

RM05/3/2

RM05/3/2 FORMATTER
CZRMLAO

AH-F919A-MC
FICHE 1 OF 1

JUN 1980
COPYRIGHT © 1980
MADE IN USA



.REM %

IDENTIFICATION

PRODUCT CODE: AC-F918A-MC
PRODUCT NAME: CZRMLAO RM05/3/2 FORMATTER
DATE CREATED: APRIL 1980
MAINTAINER: CX DIAGNOSTIC ENGINEERING
AUTHOR: MIKE LEAVITT

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS MANUAL.

THE SOFTWARE DESCRIBED IN THIS DOCUMENT IS FURNISHED TO THE PURCHASER UNDER A LICENSE FOR USE ON A SINGLE COMPUTER SYSTEM AND CAN BE COPIED (WITH INCLUSION OF DIGITAL'S COPYRIGHT NOTICE) ONLY FOR USE IN SUCH SYSTEM, EXCEPT AS MAY OTHERWISE BE PROVIDED IN WRITING BY DIGITAL.

DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL.

COPYRIGHT (C) 1980 DIGITAL EQUIPMENT CORPORATION

CONTENTS

1. ABSTRACT
2. REQUIREMENTS
 - 2.1 EQUIPMENT
 - 2.2 PRELIMINARY PROGRAMS
3. LOADING PROCEDURES
 - 3.1 PAPER TAPE AND XXDP
 - 3.2 APT
 - 3.3 APT ETABLE DEFINITIONS
4. STARTING PROCEDURES
 - 4.1 STARTING ADDRESSES
 - 4.2 OPERATOR ACTION
 - 4.3 RH11 - RH70 UNIBUS ADDRESS
 - 4.4 OTHER UNIBUS ADDRESSES
5. SWITCH REGISTER SETTINGS
6. ERROR MESSAGES
7. MISCELLANEOUS
 - 7.1 FORMAT TIMES
 - 7.2 HALTING THE PROGRAM
 - 7.3 SURFACE VERIFICATION
8. PROGRAM DESCRIPTION
 - 8.1 FORMAT OPERATION
 - 8.2 CHECK OPERATION
 - 8.3 POSITIONER VERIFICATION
 - 8.4 HEADER VERIFICATION
9. BAD SPOT FILE
10. RH/RM SOFTWARE DRIVER DOCUMENT

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43

1. ABSTRACT

THE RM05/3/2 FORMATTER PROGRAM PROVIDES THE FACILITIES TO FORMAT, TO CHECK THE HEADER AND DATA FIELDS OR VERIFY THE HEADER FIELD OF EACH DATA BLOCK ON THE PACK. EACH HEADER FIELD SPECIFIES THE ADDRESS OF ITS ASSOCIATED DATA BLOCK ON THE DISK PACK.

IN THE FORMAT OPERATION, THE PROGRAM WRITES THE HEADER OF EACH DATA BLOCK WITH A CYLINDER NUMBER, TRACK NUMBER AND SECTOR NUMBER. ALSO, WRITES THE DATA FIELD WITH SELECTED DATA PATTERN. THE PROGRAM THEN VERIFIES THE WRITTEN DATA BLOCKS VIA EXECUTING THE "WRITE CHECK HEADER AND DATA" COMMAND. THE PROGRAM THEN PERFORMS A VERIFY OF SECTOR ZERO, ON EACH OF THE TRACKS SELECTED FOR FORMATTING. THE VERIFY IS ACCOMPLISHED BY EXECUTING A "READ HEADER AND DATA" COMMAND AND COMPARING THE TWO HEADER WORDS TO AN EXPECTED VALUE.

IN THE VERIFY OPERATION, THE PROGRAM READS THE HEADER OF SECTOR 0 THRU 29. (18 BIT MODE) OR 31. (16 BIT MODE) ON EACH CYLINDER AND TRACK TO BE VERIFIED, THEN COMPARES THE TWO HEADER WORDS TO MAKE SURE THEY ARE CORRECT.

IN THE CHECK OPERATION, THE PROGRAM REPEATS THE FORMAT OPERATION THREE TIMES WITH DATA PATTERN BEING ROTATED ONE BIT AT EACH PASS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
8K MEMORY
KW11-L OR KW11-P CLOCK
PROGRAM LOADING DEVICE
TERMINAL
RH11 OR RH70 CONTROLLER
1 TO 8 DISK DRIVES (ANY COMBINATION OF RM05'S, RM03'S OR RM02'S)

2.2 PRELIMINARY PROGRAMS

THERE ARE NO PREQUISITE PROGRAMS, PROVIDING THE RM SUBSYSTEM IS KNOWN TO BE OPERATIONAL. IF THE STATE OF THE RM SUBSYSTEM IS UNKNOWN, THE FOLLOWING PROGRAMS SHOULD BE RUN PRIOR TO USING THE FORMATTER PROGRAM.

RM05/3/2 DISKLESS TEST, PART 1 & 2

RM05/3/2 FUNCTIONAL TEST, PART 1

3. LOADING PROCEDURES

3.1 PAPER TAPE AND XXDP

THE PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR IT MAY BE LOADED FROM 'XXDP' MEDIA USING THE APPROPRIATE LOADER.

3.2 APT

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

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

AUTOMATIC MODE (MONITOR)

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

DUMP MODE

INPUT DIALOGUE AFTER PROGRAM STARTS

3.3 APT ETABLE DEFINITIONS

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

1. SOFTWARE ENVIRONMENT:

- = 1 IF APT SCRIPT MODE
- = 0 IF STANDLONE MODE

2. ENVIRONMENT MODE:

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

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

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

BIT 4 TO BIT 0 ARE NOT USED

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

4. SWITCH 2 (USER SWITCH REGISTER) NOT USED

5. CPU OPTIONS

115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171

NOT USED

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

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

8. BUS PRIORITY 1:
NOT USED.

9. INTERRUPT VECTOR 2:
NOT USED

10. BUS PRIORITY 2:
NOT USED

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

12. DEVICE MAP:
USED WHEN ENVIRONMENT MODE BIT 7 = 1. EACH BIT SET TO
1 IN BITS 0 TO 7 WILL SELECT THE CORRESPONDING DRIVE
TO BE TESTED. BITS 8-15 ARE NOT USED.

13. CONTROLLER DESCRIPTOR WORDS:
USED WHEN ENVIRONMENT MODE BIT 7 = 1. ANY NONE ZERO
NUMBER SPECIFIES THAT PROGRAM RUNS IN CHECK MODE.

14. CONTROLLER DESCRIPTOR WORDS:
USED WHEN ENVIRONMENT MODE BIT 7 = 1. ANY NONE ZERO
NUMBER SPECIFIES THAT PROGRAM SELECTS 30.(18 BIT MODE)
SECTORS FOR A TRACK IN ALL OPERATIONS.

4. STARTING PROCEDURES -----

4.1 STARTING ADDRESSES

THE PROGRAM IS STARTED FROM LOCATION 200 IF THE ADDRESS OF THE
RH11 OR RH70 WILL NOT BE CHANGED FROM ITS DEFAULT VALUE OF 176700.

THE PROGRAM IS STARTED FROM LOCATION 204 IF THE ADDRESS OF
THE RH11 OR RH70 IS TO BE CHANGED FROM THE PRELOADED VALUE.
NOTE THAT STARTING ADDRESS 204 IS VALID ONLY ONCE AFTER THE
PROGRAM IS LOADED.
(SEE SECTION 4.3)

4.2 OPERATION ACTION

1. LOAD THE PROGRAM INTO MEMORY (SEE SECTION 3).
2. LOAD THE STARTING ADDRESS - 200 OR 204

- 172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
3. SET THE SWITCHES AS REQUIRED AND PRESS 'START'.

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

4. THE PROGRAM WILL THEN TYPE THE FOLLOWING MESSAGE:

'PROGRAM MODE (F, C OR V):'

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

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

'OPERATE IN 32 SECTOR (16 BIT) MODE (Y OR N)'

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

6. THE PROGRAM WILL THEN ASK FOR A DRIVE:

'DRIVE: '

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

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

'ENTER ADDRESS LIMITS: '

THE PREVIOUSLY SELECTED OR DEFAULT VALUES FOR BEGINNING CYLINDER AND TRACK AND FOR ENDING CYLINDER AND TRACK WILL BE TYPED OUT. IF A 'CARRIAGE RETURN' IS TYPED AS A RESPONSE, THE PRESENT VALUE WILL BE USED; IF A 'PERIOD' IS TYPED, THE PROGRAM WILL BYPASS THE REMAINING ENTRIES AND WILL USE THEIR PRESENT VALUES. NOTE THAT THE CYLINDER AND TRACK VALUES ARE DECIMAL NUMBERS. THE ADDRESS SPECIFIED BY THE BEGINNING TRACK MUST BE LESS THAN THE ENDING TRACK ADDRESS IF THESE TWO ADDRESSES ARE ON THE SAME CYLINDER. ON THE OTHER HAND, THE ENDING CYLINDER ADDRESS MAY BE LESS THAN THE STARTING CYLINDER ADDRESS. IN THIS CASE, THE PROGRAM WILL FORMAT OR VERIFY THE DISK PACK FROM THE STARTING CYLINDER TO CYLINDER 822 AND THEN FROM CYLINDER 0 TO THE ENDING CYLINDER.

8. THE PROGRAM WILL THEN ASK FOR THE DATA PATTERN:
(IN CASE OF FORMAT MODE)

'SELECT DATA PATTERN
(0) ZERO'S

(1) ONE'S
(2) WORST CASE
ENTER (0, 1 OR 2):

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

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

066666

NOTE: IN THE CHECK OPERATION, THE ABOVE MENTIONED MESSAGE IS
BYPASSED. THE DATA PATTERN IS INITIATED TO 133331 AND IS
ROTATED ONE BIT TO THE RIGHT AT EACH PASS OF THE CHECK
OPERATION. AFTER THE CHECK OPERATION IS DONE, THE DATA
PATTERN WILL BE RESTORED TO 066666.

9. THE PROGRAM WILL THEN TYPE:

'STARTING FORMAT ON DRIVE N'

OR

'STARTING CHECK ON DRIVE N'

OR

'STARTING VERIFY ON DRIVE N'

NOTE: IF A NEW PACK IS UNFORMATTED, THE PROGRAM ALSO ASKS YOU TO
ENTER TWO SERIAL NUMBERS. (EXCEPT IF OPERATING IN VERIFY
ONLY MODE) THESE TWO SERIAL NUMBER MUST BE NON-ZERO DECIMAL
NUMBERS.

10. THE OPERATOR CAN DETERMINE WHERE THE DRIVE IS DURING THE OPERATION
BY TYPING A 'CONTROL 0'. THE PROGRAM WILL TYPE THE FOLLOWING
MESSAGE:

'PRESENT ADDRESS IS: CXXX TXX'

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

4.3 RH11 - RH70 UNIBUS ADDRESS

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

4.4 OTHER UNIBUS ADDRESSES

LOC	TAG	CONTENTS	FUNCTION
---	---	-----	-----
1160	\$TKS	177560	TTY KEYBOARD STATUS REGISTER
1162	\$TKB	177562	TTY KEYBOARD BUFFER REGISTER
1164	\$TPS	177564	TTY PRINTER STATUS REGISTER
1166	\$TPB	177566	TTY PRINTER BUFFER REGISTER
1276	\$LKCSR	172540	KW11-P CONTROL REGISTER
1300	\$LKCSB	172542	KW11-P COUNTER REGISTER
1302	\$LPVEC	104	KW11-P VECTOR ADDRESS
1304	\$LKS	177546	KW11-L CONTROL REGISTER
1306	\$LKV	100	;ADDRESS OF KW11-L VECTOR

5. SWITCH REGISTER SETTINGS

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

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/34) THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE 'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176. THE SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM IS AT A HIGHER PRIORITY PROCESSING AN RM INTERRUPT. THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

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

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

6. ERROR MESSAGES

1. 'RH INTERRUPT OCCURRED (RMAS=0)' - AN INTERRUPT OCCURRED, BUT NOTHING ON THE MASSBUS IS INDICATING AN ATTENTION.
2. 'UNEXPECTED ATTENTION OCCURRED' - THE INDICATED DRIVE INTERRUPTED, BUT NO INTERRUPT WAS EXPECTED FROM THE INDICATED DRIVE.
3. 'MASSBUS PARITY ERROR (MCPE=1)' - A CONTROL BUS PARITY ERROR WAS DETECTED BY THE RH WHEN THE INDICATED REGISTER WAS READ.
4. 'MASSBUS PARITY ERROR (PAR=1)' - A CONTROL BUS PARITY ERROR OCCURRED WHEN THE INDICATED REGISTER WAS WRITTEN.
5. 'ADDRESS PLUG CHANGE BIT SET' - THE PROGRAM FOUND THE 'OPE' BIT SET FOR THE INDICATED DRIVE.
6. 'RH DIDN'T RESPOND TO ADDRESSING' - THE PROGRAM ACCESSED THE RH AT THE INDICATED ADDRESS AND RECEIVED NO RESPONSE.
7. 'DRIVE OFFLINE' - THE INDICATED DRIVE HAS GONE OFFLINE
8. 'PERSISTENT DRIVE UNSAFE ERROR' - THE INDICATED DRIVE HAS BECOME UNSAFE AND THE CONDITION CANNOT BE CLEARED BY ISSUING 'DRIVE CLEAR' INSTRUCTIONS.
9. 'UNCORRECTABLE MASSBUS PARITY ERROR' - THE PROGRAM ATTEMPTED TO PERFORM AN OPERATION AND DETECTED 3 SUCESSIVE MASSBUS PARITY ERRORS OR THE PROGRAM ATTEMPTED TO CLEAR A 'PAR' ERROR IN THE DRIVE AND A PARITY ERROR OCCURRED.
10. 'SOFTWARE TIMEOUT' - THE OPERATION FAILED TO COMPLETE WITHIN 1 SECOND.
11. 'DRIVE UNSAFE ERROR' - A NON-PERSISTENT UNSAFE ERROR OCCURRED DURING THE OPERATION.
12. 'CONTROLLER/DRIVE ERROR DURING WRITE' - THE INDICATED NON-DATA ERROR WAS DETECTED DURING A FORMAT OPERATION.
13. 'CONTROLLER/DRIVE ERROR DURING WRITE CHECK' - A NON-DATA ERROR OCCURRED DURING THE WRITE CHECK.
14. 'DATA ERROR DURING WRITE CHECK' - A DATA RELATED ERROR OCCURRED DURING A WRITE CHECK OPERATION. A DATA ERROR IS CONSIDERED TO BE ONE OF THE FOLLOWING ERRORS: 'DCK', 'OPI', 'DTE', 'HCRC', 'HCE', OR 'FER'.
15. 'RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE' - THE INDICATED SECTOR FAILED DURING RETRY FOLLOWING A DATA ERROR.
16. 'CONTROLLER/DRIVE ERROR VERIFYING HEADERS' - AN ERROR OCCURRED DURING THE VERIFICATION PASS AFTER FORMATTING.
17. ''HCE' ERROR VERIFYING HEADERS' - A HEADER ERROR OCCURRED DURING THE VERIFICATION PASS AFTER FORMATTING.
18. 'CYLINDER FIELD IN HEADER IS NOT CORRECT' - THE CYLINDER FIELD

FROM A HEADER READ DURING THE VERIFICATION PASS IS NOT CORRECT.

19. 'TRACK/SECTOR FIELD IN HEADER IS NOT CORRECT' - THE TRACK AND SECTOR FIELD FROM A HEADER READ DURING THE VERIFICATION IS NOT CORRECT.

20. 'WRITE CHECK ERROR' - THE RM REPORTED A WRITE CHECK ERROR AND NO DRIVE ERRORS WERE SET.

7. MISCELLANEOUS

7.1 FORMAT TIME

IT TAKES APPROX. 10 MINUTES TO FORMAT AN ENTIRE RM03/2 DISK PACK IN 'FORMAT' MODE. THE 'CHECK' MODE TAKES APPROX. 30 MINUTES FOR AN ENTIRE RM03/2 DISK PACK.

IT TAKES APPROX. 30 MINUTES TO FORMAT AN ENTIRE RM05 DISK PACK IN 'FORMAT' MODE. THE 'CHECK' MODE TAKES APPROX. 90 MINUTES FOR AN ENTIRE RM05 DISK PACK.

THE 'VERIFY' ONLY MODE TAKES APPROX. 7 MINUTES FOR AN RM03/2 AND APPROX. 20 MINUTES FOR RM05.

7.2 HALTING THE PROGRAM

THE OPERATOR SHOULD NOT HALT THE PROGRAM VIA THE CONSOLE DURING A FORMAT OPERATION. HALTING THE PROGRAM MAY LEAVE A SECTOR INCORRECTLY FORMATTED. TO TERMINATE THE FORMAT, TYPE A 'CONTROL C'.

7.3 SURFACE VERIFICATION

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

8. PROGRAM DESCRIPTION

8.1 FORMAT OPERATION

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

THE FORMAT OPERATION CONSISTS OF A WRITE HEADER AND DATA COMMAND FOR THE ENTIRE TRACK FOLLOWED BY A WRITE CHECK HEADER AND DATA COMMAND. IF AN ERROR OCCURS DURING THE WRITE, THE PROGRAM WILL RETRY THE WRITE BEFORE CONTINUING. IF A DATA RELATED ERROR IS DETECTED DURING THE WRITE CHECK (A DATA ERROR IS DEFINED AS ONE OF THE FOLLOWING ERRORS: 'DCK', 'OPI', 'DTE', 'HCRC', 'HCE',

OR 'FER'), THE SECTOR IN ERROR WILL BE REWRITTEN. THE PROGRAM WILL CHECK THE SECTOR TWICE; IF A DATA ERROR IS DETECTED IN THE SECTOR DURING EITHER OF THE WRITE CHECKS, THE PROGRAM WILL DECLARE THE SECTOR AS BEING 'NONRECOVERABLE'. FOLLOWING THIS SEQUENCE, THE REMAINDER OF THE TRACK IS CHECKED. IF DATA ERRORS ARE ENCOUNTERED IN ANY OF THE REMAINING SECTORS, EACH SECTOR WILL BE HANDLED AS DESCRIBED ABOVE.

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

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

DURING THE FORMAT OPERATION, THE PROGRAM FILLS THE DATA FIELD WITH THE PATTERN SELECTED BY THE OPERATOR.

8.2 CHECK OPERATION

THE CHECK OPERATION IS IDENTICAL TO THE THE FORMAT OPERATION DESCRIBED IN SECTION 8.1, EXCEPT THAT IN EACH CHECK OPERATION THE FORMAT OPERATION IS REPEATED THREE TIMES WITH DATA PATTERN BEING ROTATED ONE BIT POSITION AT EACH PASS.

8.3 POSITIONER VERIFICATION (QUICK VERIFY)

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

8.4 HEADER VERIFICATION (VERIFY ONLY)

THE HEADER VERIFICATION OPERATION PERFORMS A READ HEADER AND DATA TO AN ENTIRE TRACK AT A TIME. THEN COMPARES THE EXPECTED HEADER WORDS WITH RECIEVED HEADER WORDS. THE CYLINDER ADDRESS FIELD FROM THE HEADER IS COMPARED TO THE EXPECTED CYLINDER, IF THE CYLINDER ADDRESSES DO NOT COMPARE, AN ERROR MESSAGE IS REPORTED. NEXT, THE TRACK/SECTOR FIELD FROM THE HEADER IS COMPARED TO THE EXPECTED TRACK/SECTOR, IF THE TRACK/SECTOR ADDRESSES DO NOT COMPARE, AN ERROR IS REPORTED. VERIFICATION OF THE HEADERS STARTS FROM SECTOR 0 ON THE BEGINNING CYLINDER AND TRACK, AND CONTINUES UNTIL COMPARING SECTOR 29.(18 BIT MODE) OR 31. (16 BIT MODE) ON ENDING CYLINDER AND TRACK. THIS CHECK IS PERFORMED TO CONFIRM THAT A DISK HAS PREVIOUSLY BEEN FORMATTED

AND ALL THE HEADERS ARE IN GOOD CONDITION.

9. BAD SPOT FILE

SECTORS 0 THRU 31., ON CYLINDER 822., LAST TRACK ARE ALWAYS FORMATTED IN 16 BIT MODE. THEY CONTAIN THE BAD SECTOR ADDRESS ON THE PACK FOR BOTH 30. AND 32. SECTOR OPERATIONS. THE DATA FIELD OF EACH SECTOR OF THE BAD SPOT FILE IS DESCRIBED BELOW: THE FIRST TWO WORDS IN THE DATA FIELD SPECIFY THE SERIAL NUMBER OF THE PACK. THE SERIAL NUMBER MUST BE A NON-ZERO NUMBER AND CONSISTS OF MAXIMUM 10 OCTAL DIGITS. THE FIRST WORD OF THE SERIAL NUMBER CONTAINS THE 5 LEAST SIGNIFICANT OCTAL DIGITS, WHILE THE SECOND WORD CONTAINS THE 5 MOST SIGNIFICANT DIGITS.

THE THIRD WORD IS ALWAYS ZERO.

THE FORTH WORD DEFINES THE PACK IS A DATA PACK ,IF IT IS 0.

THE FOLLOWING 252 WORDS DEFINE THE BAD SECTOR ADDRESS; TWO WORDS ARE USED TO DEFINE A SIGNLE BAD SECTOR, THE FIRST WORD SPECIFIES THE CYLINDER ADDRESS, THE SECOND WORD SPEDIFIES THE TRACK (HIGH BYTE) AND SECTOR (LOW BATE) ADDRESSES. ALL UNUSED LOCATIONS ARE RECORDED WITH ONES.

THE SECTORS ON THE LAST TRACK ARE FURTHER DIVIDED INTO FOUR GROUPS AS FOLLOWS:

- (1) SECTORS 0, 2, 4, 6 AND 8. CONTAIN THE MANUFACTURES DEFINED BAD SECTORS FOR 16 BIT MODE.
- (2) SECTORS 1, 3, 5, 7 AND 9. CONTAIN THE MANUFACTURES DEFINED BAD SECTORS FOR 18 BIT MODE.
- (3) SECTORS 10., 12. THRU 30. CONTAIN THE USER DEFINED BAD SECTORS FOR 16 BIT MODE.
- (4) SECTORS 11., 13. THRU 31. CONTAIN THE USER DEFINED EAD SECTORS FOR 18 BIT MODE.

THE SECTORS IN EACH GROUP ARE IDENTICAL AND SECTORS 0, 1, 10. AND 11. ARE USED AS REFERENCE SECTORS BY THE PROGRAM.

THE PROGRAM PROVIDES A FEW UTILITY ROUTINES TO HANDLE THE BAD SECTOR FILE.
TO ACCESS THESE ROUTINES START THE PROGRAM AT 204.

BEFORE THE PROGRAM FORMATS THE PACK, THE PROGRAM TYPES THE FOLLOWING MESSAGE TO ALLOW THE OPERATOR TO ACCESS THE ROUTINES BY ENTERING THE SELECTED FUNCTION NUMBER.

KEYIN U.S.R. BAD SECTORS.....0
PRINT M.F.G. BAD SECTORS.....1


```

571 PRINT U.S.R. BAD SECTORS.....2
572 INITIALIZE U.S.R. BAD SECTOR FILE.....3
573 PRINT A SECTOR OF THE LAST TRACK.....4
574 PRINT THIS MESSAGE.....5
575 EXIT.....<CR>
576 ENTER UTILITY FUNCTION:
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627

```

THE FIRST ROUTINE ALLOWS THE USER DEFINED BAD SECTORS TO BE ENTERED MANUALLY BY SPECIFYING THE CYLINDER ADDRESS, TRACK ADDRESS AND SECTOR ADDRESS IN DECIMAL VALUE. TO EXIT FROM THE ROUTINE JUST ENTER A PERIOD(.) FOLLOWED BY A <CR>.

EXAMPLE:

```

CYLINDER -1 / 200
TRACK -1 / 4
SECTOR -1 / 23
CYLINDER -1 / .<CR>

```

THE SECOND AND THIRD ROUTINES TYPE THE MANUFACTURE AND USER DEFINED BAD SECTORS ON THE CONSOLE IN OCTAL NUMBER. THE FIRST TWO WORDS ON THE LISTING ARE THE SERIAL NUMBERS FOLLOWED BY TWO WORDS OF ALL 0'S.

THE FOURTH ROUTINE RESETS ALL USER DEFINED BAD SECTOR ADDRESSES TO -1.

THE FIFTH ROUTINE ALLOWS A WHOLE SECTOR OF THE BAD SPOT FILE RETRIEVED FROM THE PACK BEING FORMATTED TO BE TYPED ON THE CONSOLE.

TO EXIT THE ROUTINE JUST TYPE A "CARRIAGE RETURN" <CR>.

10.1 RH/RM DRIVER

THIS DOCUMENT IS THE USER'S GUIDE FOR THE RH/RM DRIVER.

10.2 TO INITIALIZE THE DRIVER:

```

JSR PC,RMINIT
RETURN

```

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

DRVSTA	DRIVE STATE
-----	-----
>0	ONLINE
=0	OFFLINE, DRIVE
	IS NOT AN RM05/3/2, OR
	NONEXISTENT DRIVE
<0	UNSAFE

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

DRVTYP	CONDITION
-----	-----
0	NONEXISTENT DRIVE
4	RM03
5	RM02
7	RM05
-1	NOT AN RM05/3/2

THE 'RMINIT' ROUTINE WILL DO A READIN PRESET AND WILL SET FMT16.

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

CALL:

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

*DPB (DATA PARAMETER BLOCK)

PNTDPB: .BYTE	0	: (0) DRIVE NUMBER
.BYTE	0	: (1) OFFSET VALUE OR FMT16, ECT, AND HCI
.BYTE	0	: (2) COMMAND
.BYTE	0	: (3) PSEL AND A17 AND A16
.WORD	0	: (4) WORD COUNT (MUST BE NEG.)
.WORD	0	: (6) BUFFER ADDRESS OR
		: REGISTER TABLE POINTER
.BYTE	0	: (10) SECTOR ADDRESS OR
		: FIRST REG. INDEX
.BYTE	0	: (11) TRACK ADDRESS OR
		: LAST REG. INDEX
.WORD	0	: (12) CYLINDER ADDRESS
.WORD	0	: (14) ERROR TABLE POINTER
		: POINTS TO THE FIRST OF TWENTY
		: LOCATIONS OF WHERE THE DRIVER
		: IS TO STORE THE RH/RM
		: REGISTERS ON AN ERROR. IF LEFT
		: ZERO REGISTERS ARE NOT SAVED.
.WORD	0	: (16) STATUS/ERROR INDICATOR
		: BIT15=1=>ERROR OCCURRED
		: BIT07=1=>DONE
		: BIT14-BIT09 AND BIT06-BIT03
		: INDICATE TYPE OF ERROR

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

MOV	#16., -(SP)	:16 MILLISECONDS BETWEEN
-----	-------------	--------------------------

685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741

```

JSR      PC,RMTMR      ;CLOCK TICKS
                        ;CALL THE TIMER ROUTINE

```

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

10.4.1 EXAMPLE - WRITE 1000. WORDS

```

1$:      JSR      R0,RM03      ;CALL THE DRIVER
        FMTDPB      ;DPB ADDRESS
BR        1$      ;WAIT FOR QUEUE IF FULL
2$:      TST      FMTDPB+16    ;WAIT FOR COMMAND TO COMPLETE
        BEQ      2$
        BMI      ERROR1      ;ERROR OCCURRED
        .
        .
        .
FMTDPB:  .BYTE     5           ;DRIVE #5
        .BYTE     0
        .BYTE     161        ;WRITE COMMAND
        .BYTE     0
        .WORD     -1000.     ;WORD COUNT
        .WORD     WRTBUF     ;BUFFER ADDRESS
        .BYTE     3          ;SECTOR
        .BYTE     5          ;TRACK
        .WORD     400        ;CYLINDER
        .WORD     ERRTB5     ;ERROR TABLE
        .WORD     0          ;STATUS/ERROR INDICATOR

```

ALTERNATE DPB SETUP

```

FMTDPB:  .WORD     5           ;THIS SETUP ACHIEVED
        .WORD     WRITE      ;EVERYTHING THE
        .WORD     -1000.     ;ABOVE TABLE DID, BUT
        .WORD     WRTBUF     ;IN A CLEANER FORMAT
        .BYTE     3,5
        .WORD     400,ERRTB5,0

```

10.5 RH/RM REGISTERS

MNEMONIC	INDEX
-----	-----
RMCS1	0
RMWC	2
RMBA	4
RMDA	6
RMCS2	10
RMD5	12
RMER1	14
RMA5	16
RMLA	20

742	RMDB	22
743	RMMR1	24
744	RMDT	26
745	RMSN	30
746	RMOF	32
747	RMDC	34
748	RMHR	36
749	RMMR2	40
750	RMER2	42
751	RMEC1	44
752	RMEC2	46

10.6 COMMANDS PERFORMED BY THE DRIVER

COMMAND	CODE	COMMAND TYPE
NO OPERATION	101	N
UNLOAD	103	N
SEEK	105	P
RECALIRATE	107	P
DRIVE CLEAR	111	N
RELEASE	113	N
OFFSET	115	P
RETURN TO CENTER	117	P
READIN PRESET	121	N
PACK ACKNOWLEDGE	123	N
SEARCH	131	P
GET REGISTER(S)	141	S
SET FORMAT	143	S
SELECT DRIVE	145	S
WRITE CHECK DATA	151	D
WRT CHK HDR & DATA	153	D
WRITE DATA	161	D
WRITE HEADER & DATA	163	D
READ DATA	171	D
READ HEADER & DATA	173	D

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

10.7 DPB STATUS/ERROR INDICATOR WORD

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

BIT NO.	MEANING IF ON A '1'
15	ERROR OCCURRED DONE (BIT07=0); BITS 14-10 SPECIFIES TYPE DONE (BIT07=1); BITS 06-03 SPECIFIES TYPE
14(1)	USER MADE A REQUEST FOR A FUNCTION TO BE

799		PERFORMED ON AN OFFLINE OR UNSAFE DRIVE
800		
801	13(1)	USER MADE A REQUEST FOR A FUNCTION
802		TO BE PERFORMED ON A DRIVE THAT HAS AN
803		UNLOAD REQUEST IN QUEUE.
804		
805	12(2)	PERSISTENT UNSAFE CONDITION EXIST.
806		
807	11(2)	UNCORRECTABLE PARITY ERROR OCCURRED
808		
809	10(2)(4)	FATAL PARITY ERROR. A MASSBUS CLEAR WAS
810		PERFORMED, ALL QUEUES WERE EMPTIED, AND
811		ALL DRVACT'S SET TO THE IDLE STATE
812		
813	9(3)(4)	SOFTWARE TIMEOUT OCCURRED ON THIS DRIVE
814		
815	8(4)	SOFTWARE TIMEOUT OCCURRED ON ANOTHER DRIVE
816		
817	7	DONE
818		
819	6(2)	ERROR OCCURRED DURING AN I/O OPERATION
820		
821	5(2)	ERROR OCCURRED DURING AN OPERATION
822		OTHER THAN I/O.
823		
824	4(2)	CORRECTABLE UNSAFE CONDITION OCCURRED
825		
826	3(2)	DRIVE ERROR OCCURRED THAT CAUSED AN
827		AUTOMATIC "RECALIBRATE" SEQUENCE
828		
829	2	PORT REQUEST TIMEOUT. THE DRIVER REQUESTED
830		THE DRIVE BUT THE OPPOSITE PORT DID NOT
831		RELEASE THE DRIVE WITHIN 20 SECONDS.
832		
833	1	NON-EXISTENT DRIVE REQUESTED. USER MADE
834		A REQUEST FOR A NON-EXISTENT DRIVE.
835		
836	(1) =>	REQUEST WASN'T PUT IN QUEUE. (RH/RM
837		REGISTERS WERE NOT SAVED)
838		
839	(2) =>	REQUEST QUEUE HAS BEEN EMPTIED. THE DRIVER
840		ISSUED A "DRIVE CLEAR" TO THE DRIVE.
841		NOTE: ALL RH/RM REGISTERS ARE SAVED
842		AS PER DPB+14 BEFORE THE "DRIVE CLEAR".
843		
844	(3) =>	REQUEST QUEUE HAS BEEN EMPTIED. THE
845		DRIVER ISSUED A MASSBUS INIT. ALL
846		RH/RM REGISTERS FOR THE DRIVE WERE
847		SAVED AS PER DPB+14 BEFORE THE INIT.
848		
849	(4) =>	A "RECALIBRATE" SHOULD BE ISSUED
850		BEFORE ANY OTHER COMMAND.
851		
852	10.8	ERROR CALLS MADE BY THE DRIVER.
853		
854		THERE ARE A FEW ERRORS THAT CAN OCCUR THAT CAN NOT BE INDICATED IN A DPB.
855		

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

N	TYPE	DATA AVAILABLE
-	----	-----
1	RH70 INTERRUPT OCCURRED (RMAS=0)	*R4= RMCS1'S ADDRESS
2	UNEXPECTED ATTENTION OCCURRED	R1= DRIVE NUMBER R3= ATA BIT *R4= RMCS1'S ADDRESS R5= (RMAS) RMERRS =RMDS RMERRS+2=RMER1 RMERRS+4=RMER2 RMERRS+6=RMMR2
3	MASSBUS PARITY ERROR (MCPE=1)	RD.ADR= ADDRESS OF REG. READ RD.WRD= WORD READ
4	MASSBUS PARITY ERROR (PAR=1)	WRT.AD= ADDRESS OF REG. WRITTEN WRT.WD= WORD WRITTEN RD.WRD= WORD READ BACK
5	ADDRESS PLUG CHANGE BIT SET ('OPE' ERROR)	R1= DRIVE NUMBER R3= ATA BIT *R4= RMCS1'S ADDRESS R5= (RMAS) RMERRS =RMDS RMERRS+2=RMER1 RMERRS+4=RMER2 RMERRS+6=RMMR2

* THIS IS THE ACTUAL UNIBUS ADDRESS (176700)

856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894

%

;PROGRAM REVISION #001

.TITLE CZRMLAO RM05/3/2 FORMATTER

;*COPYRIGHT (C) 1980

;*DIGITAL EQUIPMENT CORP.

;*MAYNARD, MASS. 01754

;*

;*PROGRAM BY MIKE LEAVITT

;*

;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC

;*PACKAGE (MAINDEC-11-DZQAC-C4), 1980.

;*

.SBTTL OPERATIONAL SWITCH SETTINGS

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

.SBTTL BASIC DEFINITIONS

;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***

001100
104000
000004

STACK = 1100

ERROR = EMT

;;BASIC DEFINITION OF ERROR CALL

SCOPE = IOT

;;BASIC DEFINITION OF SCOPE CALL

;*MISCELLANEOUS DEFINITIONS

000011
000012
000015
000200
177776
177776
177774
177772
177570
177570

HT = 11

;;CODE FOR HORIZONTAL TAB

LF = 12

;;CODE FOR LINE FEED

CR = 15

;;CODE FOR CARRIAGE RETURN

CRLF = 200

;;CODE FOR CARRIAGE RETURN-LINE FEED

PS = 177776

;;PROCESSOR STATUS WORD

PSW=PS

STKLMT = 177774

;;STACK LIMIT REGISTER

PIRQ = 177772

;;PROGRAM INTERRUPT REQUEST REGISTER

DSWR = 177570

;;HARDWARE SWITCH REGISTER

DDISP = 177570

;;HARDWARE DISPLAY REGISTER

;*GENERAL PURPOSE REGISTER DEFINITIONS

000000
000001
000002
000003
000004
000005
000006
000007
000006
000007

R0 = %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

SP = %6

;;STACK POINTER

PC = %7

;;PROGRAM COUNTER

;*PRIORITY LEVEL DEFINITIONS

000000

PRO = 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
001000	SW9=SW09	
000400	SW8=SW08	
000200	SW7=SW07	
000100	SW6=SW06	
000040	SW5=SW05	
000020	SW4=SW04	
000010	SW3=SW03	
000004	SW2=SW02	
000002	SW1=SW01	
000001	SW0=SW00	

;*DATA BIT DEFINITIONS (BIT00 TO BIT15)

100000	BIT15	= 100000
040000	BIT14	= 40000
020000	BIT13	= 20000
010000	BIT12	= 10000
004000	BIT11	= 4000
002000	BIT10	= 2000
001000	BIT09	= 1000
000400	BIT08	= 400
000200	BIT07	= 200
000100	BIT06	= 100
000040	BIT05	= 40
000020	BIT04	= 20
000010	BIT03	= 10
000004	BIT02	= 4
000002	BIT01	= 2
000001	BIT00	= 1
001000	BIT9=BIT09	
000400	BIT8=BIT08	
000200	BIT7=BIT07	
000100	BIT6=BIT06	

```
000040      BIT5=BIT05
000020      BIT4=BIT04
000010      BIT3=BIT03
000004      BIT2=BIT02
000002      BIT1=BIT01
000001      BIT0=BIT00

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

.SBTTL RH11/RH70 REGISTERS

;CONTROL AND STATUS REGISTER 1 (RMCS1)

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

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

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

;CONTROL AND STATUS REGISTER 2 (RMCS2)

000001      US1 = 1      ;UNIT SELECT (BIT #0)
000002      US2 = 2      ;UNIT SELECT (BIT #1)
000004      US4 = 4      ;UNIT SELECT (BIT #2)
000010      BAI = 10     ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
000020      PAT = 20     ;MASSBUS PARITY TEST (BIT #4)
000040      CLR = 40     ;CLEAR (BIT #5)
000100      IR = 100     ;INPUT READY (BIT #6)
000200      OR = 200     ;OUTPUT READY (BIT #7)
000400      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)
```



```
116      100000      DLT      = 100000      ;DATA LATE (BIT #15)
117
118      ;DATA BUFFER REGISTER (RMDB)
119      ;(EACH BIT IS CALLED BY BIT NUMBER)
120
121      .SBTTL  RM REGISTERS
122
123      ;CONTROL AND STATUS 1 REGISTER. (#00)
124
125      000001      GO      = 1      ;GO BIT (BIT #0)
126      000002      F1      = 2      ;FUNCTION CODE BIT #1
127      000004      F2      = 4      ;FUNCTION CODE BIT #2
128      000010      F3      = 10     ;FUNCTION CODE BIT #3
129      000020      F4      = 20     ;FUNCTION CODE BIT #4
130      000040      F5      = 40     ;FUNCTION CODE BIT #5
131      004000      DVA      = 4000   ;DEVICE AVAILABLE (BIT #11)
132
133      ;DRIVE STATUS REGISTER (RMDS1) (#01)
134
135      000100      VV      = 100     ;VOLUME VALID (BIT #6)
136      000200      DRY     = 200     ;DRIVE READY (BIT #7)
137      000400      DPR     = 400     ;DRIVE PRESENT (BIT #8)
138      001000      PGM     = 1000    ;PROGRAMABLE (BIT #9)
139      002000      LST     = 2000    ;LAST SECTOR TRANSFERRED (BIT #10)
140      004000      WRL     = 4000    ;WRITE LOCK (BIT #11)
141      010000      MOL     = 10000   ;MEDIUM ON-LINE (BIT #12)
142      020000      PIP     = 20000   ;POSITIONING OPERATION IN PROGRESS (BIT #13)
143      040000      ERR     = 40000   ;COMPOSITE ERROR (BIT #14)
144      100000      ATA     = 100000  ;ATTENTION ACTIVE (BIT #15)
145
146      ;ERROR REGISTER #01 (RMER1) (#02)
147
148      000001      ILF     = 1      ;ILLEGAL FUNCTION (BIT #0)
149      000002      ILR     = 2      ;ILLEGAL REGISTER (BIT #1)
150      000004      RMR     = 4      ;REGISTER MODIFICATION REFUSED (BIT #2)
151      000010      PAR     = 10     ;PARITY ERROR (BIT #3)
152      000020      FER     = 20     ;FORMAT ERROR (BIT #4)
153      000040      WCF     = 40     ;WRITE CLOCK FAIL (BIT #5)
154      000100      ECH     = 100     ;ECC HARD ERROR (BIT #6)
155      000200      HCE     = 200     ;HEADER COMPARE ERROR (BIT #7)
156      000400      HCRC    = 400     ;HEADER CRC ERROR (BIT #8)
157      001000      AOE     = 1000    ;ADDRESS OVERFLOW ERROR (BIT #9)
158      002000      IAE     = 2000    ;INVALID ADDRESS ERROR (BIT #10)
159      004000      WLE     = 4000    ;WRITE LOCK ERROR (BIT #11)
160      010000      DTE     = 10000   ;DRIVE TIMING ERROR (BIT #12)
161      020000      OPI     = 20000   ;OPERATION INCOMPLETE (BIT #13)
162      040000      UNS     = 40000   ;DRIVE UNSAFE (BIT #14)
163      100000      DCK     = 100000  ;DATA CHECK ERROR (BIT 15)
164
165      ;MAINTAINABILITY REGISTER (RMMR1) (#03)
166
167      000001      DMD     = 1      ;DIAGINOSTIC MODE (BIT #0)
168      000002      MCLK    = 2      ;MAINTAINABILITY CLOCK (BIT #1)
169      000004      MINX    = 4      ;MAINTAINABILITY INDEX (BIT #2)
170      000010      MSTCK   = 10     ;MAINTAINABILITY SECTOR CLOCK (BIT #3)
171      000020      MRD     = 20     ;MAINTAINABILITY READ (BIT #4)
172      000040      MWR     = 40     ;MAINTAINABILITY WRITE (BIT #5)
```

