  042524          .WORD   PAR4,0,MAXCYL+DRIVE2
8029  054044  053571  000022  042532          .WORD   PAR7,18.,MINTRK+DRIVE2
8030  054052  053562  000022  042530          .WORD   PAR6,18.,MAXTRK+DRIVE2
8031  054060  053607  000025  042536          .WORD   PAR9,21.,MINSEC+DRIVE2
8032  054066  053600  000025  042534          .WORD   PAR8,21.,MAXSEC+DRIVE2,0
8033  054074  000000
8034
8035  054076  053553  000000  043032  TABLE3: .WORD   PAR5,0,MINCYL+DRIVE3
8036  054104  053544  000000  043030          .WORD   PAR4,0,MAXCYL+DRIVE3
```

```
8037  054112  053571  000022  043036            .WORD   PAR7,18.,MINTRK+DRIVE3
8038  054120  053562  000022  043034            .WORD   PAR6,18.,MAXTRK+DRIVE3
8039  054126  053607  000025  043042            .WORD   PAR9,21.,MINSEC+DRIVE3
8040  054134  053600  000025  043040            .WORD   PAR8,21.,MAXSEC+DRIVE3,0
8041  054142  000000
8042
8043  054144  053553  000000  043336  TABLE4:   .WORD   PAR5,0,MINCYL+DRIVE4
8044  054152  053544  000000  043334            .WORD   PAR4,0,MAXCYL+DRIVE4
8045  054160  053571  000022  043342            .WORD   PAR7,18.,MINTRK+DRIVE4
8046  054166  053562  000022  043340            .WORD   PAR6,18.,MAXTRK+DRIVE4
8047  054174  053607  000025  043346            .WORD   PAR9,21.,MINSEC+DRIVE4
8048  054202  053600  000025  043344            .WORD   PAR8,21.,MAXSEC+DRIVE4,0
8049  054210  000000
8050
8051  054212  053553  000000  043642  TABLE5:   .WORD   PAR5,0,MINCYL+DRIVE5
8052  054220  053544  000000  043640            .WORD   PAR4,0,MAXCYL+DRIVE5
8053  054226  053571  000022  043646            .WORD   PAR7,18.,MINTRK+DRIVE5
8054  054234  053562  000022  043644            .WORD   PAR6,18.,MAXTRK+DRIVE5
8055  054242  053607  000025  043652            .WORD   PAR9,21.,MINSEC+DRIVE5
8056  054250  053600  000025  043650            .WORD   PAR8,21.,MAXSEC+DRIVE5,0
8057  054256  000000
8058
8059  054260  053553  000000  044146  TABLE6:   .WORD   PAR5,0,MINCYL+DRIVE6
8060  054266  053544  000000  044144            .WORD   PAR4,0,MAXCYL+DRIVE6
8061  054274  053571  000022  044152            .WORD   PAR7,18.,MINTRK+DRIVE6
8062  054302  053562  000022  044150            .WORD   PAR6,18.,MAXTRK+DRIVE6
8063  054310  053607  000025  044156            .WORD   PAR9,21.,MINSEC+DRIVE6
8064  054316  053600  000025  044154            .WORD   PAR8,21.,MAXSEC+DRIVE6,0
8065  054324  000000
8066
8067  054326  053553  000000  044452  TABLE7:   .WORD   PAR5,0,MINCYL+DRIVE7
8068  054334  053544  000000  044450            .WORD   PAR4,0,MAXCYL+DRIVE7
8069  054342  053571  000022  044456            .WORD   PAR7,18.,MINTRK+DRIVE7
8070  054350  053562  000022  044454            .WORD   PAR6,18.,MAXTRK+DRIVE7
8071  054356  053607  000025  044462            .WORD   PAR9,21.,MINSEC+DRIVE7
8072  054364  053600  000025  044460            .WORD   PAR8,21.,MAXSEC+DRIVE7,0
8073  054372  000000
8074
8075
8076  054374  000000  000000  000000  CYLDER:   .WORD   0,0,0,0          ;HEADER BUFFER FOR 'READHD' ROUTINE
8077  054402  000000
8078
8079          054404                  ENDPGM  =       .                  ;LAST LOCATION OF PROG + 2
8080
8081                                  ;;*****************************************************************
8082
8083                                  ;ROUTINE TO GET THE DATE AND THE OPERATOR FROM THE OPERATOR
8084                                  ;CALL:
8085                                  ;       JSR     PC,OPRDAT
8086                                  ;       RETURN
8087                                  ;
8088                                  ;NOTE: THIS ROUTINE IS ENTERED ONLY AT INITIAL START
8089
8090  054404  104401  054516          OPRDAT: TYPE    ,ENTDAT            ;'ENTER DATE'
```

```
8091  054410  104411                          RDLIN                   ;READ THE ENTRY
8092  054412  012605                          MOV     (SP)+,R5        ;PUT THE ENTRY ADDRESS INTO R5
8093  054414  112537  001220                  MOVB    (R5)+,DATE      ;STORE THE DATE
8094  054420  112537  001221                  MOVB    (R5)+,DATE+1    ;STORE THE DATE
8095  054424  112537  001222                  MOVB    (R5)+,DATE+2    ;STORE THE DATE
8096  054430  112537  001223                  MOVB    (R5)+,DATE+3    ;STORE THE DATE
8097  054434  112537  001224                  MOVB    (R5)+,DATE+4    ;STORE THE DATE
8098  054440  112537  001225                  MOVB    (R5)+,DATE+5    ;STORE THE DATE
8099  054444  112537  001226                  MOVB    (R5)+,DATE+6    ;STORE THE DATE
8100  054450  112537  001227                  MOVB    (R5)+,DATE+7    ;STORE THE DATE
8101  054454  104401  054535                  TYPE    ,ENTID          ;'ENTER OPERATOR I.D.'
8102  054460  104411                          RDLIN                   ;READ THE ENTRY
8103  054462  012605                          MOV     (SP)+,R5        ;ENTRY ADDRESS
8104  054464  112537  001232                  MOVB    (R5)+,OPERID    ;STORE THE I.D.
8105  054470  112537  001233                  MOVB    (R5)+,OPERID+1  ;STORE THE I.D.
8106  054474  112537  001234                  MOVB    (R5)+,OPERID+2  ;STORE THE I.D.
8107  054500  112537  001235                  MOVB    (R5)+,OPERID+3  ;STORE THE I.D.
8108  054504  112537  001236                  MOVB    (R5)+,OPERID+4  ;STORE THE I.D.
8109  054510  112537  001237                  MOVB    (R5)+,OPERID+5  ;STORE THE I.D.
8110  054514  000207                          RTS     PC              ;RETURN
8111
8112  054516  005015  047105  042524  ENTDAT: .ASCIZ  <CR><LF>/ENTER DATE: /
8113  054524  020122  040504  042524
8114  054532  020072     000
8115  054535     105  052116  051105  ENTID:  .ASCIZ  /ENTER OPERATOR I.D.: /
8116  054542  047440  042520  040522
8117  054550  047524  020122  027111
8118  054556  027104  020072     000
8119          054564                  .EVEN
8120
8121                                  .SBTTL  ROUTINE TO SIZE MEMORY
8122
8123                                  ;;******************************************************************
8124                                  ;*CALL:
8125                                  ;*      JSR     PC,$SIZE
8126                                  ;*      RETURN
8127                                  ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
8128
8129  054564  010046                  $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
8130  054566  010146                          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
8131  054570  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
8132  054574  013746  000006                  MOV     @#ERRVEC+2,-(SP)
8133  054600  010600                          MOV     SP,R0           ;;SAVE THE STACK POINTER
8134                                  ;;SET THE ERRVEC PS TO THE PRESENT PS
8135  054602  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
8136  054604  012637  000006                  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
8137  054610  012737  054630  000004          MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
8138  054616  012701  020000                  MOV     #20000,R1       ;;FIRST ADDRESS
8139  054622  005711                  1$:     TST     (R1)            ;;TEST THIS ADDRESS
8140  054624  005721                          TST     (R1)+           ;;STEP TO NEXT ADDRESS
8141  054626  000775                          BR      1$              ;;TRY ANOTHER
8142  054630  162701  000002          2$:     SUB     #2,R1           ;;CROP BACK
8143  054634  010006                          MOV     R0,SP           ;;RESTORE THE STACK
8144  054636  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
```

```
 8145  054642  012637  000004                 MOV     (SP)+,@#ERRVEC
 8146  054646  010137  054660                 MOV     R1,$LSTAD       ;;LAST ADDRESS
 8147  054652  012601                         MOV     (SP)+,R1        ;;RESTORE R1
 8148  054654  012600                         MOV     (SP)+,R0        ;;RESTORE R0
 8149  054656  000207                         RTS     PC
 8150  054660  000000             $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
 8151
 8152                             .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH11
 8153                             ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
 8154                             ;OF THE RH11 IS SETUP FOR THE PROPER ADDRESS.
 8155                             ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 8156                             ;REQUIRED.
 8157                             ;NOTE: THIS ROUTINE DESTROYS R0-R4
 8158                             ;CALL
 8159                             ;
 8160                             ;       JSR     PC,BUSADR
 8161                             ;       RETURN
 8162
 8163  054662  005737  001260    BUSADR: TST     CHGADR          ;INPUT FROM TTY REQUESTED?
 8164  054666  001450                     BEQ     7$              ;NO--BRANCH
 8165  054670  005037  001260             CLR     CHGADR          ;YES--CLEAR THE REQUEST FLAG
 8166  054674  012700  001170    1$:      MOV     #$RPADR,R0      ;FIRST ADDRESS
 8167  054700  104401  055072             TYPE    ,MRPCS1         ;"RPCS1="
 8169  054704  012046                     MOV     (R0)+,-(SP)     ;PRESENT RPCS1 ADDRESS
 8169  054706  104402                     TYPOC                   ;TYPE IT
 8170  054710  104401  052073             TYPE    ,LINSP          ;2 SPACES
 8171  054714  104411                     RDLIN                   ;GET THE ENTRY
 8172  054716  012601                     MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
 8173  054720  004537  055114             JSR     R5,CK.NUM       ;CHECK THE NUMBER
 8174  054724  054744                     3$                      ;CARRIAGE RETURN ONLY ENTERED
 8175  054726  055010                     7$                      ;PERIOD ONLY ENTERED
 8176  054730  054674                     1$                      ;ILLEGAL INPUT
 8177  054732  054740                     2$                      ;TERMINATED WITH A CARRIAGE RETURN
 8178  054734  054674                     1$                      ;TERMINATED WITH A "."