173	000200	DTSY = 200	;MAINTAINABILITY SYNC DETECTED (BIT #7)
174			
175		;ATTENTION SUMMARY PSEUDO-REGISTER (RMAS) (#04)	
176			
177	000001	AT0 = 1	;DEVICE 0 (BIT #0)
178	000002	AT1 = 2	;DEVICE 1 (BIT #1)
179	000004	AT2 = 4	;DEVICE 2 (BIT #2)
180	000010	AT3 = 10	;DEVICE 3 (BIT #3)
181	000020	AT4 = 20	;DEVICE 4 (BIT #4)
182	000040	AT5 = 40	;DEVICE 5 (BIT #5)
183	000100	AT6 = 100	;DEVICE 6 (BIT #6)
184	000200	AT7 = 200	;DEVICE 7 (BIT #7)
185			
186		;DESIRED SECTOR/TRACK ADDRESS REGISTER (RMDA) (#05)	
187		;(EACH BIT IS CALLED BY BIT NUMBER)	
188			
189		;DRIVE TYPE REGISTER (RMDT) (#06)	
190			
191	000001	DT00 = 1	;DRIVE TYPE NUMBER BIT 1
192	000002	DT01 = 2	;DRIVE TYPE NUMBER BIT 2
193	000004	DT02 = 4	;DRIVE TYPE NUMBER BIT 3
194	000010	DT03 = 10	;DRIVE TYPE NUMBER BIT 4
195	000020	DT04 = 20	;DRIVE TYPE NUMBER BIT 5
196	000040	DT05 = 40	;DRIVE TYPE NUMBER BIT 6
197	000100	DT06 = 100	;DRIVE TYPE NUMBER BIT 7
198	000200	DT07 = 200	;DRIVE TYPE NUMBER BIT 8
199	000400	DT08 = 400	;DRIVE TYPE NUMBER BIT 9
200	004000	DRQ = 4000	;DRIVE REQUEST REQUIRED (BIT #11)
201	020000	MOH = 20000	;MOVING HEAD (BIT #13)
202	040000	TAP = 40000	;TAPE DRIVE (BIT #14)
203	100000	NBA = 100000	;NOT BLOCK ADDRESSED (BIT #15)
204			
205		;LOOK-AHEAD REGISTER (RMLA) (#07)	
206			
207	000100	SC01 = 100	;SECTOR COUNT FIELD 0 (BIT #6)
208	000200	SC02 = 200	;SECTOR COUNT FIELD 1 (BIT #7)
209	000400	SC04 = 400	;SECTOR COUNT FIELD 2 (BIT #8)
210	001000	SC10 = 1000	;SECTOR COUNT FIELD 3 (BIT #9)
211	002000	SC20 = 2000	;SECTOR COUNT FIELD 4 (BIT #10)
212			
213	004000	TRK1 = 4000	;TRACK FIELD 1 (BIT #11)
214	010000	TRK2 = 10000	;TRACK FIELD 2 (BIT #12)
215	020000	TRK4 = 20000	;TRACK FIELD 3 (BIT #13)
216	040000	TRK10 = 40000	;TRACK FIELD 4 (BIT #14)
217	100000	TRK20 = 100000	;TRACK FIELD 5 (BIT #15)
218			
219		;OFFSET REGISTER (RMOF) (#11)	
220			
221	000001	OFDIR = 1	;OFFSET DIRECTION
222	002000	HCI = 2000	;HEADER COMPARE INHIBIT (BIT #10)
223	004000	ECI = 4000	;ERROR CORRECTION CODE INHIBIT (BIT #11)
224	010000	FMT16 = 10000	;FORMAT BIT (BIT #12)
225			
226		;DESIRED CYLINDER ADDRESS (RMDC) (#12)	
227		;(EACH BIT IS CALLED BY BIT NUMBER)	
228			
229		;SERIAL NUMBER REGISTER (RMSN) (#14)	


```
230      ;(EACH IS CALLED BY BIT NUMBER)
231
232      ;RM MAINTENANCE REGISTER #02 (RMMR2) (#15)
233
234      040000      SKI      = 40000      ;SEEK INCOMPLETE (BIT #14)
235
236      ;ERROR REGISTER #02 (RMER2)
237
238      100000      BSE      = 100000      ;BAD SECTOR ERROR (BIT #15)
239
240      ;ECC POSITION REGISTER (RMEC1) (#16)
241      ;(EACH BIT IS CALLED BY BIT NUMBER)
242
243      ;ECC PATTERN REGISTER (RMEC2) (#17)
244      ;(EACH BIT IS CALLED BY BIT NUMBER)
245
246      ;SOME 1ST HEADER WORD DEFINITIONS
247
248      100000      MF      = 100000      ;MANUFACTURES BAD SECTOR FLAG (BIT #15)
249      040000      UF      = 40000      ;USERS BAD SECTOR FLAG (BIT #14)
250      010000      FMT      = 10000      ;FORMAT 16 BIT MODE (BIT #12)
251
252      .SBTTL  RM DRIVER COMMANDS
253
254      000101      RNOP      = 101      ;NO OPERATION
255      000105      SEEK      = 105      ;SEEK
256      000107      RECAL      = 107      ;RECALIBRATE
257      000111      DRVCLR      = 111      ;DRIVE CLEAR
258      000113      RELSE      = 113      ;RELEASE
259      000115      OFFSET      = 115      ;OFFSET
260      000117      RTC      = 117      ;RETURN TO CENTER LINE
261      000121      READIN      = 121      ;READ IN PRESET
262      000123      ACK      = 123      ;PACK ACKNOWLEDGE
263      000131      SEARCH      = 131      ;SEARCH
264      000141      GETREG      = 141      ;GET REGISTERS
265      000143      SETFMT      = 143      ;SET FORMAT (& ECI OR HCI)
266      000145      SELDRV      = 145      ;SELECT DRIVE
267      000151      WCKD      = 151      ;WRITE CHECK DATA
268      000153      WCKHD      = 153      ;WRITE CHECK HEADER & DATA
269      000161      WRTDAT      = 161      ;WRITE DATA
270      000163      WRTHD      = 163      ;WRITE HEADER & DATA
271      000171      RDDAT      = 171      ;READ DATA
272      000173      RDHD      = 173      ;READ HEADER & DATA
273
274      176700      ABASE      = 176700
275      000254      AVECT1      = 254
276
277      .SBTTL  TRAP CATCHER
278
279      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
      .=174
000174      000000      DISPREG: .WORD 0      ;;SOFTWARE DISPLAY REGISTER
000176      000000      SWREG: .WORD 0      ;;SOFTWARE SWITCH REGISTER
```

```
.SBTTL STARTING ADDRESS(ES)

000200 000137 007014      JMP      @#START      ;;JUMP TO STARTING ADDRESS OF PROGRAM
280 000204 000137 006776      JMP      @#BEGIN      ;CHANGE THE RM ADDRESS
281
282
283

.SBTTL ACT11 HOOKS

;*****
;HOOKS REQUIRED BY ACT11
000210      $SVPC=.      ;SAVE PC
000046      .=46
016772      $ENDAD      ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052      .=52
020000      .WORD      20000      ;;2)SET LOC.52 TO 20000
000210      .=$SVPC      ;; RESTORE PC

284      .=1100
285      .SBTTL APT PARAMETER BLOCK
286

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

;*****
;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
;INTERFACE SPEC.

001100      $APTHD:
001100      $HIBTS: .WORD      0      ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001102      $MBADR: .WORD      $MAIL    ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001104      $TSTM: .WORD      200.    ;;RUN TIM OF LONGEST TEST
001106      $PASTM: .WORD      200.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001110      $UNITM: .WORD      200.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDED UNIT
001112      .WORD      $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
287      TAB.XY=.      ;CMTAGSTARTING ADDRESS
288
```


0

.SBTTL COMMON TAGS

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

	001114			.=TAB.XY		
001114	000000			\$CMTAG:		::START OF COMMON TAGS
001114	000				.WORD 0	
001116	000			\$TSTNM:	.BYTE 0	::CONTAINS THE TEST NUMBER
001117	000			\$ERFLG:	.BYTE 0	::CONTAINS ERROR FLAG
001120	000000			\$ICNT:	.WORD 0	::CONTAINS SUBTEST ITERATION COUNT
001122	000000			\$LPADR:	.WORD 0	::CONTAINS SCOPE LOOP ADDRESS
001124	000000			\$LPERR:	.WORD 0	::CONTAINS SCOPE RETURN FOR ERRORS
001126	000000			\$ERTTL:	.WORD 0	::CONTAINS TOTAL ERRORS DETECTED
001130	000			\$ITEMB:	.BYTE 0	::CONTAINS ITEM CONTROL BYTE
001131	001			\$ERMAX:	.BYTE 1	::CONTAINS MAX. ERRORS PER TEST
001132	000000			\$ERRPC:	.WORD 0	::CONTAINS PC OF LAST ERROR INSTRUCTION
001134	000000			\$GDADR:	.WORD 0	::CONTAINS ADDRESS OF 'GOOD' DATA
001136	000000			\$BDADR:	.WORD 0	::CONTAINS ADDRESS OF 'BAD' DATA
001140	000000			\$GDDAT:	.WORD 0	::CONTAINS 'GOOD' DATA
001142	000000			\$BDDAT:	.WORD 0	::CONTAINS 'BAD' DATA
001144	000000				.WORD 0	::RESERVED--NOT TO BE USED
001146	000000				.WORD 0	
001150	000			\$AUTOB:	.BYTE 0	::AUTOMATIC MODE INDICATOR
001151	000			\$INTAG:	.BYTE 0	::INTERRUPT MODE INDICATOR
001152	000000				.WORD 0	
001154	177570			\$WR:	.WORD DSWR	::ADDRESS OF SWITCH REGISTER
001156	177570			\$DISPLAY:	.WORD DDISP	::ADDRESS OF DISPLAY REGISTER
001160	177560			\$TKS:	177560	::TTY KBD STATUS
001162	177562			\$TKB:	177562	::TTY KBD BUFFER
001164	177564			\$TPS:	177564	::TTY PRINTER STATUS REG. ADDRESS
001166	177566			\$TPB:	177566	::TTY PRINTER BUFFER REG. ADDRESS
001170	000			\$NULL:	.BYTE 0	::CONTAINS NULL CHARACTER FOR FILLS
001171	002			\$FILLS:	.BYTE 2	::CONTAINS # OF FILLER CHARACTERS REQUIRED
001172	012			\$FILLC:	.BYTE 12	::INSERT FILL CHARS. AFTER A 'LINE FEED'
001173	000			\$TPFLG:	.BYTE 0	::'TERMINAL AVAILABLE' FLAG (BIT<07>=0=YES)
001174	000000			\$TMP0:	.WORD 0	::USER DEFINED
001176	000000			\$ESCAPE:	0	::ESCAPE ON ERROR ADDRESS
001200	207	377	377	\$BELL:	.ASCIIZ <207><377><377>	::CODE FOR BELL
001204	077			\$QUES:	.ASCII /?/	::QUESTION MARK
001205	015			\$CRLF:	.ASCII <15>	::CARRIAGE RETURN
001206	012	000		\$LF:	.ASCIIZ <12>	::LINE FEED

.SBTTL APT MAILBOX-ETABLE

001210						::APT MAILBOX
001210	000000			\$MSGTY:	.WORD AMSGTY	::MESSAGE TYPE CODE
001212	000000			\$FATAL:	.WORD AFATAL	::FATAL ERROR NUMBER
001214	000000			\$TESTN:	.WORD ATESTN	::TEST NUMBER
001216	000000			\$PASS:	.WORD APASS	::PASS COUNT
001220	000000			\$DEVCT:	.WORD ADEVCT	::DEVICE COUNT
001222	000000			\$UNIT:	.WORD AUNIT	::I/O UNIT NUMBER
001224	000000			\$MSGAD:	.WORD AMSGAD	::MESSAGE ADDRESS
001226	000000			\$MSGLG:	.WORD AMSGLG	::MESSAGE LENGTH

001230		SETABLE:		:: APT ENVIRONMENT TABLE
001230	000	\$ENV: .BYTE	AENV	:: ENVIRONMENT BYTE
001231	000	\$ENVM: .BYTE	AENVM	:: ENVIRONMENT MODE BITS
001232	000000	\$SWREG: .WORD	ASWREG	:: APT SWITCH REGISTER
001234	000000	\$USWR: .WORD	AUSWR	:: USER SWITCHES
001236	000000	\$CPUOP: .WORD	ACPUOP	:: CPU TYPE, OPTIONS
		::*		BITS 15-11=CPU TYPE
		::*		11/04=01, 11/05=02, 11/20=03, 11/40=04, 11/45=05
		::*		11/70=06, PDQ=07, Q=10
		::*		BIT 10=REAL TIME CLOCK
		::*		BIT 9=FLOATING POINT PROCESSOR
		::*		BIT 8=MEMORY MANAGEMENT
001240	000	\$MAMS1: .BYTE	AMAMS1	:: HIGH ADDRESS, M.S. BYTE
001241	000	\$MTYP1: .BYTE	AMTYP1	:: MEM. TYPE, BLK#1
		::*		MEM. TYPE BYTE -- (HIGH BYTE)
		::*		900 NSEC CORE=001
		::*		300 NSEC BIPOLAR=002
		::*		500 NSEC MOS=003
001242	000000	\$MADR1: .WORD	AMADR1	:: HIGH ADDRESS, BLK#1
		::*		MEM. LAST ADDR.=3 BYTES, THIS WORD AND LOW OF "TYPE" ABOVE
001244	000	\$MAMS2: .BYTE	AMAMS2	:: HIGH ADDRESS, M.S. BYTE
001245	000	\$MTYP2: .BYTE	AMTYP2	:: MEM. TYPE, BLK#2
001246	000000	\$MADR2: .WORD	AMADR2	:: MEM. LAST ADDRESS, BLK#2
001250	000	\$MAMS3: .BYTE	AMAMS3	:: HIGH ADDRESS, M.S. BYTE
001251	000	\$MTYP3: .BYTE	AMTYP3	:: MEM. TYPE, BLK#3
001252	000000	\$MADR3: .WORD	AMADR3	:: MEM. LAST ADDRESS, BLK#3
001254	000	\$MAMS4: .BYTE	AMAMS4	:: HIGH ADDRESS, M.S. BYTE
001255	000	\$MTYP4: .BYTE	AMTYP4	:: MEM. TYPE, BLK#4
001256	000000	\$MADR4: .WORD	AMADR4	:: MEM. LAST ADDRESS, BLK#4
001260	000254	\$VECT1: .WORD	AVECT1	:: INTERRUPT VECTOR#1, BUS PRIORITY#1
001262	000000	\$VECT2: .WORD	AVECT2	:: INTERRUPT VECTOR#2, BUS PRIORITY#2
001264	176700	\$BASE: .WORD	ABASE	:: BASE ADDRESS OF EQUIPMENT UNDER TEST
001266	000000	\$DEVN: .WORD	ADEVN	:: DEVICE MAP
001270	000000	\$CDW1: .WORD	ACDW1	:: CONTROLLER DESCRIPTION WORD#1
001272	000000	\$CDW2: .WORD	ACDW2	:: CONTROLLER DESCRIPTION WORD#2
001274		SETEND:		
		.MEXIT		

0

.SBTTL USER DEFINED TAGS

001274	176700	SRMADR: .WORD	176700	:RH/RM UNIBUS ADDRESS
001276	000254	SRMVEC: .WORD	254	:RH INTERRUPT VECTOR
001300	172540	SLKCSR: .WORD	172540	:ADDRESS OF KW11-P CSR
001302	172542	SLKCSB: .WORD	172542	:ADDRESS OF KW11-P COUNTER BUFFER
001304	000104	000106	SLPVEC: .WORD	104,106 :ADDRESS OF KW11-P VECTOR
001310	177546	SLKS: .WORD	177546	:ADDRESS OF KW11-L CONTROL REGISTER
001312	000100	000102	SLLVEC: .WORD	100,102 :ADDRESS OF KW11-L VECTOR
	001222	DRIVE	=\$UNIT	:CONTAINS DRIVE NUMBER SELECTED
				:SAME PARAMETER USED IN APT
001316	000000	SOF SW: .WORD	0	:CONTENTS ARE FOR SOFTWARE DECISIONS
001320	000000	MODE: .WORD	0	:FORMAT = -1, CHECK = 0 AND VERIFY ONLY = 1
001322	000000	SNGSEC: .WORD	0	:READ MULTI-SECTOR = 0, READ SINGLE SECTOR = 1
001324	000000	LSTRK: .WORD	0	:CONTAINS THE LAST TRACK OF THE UNIT UNDER
				:TEST. RM02/3 = 4., RM05 = 18.
001326	000000	ENDCYL: .WORD	0	:ENDING CYLINDER
001330	000000	BEGCYL: .WORD	0	:STARTING CYLINDER
001332	000000	ENDTRK: .WORD	0	:ENDING TRACK
001334	000000	BEGTRK: .WORD	0	:STARTING TRACK
001336	000000	PATSEL: .WORD	0	:CONTAINS PATTERN SELECTED
001340	000000	PATA: .WORD	0	:1ST WORD OF PATTERN
001342	000000	PATB: .WORD	0	:2ND WORD OF PATTERN
001344	000000	RETRY: .WORD	0	:MAINTAINS # OF WRITE RETRIES MADE
001346	000000	SAVSEC: .WORD	0	:CONTAINS LAST BAD SECTOR ON FORMAT
001350	000000	SAVWC: .WORD	0	:CONTAINS WC FOR REMAINING SECTORS ON ERROR
001352	000000	WC: .WORD	0	:30 OR 32 SECTOR TRACK SIZE (IN WORDS)
001354	000000	MWC: .WORD	0	:2'S COMPLEMENT OF 'WC'
001356	000000	HEDERR: .WORD	0	:POSITIONING ERROR DURING FORMAT INDICATOR
001360	000000	SEC30: .WORD	0	:30 OR 32 SECTOR MODE INDICATOR
				:0 = 30 SECTOR MODE
				:1'S = 32 SECTOR MODE
001362	000000	MAXSEC: .WORD	0	:MAXIMUM SECTOR ADDRESS (FOR EITHER 30 OR 32 SECTOR
				:FORMAT)
001364	000000	DS.CYL: .WORD	0	:ADDRESS OF CURRENT CYLINDER
001366	000000	DS.TRK: .WORD	0	:ADDRESS OF CURRENT TRACK
001370	000000	DDRIVE: .WORD	0	:DRIVE NUMBER OF 'DRIVER' ERROR MESSAGES
001372	000000	ATTN: .WORD	0	:ATTENTION REGISTER IMAGE FOR 'DRIVER'
				:ERROR MESSAGES
001374	000000	CNTLC: .WORD	0	:ADDRESS OF 'AC' RETURN
001376	000001	CHGADR: .WORD	1	: 'CHANGE RH/RM ADDRESS' FLAG = 1
001400	000000	WRAP: .WORD	0	:WRAP AROUND FLAG,FORMAT FROM HIGH TO LOW
				:CYLINDER NUMBER
001402	000000	DEVMP: .WORD	0	:DEVICE MAP FOR APT
001404	000000	PACK: .WORD	0	:PACK >0, BAD SPOT FILE AVAILABLE FROM PACK
001406	000000	EDIT: .WORD	0	:EDIT THE BAD SPOT FILE ,IF EDIT >0
001410	000000	HEADX: .WORD	0	:HEAD BIT INDICATOR
				:BIT15:BIT14 GOOD SECTOR
				:BIT15 ALONE, USER DEFINED BAD SECTOR
				:BIT14 ALONE, MFG DEFINED BAD SECTOR
001412	000000	XXDP: .WORD	0	:THE LOW BYTE CONTAINS THE DRIVE NUMBER FROM WHICH
				:THE PROGRAM WAS LOADED. THE HIGH BYTE CONTAINS THE
				: 'XXDP' DEVICE CODE THE RM05/3/2.
001414		BAD16: .BLKW	256.	:MFG 16 BIT BAD SPOT TABLE
002414	177777	.WORD	-1	

002416	177777	.WORD	-1	
002420		BAD18: .BLKW	256.	;MFG 18 BIT BAD SPOT TABLE
003420	177777	.WORD	-1	
003422	177777	.WORD	-1	
003424		USTAB: .BLKW	256.	;USER BAD SPOT TABLE
004424	177777	.WORD	-1	
004426	177777	.WORD	-1	
004430		USSAV: .BLKW	256.	;USER BAD SPOT TABLE SAVE FROM PACK
005430	177777	.WORD	-1	
005432	177777	.WORD	-1	
005434		SECCU: .BLKW	32.	;32 WORDS MAX TO STORE BAD SECTORS
005534	177777	.WORD	-1	
005536	000000	NEXT: .WORD	0	;FLAG, IF NEXT=-1, ALL GOOD SPOT ON ;THE CURRENT TRACK ARE FORMATTED

;DATA/PARAMETER BLOCK - USED FOR ALL DRIVE OPERATION

005540	000	FMTDPB: .BYTE	0	;DRIVE NUMBER
005541	000	.BYTE	0	;OFFSET VALUE OR FMT16, ECI, AND HCI
005542	000	.BYTE	0	;COMMAND
005543	000	.BYTE	0	;PSEL AND A17 AND A16
005544	000000	.WORD	0	;WORD COUNT (NEG)
005546	000000	.WORD	0	;BUFFER ADDRESS
005550	000	.BYTE	0	;SECTOR ADDRESS
005551	000	.BYTE	0	;TRACK ADDRESS
005552	000000	.WORD	0	;CYLINDER ADDRESS
005554	005560	.WORD	RM.REG	;ERROR TABLE POINTER
005556	000000	.WORD	0	;STATUS-ERROR INDICATOR ;BIT 15 = 1: ERROR OCCURRED ;BIT 07 = 1: DONE ;BIT 14-10 AND BIT 06-03 ;INDICATE TYPE OF ERROR

;RM/RM REGISTERS STORED HERE AFTER AN OPERATION

005560	000000	RM.REG: .WORD	0	;RMCS1
005562	000000	.WORD	0	;RMWC
005564	000000	.WORD	0	;RMBA
005566	000000	.WORD	0	;RMDA
005570	000000	.WORD	0	;RMCS2
005572	000000	.WORD	0	;RMDS
005574	000000	.WORD	0	;RMER1
005576	000000	.WORD	0	;RMAS
005600	000000	.WORD	0	;RMLA
005602	000000	.WORD	0	;RMDB
005604	000000	.WORD	0	;RMMR1
005606	000000	.WORD	0	;RMDT
005610	000000	.WORD	0	;RMSN
005612	000000	.WORD	0	;RMCF
005614	000000	.WORD	0	;RMCA
005616	000000	.WORD	0	;RMDC
005620	000000	.WORD	0	;RMER2
005622	000000	.WORD	0	;RMMR2

005624	000000	.WORD	0	:RMEC1
005626	000000	.WORD	0	:RMEC2
005630	000	FMTX: .BYTE	0	:SPECIAL DPB TO WRITE HEADER OF BAD SPOT
005631	000	.BYTE	0	
005632	000	.BYTE	0	
005633	000	.BYTE	0	
005634	177776	.WORD	-2	:ONLY TWO WORDS FOR HEADER
005636	045764	.WORD	RBUF	:BUFFER ADDRESS
005640	000	.BYTE	0	:SECTOR
005641	000	.BYTE	0	:TRACK
005642	000000	.WORD	0	:CYLINDER ADDRESS
005644	000000	.WORD	0	:ERROR TABLE
				:DONT'SAVE ANYTHING
005646	000000	.WORD	0	:STATUS WORD

:PARAMETER LIMIT POINTER TABLE

005650	005776	001467	001330	TABLE: PAR1,823.,BEGCYL
005656	006011	000005	001334	PAR2,5.,BEGTRK
005664	006024	001467	001326	PAR3,823.,ENDCYL
005672	006035	000005	001332	PAR4,5.,ENDTRK,0
005702	006046	001467	001364	TABLE2: PAR5,823.,DS.CYL
005710	006057	000005	001366	PAR6,5.,DS.TRK
005716	006070	000040	001346	PAR7,32.,SAVSEC,0
005726	006046	001467	001364	TABLE3: PAR5,823.,DS.CYL
005734	006057	000005	001366	PAR6,5.,DS.TRK
005742	006070	000036	001346	PAR7,30.,SAVSEC,0
005752	006046	001467	001364	TABLE4: PAR5,823.,DS.CYL
005760	006057	000005	001366	PAR6,5,DS.TRK
005766	006101	047301	001346	PAR8,20161.,SAVSEC,0

:ASCII MESSAGES FOR ADDRESS PARAMETERS

005776	123	124	101	PAR1: .ASCII @START CYL @
006011	123	124	101	PAR2: .ASCII @START TRK @
006024	105	116	104	PAR3: .ASCII @END CYL @
006035	105	116	104	PAR4: .ASCII @END TRK @
006046	103	131	114	PAR5: .ASCII /CYLINDER/
006057	124	122	101	PAR6: .ASCII /TRACK /
006070	123	105	103	PAR7: .ASCII /SECTOR /
006101	102	131	124	PAR8: .ASCII /BYTE POSITION /
				.EVEN

006120	022116	022414	022502	TABCAL: .WORD FUNCT2,FUNCT3,FUNCT4,FUNCT6,FUNCT7
--------	--------	--------	--------	--

:SECTOR BUFFER ADDRESS TABLE

006132	045774	ADRTBL: .WORD	BUPP	:ADDRESS OF SECTOR 0
006134	047000	.WORD	BUPP+<516.*1.>	:ADDRESS OF SECTOR 1.
006136	050004	.WORD	BUPP+<516.*2.>	:ADDRESS OF SECTOR 2.
006140	051010	.WORD	BUPP+<516.*3.>	:ADDRESS OF SECTOR 3.
006142	052014	.WORD	BUPP+<516.*4.>	:ADDRESS OF SECTOR 4.

006144	053020	.WORD	BUFP+<516.*5.>	; ADDRESS OF SECTOR 5.
006146	054024	.WORD	BUFP+<516.*6.>	; ADDRESS OF SECTOR 6.
006150	055030	.WORD	BUFP+<516.*7.>	; ADDRESS OF SECTOR 7.
006152	056034	.WORD	BUFP+<516.*8.>	; ADDRESS OF SECTOR 8.
006154	057040	.WORD	BUFP+<516.*9.>	; ADDRESS OF SECTOR 9.
006156	060044	.WORD	BUFP+<516.*10.>	; ADDRESS OF SECTOR 10.
006160	061050	.WORD	BUFP+<516.*11.>	; ADDRESS OF SECTOR 11.
006162	062054	.WORD	BUFP+<516.*12.>	; ADDRESS OF SECTOR 12.
006164	063060	.WORD	BUFP+<516.*13.>	; ADDRESS OF SECTOR 13.
006166	064064	.WORD	BUFP+<516.*14.>	; ADDRESS OF SECTOR 14.
006170	065070	.WORD	BUFP+<516.*15.>	; ADDRESS OF SECTOR 15.
006172	066074	.WORD	BUFP+<516.*16.>	; ADDRESS OF SECTOR 16.
006174	067100	.WORD	BUFP+<516.*17.>	; ADDRESS OF SECTOR 17.
006176	070104	.WORD	BUFP+<516.*18.>	; ADDRESS OF SECTOR 18.
006200	071110	.WORD	BUFP+<516.*19.>	; ADDRESS OF SECTOR 19.
006202	072114	.WORD	BUFP+<516.*20.>	; ADDRESS OF SECTOR 20.
006204	073120	.WORD	BUFP+<516.*21.>	; ADDRESS OF SECTOR 21.
006206	074124	.WORD	BUFP+<516.*22.>	; ADDRESS OF SECTOR 22.
006210	075130	.WORD	BUFP+<516.*23.>	; ADDRESS OF SECTOR 23.
006212	076134	.WORD	BUFP+<516.*24.>	; ADDRESS OF SECTOR 24.
006214	077140	.WORD	BUFP+<516.*25.>	; ADDRESS OF SECTOR 25.
006216	100144	.WORD	BUFP+<516.*26.>	; ADDRESS OF SECTOR 26.
006220	101150	.WORD	BUFP+<516.*27.>	; ADDRESS OF SECTOR 27.
006222	102154	.WORD	BUFP+<516.*28.>	; ADDRESS OF SECTOR 28.
006224	103160	.WORD	BUFP+<516.*29.>	; ADDRESS OF SECTOR 29.
006226	104164	.WORD	BUFP+<516.*30.>	; ADDRESS OF SECTOR 30.
006230	105170	.WORD	BUFP+<516.*31.>	; ADDRESS OF SECTOR 31.

;REMAINING WORD COUNT TABLE

006232	000402	WCTBL: .WORD	258.	; REMAINING WORD COUNT AFTER SECTOR 0
006234	001004	.WORD	258.+<258.*1.>	; REMAINING WORD COUNT AFTER SECTOR 1.
006236	001406	.WORD	258.+<258.*2.>	; REMAINING WORD COUNT AFTER SECTOR 2.
006240	002010	.WORD	258.+<258.*3.>	; REMAINING WORD COUNT AFTER SECTOR 3.
006242	002412	.WORD	258.+<258.*4.>	; REMAINING WORD COUNT AFTER SECTOR 4.
006244	003014	.WORD	258.+<258.*5.>	; REMAINING WORD COUNT AFTER SECTOR 5.
006246	003416	.WORD	258.+<258.*6.>	; REMAINING WORD COUNT AFTER SECTOR 6.
006250	004020	.WORD	258.+<258.*7.>	; REMAINING WORD COUNT AFTER SECTOR 7.
006252	004422	.WORD	258.+<258.*8.>	; REMAINING WORD COUNT AFTER SECTOR 8.
006254	005024	.WORD	258.+<258.*9.>	; REMAINING WORD COUNT AFTER SECTOR 9.
006256	005426	.WORD	258.+<258.*10.>	; REMAINING WORD COUNT AFTER SECTOR 10.
006260	006030	.WORD	258.+<258.*11.>	; REMAINING WORD COUNT AFTER SECTOR 11.
006262	006432	.WORD	258.+<258.*12.>	; REMAINING WORD COUNT AFTER SECTOR 12.
006264	007034	.WORD	258.+<258.*13.>	; REMAINING WORD COUNT AFTER SECTOR 13.
006266	007436	.WORD	258.+<258.*14.>	; REMAINING WORD COUNT AFTER SECTOR 14.
006270	010040	.WORD	258.+<258.*15.>	; REMAINING WORD COUNT AFTER SECTOR 15.
006272	010442	.WORD	258.+<258.*16.>	; REMAINING WORD COUNT AFTER SECTOR 16.
006274	011044	.WORD	258.+<258.*17.>	; REMAINING WORD COUNT AFTER SECTOR 17.
006276	011446	.WORD	258.+<258.*18.>	; REMAINING WORD COUNT AFTER SECTOR 18.
006300	012050	.WORD	258.+<258.*19.>	; REMAINING WORD COUNT AFTER SECTOR 19.
006302	012452	.WORD	258.+<258.*20.>	; REMAINING WORD COUNT AFTER SECTOR 20.
006304	013054	.WORD	258.+<258.*21.>	; REMAINING WORD COUNT AFTER SECTOR 21.
006306	013456	.WORD	258.+<258.*22.>	; REMAINING WORD COUNT AFTER SECTOR 22.
006310	014060	.WORD	258.+<258.*23.>	; REMAINING WORD COUNT AFTER SECTOR 23.
006312	014462	.WORD	258.+<258.*24.>	; REMAINING WORD COUNT AFTER SECTOR 24.
006314	015064	.WORD	258.+<258.*25.>	; REMAINING WORD COUNT AFTER SECTOR 25.
006316	015466	.WORD	258.+<258.*26.>	; REMAINING WORD COUNT AFTER SECTOR 26.

006320	016070	.WORD	258.*<258.*27.>	;REMAINING WORD COUNT AFTER SECTOR 27.
006322	016472	.WORD	258.*<258.*28.>	;REMAINING WORD COUNT AFTER SECTOR 28.
006324	017074	.WORD	258.*<258.*29.>	;REMAINING WORD COUNT AFTER SECTOR 29.
006326	017476	.WORD	258.*<258.*30.>	;REMAINING WORD COUNT AFTER SECTOR 30.
006330	020100	.WORD	258.*<258.*31.>	;REMAINING WORD COUNT AFTER SECTOR 31.

006332	001166	BYTE16: .WORD	630.	
006334	002354	.WORD	630.*<630.*1.>	
006336	003542	.WORD	630.*<630.*2.>	
006340	004730	.WORD	630.*<630.*3.>	
006342	006116	.WORD	630.*<630.*4.>	
006344	007304	.WORD	630.*<630.*5.>	
006346	010472	.WORD	630.*<630.*6.>	
006350	011660	.WORD	630.*<630.*7.>	
006352	013046	.WORD	630.*<630.*8.>	
006354	014234	.WORD	630.*<630.*9.>	
006356	015422	.WORD	630.*<630.*10.>	
006360	016610	.WORD	630.*<630.*11.>	
006362	017776	.WORD	630.*<630.*12.>	
006364	021164	.WORD	630.*<630.*13.>	
006366	022352	.WORD	630.*<630.*14.>	
006370	023540	.WORD	630.*<630.*15.>	
006372	024726	.WORD	630.*<630.*16.>	
006374	026114	.WORD	630.*<630.*17.>	
006376	027302	.WORD	630.*<630.*18.>	
006400	030470	.WORD	630.*<630.*19.>	
006402	031656	.WORD	630.*<630.*20.>	
006404	033044	.WORD	630.*<630.*21.>	
006406	034232	.WORD	630.*<630.*22.>	
006410	035420	.WORD	630.*<630.*23.>	
006412	036606	.WORD	630.*<630.*24.>	
006414	037774	.WORD	630.*<630.*25.>	
006416	041162	.WORD	630.*<630.*26.>	
006420	042350	.WORD	630.*<630.*27.>	
006422	043536	.WORD	630.*<630.*28.>	
006424	044724	.WORD	630.*<630.*29.>	
006426	046112	.WORD	630.*<630.*30.>	
006430	047300	.WORD	630.*<630.*31.>	

006432	001240	BYTE18: .WORD	672.	
006434	002500	.WORD	672.*<672.*1.>	
006436	003740	.WORD	672.*<672.*2.>	
006440	005200	.WORD	672.*<672.*3.>	
006442	006440	.WORD	672.*<672.*4.>	
006444	007700	.WORD	672.*<672.*5.>	
006446	011140	.WORD	672.*<672.*6.>	
006450	012400	.WORD	672.*<672.*7.>	
006452	013640	.WORD	672.*<672.*8.>	
006454	015100	.WORD	672.*<672.*9.>	
006456	016340	.WORD	672.*<672.*10.>	
006460	017600	.WORD	672.*<672.*11.>	
006462	021040	.WORD	672.*<672.*12.>	
006464	022300	.WORD	672.*<672.*13.>	
006466	023540	.WORD	672.*<672.*14.>	
006470	025000	.WORD	672.*<672.*15.>	
006472	026240	.WORD	672.*<672.*16.>	
006474	027500	.WORD	672.*<672.*17.>	

006476	030740	.WORD	672.+<672.*18.>
006500	032200	.WORD	672.+<672.*19.>
006502	033440	.WORD	672.+<672.*20.>
006504	034700	.WORD	672.+<672.*21.>
006506	036140	.WORD	672.+<672.*22.>
006510	037400	.WORD	672.+<672.*23.>
006512	040640	.WORD	672.+<672.*24.>
006514	042100	.WORD	672.+<672.*25.>
006516	043340	.WORD	672.+<672.*26.>
006520	044600	.WORD	672.+<672.*27.>
006522	046040	.WORD	672.+<672.*28.>
006524	047300	.WORD	672.+<672.*29.>

.EVEN

0

.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

006526

\$ERRTB:

;ERROR 1

EM1
DH1
DT1
DF1

;RH/RM INTERRUPT OCCURRED (RMAS=0)

;ERROR 2

EM2
DH2
DT2
DF2

;UNEXPECTED ATTENTION OCCURRED

;ERROR 3

EM3
DH3
DT3
DF3

;MASSBUS PARITY ERROR (MCPE=1)

;ERROR 4

EM4
DH4
DT4
DF4

;MASSBUS PARITY ERROR (PAR=1)

;ERROR 5

0
0
0
0

;UNUSED

;ERROR 6

EM6
DH6
DT6
DF6

;RH/RM DIDN'T RESPOND TO ADDRESSING

1		
2		
3		
4	006526	042226
5	006530	043472
6	006532	045030
7	006534	045402
8		
9		
10		
11	006536	042270
12	006540	043540
13	006542	045046
14	006544	045406
15		
16		
17		
18	006546	042326
19	006550	043612
20	006552	045062
21	006554	045412
22		
23		
24		
25	006556	042364
26	006560	043663
27	006562	045076
28	006564	045416
29		
30		
31		
32	006566	000000
33	006570	000000
34	006572	000000
35	006574	000000
36		
37		
38		
39	006576	042455
40	006600	043746
41	006602	045114
42	006604	045422

43			
44			
45			:ERROR 7
46	006606	042520	EM7
47	006610	044554	DH23
48	006612	045116	DT7
49	006614	045512	DF25
50			
51			:ERROR 10
52			
53	006616	042572	EM10
54	006620	043761	DH10
55	006622	045126	DT10
56	006624	045426	DF10
57			
58			:ERROR 11
59			
60	006626	042610	EM11
61	006630	043761	DH10
62	006632	045126	DT10
63	006634	045426	DF10
64			
65			:ERROR 12
66			
67	006636	042646	EM12
68	006640	043761	DH10
69	006642	045126	DT10
70	006644	045426	DF10
71			
72			:ERROR 13
73			
74	006646	042711	EM13
75	006650	043761	DH10
76	006652	045126	DT10
77	006654	045426	DF10
78			
79			:ERROR 14
80			
81	006656	042732	EM14
82	006660	043761	DH10
83	006662	045126	DT10
84	006664	045426	DF10
85			
86			:ERROR 15
87			
88	006666	042755	EM15
89	006670	043761	DH10
90	006672	045126	DT10
91	006674	045426	DF10
92			
93			:ERROR 16
94			
95	006676	043021	EM16
96	006700	043761	DH10
97	006702	045126	DT10
98	006704	045426	DF10
99			

:TRACK/SECTOR FIELD IN HEADER IS NOT CORRECT

:DRIVE OFFLINE

:PERSISTENT DRIVE UNSAFE ERROR

:UNCORRECTABLE MASSBUS PARITY ERROR

:SOFTWARE TIMEOUT

:DRIVE UNSAFE ERROR

:CONTROLLER/DRIVE ERROR DURING WRITE

:CONTROLLER/DRIVE ERROR DURING WRITE CHECK

100			;ERROR 17	
101				
102	006706	043073	EM17	;RETRIES NOT SUCESSFUL - SECTOR NOT ACCEPTABLE
103	006710	044210	DH17	
104	006712	045200	DT17	
105	006714	045442	DF17	
106				
107			;ERROR 20	
108				
109	006716	043151	EM20	;DATA ERROR DURING WRITE CHECK
110	006720	044257	DH20	
111	006722	045212	DT20	
112	006724	045446	DF20	
113				
114			;ERROR 21	
115				
116	006726	043207	EM21	;CONTROLLER/DRIVE ERROR VERIFYING HEADERS
117	006730	043761	DH10	
118	006732	045126	DT10	
119	006734	045426	DF10	
120				
121			;ERROR 22	
122				
123	006736	043260	EM22	; 'HCE' OR 'HCRC' ERROR VERIFYING HEADERS
124	006740	043761	DH10	
125	006742	045126	DT10	
126	006744	045426	DF10	
127				
128			;ERROR 23	
129				
130	006746	043330	EM23	;CYLINDER FIELD IN HEADER IS NOT CORRECT
131	006750	044554	DH23	
132	006752	045274	DT23	
133	006754	045512	DF23	
134				
135			;ERROR 24	
136				
137	006756	043400	EM24	;WRITE CHECK ERROR
138	006760	044613	DH24	
139	006762	045304	DT24	
140	006764	045472	DF24	
141				
142			;ERROR 25	
143				
144	006766	043422	EM25	;ILLEGAL BAD SECTOR
145	006770	044766	DH25	
146	006772	045372	DT25	
147	006774	045512	DF25	
148				

```
1      .SBTTL PROGRAM START
2
3 006776 012737 000001 001376 BEGIN: MOV #1,CHGADR ;ENABLE CHANGE OF 'RH/RM BUS ADDRESS'
4 007004 012737 177777 001270      MOV #-1,$CDW1 ;ENABLE USE OF UTILITY ROUTINES
5 007012 000402
6
7 007014 005037 001270      START: CLR $CDW1 ;DISABLE USE OF UTILITY ROUTINES
8
9 007020      BEGIN2:
10      007020 000240      TST1: NOP
11      007022 012737 000001 001214      MOV #1,$TESTN ;:SET TEST NUMBER IN APT MAIL BOX
12      007030 005227 000000      INC #0 ;:TTY LOOP, WAIT FOR INCREMENT
13      007034 001375      BNE .-4 ;:OF WORD
14      007036 000005      RESET ;:CLEAR THE WORLD

      .SBTTL INITIALIZE THE COMMON TAGS
      ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
      MOV #CMTAG,R6 ;:FIRST LOCATION TO BE CLEARED
      CLR (R6)+ ;:CLEAR MEMORY LOCATION
      CMP #SWR,R6 ;:DONE?
      BNE .-6 ;:LOOP BACK IF NO
      MOV #STACK,SP ;:SETUP THE STACK POINTER
      ;;INITIALIZE A FEW VECTORS
      MOV #ERROR,@EMTVEC ;:EMT VECTOR FOR ERROR ROUTINE
      MOV #340,@EMTVEC+2 ;:LEVEL 7
      MOV #TRAP,@TRAPVEC ;:TRAP VECTOR FOR TRAP CALLS
      MOV #340,@TRAPVEC+2 ;:LEVEL 7
      MOV #SPWRDN,@PWRVEC ;:POWER FAILURE VECTOR
      MOV #340,@PWRVEC+2 ;:LEVEL 7
      CLR $ESCAPE ;:CLEAR THE ESCAPE ON ERROR ADDRESS
      MOVB #1,$ERMAX ;:ALLOW ONE ERROR PER TEST
      ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
      ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
      MOV @ERRVEC,-(SP) ;:SAVE ERROR VECTOR
      MOV #64$,@ERRVEC ;:SET UP ERROR VECTOR
      MOV #DSWR,SWR ;:SETUP FOR A HARDWARE SWICH REGISTER
      MOV #DDISP,DISPLAY ;:AND A HARDWARE DISPLAY REGISTER
      CMP #-1,@SWR ;:TRY TO REFERENCE HARDWARE SWR
      BNE 66$ ;:BRANCH IF NO TIMEOUT TRAP OCCURRED
      ;:AND THE HARDWARE SWR IS NOT = -1
      BR 65$ ;:BRANCH IF NO TIMEOUT
      64$: MOV #65$,(SP) ;:SET UP FOR TRAP RETURN
      RTI
      65$: MOV #SWREG,SWR ;:POINT TO SOFTWARE SWR
      MOV #DISPREG,DISPLAY
      66$: MOV (SP)+,@ERRVEC ;:RESTORE ERROR VECTOR

      CLR $PASS ;:CLEAR PASS COUNT
      BITB #APTSIZE,$ENVM ;:TEST USER SIZE UNDER APT
      BEQ 67$ ;:YES,USE NON-APT SWITCH
      MOV #SSWREG,SWR ;:NO,USE APT SWITCH REGISTER
      67$:
15      .SBTTL TYPE PROGRAM NAME
      ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
      INC #-1 ;:FIRST TIME?
      BNE 68$ ;:BRANCH IF NO
```



```
007254 104401 007322          TYPE 69$          ;;TYPE ASCII STRING
                                .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
007260 005737 000042          TST @#42          ;;ARE WE RUNNING UNDER XXDP/ACT?
007264 001012                BNE 70$          ;;BRANCH IF YES
007266 123727 001230 000001    CMPB $ENV,#1      ;;ARE WE RUNNING UNDER APT?
007274 001406                BEQ 70$          ;;BRANCH IF YES
007276 023727 001154 000176    CMP SWR,#SWREG    ;;SOFTWARE SWITCH REG SELECTED?
007304 001005                BNE 71$          ;;BRANCH IF NO
007306 104406                GTSWR              ;;GET SOFT-SWR SETTINGS
007310 000403                BR 71$
007312 112737 000001 001150    70$: MOVB #1,$AUTOB ;;SET AUTO-MODE INDICATOR
007320                71$:
007320 000420                BR 68$          ;;GET OVER THE ASCII
                                ;;69$: .ASCIIZ <CRLF>@CZRMLAO - RM05/3/2 FORMATTER@<CRLF>
                                68$:
16 007362 005227 177777        INC #1          ;FIRST TIME THRU ?
17 007366 001024                BNE 1$          ;BR IF NO
18 007370 104401 007376        TYPE 72$          ;;TYPE ASCII STRING
007374 000421                BR 1$          ;;GET OVER THE ASCII
                                ;;72$: .ASCIIZ <CRLF>@PROGRAM REQUIRES 20K OF MEMORY@<CRLF>
                                1$:
22
23
24
25
26 007440 005037 001412          CLR XXDP          ;CLEAR 'XXDP' LOAD DEVICE STORAGE
27 007444 122737 000016 000041  CMPB #16,@#41    ;LOADED FROM AN RM05/3/2 ?
28 007452 001160                BNE 4$          ;BR IF NOT
29 007454 013737 000040 001412  MOV @#40,XXDP    ;GET DEVICE INDICATOR AND NUMBER
30 007462 122737 000007 001412  CMPB #7,XXDP    ;IS IT A VALID NUMBER ?
31 007470 103002                BHIS 2$          ;YES
32 007472 105037 001412          CLRB XXDP        ;NO, DEFAULT TO DRIVE 0
33 007476 005737 000042          TST @#42        ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
34 007502 001425                BEQ 3$          ;BR IF NEITHER
35 007504 104401 007512          TYPE 74$          ;;TYPE ASCII STRING
007510 000412                BR 73$          ;;GET OVER THE ASCII
                                ;;74$: .ASCIIZ <CRLF>/NOT TESTING DRIVE /
                                73$:
36 007536 005046                CLR -(SP)        ;CLEAR WORD ON STACK
37 007540 113716 001412          MOVB XXDP,(SP)    ;GET DRIVE ADDRESS
38 007544 104403                TYP0S            ;TYPE THE ADDRESS
39 007546 001                .BYTE 1            ;ONLY 1 CHARACTER
40 007547 000                .BYTE 0            ;SUPPRESS LEADING ZEROS
41 007550 104401 001205          TYPE , $CRLF      ;CR-LF
42 007554 000517                BR 4$          ;GET NUMBER OF DRIVES
43
44 007556 005227 177777          3$: INC #1        ;FIRST TIME THRU HERE ?
45 007562 001114                BNE 4$          ;NO
46 007564 104401 007572          TYPE 76$          ;;TYPE ASCII STRING
007570 000410                BR 75$          ;;GET OVER THE ASCII
                                ;;76$: .ASCIIZ <CRLF>/TO TEST DRIVE /
                                75$:
47 007612 005046                CLR -(SP)        ;CLEAR WORD ON STACK
48 007614 113716 001412          MOVB XXDP,(SP)    ;GET DRIVE ADDRESS
49 007620 104403                TYP0S            ;TYPE DRIVE ADDRESS
50 007622 001                .BYTE 1            ;ONLY 1 CHARACTER
51 007623 000                .BYTE 0            ;SUPPRESS LEADING ZEROS
```



```
52 007624 104401 007632      TYPE      78$      ;;TYPE ASCII STRING
    007630 000431      BR      77$      ;;GET OVER THE ASCII
    007714      ;;78$: .ASCIIZ /, HALT PROGRAM, REMOVE RRD PAK AND REPLACE IT/<CRLF>
53 007714 104401 007722      TYPE      79$      ;;TYPE ASCII STRING
    007720 000435      BR      4$      ;;GET OVER THE ASCII
    010014      ;;79$: .ASCIIZ /WITH A WORK PAK, CLEAR LOCATION 40 AND RESTART PROGRAM./<CRLF>
57 010014 012737 007014 001374      MOV      #START,CNTLC      ;'CONTROL C' ADDRESS
58 010022 004737 025576      JSR      PC,$TKINT      ;TURN ON THE KEYBOARD INTERRUPT
59
60 010026 105737 001150      TSTB      $AUTOB      ;RUNNING AUTO MODE ?
61 010032 001010      BNE      5$      ;BR IF YES
62 010034 004737 045516      JSR      PC,BUSADR      ;CHECK THE RH/RM ADDRESS
63 010040 013737 001274 030034      MOV      $RMADR,RMADR      ;RH/RM ADDRESS
64 010046 013737 001276 030036      MOV      $RMVEC,RMVEC      ;RH/RM VECTOR ADDRESS
65 010054      5$:
66 010054 105737 001230      TSTB      $ENV      ;RUN UNDER APT MODE?
67 010060 001422      BEQ      SETVEC      ;NO, DO NOT LOAD FROM E-TABLE
68 010062 105737 001260      TSTB      $VECT1      ;UUT INTERRUPT VECTOR
69 010066 001406      BEQ      6$      ;DO NOT CHANGE IF = 0
70 010070 113737 001260 001276      MOV      $VECT1,$RMVEC      ;NEW VALUE
71 010076 013737 001276 030036      MOV      $RMVEC,RMVEC      ;RH/RM VECTOR
72 010104 005737 001264      6$:      TST      $BASE      ;UUT BASE REGISTER ADDRESS
73 010110 001406      BEQ      SETVEC      ;DO NOT CHANGE IF = 0
74 010112 013737 001264 001274      MOV      $BASE,$RMADR      ;NEW BASE ADDRESS
75 010120 013737 001274 030034      MOV      $RMADR,RMADR      ;RH/RM ADDRESS
76
77      ;DISPLAY DRIVE STATUS AND SET UP THE OTHER UNITS THE
78      ;PROGRAM WILL USE
79
80 010126 004737 020016      SETVEC: JSR      PC,$T.CLK      ;START THE CLOCK
81 010132 004737 030052      JSR      PC,RMINIT      ;INITIALIZE THE RM DRIVER
82 010136 012737 177777 027774      MOV      #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
83 010144 005227 177777      INC      #-1      ;FIRST TIME THRU HERE ?
84 010150 001404      BEQ      1$      ;BR IF NO
85 010152 032777 000004 170774      BIT      #SW02,$SWR      ;TYPEOUT THE DRIVE STATUS TABLE ?
86 010160 001113      BNE      12$      ;BR IF NO
87 010162 012737 000340 177776 1$:      MOV      #PR7,PS      ;DON'T ALLOW RM INTERRUPT
88 010170 005037 001402      CLR      DEVMP      ;CLEAR DEVICE MAP
89 010174 005004      CLR      R4      ;DRIVE TABLE POINTER
90 010176 104401 036354      TYPE      ,UNSTAT      ;TYPE 'UNIT STATUS'
91 010202 104401 001205      2$:      TYPE      ,CRLF      ;CR-LF
92 010206 010446      MOV      R4,-(SP)      ;;SAVE R4 FOR TYPEOUT
    010210 104403      TYPOS      ;;TYPE DRIVE NUMBER
    010212 002      .BYTE      2      ;;GO TYPE--OCTAL ASCII
    010213 000      .BYTE      0      ;;TYPE 2 DIGIT(S)
93 010214 104401 036423      TYPE      ,BLNKS4      ;;SUPPRESS LEADING ZEROS
94 010220 105764 027706      TSTB      DRVSTA(R4)      ;TYPE 4 SPACES
95 010224 100416      BMI      5$      ;CHECK DRIVE'S STATUS
96 010226 001020      BNE      6$      ;BR IF UNSAFE
97
98 010230 105764 027716      TSTB      DRVTYP(R4)      ;BR IF ONLINE
99 010234 001404      BEQ      3$      ;SEE IF OFFLINE OR NONEXISTENT
100 010236 100006      BPL      4$      ;BR IF NONEXISTENT
101 010240 104401 056247      TYPE      ,NOTRM      ;BR IF OFFLINE
    ;DRIVE NOT AN RM05/3/2
```



```
102 010244 000455          BR      11$          ;CHECK NEXT DRIVE
103
104 010246 104401 036270    3$:    TYPE      ,NOTPRS      ;DRIVE NOT PRESENT
105 010252 000452          BR      11$          ;CHECK NEXT DRIVE
106
107 010254 104401 036226    4$:    TYPE      ,UNTOFF      ;DRIVE OFFLINE
108 010260 000421          BR      8$          ;PRINT DRIVE TYPE
109
110 010262 104401 036305    5$:    TYPE      ,NOTSAF      ;DRIVE UNSAFE
111 010266 000416          BR      8$          ;PRINT DRIVE TYPE
112
113 010270 005737 001412    6$:    TST      XXDP          ;LOADED FROM THIS DEVICE ?
114 010274 001406          BEQ      7$          ;BR IF NO
115 010276 123704 001412    CMPB     XXDP,R4        ;LOADED FROM THIS DRIVE ?
116 010302 001003          BNE      7$          ;BR IF NO
117 010304 104401 036315    TYPE     ,LODEV          ;DRIVE IS LOAD DEVICE
118 010310 000433          BR      11$
119
120 010312 104401 036237    7$:    TYPE     ,UNTON          ;DRIVE ONLINE
121 010316 156437 030022 001402  BISB     ATABIT(R4),DEVMP ;SET DEVICE MAP
122 010324 104401 036425    8$:    TYPE     ,BLNKS2        ;TYPE 2 SPACES
123 010330 005000          CLR      R0
124 010332 116400 027716    MOVB     DRVTP(R4),R0    ;GET DRIVE TYPE
125 010336 012737 036342 010376  MOV      #SRM03,10$    ;ASSUME ADDRESS OF RM03 MESSAGE
126 010344 122700 000004    CMPB     #4,R0          ;IS DEVICE AN RM03 ?
127 010350 001411          BEQ      9$          ;BR IF YES
128 010352 012737 036335 010376  MOV      #SRM02,10$    ;ADDRESS OF RM02 MESSAGE
129 010360 122700 000005    CMPB     #5,R0          ;IS DEVICE AN RM02 ?
130 010364 001403          BEQ      9$          ;BR IF YES
131 010366 012737 036347 010376  MOV      #SRM05,10$    ;ADDRESS OF RM05 MESSAGE
132
133 010374 104401          9$:    TYPE     ,
134 010376 000000          10$:   .WORD     0          ;MESSAGE ADDRESS HERE
135
136 010400 005204          11$:   INC      R4          ;INCREMENT DRIVE NUMBER/TABLE POINTER
137 010402 020427 000010    CMP      R4,#8.        ;FINISHED ?
138 010406 001275          BNE      2$          ;BR IF NOT
139 010410 104401 001205    12$:   TYPE     ,%CRLF        ;CR-LF
140
141 010414 105737 001150    TSTB     %AUTOB        ;RUNNING UNDER AUTO MODE ?
142 010420 001566          BEQ      M1          ;BR IF NO
143
144          ;PROGRAM IS RUNNING IN AUTO MODE - SEE IF SIZING IS ALLOWED
145 010422          XSIZE:
146 010422 132737 000200 001231  BITB     #BIT7,$ENVMP ;APT AUTO SIZING ALLOWED ?
147 010430 001162          BNE      M1          ;BR IF NO
148
149 010432 005737 001266    TST      $DEVMP        ;DEVICE MAP AVAILABLE FROM APT MAIL BOX
150 010436 001406          BEQ      1$          ;BR IF NONE
151 010440 013737 001266 001402  MOV      $DEVMP,DEVMP    ;LOAD IT FROM MAIL BOX
152 010446 042737 177400 001402  BIC      #177400,DEVMP    ;ALLOW MAX 8 DRIVES
153 010454 005737 001402    1$:    TST      DEVMP        ;CHECK DEVICE MAP
154 010460 001002          BNE      M5FX         ;BR IF DRIVES ASSIGNED
155 010462 000137 016342    JMP      $EOP        ;OTHERWISE,EXIT
156
157 010466 012737 000000 001334 M5FX:  MOV      #0,BEGTRK    ;ALWAYS STARTS FROM 0 TRACK
158 010474 012737 000000 001330    MOV      #0,BEGCYL    ;ALWAYS STARTS FROM 0 CYLINDER
```



```

159 010502 012737 001466 001326      MOV    #822.,ENDCYL      ;LAST CYLINDER
160 010510 005037 001400              CLR    WRAP            ;SEEK FROM LO TO HI CYLINDER ADDRESS
161 010514 005037 001406              CLR    EDIT            ;DON'T ALLOW UPDATE OF BAD SECTOR FILE
162 010520 012737 177777 001320      MOV    #-1,MODE        ;SET FORMAT AND VERIFY MODE
163 010526 005737 001270              TST    $CDW1           ;APT PARAMETER = 0
164 010532 001402                    BEQ    .+6              ;YES,DEFAULT TO -1
165 010534 005037 001320              CLR    MODE            ;NO, SET TO CHECK MODE
166 010540 012737 177777 001360      MOV    #-1,SEC30       ;SET 32 SECTOR
167 010546 005737 001272              TST    $CDW2           ;APT PARAMETER =0
168 010552 001012                    BNE    1$              ;NO,30 SECTOR
169 010554 012737 020100 001352      MOV    #<258.*32.>,WC    ;COUNT OF WORDS
170 010562 012737 157700 001354      MOV    #-<258.*32.>,MWC  ;WORD COUNT
171 010570 012737 000037 001362      MOV    #31.,MAXSEC     ;MAX 32 SECTOR
172 010576 000413                    BR     2$
173
174 010600 012737 017074 001352 1$:   MOV    #<258.*30.>,WC    ;COUNT OF WORDS
175 010606 012737 160704 001354      MOV    #-<258.*30.>,MWC  ;WORD COUNT
176 010614 005037 001360              CLR    SEC30          ;30 SECTOR
177 010620 012737 000035 001362      MOV    #29.,MAXSEC     ;MAX 30 SECTOR
178 010626 005737 001320 2$:         TST    MODE            ;CHECK MODE ?
179 010632 001006                    BNE    .+16            ;NO
180 010634 012737 133331 001340      MOV    #133331,PATA    ;INITIATE PATTERN
181 010642 012737 133331 001342      MOV    #133331,PATB    ;INITIATE PATTERN
182 010650 012737 000002 001336      MOV    #2,PATSEL      ;WORSE CASE
183 010656 005001                    CLR    R1              ;START WITH DRIVE NUMBER 0
184 010660 136137 030022 001402 3$:   BITB   ATABIT(R1),DEVMP ;IS THIS DRIVE IN DEVICE MAP ?
185 010666 001005                    BNE    4$              ;BR IF YES
186 010670 005201                    INC    R1              ;INCREMENT DRIVE #
187 010672 020127 000007              CMP    R1,#7          ;ALL DONE WITH MAP ?
188 010676 003770                    BLE    3$              ;BR IF NO
189 010700 000434                    BR     7$              ;DONE !!
190
191 010702 010137 001222 001402 4$:   MOV    R1,DRIVE        ;LOAD R1 INTO DRIVE
192 010706 146137 030022 001402      BICB   ATABIT(R1),DEVMP ;CLEAR THE BIT FROM DEVICE MAP
193 010714 105761 027706              TSTB   DRVSTA(R1)      ;IS DRIVE ON LINE ?
194 010720 003757                    BLE    3$              ;BR IF NO
195 010722 005737 001412              TST    XXDP           ;LOADED FROM THIS DEVICE ?
196 010726 001403                    BEQ    5$              ;BR IF NO
197 010730 123701 001412              CMPB   XXDP,R1        ;LOADED FROM THIS DRIVE ?
198 010734 001751                    BEQ    3$              ;BR IF YES
199
200 010736 012702 000004 027716 5$:   MOV    #4,R2          ;SETUP TRACK PARAMETER FOR AN RM03/2
201 010742 122761 000007 027716      CMPB   #7,DRVTP(R1)    ;IS DEVICE AN RM05 ?
202 010750 001002                    BNE    6$              ;BR IF NO
203 010752 012702 000022              MOV    #18.,R2        ;SETUP TRACK PARAMETER FOR AN RM05
204 010756 010237 001324 6$:         MOV    R2,LSTRK        ;SETUP LAST TRACK AND
205 010762 010237 001332              MOV    R2,ENDTRK      ;END TRACK FOR AUTO MODE.
206 010766 000137 012146              JMP     M5            ;START TO FORMAT OR CHECK
207
208 010772 000137 016342 7$:         JMP     $EOP            ;END OF PASS FOR ALL DRIVES ON $DEVMP
209
210
211                                     ;SEE WHICH MODE THE PROGRAM IS TO BE RUN IN.
212                                     ;MODES ARE: 'FORMAT & VERIFY', 'CHECK FORMAT' OR 'VERIFY HEADER FORMAT'
213
214 010776 005037 177776 M1:         CLR    PS
215 011002 005037 001320              CLR    MODE          ;SET MODE TO 'CHECK FORMAT'

```


216	011006	104401	036636		TYPE	,MMODE	:TYPE 'PROGRAM MODE'
217	011012	104410			RDCHR		:READ THE KEYBOARD
218	011014	012637	001174		MOV	(SP)+,\$TMP0	:GET CHARACTER INPUT
219	011020	023727	001174	000015	CMP	\$TMP0,#CR	: 'CR' ENTERED (DEFAULT)
220	011026	001432			BEQ	3\$	:BR IF YES
221	011030	104401	001174		TYPE	, \$TMP0	:TYPE CHARACTER
222	011034	022737	000103	001174	CMP	#'C,\$TMP0	: 'CHECK' ?
223	011042	001413			BEQ	1\$	:BR IF YES
224	011044	022737	000106	001174	CMP	#'F,\$TMP0	: 'FORMAT' ?
225	011052	001422			BEQ	4\$	:BR IF YES
226	011054	022737	000126	001174	CMP	#'V,\$TMP0	: 'VERIFY' ONLY ?
227	011062	001406			BEQ	2\$	:BR IF YES
228	011064	104401	001204		TYPE	, \$QUES	:NO CORRECT ENTRY
229	011070	000742			BR	M1	:TRY AGAIN
230	011072	104401	036713	1\$:	TYPE	,MCHECK	:TYPE REST OF 'CHECK'
231	011076	000415			BR	5\$	:GET STARTING ADDRESS
232							
233	011100	104401	036767	2\$:	TYPE	,MVERIFY	:TYPE 'VERIFY'
234	011104	012737	000001	001320	MOV	#1,MODE	:SET VERIFY ONLY MODE
235	011112	000407			BR	5\$	
236							
237	011114	104401	036413	3\$:	TYPE	,F	:TYPE 'F'
238	011120	104401	036672	4\$:	TYPE	,MFORMAT	:TYPE 'FORMAT & VERIFY'
239	011124	012737	177777	001320	MOV	#-1,MODE	:SET MODE TO FORMAT & VERIFY
240	011132			5\$:			
241							
242							
243							
244	011132	104401	001205	M1A:	TYPE	, \$CRLF	:CR-LF
245	011136	104401	037004	1\$:	TYPE	,MSIZE	:TYPE FORMAT MODE REQUEST
246	011142	104410			RDCHR		:READ KEYBOARD
247	011144	012637	001174		MOV	(SP)+,\$TMP0	:GET CHARACTER ENTRY
248	011150	023727	001174	000015	CMP	\$TMP0,#CR	:CARRIAGE RETURN ?
249	011156	001415			BEQ	2\$	:BR IF YES
250	011160	104401	001174		TYPE	, \$TMP0	:TYPE CHARACTER
251	011164	022737	000131	001174	CMP	#'Y,\$TMP0	:IS ENTRY A 'Y' ?
252	011172	001411			BEQ	3\$	:BR IF IT IS
253	011174	022737	000116	001174	CMP	#'N,\$TMP0	:IS ENTRY A 'N' ?
254	011202	001424			BEQ	4\$	:BR IF IT IS
255	011204	104401	001204		TYPE	, \$QUES	:TYPE '?'
256	011210	000752			BR	1\$	:TRY AGAIN
257							
258	011212	104401	036417	2\$:	TYPE	,Y	:TYPE 'Y'
259	011216	104401	037132	3\$:	TYPE	,MSEC32	:TYPEOUT MODE SELECTED
260	011222	012737	177777	001360	MOV	#-1,SEC30	:32 SECTOR INDICATOR
261	011230	012737	020100	001352	MOV	#<258.*32>.,WC	:TRACK SIZE IN 32 SECTOR MODE
262	011236	012737	157700	001354	MOV	#-<258.*32>.,MWC	:2'S COMPLEMENT WORD COUNT
263	011244	012737	000037	001362	MOV	#31.,MAXSEC	:MAX SECTOR ADDRESS IN 32 SECTOR MODE
264	011252	000415			BR	5\$	:CONTINUE
265							
266	011254	104401	037053	4\$:	TYPE	,MSEC30	:TYPE OUT 30 SECTOR MODE SELECTED
267	011260	005037	001360		CLR	SEC30	:30 SECTOR INDICATOR
268	011264	012737	017074	001352	MOV	#<258.*30>.,WC	:TRACK SIZE IN 30 SECTOR MODE
269	011272	012737	160704	001354	MOV	#-<258.*30>.,MWC	:2'S COMPLEMENT WORD COUNT
270	011300	012737	000035	001362	MOV	#29.,MAXSEC	:MAX SECTOR ADDRESS IN 30 SECTOR MODE
271	011306			5\$:			
272							

```
273 011306 012737 000000 001334 M1B: MOV #0,BEGTRK ;CLEAR STARTING TRACK ADDRESS
274 011314 012737 000000 001330 MOV #0,BEGCYL ;CLEAR BEGINNING CYLINDER ADDRESS
275 011322 005037 001400 CLR WRAP ;SEEK FROM LO TO HI CYLINDER ADDRESS
276 011326 012737 000002 001336 MOV #2,PATSEL ;SETUP FOR WORST CASE PATTERN
277 011334 112737 177777 005540 MOVB #-1,FMTDPB ;SETUP INVALID DRIVE NUMBER
278
279 ;GO FIND OUT WHAT DRIVE
280
281 011342 012737 020262 001374 M0: MOV #C.ENTR,CNTLC ;CONTROL C ABORT ENTRANCE
282 011350 004737 025576 JSR PC,$TKINT ;INITIALIZE THE TTY KEYBOARD
283 011354 005037 001126 CLR $ERTTL ;CLEAR THE ERROR ACCUMULATOR
284 011360 104401 036372 TYPE ,MUNIT ;ASK FOR DRIVE NUMBER
285 011364 104410 RDCHR ;READ THE KEYBOARD
286 011366 012637 001174 MOV (SP)+,$TMP0 ;GET CHARACTER TYPED
287 011372 023727 001174 000015 CMP $TMP0,#CR ;CARRIAGE RETURN ?
288 011400 001420 BEQ 1$ ;BR IF YES
289 011402 023727 001174 000056 CMP $TMP0,#'. ;PERIOD ?
290 011410 001414 BEQ 1$ ;BR IF YES
291 011412 104401 001174 TYPE , $TMP0 ;TYPE CHARACTER
292 011416 012701 001174 MOV # $TMP0,R1 ;GET ADDRESS OF ENTRY
293 011422 004537 023410 JSR R5,CK.CHR ;CHECK ONE CHARACTER
    011426 011452 2$ ;ILLEGAL CHARACTER
    011430 011442 1$ ;CARRIAGE RETURN
    011432 011452 2$ ;
    011434 011442 1$ ;
    011436 011460 3$ ;DIGIT 0-7
    011440 011452 2$ ;DIGIT 8-9
294 011442 005002 1$: CLR R2 ;SELECT DRIVE ZERO
295 011444 104401 036403 TYPE ,ZERO ;TYPE UNIT NUMBER 0
296 011450 000403 BR 3$ ;GO SEE IF DRIVE ZERO IS THERE
297
298 011452 104401 001204 2$: TYPE , $QUES ;TYPE '?'
299 011456 000731 BR M0 ;ASK FOR DRIVE NUMBER AGAIN
300 011460 010237 001222 3$: MOV R2,DRIVE ;SAVE DRIVE NUMBER
301
302 011464 005737 001412 TST XXDP ;LOADED FROM THIS DEVICE ?
303 011470 001406 BEQ 4$ ;BR IF NO
304 011472 123702 001412 CMPB XXDP,R2 ;WAS THIS THE DRIVE ?
305 011476 001003 BNE 4$ ;BR IF NO
306 011500 104401 036574 TYPE ,MLODEV ;DRIVE IS LOAD DEVICE
307 011504 000716 BR M0
308
309 011506 004737 020016 4$: JSR PC,ST.CLK ;START THE CLOCK
310 011512 004737 030052 JSR PC,RMINIT ;GO SEE WHAT DRIVES ARE AVAILABLE
311 011516 012737 177777 027774 MOV #-1,SAVEFG ;SAVE THE REGISTERS
312 011524 012737 177777 027776 MOV #-1,SEEKFG ;SET 'NO OPTIMIZATION' FLAG
313 011532 005037 177776 CLR PS ;PRIORITY = 0
314 011536 105762 027706 TSTB DRVSTA(R2) ;LOOK AT DRIVE STATUS
315 011542 003015 BGT 7$ ;BR IF ONLINE
316 011544 001403 BEQ 5$ ;BR IF DRIVE NOT AVAILABLE
317 011546 104401 036554 TYPE ,MUSDR ;'DRIVE UNSAFE'
318 011552 000673 BR M0 ;GO GET DRIVE NUMBER AGAIN
319
320 011554 105762 027716 5$: TSTB DRVSTP(R2) ;A DRIVE PRESENT?
321 011560 001003 BNE 6$ ;BR IF SO
322 011562 104401 036500 TYPE ,MDRNP ;TYPE 'DRIVE NOT PRESENT'
323 011566 000665 BR M0 ;GO GET DRIVE NUMBER AGAIN
```



```
324
325 011570 104401 036525      6$:  TYPE      ,MER11      ;'DRIVE NOT AVAILABLE'
326 011574 000662              BR      MO      ;GO GET DRIVE NUMBER AGAIN
327
328 011576 113737 001222 005540 7$:  MOV      DRIVE,FMTDPB ;SETUP DRIVE ADDRESS
329 011604 012737 000000 001330      MOV      #0,BEGCYL ;CLEAR STARTING CYLINDER ADDRESS
330 011612 012737 001466 001326      MOV      #822.,ENDCYL ;SETUP END CYLINDER
331 011620 012737 000000 001334      MOV      #0,BEGTRK ;CLEAR STARTING TRACK ADDRESS
332 011626 012700 000004              MOV      #4,R0 ;GET LAST TRACK FOR AN RM03/2
333 011632 122762 000007 027716      CMP      #7,DRVTP(R2) ;IS DEVICE AN RM05 ?
334 011640 001002              BNE      8$ ;BR IF NO
335 011642 012700 000022              MOV      #18.,R0 ;GET LAST TRACK FOR AN RM05
336 011646 010037 001324      8$:  MOV      R0,LSTRK ;SETUP LAST TRACK AND
337 011652 010037 001332              MOV      R0,ENDTRK ;END TRACK PARAMETERS
338 011656 005200              INC      R0 ;ADJUST TRACK LIMIT
339 011660 012701 000010              MOV      #10,R1 ;GET TRACK OFFSET IN PARAMETER TABLES
342 011664 010061 005650              MOV      R0,TABLE(R1) ;SETUP TRACK PARAMETER LIMITS IN "TABLE"
      011670 010061 005702              MOV      R0,TABLE2(R1) ;SETUP TRACK PARAMETER LIMITS IN "TABLE2"
      011674 010061 005726              MOV      R0,TABLE3(R1) ;SETUP TRACK PARAMETER LIMITS IN "TABLE3"
      011700 010061 005752              MOV      R0,TABLE4(R1) ;SETUP TRACK PARAMETER LIMITS IN "TABLE4"
343 011704 062701 000014              ADD      #14,R1 ;GET OFFSET FOR ENDTRK LIMIT IN "TABLE"
344 011710 010061 005650              MOV      R0,TABLE(R1) ;SETUP TRACK PARAMETER LIMIT
345 011714 104401 001205              TYPE      ,$CRLF ;CR-LF
346
347 ;GET ADDRESS LIMITS
348
349 011720 104401 036430      M2:  TYPE      ,ENTADR      ;'ENTER ADDRESS LIMITS'
350 011724 004437 020454              JSR      R4,PARENT ;ENTER THE ADDRESS LIMITS
351 011730 005650              TABLE ;TABLE PARAMETERS
352 011732 005037 001400              CLR      WRAP ;SEEK FROM LO TO HI CYLINDER ADDRESS
353 011736 023737 001326 001330      CMP      ENDCYL,BEGCYL ;SEE IF ENDING CYL EQ TO GT THAN BEGINNING
354 011744 001402              BEQ      1$ ;BR IF ON THE SAME CYLINDER
355 011746 103410              BLO      3$ ;BR IF LESS
356 011750 000413              BR      M4 ;TO CHECK DRIVE
357
358 011752 023737 001332 001334 1$:  CMP      ENDTRK,BEGTRK ;SEE IF ENDING TRACK EQ OR GT THAN BEGINNING
359 011760 103007              BHIS     M4 ;BR IF YES
360 011762 104401 037230      2$:  TYPE      ,MADRER ;INVALID ADDRESS ENTERED
361 011766 000754              BR      M2 ;TRY AGAIN
362
363 011770 012737 177777 001400 3$:  MOV      #-1,WRAP ;ALLOW SEEK FROM HI TO LO CYLINDER ADDRESS
364 011776 000400              BR      M4
365
366 ;GO GET DATA PATTERN FOR FORMAT
367
368 012000 005737 001320      M4:  TST      MODE ;IS IT CHECK MODE ?
369 012004 003060              BGT      M5 ;NO, VERIFY ONLY MODE
370 012006 001007              BNE      M4A ;NO, FORMAT & VERIFY MODE
371 012010 012737 133331 001340      MOV      #133331,PATA ;CHECK MODE USE WORST CASE DATA
372 012016 012737 133331 001342      MOV      #133331,PATB ;INITIAL THE DATA PATTERN -SHIFT 3 BITS
373 012024 000450              BR      M5 ;START TO FORMAT AND CHECK
374
375 012026 104401 037331      M4A: TYPE      ,MSELP ;GO TYPE 'SELECT PATTERN'
376 012032 104410              RDCHR ;READ THE KEYBOARD
377 012034 012637 001174              MOV      (SP)+,$TMP0 ;CHARCTER ENTRY
378 012040 023727 001174 000015      CMP      $TMP0,#CR ;CARRIAGE RETURN ?
379 012046 001420              BEQ      1$ ;BR IF YES
```

Line	Address	Hex	Label	Operation	Comment
380	012050	023727	001174	000056	CMP \$TMPO,#' :
381	012056	001414			PERIOD ?
382	012060	104401	001174		BEQ 1\$:BR IF YES
383	012064	012701	001174		TYPE , \$TMPO :
384	012070	004537	023410		TYPE CHARACTER
	012074	012130			MOV # \$TMPO,R1' :
	012076	012110			ENTRY ADDRESS
	012100	012130			JSR R5,CK.CHR :
	012102	012110			CHECK ONE CHARACTER
	012104	012122			3\$:
	012106	012130			1\$:
385	012110	104401	036421	1\$:	ILLEGAL CHARACTER
386	012114	012702	000002		3\$:
387	012120	000406			1\$:
388					2\$:
389	012122	020227	000002	2\$:	3\$:
390	012126	101403			4\$:
391	012130	104401	001204	3\$:	
392	012134	000721			
393					
394	012136	104401	001205	4\$:	
395	012142	010237	001336		
396					


```
1      .SBTTL  START OF FORMAT
2
3      ;GO TYPE 'STARTING FORMAT ON DRIVE N'
4      012146      012737      020302      000060      M5:      MOV      #0.ENTR,@#TKVEC ;VECTOR FOR CONTROL-0
5      012146      012737      020302      000060      CLR      PS ;PRIORITY = 0
6      012154      005037      177776
7
8      012160      005037      001406      CLR      EDIT ;DON'T ALLOW UPDATE OF BAD SECTOR FILE
9      012164      005737      001320      TST      MODE ;'FORMAT', 'CHECK' OR VERIFY MODE ?
10     012170      003017      BGT      3$ ;BR IF 'VERIFY ONLY' MODE
11     012172      001403      BEQ      1$ ;BP IF 'CHECK' MODE
12     012174      104401      037452      TYPE     ,MSFOR ;TYPE 'STARTING FORMAT ON DRIVE N'
13     012200      000402      BR      2$
14
15     012202      104401      037505      1$:      TYPE     ,MSCHK ;TYPE 'STARTING CHECK ON DRIVE N'
16     012206      012206      013746      001222      2$:      MOV      DRIVE,-(SP) ;;SAVE DRIVE FOR TYPEOUT
17     012212      104403      TYPOS     ;TYPE DRIVE NUMBER
18     012214      001      .BYTE      1 ;GO TYPE--OCTAL ASCII
19     012215      000      .BYTE      0 ;TYPE 1 DIGIT(S)
20
21     012216      104401      001205      TYPE     ,$CRLF ;SUPPRESS LEADING ZEROS
22     012222      012737      177777      001406      MOV      #-1,EDIT ;CR-LF
23     012230      3$:      ;UPDATE BAD SECTOR FILE AT END OF PASS
24
25     ;THIS CODE RETRIEVES THE BAD SPOT FILE FROM THE PACK (IF FORMATTED PACK)
26     ;SET UP DPB BLOCK READ CYL 822., LAST TRACK.
27
28     012230      005037      001344      RETBAD:  CLR      RETRY ;CLEAR THE RETRY FLAG
29     012234      012737      177777      001404      MOV      #-1,PACK ;RESET THE MFG AVAILABLE FLAG
30     012242      013737      001222      005540      MOV      DRIVE,FMTDPB ;LOAD DRIVE #
31     012250      012737      001466      005552      MOV      #822.,FMTDPB+12 ;CYL 822
32     012256      113737      001324      005551      MOV      LSTRK,FMTDPB+11 ;LAST TRACK
33     012264      105037      005550      CLRB     FMTDPB+10 ;SECTOR 0
34     012270      012737      045774      005546      MOV      #BUFP,FMTDPB+6 ;BUFFER ADDRESS
35     012276      012737      157700      005544      MOV      #-<32.*258.>,FMTDPB+4 ;WORD COUNT FULL TRACK INCLUDING HEAD
36     012304      112737      000020      005541      MOV      #20,FMTDPB+1 ;FMT SET
37     012312      112737      000143      005542      MOV      #SETFMT,FMTDPB+2 ;SET 16 BIT MODE
38     012320      004037      030622      1$:      JSR      R0,RM05 ;SET THE FORMAT BIT
39     012324      005540      FMTDPB
40     012326      000774      BR      1$
41     012330      005737      005556      2$:      TST      FMTDPB+16 ;THE COMMAND IS DONE ?
42     012334      001775      BEQ      2$ ;BR IF NOT
43
44     012336      012737      012336      001124      MOV      #.,$LPERR ;LOOP ON ERROR ADDRESS
45     012344      012706      001100      MOV      #STACK,SP ;RESET STACK POINT
46     012350      112737      000173      005542      MOV      #RDHD,FMTDPB+2 ;RELOAD THE READ HEAD AND DATA COMMAND
47     012356      004037      030622      3$:      JSR      R0,RM05 ;READ THE LAST TRACK
48     012362      005540      FMTDPB
49     012364      000774      BR      3$ ;BR IF QUEUE FAIL
50     012366      005737      005556      4$:      TST      FMTDPB+16 ;ALL DONE
51     012372      001775      BEQ      4$ ;BR IF NOT
52     012374      100007      BPL      6$ ;BR IF NO ERROR
53
54     ;      ESCAPE  5$
55     ;      JSR      PC,ERINDX ;SEE WHICH ERROR
56     ;      ERROR  10
```

```
53      :      ERROR      11
54      :      ERROR      12
55      :      ERROR      13
56      :      ERROR      14
57      :      ERROR      21
58      :5$: JSR      PC,LOP.CK      ;CHECK LOOP ON ERROR
59 012376 022737 000003 001344      CMP      #3,RETRY      ;DONT' TRY OVER 3 TIMES
60 012404 103451      BLO      8$      ;
61 012406 005237 001344      INC      RETRY
62 012412 000761      BR      3$      ;TRY AGAIN
63
64 012414 005037 001176      6$: CLR      $ESCAPE      ;
65 012420 005037 001344      CLR      RETRY
66 012424 005737 005556      TST      FMTDPB+16      ;ANY ERROR ?
67 012430 100437      BMI      8$      ;BR IF ANY
68 012432 022737 151466 045774      CMP      #151466,BUFP      ;ON THE LAST CYLINDER ?
69 012440 001033      BNE      8$      ;BR IF NOT
70 012442 013700 001324      MOV      LSTRK,R0      ;GET LAST TRACK
71 012446 000300      SWAB      R0      ;MOVE TRACK TO HI BYTE AND SECTOR TO LO BYTE
72 012450 020037 045776      CMP      R0,BUFP+2      ;ON LAST TRACK AND SECTOR 0
73 012454 001025      BNE      8$      ;BR IF NOT
74 012456 005737 046000      TST      BUFP+4      ;SERIAL NUMBER SHOULD NOT 0
75 012462 001003      BNE      7$      ;BR IF NOT 0
76 012464 005737 046002      TST      BUFP+6      ;SECOND WORD OF SERIAL NUMBER
77 012470 001417      BEQ      8$      ;BR IF ZERO
78 012472 005737 046004      7$: TST      BUFP+10      ;THE THIRD WORD MUST BE 0
79 012476 001014      BNE      8$      ;BR IF NOT
80 012500 022737 177777 046006      CMP      #-1,BUFP+12      ;AN ALIGNMENT PACK ?
81 012506 001002      BNE      .+6      ;BR IF NOT
82 012510 000137 017112      JMP      REJEC1
83 012514 005737 046006      TST      BUFP+12      ;A DATA PACK ?
84 012520 001003      BNE      8$      ;BR IF NOT IDENTIFIED
85 012522 012737 000400 001404      MOV      #400,PACK      ;SET MFG BAD SPOT FILE AVAILABLE FLAG
86 012530 000240      8$: NOP      ;DONE
87
88      ;THIS CODE INITIALIZES THE BAD16,BAD18,USTAB,USSAV TABLES
89
90 012532 012706 001100      TABINT: MOV      #STACK,SP      ;INITIAL STACK POINT
91 012536 005046      CLR      -(SP)      ;TERMINATOR
92 012540 012746 004430      MOV      #USSAV,-(SP)      ;USSAV TABLE ADDRESS
93 012544 012746 002420      MOV      #BAD18,-(SP)      ;MFG 18 BIT FILE ADDRESS
94 012550 012746 001414      MOV      #BAD16,-(SP)      ;MFG 16 BIT FILE ADDRESS
95 012554 012703 003424      MOV      #USTAB,R3      ;USER BAD SPOT FILE ADDRESS
96 012560 012704 000004      1$: MOV      #4,R4      ;FIRST 4 WORDS SET TO 0 TEMPERARY
97 012564 005023      2$: CLR      (R3)+
98 012566 005304      DEC      R4
99 012570 001375      BNE      2$      ;BR IF NOT DONE
100 012572 012704 000374      MOV      #252,R4      ;SET -1 TO ALL THE REST LOCATIONS
101 012576 012705 177777      MOV      #-1,R5
102 012602 010523      3$: MOV      R5,(R3)+
103 012604 005304      DEC      R4      ;DECREMENT WORD COUNT
104 012606 001375      BNE      3$      ;BR IF NOT DONE
105 012610 012603      MOV      (SP)+,R3      ;NEXT TABLE
106 012612 001362      BNE      1$      ;LOOPING BACK IF NOT TERMINATOR
107
108
109      ;THIS CODE LOADS TABLE BAD16,BAD18,USSAV, FROM PACK (IF FORMATTED PACK)
```



```
110
111 012614 005737 001404
112 012620 003451
113 012622 012702 046000
114 012626 012703 001414
115 012632 012704 000400
116 012636 012223
117 012640 005304
118 012642 001375
119 012644 012702 047004
120 012650 012703 002420
121 012654 012704 000400
122 012660 012223
123 012662 005304
124 012664 001375
125 012666 012702 061054
126 012672 005737 001360
127 012676 100402
128 012700 012702 060050
129 012704 012703 004430
130 012710 012704 000400
131 012714 012223
132 012716 005304
133 012720 001375
134 012722 062702 000004
135 012726 012703 003424
136 012732 012704 000400
137 012736 012223
138 012740 005304
139 012742 001375
140 012744 000240
141
142
143
144 012746 005737 001320
145 012752 003162
146 012754 005737 001404
147 012760 003124
148 012762 105737 001150
149 012766 001144
150
151 012770 004737 025576
152 012774 104401 001205
153 013000 104401 040022
154 013004 104401 040101
155 013010 012702 000012
156 013014 005037 001414
157 013020 005037 001416
158 013024 104411
159 013026 012601
160 013030 105711
161 013032 001471
162 013034 121127 000060
163 013040 103761
164 013042 121127 000067
165 013046 101356
166 013050 013746 001414

TABLD: TST PACK ;BAD SPOT FILE AVAILABLE FROM PACK ?
        BLE 6$ ;BR IF NOT AVAILABLE
        MOV #BUFP+4,R2 ;LOAD BAD16 TABLE FIRST
        MOV #BAD16,R3 ;TABLE ADDRESS
        MOV #256.,R4 ;WORD COUNT
1$: MOV (R2)+,(R3)+ ;LOAD THE BAD16 TABLE
    DEC R4 ;BR IF NOT DONE
    BNE 1$
    MOV #BUFP+520.,R2 ;258 X 2 + 2 X 2 + BUFP
    MOV #BAD18,R3 ;TABLE ADDRESS
    MOV #256.,R4 ;WORD COUNT
2$: MOV (R2)+,(R3)+ ;LOAD THE BAD18 TABLE
    DEC R4 ;DECREMENT WORD COUNT
    BNE 2$ ;BR IF NOT DONE
    MOV #BUFP+4+<11.*516.>,R2 ;SECTOR 11.
    TST SEC30 ;FORMAT IN 16 BIT MODE
    BMI 3$ ;BR IF IT IS
    MOV #BUFP+4+<10.*516.>,R2 ;SECTOR 10.
3$: MOV #USSAV,R3 ;LOAD THE USSAV TABLE
    MOV #256.,R4 ;WORD COUNT
4$: MOV (R2)+,(R3)+ ;
    DEC R4
    BNE 4$
    ADD #4,R2 ;ACCESSSES THE USTAB BUFFER ADD
    MOV #USTAB,R3 ;LOAD THE USTAB TABLE
    MOV #256.,R4 ;WORD COUNT
5$: MOV (R2)+,(R3)+ ;LOAD THE TABLE
    DEC R4 ;DECREMENT THE COUNT
    BNE 5$ ;BR IF NOT ALL DONE
6$: NOP ;EXIT

;THIS CODE ASK O.P TO ENTER A SERIAL NUMBER FOR UNFORMATTED PACK
SERNL: TST MODE ;VERIFY ONLY MODE ?
        BGT 6$ ;BR IF YES
        TST PACK ;BAD SPOT FILE AVAILABLE ?
        BGT 4$ ;BR IF AVAILABLE
        TSTB $AUTOB ;RUNNING UNDER AUTO MODE ?
        BNE 5$ ;BR IF YES

        JSR PC,$TKINT ;INITIALTHE KEYBOARD
        TYPE ,$CRLF ;TYPE CRLF
        TYPE ,MESG1 ;'ENTER TWO WORDS FOR SN'
1$: TYPE ,SN1
    MOV #10.,R2 ;MAXMUM 10 OCTAL DIGITS ALLOWED
    CLR BAD16 ;CLEAR THE LSW OF THE SERIAL NUMBER
    CLR BAD16+2 ;CLEAR THE MSW OF THE SERIAL NUMBER
    RDLIN ;READ IN THE STRING
    MOV (SP)+,R1 ;ADDRESS OF THE READ IN STRING
2$: TSTB (R1) ;TERMINATOR OF THE INPUT STRING
    BEQ 3$ ;BR IF IT IS
    CMPB (R1),#'0 ;LESS THAN ASCII 0 ?
    BLO 1$ ;ENTER AGAIN IF IT IS
    CMPB (R1),#'7 ;HIGH THAN ASCII 7 ?
    BHI 1$ ;ENTER AGAIN IF SO
    MOV BAD16,-(SP) ;SAVE THE LSW
```