 8179  054736  055004                     4$                      ;TERMINATED WITH A "'"
 8180  054740  010260  177776     2$:     MOV     R2,-2(R0)       ;SAVE NEW RPCS1
 8181  054744  104401  055103     3$:     TYPE    ,MRHVEC         ;"RHVEC="
 8182  054750  012046                     MOV     (R0)+,-(SP)     ;PRESENT RH11 VECTOR ADDRESS ON THE STACK
 8183  054752  104402                     TYPOC                   ;TYPE IT
 8184  054754  104401  052073             TYPE    ,LINSP          ;2 SPACES
 8185  054760  104411                     RDLIN                   ;READ THE ENTRY
 8186  054762  012601                     MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
 8187  054764  004537  055114             JSR     R5,CK.NUM       ;CHECK THE NUMBER
 8188  054770  055010                     7$                      ;CARRIAGE RETURN ONLY ENTERED
 8189  054772  055010                     7$                      ;PERIOD ONLY ENTERED
 8190  054774  054744                     3$                      ;ILLEGAL INPUT
 8191  054776  055004                     4$                      ;TERMINATED WITH A CARRIAGE RETURN
 8192  055000  054744                     3$                      ;TERMINATED WITH A "."
 8193  055002  055004                     4$                      ;TERMINATED WITH A "'"
 8194  055004  010260  177776     4$:     MOV     R2,-2(R0)       ;SAVE INPUT
 8195  055010  013701  000004     7$:     MOV     ERRVEC,R1       ;SAVE THE ERROR VECTOR
 8196  055014  012737  055050  000004     MOV     #8$,ERRVEC      ;SETUP FOR TRAP
 8197  055022  005777  124142             TST     @$RPADR         ;CHECK FOR RH11
 8198  055026  010137  000004             MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
```

```
 8199  055032  012700  001170                    MOV     #$RPADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
 8200  055036  012701  033250                    MOV     #RPADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
 8201  055042  012021                            MOV     (R0)+,(R1)+     ;BUS ADDRESS
 8202  055044  012021                            MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
 8203  055046  000207                            RTS     PC              ;RETURN
 8204  055050  010137  000004          8$:     MOV     R1,ERRVEC       ;RESTORE ERROR VECTOR
 8205  055054  022626                            CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
 8206  055056  104006                            ERROR   6               ;REPORT THE ERROR
 8207  055060  005737  000042                    TST     @#42            ;IS THERE A MONITOR?
 8208  055064  001703                            BEQ     1$              ;NO--GO ASK FOR ADDRESS
 8209  055066  000137  005256                    JMP     $GET42          ;GO TO END OF PROGRAM
 8210
 8211  055072  050122  051503  020061  MRPCS1: .ASCIZ  @RPCS1 = @
 8212  055100  020075     000
 8213  055103     122  053110  041505  MRHVEC: .ASCIZ  @RHVEC = @
 8214  055110  036440  000040
 8215
 8216                                    .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
 8217                                    ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
 8218                                    ;AND FORMS AN OCTAL NUMBER IN R2
 8219                                    ;CALL:
 8220                                    ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
 8221                                    ;       MOV     #NUM,R2         ;MAX SIZE OF INPUT NUMBER
 8222                                    ;       JSR     R5,CK.NUM       ;GO FORM THE NUMBER
 8223                                    ;       RETURN  ADR1            ;"CR" ONLY ENTERED -- R2 = 0
 8224                                    ;       RETURN  ADR2            ;"PERIOD" ONLY ENTERED -- R2 = 0
 8225                                    ;       RETURN  ADR3            ;ILLEGAL CHARACTER IN THE INPUT STRING
 8226                                    ;       RETURN  ADR4            ;"CR" ENTERED -- R2 = NUMBER
 8227                                    ;       RETURN  ADR5            ;"COMMA" -- R2 = NUMBER
 8228                                    ;       RETURN  ADR6            ;"PERIOD" -- R2 = NUMBER
 8229
 8230  055114  010446          CK.NUM: MOV     R4,-(SP)        ;SAVE R4
 8231  055116  010346                  MOV     R3,-(SP)        ;SAVE R3
 8232  055120  010246                  MOV     R2,-(SP)        ;SAVE R2
 8233  055122  005004                  CLR     R4              ;RETURN POINTER
 8234  055124  005003                  CLR     R3              ;START NUMBER AT ZERO
 8235  055126  005002                  CLR     R2              ;STORE RESULT
 8236  055130  004537  027510          JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
 8237  055134  055232                  6$                      ;ILLEGAL CHARACTER
 8238  055136  055236                  8$                      ;CARRIAGE RETURN
 8239  055140  055232                  6$                      ;" "
 8240  055142  055234                  7$                      ;"."
 8241  055144  055150                  1$                      ;DIGIT 0-7
 8242  055146  055232                  6$                      ;DIGIT 8-9
 8243  055150  062705  000004  1$:     ADD     #4,R5           ;INCREMENT RETURN PAST "CR" AND "PERIOD" ONLY RETURNS
 8244  055154  006303          2$:     ASL     R3              ;FOR THE OCTAL NUMBER IN R3
 8245  055156  103425                  BCS     6$              ;DON'T LET IT GET TO BIG
 8246  055160  006303                  ASL     R3
 8247  055162  103423                  BCS     6$
 8248  055164  006303                  ASL     R3
 8249  055166  103421                  BCS     6$
 8250  055170  060203                  ADD     R2,R3
 8251  055172  004537  027510          JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
 8252  055176  055236                  8$                      ;ILLEGAL CHARACTER
```

```
8253  055200  055222                        5$                      ;CARRIAGE RETURN
8254  055202  055220                        4$                      ;"
8255  055204  055212                        3$                      ;.'.