167	013054	042737	100000	001414	BIC	#BIT15,BAD16	:CLEAR THE SIGN BIT OF LSW
168	013062	006137	001414		ROL	BAD16	:ROTATE THE LSW FIVE TIMES
169	013066	006137	001414		ROL	BAD16	:TO MOVE THE MOST SIGN DIGIT
170	013072	006137	001414		ROL	BAD16	:TO BIT 0 TO BIT 2
171	013076	006137	001414		ROL	BAD16	:
172	013102	006137	001414		ROL	BAD16	:
173	013106	042737	177770	001414	BIC	#177770,BAD16	:LEFT ON THE MS DIGIT OF THE LSW
174	013114	006337	001416		ASL	BAD16+2	:SHIFT THE MSW LEFT ONE OCTAL DIGIT
175	013120	100731			BMI	1\$	:ENTER AGAIN IF SIGN BIT SET
176	013122	006337	001416		ASL	BAD16+2	:
177	013126	100726			BMI	1\$	:
178	013130	006337	001416		ASL	BAD16+2	:
179	013134	100723			BMI	1\$	:
180	013136	063737	001414	001416	ADD	BAD16,BAD16+2	:APPENDING THE DIGITS INTO MSW
181	013144	012637	001414		MOV	(SP)+,BAD16	:RESTORE THE LSW
182	013150	006337	001414		ASL	BAD16	:SHIFT THE LSW LEFT ONE OCTAL DIGIT
183	013154	006337	001414		ASL	BAD16	:
184	013160	006337	001414		ASL	BAD16	:
185	013164	042737	100000	001414	BIC	#BIT15,BAD16	:CLEAR THE SIGN BIT
186	013172	111103			MOVB	(R1),R3	:LOAD THE CURRENT READ IN DIGITS
187	013174	042703	177770		BIC	#177770,R3	:LEFT ONLY ONE OCTAL DIGIT
188	013200	060337	001414		ADD	R3,BAD16	:APPEND THE READ IN CHARACTER TO LSW
189	013204	005201			INC	R1	:ADJUST THE READ IN STRING ADDRESS
190	013206	005302			DEC	R2	:DECREMENT ONE DIGIT COUNT
191	013210	001307			BNE	2\$	:BR IF NOT DONE
192	013212	105711			TSTB	(R1)	:IF 10 DIGITS HAVE BEEN ENTERED
193	013214	001273			BNE	1\$	:MUST BE FOLLOWED BY <CR>
194	013216	005737	001414	3\$:	TST	BAD16	:SERIAL NUMBER MUST BE NOT 0
195	013222	001003			BNE	4\$	:BR IF NOT 0
196	013224	005737	001416		TST	BAD16+2	:
197	013230	001665			BEQ	1\$	:ENTER AGAIN IF ZERO
198	013232	013737	001414	002420	MOV	BAD16,BAD18	:LOAD ALL TABLE WITH THE SERIAL NUMBER.
199	013240	013737	001414	003424	MOV	BAD16,USTAB	
200	013246	013737	001414	004430	MOV	BAD16,USSAV	
201	013254	013737	001416	003426	MOV	BAD16+2,USTAB+2	
202	013262	013737	001416	004432	MOV	BAD16+2,USSAV+2	
203	013270	013737	001416	002422	MOV	BAD16+2,BAD18+2	
204	013276	000410			BR	6\$	:EXIT
205							
206	013300	005237	004430	5\$:	INC	USSAV	:CODE FOR AUTO MODE APT,ACT,ETC.
207	013304	005237	001414		INC	BAD16	
208	013310	005237	002420		INC	BAD18	
209	013314	005237	003424		INC	USTAB	
210							
211	013320	000240		6\$:	NOP		:DONE
212							
213							:THIS CODING TO PROVIDE UTILITY ROUTINE ENTRIES
214							
215	013322	000240			CALIN: NOP		
216	013324	004737	025576		JSR	PC,\$TKINT	:INITIALIZE THE KEYBOARD
217	013330	105737	001150		TSTB	\$AUTOB	:AUTO BYTE SET ?
218	013334	001052			BNE	4\$	:IF SO, BRANCH
219	013336	005737	001270		TST	\$CDW1	:ALLOW ANY UTILITY ROUTINE ?
220	013342	001447			BEQ	4\$	:BR IF NOT
221							
222	013344	104401	040415	1\$:	TYPE	,MSGBLK	:ENTER MESSAGE BLOCK
223	013350	104401	041204	2\$:	TYPE	,MUTLTY	:TYPE UTILITY MESSAGE

224	013354	104410			RDCHR			:READ IN THE ROUTINE NUMBER
225	013356	012637	001174		MOV	(SP)+,\$TMP0		:ADDRESS OF INPUT BUFFER
226	013362	022737	000060	001174	CMP	#'0,\$TMP0		:INPUT NUMBER LESS THAN 0 ?
227	013370	101020			BHI	3\$		:BR IF SO
228	013372	122737	000064	001174	CMPB	#'4,\$TMP0		:INPUT NUMBER LARGER THAN 4 ?
229	013400	103414			BLO	3\$		:BR IF SO
230	013402	104401	001174		TYPE	,\$TMP0		:TYPE CHARACTER
231	013406	104401	001205		TYPE	,\$CRLF		:CR-LF
232	013412	013701	001174		MOV	\$TMP0,R1		:GET NUMBER
233	013416	042701	177760		BIC	#177760,R1		:LEFT OF THREE BITS
234	013422	006301			ASL	R1		:WORD INDEX
235	013424	004771	006120		JSR	PC,@TABCAL(R1)		:CALL THE DESIRED UTILITY ROUTINE
236	013430	000747			BR	2\$		:LOOP BACK TO THE SAME POINT
237	013432							
238	013432	104401	001205		TYPE	,\$CRLF		:CR-LF
239	013436	022737	000065	001174	CMP	#'5,\$TMP0		:TYPE WHOLE MESSAGE AGAIN ?
240	013444	001737			BEQ	1\$		:BR IF YES
241	013446	005037	001364		CLR	DS.CYL		:CLEAR ALL PARAMETERS
242	013452	005037	001366		CLR	DS.TRK		
243	013456	005037	001346		CLR	SAVSEC		
244	013462							
245								

```
1
2 013462
3
4
5
6
7 013462 000240
8 013464 012737 020302 000060
9 013472 005037 177776
10
11 013476 005737 001320
12 013502 001432
13 013504 002402
14 013506 000137 015550
15
16 013512 005037 001340
17 013516 005037 001342
18 013522 005737 001336
19 013526 001420
20 013530 012737 177777 001340
21 013536 012737 177777 001342
22 013544 022737 000001 001336
23 013552 001406
24 013554 012737 066666 001340
25 013562 012737 066666 001342
26 013570 013703 001352
27 013574 012700 045774
28 013600 013701 001340
29 013604 013702 001342
30 013610 010120
31 013612 010220
32 013614 005303
33 013616 005303
34 013620 001373
35
36
37
38 013622 004737 017352
39 013626 004737 017556
40
41 013632 112737 000020 005541
42 013640 005737 001360
43 013644 001002
44 013646 105037 005541
45 013652 112737 000143 005542
46 013660 004037 030622
47 013664 005540
48 013666 000774
49 013670 005737 005556
50 013674 001775
51
52
53
54 013676 023727 005552 001466
55 013704 103406
56 013706 123737 005551 001324
57 013714 103402
```

ST1:

:THIS CODE SETS UP THE SELECTED DATA PATTERN TO BE WRITTEN ON EACH
:SECTOR IMAGE

SELPAT: NOP
MOV #0.ENTR,#ATKVEC ;VECTOR FOR CONTROL-0
CLR PS ;PRIORITY = 0

1\$: TST MODE ;CHECK MODE ?
BEQ 3\$;YES
BLT 2\$;NO, FORMAT & VERIFY
JMP HDREAD ;NO, VERIFY ONLY

2\$: CLR PATA ;CLEAR DATA PATTERN A
CLR PATB ;CLEAR DATA PATTERN B
TST PATSEL ;SEE IF PATTERN OF ONES
BEQ 3\$;BR IF SO
MOV #177777,PATA ;PATA = AB
MOV #177777,PATB ;PATB=CD
CMP #1,PATSEL ;SEE IF PATTERN OF ZEROS
BEQ 3\$;BR IF SO
MOV #066666,PATA ;SET UP WORST CASE
MOV #066666,PATB ;SET UP WORST CASE

3\$: MOV WC,R3 ;SET UP COUNTER
MOV #BUFP,R0 ;SET UP MEMORY POINTER

4\$: MOV PATA,R1 ;SET UP PATTERN IN R1
MOV PATB,R2 ;SET UP PATTERN IN R2

5\$: MOV R1,(R0)+ ;MOV 1ST PAT INTO MEM
MOV R2,(R0)+ ;MOV 2ND PAT INTO MEM
DEC R3 ;KEEP COUNT
DEC R3 ;KEEP COUNT
BNE 5\$;DO IT AGAIN IF R3 NOT 0

:THIS CODE SETS UP FOR THE ACTUAL FORMAT

WTRK: JSR PC,SETTBL ;GO SET UP DRIVER TABLE
JSR PC,SETHDR ;GO INITIALIZE HEADERS IN THE SECTOR BUFFER IN CORE

MOVB #20,FMTDPB+1 ;LOAD FMT16 BIT
TST SEC30 ;18 BIT MODE ?
BNE 1\$;BR IF NOT
CLRB FMTDPB+1 ;CLEAR THE FMT16 BIT

1\$: MOVB #SETFMT,FMTDPB+2 ;'LOAD FORMAT' COMMAND
2\$: JSR R0,RM05 ;START THE COMMAND
FMTDPB ;DPB ADDRESS
BR 2\$;QUEUE FULL RETURN

3\$: TST FMTDPB+16 ;LOOK FOR DONE
BEQ 3\$;LOOP UNTIL FINISHED

:SET UP SECCU TABLE: BAD SPOT ON CURRENT TRACK ,RETRIEVED FROM PACK

WTRKX: CMP FMTDPB+12,#822. ;LAST CYLINDER ?
BLO 1\$;BR IF NO
CMPB FMTDPB+11,LSTRK ;LAST TRACK OF LAST CYLINDER ?
BLO 1\$;BR IF NO


```
58 013716 000137 015536          JMP      WRTRKZ          ;DON'T DESTROY LAST TRACK ON CYL 822.
59
60 013722 012703 005434          1$:    MOV      #SECCU,R3          ;INITILIZE THE SECCU TABLE
61 013726 012704 000040          MOV      #32.,R4          ;TOTAL 32 WORD MAX
62 013732 012702 177777          MOV      #-1,R2          ;LOAD ALL LOCATION TO -1
63 013736 010223                2$:    MOV      R2,(R3)+          ;
64 013740 005304                DEC      R4
65 013742 001375                BNE      2$          ;BR IF NOT DONE
66
67                                ;LOAD THE BAD SPOT INTO SECCU TABLE IF ANY
68
69 013744 005737 001404          WRTRKY: TST      PACK          ;BAD SPOT FILE AVAILABLE AT ALL
70 013750 003461                BLE      6$          ;BR IF NOT
71 013752 005046                CLR      -(SP)          ;CLEAR UP THE DUMMY RETURN ADDRESS
72 013754 012746 003434          MOV      #USTAB+8.,-(SP) ;USER BAD SECTOR TABLE
73 013760 012702 001414          MOV      #BAD16,R2          ;R2 POINTER OF MFG BAD SPOT TABLE
74 013764 005737 001360          TST      SEC30          ;IF 18 BIT MODE CHANGE POINTER
75 013770 100402                BMI      1$          ;BR IF 16 BIT MODE
76 013772 012702 002420          MOV      #BAD18,R2
77 013776 010201                1$:    MOV      R2,R1          ;R1: LAST ADDRESS OF BAD SPOT TABLE
78 014000 062701 000776          ADD      #510.,R1
79 014004 012703 005434          MOV      #SECCU,R3          ;TABLE ADDRESS
80 014010 012704 000076          MOV      #62.,R4          ;LAST ADDRESS OF THE TABLE
81 014014 060304                ADD      R3,R4
82 014016 062702 000010          ADD      #10,R2          ;BAD SPOT STARTS FROM THE 5TH WORD OF THE FILE
83 014022 023712 005552          2$:    CMP      FMTDPB+12,(R2) ;BAD SPOT ON THIS CYLINDER ?
84 014026 001007                BNE      3$          ;BR IF NOT
85 014030 123762 005551 000003  CMPB     FMTDPB+11,3(R2) ;ALSO, ON THE SAME TRK ?
86 014036 001003                BNE      3$          ;BR IF NOT
87 014040 116205 000002          MOVB     2(R2),R5          ;BAD SECTOR
88 014044 010523                MOV      R5,(R3)+          ;WORD STORAGE
89 014046 062702 000004          3$:    ADD      #4,R2          ;ADVANCE TO NEXT SET
90 014052 020102                CMP      R1,R2          ;ALL SPOT ARE CHECKED ?
91 014054 103412                BLO      5$          ;BR IF IT IS
92 014056 020403                CMP      R4,R3          ;END OF SECCU TABLE ?
93 014060 103401                BLO      4$          ;REJECT THE PACK
94 014062 000757                BR       2$          ;LOOPING BACK
95
96 014064 004737 020160          4$:    JSR      PC,RESTR1          ;IMPROPER MFG INFORMATION
97 014070 012737 177777 001404  MOV      #-1,PACK          ;RESET MFG FILE AVAILABLE FLAG
98 014076 000137 012532          JMP      TABINT          ;AND START AGAIN
99
100 014102 011601                5$:    MOV      (SP),R1          ;NEXT TABLE
101 014104 062701 000766          ADD      #502.,R1          ;ENDING OF THE TABLE
102 014110 012602                MOV      (SP)+,R2          ;BEGINNING OF THE TABLE
103 014112 001343                BNE      2$          ;BR IF NOT DUMMY ADD
104 014114 000240                6$:    NOP
105
106                                ;THIS CODE SORTS THE BAD SECTOR TABLE "SECCU" IN ASCENDING ORDER
107                                ;AND DELETES THE DUPLICATED ONES
108
109 014116 012702 005434          SORT1: MOV      #SECCU,R2          ;TOP OF THE TABLE
110 014122 012703 005532          MOV      #SECCU+62.,R3          ;BOTTOM OF THE TABLE
111 014126 012704 000037          MOV      #31.,R4          ;TOTAL 32 ELEMENT,SORT 31 TIMES
112 014132 022712 177777          CMP      #-1,(R2)          ;IS THE TABLE EMPTY ?
113 014136 001451                BEQ      6$          ;BR IF IT IS, QUICK EXIT
114 014140 021262 000002          1$:    CMP      (R2),2(R2)          ;N TH ELEMENT : N+1 TH ELEMENT
```



```
115 014144 103430      BLO 4$      ;BR IF SMALLER
116 014146 001406      BEQ 2$      ;DELET N+1 TH ELEMENT, IF SAME
117                      ;OTHERWISE, N > N+1
118 014150 011246      MOV (R2),-(SP) ;STORE N ELEMENT
119 014152 016212 000002 MOV 2(R2),(R2) ;SWITCH N+1 ELEMENT TO N ELEMENT
120 014156 012662 000002 MOV (SP)+,2(R2) ;SWITCH N ELEMENT TO N+1 ELEMENT
121 014162 000421      BR 4$      ;ADJUST TOP POINTER
122 014164 022712 177777 2$: CMP #-1,(R2) ;TERMINATOR ?
123 014170 001416      BEQ 4$      ;BR IF IT IS
124 014172 010246      MOV R2,-(SP) ;SAVE TOP POINTER
125 014174 062702 000002 ADD #2,R2 ;DELET 2(R2)
126 014200 016222 000002 3$: MOV 2(R2),(R2)+ ;
127 014204 022702 005532 CMP #SECCU+62.,R2 ;BOTTOM OF THE TABLE ?
128 014210 101373      BHI 3$      ;BR IF NOT
129 014212 012737 177777 005532 MOV #-1,SECCU+62. ;LOAD -1 TO TABLE BOTTOM
130 014220 012602      MOV (SP)+,R2 ;RESTORE THE TOP POINTER
131 014222 005304      DEC R4 ;DECREMENT ONE ELEMENT COUNT
132 014224 001416      BEQ 6$      ;BR IF ALL DONE
133 014226 062702 000002 4$: ADD #2,R2 ;INCREMENT THE TOP POINTER
134 014232 020302      CMP R3,R2 ;REACH THE BOTTOM ?
135 014234 001341      BNE 1$      ;BR IF NOT
136 014236 005304      5$: DEC R4 ;DECREMENT ONE SORT COUNT
137 014240 001410      BEQ 6$      ;BR IF ALL DONE
138 014242 012702 005434 MOV #SECCU,R2 ;RESET TOP POINTER
139 014246 162703 000002 SUB #2,R3 ;UPDATE BOTTOM POINTER
140 014252 022703 005434 CMP #SECCU,R3 ;EXIT IF TOP = BOTTOM
141 014256 001401      BEQ 6$      ;
142 014260 000727      BR 1$      ;SORT THE REST ELEMENTS
143 014262 000240      6$: NOP ;DONE
144 014264 005037 005536 CLR NEXT ;FLAG,START OF A NEW TRACK
145
146 014270 005037 001316 WRTRK1: CLR SOFSW ;CLEAR ERROR COUNTER
147 014274 005037 001344 CLR RETRY ;ZERO THE RETRY COUNTER
148 014300 105037 005550 CLRB FMTDPB+10 ;RESTORE SECTOR
149 014304 013737 001354 005544 MOV MWC,FMTDPB+4 ;RESTORE WC
150 014312 012737 045774 005546 MOV #BUFP,FMTDPB+6 ;RESTORE BA
151
152 ;THIS CODE TO SET UP WORD COUNT AND BUFFER ADDRESS
153
154 014320 022737 177777 005536 WRTRKA: CMP #-1,NEXT ;END OF OPERATION ?
155 014326 001003      BNE 1$      ;BR IF NOT
156 014330 104401 040373 TYPE ,MHALT
157 014334 000000      HALT ;OTHERWISE SOMETHING WRONG *****
158
159 014336 113737 005536 005550 1$: MOVB NEXT,FMTDPB+10 ;STARTING SECTOR
160 014344 012701 005434 MOV #SECCU,R1 ;R1 POINTS TO THE BAD SECTOR TABLE
161 014350 022711 177777 2$: CMP #-1,(R1) ;END OF TABLE ?
162 014354 001513      BEQ WRTRKD ;BR IF IT IS
163 014356 032711 100000 BIT #BIT15,(R1) ;THE BAD SECTOR HAS ALREADY ACCESSED ?
164 014362 001403      BEQ 3$      ;BR IF NOT
165 014364 062701 000002 ADD #2,R1 ;ADJUST THE POINTER
166 014370 000767      BR 2$      ;LOOPING BACK
167 014372 123711 005550 3$: CMPB FMTDPB+10,(R1) ;BAD SPOT = STARTING SECTOR ?
168 014376 001417      BEQ WRTRKB ;BR IF IT IS
169 014400 103403      BLO 4$      ;BR IF START SEC < BAD SPOT
170 014402 104401 040373 TYPE ,MHALT
171 014406 000000      HALT ;OTHERWISE , SOMETHING WRONG
```



```
172
173 014410 111102
174 014412 023702 001362
175 014416 001463
176 014420 103471
177
178 014422 005202
179 014424 010237 005536
180 014430 052721 100000
181 014434 000432
182
183 014436 105237 005550
184 014442 052721 100000
185 014446 123711 005550
186 014452 001771
187 014454 123737 005550 001362
188 014462 101402
189
190
191
192 014464 000137 015450
193
194 014470 022711 177777
195 014474 001443
196 014476 111102
197 014500 023702 001362
198
199 014504 001430
200 014506 103436
201 014510 005202
202 014512 010237 005536
203 014516 052711 100000
204
205 014522 013702 005536
206 014526 162702 000002
207 014532 006302
208 014534 016203 006232
209 014540 113702 005550
210 014544 006302
211 014546 166203 006232
212 014552 062703 000402
213 014556 005403
214 014560 010337 005544
215 014564 000432
216
217 014566 012737 177777 005536
218 014574 052711 100000
219 014600 005302
220 014602 000405
221
222 014604 012737 177777 005536
223 014612 013702 001362
224
225 014616 006302
226 014620 016203 006232
227 014624 113702 005550
228 014630 006302

4$:  MOVB (R1),R2      ;UPDATE NEXT STARTING ADDRESS
      CMP  MAXSEC,R2    ;NEXT BAD SPOT IS THE LAST SECTOR?
      BEQ  WRTRKF        ;BR IF LAST SECTOR
      BLO  WRTRKD        ;BR IF LESS
      BLOS WRTRKD        ;BR IF IT IS
      INC  R2            ;NEXT = BAD + 1
      MOV  R2,NEXT       ;NEXT STARTING ADDRESS
      BIS  #BIT15,(R1)+  ;MARK THE ACCESSED SECTOR
      BR   WRTRKC        ;TO SET UP WORD COUNT

WRTRKB: INCB FMTDPB+10    ;INCREMENT THE STARTING SECTOR
      BIS  #BIT15,(R1)+  ;MARK THE ACCESSED SECTOR
      CMPB FMTDPB+10,(R1) ;STILL ON ANOTHER BAD SPOT ?
      BEQ  WRTRKB        ;LOOP AGAIN
      CMPB FMTDPB+10,MAXSEC ;IF START SECTOR > MAXSEC
      BLOS 1$            ;IMPROPER MFG INFORMATION
      JSR  PC,RESTRT     ;START AGAIN AND REBUILD FMG FILE
      MOV  #-1,PACK      ;RESET THE MFG FILE AVAILABLE FLAG
      JMP  TABINT        ;RESTART POINT
      JMP  HSET          ;EXIT

1$:  CMP  #-1,(R1)      ;TO SEE IF NEXT BAD SPOT IN TABLE
      BEQ  WRTRKD        ;BR IF NONE
      MOVB (R1),R2      ;UPDATE THE NEXT
      CMP  MAXSEC,R2    ;BAD SECTOR IS THE LAST SECTOR ?
      BLOS WRTRKD        ;BR IF IT IS
      BEQ  WRTRKF        ;BR IF LESS
      BLO  WRTRKD        ;BAD SEC +1
      INC  R2            ;NEXT STARTING ADDRESS
      MOV  R2,NEXT       ;NEXT STARTING ADDRESS
      BIS  #BIT15,(R1)  ;MARK THE ACCESSED SECTOR

WRTRKC: MOV  NEXT,R2     ;CALCULATE THE WORD COUNT
      SUB  #2,R2         ;ENDSECTOR = NEXT - 2
      ASL  R2            ;WORD INDEX
      MOV  WCTBL(R2),R3  ;WORD CTR FOR SECTOR 0 TO ENDING SECTOR
      MOVB FMTDPB+10,R2  ;STARTING SECTOR
      ASL  R2            ;WORD INDEX
      SUB  WCTBL(R2),R3  ;WORD COUNT FOR SECTOR 0 TO STARTING SECTOR
      ADD  #258.,R3      ;ADJUST ONE SECTOR
      NEG  R3            ;GET THE NEAGTIVE WORD COUNT
      MOV  R3,FMTDPB+4   ;LOAD THE WORD CTR INTO DPB
      BR   WRTRKE        ;LOAD THE STARTING ADDRESS

WRTRKF: MOV  #-1,NEXT    ;ALL DONE
      BIS  #BIT15,(R1)  ;MASK THE SECTOR
      DEC  R2            ;PATCH FOR THE LAST SECTOR
      BR   WRTRKH        ;PATCH

WRTRKD: MOV  #-1,NEXT    ;NO MORE BAD SPOT
      MOV  MAXSEC,R2     ;LAST SECTOR

WRTRKH: ASL  R2          ;WORD INDEX
      MOV  WCTBL(R2),R3  ;WORD CTR FOR THE ENDING SECTOR
      MOVB FMTDPB+10,R2  ;STARTING ADDRESS
      ASL  R2            ;WORD INDEX
```

```
229 014632 166203 006232          SUB    WCTBL(R2),R3      ;WORD CTR FOR THE STARTING SECTOR
230 014636 062703 000402          ADD    #258.,R3      ;ADJUST ONE SECTOR
231 014642 005403                NEG    R3          ;NEGATIVE WORD COUNT
232 014644 010337 005544          MOV    R3,FMTDPB+4      ;LOAD THE WORD COUNT INTO DPB
233 014650 000240                NOP                    ;DONE
234
235 014652 113702 005550          WRTRKE: MOVB   FMTDPB+10,R2    ;STARTING ADDRESS
236 014656 006302                ASL    R2          ;LOCATE THE BUFFER ADDRESS
237 014660 016237 006132 005546          MOV    ADRTBL(R2),FMTDPB+6    ;BUFFER ADDRESS
238
239 014666 112737 000163 005542          WRTRK2: MOVB   #WRTHD,FMTDPB+2    ;SET WRITE HEADER & DATA COMMAND IN TBL
240 014674 012737 014674 001124          MOV    #.,$LPERR      ;SET UP LOOP ON ERROR ADDRESS
241 014702 012706 001100                MOV    #STACK,SP      ;LOAD STACK POINT
242 014706 004037 030622          1$:   JSR    R0,RM05        ;GO FORMAT A TRACK
243 014712 005540                FMTDPB      ;ADRS OF PARAMETERS - TBL
244 014714 000774                BR     1$          ;WAIT FOR QUEUE IF FULL
245 014716 005737 005556          2$:   TST    FMTDPB+16      ;WAIT FOR COMMAND TO COMPLETE
246 014722 001775                BEQ     2$          ;BR IF NOT DONE
247 014724 100024                BPL     4$          ;BR IF NO ERROR
248 014726 012737 014754 001176          MOV    #3$, $ESCAPE    ;:ESCAPE TO 3$ ON ERROR
249 014734 004737 017204          JSR    PC,ERINDX      ;SEE WHICH ERROR
250 014740 104010                EMT     10
251 014742 104011                EMT     11
252 014744 104012                EMT     12
253 014746 104013                EMT     13
254 014750 104014                EMT     14
255 014752 104015                EMT     15
256 014754 004737 017304          3$:   JSR    PC,LOP.CK      ;LOOP ON THE ERROR ?
257 014760 022737 000003 001344          CMP    #3,RETRY      ;ERROR RETRY LIMIT ?
258 014766 001403                BEQ     4$          ;BR IF REACHED
259 014770 005237 001344          INC     RETRY          ;COUNT THE ERROR
260 014774 000744                BR     1$          ;TRY AGAIN
261 014776 005037 001176          4$:   CLR     $ESCAPE      ;CLEAR ERROR ESCAPE ADDRESS
262 015002 005037 001344          CLR     RETRY          ;CLEAR THE RETRY COUNTER
263
264          ;CHECK THE TRACK JUST WRITTEN
265
266 015006 112737 000153 005542          CKTRK: MOVB   #WCKHD,FMTDPB+2    ;SET WRITE CHECK HEADER & DATA COMMAND IN TBL
267 015014 012737 015014 001124          MOV    #.,$LPERR      ;SETUP LOOP ON ERROR ADDRESS
268 015022 012706 001100                MOV    #STACK,SP      ;LOAD STACK POINTER
269 015026 004037 030622          1$:   JSR    R0,RM05        ;GO CHECK THE TRACK JUST FORMATTED
270 015032 005540                FMTDPB      ;ADRS OF PARAMETERS - TBL
271 015034 000774                BR     1$          ;WAIT FOR QUEUE IF FULL
272 015036 005737 005556          2$:   TST    FMTDPB+16      ;WAIT FOR COMMAND TO COMPLETE
273 015042 001775                BEQ     2$          ;BR IF NOT DONE
274 015044 100131                BPL     9$          ;BR IF NO ERROR
275 015046 113737 005566 001346          MOVB   RM.REG+RMDA,SAVSEC    ;GET THE SECTOR ADDRESS
276 015054 001005                BNE     3$          ;BR IF NOT SECTOR 0
277 015056 013737 001362 001346          MOV    MAXSEC,SAVSEC    ;RESTORE TO LAST SECTOR +1
278 015064 005237 001346          INC     SAVSEC          ;INCREMENT TO LAST SECTOR +1
279 015070 005337 001346          3$:   DEC     SAVSEC          ;ADJUST SECTOR TO THE ONE THAT FAILED
280 015074 012737 015376 001176          MOV    #11$, $ESCAPE    ;:ESCAPE TO 11$ ON ERROR
281 015102 004737 017204          JSR    PC,ERINDX      ;SEE WHICH ERROR
282 015106 104010                EMT     10
283 015110 104011                EMT     11
284 015112 104012                EMT     12
285 015114 104013                EMT     13
```


285	015116	104014			EMT	14	
286	015120	032737	040000	005570	BIT	#WCE,RM.REG+RMCS2	;WRITE CHECK ERROR ?
287	015126	001005			BNE	4\$	;BR IF SET
288	015130	033727	005574		BIT	RM.REG+RMER1,(PC)+	;CHECK FOR DATA ERRORS
289	015134	130620			.WORD	DCK!OPI!DTE!HCRC!HCE!FER	;DATA ERROR BITS
290	015136	001001			BNE	4\$	;BR IF SET
291	015140	104016			EMT	16	
292	015142	005737	001316		4\$: TST	SOF SW	;RETRYING THE SECTOR ?
293	015146	001413			BEQ	5\$	;BR IF NOT
294	015150	012737	015422	001176	MOV	#12\$, \$ESCAPE	;ESCAPE TO 12\$ ON ERROR
295	015156	004737	020570		JSR	PC,RECORD	;RECORD THE BAD SPOT
296	015162	012737	100000	001410	MOV	#BIT15,HEADX	;RESET THE USER BIT
297	015170	004737	021416		JSR	PC,RESET	;RESET THE HEADER BITS
298	015174	104017			EMT	17	
299	015176	005037	001176		5\$: CLR	\$ESCAPE	;RESET ESCAPE ADDRESS
300	015202	032737	040000	005572	BIT	#ERR,RM.REG+RMDS	;DATA ERROR ?
301	015210	001002			BNE	6\$	;BR IF IT IS
302	015212	104024			EMT	24	
303	015214	000401			BR	7\$	;CONTINUE
304	015216				6\$: EMT	20	
	015216	104020			7\$: MOV	SAVSEC,R1	;FAILING SECTOR ADDRESS
305	015220	013701	001346		MOV	SAVSEC,FMTDPB+10	;SECTOR ADDRESS
306	015224	113737	001346	005550	MOVB	R1	;SETUP INDEX TO ADDRESS WORDS
307	015232	006301			ASL	ADRTBL(R1),FMTDPB+6	;BUFFER ADDRESS FOR FAILING SECTOR
308	015234	016137	006132	005546	MOV	MAXSEC,R1	;R1 ENDING SECTOR #
309	015242	013701	001362		MOV	NEXT	;WHOLE TRACK DONE ?
310	015246	005737	005536		TST	8\$	;BR IF IT IS
311	015252	100404			BMI	NEXT,R1	;LOAD CURRENT ENDING SECTOR
312	015254	013701	005536		MOV	#2,R1	;ADJUST TWO SECTORS
313	015260	162701	000002		SUB	R1	;WORD INDEX
314	015264	006301			8\$: ASL	WCTBL(R1),R2	;WORDCTR FOR ENDING SECTOR
315	015266	016102	006232		MOV	FMTDPB+10,R1	;STARTING ADDRESS
316	015272	113701	005550		MOVB	R1	;WORD COUNT
317	015276	006301			ASL	WCTBL(R1),R2	;WORD CTR FOR STARTING SECTOR
318	015300	166102	006232		SUB	R2	
319	015304	005402			NEG	R2,SAVWC	;SAVE THE WORD COUNT
320	015306	010237	001350		MOV	#-258.,FMTDPB+4	;WORD COUNT FOR 1 SECTOR
321	015312	012737	177376	005544	MOV	SOF SW	;INDICATE THAT A RETRY IS IN PROGRESS
322	015320	005237	001316		INC	WRTRK2	;REFORMAT ERROR SECTOR
323	015324	000137	014666		JMP	9\$: TST	;RETRY IN PROGRESS ?
324	015330	005737	001316		TST	12\$	;BR IF NOT
325	015334	001432			BEQ	#2,SOF SW	;SEE IF LAST RETRY
326	015336	022737	000002	001316	CMP	10\$	;BR IF IT IS
327	015344	001403			BEQ	SOF SW	;INCREMENT RETRY COUNT
328	015346	005237	001316		INC	1\$	;READ AGAIN
329	015352	000625			BR	10\$: CMPB	MAXSEC,FMTDPB+10 ;SEE IF LAST SECTOR ON THE TRACK
330	015354	123737	001362	005550	CMPB	12\$	;BR IF IT IS
331	015362	001417			BEQ	PC,SCAWC	;SETUP TO CHECK REMAINING SECTORS ON THE TRACK
332	015364	004737	017530		JSR	SOF SW	;CLEAR RETRY COUNTER
333	015370	005037	001316		CLR	1\$	;FINISH CHECKING THE TRACK
334	015374	000614			BR	PC,LOP.CK	;CHECK FOR LOOP ON ERROR
335	015376	004737	017304		JSR	#3,RETRY	;ERROR RETRY REACHED ?
336	015402	022737	000003	001344	CMP	12\$	;BR IF IT IS
337	015410	001404			BEQ	RETRY	;COUNT THE RETRY
338	015412	005237	001344		INC	1\$	;DO THE WRITE CHECK AGAIN
339	015416	000137	015026		JMP	\$ESCAPE	;CLEAR THE ERROR RETURN ESCAPE ADDRESS
340	015422	005037	001176		12\$: CLR		

```
341 015426 005037 001344 CLR RETRY ;CLEAR THE RETRY COUNTER
342 015432 005037 001316 CLR SOFSW ;CLEAR THE SOFTWARE RETRY COUNT
343 015436 005737 005536 TST NEXT ;WHOLE TRACK DONE ?
344 015442 100402 BMI .+6 ;BR IF IT IS
345 015444 000137 014320 JMP WTRKA
346
347 015450 032777 000002 163476 HSET: BIT #BIT1, @SWR ;LOOP ON CURRENT TRACK ?
348 015456 001402 BEQ 1$ ;BR IF NOT
349 015460 000137 013676 JMP WTRKX ;START AGAIN ON THE SAME TRACK
350 ;RESET THE HEADER WORD OF ALL MFG
351 ;DEFINED BAD SECTOR
352 015464 012737 040000 001410 1$: MOV #BIT14, HEADX ;RESET THE MFG BIT OF THE 1ST HEADER WORD
353 015472 012704 005434 MOV #SECCU, R4 ;TABLE FOR BAD SECTOR ON CURRENT TRACK
354 015476 022714 177777 2$: CMP #-1, (R4) ;END OF TABLE ?
355 015502 001414 BEQ 4$ ;BR IF SO
356 015504 032714 040000 BIT #BIT14, (R4) ;HAS THE SECTOR BE ASSCESSED ?
357 015510 001006 BNE 3$ ;BR IF SO
358 015512 052714 040000 BIS #BIT14, (R4) ;MASK THE SECTOR TABLE
359 015516 111437 001346 MOVB (R4), SAVSEC ;SECTOR ADDRESS
360 015522 004737 021416 JSR PC, RESET ;RESET THE HEADER
361 015526 062704 000002 3$: ADD #2, R4 ;INCREMENT THE TABLE POINTER
362 015532 000761 BR 2$ ;LOOPING BACK
363 015534 000240 4$: NOP ;ALL DONE
364
365 015536 004737 017426 WTRKZ: JSR PC, TRKTST ;GET UPDATED TRACK AND CYLINDER ADDRESSES
366 015542 000402 BR HDREAD ;RETURN HERE IF DONE
367 ;AND DO QUICK CHECK OF DISK
368 015544 000137 013676 JMP WTRKX ;CONTINUE WITH THE FORMAT
369
370 ;THIS CODE MAKES SURE EACH CYLINDER FORMATTED CONTAINS THE
371 ;PROPER CYLINDER ADDRESS. THE PROGRAM IS LOOKING FOR
372 ;POSSIBLE POSITIONER ERRORS THAT MAY HAVE OCCURRED DURING THE FORMAT.
373
374 015550 005737 001320 HDREAD: TST MODE ;CHECK MODE ?
375 015554 001022 BNE 1$ ;NO
376 015556 022737 066666 001340 CMP #066666, PATA ;PATTERN HAS BEEN ROTATED TO WORST CASE ?
377 015564 001002 BNE .+6
378 015566 000137 016342 JMP $EOP ;EXIT
379
380 015572 000241 CLC ;CLEAR THE CARRY BIT
381 015574 006037 001340 ROR PATA ;ROTATE PATTERN
382 015600 103003 BCC .+10 ;SET SIGN BIT IF CARRY=1
383 015602 052737 100000 001340 BIS #BIT15, PATA ;FROM BIT 0
384 015610 013737 001340 001342 MOV PATA, PATB ;SET BOTH PATTERN
385 015616 000137 013462 JMP ST1 ;CONTINUE THE VERIFY OPERATION
386
387 015622 005737 001320 1$: TST MODE ;'FORMAT', 'CHECK' OR VERIFY MODE ?
388 015626 003003 BGT 2$ ;BR IF 'VERIFY ONLY' MODE
389 015630 104401 037537 TYPE ,MSQVER ;TYPE 'STARTING QUICK VERIFICATION'
390 015634 000402 BR 3$
391 015636 104401 037600 2$: TYPE ,MSVER ;TYPE 'STARTING VERIFICATION'
392 015642 013746 001222 3$: MOV DRIVE, -(SP) ;SAVE DRIVE FOR TYPEOUT
;TYPE DRIVE NUMBER
;GO TYPE--OCTAL ASCII
;TYPE 1 DIGIT(S)
;SUPPRESS LEADING ZEROS
015646 104403 TYPOS
015650 001 .BYTE 1
015651 000 .BYTE 0
```