8256  055206  055154                        2$                      ;DIGIT 0-7
8257  055210  055236                        8$                      ;DIGIT 8-9
8258  055212  105711              3$:       TSTB    (R1)            ;DOES A "CR" FOLLOW THE "PERIOD"
8259  055214  001010                        BNE     8$              ;BR IF NOT
8260  055216  005724                        TST     (R4)+           ;INCREMENT THE RETURN
8261  055220  005724              4$:       TST     (R4)+           ;INCREMENT THE RETURN INDEX
8262  055222  005724              5$:       TST     (R4)+           ;INCREMENT THE RETURN INDEX
8263  055224  020316                        CMP     R3,(SP)         ;INPUT VALUE TOO LARGE ?
8264  055226  101003                        BHI     8$              ;BR IF IT IS
8265  055230  000401                        BR      7$              ;BR IF NOT
8266  055232  005725              6$:       TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
8267  055234  005725              7$:       TST     (R5)+           ;INCREMENT THE RETURN ADDRESS
8268  055236  060405              8$:       ADD     R4,R5           ;SETUP FOR PROPER RETURN
8269  055240  010302                        MOV     R3,R2           ;LOAD ENTERED VALUE
8270  055242  005726                        TST     (SP)+           ;CLEAN OFF THE STACK
8271  055244  012603                        MOV     (SP)+,R3        ;RESTORE R3
8272  055246  012604                        MOV     (SP)+,R4        ;RESTORE R4
8273  055250  011505                        MOV     (R5),R5         ;GET RETURN ADDRESS
8274  055252  000205                        RTS     R5              ;RETURN
8275
8276
8277  055254  005015  040515  047111  TITLE:  .ASCII  <CR><LF>/MAINDEC-11-DZRJD-A/<CR><LF>
8278  055262  042504  026503  030461
8279  055270  042055  051132  042112
8280  055276  040455  005015
8281  055302  050122  032060  032457          .ASCIZ  @RP04/5/6 MULTI-DRIVE EXERCISER PROGRAM@<CR><LF><LF>
8282  055310  033057  046440  046125
8283  055316  044524  042055  044522
8284  055324  042526  042440  042530
8285  055332  041522  051511  051105
8286  055340  050040  047522  051107
8287  055346  046501  005015  000012
8288  055354  005015  047524  052040  LOADRV: .ASCII  <CR><LF>/TO TEST DRIVE 0, REPLACE THE 'XXDP' PACK ON DRIVE 0/<CR><LF>
8289  055362  051505  020124  051104
8290  055370  053111  020105  026060
8291  055376  051040  050105  040514
8292  055404  042503  052040  042510
8293  055412  023440  054130  050104
8294  055420  020047  040520  045503
8295  055426  047440  020116  051104
8296  055434  053111  020105  006460
8297  055442     012
8298  055443     127  052111  020110          .ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40,/<CR><LF>
8299  055450  047101  052117  042510
8300  055456  020122  040520  045503
8301  055464  020054  046103  040505
8302  055472  020122  042515  047515
8303  055500  054522  046040  041517
8304  055506  052101  047511  020116
8305  055514  030064  006454     012
8306  055521     101  042116  051040          .ASCIZ  /AND RESTART THE PROGRAM/<CR><LF>
```

```
 8307  055526  051505  040524  052122
 8308  055534  052040  042510  050040
 8309  055542  047522  051107  046501
 8310  055550  005015     000
 8311  055553     015  051412  051531  NOLOAD: .ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR><L
 8312  055560  042524  020115  040510
 8313  055566  020123  033061  020113
 8314  055574  042515  047515  054522
 8315  055602  020054  054047  042130
 8316  055613  023520  046040  040517
 8317  055616  042504  020122  044527
 8318  055624  046114  041040  020105
 8319  055632  053117  051105  051127
 8320  055640  052111  042524  006516
 8321  055646  000012
 8322
 8323          000001                          .END
```

```
ABNRML  026454          ABS   = 000200          ACK   = 000123          ACL   = 000040
ACTDRV  033166          ACTSTR  033167          ACU   = 100000          AOE   = 001000
ASGND   052636          ASGN1   024144          ASGN2   024224          ASGN3   024276
ASGN4   024414          ASGN5   024424          ASGN6   024432          ASGN7   024442
ASKPAR  053470          ASNERR  026346          ASNLST  001442          ASNMSG  026366
ASSIGN  024136          ATA   = 100000          ATABIT  033236          ATTN    001244
AT0   = 000001          AT1   = 000002          AT2   = 000004          AT3   = 000010
AT4   = 000020          AT5   = 000040          AT6   = 000100          AT7   = 000200
AUTOCK  001404          AVAIL   001510          A16   = 000400          A17   = 001000
BADENT  053214          BADSEC  001264          BAI   = 000010          BEGCOD  001414
BEGPAT  001412          BEGSIZ  001416          BIT0  = 000001          BIT00 = 000001
BIT01 = 000002          BIT02 = 000004          BIT03 = 000010          BIT04 = 000020
BIT05 = 000040          BIT06 = 000100          BIT07 = 000200          BIT08 = 000400
BIT09 = 001000          BIT1  = 000002          BIT10 = 002000          BIT11 = 004000
BIT12 = 010000          BIT13 = 020000          BIT14 = 040000          BIT15 = 100000
BIT2  = 000004          BIT3  = 000010          BIT4  = 000020          BIT5  = 000040
BIT6  = 000100          BIT7  = 000200          BIT8  = 000400          BIT9  = 001000
BLKADR  001720          BPTVEC= 000014          BUFTBL  001576          BUSADR  054662
BUSY    053236          CFLAG   001262          CHGADR  001260          CI1     034610
CI3     034716          CI4     035024          CI5     035402          CI6     035424
CI7     035440          CI7B    035466          CI8     035540          CKBUS   013020
CKCLK   022342          CKCLK1  022436          CKCLK2  022504          CKCLK3  022534
CKERR   012720          CKFMT   011022          CKHCE   011216          CKSWR = 104407
CK.CHR  027510          CK.DEC  027462          CK.DIG  027562          CK.NUM  055114
CK.OCT  027434          CLKFLG  001210          CLOCK   023476          CLR   = 000040
CLRDPB  025114          CLRQUE  041350          CMCNT   001312          CMCYL   001314
CMDAT   013366          CMHED   013272          CMPAR   013104          CMPARD  013122
CMPLMT  001374          CMPRES  017460          CMPRT   013632          CMPRX   013624
CMSEC   001316          CMSTR   013214          CMTRK   001317          COLON   053125
COMTBL  001740          CR    = 000015          CRLF  = 000200          CSF   = 000002
CSU   = 000010          CYLDER  054374          CYLIMT  001350          DATAPK  025070
DATA0   003006          DATA1   003046          DATE    001220          DATEIS  053127
DCK   = 100000          DCKER   007520          DCKER1  007652          DCL   = 000100
DCU   = 000001          DDISP = 177570          DEASGN  024512          DEASSG  052566
DE1   = 000040          DFF20 = 000002          DH1     047376          DH14    047554
DH15    047660          DH16    047757          DH2     047403          DH3     047460
DH4     047506          DH6     047545          DIGB  = 000004          DISPLA  001142
DISPLY= 104414          DISPRE  000174          DLT   = 100000          DL64  = 000020
DMD   = 000001          DONE    007214          DPINT   033142          DPR   = 000400
DPRQS   033152          DRIVE   001242          DRIVE0  041606          DRIVE1  042112
DRIVE2  042416          DRIVE3  042722          DRIVE4  043226          DRIVE5  043532
DRIVE6  044036          DRIVE7  044342          DRNUM   052611          DROP    026376
DROPNG  052500          DRQ   = 004000          DRVACT  033112          DRVCLR= 000111
DRVER   010770          DRVINT  033500          DRVPRM  025310          DRVQUE  041446
DRVSTA  033122          DRVTYP  033132          DRY   = 000200          DSWR  = 177570
DTE   = 010000          DTEER   011626          DTSY  = 000200          DTUW    033234
DT00  = 000001          DT01  = 000002          DT02  = 000004          DT03  = 000010
DT04  = 000020          DT05  = 000040          DT06  = 000100          DT07  = 000200
DT08  = 000400          DT1     050030          DT14    050100          DT15    050122
DT16    050144          DT2     050034          DT3     050052          DT4     050062
DT6     050074          DUNIT   001444          DVA   = 004000          ECBAD0  001334
ECBAD1  001342          ECBIT   001320          ECC     014232          ECCX    014764
ECC1    014630          ECC2    014760          ECGD    001332          ECGD1   001340
ECH   = 000100          ECI   = 004000          ECMSK0  001324          ECMSK1  001326
```

```
ECSEC   001322          ECWRD   001330          ECWRD1  001336          EMPTYQ  041426
EM1VEC= 000030          EM1     044736          EM10    045230          EM11    045273
EM12    045326          EM13    045357          EM14    045431          EM15    045454
EM20    045001          EM20    045510          EM21    045531          EM22    045562
EM23    045635          EM24    045714          EM25    045762          EM26    046043
EM2?    046070          EM3     045037          EM30    046125          EM3?    046157
EM32    046222          EM33    046255          EM34    046332          EM35    046374
EM36    046432          EM37    046463          EM4     045075          EM40    046545
EM41    046603          EM42    046647          EM43    046730          EM44    046775
EM45    047061          EM46    047147          EM5     045132          EM50    047221
EM51    047310          EM6     045166          EM60    047353          ENDCMP  014106
ENDCON  001352          ENDET   001410          ENDPAS  052534          ENDPGM= 054404
ENDSEK  001356          ENDTST  052550          ENTADR  053064          ENTCOM  052751
ENTDAT  054516          ENTDRV  052276          ENTID   054535          ENTLMT  053023
ENTPAR  004704          EOP     026502          EOPX    026754          EOPI    026534
EOP2    026556          ERRCTR  001306          ERPRC1  006574          ERPROC  006560
EXT1    = 000001        EXTIO   = 000010        EXT2    = 000002        EXT20   = 000020
EXT4    = 000004        EXT40   = 000040        FACTOR  015620          FAILRNS 001254
FALPAR  006760          FALPR1  006770          FEN     = 000200        FER     = 000020
FILBUF  016172          FMTER   012022          FMT22   = 010000        FORMAT  001376
FRSTER  001300          F1      = 000002        F2      = 000004        F3      = 000010