393	015652	104401	001205		TYPE	,\$CRLF	:CR-LF
394	015656	005037	001356		CLR	HEDERR	:CLEAR HEADER CHECK ERROR INDICATOR
395	015662	004737	017352		JSR	PC,SETTBL	:GO SET UP DRIVER TABLE
396	015666	004737	017556		JSR	PC,SETHDR	:GO SET UP HEADERS IN CORE
397	015672	012700	045774	4\$:	MOV	#BUFP,R0	:GET STARTING ADDRESS OF EXPECTED HEADERS
398	015676	012701	106174		MOV	#BUFV,R1	:GET STARTING ADDRESS OF RECIEVED HEADERS
399	015702	010137	005546		MOV	R1,FMTDPB+6	:SET UP BUFFER ADDRESS
400	015706	112737	000173	005542	MOVB	#RDHD,FMTDPB+2	:SET UP-READ HEADER & DATA COMMAND
401	015714	013737	001354	005544	MOV	MWC,FMTDPB+4	:SETUP WORD FOR VERIFY ONLY MODE
402	015722	005037	001322		CLR	SNGSEC	:SETUP MULTI-SECTOR READ FLAG
403	015726	005737	001320		TST	MODE	:VERIFY MODE ONLY ?
404	015732	003005			BGT	6\$	:BR IF YES
405	015734	012737	177776	005544	MOV	#-2,FMTDPB+4	:SETUP WORD COUNT FOR QUICK VERIFY
406	015742	005237	001322		INC	SNGSEC	:SETUP SINGLE SECTOR READ
407							
408	015746	012737	015746	001124	MOV	#,\$LPERR	:SETUP LOOP ON ERROR ADDRESS
409	015754	004037	030622		JSR	R0,RM05	:GO READ HEADER
410	015760	005540			FMTDPB		:ADRS OF PARAMETER TBL
411	015762	000774			BR	7\$	:WAIT IF QUEUE IS FULL
412	015764	005737	005556	8\$:	TST	FMTDPB+16	:WAIT FOR COMMAND TO COMPLETE
413	015770	001775			BEQ	8\$	:BR IF NOT DONE
414	015772	100044			BPL	11\$	:BR IF NOT ERROR
415							
416	015774	012737	016170	001176	MOV	#13\$,\$ESCAPE	:ESCAPE TO 13\$ ON ERROR
417	016002	004737	017204		JSR	PC,ERINDX	:SEE WHICH ERROR
418	016006	104010			EMT	10	:DRIVE OFFLINE
419	016010	104011			EMT	11	:PERSISTENT DRIVE UNSAFE ERROR
420	016012	104012			EMT	12	:UNCORRECTABLE MASSBUS PARITY ERROR
421	016014	104013			EMT	13	:SOFTWARE TIMEOUT
422	016016	104014			EMT	14	:DRIVE UNSAFE ERROR
423							
424	016020	032737	040000	005572	BIT	#ERR,RM.REG+12	:ANY DRIVE ERRORS ?
425	016026	001426			BEQ	11\$	:BR IF NO
426	016030	022737	000200	005574	CMP	#HCE,RM.REG+14	:IS IT A HEADER COMPARE ERROR ?
427	016036	001411			BEQ	9\$	:BR IF YES
428	016040	032737	000400	005574	BIT	#HCRC,RM.REG+14	:IS IT A HEADER CRC ERROR ?
429	016046	001005			BNE	9\$	:BR IF YES
430	016050	022737	100000	005622	CMP	#BSE,RM.REG+42	:BAD SECTOR ERROR ?
431	016056	001406			BEQ	10\$	:BR IF YES
432	016060	104021			EMT	21	
433	016062	005037	001176	9\$:	CLR	\$ESCAPE	:CLEAR THE ERROR ESCAPE ADDRESS
434	016066	104022			EMT	22	
435	016070	004737	017304		JSR	PC,LOP.CK	:CHECK FOR LOOP ON ERROR
436							
437	016074	000240		10\$:	NOP		
438	016076	005737	001322		TST	SNGSEC	:ALREADY READING SINGLE SECTORS ?
439	016102	001714			BEQ	5\$	:BR IF NO
440	016104	052711	140000	11\$:	BIS	#MF!UF,(R1)	:SET MFG AND USER SECTOR GOOD BITS
441	016110	011037	045770		MOV	(R0),RBUF+4	:GET EXPECTED CYLINDER HEADER
442	016114	011137	045764		MOV	(R1),RBUF	:GET RECIEVED CYLINDER HEADER
443	016120	023737	045764	045770	CMP	RBUF,RBUF+4	:SEE IF CYL READ EQUALS CYL EXPECTED
444	016126	001402			BEQ	12\$	:BR IF CYL CORRECT
445	016130	104023			EMT	23	
446	016132	000416			BR	13\$	
447							
448	016134	005737	001320	12\$:	TST	MODE	:VERIFY ONLY MODE ?
449	016140	003451			BLE	17\$	:BR IF NO

```
450 016142 016037 000002 045772      MOV      2(R0),RBUF+6      ;GET EXPECTED TRACK/SECTOR HEADER
451 016150 016137 000002 045766      MOV      2(R1),RBUF+2      ;GET RECIEVED TRACK/SECTOR HEADER
452 016156 023737 045766 045772      CMP      RBUF+2,RBUF+6    ;IS TRACK AND SECTOR CORRECT ?
453 016164 001405                      BEQ      15$              ;BR IF YES
454 016166 104007                      EMT      7
455
456 016170 004737 017304              13$: JSR      PC,LOP.CK      ;CHECK FOR LOOP ON ERROR
457 016174 000137 016342              14$: JMP      $EOP          ;END OF VERIFY
458
459 016200 000240                      15$: NOP
460 016202 123737 005550 ,001362      CMPB     FMTDPB+10,MAXSEC ;DONE WITH ALL SECTORS ?
461 016210 001412                      BEQ      16$              ;BR IF YES
462 016212 105237 005550              INCB     FMTDPB+10      ;UPDATE SECTOR ADDRESS
463 016216 062700 001004              ADD      #516.,R0      ;ADJUST POINTER TO NEXT EXPECTED HEADER
464 016222 005737 001322              TST      SNGSEC        ;READING ONE SECTOR AT A TIME ?
465 016226 001252                      BNE      7$              ;BR IF YES
466 016230 062701 001004              ADD      #516.,R1      ;ADJUST POINTER TO NEXT RECIEVED HEADER
467 016234 000723                      BR       11$              ;GO COMPARE NEXT SECTOR
468 016236 105037 005550              16$: CLRB     FMTDPB+10      ;START AT SECTOR 0
469 016242 105237 005551              INCB     FMTDPB+11      ;INCREMENT TRACK NUMBER
470 016246 123737 005551 001332      CMPB     FMTDPB+11,ENDTRK ;WAS IT LAST TRACK ?
471 016254 101003                      BHI      17$              ;BR IF YES
472 016256 004737 017756              JSR      PC,UPDTRK      ;UPDATE TRACK ADDRESS IN BUFFER
473 016262 000603                      BR       4$              ;GO READ NEXT TRACK
474
475 016264 113737 001334 005551 17$: MOVB     BEGTRK,FMTDPB+11 ;GET BEGINNING TRACK ADDRESS
476 016272 005737 001400              TST      WRAP          ;SEEKING FROM HI TO LO CYLINDERS ?
477 016276 001407                      BEQ      18$              ;BR IF NO
478 016300 005337 005552              DEC      FMTDPB+12      ;DECREMENT CYLINDER ADDRESS
479 016304 023737 005552 001326      CMP      FMTDPB+12,ENDCYL ;DONE WITH VERIFY ?
480 016312 002730                      BLT      14$              ;BR IF YES
481 016314 000406                      BR       19$
482 016316 005237 005552              18$: INC      FMTDPB+12      ;INCREMENT CYLINDER ADDRESS BEING CHECKED
483 016322 023737 005552 001326      CMP      FMTDPB+12,ENDCYL ;DONE WITH VERIFY ?
484 016330 101321                      BHI      14$              ;BR IF YES
485 016332 004737 017644              19$: JSR      PC,UPDCYL      ;UPDATE CYLINDER ADDRESS IN BUFFER
486 016336 000137 015672              JMP      4$              ;GO READ NEXT CYLINDER
487
567
568
```

.SBTTL END OF PASS ROUTINE

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

```
016342
016342 005737 001406      $EOP:
016346 001537            1$: TST      EDIT          ;UPDATE LAST TRACK ?
016350 005037 001344      BEQ      8$              ;BR IF NO
016354 004537 020710      CLR      RETRY        ;CLEAR RETRY COUNT
016360 003434            JSR      R5,SORT2      ;SORT THE USTAB IN ASCENDING FORM
016362 004737 021050      USTAB+8.          ;TABLE ENTRY POINT
016366 112737 000020 005541      JSR      PC,TEXT      ;SET UP THE BUFFER
016374 112737 000143 005542      MOVB     #20,FMTDPB+1 ;16 BIT MODE
016402 004037 030622      MOVB     #SETFMT,FMTDPB+2 ;SET FORMAT COMMAND
016406 005540            2$: JSR      R0,RM05      ;CALL THE DRIVER
                        FMTDPB
```



```
016410 000774
016412 005737 005556      3$: BR      2$      ;LOOP IF QUEQU FAILS
016416 001775              TST      FMTDPB+16 ;ALL DONE ?
                                BEQ      3$      ;BR IF NOT

016420 012737 001466 005552      MOV      #822.,FMTDPB+12 ;CYLINDER ADDRESS
016426 113737 001324 005551      MOV      LSTRK,FMTDPB+11 ;TRACK NUMBER
016434 105037 005550              CLRB      FMTDPB+10 ;SECTOR 0
016440 012737 157700 005544      MOV      #-<258.*32.>,FMTDPB+4 ;WORD COUNT
016446 012737 045774 005546      MOV      #BUFP,FMTDPB+6 ;BUFFER ADDRESS
016454 112737 000163 005542      MOV      #WRTHD,FMTDPB+2 ;WRITE HEAD AND DATA COMMAND
016462 000240              4$: NOP
016464 004037 030622      JSR      RO,RM05 ;CALL THE DRIVER
016470 005540              FMTDPB
016472 000773              BR      4$      ;LOOP IF QUEUE FAILS
016474 005737 005556      5$: TST      FMTDPB+16 ;ALL DONE ?
016500 001775              BEQ      5$      ;BR IF NOT
016502 100061              BPL      8$      ;EXIT IF NO ERROR

016504 012737 016532 001176      MOV      #6$, $ESCAPE ;ERROR ESCAPE ADDRESS
016512 004737 017204              JSR      PC,ERINDX ;ERROR INDICATOR RT.
016516 104010              EMT      10
016520 104011              EMT      11
016522 104012              EMT      12
016524 104013              EMT      13
016526 104014              EMT      14
016530 104015              EMT      15
016532 000240              6$: NOP
016534 005237 001344              INC
016540 022737 000003 001344      CMP      #3,RETRY ;OVER 3 TIMES ?
016546 101345              BHI      4$      ;BR IF IT IS
016550 000137 017162              JMP      REJCT3 ;WRITE THE LAST TRACK FAILS THREE TIMES
016554 122737 000037 005550      CMP      #31.,FMTDPB+10 ;LAST SECTOR ?
016562 003431              BLE      8$      ;BR IF ALL SET
016564 113737 005566 001346      MOV      RM.REG+RMDA,SAVSEC ;FOUND THE FALLING SPOT
016572 001003              BNE      7$      ;BR IF NOT 0
016574 012737 000037 001346      MOV      #31.,SAVSEC ;THE LAST SECTOR IS A BAD SECTOR
016602 113737 001346 005550      7$: MOV      SAVSEC,FMTDPB+10 ;LOAD THE NEW STARTING SECTOR
016610 113701 001346              MOV      SAVSEC,R1 ;LOAD THE WORD CTR AND BUFFER
016614 006301              ASL      R1 ;WORD INDEX
016616 016137 006132 005546      MOV      ADRTBL(R1),FMTDPB+6 ;BUFFER ADDRESS
016624 012737 157700 005544      MOV      #-<258.*32.>,FMTDPB+4 ;WORD COUNT
016632 066137 006232 005544      ADD      WCTBL(R1),FMTDPB+4 ;WORD COUNT
016640 005037 001344              CLR      RETRY ;RESET THE RETRY FLAG
016644 000706              BR      4$      ;BR BACK

016646 005737 001320      8$: TST      MODE ;FORMAT, CHECK OR VERIFY MODE
016652 003007              BGT      10$      ;BR IF VERIFY ONLY MODE
016654 001403              BEQ      9$      ;BR IF CHECK
016656 104401 037633              TYPE      ,MFCMPT ;FORMAT COMPLETE
016662 000405              BR      11$
016664 104401 037656      9$: TYPE      ,MCCMPT ;CHECK COMPLETE
016670 000402              BR      11$
016672 104401 037700      10$: TYPE      ,MVCMP ;VERIFY COMPLETE
016676 104401 037723      11$: TYPE      ,NUMERR ;TOTAL ERRORS
016702 013746 001126      MOV      $ERTTL,-(SP) ;SAVE $ERTTL FOR TYPEOUT
016706 104405              TYPDS ;GO TYPE--DECIMAL ASCII WITH SIGN
016710 005037 001126      CLR      $ERTTL ;CLEAR THE ERROR ACCUMULATOR
```

```
016714 104401 037753      TYPE      ,STARS
016720 005737 001402      1ST      DEVMP      ;ALL ASSIGNED DEVICE DONE ?
016724 001030              BNE      DONE      ;TO FORMAT NEXT DRIVE
016726 005337 001216      DEC      $PASS      ;RESTORE THE PASS COUNT
016732 000240              NOP
016734 005237 001216      12$:      INC      $PASS      ;;INCREMENT THE PASS NUMBER
016740 042737 100000 001216      BIC      #100000,$PASS      ;;DON'T ALLOW A NEG. NUMBER
016746 005327              DEC      (PC)+      ;;LOOP?
016750 000001              $EOPCT: .WORD      1
016752 003013              BGT      $DOAGN      ;;YES
016754 012737              MOV      (PC)+,@(PC)+      ;;RESTORE COUNTER
016756 000001              $ENDCT: .WORD      1
016760 016750              $EOPCT
016762 013700 000042      $GET42: MOV      @#42,R0      ;;GET MONITOR ADDRESS
016766 001405              BEQ      $DOAGN      ;;BRANCH IF NO MONITOR
016770 000005              RESET      ;;CLEAR THE WORLD
016772 004710              $ENDAD: JSR      PC,(R0)      ;;GO TO MONITOR
016774 000240              NOP      ;;SAVE ROOM
016776 000240              NOP      ;;FOR
017000 000240              NOP      ;;ACT11
017002              $DOAGN:
017002 000137              JMP      @(PC)+      ;;RETURN
017004 017006              $RTNAD: .WORD      DONE
569
570 017006 105737 001150      DONE:  TSTB     $AUTOB      ;RUNNING IN AUTO MODE ?
571 017012 001405              BEQ      13$      ;NO
572 017014 005737 001402      TST      DEVMP      ;ARE ALL DRIVES DONE ?
573 017020 001427              BEQ      16$      ;BR IF YES
574 017022 000137 010466      JMP      MSFX      ;NEXT DRIVE FROM APT DEVICE MAP
575
576 017026 032777 000001 162120 13$:  BIT      #SW0,@SWR      ;SEE IF SWR 0 SET
577 017034 001002              BNE      14$      ;BR IF SET
578 017036 000137 011342      JMP      M0      ;ASK FOR NEXT DRIVE
579
580 017042 012706 001100      14$:  MOV      #STACK,SP      ;RESET STACK POINTER
581 017046 005737 001320      TST      MODE      ;CHECK MODE ?
582 017052 001402              BEQ      15$      ;YES
583 017054 000137 013462      JMP      ST1      ;DO THE FORMAT OR CHECK AGAIN
584
585 017060 012737 133331 001340 15$:  MOV      #133331,PATA      ;INITIATE PATTERN
586 017066 012737 133331 001342      MOV      #133331,PATB      ;INITIATE PATTERN
587 017074 000137 013462      JMP      ST1      ;LOOP ON CHECK
588
589 017100 005237 001216      16$:  INC      $PASS      ;GARBAGE CODE FOR APT
590 017104 005237 001214      17$:  INC      $TESTN
591 017110 000775              BR      17$
592
593 017112 104401 001205      REJECT1: TYPE     , $CRLF
594 017116 104401 040354      TYPE     , $MSG4
595 017122 104401 040373      TYPE     , $MHALT
596 017126 000000              HALT
597 017130 000137 007020      JMP      BEGIN2
598
599 017134 104401 001205      REJECT2: TYPE     , $CRLF
600 017140 113737 005551 001366      MOV     FMTDPB+11,DS.TRK ;TRACK NUMBER FOR ERROR LOG
601 017146 104025              EMT      25
602 017150 104401 040373      TYPE     , $MHALT
```


603 017154 000000
604 017156 000137 007020
605
606 017162 104401 001205
607 017166 104401 042126
608 017172 104401 040373
609 017176 000000
610 017200 000137 007020

HALT
JMP BEGIN2
REJCT3: TYPE , \$CRLF
TYPE , MSG17
TYPE , MHALT
HALT
JMP BEGIN2

611
612
613
614
615
616
617
618
619

;;*****

.SBTTL SUPPORT SUBROUTINES

;;*****

;THIS ROUTINE DETERMINES THE ERROR TYPE

620 017204 010146
621 017206 005001
622 017210 033727 005556
623 017214 060006
624 017216 001025
625 017220 033727 005556
626 017224 010000
627 017226 001020
628 017230 033727 005556
629 017234 006000
630 017236 001013
631 017240 033727 005556
632 017244 001400
633 017246 001006
634 017250 033727 005556
635 017254 000020
636 017256 001001
637 017260 005201
638 017262 005201
639 017264 005201
640 017266 005201
641 017270 005201
642 017272 006301
643 017274 060166 000002
644 017300 012601
645 017302 000207

ERINDX: MOV R1, -(SP) ;STORE R1
CLR R1 ;CLEAR R1
BIT FMTDPB+16, (PC)+ ;CHECK ERROR TYPE
;WORD BIT14!BIT13!BIT12!BIT11 ;DRIVE OFFLINE
BNE 5\$;BR IF OFFLINE
BIT FMTDPB+16, (PC)+ ;CHECK ERROR TYPE
;WORD BIT12 ;DRIVE PERSISTENTLY UNSAFE
BNE 4\$;BR IF UNSAFE
BIT FMTDPB+16, (PC)+ ;CHECK ERROR TYPE
;WORD BIT11!BIT10 ;UNCORRECTABLE MASSBUS PARITY ERROR ?
BNE 3\$;BR IF PARITY ERROR
BIT FMTDPB+16, (PC)+ ;CHECK ERROR TYPE
;WORD BIT09!BIT08 ;SOFTWARE TIMEOUT ?
BNE 2\$;BR IF YES
BIT FMTDPB+16, (PC)+ ;CHECK ERROR TYPE
;WORD BIT04 ;DRIVE UNSAFE ERROR ?
BNE 1\$;BR IF YES
INC R1 ;INCREMENT THE RETURN INDEX
1\$: INC R1 ;INCREMENT THE RETURN INDEX
2\$: INC R1 ;INCREMENT THE RETURN INDEX
3\$: INC R1 ;INCREMENT THE RETURN INDEX
4\$: INC R1 ;INCREMENT THE RETURN INDEX
5\$: ASL R1 ;DOUBLE THE INCREMENT
ADD R1, 2(SP) ;DEVELOP THE RETURN ADDRESS
MOV (SP)+, R1 ;RESTORE R1
RTS PC ;RETURN

;ROUTINE TO CHECK FOR LOOP ON ERROR

646
647
648
649 017304 032777 001000 161642
650 017312 001402
651 017314 000177 161604
652
653 017320 005037 001176
654 017324 033727 005556
655 017330 072002
656 017332 001004
657 017334 032737 004000 005574
658 017342 001402
659 017344 000137 016342

LOP.CK: BIT #SW09, @SWR ;LOOP ON ERROR ?
BEQ 1\$;BR IF NOT
JMP @SLPERR ;GO TO THE LOOP ON ERROR ADDRESS
1\$: CLR \$ESCAPE ;CLEAR THE ERROR ESCAPE ADDRESS
BIT FMTDPB+16, (PC)+ ;CHECK FOR 'FATAL' ERROR
;WORD BIT14!BIT13!BIT12!BIT10!BIT01 ;'FATAL' ERROR BITS
BNE 2\$;BR IF NOT
BIT #WLE, RM.REG+RMER1 ;WRITE LOCK ERROR ?
BEQ 3\$;BR IF NOT
JMP \$EOP ;TERMINATE THE FORMAT
2\$: JMP \$EOP

```
660
661 017350 000207      3$:   RTS   PC           ;RETURN
662
663                   ;THIS ROUTINE SETS UP THE INPUT TABLE FOR THE DRIVER ROUTINE
664
665 017352 113737 001222 005540 SETTBL: MOV   DRIVE,FMTDPB ;SET UP DRIVE #
666 017360 105037 005543          CLR   FMTDPB+3 ;CLEAR HIGH ORDER ADRS BITS
667 017364 013737 001354 005544          MOV   MWC,FMTDPB+4 ;LOAD UP WORD COUNT
668 017372 012737 045774 005546          MOV   #BUFP,FMTDPB+6 ;LOAD UP CURRENT ADRS
669 017400 105037 005550          CLR   FMTDPB+10 ;SET SECTOR TO ZERO
670 017404 113737 001334 005551          MOV   BEGTRK,FMTDPB+11 ;SET UP STARTING TRK ADRS
671 017412 013737 001330 005552          MOV   BEGCYL,FMTDPB+12 ;SET UP STARTING CYL
672 017420 005037 005556          CLR   FMTDPB+16 ;CLEAR RM STATUS
673 017424 000207          RTS   PC           ;RETURN FROM SETUP
674
675                   ;THIS ROUTINE CONTROLS THE DISK ADDRESSING AND TOTAL TRK COUNT
676                   ;IT IS ENTERED AFTER EVERY TRK OPERATION
677
678 017426
679 017426 105237 005551          TRKTST: INCB   FMTDPB+11 ;INCREMENT TRACK NUMBER
680 017432 123737 005551 001332          CMPB   FMTDPB+11,ENDTRK ;LAST TRACK TO BE FORMATTED ON THIS CYLINDER ?
681 017440 101003          BHI   1$ ;BR IF YES
682 017442 004737 017756          JSR   PC,UPDTRK ;UPDATE TRACK ADDRESS IN BUFFER
683 017446 000425          BR     4$ ;EXIT
684
685 017450 113737 001334 005551 1$:   MOV   BEGTRK,FMTDPB+11 ;GET BEGINNING TRACK ADDRESS
686 017456 005737 001400          TST   WRAP ;SEEKING FROM HI TO LO CYLINDER ?
687 017462 001407          BEQ   2$ ;BR IF NO
688 017464 005337 005552          DEC   FMTDPB+12 ;DECREMENT CYLINDER ADDRESS
689 017470 023737 005552 001326          CMP   FMTDPB+12,ENDCYL ;DONE WITH FORMATTING ?
690 017476 002413          BLT   5$ ;BR IF YES
691 017500 000406          BR     3$
692 017502 005237 005552          2$:   INC   FMTDPB+12 ;INCREMENT CYLINDER ADDRESS
693 017506 023737 005552 001326          CMP   FMTDPB+12,ENDCYL ;DONE WITH FORMATTING ?
694 017514 101004          BHI   5$ ;BR IF YES
695 017516 004737 017644          3$:   JSR   PC,UPDCYL ;UPDATE CYLINDER ADDRESS IN BUFFER
696
697 017522 062716 000002          4$:   ADD   #2,(SP) ;ADD TWO TO RETURN ADRS (NOT DONE)
698 017526 000207          5$:   RTS   PC ;RETURN, DONE FORMAT !!
699
700                   ;THIS ROUTINE SETS UP WC & BA FOR REMAINING SECTORS
701                   ;AFTER A WRITE CHECK ERROR
702
703 017530 013737 001350 005544 SCAWC: MOV   SAVWC,FMTDPB+4 ;SET UP WC FOR REMAINING SECTORS
704 017536 062737 001004 005546          ADD   #516,FMTDPB+6 ;SET UP BA FOR REMAINING SECTORS
705 017544 005237 005550          INC   FMTDPB+10 ;ADVANCE TO NEXT SECTOR IN TBL
706 017550 005037 001316          CLR   SOFSW ;RESET RETRY COUNTER
707 017554 000207          RTS   PC ;RETURN TO COMPLETE TRK FORMAT
708
709
710                   ;THIS ROUTINE SETS UP THE CYLINDER ADRS, FORMAT BIT, TRACK AND
711                   ;SECTOR ADRS IN MEMORY WITH THE STARTING CYL - TRK INFORMATION
712
713 017556 013701 001362          SETHDR: MOV   MAXSEC,R1 ;SET UP SECTOR COUNT
714 017562 012737 000001 001214          MOV   #1,$TESTN ;GARBAGE CODE FOR APT
715 017570 012700 045774          MOV   #BUFP,R0 ;SET UP HEADER POINTER IN R0
716 017574 013702 001330          MOV   BEGCYL,R2 ;PUT STARTING CYL # IN R2
```



```
717 017600 052702 140000      BIS      #MF!UF,R2      ;SET MFG AND USR GOOD BITS (DEC STANDARD 144)
718 017604 013703 001334      MOV      BEGTRK,R3      ;PUT STARTING TRK # IN R3
719 017610 000303              SWAB      R3              ;JUSTIFY TRACK ADRS
720 017612 005737 001360      TST      SEC30          ;SEE IF 30 OR 32 SECTOR MODE
721 017616 001402              BEQ      1$            ;BR IF 30 SECTOR MODE
722 017620 052702 010000      BIS      #FMT,R2          ;SET THE 32 SECTOR FORMAT BIT
723 017624 010220      1$:    MOV      R2,(R0)+        ;WRITE IN HEADER AREA OF CORE THE CYL ADRS
724 017626 010320      MOV      R3,(R0)+        ;WRITE IN HEADER AREA OF CORE THE TRK ADRS
725 017630 062700 001000      ADD      #512.,R0      ;SET UP FOR NEXT HEADER
726 017634 005203              INC      R3          ;UPDATE SECTOR ADRS FOR NEXT HEADER
727 017636 005301              DEC      R1          ;MAINTAIN COUNT OF SECTORS
728 017640 002371              BGE      1$          ;BR IF NOT LAST SECTOR
729 017642 000207              RTS      PC          ;EXIT - HEADERS ARE LOADED INTO CORE
```

;THIS ROUTINE UPDATES THE CYLINDER ADRS OF THE HEADER WORDS
;AND FILLS DATA BUFFER FIELD IN CORE

```
730
731
732
733
734 017644      UPDCYL:      MOV      R0,-(SP)          ;;PUSH R0 ON STACK
      017644 010046      MOV      R1,-(SP)          ;;PUSH R1 ON STACK
      017646 010146      MOV      R2,-(SP)          ;;PUSH R2 ON STACK
      017650 010246      MOV      R3,-(SP)          ;;PUSH R3 ON STACK
735 017654 013701 001362      MOV      MAXSEC,R1      ;SET UP SECTOR COUNT
736 017660 012700 045774      MOV      #BUFP,R0      ;SET UP HEADER POINTER IN R0
737 017664 013703 001334      MOV      BEGTRK,R3      ;GET BEGINNING TRACK
738 017670 000303              SWAB      R3          ;STARTING SECTOR = 0
739 017672 005737 001400      1$:    TST      WRAP      ;SEEKING FROM HI TO LO CYLINDERS ?
740 017676 001402              BEQ      2$            ;BR IF NO
741 017700 162710 000002      SUB      #2,(R0)        ;DECREMENT CYLINDER NUMBER
742 017704 005220      2$:    INC      (R0)+          ;INCREMENT FOR NEXT CYLINDER
743 017706 010320      MOV      R3,(R0)+          ;WRITE TRACK AND SECTOR HEADER
744 017710 012702 001000      MOV      #512.,R2      ;DATA FIELD LENGTH
745 017714 013720 001340      3$:    MOV      PATA,(R0)+ ;FILL BUFFER
746 017720 013720 001342      MOV      PATB,(R0)+ ;FILL BUFFER
747 017724 162702 000004      SUB      #4,R2        ;END OF DATA FIELD ?
748 017730 001371              BNE      3$          ;NO
749 017732 005203              INC      R3          ;INCREMENT TO NEXT SECTOR
750 017734 005301              DEC      R1          ;COUNT SECTORS
751 017736 002355              BGE      1$          ;BR IF NOT LAST SECTOR
752 017740 012603      MOV      (SP)+,R3          ;;POP STACK INTO R3
      017742 012602      MOV      (SP)+,R2          ;;POP STACK INTO R2
      017744 012601      MOV      (SP)+,R1          ;;POP STACK INTO R1
      017746 012600      MOV      (SP)+,R0          ;;POP STACK INTO R0
753 017750 005237 001214      INC      $TESTN      ;INCREMENT TST NUMBER FOR EACH CYLINDER CHANGE
754
755 017754 000207              RTS      PC          ;GARBAGE CODE FOR APT
756
757
758
759 017756      UPDTRK:      MOV      R0,-(SP)          ;;PUSH R0 ON STACK
      017756 010046      MOV      R1,-(SP)          ;;PUSH R1 ON STACK
      017760 010146      MOV      MAXSEC,R1      ;SET UP SECTOR COUNT
760 017762 013701 001362      MOV      #BUFP,R0      ;SET UP HEADER POINTER IN R0
761 017766 012700 045774      MOV      (R0)+        ;POINT HEADER POINTER TO TRK - SEC ADRS
762 017772 005720      1$:    TST      (R0)+        ;INDEX TRK ADRS
763 017774 062710 000400      ADD      #400,(R0)      ;SET UP FOR NEXT HEADER
764 020000 062700 001004      ADD      #516.,R0
```