F4      = 000020        F5      = 000040        GENDPB  044646          GENREG  044666
GETADR  025702          GETBUF  015622          GETID   025572          GETPAR  017252
GETPAT  017224          GETREG= 000141          GETREM  026756          GETREQ  041522
GO      = 000001        GODRIV  016320          GBV     = 000010        GTSWR   = 044406
HCE     = 000200        HCEER   012100          HCI     = 002000        HCRC    = 000400
HCRCER  010640          HEDLIN  053162          HOUR    001266          HT      = 000011
HZ      001212          IAE     = 002000        IAEER   011742          IDIS    053140
IDLE    006132          IDLE1   006230          IE      = 000100        ILF     = 000001
ILR     = 000002        INCHRD  023260          INCMIS  023330          INCSKI  023304
INCSOF  023234          INCTOT  023354          INTCON  053257          INTRVL  001370
INVLD   052727          IOTVEC= 000020          IR      = 000100        ISR     036132
IXE     = 004000        KSR     023640          KSR1    023674          LA      035774
LACNT   033200          LF      = 000012        LIMIT   001310          LINA3   050376
LINB3   050450          LINB5   050625          LINB6   050740          LINCA3  050427
LINC6   050773          LINCA3  050440          LINEC   022224          LIND5   050610
LINEN3  050361          LINE05  050726          LINEP5  050715          LINE1   020130
LINE2   020174          LINE2A  020344          LINE2B  020362          LINE3   020602
LINE3A  020610          LINE3B  020616          LINE3C  020630          LINE3D  020640
LINE3E  020706          LINE3F  020774          LINE4   021256          LINE5   021346
LINE5A  021446          LINE5B  021540          LINE6   021602          LINE6A  021614
LINE6B  021622          LINE6C  021630          LINE6D  021636          LINE7   021712
LINE7A  022040          LINE8   022160          LING6   051022          LINKDV  027004
LINM3   050261          LINM4   050524          LINM3   050277          LINOCT  022172
LINP3   050323          LINP5   050643          LINP6   051040          LINSP   052073
LINSPO  052074          LINSS3  050507          LINST3  050472          LINS3   050344
LINS4   050543          LINS5   050661          LINT3   050416          LINU06  051051
LINW3   050460          LINX4   050555          LIN10A  051507          LIN10B  051543
LIN10C  051604          LIN10H  051711          LIN11H  051776          LIN2C   050160
LIN2P   050201          LIN2S   050225          LIN3.1  021046          LIN3.3  021160
LIN3.4  021212          LIN4SP  052071          LIN6.1  021644          LIN6.2  021666
LIN7M   051076          LIN7O   051134          LIN7P   051134          LIN7R   051231
LIN7S   051154          LIN7T   051313          LIN7X   051215          LIN8M   051246
LIN9B   051303          LIN9E   051430
```

```
LIN9G   051460          LIN9H   051332          LIN9I   051410          LKPAR   004650
LOADRV  055364          LST   = 002000          LSTAD   001256          MAIN    005324
MAIN1   005452          MAIN2   005572          MAIN3   006026          MASK    001250
MAX_H   014154          MAXCYL= 000106          MAXDL   001364          MAXER   001366
MAXSEC= 000116          MAXTRK= 000112          MCLK  = 000002          MCPE  = 020000
MCPEMX  033246          MHS   = 001000          MINCYL= 000110          MINSEC= 000120
MINTRK= 000114          MINUTE  001270          MINX  = 000004          MNCLTA  033262
MNTBL   001170          MOH   = 020000          MOL   = 010000          MONTR   005200
MRE   = 000400          MRD   = 000020          MRHVEC  055103          MRPCS1  055072
MSE   = 000020          MSTCK = 000010          MWR   = 000040          MXCLTA  033260
MXF   = 001000          MXLACT  033256          MXWNDW  033264          M.DPID  027052
M.DP40  027110          M.DP41  027144          M.DP42  027154          M.DP44  027206
M.DP50  027220          NBA   = 100000          NED   = 010000          NEDCLK  052651
NEM   = 004000          NEWASN  024502          NEWUNT  001466          NHS   = 002000
NOLOAD  055553          NOMTCH  012476          NONE    053205          NOTAVL  052233
NOTPRS  052216          NOTPRT  001406          NOTRP   052175          NOTSAF  052252
NXM   = 100000          OFFCOD  002200          OFFSET= 000115          OFFST   015222
OFLIN   007066          OFMSGA  002704          OFMSG0  002254          OFMSG1  002307
OFMSG2  002343          OFMSG3  002377          OFMSG4  002433          OFMSG5  002467
OFMSG6  002523          OFMSG7  002557          OFMSG8  002613          OFMSG9  002647
OFMTBL  002220          OFREV = 000200          OF100 = 000004          OF200 = 000010
OF25  = 000001          OF400 = 000020          OF50  = 000002          OF800 = 000040
OPE   = 020000          OPERID  001232          OPI   = 020000          OPIER   011516
OPIER1  011562          OPRDAT  054404          OPT     034330          OPTBL   001746
OR    = 000200          ORDERQ  001420          PACK    001216          PAR   = 000010
PARENT  026222          PARER   011650          PARLST  053372          PARQ    001554
PAR1    053520          PAR10   053616          PAR11   053625          PAR14   053633