;THIS ROUTINE UPDATES THE TRACK ADRS OF THE HEADER WORDS IN CORE


```
765 020004 005301          DEC      R1          ;COUNT SECTORS
766 020006 002372          BGE      1$          ;BR IF NOT LAST SECTOR
767 020010 012601          MOV      (SP)+,R1      ;POP STACK INTO R1
      020012 012600          MOV      (SP)+,R0      ;POP STACK INTO R0
768 020014 000207          RTS      PC          ;EXIT
769
770          ;ROUTINE TO CHECK FOR KW11-L OR KW11-P CLOCKS
771
772 020016 012737 020074 000004 ST.CLK: MOV      #STCLK1,@#ERRVEC ;SET UP VECTOR FOR P CLK
773 020024 005037 000006          CLR      @#ERRVEC+2 ;NEW PSW
774 020030 005777 161244          TST      @#LKCSR ;CHECK FOR KW11-P
775 020034 013746 001304          MOV      $LPVEC,-(SP) ;VECTOR ADDRESS
776 020040 012776 020250 000000          MOV      #CLOCK,@(SP) ;SET UP KW11-P VECTOR
777 020046 062716 000002          ADD      #2,(SP) ;POINT TO PSW
778 020052 012736 000300          MOV      #PR6,@(SP)+ ;PSW - PRI 6
779 020056 012777 177777 161216          MOV      #-1,@$LKCSB ;LOAD COUNTER BUFFER
780 020064 012777 000135 161206          MOV      #135,@$LKCSR ;SET CLK - CNT UP
781 020072 000426          BR      STCLK3
782 020074 062706 000004          STCLK1: ADD      #4,SP ;RESTORE THE STACK POINTER
783 020100 012737 020144 000004          MOV      #STCLK2,@#ERRVEC ;CHANGE ERROR VECTOR
784 020106 005777 161176          TST      @$LKS ;LOOK FOR KW11-L
785 020112 013746 001312          MOV      $LLVEC,-(SP) ;KW11-L VECTOR ADDRESS
786 020116 012776 020250 000000          MOV      #CLOCK,@(SP) ;SET UP KW11-L VECTOR
787 020124 062716 000002          ADD      #2,(SP) ;INCREMENT VECTOR ADDRESS
788 020130 012736 000300          MOV      #PR6,@(SP)+ ;PSW - PRI 6
789 020134 012777 000100 161146          MOV      #100,@$LKS ;SET KW11-L INTERRUPT ENABLE
790 020142 000402          BR      STCLK3
791 020144 062706 000004          STCLK2: ADD      #4,SP ;RESTORE THE STACK POINTER
792 020150 012737 000006 000004          STCLK3: MOV      #6,@#ERRVEC ;RESTORE THE ERROR VECTOR
793 020156 000207          RTS      PC
794
795          ;THIS CODE PRINT THE ABORT MESSAGE AND LET O.P. RESTART
796
797 020160 105737 001150          RESTRT: TSTB     $AUTOB ;RUN UNDER APT ?
798 020164 001024          BNE      1$ ;BR IF SO
799 020166 004737 025576          JSR      PC,$TKINT ;ENABLE TO READ
800 020172 104401 040212          TYPE     ,MSG2 ;IMPROPER MFG INFORMATION
801 020176 104410          RDCHR
802 020200 012637 001174          MOV      (SP)+,$TMP0 ;GET CHARACTER
803 020204 023727 001174 000015          CMP      $TMP0,#CR ;CARRIAGE RETURN ?
804 020212 001411          BEQ      1$ ;BR IF YES
805 020214 123727 001174 000131          CMPB     $TMP0,#'Y ;ENTER Y ?
806 020222 001405          BEQ      1$ ;BR IF YES
807 020224 104401 040373          TYPE     ,MHALT
808 020230 000000          HALT
809 020232 000137 007020          JMP      BEGIN2 ;JUMP TO BEGIN2
810
811 020236 104401 036417          1$: TYPE     ,Y ;TYPE 'Y'
812 020242 104401 001205          TYPE     ,$CRLF ;CR-LF
813 020246 000207          RTS      PC ;EXIT
814
815          ;THIS CODE SERVICES A CLOCK INTERRUPT EVERY 16MS
816
817 020250 012746 000020          CLOCK: MOV      #16,-(SP) ;PUT MILLISEC ON THE STACK
818 020254 004737 034272          JSR      PC,RMTMR ;GO REPORT TIME
819 020260 000002          RTI ;RETURN AND CONTINUE
820
```



```
821 ;ROUTINE TO INTERCEPT 'CONTROL C' TYPED DURING PARAMETER ENTRY TIME
822
823 020262 012706 001100 C.ENTR: MOV #STACK,SP ;INITIALIZE THE STACK
824 020266 005737 027746 1$: TST TRNSWT ;ALL ACTIVITY STOPPED ?
825 020272 001375 BNE 1$ ;BR IF NOT
826 020274 000005 RESET ;CLEAR THE BUS
827 020276 000137 011306 JMP M1B ;START AGAIN WITH DRIVE SELECTION
828
829 ;ROUTINE TO INTERCEPT 'CONTROL O' TYPED WHILE PROGRAM IS FORMATTING
830 ;THE DISK PACK. THE CURRENT DISK ADDRESS IS TYPED TO THE TERMINAL
831 ;DURING THIS ROUTINE IN THE FOLLOWING FORMAT.
832
833 ;PRESENT ADDRESS IS: CXXX TXXX ;WHERE 'C' IS THE CYLINDER ADDRESS
834 ;AND 'T' IS THE TRACK ADDRESS.(IN DECIMAL)
835
836 020302 117746 160654 O.ENTR: MOVB @STKB,-(SP) ;READ FROM TTY BUFFER
837 020306 042716 177600 BIC #^C177,(SP) ;STRIP PARITY
838 020312 021627 000003 CMP (SP),#3 ;CONTROL-C ?
839 020316 001005 BNE 1$ ;BR IF NO
840 020320 104401 026767 TYPE ,%CNTLC ;TYPE A CONTROL-C (^C)
841 020324 005726 TST (SP)+ ;RESTORE STACK
842 020326 000177 161042 JMP @CNTLC ;JUMP TO CONTROL-C RESTART
843 020332
844 020332 022627 000017 1$: CMP (SP)+,#17 ;CONTROL-O ?
845 020336 001406 BEQ 2$ ;YES
846 020340 005777 160616 TST @STKB ;CLEAR DONE BIT
847 020344 012777 000100 160606 MOV #100,@STKS ;ENABLE TTY INTERRUPT
848 020352 000002 RTI
849 020354
850
851 020354 005037 177776 TYPADR: CLR PS ;SET PROCESSOR TO PRIORITY 0
852 020360 012737 020262 001374 MOV #C.ENTR,CNTLC ;CHANGE 'CONTROL C' RETURN ADDRESS
853 020366 104401 037775 TYPE ,ADDRIS ;'PRESENT ADDRESS IS: '
854 020372 104401 036411 TYPE ,C ;'C'
855 020376 013746 005552 MOV FMTDPB+12,-(SP) ;PUT THE CYLINDER ADDRESS ON THE STACK
856 020402 004737 027256 JSR PC,$SB2D ;CONVERT IT TO DECIMAL
857 020406 004737 027216 JSR PC,$SUPRS ;TYPE IT
858 020412 104401 036425 TYPE ,BLNKS2 ;TYPE 2 SPACES
859 020416 104401 036415 TYPE ,T ;'T'
860 020422 005046 CLR -(SP) ;CLEAR THE STACK
861 020424 113716 005551 MOVB FMTDPB+11,(SP) ;PUT THE TRACK ADDRESS ON THE STACK
862 020430 004737 027256 JSR PC,$SB2D ;CONVERT IT TO DECIMAL
863 020434 004737 027216 JSR PC,$SUPRS ;TYPE IT
864 020440 104401 001205 TYPE ,%CRLF ;CR-LF
865 020444 012737 020302 000060 MOV #O.ENTR,@#TKVEC ;RESTORE ENTRANCE FOR CONTROL-O
866 020452 000002 RTI ;RETURN
867
868 ;PARAMETER ENTRY ROUTINE
869 ;CALL
870 ; JSR R4,PARENT ;THE CALLING SEQ
871 ; TABLE ;PARAMETERS TABLE
872 ;
873
874 020454 010346 PARENT: MOV R3,-(SP) ;SAVE R3
875 ; MOV #TABLE,R3 ;PARAMETER TABLE ADDRESS
876 020456 011403 ; MOV (R4),R3 ;PARAMETER TABLE ADDRESS
877 020460 012337 020470 1$: MOV (R3)+,2$ ;ADDRESS OF PARAMETER NAME
```



```
878 020464 001435      BEQ      7$      ;BR IF AT END OF TABLE
879 020466 104401      TYPE      ;TYPE THE PARAMETER NAME
880 020470 000000      2$: .WORD 0      ;ADDRESS OF PARAMETER NAME TEXT
881 020472 012302      MOV      (R3)+,R2      ;MAXIMUM PARAMETER VALUE
882 020474 012305      MOV      (R3)+,R5      ;ADDRESS OF PARAMETER
883 020476 011546      MOV      (R5),-(SP)      ;CURRENT VALUE OF PARAMETER
884 020500 104405      TYPDS      ;TYPE THE CURRENT VALUE OF THE PARAMETER
885 020502 104401 036405 TYPE      ,SLASH      ;' / '
886 020506 104411      RDLIN      ;READ THE KEYBOARD
887 020510 012601      MOV      (SP)+,R1      ;INPUT ASCII STRING ADDRESS
888 020512 004537 023462 JSR      R5,CK.DIG      ;CHECK THE DIGIT(S)
      020516 020460      1$      ;CARRIAGE RETURN ONLY ENTERED
      020520 020560      7$      ;5$ ONLY ENTERED
      020522 020536      4$      ;ILLEGAL INPUT
      020524 020532      3$      ;TERMINATED WITH A CARRIAGE RETURN
      020526 020536      4$      ;TERMINATED WITH A '..'
      020530 020550      5$      ;TERMINATED WITH A '...'
889 020532 010215      3$: MOV      R2,(R5)      ;MOVE NEW VALUE TO PARAMETER LOCATION
890 020534 000751      BR      1$      ;GET MORE PARAMETERS
891 020536 104401 037211 4$: TYPE      ,BADENT      ;'BAD ENTRY'
892 020542 162703 000006 SUB      #6,R3      ;DECREMENT THE TABLE POINTER
893 020546 000744      BR      1$      ;TRY AGAIN
894 020550 010215      5$: MOV      R2,(R5)      ;NEW VALUE
895 020552 000402      BR      7$      ;EXIT
896      ;6$: MOV      #TABLE,R3      ;RELOAD THE PARAMETER TABLE ADDRESS
897 020554 011403      6$: MOV      (R4),R3      ;RELOAD THE PARAMETER TABLE ADDRESS
898 020556 000740      BR      1$      ;TRY AGAIN
899 020560 012603      7$: MOV      (SP)+,R3      ;RESTORE R3
900 020562 062704 000002 ADD      #2,R4      ;ADJUST THE RETURN ADDRESS
901 020566 000204      RTS      R4      ;RETURN FROM THE R4
902      ;      RTS      PC      ;RETURN
903
904      ;THIS ROUTINE LOAD THE BAD SECTOR INTO USTAB TABLE
905      ;CALL SEQ JSR PC,RECORD
906      ;ALL REGISTER USED ARE DESTORIED
907
908 020570 012701 003434 RECORD: MOV      #USTAB+10,R1      ;TABLE ENTRY IN R1
909 020574 022711 177777 1$: CMP      #-1,(R1)      ;AN OPENING IN THE TABLE
910 020600 001421      BEQ      3$      ;BR IF IT IS
911 020602 023711 005552 CMP      FMTDPB+12,(R1) ;CYLINDER NUMBER MATCHES ?
912 020606 001010      BNE      2$      ;BR IF NOT
913 020610 123761 005551 000003 CMPB     FMTDPB+11,3(R1) ;TRK NUMBER MATCHES ?
914 020616 001004      BNE      2$      ;BR IF NOT
915 020620 123761 005550 000002 CMPB     FMTDPB+10,2(R1) ;SECTOR NUMBER MATCHES ?
916 020626 001416      BEQ      4$      ;BR TO EXIT,IF THE SPOT HAS RECORDED
917 020630 062701 000004 2$: ADD      #4,R1      ;INCREMENT 4 BYTES
918 020634 022701 004424 CMP      #USTAB+512.,R1 ;END OF TABLE ?
919 020640 101355      BHI      1$      ;BR IF NOT
920 020642 000411      BR      5$      ;THROW AWAY THE PACK
921 020644 013711 005552 3$: MOV      FMTDPB+12,(R1) ;LOAD THE CYLINDER #
922 020650 113761 005551 000003 MOV      FMTDPB+11,3(R1) ;LOAD THE TRK NUMBER
923 020656 113761 001346 000002 MOV      SAVSEC,2(R1) ;LOAD THE SECTOR NUMBER
924 020664 000207      4$: RTS      PC      ;EXIT
925 020666 104401 001205 5$: TYPE      ,$CRLF
926 020672 104401 040112      TYPE      ,MMSG3      ;THROW AWAY THE PACK
927 020676 104401 040373      TYPE      ,MHALT
928 020702 000000      HALT
```



```
929 020704 000137 007020      JMP      BEGIN2      ;RESTART IF DESIRED ?
930
931      ;THIS ROUTINE SORT THE USTAB IN ASCENDING ORDER
932      ;CALL SEQ      JSR      'PC, SORT2
933
934 020710      SORT2:
935      ;      MOV      #USTAB+8.,R1      ;TOP POINTER
936      MOV      (R5),R1      ;TOP POINTER
937 020712 011501      MOV      #125.,R2      ;TOTAL 126 ELEMENTS
938 020716 010103      MOV      R1,R3      ;LOCATE THE BOTTOM POINTER
939 020720 062703 000764      ADD      #500.,R3      ;254-4) X 2
940      ;      MOV      #USTAB+508.,R3      ;THE LAST ELEMENT
941 020724 022711 177777      CMP      #-1,(R1)      ;THE TABLE IS EMPTY ?
942 020730 001444      BEQ      4$      ;QUICK EXIT
943 020732 021161 000004      1$:      CMP      (R1),4(R1)      ;COMPARE THE CYLINDER NUMBER
944 020736 101013      BHI      2$      ;SWITCH THE TWO ELEMENT
945 020740 103426      BLO      3$      ;INCREMENT POINTER
946 020742 126161 000003 000007      CMPB      3(R1),7(R1)      ;COMPARE THE TRK NUMBER
947 020750 101006      BHI      2$      ;SWITCH ELEMENT
948 020752 103421      BLO      3$      ;INCREMENT POINTER
949 020754 126161 000002 000006      CMPB      2(R1),6(R1)      ;COMPARE THE SECTOR NUMBER
950 020762 101001      BHI      2$      ;SWITCH ELEMENT
951 020764 000414      BR      3$      ;INCREMENT POINTER
952 020766 011146      2$:      MOV      (R1),-(SP)      ;SAVE THE N BLOCK
953 020770 016146 000002      MOV      2(R1),-(SP)      ;INTO STACK
954 020774 016111 000004      MOV      4(R1),(R1)      ;SWITCH THE N+1 BLOCK TO N BLOCK
955 021000 016161 000006 000002      MOV      6(R1),2(R1)      ;
956 021006 012661 000006      MOV      (SP)+,6(R1)      ;LOAD THE N+1 BLOCK
957 021012 012661 000004      MOV      (SP)+,4(R1)      ;
958 021016 062701 000004      3$:      ADD      #4,R1      ;UPDATE THE TOP POINTER
959 021022 020103      CMP      R1,R3      ;REACH THE BOTTOM ?
960 021024 001342      BNE      1$      ;BR IF NOT
961 021026 005302      DEC      R2      ;DECREMENT ONE SORT COUNT
962 021030 001404      BEQ      4$      ;BR IF ALL DONE
963 021032 162703 000004      SUB      #4,R3      ;ADJUST THE BOTTOM POINTER
964      ;      MOV      #USTAB+8.,R1      ;RESET TOP POINTER
965 021036 011501      MOV      (R5),R1      ;RESET THE TOP POINTER
966 021040 000734      BR      1$      ;BR IF NOT ALL DONE
967 021042      4$:
968 021042 062705 000002      ADD      #2,R5      ;ADJUST RETURN ADDRESS
969 021046 000205      RTS      R5      ;EXIT
970      ;      RTS      PC      ;EXIT
971
972      ;THIS ROUTINE TEXT THE LAST TRACK      CYL 822, LAST TRACK
973      ;SECTORS 0,2,4,6,8      16 BIT MFG
974      ;SECTORS 1,3,5,7,9      18 BIT MFG
975      ;SECTORS 10,12,14,16,.....30,      16 BIT USER
976      ;SECTORS 11,13,15,17,.....31      18 BIT USER
977
978 021050 012700 045774      TEXT:      MOV      #BUFP,R0      ;BUFFER ADDRESS
979 021054 012701 020100      MOV      #<258.*32.>,R1      ;TOTAL WORD COUNT
980 021060 012702 177777      MOV      #-1,R2      ;SET ALL LOCATIONS TO -1
981 021064 010220      1$:      MOV      R2,(R0)+      ;FULL THE BUFFER
982 021066 005301      DEC      R1      ;ALL DONE ?
983 021070 001375      BNE      1$      ;LOOP, IF NOT
984 021072 013746 001214      MOV      $TESTN,-(SP)      ;SAVE TESTN,BEGCYL,BEGTRK
985 021076 013746 001330      MOV      BEGCYL,-(SP)      ;
```

986	021102	013746	001334		MOV	BEGTRK,-(SP)	:
987	021106	013746	001362		MOV	MAXSEC,-(SP)	:SAVE FLAG MAXSEC AND SEC30
988	021112	013746	001360		MOV	SEC30,-(SP)	:
989	021116	012737	000037	001362	MOV	#37,MAXSEC	:SET MAX 31 SECTORS
990	021124	012737	177777	001360	MOV	#-1,SEC30	:ALWAYS IN 16 BIT MODE
991	021132	012737	001466	001330	MOV	#822.,BEGCYL	:LOAD LAST CYLINDER
992	021140	013737	001324	001334	MOV	LSTRK,BEGTRK	:LAST TRACK
993	021146	004737	017556		JSR	PC,SETHDR	:SET UP THE HEAD FIELD IN THE BUFFER
994	021152	012637	001360		MOV	(SP)+,SEC30	:RESTORE SEC30 AND MAXSEC
995	021156	012637	001362		MOV	(SP)+,MAXSEC	:
996	021162	012637	001334		MOV	(SP)+,BEGTRK	:
997	021166	012637	001330		MOV	(SP)+,BEGCYL	:
998	021172	012637	001214		MOV	(SP)+,\$TESTN	:
999	021176	012701	001414		MOV	#BAD16,R1	:LOAD SERIAL NUMBER TO EVERY SECTOR
1000	021202	012702	046000		MOV	#BUFP+4,R2	:BUFFER LOCATION + 4
1001	021206	012703	000040		MOV	#32.,R3	:TOTAL 32 SECTORS
1002	021212	011112			MOV	(R1),(R2)	:1 ST SN #
1003	021214	016162	000002	000002	MOV	2(R1),2(R2)	:2 ND SN #
1004	021222	005062	000004		CLR	4(R2)	:THIRD WORD = 0
1005	021226	005062	000006		CLR	6(R2)	:ID = DATA PACK
1006	021232	062702	001004		ADD	#516.,R2	:ADVANCE TO NEXT SECTOR
1007	021236	005303			DEC	R3	:DECREMENT ONE SECTOR COUNT
1008	021240	001364			BNE	2\$	:BR IF NOT DONE
1009	021242	005046			CLR	-(SP)	:LOAD TABLE INTO SECTORS
1010	021244	005046			CLR	-(SP)	:DUMMY PAIRS
1011	021246	005046			CLR	-(SP)	:
1012	021250	012746	001414		MOV	#BAD16,-(SP)	:TABLE ADDRESS
1013	021254	012746	046000		MOV	#BUFP+4,-(SP)	:BUFFER ADDRESS
1014	021260	012746	000005		MOV	#5,-(SP)	:SECTOR COUNT
1015	021264	012746	002420		MOV	#BAD18,-(SP)	:TABLE ADDRESS
1016	021270	012746	047004		MOV	#BUFP+4+516.,-(SP)	:BUFFER ADDRESS
1017	021274	012746	000005		MOV	#5,-(SP)	:SECTOR COUNT
1018	021300	012746	003424		MOV	#USTAB,-(SP)	:USER DEFINED TABLE
1019	021304	012746	060050		MOV	#BUFP+4+<516.*10.>,-(SP)	:BUFFER ADDRESS
1020	021310	005737	001360		TST	SEC30	:
1021	021314	100402			BMI	3\$	:BR IF IN 16 BIT MODE
1022	021316	012716	061054		MOV	#BUFP+4+<516.*11.>,(SP)	:RESET THE BUFFER ADDRESS
1023	021322	012746	000013	3\$:	MOV	#11.,-(SP)	:SECTOR COUNT
1024	021326	012701	004430		MOV	#USSAV,R1	:TABLE ADDRESS IN R1
1025	021332	012702	061054		MOV	#BUFP+4+<516.*11.>,R2	:BUFFER ADDRESS IN R2
1026	021336	005737	001360		TST	SEC30	:BR IF IN 16 BIT MODE
1027	021342	100402			BMI	4\$	:
1028	021344	012702	060050		MOV	#BUFP+4+<516.*10.>,R2	:BUFFER ADDRESS FOR 18 BIT MODE
1029	021350	012703	000013	4\$:	MOV	#11.,R3	:SECTOR COUNT IN R3
1030	021354	010105			MOV	R1,R5	:TEMPOR STORAGE
1031	021356	012704	000400	5\$:	MOV	#256.,R4	:WORD COUNT = DATA FIELD OF ONE SECTOR
1032	021362	012122		6\$:	MOV	(R1)+,(R2)+	:LOAD TABLE INTO SECTOR DATA FIELD
1033	021364	005304			DEC	R4	:ALL DONE ?
1034	021366	001375			BNE	6\$	:BR IF NOT
1035	021370	010501			MOV	R5,R1	:RELOAD THE TABLE ADDRESS
1036	021372	062702	001010		ADD	#520.,R2	:SKIP ONE SECTOR
1037	021376	005303			DEC	R3	:DECREMENT ONE SECTOR COUNT
1038	021400	001366			BNE	5\$	:BR IF NOT DONE
1039	021402	012603			MOV	(SP)+,R3	:RETRIEVE NEXT SET OF SECTOR #
1040	021404	012602			MOV	(SP)+,R2	:BUFFER ADDRESS
1041	021406	012601			MOV	(SP)+,R1	:TABLE ADDRESS
1042	021410	010105			MOV	R1,R5	:TEMPOR STORAGE


```
1043 021412 001361          BNE      5$          ;BR IF NOT DUMMY PAIR
1044 021414 000207          RTS       PC          ;EXIT
1045
1046          ;THIS ROUTINE RESET:
1047          ;RESET THE BIT 14/15 OF THE 1 ST HEADER WORD OF THE BAD SPOT
1048          ;CALLING SEQ;          JSR      PC,RESET
1049
1050 021416 013737 005552 045764 RESET: MOV      FMTDPB+12,RBUF ;CYLINDER ADDRESS
1051 021424 001006          BNE      1$          ;BR IF NOT ON TRACK 0
1052 021426 122737 000001 005551      CMPB     #1,FMTDPB+11 ;BR IF NOT CYLO,TRK 0 OR 1
1053 021434 103402          BLO      1$          ;BR IF NOT
1054 021436 000137 017134          JMP      REJCT2 ;OTHERWISE, ILLEGAL BAD SECTORS
1055 021442 000240          1$:      NOP
1056 021444 113737 005551 045767      MOV      FMTDPB+11,RBUF+3 ;TRACK ADDRESS
1057 021452 113737 001346 045766      MOV      SAVSEC,RBUF+2 ;SECTOR ADDRESS
1058 021460 053737 001410 045764      BIS      HEADX,RBUF ;SET MFG BIT,RESET USER BIT
1059 021466 113737 001222 005630      MOV      DRIVE,FMTX ;SETUP THE DPB FOR OPERATION
1060 021474 012737 177776 005634      MOV      #-2,FMTX+4 ;WORD COUNT =2
1061 021502 112737 000163 005632      MOV      #WRTHD,FMTX+2 ;WRITE HEAD AND DATA COMMAND
1062 021510 012737 045764 005636      MOV      #RBUF,FMTX+6 ;BUFFER ADDRESS
1063 021516 113737 001346 005640      MOV      SAVSEC,FMTX+10 ;SECTOR ADDRESS
1064 021524 113737 005551 005641      MOV      FMTDPB+11,FMTX+11 ;TRACK ADDRESS
1065 021532 013737 005552 005642      MOV      FMTDPB+12,FMTX+12 ;CYLINDER ADDRESS
1066 021540 052737 010000 045764      BIS      #FMT,RBUF ;ASSUM 16 BIT MODE
1067 021546 005737 001360          TST      SEC30 ;IN 16 BIT MODE ?
1068 021552 100403          BMI      2$          ;BR IF IT IS
1069 021554 042737 010000 045764      BIC      #FMT,RBUF ;RESET THE FMT BIT
1070 021562 004037 030622          JSR      R0,RM05 ;CALL THE DRIVER
1071 021566 005630          FMTX
1072 021570 000774          BR      2$          ;DPB ADDRESS
1073 021572 005737 005646          3$:      TST      FMTX+16 ;BR IF QUEUE FAILS
1074 021576 001775          BEQ      3$          ;DONE ?
1075 021600 000207          RTS       PC          ;BR IF NOT
1076
1077          ;THE ROUTINE INSERT:
1078          ;INSERT A BAD SECTOR ADDRESS INTO ONE OF THE USTAB,USSAV,BAD16,BAD18 TABLES
1079          ;CALLING SEQ
1080          ;          JSR      R5,INSERT
1081          ;          TABLE + 8.
1082
1083 021602 010446          INSERT: MOV      R4,-(SP) ;SAVE THE R4
1084 021604 012746 000176          MOV      #126,-(SP) ;ENTRIES OF THE TABLE
1085 021610 011504          MOV      (R5),R4 ;TABLE ADDRESS + 8 BYTES
1086 021612 022714 177777          1$:      CMP      #-1,(R4) ;AN OPEN ENTRY ?
1087 021616 001420          BEQ      3$          ;BR IF SO
1088 021620 023714 001364          CMP      DS.CYL,(R4) ;CHECK IF THE BAD SECTOR HAS RECORDED
1089 021624 001010          BNE      2$          ;BR IF NOT
1090 021626 123764 001366 000003      CMPB     DS.TRK,3(R4) ;CYL AND TRK MATCH ?
1091 021634 001004          BNE      2$          ;BR IF NOT
1092 021636 123764 001346 000002      CMPB     SAVSEC,2(R4) ;CYL,TRK AND SEC MATCH ?
1093 021644 001415          BEQ      4$          ;BR IF SO
1094 021646 005316          2$:      DEC      (SP) ;DECREMENT THE ENTRY COUNT
1095 021650 001413          BEQ      4$          ;BR IF EXHAUST
1096 021652 062704 000004          ADD      #4,R4 ;LOCATE THE NEXT ENTRY
1097 021656 000755          BR      1$          ;BR BACK
1098 021660 013714 001364          3$:      MOV      DS.CYL,(R4) ;LOAD INTO TABLE
1099 021664 113764 001366 000003      MOV      DS.TRK,3(R4) ;LOAD THE TRACK NUMBER
```

```
1100 021672 113764 001346 000002      4$:  MOVB    SAVSEC,2(R4)      ;LOAD THE SECTOR NUMBER
1101 021700 062706 000002      ADD     #2,SP      ;CLEAR UP THE STACK
1102 021704 012604      MOV     (SP)+,R4      ;RESTORE R4
1103 021706 062705 000002      ADD     #2,R5      ;ASJUST THE RETURN ADDRESS
1104 021712 000205      RTS      R5      ;EXIT
1105
1106 021714 104401 041236      FUNCT1: TYPE    ,MSG5
1107 021720 104401 001205      TYPE    ,%CRLF      ;CR-LF
1108 021724 012737 177777 001364 1$:  MOV     #-1,DS.CYL      ;RESET THE INPUT VALUES
1109 021732 012737 177777 001366      MOV     #-1,DS.TRK      ;
1110 021740 012737 177777 001346      MOV     #-1,SAVSEC      ;
1111 021746 004437 020454      JSR     R4,PARENT      ;ENTER THE VALUE FROM THE KEYBOARD
1112 021752 005702      TABLE2
1113
1114 021754 005737 001364      TST     DS.CYL      ;UPDATE VALUES ?
1115 021760 100412      BMI     2$      ;BR IF NOT
1116 021762 005737 001366      TST     DS.TRK      ;
1117 021766 100407      BMI     2$      ;
1118 021770 005737 001346      TST     SAVSEC      ;
1119 021774 100404      BMI     2$      ;
1120 021776 004537 021602      JSR     R5,INSERT      ;INSERT INTO THE BAD16 TABLE
1121 022002 001424      BAD16+8.
1122 022004 000747      BR      1$      ;NEXT SET
1123 022006 004537 020710 2$:  JSR     R5,SORT2      ;SORT THE TABLE
1124 022012 001424      BAD16+8.
1125
1126 022014 104401 041321      TYPE    ,MSG6
1127 022020 104401 001205      TYPE    ,%CRLF      ;CR-LF
1128 022024 012737 177777 001364 3$:  MOV     #-1,DS.CYL      ;RESET THE INPUT VALUES
1129 022032 012737 177777 001366      MOV     #-1,DS.TRK      ;
1130 022040 012737 177777 001346      MOV     #-1,SAVSEC      ;
1131 022046 004437 020454      JSR     R4,PARENT      ;INPUT VALUES FROM THE KEYBOARD
1132 022052 005726      TABLE3      ;18 BIT TABLE
1133
1134 022054 005737 001364      TST     DS.CYL      ;UPDATED VALUES ?
1135 022060 100412      BMI     4$      ;BR IF NOT
1136 022062 005737 001366      TST     DS.TRK      ;
1137 022066 100407      BMI     4$      ;
1138 022070 005737 001346      TST     SAVSEC      ;
1139 022074 100404      BMI     4$      ;
1140 022076 004537 021602      JSR     R5,INSERT      ;INSERT THE BAD SECTOR INTO TABLE BAD18
1141 022102 002430      BAD18+8.
1142 022104 000747      BR      3$      ;NEXT SET
1143 022106 004537 020710 4$:  JSR     R5,SORT2      ;SORT THE BAD18 TABLE
1144 022112 002430      BAD18+8.
1145 022114 000207      RTS      PC      ;EXIT FROM THE CALLING OF TABCAL
1146
1147 022116 012737 003434 022272 FUNCT2: MOV     #USTAB+8.,3$      ;SETUP TABLES FOR 16 BITS MODE
1148 022124 012737 003434 022302      MOV     #USTAB+8.,5$      ;
1149 022132 012737 004440 022372      MOV     #USSAV+8.,7$      ;
1150 022140 012737 004440 022402      MOV     #USSAV+8.,9$      ;
1151 022146 005737 001360      TST     SEC30      ;IN 16 BIT MODE ?
1152 022152 100414      BMI     1$      ;BR IS SO,OTHERWISE RELOAD THE TABLES
1153 022154 012737 003434 022372      MOV     #USTAB+8.,7$      ;SET UP TABLES FOR 18 BITS MODE
1154 022162 012737 003434 022402      MOV     #USTAB+8.,9$      ;
1155 022170 012737 004440 022272      MOV     #USSAV+8.,3$      ;
1156 022176 012737 004440 022302      MOV     #USSAV+8.,5$      ;
```



```
1157
1158 022204 104401 041404
1159 022210 104401 001205
1160 022214 012737 177777
1161 022222 012737 177777
1162 022230 012737 177777
1163 022236 004437 020454
1164 022242 005702
1165 022244 005737 001364
1166 022250 100412
1167 022252 005737 001366
1168 022256 100407
1169 022260 005737 001346
1170 022264 100404
1171 022266 004537 021602
1172 022272 000000
1173 022274 000747
1174 022276 004537 020710
1175 022302 000000
1176
1177 022304 104401 041467
1178 022310 104401 001205
1179 022314 012737 177777
1180 022322 012737 177777
1181 022330 012737 177777
1182 022336 004437 020454
1183 022342 005726
1184
1185 022344 005737 001364
1186 022350 100412
1187 022352 005737 001366
1188 022356 100407
1189 022360 005737 001346
1190 022364 100404
1191 022366 004537 021602
1192 022372 000000
1193 022374 000747
1194 022376 004537 020710
1195 022402 000000
1196 022404 012737 177777
1197 022412 000207
1198
1199 022414 010146
1200 022416 012701 001414
1201 022422 104401 041552
1202 022426 104401 001205
1203 022432 012146
1204 022434 100402
1205 022436 104402
1206 022440 000772
1207 022442 062706 000002
1208 022446 104401 041622
1209 022452 012701 002420
1210 022456 104401 001205
1211 022462 012146
1212 022464 100402
1213 022466 104402
```

```
1$: TYPE ,MSG7 ;MESSAGE FOR ENTER 16 BITS USR TABLE
TYPE ,$CRLF ;CR-LF
2$: MOV #-1,DS.CYL ;RESET THE INPUT VALUES
MOV #-1,DS.TRK ;
MOV #-1,SAVSEC ;
JSR R4,PARENT ;ENTER BAD SECTOR ADDRESS FROM THE KEYBOARD
TABLE2
TST DS.CYL ;UPDATED INPUT VALUE ?
BMI 4$ ;BR IF NOT
TST DS.TRK ;
BMI 4$ ;
TST SAVSEC ;
BMI 4$ ;
JSR R5,INSERT ;INSERT THE BAD SECTOR INTO TABLE
;TABLE ADDRESS
3$: .WORD 0 ;ENTER NEXT BAD SECTOR ADDRESS
BR 2$ ;SORT THE TABLE
4$: JSR R5,SORT2 ;TABLE ADDRESS
5$: .WORD 0 ;
TYPE ,MSG8 ;MESSAGE FOR 18 BIT USR TABLE
TYPE ,$CRLF ;CR-LF
6$: MOV #-1,DS.CYL ;RESET THE INPUT VALUES
MOV #-1,DS.TRK ;
MOV #-1,SAVSEC ;
JSR R4,PARENT ;ENTER BAD SECTOR FORM KEYBOARD
TABLE3
TST DS.CYL ;UPDATED INPUT VALUE ?
BMI 8$ ;BR IF NOT
TST DS.TRK ;BR IF NOT UPDATE
BMI 8$ ;
TST SAVSEC ;
BMI 8$ ;BR IF NOT UPDATED
JSR R5,INSERT ;INSERT THE BAD SECTOR INTO TABLE
BR 6$ ;BR TO ENTER NEXT SECTOR
7$: .WORD 0 ;SORT THE TABLE
8$: JSR R5,SORT2 ;TABLE ADDRESS
9$: .WORD 0 ;UPDATE BAD SECTOR FILE AT END OF PASS
MOV #-1,EDIT ;EXIT FORM THE TABCAL CALLING
RTS PC
FUNCT3: MOV R1,-(SP) ;SAVE R1
MOV #BAD16,R1 ;ADDRESS OF THE TABLE
TYPE ,MSG9 ;MSG TO TYPE THE 16 BIT MFG
1$: TYPE ,$CRLF ;CR-LF FIRST
MOV (R1)+,-(SP) ;CALLING SEQ FOR TYPOC RT.
BMI 2$ ;BR IF END OF TABLE
;TYPE THE VALUE
BR 1$ ;LOOPING BACK
2$: ADD #2,SP ;ADJUST THE RETURN ADDRESS
TYPE ,MSG10 ;MSG TO TYPE 18 BIT MFG
MOV #BAD18,R1 ;TABLE ADDRESS
3$: TYPE ,$CRLF ;
MOV (R1)+,-(SP) ;CALLING SEQ FOR TYPOC RT.
BMI 4$ ;BR IF END OF TABLE
;TYPE THE VALUE IN OCTAL
TYPOC
```

```
1214 022470 000772
1215 022472 062706 000002
1216 022476 012601
1217 022500 000207
1218
1219 022502 010146
1220 022504 010246
1221 022506 012701 003424
1222 022512 012702 004430
1223 022516 005737 001360
1224 022522 100404
1225 022524 012702 003424
1226 022530 012701 004430
1227 022534 104401 041672
1228 022540 104401 001205
1229 022544 012146
1230 022546 100402
1231 022550 104402
1232 022552 000772
1233 022554 062706 000002
1234 022560 104401 041742
1235 022564 104401 001205
1236 022570 012246
1237 022572 100402
1238 022574 104402
1239 022576 000772
1240 022600 062706 000002
1241 022604 012602
1242 022606 012601
1243 022610 000207
1244
1245 022612 010146
1246 022614 010246
1247 022616 005037 001420
1248 022622 005037 001422
1249 022626 012701 001424
1250 022632 012702 000374
1251 022636 012721 177777
1252 022642 005302
1253 022644 001374
1254 022646 005037 002424
1255 022652 005037 002426
1256 022656 012701 002430
1257 022662 012702 000374
1258 022666 012721 177777
1259 022672 005302
1260 022674 001374
1261 022676 012602
1262 022700 012601
1263 022702 104401 042041
1264 022706 000207
1265
1266 022710 010146
1267 022712 010246
1268 022714 005037 003430
1269 022720 005037 003432
1270 022724 012701 003434

4$: BR 3$ ;LOOPING BACK
5$: ADD #2,SP ;ADJUST THE RETURN ADDRESS
MOV (SP)+,R1 ;RESTORE THE R1
RTS PC ;EXIT FROM THE CALLING OF TABCAL

FUNCT4: MOV R1,-(SP) ;SAVE R1
MOV R2,-(SP) ;SAVE R2
MOV #USTAB,R1 ;SET 16 BIT MODE TABLE
MOV #USSAV,R2
TST SEC30 ;16 BIT MODE ?
BMI 1$ ;BR IF SO
MOV #USTAB,R2 ;OTHERWISE,RELOAD THE TABLE ADDRESS
MOV #USSAV,R1
1$: TYPE ,MSG11 ;MSG FOR 16 BIT
2$: TYPE ,$CRLF
MOV (R1)+,-(SP)
BMI 3$ ;BR IF END OF TABLE
TYP0C
BR 2$
3$: ADD #2,SP ;ADJUST STACK POINTER
TYPE ,MSG12 ;MESSAGE FOR 18 BIT MODE
4$: TYPE ,$CRLF ;CR-LF
MOV (R2)+,-(SP)
BMI 5$ ;BR IF END OF TABLE
TYP0C
BR 4$ ;NEXT SECTOR ADDRESS
5$: ADD #2,SP ;ADJUST THE STACK POINT
MOV (SP)+,R2 ;RESTORE R2,R1
MOV (SP)+,R1
RTS PC ;EXIT FROM THE CALLING OF TABCAL

FUNCT5: MOV R1,-(SP) ;SAVE R1,R2
MOV R2,-(SP)
CLR BAD16+4.
CLR BAD16+6.
MOV #BAD16+8.,R1 ;START AT THE 5TH WORD
MOV #252.,R2 ;WORD CTR
1$: MOV #-1,(R1)+ ;RESET TO -1
DEC R2 ;DECREMENT WORD CTR
BNE 1$ ;BR IF NOT DONE
CLR BAD18+4.
CLR BAD18+6.
MOV #BAD18+8.,R1 ;START AT THE 5TH WORD
MOV #252.,R2 ;WORD CTR
2$: MOV #-1,(R1)+ ;RESET TO -1
DEC R2 ;DECREMENT WORD CTR
BNE 2$ ;BR IF NOT DONE
MOV (SP)+,R2 ;RESTORE R2,R1
MOV (SP)+,R1
TYPE ,MSG14 ;DONE MESSAGE
RTS PC ;EXIT FROM THE TABCAL CALLING

FUNCT6: MOV R1,-(SP) ;STORE R1,R2
MOV R2,-(SP)
CLR USTAB+4
CLR USTAB+6
MOV #USTAB+8.,R1
```



```
1271 022730 012702 000374      MOV      #252.,R2      ;WORD CTR
1272 022734 012721 177777      1$: MOV      #-1,(R1)+    ;RESET TO -1
1273 022740 005302              DEC      R2              ;DECREMENT WORD CTR
1274 022742 001374              BNE      1$              ;BR IF NOT DONE
1275 022744 005037 004434      CLR      USSAV+4
1276 022750 005037 004436      CLR      USSAV+6
1277 022754 012701 004440      MOV      #USSAV+8.,R1    ;TABLE ADDRESS
1278 022760 012702 000374      MOV      #252.,R2
1279 022764 012721 177777      2$: MOV      #-1,(R1)+    ;RESET TO -1
1280 022770 005302              DEC      R2              ;DECREMENT WORD CTR
1281 022772 001374              BNE      2$              ;BR IF NOT DONE
1282 022774 012602              MOV      (SP)+,R2        ;RESTORE R1,R2
1283 022776 012601              MOV      (SP)+,R1
1284 023000 104401 042041      TYPE      ,MSG14          ;DONE MESSAGE
1285 023004 012737 177777 001406 MOV      #-1,EDIT    ;UPDATE BAD SECTOR FILE AT END OF PASS
1286 023012 000207              RTS      PC              ;EXIT FORM THE TABCAL CALLING
1287
1288 023014 104401 042012      FUNCT7: TYPE      ,MSG13    ;MESSAGE ENTER SECTOR #
1289 023020 104411              1$: RDLIN
1290 023022 012601              MOV      (SP)+,R1        ;READ THE SECTOR NUMBER
1291 023024 012702 000040      MOV      #32.,R2          ;ADDRESS OF READ-IN BUFFER
1292 023030 004537 023462      JSR      R5,CK.DIG        ;MAX VALUE
1293 023034 023050              2$
1294 023036 023050              2$
1295 023040 023020              1$
1296 023042 023050              2$
1297 023044 023050              2$
1298 023046 023050              2$
1299 023050 006302              2$: ASL      R2            ;FOUND THE WORD INDEX
1300 023052 016201 006132      MOV      ADRTBL(R2),R1    ;ADDRESS OF THE BUFFER
1301 023056 012702 000402      MOV      #258.,R2        ;WC FOR WHOLE SECTOR INCLUDING HEADER
1302 023062 104401 001205      3$: TYPE      ,%CRLF      ;CR-LF
1303 023066 012705 000010      MOV      #10,R5          ;8 WORDS ON A LINE
1304 023072 012146              4$: MOV      (R1)+,-(SP)  ;CONTENTS OF THE BUFFER
1305 023074 104402              TYPE
1306 023076 104401 036425      TYPE      ,BLNKS2        ;TYPE 2 SPACES
1307 023102 005302              DEC      R2              ;DECREMENT WORD CTR
1308 023104 001403              BEQ      5$              ;BR IF FINISH
1309 023106 005305              DEC      R5              ;START ANOTHER LINE ?
1310 023110 001370              BNE      4$              ;BR IF NOT
1311 023112 000763              BR       3$              ;BR IF SO
1312 023114 104401 001205      5$: TYPE      ,%CRLF      ;CR-LF
1313 023120 000207              RTS      PC              ;EXIT FROM TABCAL CALLING
1314
1315 023122 104401 042051      FUNCT8: TYPE      ,MSG15    ;RESET ALL INPUT VALUES
1316 023126 012737 177777 001364 1$: MOV      #-1,DS.CYL  ;TRACK NUMBER
1317 023134 012737 177777 001366      MOV      #-1,DS.TRK  ;BYTE NUMBER
1318 023142 012737 047301 001346      MOV      #20161.,SAVSEC ;ENTER THE VALUE FROM KEYBOARD
1319 023150 004437 020454      JSR      R4,PARENT
1320 023154 005752              TABLE4
1321
1322 023156 005737 001364      TST      DS.CYL          ;UPDATED ?
1323 023162 100455              BMI      6$              ;EXIT IF NOT
1324 023164 005737 001366      TST      DS.TRK          ;BR IF NOT UPDATED
1325 023170 100452              BMI      6$              ;
1326 023172 005737 001346      TST      SAVSEC          ;BR TO EXIT IF NEG
1327 023176 100447              BMI      6$              ;EXIT
```

```
1328 023200 022737 047301 001346      CMP      #20161.,SAVSEC      ;TOO LARGE ?
1329 023206 003443                      BLE      6$              ;BR IF SO,EXIT
1330 023210 010446                      MOV      R4,-(SP)          ;SAVE R4
1331 023212 013746 001346              MOV      SAVSEC,-(SP)        ;SAVE SAVSEC
1332 023216 005004                      CLR      R4              ;INDEX STARTS FROM 0
1333 023220 023764 001346 006332 2$:    CMP      SAVSEC,BYTE16(R4)    ;LOCATE THE SECTOR ADDRESS
1334 023226 101403                      BLOS     3$              ;BR IF FOUND
1335 023230 062704 000002              ADD      #2,R4            ;TRY NEXT SECTOR
1336 023234 000771                      BR       2$              ;LOOPING
1337 023236 006204                      3$:    ASR      R4              ;SECTOR ADDRESS
1338 023240 010437 001346              MOV      R4,SAVSEC          ;16 BIT MODE BAD SECTOR ADD
1339 023244 004537 021602              JSR      R5,INSERT        ;INSERT INTO TABLE
1340 023250 001424                      BAD16+8.
1341 023252 012637 001346              MOV      (SP)+,SAVSEC      ;LOCATE SECTOR FOR 18 BIT
1342 023256 005004                      CLR      R4              ;RESET INDEX VALUE
1343 023260 023764 001346 006432 4$:    CMP      SAVSEC,BYTE18(R4)    ;USE TABLE 18 BIT
1344 023266 101403                      BLOS     5$              ;BR IF FOUND
1345 023270 062704 000002              ADD      #2,R4            ;TRY NEXT SECTOR IF NOT FOUND
1346 023274 000771                      BR       4$              ;LOOPIN BACK
1347 023276 006204                      5$:    ASR      R4              ;SECTOR ADDRESS
1348 023300 010437 001346              MOV      R4,SAVSEC          ;
1349 023304 004537 021602              JSR      R5,INSERT        ;INSET INTO TABLE
1350 023310 002430                      BAD18+8.
1351 023312 012604                      MOV      (SP)+,R4          ;RESTORE R4
1352 023314 000704                      BR       1$              ;LOOPING BACK
1353 023316 004537 020710              6$:    JSR      R5,SORT2        ;SORT BOTH TABLE ANYWAY
1354 023322 001424                      BAD16+8.
1355 023324 004537 020710              JSR      R5,SORT2        ;
1356 023330 002430                      BAD18+8.
1357 023332 000207                      RTS       PC              ;RETURN TO SERVICE LOOP
```

```
1358
1359      ;THIS ROUTINE IS USED TO CHECK IF AN
1360      ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
1361      ;CALL
1362      :    MOV      #ADR,R1      ;ADDRESS OF ASCII CHARACTER
1363      :    JSR      R5,CK.OCT    ;CHECK THE CHARACTER
1364      :    RETURN1              ;CHARACTER IS NOT BETWEEN 0-7
1365      :    RETURN2              ;CHARACTER IS IN R2 AS A
1366      :                          ;OCTAL DIGIT
```

```
1367
1368 023334 121127 000060      CK.OCT: CMPB     (R1),#0      ;LESS THAN ZERO?
1369 023340 103407                      BLO      1$              ;YES
1370 023342 121127 000067      CMPB     (R1),#7      ;GREATER THAN SEVEN?
1371 023346 101004                      BHI      1$              ;YES
1372 023350 111102                      MOVB     (R1),R2        ;GET THE CHARACTER
1373 023352 042702 177770      BIC      #^C7,R2        ;STRIP AWAY THE ASCII
1374 023356 005725                      TST      (R5)+          ;ADJUST FOR RETURN
1375 023360 000205      1$:    RTS       R5              ;RETURN
```

```
1376
1377      ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
1378      ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
1379      ;CALL
1380      :    MOV      #ADR,R1      ;ADDRESS OF ASCII CHARACTER
1381      :    JSR      R5,CK.DEC    ;CHECK THE CHARACTER
1382      :    RETURN1              ;NOT BETWEEN 0 AND 9
1383      :    RETURN2              ;BETWEEN 0 AND 9
1384      :                          ;R2 = DIGIT
```



```
1385
1386 023362 121127 000060      CK.DEC: CMPB    (R1),#'0      ;LESS THAN ZERO?
1387 023366 103407              BLO      1$          ;YES
1388 023370 121127 000071      CMPB    (R1),#'9      ;GREATER THAN NINE?
1389 023374 101004              BHI      1$          ;YES
1390 023376 111102              MOVB    (R1),R2       ;GET THE CHARACTER
1391 023400 042702 000060      BIC      #'0,R2       ;STRIP AWAY THE ASCII
1392 023404 005725              TST     (R5)+        ;ADJUST FOR RETURN
1393 023406 000205              1$:    RTS      R5      ;RETURN
1394
1395      ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
1396      ;DETERMINE WHAT IT IS.
1397      ;CALL
1398      ;      MOV      #ADR,R1      ;ADDRESS OF ASCII CHARACTER
1399      ;      JSR      R5,CK.CHR    ;CHECK CHARACTER
1400      ;      RETURN   ADR1        ;UNKNOWN CHARACTER
1401      ;      RETURN   ADR2        ;CARRIAGE RETURN * (R1)=ADR+1
1402      ;      RETURN   ADR3        ;COMMA * (R1)=ADR+1
1403      ;      RETURN   ADR4        ;PERIOD * (R1)=ADR+1
1404      ;      RETURN   ADR5        ;DIGIT BETWEEN 0 AND 7.
1405      ;      RETURN   ADR6        ;DIGIT BETWEEN 8 AND 9.
1406      ;      ;R2 = DIGIT * (R1)=ADR+1
1407
1408 023410 105711      CK.CHR: TSTB    (R1)          ;'CARRIAGE RETURN'?
1409 023412 001417      BEQ      3$          ;YES
1410 023414 121127 000054      CMPB    (R1),#',      ;'COMMA'?
1411 023420 001413      BEQ      2$          ;YES
1412 023422 121127 000056      CMPB    (R1),#'.      ;'PERIOD'?
1413 023426 001407      BEQ      1$          ;YES
1414 023430 004537 023362      JSR      R5,CK.DEC    ;'DIGIT'?
1415 023434 000410      BR       4$          ;NO
1416 023436 004537 023334      JSR      R5,CK.OCT    ;OCTAL ?
1417 023442 005725      TST     (R5)+        ;DIGIT BETWEEN 8-9
1418 023444 005725      TST     (R5)+        ;DIGIT BETWEEN 0-7
1419 023446 005725      1$:    TST     (R5)+        ;PERIOD
1420 023450 005725      2$:    TST     (R5)+        ;COMMA
1421 023452 005725      3$:    TST     (R5)+        ;CARRIAGE RETURN
1422 023454 005201      INC      R1          ;MOVE POINTER TO NEXT CHARACTER
1423 023456 011505      4$:    MOV     (R5),R5      ;UNKNOWN CHARACTER
1424 023460 000205      RTS      R5          ;RETURN
1425
1426      ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
1427      ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
1428      ;CALL
1429      ;      MOV      #ADR,R1      ;ADDRESS OF ASCII STRING
1430      ;      MOV      #NUM,R2      ;MAX. MAGNITUDE OF INPUT NUMBER
1431      ;      JSR      R5,CK.DIG    ;CHECK DIGITS
1432      ;      RETURN   ADR1        ;'CR' ONLY ENTERED -- R2=0
1433      ;      RETURN   ADR2        ;'PERIOD' ONLY ENTERED -- R2=0
1434      ;      RETURN   ADR3        ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2=?
1435      ;      RETURN   ADR4        ;'CR' -- R2 = NUMBER
1436      ;      RETURN   ADR5        ;'COMMA' -- R2 = NUMBER
1437      ;      RETURN   ADR6        ;'PERIOD' -- R2 = NUMBER
1438
1439 023462 010446      CK.DIG: MOV     R4,-(SP)      ;SAVE R4
1440 023464 010346      MOV     R3,-(SP)      ;SAVE R3
1441 023466 010246      MOV     R2,-(SP)      ;SAVE THE MAX. SIZE ON THE STACK
```

```
1442 023470 005002          CLR      R2          ;START WITH 0
1443 023472 005003          CLR      R3
1444 023474 005004          CLR      R4
1445 023476 004537 023410   JSR      R5,CK.CHR    ;CHECK ONE CHARACTER
                                6$          ;ILLEGAL CHARACTER
                                9$          ;CARRIAGE RETURN
                                6$          ;
                                7$          ;
                                1$          ;DIGIT 0-7
                                1$          ;DIGIT 8-9
1446 023516 062705 000004   1$:  ADD      #4,R5    ;STEP RETURN POINTER PAST 'CR' & 'PERIOD' RETURNS
1447 023522 006303          2$:  ASL      R3        ;INPUT NUMBER *2
1448 023524 010346          MOV      R3,-(SP)      ;SAVE *2
1449 023526 006303          ASL      R3            ;*4
1450 023530 006303          ASL      R3            ;*8
1451 023532 062603          ADD      (SP)+,R3      ;(*2)+(*8) = *10
1452 023534 060203          ADD      R2,R3        ;UPDATE THE INPUT NUMBER
1453 023536 004537 023410   JSR      R5,CK.CHR    ;CHECK ONE CHARACTER
                                8$          ;ILLEGAL CHARACTER
                                5$          ;CARRIAGE RETURN
                                4$          ;
                                3$          ;
                                2$          ;DIGIT 0-7
                                2$          ;DIGIT 8-9
1454 023556 105711          3$:  TSTB     (R1)      ;DOES A 'CR' FOLLOW THE 'PERIOD'
1455 023560 001010          BNE      8$          ;BR IF NOT
1456 023562 005724          TST      (R4)+        ;INCREMENT THE RETURN
1457 023564 005724          4$:  TST      (R4)+        ;INCREMENT THE RETURN
1458 023566 005724          5$:  TST      (R4)+        ;INCREMENT THE RETURN
1459 023570 020316          CMP      R3,(SP)      ;CHECK THE MAGNITUDE OF THE NUMBER
1460 023572 002004          BGE      9$          ;BR IF ENTERED NUMBER TOO LARGE
1461 023574 000402          BR       8$          ;BYPASS INCREMENT
1462 023576 005725          6$:  TST      (R5)+        ;INCREMENT RETURN PAST INVALID RETURN
1463 023600 005725          7$:  TST      (R5)+        ;INCREMENT RETURN
1464 023602 060405          8$:  ADD      R4,R5      ;SETUP RETURN POINTER
1465 023604 010302          9$:  MOV      R3,R2      ;ENTERED VALUE
1466 023606 005726          TST      (SP)+        ;CLEAN MAX. SIZE OFF OF STACK
1467 023610 012603          MOV      (SP)+,R3      ;RESTORE R3
1468 023612 012604          MOV      (SP)+,R4      ;RESTORE R4
1469 023614 011505          MOV      (R5),R5      ;GET RETURN ADDRESS
1470 023616 000205          RTS      R5          ;RETURN
```

```
1471
1472          .SBTTL  MACRO ROUTINES
1473
1485
1486
```

```
.SBTTL  ERROR HANDLER ROUTINE
```