PAR15   053641          PAR16   053650          PAR19   053656          PAR2    053526
PAR20   053665          PAR3    053535          PAR4    053544          PAR5    053553
PAR6    053562          PAR7    053571          PAR8    053600          PAR9    053607
PASCNT  001362          PAT   = 000020          PC    =%000007          PCLOCK  001206
PDONE   052470          PERIOD  052723          PGE   = 002000          PGM   = 001000
PIP   = 020000          PIRQ  = 177772          PIRQVE= 000240          PLU   = 020000
POPDNE  041544          POSER   011442          PROCES  006470          PRTBAD  014772
PRTIM   007156          PRO   = 000000          PR1   = 000040          PR2   = 000100
PR3   = 000140          PR4   = 000200          PR5   = 000240          PR6   = 000300
PR7   = 000340          PS    = 177776          PSEL  = 002000          PSU   = 000001
PSW   = 177776          PUNSAF  006656          PWRVEC= 000024          QCNT    041056
QDRV0   041150          QDRV1   041170          QDRV2   041210          QDRV3   041230
QDRV4   041250          QDRV5   041270          QDRV6   041310          QDRV7   041330
QINPT   041066          QOUTPT  041106          QSTART  041126          QSTOP   041130
QTERM = 041350          QUES    052725          RANCYL  016632          RANPAT  017100
RANSEC  016456          RANSIZ  016744          RANTRK  016532          RANWRT  017120
RANXIT  017110          RATIO   001402          RAW   = 000020          RDCHR = 104410
RDDAT = 000171          RDHD  = 000173          RDLIN = 104411          RDY   = 000200
RD.ADR  040350          RD.RP   040324          RD.RP1  040345          RD.RP2  040466
RD.RP3  040472          RD.RP4  040476          RD.WRD  040352          READDR  022244
READHD  015246          READIN= 000121          RECAL = 000107          RECALT  015170
RECALO  015174          REDAPK  025102          REFMT   006324          REFMTX  006466
RELBUF  015756          RELSE = 000113          REPLZ   027230          RESREG= 104413
RESVEC= 000010          RETRY   001252          RMR   = 000004          RNOP  = 000101
RPADR   033250          RPAS  = 000016          RPBA  = 000004          RPCA  = 000034
RPCC  = 000036          RPCS1 = 000000          RPCS2 = 000010          RPDA  = 000006
RPDB  = 000022          RPDS1 = 000012          RPDT  = 000026          RPEC1 = 000044
```

```
RPEC2 = 000046          RPERRS  033102          RPER1 = 000014          RPER2 = 000040
RPER3 = 000042          RPINIT  033266          RPLA  = 000020          RPMR  = 000024
RPOF  = 000032          RPSN  = 000030          RPTMR   037576          RPVEC   033252
RPWC  = 000002          RPC4    034036          RPC4B   052302          RPC5    052307
RPC6    052314          RTC   = 000117          RTNCTR  015144          R0    =%000000
R1    =%000001          R2    =%000002          R3    =%000003          R4    =%000004
R5    =%000005          R6    =%000006          R7    =%000007          S       050320
SAVEFG  033210          SAVER1  001302          SAVER5  001304          SAVREG= 104412
SC      036460          SCMND   024620          SC1   = 000100          SC10  = 001000
SC11    037276          SC12    037366          SC13    037436          SC2   = 000200
SC2C  = 002000          SC3     036524          SC4     036530          SC5     036542
SC6     036732          SC6A    037042          SC7     037170          SC8     037246
SDETAL  022676          SEARCH= 000131          SECLMT  001344          SECOND  001272
SEEK  = 000105          SEEKFG  033212          SELDRV= 000145          SELPAR  016376
SETFMT= 000143          SETVEC  004732          SET.IE  041004          SHDTYP  022654
SIXTEE  001274          SIZMEM  004510          SKI   = 040000          SKIER   012262
SLASH   053514          SP    =%000006          SPOTCK  017772          SRCHWT  033164
STACK = 001100          START   004066          START1  004076          START2  004102
STATHD  052321          STATIN  001214          STATIS  015456          STATPR  022544
STKLMT= 177774          STNDAT  002742          ST0     037670          ST01    037720
ST02    040116          ST03    040166          ST05    040212          ST06    040220
ST07    040256          ST08    040306          ST09    040316          SVRM11  040666
SWR     001140          SWREG   000176          SWTIM   007030          SW0   = 000001
SW00  = 000001          SW01  = 000002          SW02  = 000004          SW03  = 000010
SW04  = 000020          SW05  = 000040          SW06  = 000100          SW07  = 000200
SW08  = 000400          SW09  = 001000          SW1   = 000002          SW10  = 002000
SW11  = 004000          SW12  = 010000          SW13  = 020000          SW14  = 040000
SW15  = 100000          SW2   = 000004          SW3   = 000010          SW4   = 000020
SW5   = 000040          SW6   = 000100          SW7   = 000200          SW8   = 000400
SW9   = 001000          SYSTAT  052262          T       050274          TABLE   053674
TABLE0  053714          TABLE1  053762          TABLE2  054030          TABLE3  054076
TABLE4  054144          TABLE5  054212          TABLE6  054260          TABLE7  054326