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



```

; *      ERROR      N      ;; ERROR=EMT AND N=ERROR ITEM NUMBER
$ERROR:
023620      104407      001370      CKSWR      ;; TEST FOR CHANGE IN SOFT-SWR
023622      010137      001372      MOV      R1,DDRIVE      ;; DRIVE ADDRESS IF DRIVE ERROR CALL
023626      010337      001372      MOV      R3,ATTN      ;; ATTENTION REGISTER CONTENTS
023632      013737      005552      001364      MOV      FMTDPB+12,DS.CYL      ;; CURRENT CYLINDER ADDRESS
023640      113737      005551      001366      MOV      FMTDPB+11,DS.TRK      ;; REQUESTED TRACK ADDRESS
023646      005737      005564      TST      RM.REG+RMBA      ;; NON-ZERO BUFFER ADDRESS ?
023652      001406      BEQ      7$      ;; BR IF NO BUFFER ADDRESS
023654      013746      005564      MOV      RM.REG+RMBA,-(SP)      ;; BUFFER ADDRESS
023660      162716      000002      SUB      #2,(SP)      ;; DECREMENT THE ADDRESS
023664      013637      001140      MOV      @ (SP)+,$GDDAT      ;; GET THE BUFFER WORD WHICH DIDN'T COMPARE
023670      105237      001117      7$:      INCB      $ERFLG      ;; SET THE ERROR FLAG
023674      001775      BEQ      7$      ;; DON'T LET THE FLAG GO TO ZERO
023676      013777      001116      155252      MOV      $TSTNM,@DISPLAY      ;; DISPLAY TEST NUMBER AND ERROR FLAG
023704      032777      002000      155242      BIT      #BIT10,@SWR      ;; BELL ON ERROR?
023712      001402      BEQ      1$      ;; NO - SKIP
023714      104401      001200      TYPE      $BELL      ;; RING BELL
023720      005237      001126      1$:      INC      $ERTTL      ;; COUNT THE NUMBER OF ERRORS
023724      011637      001132      MOV      (SP),$ERRPC      ;; GET ADDRESS OF ERROR INSTRUCTION
023730      162737      000002      001132      SUB      #2,$ERRPC
023736      117737      155170      001130      MOV      @ $ERRPC,$ITEMB      ;; STRIP AND SAVE THE ERROR ITEM CODE
023744      032777      020000      155202      BIT      #BIT13,@SWR      ;; SKIP TYPEOUT IF SET
023752      001004      BNE      20$      ;; SKIP TYPEOUTS
023754      004737      024054      JSR      PC,TYPERR      ;; GO TO USER ERROR ROUTINE
023760      104401      001205      TYPE      $CRLF
023764      122737      000001      001230      20$:      CMPB      #APTENV,$ENV      ;; RUNNING IN APT MODE
023772      001007      BNE      2$      ;; NO, SKIP APT ERROR REPORT
023774      113737      001130      024006      MOV      $ITEMB,21$      ;; SET ITEM NUMBER AS ERROR NUMBER
024002      004737      024656      JSR      PC,$ATY4      ;; REPORT FATAL ERROR TO APT
024006      000      21$:      .BYTE      0
024007      000      .BYTE      0
024010      000777      22$:      BR      22$      ;; APT ERROR LOOP
024012      005777      155136      2$:      TST      @SWR      ;; HALT ON ERROR
024016      100002      BPL      3$      ;; SKIP IF CONTINUE
024020      000000      HALT      ;; HALT ON ERROR!
024022      104407      CKSWR      ;; TEST FOR CHANGE IN SOFT-SWR
024024      032777      001000      155122      3$:      BIT      #BIT09,@SWR      ;; LOOP ON ERROR SWITCH SET?
024032      001402      BEQ      4$      ;; BR IF NO
024034      013716      001124      MOV      $LPERR,(SP)      ;; FUDGE RETURN FOR LOOPING
024040      005737      001176      4$:      TST      $ESCAPE      ;; CHECK FOR AN ESCAPE ADDRESS
024044      001402      BEQ      5$      ;; BR IF NONE
024046      013716      001176      MOV      $ESCAPE,(SP)      ;; FUDGE RETURN ADDRESS FOR ESCAPE
024052      5$:
024052      000002      RTI      ;; RETURN

; 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.

1487
1488
1489
1490
1491
1492
1493
1494      024054      104412      TYPERR: SAVREG      ;; SAVE R0-R5
1495      024056      005000      CLR      R0      ;; CLEAR R0 FOR ERROR NUMBER
1496      024060      113700      001130      MOV      $ITEMB,R0      ;; ERROR NUMBER
```


1497	024064	005300		DEC	R0	:FORM INDEX FOR ERROR TABLE
1498	024066	006300		ASL	R0	
1499	024070	006300		ASL	R0	
1500	024072	006300		ASL	R0	
1501	024074	062700	006526	1\$: ADD	#ERRTB,R0	:FORM ADDRESS
1502	024100	012037	024114	MOV	(R0)+,2\$	:GET ERROR MESSAGE (EM) POINTER
1503	024104	001404		BEQ	3\$	:BR IF THERE ISN'T ONE
1504	024106	104401	001205	TYPE	, \$CRLF	: 'CARRIAGE RETURN - LINE FEED
1505	024112	104401		TYPE		
1506	024114	000000		2\$: .WORD	0	: 'EM' POINTER GOES HERE
1507	024116	012037	024132	3\$: MOV	(R0)+,4\$	: PICK UP DATA HEADER (DH) POINTER
1508	024122	001404		BEQ	5\$	: BR IF NONE
1509	024124	104401	001205	TYPE	, \$CRLF	: CARRIAGE RETURN-LINE FEED
1510	024130	104401		TYPE		
1511	024132	000000		4\$: .WORD	0	: 'DH' POINTER GOES HERE
1512	024134	012001		5\$: MOV	(R0)+,R1	: PICKUP DATA TABLE (DT) POINTER
1513	024136	001460		BEQ	15\$	: BR IF NONE
1514	024140	005005		CLR	R5	: SET INDENT SWITCH
1515	024142	012000		MOV	(R0)+,R0	: DATA FORMAT (DF) POINTER
1516	024144	012002		MOV	(R0)+,R2	: NUMBER OF DH'S TO TYPE
1517	024146	001451		BEQ	14\$	: BR IF DH NUMBER IS 0
1518	024150	005105		COM	R5	: NO INDENT
1519	024152	104401	001205	TYPE	, \$CRLF	: CARRIAGE RETURN-LINE FEED
1520	024156	112003		6\$: MOVB	(R0)+,R3	: NUMBER OF DATA WORDS TO TYPE
1521	024160	112004		MOVB	(R0)+,R4	: AND HOW TO TYPE THEM
1522	024162	006004		7\$: ROR	R4	: OCTAL OR DECIMAL?
1523	024164	103403		BCS	8\$	: DECIMAL
1524	024166	013146		MOV	@(R1)+, -(SP)	: SAVE @(R1)+ FOR TYPEOUT
	024170	104402		TYPOC		: GO TYPE--OCTAL ASCII(ALL DIGITS)
1525	024172	000402		BR	9\$	
1526	024174			8\$: MOV	@(R1), -(SP)	: SAVE @(R1)+ FOR TYPEOUT
	024174	013146		TYPDS		: GO TYPE--DECIMAL ASCII WITH SIGN
	024176	104405		9\$: DEC	R3	: MORE NUMBERS TO TYPE?
1527	024200	005303		BEQ	10\$	: NO
1528	024202	001403		TYPE	, BLNKS2	: TYPE 2 SPACES
1529	024204	104401	036425	BR	7\$	: LOOP
1530	024210	000764		10\$: DEC	R2	: MORE DH'S?
1531	024212	005302		BLE	15\$	: NO
1532	024214	003431		TYPE	, \$CRLF	: YES--START A NEW LINE
1533	024216	104401	001205	TST	2(R0)	: ONLY A 'DH' IN THIS REQUEST ?
1534	024222	005760	000002	BEQ	11\$	: BR IF YES - BYPASS THE INDENT
1535	024226	001404		COM	R5	: INDENT?
1536	024230	005105		BNE	11\$	: NO
1537	024232	001002		TYPE	, BLNKS2	: TYPE 2 SPACES
1538	024234	104401	036425	11\$: MOV	(R0)+,12\$	: GET NEXT DH
1539	024240	012037	024246	TYPE		: AND TYPE IT
1540	024244	104401		12\$: .WORD	0	: DH POINTER GOES HERE
1541	024246	000000		TST	(R0)	: TYPE A 'DT' ?
1542	024250	005710		BNE	13\$	: BR IF A 'DT'
1543	024252	001003		ADD	#4,R0	: INCREMENT THE 'DF' POINTER
1544	024254	062700	000004	BR	10\$	: SEE IF END OF 'DF' BLOCK
1545	024260	000754		13\$: TYPE	, \$CRLF	: CARRIAGE RETURN-LINE FEED
1546	024262	104401	001205	TST	R5	: INDENT?
1547	024266	005705		BNE	6\$	: NO
1548	024270	001332		14\$: TYPE	, BLNKS2	: TYPE 2 SPACES
1549	024272	104401	036425	BR	6\$	: LOOP
1550	024276	000727				

1551 024300 104413
1552 024302 000207
1553
155415\$: RESREG
RTS PC :RESTORE R0-R5
:RETURN

.SBTTL TYPE ROUTINE

:ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
:THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
:*NOTE1: \$NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
:*NOTE2: \$FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
:*NOTE3: \$FILLC CONTAINS THE CHARACTER TO FILL AFTER.:*CALL:
:*1) USING A TRAP INSTRUCTION
:* TYPE ,MESADR ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
:*OR
:* TYPE
:* MESADR
:*

024304	105737	001173	STYPE:	TSTB	\$TPFLG	::IS THERE A TERMINAL?
024310	100002			BPL	1\$	::BR IF YES
024312	000000			HALT		::HALT HERE IF NO TERMINAL
024314	000430			BR	3\$	::LEAVE
024316	010046		1\$:	MOV	R0,-(SP)	::SAVE R0
024320	017600	000002		MOV	@2(SP),R0	::GET ADDRESS OF ASCIZ STRING
024324	122737	000001 001230		CMPB	#APTENV,\$ENV	::RUNNING IN APT MODE
024332	001011			BNE	62\$	::NO,GO CHECK FOR APT CONSOLE
024334	132737	000100 001231		BITB	#APTPOOL,\$ENV	::SPOOL MESSAGE TO APT
024342	001405			BEQ	62\$	::NO,GO CHECK FOR CONSOLE
024344	010037	024354		MOV	R0,61\$	::SETUP MESSAGE ADDRESS FOR APT
024350	004737	024646		JSR	PC,\$ATY3	::SPOOL MESSAGE TO APT
024354	000000		61\$:	.WORD	0	::MESSAGE ADDRESS
024356	132737	000040 001231	62\$:	BITB	#APTCUP,\$ENV	::APT CONSOLE SUPPRESSED
024364	001003			BNE	60\$	::YES,SKIP TYPE OUT
024366	112046		2\$:	MOVB	(R0)+,-(SP)	::PUSH CHARACTER TO BE TYPED ONTO STACK
024370	001005			BNE	4\$	::BR IF IT ISN'T THE TERMINATOR
024372	005726			TST	(SP)+	::IF TERMINATOR POP IT OFF THE STACK
024374	012600		60\$:	MOV	(SP)+,R0	::RESTORE R0
024376	062716	000002	3\$:	ADD	#2,(SP)	::ADJUST RETURN PC
024402	000002			RTI		::RETURN
024404	122716	000011	4\$:	CMPB	#HT,(SP)	::BRANCH IF <HT>
024410	001430			BEQ	8\$	
024412	122716	000200		CMPB	#CRLF,(SP)	::BRANCH IF NOT <CRLF>
024416	001006			BNE	5\$	
024420	005726			TST	(SP)+	::POP <CR><LF> EQUIV
024422	104401			TYPE		::TYPE A CR AND LF
024424	001205			\$CRLF		
024426	105037	024634		CLRB	\$CHARCNT	::CLEAR CHARACTER COUNT
024432	000755			BR	2\$	::GET NEXT CHARACTER
024434	004737	024516	5\$:	JSR	PC,\$TYPEC	::GO TYPE THIS CHARACTER
024440	123726	001172	6\$:	CMPB	\$FILLC,(SP)+	::IS IT TIME FOR FILLER CHARS.?
024444	001350			BNE	2\$	::IF NO GO GET NEXT CHAR.
024446	013746	001170		MOV	\$NULL,-(SP)	::GET # OF FILLER CHARS. NEEDED
						::AND THE NULL CHAR.
024452	105366	000001	7\$:	DECB	1(SP)	::DOES A NULL NEED TO BE TYPED?
024456	002770			BLT	6\$	::BR IF NO--GO POP THE NULL OFF OF STACK

```
024460 004737 024516      JJR      PC,$TYPEC      ;;GO TYPE A NULL
024464 105337 024634      DEC8     $CHARCNT      ;;DO NOT COUNT AS A COUNT
024470 000770              BR        7$          ;;LOOP

      ;HORIZONTAL TAB PROCESSOR

024472 112716 000040      8$:      MOV8     #' (SP)      ;;REPLACE TAB WITH SPACE
024476 004737 024516      9$:      JSR      PC,$TYPEC      ;;TYPE A SPACE
024502 132737 000007 024634      BIT8     #7,$CHARCNT      ;;BRANCH IF NOT AT
024510 001372              BNE      9$          ;;TAB STOP
024512 005726              TST      (SP)+      ;;POP SPACE OFF STACK
024514 000724              BR        2$          ;;GET NEXT CHARACTER
024516              $TYPEC:
024516 105777 154436      TST8     @ $TKS      ;;CHAR IN KYBD BUFFER?
024522 100022              BPL      10$          ;;BR IF NOT
024524 017746 154432      MOV      @ $TKB,-(SP)      ;;GET CHAR
024530 042716 177600      BIC      #177600,(SP)      ;;STRIP EXTRANEIOUS BITS
024534 122716 000023      CMP8     # $XOFF,(SP)      ;;WAS CHAR XOFF
024540 001012              BNE      102$          ;;BR IF NOT
024542              101$:
024542 105777 154412      TST8     @ $TKS      ;;WAIT FOR CHAR
024546 100375              BPL      101$          ;;BR IF NOT
024550 117716 154406      MOV8     @ $TKB,(SP)      ;;GET CHAR
024554 042716 177600      BIC      #177600,(SP)      ;;STRIP IT
024560 122716 000021      CMP8     # $XON,(SP)      ;;WAS IT XON?
024564 001366              BNE      101$          ;;BR IF NOT
024566              102$:
024566 005726              TST      (SP)+      ;;FIX STACK
024570              10$:
024570 105777 154370      TST8     @ $TPS      ;;WAIT UNTIL PRINTER IS READY
024574 100375              BPL      10$          ;;BR IF NOT
024576 116677 000002 154362      MOV8     2(SP),@ $TPB      ;;LOAD CHAR TO BE TYPED INTO DATA REG.
024604 122766 000015 000002      CMP8     #CR,2(SP)      ;;IS CHARACTER A CARRIAGE RETURN?
024612 001003              BNE      1$          ;;BRANCH IF NO
024614 105037 024634      CLRB     $CHARCNT      ;;YES--CLEAR CHARACTER COUNT
024620 000406              BR        $TYPEX      ;;EXIT
024622 122766 000012 000002 1$:      CMP8     #LF,2(SP)      ;;IS CHARACTER A LINE FEED?
024630 001402              BEQ      $TYPEX      ;;BRANCH IF YES
024632 105227              INCB     (PC)+      ;;COUNT THE CHARACTER
024634 000000              $CHARCNT: .WORD 0      ;;CHARACTER COUNT STORAGE
024636 000207              $TYPEX: RTS      PC
```

1555
1556

.SBTTL APT COMMUNICATIONS ROUTINE

```
*****
024640 112737 000001 025104 $ATY1: MOV8     #1,$FFLG      ;;TO REPORT FATAL ERROR
024646 112737 000001 025102 $ATY3: MOV8     #1,$MFLG      ;;TO TYPE A MESSAGE
024654 000403              BR        $ATYC
024656 112737 000001 025104 $ATY4: MOV8     #1,$FFLG      ;;TO ONLY REPORT FATAL ERROR
024664              $ATYC:
024664 010046              MOV      R0,-(SP)      ;;PUSH R0 ON STACK
024666 010146              MOV      R1,-(SP)      ;;PUSH R1 ON STACK
024670 105737 025102              TST8     $MFLG      ;;SHOULD TYPE A MESSAGE?
024674 001450              BEQ      3$          ;;IF NOT: BR
024676 122737 000001 001230      CMP8     #APTENV,$ENV      ;;OPERATING UNDER APT?
024704 001031              BNE      3$          ;;IF NOT: BR
```



```
024706 132737 000100 001231      BITB      #APTSPOOL,$ENVM  ;; SHOULD SPOOL MESSAGES?
024714 001425                      BEQ        3$              ;; IF NOT: BR
024716 017600 000004                      MOV      @4(SP),R0      ;; GET MESSAGE ADDR.
024722 062766 000002 000004      ADD      #2,4(SP)      ;; BUMP RETURN ADDR.
024730 005737 001210      1$:      TST      $MSGTYPE      ;; SEE IF DONE W/ LAST XMISSION?
024734 001375                      BNE        1$              ;; IF NOT: WAIT
024736 010037 001224      MOV      R0,$MSGAD      ;; PUT ADDR IN MAILBOX
024742 105720      2$:      TSTB      (R0)+      ;; FIND END OF MESSAGE
024744 001376                      BNE        2$
024746 163700 001224      SUB      $MSGAD,R0      ;; SUB START OF MESSAGE
024752 006200                      ASR        R0      ;; GET MESSAGE LGTH IN WORDS
024754 010037 001226      MOV      R0,$MSGGLT      ;; PUT LENGTH IN MAILBOX
024760 012737 000004 001210      MOV      #4,$MSGTYPE      ;; TELL APT TO TAKE MSG.
024766 000413                      BR         5$
024770 017637 000004 025014 3$:      MOV      @4(SP),4$      ;; PUT MSG ADDR IN JSR LINKAGE
024776 062766 000002 000004      ADD      #2,4(SP)      ;; BUMP RETURN ADDRESS
025004 013746 177776      MOV      177776,-(SP)      ;; PUSH 177776 ON STACK
025010 004737 024304      JSR      PC,$TYPE      ;; CALL TYPE MACRO
025014 000000      4$:      .WORD      0
025016      5$:
025016 105737 025104      10$:     TSTB      $FFLG      ;; SHOULD REPORT FATAL ERROR?
025022 001416                      BEQ        12$      ;; IF NOT: BR
025024 005737 001230      TST      $ENV      ;; RUNNING UNDER APT?
025030 001413                      BEQ        12$      ;; IF NOT: BR
025032 005737 001210      11$:     TST      $MSGTYPE      ;; FINISHED LAST MESSAGE?
025036 001375                      BNE        11$      ;; IF NOT: WAIT
025040 017637 000004 001212      MOV      @4(SP),$FATAL      ;; GET ERROR #
025046 062766 000002 000004      ADD      #2,4(SP)      ;; BUMP RETURN ADDR.
025054 005237 001210      INC      $MSGTYPE      ;; TELL APT TO TAKE ERROR
025060 105037 025104      12$:     CLRB      $FFLG      ;; CLEAR FATAL FLAG
025064 105037 025103      CLRB      $LFLG      ;; CLEAR LOG FLAG
025070 105037 025102      CLRB      $MFLG      ;; CLEAR MESSAGE FLAG
025074 012601      MOV      (SP)+,R1      ;; POP STACK INTO R1
025076 012600      MOV      (SP)+,R0      ;; POP STACK INTO R0
025100 000207      RTS      PC      ;; RETURN
025102 000      $MFLG: .BYTE      0      ;; MESSG. FLAG
025103 000      $LFLG: .BYTE      0      ;; LOG FLAG
025104 000      $FFLG: .BYTE      0      ;; FATAL FLAG
                        .EVEN
```

```
APTSIZE = 200
APTENV = 001
APTSPOOL = 100
APTCSUP = 040
```

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

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

```
1557
1558
```

```

;*
;*$TYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
;*$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
025106 017646 000000
025112 116637 000001 025331 $TYPOS: MOV @ (SP),-(SP) ;;PICKUP THE MODE
025120 112637 025333 MOV 1(SP), $OFILL ;;LOAD ZERO FILL SWITCH
025124 062716 000002 MOV  (SP)+, $OMODE+1 ;;NUMBER OF DIGITS TO TYPE
025130 000406 ADD #2, (SP) ;;ADJUST RETURN ADDRESS
025132 112737 000001 025331 $TYPOC: MOV #1, $OFILL ;;SET THE ZERO FILL SWITCH
025140 112737 000006 025333 MOV #6, $OMODE+1 ;;SET FOR SIX(6) DIGITS
025146 112737 000005 025330 $TYPON: MOV #5, $OCNT ;;SET THE ITERATION COUNT
025154 010346 MOV R3, -(SP) ;;SAVE R3
025156 010446 MOV R4, -(SP) ;;SAVE R4
025160 010546 MOV R5, -(SP) ;;SAVE R5
025162 113704 025333 MOV $OMODE+1, R4 ;;GET THE NUMBER OF DIGITS TO TYPE
025166 005404 NEG R4
025170 062704 000006 ADD #6, R4 ;;SUBTRACT IT FOR MAX. ALLOWED
025174 110437 025332 MOV R4, $OMODE ;;SAVE IT FOR USE
025200 113704 025331 MOV $OFILL, R4 ;;GET THE ZERO FILL SWITCH
025204 016605 000012 MOV 12(SP), R5 ;;PICKUP THE INPUT NUMBER
025210 005003 CLR R3 ;;CLEAR THE OUTPUT WORD
025212 006105 1$: ROL R5 ;;ROTATE MSB INTO 'C'
025214 000404 BR 3$ ;;GO DO MSB
025216 006105 2$: ROL R5 ;;FORM THIS DIGIT
025220 006105 ROL R5
025222 006105 ROL R5
025224 010503 MOV R5, R3
025226 006103 3$: ROL R3 ;;GET LSB OF THIS DIGIT
025230 105337 025332 DECB $OMODE ;;TYPE THIS DIGIT?
025234 100016 BPL 7$ ;;BR IF NO
025236 042703 177770 BIC #177770, R3 ;;GET RID OF JUNK
025242 001002 BNE 4$ ;;TEST FOR 0
025244 005704 TST R4 ;;SUPPRESS THIS 0?
025246 001403 BEQ 5$ ;;BR IF YES
025250 005204 4$: INC R4 ;;DON'T SUPPRESS ANYMORE 0'S
025252 052703 000060 BIS #0, R3 ;;MAKE THIS DIGIT ASCII
025256 052703 000040 5$: BIS #1, R3 ;;MAKE ASCII IF NOT ALREADY
025262 110337 025326 MOV R3, 8$ ;;SAVE FOR TYPING
025266 104401 025326 TYPE 8$ ;;GO TYPE THIS DIGIT
025272 105337 025330 7$: DECB $OCNT ;;COUNT BY 1
025276 003347 BGT 2$ ;;BR IF MORE TO DO
025300 002402 BLT 6$ ;;BR IF DONE
025302 005204 INC R4 ;;INSURE LAST DIGIT ISN'T A BLANK
025304 000744 BR 2$ ;;GO DO THE LAST DIGIT
025306 012605 6$: MOV (SP)+, R5 ;;RESTORE R5
025310 012604 MOV (SP)+, R4 ;;RESTORE R4
025312 012603 MOV (SP)+, R3 ;;RESTORE R3
025314 016666 000002 000004 MOV 2(SP), 4(SP) ;;SET THE STACK FOR RETURNING
```


025322 012616
025324 000002
025326 000
025327 000
025330 000
025331 000
025332 000000

1559
1560

MOV (SP)+,(SP)
RTI
8\$: .BYTE 0
SOCNT: .BYTE 0
\$OFILL: .BYTE 0
\$OMODE: .WORD 0
;;RETURN
;;STORAGE FOR ASCII DIGIT
;;TERMINATOR FOR TYPE ROUTINE
;;OCTAL DIGIT COUNTER
;;ZERO FILL SWITCH
;;NUMBER OF DIGITS TO TYPE

.SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

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

*CALL:

* MOV NUM,-(SP) ;;PUT THE BINARY NUMBER ON THE STACK
* TYPDS ;;GO TO THE ROUTINE

025334 010046
025334 010146
025336 010246
025340 010346
025342 010546
025344 010746
025346 012746 020200
025352 016605 000020
025356 100004
025360 005405
025362 112766 000055 000001
025370 005000
025372 012703 025550
025376 112723 000040
025402 005002
025404 016001 025540
025410 160105
025412 002402
025414 005202
025416 000774
025420 060105
025422 005702
025424 001002
025426 105716
025430 100407
025432 106316
025434 103003
025436 116663 000001 177777
025444 052702 000060
025450 052702 000040
025454 110223
025456 005720
025460 020027 000010
025464 002746
025466 003002
025470 010502
025472 000764

\$TYPDS:
MOV R0,-(SP) ;;PUSH R0 ON STACK
MOV R1,-(SP) ;;PUSH R1 ON STACK
MOV R2,-(SP) ;;PUSH R2 ON STACK
MOV R3,-(SP) ;;PUSH R3 ON STACK
MOV R5,-(SP) ;;PUSH R5 ON STACK
MOV #20200,-(SP) ;;SET BLANK SWITCH AND SIGN
MOV 20(SP),R5 ;;GET THE INPUT NUMBER
BPL 1\$;;BR IF INPUT IS POS.
NEG R5 ;;MAKE THE BINARY NUMBER POS.
MOVB #'-,1(SP) ;;MAKE THE ASCII NUMBER NEG.
1\$: CLR R0 ;;ZERO THE CONSTANTS INDEX
MOV #SDBLK,R3 ;;SETUP THE OUTPUT POINTER
MOVB #' ,(R3)+ ;;SET THE FIRST CHARACTER TO A BLANK
2\$: CLR R2 ;;CLEAR THE BCD NUMBER
MOV \$DTBL(R0),R1 ;;GET THE CONSTANT
3\$: SUB R1,R5 ;;FORM THIS BCD DIGIT
BLT 4\$;;BR IF DONE
INC R2 ;;INCREASE THE BCD DIGIT BY 1
BR 3\$
4\$: ADD R1,R5 ;;ADD BACK THE CONSTANT
TST R2 ;;CHECK IF BCD DIGIT=0
BNE 5\$;;FALL THROUGH IF 0
TSTB (SP) ;;STILL DOING LEADING 0'S?
BMI 7\$;;BR IF YES
5\$: ASLB (SP) ;;MSD?
BCC 6\$;;BR IF NO
MOVB 1(SP),-1(R3) ;;YES--SET THE SIGN
6\$: BIS #'0,R2 ;;MAKE THE BCD DIGIT ASCII
7\$: BIS #' ,R2 ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
MOVB R2,(R3)+ ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
TST (R0)+ ;;JUST INCREMENTING
CMP R0,#10 ;;CHECK THE TABLE INDEX
BLT 2\$;;GO DO THE NEXT DIGIT
BGT 8\$;;GO TO EXIT
MOV R5,R2 ;;GET THE LSD
BR 6\$;;GO CHANGE TO ASCII

1561
1562

```

025474 105726      8$:  TSTB  (SP)+      ;;WAS THE LSD THE FIRST NON-ZERO?
025476 100003      9$:  BPL    9$      ;;BR IF NO
025500 116663 177777 177776  MOVB  -1(SP),-2(R3)  ;;YES--SET THE SIGN FOR TYPING
025506 105013      CLR    (R3)      ;;SET THE TERMINATOR
025510 012605      MOV    (SP)+,R5    ;;POP STACK INTO R5
025512 012603      MOV    (SP)+,R3    ;;POP STACK INTO R3
025514 012602      MOV    (SP)+,R2    ;;POP STACK INTO R2
025516 012601      MOV    (SP)+,R1    ;;POP STACK INTO R1
025520 012600      MOV    (SP)+,R0    ;;POP STACK INTO R0
025522 104401 025550  TYPE    $DBLK    ;;NOW TYPE THE NUMBER
025526 016666 000002 000004  MOV    2(SP),4(SP)  ;;ADJUST THE STACK
025534 012616      MOV    (SP)+,(SP)
025536 000002      RTI                ;;RETURN TO USER
025540 023420      $DTBL: 10000.
025542 001750      1000.
025544 000144      100.
025546 000012      10.
025550      $DBLK: .BLKW 4
                .SBTTL  TTY INPUT ROUTINE

;*****
;ENABL  LSB
025560 000000  $TKCNT: .WORD 0      ;;NUMBER OF ITEMS IN QUEUE
025562 000000  $TKQIN: .WORD 0      ;;INPUT POINTER
025564 000000  $TKQOUT: .WORD 0     ;;OUTPUT POINTER
025566      $TKQSR: .BLKB 7        ;;TTY KEYBOARD QUEUE
                $TKQEND=.
                .EVEN

;*TK INITIALIZE ROUTINE
;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
;
;CALL:
;
;      JSR    PC,$TKINT
;      RETURN
;
025576 005037 025560  $TKINT: CLR    $TKCNT      ;;CLEAR COUNT OF ITEMS IN QUEUE
025602 012737 025566 025562  MOV    #$TKQSR,$TKQIN  ;;MOVE THE STARTING ADDRESS OF THE
025610 013737 025562 025564  MOV    $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
025616 012737 025646 000060  MOV    #$TKSRV,@$TKVEC  ;;INITIALIZE THE KEYBOARD VECTOR
025624 012737 000200 000062  MOV    #200,@$TKVEC+2  ;;'BR' LEVEL 4
025632 005777 153324      TST    @$TKB      ;;CLEAR DONE FLAG
025636 012777 000100 153314  MOV    #100,$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
025644 000207      RTS    PC      ;;RETURN TO CALLER

;*TK SERVICE ROUTINE
;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
;*IT IN THE QUEUE.
;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (@CNTLC)
;
025646 117746 153310  $TKSRV: MOVB  @$TKB,-(SP)  ;;PICKUP THE CHARACTER
025652 042716 177600      BIC    #^C177,(SP)  ;;STRIP THE JUNK
025656 021627 000003      CMP    (SP),#3      ;;IS IT A CONTROL C?