TAP   = 040000          TBITVE= 000014          TD      036176          TDF   = 000040
TIMER   033214          TITLE   055254          TKVEC = 000060          TPVEC = 000064
TRAPVE= 000034          TRE   = 040000          TRFER   012162          TRKLMT  001346
TRK1  = 004000          TRK10 = 040000          TRK2  = 010000          TRK20 = 100000
TRK4  = 020000          TRNSWT  033162          TRTVEC= 000014          TUF   = 000100
TYPDS = 104405          TYPE  = 104401          TYPEST  022626          TYPOC = 104402
TYPCN = 104404          TYPOS = 104403          TYPRI4  027360          UCPAR   006746
UDFLG   033170          UNIT    001246          UNLOAD= 000103          UNS   = 040000
UNSAF   012416          UNTASN  052147          UNTMSG  052076          UNTNOT  052125
UNTOFF  052104          UNTON   052115          UPE   = 020000          US1   = 000001
US2   = 000002          US4   = 000004          UWR   = 000010          VUF   = 000002
VU30  = 010000          VV    = 000100          WAIT    001532          WAQ   = 000002
WC      036352          WCE   = 040000          WCF   = 000040          WCFER   012320
WCKD  = 000151          WCKER   010312          WCKHD = 000153          WCSEL   001400
WCU   = 000001          WLE   = 004000          WLEER   011774          WRL   = 004000
WRTDAT= 000161          WRTHD = 000163          WRTPK   017476          WRTPK1  017526
WRTPK2  017706          WRTPK3  017732          WRTPK4  017764          WRT.AD  040570
WRT.RP  040500          WRT.R1  040564          WRT.R2  040650          WRT.R3  040656
WRT.R4  040662          WRT.R5  040664          WRT.WD  040566          WRU   = 000400
WSU   = 000004          ZROIND  001276          $AUTOB  001134          $BDADR  001122
$BDDAT  001126          $BDSEC= 000124          $BELL   001160          $BUF  = 000006
$CHARC  031166          $CKSWR  031644          $CMTAG  001100          $CM3  = 000000
```

DZRJD.019 SYMBOL TABLE

```
$CNTLC  030452        $CNTLG  032253        $CNTLU  032246        $CODE = 000024
$COMND= 000002        $CRLF   001165        $CYL  = 000012        $DBLK   031634
$DB2D   032500        $DB2O   032674        $DECVL  032660        $DOAGN  005320
$DRVID= 000224        $DSPLY  027406        $DTBL   031624        $ENDAD  005310
$ERFLG  001103        $ERMAX  001115        $ERROR  030460        $ERRPC  001116
$ERRTB  004006        $ERRTY  030616        $ERTTL  001112        $FAIR = 000072
$FILLC  001156        $FILLS  001155        $FIRST= 000122        $FMT  = 000001
$GCADR  001120        $GDDAT  001124        $GET42  005256        $GTSWR  031714
$HARD = 000062        $HD   = 000000        $HINUM  032400        $ICNT   001104
$INTAG  001135        $ITEMB  001114        $LF     001166        $LKCSB  001176
$LKCSR  001174        $LKS    001202        $LLVEC  001204        $LONLM  032402
$LPADR  001106        $LPERR  001110        $LPVEC  001200        $LSTAD  054660
$MISPO= 000066        $MNEW   032271        $MSWR   032260        $NCODE= 000074
$NCYL = 000100        $NEXT = 000104        $NPATC= 000075        $NSEC = 000076
$NTRK = 000077        $NULL   001154        $NWRDL= 000102        $OCNT   031414
$OCTVL  032776        $OMODE  031416        $OPERC= 000036        $PACK = 000026
$PASS   001100        $PASSC= 000070        $PATTC= 000030        $POSIT= 000042
$PREVA= 000032        $PREVD= 000027        $PSEL = 000033        $QUES   001164
$RAND   032302        $RDCHR  032126        $RDLIN  030162        $RDSZ = 000001
$READ = 000052        $REG  = 000014        $RESRE  032442        $RETRY  015330
$RPADR  001170        $RPAS = 000252        $RPBA = 000240        $RPCA = 000270
$RPCC = 000272        $RPCS1= 000234        $RPCS2= 000244        $RPDA = 000242
$RPDB = 000256        $RPDS1= 000246        $RPDT = 000262        $RPEC1= 000300
$RPEC2= 000302        $RPER1= 000250        $RPER2= 000274        $RPER3= 000276
$RPLA = 000254        $RPMR = 000260        $RPOF = 000266        $RPSN = 000264
$RPVEC  001172        $RPWC = 000236        $SAVRE  032404        $SB2D   027720
$SB2O   027750        $SEC  = 000010        $SETUP= 000146        $SIZE   054564
$SKI  = 000064        $SOFT = 000060        $SSEC = 000022        $STUP = 177777
$SUPRS  027320        $SVPC = 000210        $SWR  = 122000        $STATUS= 000016
$TERM = 000032        $TIME   023400        $TKB    001146        $TKINT  030300
$TKS    001144        $TKSRV  030030        $TN   = 000001        $TNPWR  032610
$TOTAL= 000056        $TPB    001152        $TPFLG  001157        $TPS    001150
$TRANS= 000046        $TRAP   033014        $TRAP2  033036        $TRK  = 000011
$TRP  = 000015        $TRPAD  033050        $TSTNM  001102        $TTYIN  030440
$TYPDS  031420        $TYPE   030752        $TYPEC  031122        $TYPEX  031170
$TYPOC  031216        $TYPON  031232        $TYPOS  031172        $WRDL = 000020
$WRDM = 000004        $OFILL  031415        .     = 055650
```

ERRORS DETECTED: 0

```
*DZRJDA,DZRJC/SOL/LI:ME/NL:MC:MD:CND=RP0456.010,DZRJD.019
RUN-TIME:  105 88 1 SECONDS
CORE USED:  39K
```

Spooler runtime 24 Seconds, 151 KCS, 857 disk reads, 1 disk writes, 198 pages printed