```



```

:*****
:*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
:*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
:*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
:*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
$CKSWR: CMP      #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
        BNE      15$           ;;EXIT IF NOT
        TSTB     @TKS          ;;IS A CHAR WAITING?
        BPL      15$           ;;IF NOT, EXIT
        MOVB     @TKB, -(SP)    ;;YES
        BIC      #^C177, (SP)   ;;MAKE IT 7-BIT ASCII
        CMP      (SP), #7       ;;IS IT A CONTROL-G?
        BNE      2$            ;;IF NOT, PUT IT IN THE TTY QUEUE
                                ;;AND EXIT

```

```

026064 022737 000176 001154 $CKSWR: CMP      #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
026072 001124          BNE      15$      ;;EXIT IF NOT
026074 105777 153060      TSTB     @TKS      ;;IS A CHAR WAITING?
026100 100121          BPL      15$      ;;IF NOT, EXIT
026102 117746 153054      MOVB     @TKB,-(SP)    ;;YES
026106 042716 177600      BIC      #^C177,(SP)    ;;MAKE IT 7-BIT ASCII
026112 021627 000007      CMP      (SP),#7      ;;IS IT A CONTROL-G?
026116 001300          BNE      2$      ;;IF NOT, PUT IT IN THE TTY QUEUE
                                ;;AND EXIT

```

```

;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
026120 123727 001150 000001 6$: CMPB $AUTOB,#1 ;;ARE WE RUNNING IN AUTO-MODE?
026126 001674 BEQ 2$ ;;BRANCH IF YES
026130 005726 TST (SP)+ ;;CLEAR CONTROL-G OFF STACK
026132 004737 025576 JSR PC,$TKINT ;;FLUSH THE TTY INPUT QUEUE
026136 005077 153016 CLR @TKS ;;DISABLE TTY KEYBOARD INTERRUPTS
026142 112737 000001 001151 MOVB #1,$INTAG ;;SET INTERRUPT MODE INDICATOR

026150 104401 027001 SGTSWR: TYPE , $CNTLG ;;ECHO THE CONTROL-G (^G)
026154 104401 027006 TYPE , $MSWR ;;TYPE CURRENT CONTENTS
026160 013746 000176 MOV SWREG,-(SP) ;;SAVE SWREG FOR TYPEOUT
026164 104402 TYPEOC ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
026166 104401 027017 TYPE , $MNEW ;;PROMPT FOR NEW SWR
026172 005046 19$: CLR -(SP) ;;CLEAR COUNTER
026174 005046 CLR -(SP) ;;THE NEW SWR
026176 105777 152756 7$: TSTB @TKS ;;CHAR THERE?
026202 100375 BPL 7$ ;;IF NOT TRY AGAIN

026204 117746 152752 MOVB @TKB,-(SP) ;;PICK UP CHAR
026210 042716 177600 BIC #^C177,(SP) ;;MAKE IT 7-BIT ASCII

026214 021627 000003 CMP (SP),#3 ;;IS IT A CONTROL-C?
026220 001015 BNE 9$ ;;BRANCH IF NOT
026222 104401 026767 TYPE , $CNTLC ;;YES, ECHO CONTROL-C (^C)
026226 062706 000006 ADD #6,SP ;;CLEAN UP STACK
026232 123727 001151 000001 CMPB $INTAG,#1 ;;REENABLE TTY KEYBOARD INTERRUPTS?
026240 001003 BNE 8$ ;;BRANCH IF NO
026242 012777 000100 152710 MOV #100,@TKS ;;ALLOW TTY KEYBOARD INTERRUPTS
026250 000177 153120 8$: JMP @CNTLC ;;CONTROL-C RESTART

026254 021627 000025 9$: CMP (SP),#25 ;;IS IT A CONTROL-U?
026260 001005 BNE 10$ ;;BRANCH IF NOT
026262 104401 026774 TYPE , $CNTLU ;;YES, ECHO CONTROL-U (^U)
026266 062706 000006 20$: ADD #6,SP ;;IGNORE PREVIOUS INPUT
026272 000737 BR 19$ ;;LET'S TRY IT AGAIN

026274 021627 000015 10$: CMP (SP),#15 ;;IS IT A <CR>?
026300 001022 BNE 16$ ;;BRANCH IF NO
026302 005766 000004 TST 4(SP) ;;YES, IS IT THE FIRST CHAR?
026306 001403 BEQ 11$ ;;BRANCH IF YES
026310 016677 000002 152636 MOV 2(SP),@SWR ;;SAVE NEW SWR
026316 062706 000006 11$: ADD #6,SP ;;CLEAR UP STACK
026322 104401 001205 14$: TYPE , $CRLF ;;ECHO <CR> AND <LF>
026326 123727 001151 000001 CMPB $INTAG,#1 ;;RE-ENABLE TTY KBD INTERRUPTS?
026334 001003 BNE 15$ ;;BRANCH IF NOT
026336 012777 000100 152614 MOV #100,@TKS ;;RE-ENABLE TTY KBD INTERRUPTS
026344 000002 15$: RTI ;;RETURN
026346 004737 024516 16$: JSR PC,$TYPEC ;;ECHO CHAR
026352 021627 000060 CMP (SP),#60 ;;CHAR < 0?
026356 002420 BLT 18$ ;;BRANCH IF YES
026360 021627 000067 CMP (SP),#67 ;;CHAR > 7?
026364 003015 BGT 18$ ;;BRANCH IF YES
026366 042726 000060 BIC #60,(SP)+ ;;STRIP-OFF ASCII
```


026372	005766	000002		TST	2(SP)	::IS THIS THE FIRST CHAR
026376	001403			BEQ	17\$	::BRANCH IF YES
026400	006316			ASL	(SP)	::NO, SHIFT PRESENT
026402	006316			ASL	(SP)	::CHAR OVER TO MAKE
026404	006316			ASL	(SP)	::ROOM FOR NEW ONE.
026406	005266	000002	17\$:	INC	2(SP)	::KEEP COUNT OF CHAR
026412	056616	177776		BIS	-2(SP),(SP)	::SET IN NEW CHAR
026416	000667			BR	7\$	::GET THE NEXT ONE
026420	104401	001204	18\$:	TYPE	\$QUES	::TYPE ?<CR><LF>
026424	000720			BR	20\$	::SIMULATE CONTROL-U
			.DSABL	LSB		

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

026426	011646			\$RDCHR: MOV	(SP),-(SP)	::PUSH DOWN THE PC AND
026430	016666	000004	000002	MOV	4(SP),2(SP)	::THE PS
026436	005066	000004		CLR	4(SP)	::GET READY FOR A CHARACTER
026442	005046			CLR	-(SP)	::PUT NEW PS ON STACK
026444	012746	026452		MOV	#64\$,-(SP)	::PUT NEW PC ON STACK
026450	000002			RTI		::POP NEW PC AND PS
026452			64\$:			
026452	005737	025560	1\$:	TST	\$TKCNT	::WAIT ON A CHARACTER
026456	001775			BEQ	1\$	
026460	005337	025560		DEC	\$TKCNT	::DECREMENT THE COUNTER
026464	117766	177074	000004	MOVB	@\$TKQOUT,4(SP)	::GET ONE CHARACTER
026472	005237	025564		INC	\$TKQOUT	::UPDATE THE POINTER
026476	023727	025564	025575	CMP	\$TKQOUT,\$\$TKQEND	::DID IT GO OFF OF THE END?
026504	001003			BNE	2\$	::BRANCH IF NO
026506	012737	025566	025564	MOV	\$\$TKQSRT,\$TKQOUT	::RESET THE POINTER
026514	000002		2\$:	RTI		::RETURN

::*****
::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
::*

026516	010346			\$RDLIN: MOV	R3,-(SP)	::SAVE R3	
026520	005046			CLR	-(SP)	::CLEAR THE RUBOUT KEY	
026522	012703	026752		1\$:	MOV	\$\$TTYIN,R3	::GET ADDRESS
026526	022703	026767		2\$:	CMP	\$\$TTYIN+15,R3	::BUFFER FULL?
026532	101456			BLOS	4\$		::BR IF YES
026534	104410			RDCHR			::GO READ ONE CHARACTER FROM THE TTY
026536	112613			MOVB	(SP)+,(R3)		::GET CHARACTER
026540	122713	000177	10\$:	CMPB	#177,(R3)		::IS IT A RUBOUT
026544	001022			BNE	5\$		::BR IF NO
026546	005716			TST	(SP)		::IS THIS THE FIRST RUBOUT?
026550	001007			BNE	6\$		::BR IF NO
026552	112737	000134	026750	MOVB	#'\,9\$		::TYPE A BACK SLASH
026560	104401	026750		TYPE	,9\$		

```
026564 012716 177777      MOV    #-1,(SP)      ;;SET THE RUBOUT KEY
026570 005303      6$: DEC    R3              ;;BACKUP BY ONE
026572 020327 026752      CMP    R3,#$TTYIN      ;;STACK EMPTY?
026576 103434      BLO    4$              ;;BR IF YES
026600 111337 026750      MOV    (R3),9$      ;;SETUP TO TYPEOUT THE DELETED CHAR.
026604 104401 026750      TYPE   9$          ;;GO TYPE
026610 000746      BR     2$              ;;GO READ ANOTHER CHAR.
026612 005716      5$: TST    (SP)          ;;RUBOUT KEY SET?
026614 001406      BEQ    7$              ;;BR IF NO
026616 112737 000134 026750  MOV    #'\\,9$      ;;TYPE A BACK SLASH
026624 104401 026750      TYPE   9$          ;;
026630 005016      CLR    (SP)          ;;CLEAR THE RUBOUT KEY
026632 122713 000025      7$: CMPB   #25,(R3)      ;;IS CHARACTER A CTRL U?
026636 001003      BNE    8$              ;;BR IF NO
026640 104401 026774      TYPE   ,SCNTLU      ;;TYPE A CONTROL 'U'
026644 000726      BR     1$              ;;GO START OVER
026646 122713 000022      8$: CMPB   #22,(R3)      ;;IS CHARACTER A '^R'?
026652 001011      BNE    3$              ;;BRANCH IF NO
026654 105013      CLRB   (R3)          ;;CLEAR THE CHARACTER
026656 104401 001205      TYPE   ,SCRLF      ;;TYPE A 'CR' & 'LF'
026662 104401 026752      TYPE   ,TTYIN      ;;TYPE THE INPUT STRING
026666 000717      BR     2$              ;;GO PICKUP ANOTHER CHACTER
026670 104401 001204      4$: TYPE   ,QUES      ;;TYPE A '?'
026674 000712      BR     1$              ;;CLEAR THE BUFFER AND LOOP
026676 111337 026750      3$: MOV    (R3),9$      ;;ECHO THE CHARACTER
026702 104401 026750      TYPE   9$          ;;
026706 122723 000015      CMPB   #15,(R3)+      ;;CHECK FOR RETURN
026712 001305      BNE    2$              ;;LOOP IF NOT RETURN
026714 105063 177777      CLRB   -1(R3)        ;;CLEAR RETURN (THE 15)
026720 104401 001206      TYPE   ,LF          ;;TYPE A LINE FEED
026724 005726      TST    (SP)+          ;;CLEAN RUBOUT KEY FROM THE STACK
026726 012603      MOV    (SP)+,R3        ;;RESTORE R3
026730 011646      MOV    (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
026732 016666 000004 000002  MOV    4(SP),2(SP)      ;;FIRST ASCII CHARACTER ON IT
026740 012766 026752 000004  MOV    #$TTYIN,4(SP)
026746 000002      RTI                  ;;RETURN
026750 000      19$: .BYTE    0          ;;STORAGE FOR ASCII CHAR. TO TYPE
026751 000      .BYTE    0          ;;TERMINATOR
026752      .BLKB    15          ;;RESERVE 15 BYTES FOR TTY INPUT
026767 136 103 015 $TTYIN: .ASCII / ^C / <15> <12>      ;;CONTROL 'C'
026774 136 125 015 $CNTLC: .ASCII / ^U / <15> <12>      ;;CONTROL 'U'
027001 136 107 015 $CNTLU: .ASCII / ^G / <15> <12>      ;;CONTROL 'G'
027006 015 012 123 $CNTLG: .ASCII / ^G / <15> <12> / SWR = /
027017 040 040 116 $MSWR: .ASCII / NEW = /
```

1563
1564

.SBTTL POWER DOWN AND UP ROUTINES

:POWER DOWN ROUTINE

```
027030 012737 027174 000024 $PWRDN: MOV    #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
027036 012737 000340 000026      MOV    #340,@#PWRVEC+2 ;;PRIO:7
027044 010046      MOV    R0,-(SP)      ;;PUSH R0 ON STACK
027046 010146      MOV    R1,-(SP)      ;;PUSH R1 ON STACK
027050 010246      MOV    R2,-(SP)      ;;PUSH R2 ON STACK
027052 010346      MOV    R3,-(SP)      ;;PUSH R3 ON STACK
027054 010446      MOV    R4,-(SP)      ;;PUSH R4 ON STACK
027056 010546      MOV    R5,-(SP)      ;;PUSH R5 ON STACK
```



```
027060 017746 152070      MOV    @SWR,-(SP)      ;;PUSH @SWR ON STACK
027064 010637 027200      MOV    SP,$SAVR6      ;;SAVE SP
027070 012737 027102 000024  MOV    #PWRUP,@PWRVEC  ;;SET UP VECTOR
027076 000000      HALT
027100 000776      BR      -2      ;;HANG UP
```

:POWER UP ROUTINE

```
027102 012737 027174 000024 $PWRUP: MOV    #PWRUP,@PWRVEC  ;;SET FOR FAST DOWN
027110 013706 027200      MOV    $SAVR6,SP      ;;GET SP
027114 005037 027200      CLR     $SAVR6      ;;WAIT LOOP FOR THE TTY
027120 005237 027200      1$:   INC     $SAVR6      ;;WAIT FOR THE INC
027124 001375      BNE     1$      ;;OF WORD
027126 012677 152022      MOV    (SP)+,@SWR      ;;POP STACK INTO @SWR
027132 012605      MOV    (SP)+,R5      ;;POP STACK INTO R5
027134 012604      MOV    (SP)+,R4      ;;POP STACK INTO R4
027136 012603      MOV    (SP)+,R3      ;;POP STACK INTO R3
027140 012602      MOV    (SP)+,R2      ;;POP STACK INTO R2
027142 012601      MOV    (SP)+,R1      ;;POP STACK INTO R1
027144 012600      MOV    (SP)+,R0      ;;POP STACK INTO R0
027146 012737 027030 000024  MOV    #PWRDN,@PWRVEC  ;;SET UP THE POWER DOWN VECTOR
027154 012737 000340 000026  MOV    #340,@PWRVEC+2  ;;PRIO:7
027162 104401      TYPE      ;;REPORT THE POWER FAILURE
027164 027202      $PWRMG: .WORD $POWER      ;;POWER FAIL MESSAGE POINTER
027166 012716      MOV    (PC)+,(SP)      ;;RESTART AT BEGIN2
027170 007020      $PWRAD: .WORD BEGIN2      ;;RESTART ADDRESS
027172 000002      RTI
027174 000000      $ILLUP: HALT      ;;THE POWER UP SEQUENCE WAS STARTED
027176 000776      BR      -2      ;; BEFORE THE POWER DOWN WAS COMPLETE
027200 000000      $SAVR6: 0      ;;PUT THE SP HERE
1565 027202      200      042      120 $POWER: .ASCIZ <CRLF>/'POWER UP'/
```

.SBTTL TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS

:*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
:*LEADING NUMBERS.

:*CALL

```
*      MOV    #NUMADR,-(SP)      ;;FIRST ADDRESS OF ASCIZ STRING
*      JSR    PC,@#$SUPRS
```

```
027216 010046      $SUPRS: MOV    R0,-(SP)      ;;SAVE R0
027220 016600 000004      MOV    4(SP),R0      ;;PICKUP THE POINTER
027224 105710      1$:   TSTB   (R0)      ;;TERMINATEOR?
027226 001403      BEQ     2$      ;;BR IF YES
027230 122720 000060      CMPB   #'0',(R0)+      ;;IS THIS AN ASCII '0' ?
027234 001773      BEQ     1$      ;;BR IF YES
027236 005300      2$:   DEC     R0      ;;BACKUP BY '1'
027240 010037 027246      MOV    R0,3$      ;;SAVE FOR TYPING
027244 104401      TYPE      ;;GO TYPE
027246 000000      3$:   .WORD   0      ;;ASCIZ POINTER GOES HERE
027250 012600      MOV    (SP)+,R0      ;;RESTORE R0
027252 012616      MOV    (SP)+,(SP)      ;;RESTORE THE STACK
027254 000207      RTS     PC      ;;RETURN
```

.SBTTL SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE

1568
1569

```

*****
*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
*UNSIGNED DECIMAL ASCII NUMBER.
*CALL
*      MOV      NUMBER,-(SP)      ;;PUT BINARY NUMBER ON THE STACK
*      JSR      PC,@#$SB2D        ;;CALL
*      RETURN                      ;;ADDRESS OF THE 1ST ASCII CHAR.IS ON THE STACK
  
```

```

027256 016637 000002 027306 $SB2D: MOV      2(SP),1$      ;;SAVE BINARY NUMBER
027264 012746 027306          MOV      #1$,-(SP)      ;;SET POINTER
027270 004737 027312          JSR      PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
027274 062716 000005          ADD      #5,(SP)        ;;ONLY ALLOW FIVE CHARACTERS
027300 012666 000002          MOV      (SP)+,2(SP)      ;;PICKUP POINTER
027304 000207          RTS      PC                    ;;RETURN
027306 000000 000000          1$:      .WORD      0,0
  
```

1570
1571

.SBTTL DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

```

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

```

027312 104412          $DB2D: SAVREG      ;;SAVE REGISTERS
027314 016602 000002    MOV      2(SP),R2      ;;PICKUP THE DATA POINTER
027320 012700 027472    MOV      #$DECVL,R0     ;;GET ADDRESS OF "$DECVL" STRING
027324 010066 000002    MOV      R0,2(SP)      ;;PUT ADDRESS OF ASCII STRING ON STACK
027330 012201          MOV      (R2)+,R1      ;;PICKUP THE BINARY NUMBER
027332 012202          MOV      (R2)+,R2
027334 012737 000012 027410    MOV      #10,4$      ;;SET UP TO DO 10 CONVERSIONS
027342 012704 027422    MOV      #STNPWR,R4     ;;ADDRESS OF TEN POWER
027346 012705 027424    MOV      #STNPWR+2,R5
027352 005003          1$:      CLR      R3      ;;CLEAR PARTIAL
027354 161401          2$:      SUB      (R4),R1  ;;SUBTRACT TEN POWER
027356 005602          SBC      R2
027360 161502          SUB      (R5),R2
027362 002402          BLT      3$      ;;BR IF TEN POWER TO LARGE
027364 005203          INC      R3      ;;ADD 1 TO PARTIAL
027366 000772          BR      2$      ;;LOOP
027370 062401          3$:      ADD      (R4)+,R1  ;;RESTORE SUBTRACTED VALUE
027372 005502          ADC      R2
027374 062402          ADD      (R4)+,R2
027376 022525          CMP      (R5)+,(R5)+      ;;MOVE TO NEXT TEN POWER
027400 052703 000060    BIS      #'0,R3      ;;CHANGE PARTIAL TO ASCII
027404 110320          MOVB     R3,(R0)+      ;;SAVE IT
027406 005327          DEC      (PC)+          ;;DONE?
027410 000000          4$:      .WORD      0
027412 001357          BNE      1$      ;;BR IF NO
027414 105020          CLRB     (R0)+          ;;TERMINATOR
  
```


027416	104413	RESREG		::RESTORE REGISTERS
027420	000207	RTS	PC	::RETURN
027422	145000	\$TNPWR: 145000		::1.0E09
027424	035632	35632		
027426	160400	160400		::1.0E08
027430	002765	2765		
027432	113200	113200		::1.0E07
027434	000230	230		
027436	041100	041100		::1.0E06
027440	000017	17		
027442	103240	103240		::1.0E05
027444	000001	1		
027446	023420	23420		::1.0E04
027450	000000	0		
027452	001750	1750		::1.0E03
027454	000000	0		
027456	000144	144		::1.0E02
027460	000000	0		
027462	000012	12		::1.0E01
027464	000000	0		
027466	000001	1		::1.0E00
027470	000000	0		
027472		\$DECVL: .BLKB 12.		::RESERVE STORAGE FOR ASCII STRING

1572
1573

.SBTTL SAVE AND RESTORE R0-R5 ROUTINES

```

*****
*SAVE R0-R5
*CALL:
*   SAVREG
*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
*
*TOP---(+16)
* +2---(+18)
* +4---R5
* +6---R4
* +8---R3
*+10---R2
*+12---R1
*+14---R0
    
```

027506		\$SAVREG:		
027506	010046	MOV	R0,-(SP)	::PUSH R0 ON STACK
027510	010146	MOV	R1,-(SP)	::PUSH R1 ON STACK
027512	010246	MOV	R2,-(SP)	::PUSH R2 ON STACK
027514	010346	MOV	R3,-(SP)	::PUSH R3 ON STACK
027516	010446	MOV	R4,-(SP)	::PUSH R4 ON STACK
027520	010546	MOV	R5,-(SP)	::PUSH R5 ON STACK
027522	016646	MOV	22(SP),-(SP)	::SAVE PS OF MAIN FLOW
027526	016646	MOV	22(SP),-(SP)	::SAVE PC OF MAIN FLOW
027532	016646	MOV	22(SP),-(SP)	::SAVE PS OF CALL
027536	016646	MOV	22(SP),-(SP)	::SAVE PC OF CALL
027542	000002	RTI		

```

*RESTORE R0-R5
*CALL:
*   RESREG
    
```

```
027544      012666 000022      $RESREG:  MOV    (SP)+,22(SP)    ;;RESTORE PC OF CALL
027544      012666 000022      MOV    (SP)+,22(SP)    ;;RESTORE PS OF CALL
027550      012666 000022      MOV    (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
027554      012666 000022      MOV    (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
027560      012666 000022      MOV    (SP)+,R5        ;;POP STACK INTO R5
027564      012605      MOV    (SP)+,R4        ;;POP STACK INTO R4
027566      012604      MOV    (SP)+,R3        ;;POP STACK INTO R3
027570      012603      MOV    (SP)+,R2        ;;POP STACK INTO R2
027572      012602      MOV    (SP)+,R1        ;;POP STACK INTO R1
027574      012601      MOV    (SP)+,R0        ;;POP STACK INTO R0
027576      012600      MOV    (SP)+,R0
027600      000002      RTI
```

1574
1575

.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.
```

```
027602      010046      $TRAP:  MOV    R0,-(SP)        ;;SAVE R0
027604      016600 000002      MOV    2(SP),R0        ;;GET TRAP ADDRESS
027610      005740      TST     -(R0)                ;;BACKUP BY 2
027612      111000      MOV     (R0),R0              ;;GET RIGHT BYTE OF TRAP
027614      006300      ASL     R0                    ;;POSITION FOR INDEXING
027616      016000 027636      MOV    $TRPAD(R0),R0    ;;INDEX TO TABLE
027622      000200      RTS     R0                    ;;GO TO ROUTINE
```

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

```
027624      011646      $TRAP2: MOV    (SP),-(SP)      ;;MOVE THE PC DOWN
027626      016666 000004 000002      MOV    4(SP),2(SP)  ;;MOVE THE PSW DOWN
027634      000002      RTI                          ;;RESTORE THE PSW
```

.SBTTL TRAP TABLE

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

```
ROUTINE
-----
$TRPAD: .WORD  $TRAP2
$TYPE   ;;CALL=TYPE      TRAP+1(104401)  TTY TYPEOUT ROUTINE
$TYPOC  ;;CALL=TYPOC     TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
$TYPOS  ;;CALL=TYPOS     TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
$TYPON  ;;CALL=TYPON     TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
$TYPDS  ;;CALL=TYPDS     TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

027652      026154      $GTSWR  ;;CALL=GTSWR      TRAP+6(104406)  GET SOFT-SWR SETTING

027654      026064      $CKSWR  ;;CALL=CKSWR      TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
027656      026426      $RDCHR  ;;CALL=RDCHR      TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
027660      026516      $RDLIN  ;;CALL=RDLIN      TRAP+11(104411) TTY TYPEIN STRING ROUTINE
027662      027506      $SAVREG ;;CALL=SAVREG     TRAP+12(104412) SAVE R0-R5 ROUTINE
027664      027544      $RESREG ;;CALL=RESREG     TRAP+13(104413) RESTORE R0-R5 ROUTINE
```


CZRMLAO RM05/3/2 FORMATTER
TRAP TABLE

MACRO V03.01 11-APR-80 13:01:23 PAGE 10-43

D 8

SEQ 0094

1576
1583

```

1      .SBTTL SINGLE/DUAL PORT RH/RM DRIVER (REV 6.2) FEBRUARY 1980
2
3      ;NEW DRIVE TYPE ID FOR RM02 *****
4      ;10-AUG-77 *****
5      ;10-MAR-78 THE SC, SC5 CHANGES
6      ;NEW DRIVE TYPE ID FOR RM05 *****
7      ;FEBRUARY 1980 *****
8
9      ;COPYRIGHT (C) 1977
10     ;DIGITAL EQUIPMENT CORP.
11     ;MAYNARD, MA 01754
12     ;AUTHOR(S): JIM LACEY/CHUCK HESS/
13
14     ;*****
15
16     ;STORAGE FOR RMDs, RMER1, RMER2, AND RMMR2 ON AN ERROR "2"
17     ;RMERRS = RMDs
18     ;RMERRS+2 = RMER1
19     ;RMERRS+4 = RMER2
20     ;RMERRS+6 = RMMR2
21
22 027666 000000 000000 000000 RMERRS: .WORD 0,0,0,0
23
24     ;TABLE OF DRIVE ACTIVE INDICATORS (DRVACT=8 BYTES)
25     ;DRVACT=0 IF DRIVE IS IDLE
26     ;DRVACT>0 IF DRIVE IS ACTIVE WITH A COMMAND
27     ;DRVACT<0 IF DRIVE IS ACTIVE WITH AN ERROR RECOVERY OPERATION
28
29 027676 000 DRVACT: .BYTE 0 ;DRIVE 0
30 027677 000 .BYTE 0 ;DRIVE 1
31 027700 000 .BYTE 0 ;DRIVE 2
32 027701 000 .BYTE 0 ;DRIVE 3
33 027702 000 .BYTE 0 ;DRIVE 4
34 027703 000 .BYTE 0 ;DRIVE 5
35 027704 000 .BYTE 0 ;DRIVE 6
36 027705 000 .BYTE 0 ;DRIVE 7
37
38     ;TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
39     ;DRVSTA=0 IF DRIVE IS OFFLINE OR NONEXISTENT
40     ;DRVSTA>0 IF DRIVE IS ONLINE
41     ;DRVSTA<0 IF DRIVE IS UNSAFE
42
43 027706 000 DRVSTA: .BYTE 0 ;DRIVE 0
44 027707 000 .BYTE 0 ;DRIVE 1
45 027710 000 .BYTE 0 ;DRIVE 2
46 027711 000 .BYTE 0 ;DRIVE 3
47 027712 000 .BYTE 0 ;DRIVE 4
48 027713 000 .BYTE 0 ;DRIVE 5
49 027714 000 .BYTE 0 ;DRIVE 6
50 027715 000 .BYTE 0 ;DRIVE 7
51
52     ;TABLE OF DRIVE TYPES (DRVTP=8 BYTES)
53     ;DRVTP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
54     ;DRVTP=7 IF DRIVE IS RM05 *****
55     ;DRVTP=5 IF DRIVE IS RM02 *****
56     ;DRVTP=4 IF DRIVE IS RM03
57     ;DRVTP=-1 IF NOT RM05/3/2

```



```

50
51 027716      000      DRVTP: .BYTE 0      ;DRIVE 0
54 027717      000      .BYTE 0      ;DRIVE 1
    027720      000      .BYTE 0      ;DRIVE 2
    027721      000      .BYTE 0      ;DRIVE 3
    027722      000      .BYTE 0      ;DRIVE 4
    027723      000      .BYTE 0      ;DRIVE 5
    027724      000      .BYTE 0      ;DRIVE 6
    027725      000      .BYTE 0      ;DRIVE 7
55
56      ;TABLE OF DUAL PORT INITIALIZATION INDICATORS
57      ;DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
58      ;DPINT<0 IF INITIALIZATION IS IN PROGRESS
59
60 027726      000      DPINT: .BYTE 0      ;DRIVE 0
63 027727      000      .BYTE 0      ;DRIVE 1
    027730      000      .BYTE 0      ;DRIVE 2
    027731      000      .BYTE 0      ;DRIVE 3
    027732      000      .BYTE 0      ;DRIVE 4
    027733      000      .BYTE 0      ;DRIVE 5
    027734      000      .BYTE 0      ;DRIVE 6
    027735      000      .BYTE 0      ;DRIVE 7
64
65      ;TABLE OF PENDING DUAL PORT REQUESTS
66      ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
67      ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
68
69 027736      000      DPRQS: .BYTE 0      ;DRIVE 0
72 027737      000      .BYTE 0      ;DRIVE 1
    027740      000      .BYTE 0      ;DRIVE 2
    027741      000      .BYTE 0      ;DRIVE 3
    027742      000      .BYTE 0      ;DRIVE 4
    027743      000      .BYTE 0      ;DRIVE 5
    027744      000      .BYTE 0      ;DRIVE 6
    027745      000      .BYTE 0      ;DRIVE 7
73
74      ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
75      ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
76      ;"DPB" OF THE I/O OPERATION.
77
78 027746      000000    TRNSWT: .WORD 0
79
80      ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
81      ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
82      ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
83      ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
84      ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
85
86 027750      000000    SRCHWT: .WORD 0
87
88      ;RM DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
89      ;ACTDRV=0 IF DRIVER IS INACTIVE
90      ;ACTDRV>0 IF DRIVER IS ACTIVE
91
92 027752      000      ACTDRV: .BYTE 0
93
94      ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
    
```

```

95                                     ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
96                                     ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
97
98 027753      000      ACTSTR: .BYTE    0
99
100                                     ;UNLOAD FLAG (ULDFLG=8 BYTES)
101                                     ;ULDFLG=0 IF NO UNLOAD COMMAND
102                                     ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
103                                     ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
104
105 027754      000      ULDFLG: .BYTE    0          ;DRIVE 0
106 027755      000      .BYTE    0          ;DRIVE 1
107 027756      000      .BYTE    0          ;DRIVE 2
108 027757      000      .BYTE    0          ;DRIVE 3
109 027760      000      .BYTE    0          ;DRIVE 4
110 027761      000      .BYTE    0          ;DRIVE 5
111 027762      000      .BYTE    0          ;DRIVE 6
112 027763      000      .BYTE    0          ;DRIVE 7
113
114                                     ;LOOK AHEAD COUNT (LACNT=8 BYTES)
115                                     ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
116
117 027764      000      LACNT:  .BYTE    0          ;DRIVE 0
118 027765      000      .BYTE    0          ;DRIVE 1
119 027766      000      .BYTE    0          ;DRIVE 2
120 027767      000      .BYTE    0          ;DRIVE 3
121 027770      000      .BYTE    0          ;DRIVE 4
122 027771      000      .BYTE    0          ;DRIVE 5
123 027772      000      .BYTE    0          ;DRIVE 6
124 027773      000      .BYTE    0          ;DRIVE 7
125
126                                     ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
127                                     ;SAVEFG <0 IF SAVE THE RH/RM REGISTERS WHEN THE
128                                     ;OPERATION IS COMPLETED AS PER (DPB+14).
129                                     ;SAVEFG=0 IF SAVE THE RH/RM REGISTERS, AS PER
130                                     ;(DPB+14), AFTER AN ERROR.
131
132 027774      000000    SAVEFG: .WORD    0
133
134                                     ;SEEK FLAG (SEEKFG=1 WORD)
135                                     ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
136                                     ;FOR A DATA TRANSFER START A SEARCH COMMAND
137                                     ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
138                                     ;DISREGARD THE WINDOW
139
140 027776      177777    SEEKFG: .WORD   -1
141
142                                     ;TIMEOUT TABLE (TIMER=8 WORDS)
143                                     ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
144
145 030000      177777    TIMER:  .WORD   -1          ;DRIVE 0
146 030002      177777    .WORD   -1          ;DRIVE 1
147 030004      177777    .WORD   -1          ;DRIVE 2
148 030006      177777    .WORD   -1          ;DRIVE 3
149 030010      177777    .WORD   -1          ;DRIVE 4
150 030012      177777    .WORD   -1          ;DRIVE 5
151 030014      177777    .WORD   -1          ;DRIVE 6

```



```

141 030016 177777 .WORD -1 ;DRIVE 7
142 ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
143 ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
144 ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
145
146 030020 177777 DTUW: .WORD -1
147
148 ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
149 ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
150 ;ATTENTION BIT
151
152 030022 001 ATABIT: .BYTE 1 ;DRIVE 0
153 030023 002 .BYTE 2 ;DRIVE 1
154 030024 004 .BYTE 4 ;DRIVE 2
155 030025 010 .BYTE 10 ;DRIVE 3
156 030026 020 .BYTE 20 ;DRIVE 4
157 030027 040 .BYTE 40 ;DRIVE 5
158 030030 100 .BYTE 100 ;DRIVE 6
159 030031 200 .BYTE 200 ;DRIVE 7
160
161 ;FSRM TO RH11/RH70 'MASSBUS CONTROL BUS PARITY ERRORS' (MCPE) ALLOWED BEFORE
162 ;CALLING IT FATAL (MCPEMX=1 WORD)
163
164 030032 000003 MCPEMX: .WORD 3
165
166 ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH/RM),
167 ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).
168
169 030034 176700 RMADR: .WORD 176700
170 030036 000254 000240 RMVEC: .WORD 254,5*32.
171
172 ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
173 030042 000004 MXLACT: .WORD 4
174
175 ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
176 030044 001000 MXDLTA: .WORD 8*64.
177
178 ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
179 030046 000200 MNDLTA: .WORD 2*64.
180
181 ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
182 030050 000005 MXWNDW: .WORD 5
183
184 ;DEFINITIONS OF THE RH/RM ADDRESS INDEXES
185
186 000000 RMCS1=0 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
187 000002 RMWC=2 ;WORD COUNT REGISTER (NOT A DRIVE REG)
188 000004 RMBA=4 ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
189 000006 RMDA=6 ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
190 000010 RMCS2=10 ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
191 000012 RMDS=12 ;DRIVE STATUS REGISTER (DRIVE REG 01)
192 000014 RMER1=14 ;ERROR REGISTER #1 (DRIVE REG. 02)
193 000016 RMAS=16 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
194 000020 RMLA=20 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
195 000022 RMDB=22 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
196 000024 RMMR1=24 ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
    
```

```

197      000026      RMDT=26      ;DRIVE TYPE REGISTER (DRIVE REG. 06)
198      000030      RMSN=30      ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
199      000032      RMOF=32      ;OFFSET REGISTER (DRIVE REG. 11)
200      000034      RMDC=34      ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
201      000036      RMHR=36      ;DUMMY ADDRESS REGISTER (DRIVE REG. 13)
202      000040      RMMR2=40      ;MAINTENANCE REGISTER #2
203      000042      RMER2=42      ;ERROR REGISTER #2 (DRIVE REG. 15)
204      000044      RMEC1=44      ;ECC POSITION REGISTER (DRIVE REG. 16)
205      000046      RMEC2=46      ;ECC PATTERN REGISTER (DRIVE REG. 17)
206
207      .SBTTL RH/RM DRIVER INITIALIZATION CODE
208
209      ;THIS ROUTINE WILL DETERMINE WHICH RM DRIVES ARE
210      ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
211      ;TO THE PROPER STATE FOR EACH DRIVE.
212      ;NOTE: THIS ROUTINE CALLS DRVINT
213      ;
214      ;CALL
215      ;
216      JSR      PC,RMINIT
217      RETURN
218
219      ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
220
221      030052      104412      RMINIT: SAVREG      ;SAVE R0 - R5
222      030054      013746      177776      MOV      PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
223      030060      012737      000240      177776      MOV      #<5*32.>,PS      ;CHANGE THE PRIORITY TO 5
224      030066      004737      035740      JSR      PC,CLRQUE      ;CLEAR ALL REQUEST QUEUES
225      030072      012701      027666      MOV      #RMERRS,R1      ;FIRST ADDRESS TO BE CLEARED
226      030076      012702      027776      MOV      #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
227      030102      005021      1$:      CLR      (R1)+      ;CLEAR
228      030104      020102      CMP      R1,R2      ;ARE WE DONE?
229      030106      103775      BLO      1$      ;BR IF NO
230      030110      012702      030020      MOV      #DTUW,R2      ;LAST ADDRESS
231      030114      012721      177777      2$:      MOV      #-1,(R1)+      ;INITIALIZE
232      030120      020102      CMP      R1,R2      ;DONE?
233      030122      101774      BLOS      2$      ;LOOP IF NO
234      030124      005037      027706      CLR      DRVSTA      ;SET ALL DRIVES TO OFFLINE
235      030130      005037      027710      CLR      DRVSTA+2
236      030134      005037      027712      CLR      DRVSTA+4
237      030140      005037      027714      CLR      DRVSTA+6
238      030144      013703      030036      MOV      RMVEC,R3      ;SETUP THE RH/RM VECTOR
239      030150      012723      032706      MOV      #ISR,(R3)+
240      030154      013713      030040      MOV      RMVEC+2,(R3)
241      030160      013704      030034      MOV      RMADR,R4      ;FIRST ADDRESS OF RH/RM
242      030164      012764      000040      000010      MOV      #CLR,RMCS2(R4)      ;MASSBUS INIT
243      030172      005001      CLR      R1      ;START WITH DRIVE 0
244      030174      004037      030264      3$:      JSR      R0,DRVINT      ;INIT THE DRIVE
245      030200      000401      BR      4$      ;'DVA' NOT SET OR PARITY ERROR
246      030202      000402      BR      5$      ;NORMAL RETURN
247      030204      105061      027706      4$:      CLRB      DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
248      030210      005201      5$:      INC      R1      ;GO TO NEXT DRIVE
249      030212      042701      177770      BIC      #^C7,R1      ;MASK OUT UNUSED BITS
250      030216      001366      BNE      3$      ;BR IF MORE DRIVES TO GO
251      030220      012701      000007      MOV      #7,R1      ;START WITH DRIVE 7
252      030224      005037      177776      CLR      PS      ;CLEAR THE PROCESSOR STATUS
253      030230      105761      027726      6$:      TSTB      DPINT(R1)      ;WAITING FOR DRIVE TO SWITCH PORTS ?

```



```
254 030234 001405          BEQ      8$          ;BR NOT WAITING
255 030236 004737 035374    JSR      PC,SET.IE      ;SET INTERRUPT
256 030242 105761 027726    7$:    TSTB     DPINT(R1)  ;DRIVE SWITCHED PORTS ?
257 030246 001375          BNE      7$          ;BR IF NOT
258 030250 005301          8$:    DEC      R1        ;GO TO THE NEXT DRIVE
259 030252 100366          BPL      6$          ;CHECK NEXT DRIVE
260 030254 012637 177776    MOV      (SP)+,PS      ;RESTORE THE PROCESSOR STATUS
261 030260 104413          RESREG  ;RESTORE R0 - R5
262 030262 000207          RTS      PC          ;BYE-BYE
263
264 ;DRIVE INITIALIZATION ROUTINE
265 ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
266 ;AN RM05/3/2. IF IT IS, A 'READ-IN PRESET' IS ISSUED AND FMT16
267 ;IS SET TO A '1'. THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
268 ;INSURE THEY ARE ALL ON A '1'. AND DEPENDING ON THEIR STATE,
269 ;DRVSTA IS SET TO THE PROPER CONDITION.
270 ;CALL
271 ;:
272 ;:    MOV      #DRVNUM,R1      ;DRIVE NUMBER TO R1
273 ;:    MOV      RMADR,R4       ;UNIBUS ADDRESS OF RH/RM (RMCS1)
274 ;:    JSR      R0,DRVINT      ;CALLED BY A JSR
275 ;:    RETURN1   ;ERROR OCCURRED (PARITY)
276 ;:    RETURN2   ;NORMAL RETURN
277 ;:
278 030264 010546          DRVINT: MOV      R5,-(SP)    ;SAVE R5
279 030266 105061 027706    DULP:  CLRB     DRVSTA(R1) ;START DRIVE STATUS AS OFFLINE
280 030272 105061 027716    CLRB     DRVTP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
281 030276 105061 027754    CLRB     ULDFLG(R1)     ;CLEAR THE UNLOAD FLAG
282 030302 010164 000010    MOV      R1,RMCS2(R4)    ;SELECT A DRIVE
283 030306 112764 000111 000000    MOVB    #111,RMCS1(R4) ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
284 030314 032764 010000 000010    BIT      #BIT12,RMCS2(R4) ;NONEXISTENT DRIVE?
285 030322 001403          BEQ      1$          ;NO
286 030324 004737 035374    JSR      PC,SET.IE      ;GO SET 'IE' WITHOUT A 'TRE'
287 030330 000520          BR       6$          ;LEAVE THIS ROUTINE
288
289 030332 105061 027706    1$:    CLRB     DRVSTA(R1) ;SET DRIVE STATUS TO OFFLINE
290 030336 032764 004000 000000    BIT      #BIT11,RMCS1(R4) ;SEE IF DRIVE AVAILABLE
291 030344 001750          BEQ      DULP          ;BR IF DRIVE NOT AVAILABLE
292 030346 004037 034704    JSR      R0,RD.RM      ;READ THE DRIVE TYPE REG.
293 030352 000026          RMDT
294 030354 030616          8$
295 030356 012605          MOV      (SP)+,R5      ;ERROR RETURN ADDRESS
296 030360 112761 000004 027716    MOVB    #4,DRVTP(R1) ;PUT DRIVE TYPE IN R5
297 030366 022705 020024    CMP      #20024,R5     ;SET RM03 INDICATOR
298 030372 001431          BEQ      2$          ;SINGLE PORT RM03 ?
299 030374 022705 024024    CMP      #24024,R5     ;BR IF YES
300 030400 001426          BEQ      2$          ;DUAL PORT RM03 ?
301 030402 112761 000005 027716    MOVB    #5,DRVTP(R1) ;BR IF YES
302 030410 022705 020025    CMP      #20025,R5     ;SET RM02 INDICATOR
303 030414 001420          BEQ      2$          ;SINGLE PORT RM02 ?
304 030416 022705 024025    CMP      #24025,R5     ;BR IF SO
305 030422 001415          BEQ      2$          ;DUAL PORT RM02 ?
306 030424 112761 000007 027716    MOVB    #7,DRVTP(R1) ;BR IF SO
307 030432 022705 020027    CMP      #20027,R5     ;SET RM05 INDICATOR
308 030436 001407          BEQ      2$          ;SINGLE PORT RM05 ?
309 030440 022705 024027    CMP      #24027,R5     ;BR IF YES
310 030444 001404          BEQ      2$          ;DUAL PORT RM05 ?
310 030444 001404          BEQ      2$          ;BR IF YES
```

```
311 030446 112761 177777 027716      MOVB    #-1,DRVTP(R1)  ;SET INDICATOR TO 'OTHER'
312 030454 000446                      BR      6$           ;EXIT
313
314 030456 012746 000121      2$:    MOV     #121,-(SP)      ;DO A 'READ-IN PRESET'
315 030462 004037 035064      JSR      RO,WRT.RM
316 030466 000000      RMCS1
317 030470 030616      8$
318 030472 012746 010000      MOV     #BIT12,-(SP)      ;SET FMT16=1
319 030476 004037 035064      JSR      RO,WRT.RM
320 030502 000032      RMOF
321 030504 030616      8$
322 030506 004037 034704      JSR      RO,RD.RM      ;READ RMDS
323 030512 000012      RMDS
324 030514 030616      8$
325 030516 012605      MOV     (SP)+,R5      ;AND SAVE IT IN R5
326 030520 100015      BPL      4$           ;BR IF ATA=0
327 030522 116164 030022 000016      MOVB    ATABIT(R1),RMAS(R4) ;CLEAR ATTENTION BIT
328 030530 004037 034704      JSR      RO,RD.RM      ;FIND OUT WHY ATA=1
329 030534 000014      RMER1
330 030536 030616      8$
331 030540 006126      ROL     (SP)+      ;IS IT UNSAFE?
332 030542 100004      BPL      4$           ;BR IF NOT
333 030544 112761 177777 027706      MOVB    #-1,DRVSTA(R1) ;SET UNSAFE INDICATOR
334 030552 000407      BR      6$           ;EXIT
335
336 030554 005105      4$:    COM     R5           ;CHECK MOL, DPR, DRY, AND VV
337 030556 042705 167077      BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
338 030562 001003      BNE     6$           ;BR IF MOL, DPR, DRY, OR VV IS CLEAR
339 030564 112761 000001 027706      MOVB    #1,DRVSTA(R1) ;SET DRIVE STATUS TO ONLINE
340 030572 005720      6$:    TST     (R0)+      ;STEP OVER THE ERROR RETURN
341 030574 000410      BR      8$           ;EXIT
342 030576 006301      7$:    ASL     R1           ;CHANGE INDEX TO ADDRESS WORDS
343 030600 012761 060000 030000      MOV     #60000,TIMER(R1) ;START 2 SEC TIMER
344 030606 006201      ASR     R1           ;RESTORE R1
345 030610 112761 177777 027726      MOVB    #-1,DPINT(R1) ;SET PORT INITIALIZE INIDICATOR
346 030616 012605      8$:    MOV     (SP)+,R5      ;RESTORE R5
347 030620 000200      RTS     RO           ;EXIT
348
349      ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
350
351      ;CALL
352
353      ;
354      JSR      RO,RM05      ;CALL THE RM05 DRIVER
355      PNTADR   ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
356      RETURN1  ;RETURN HERE IF QUEUE IS FULL
357      RETURN2  ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
358      ;IS AN ERROR CONDITION
359
360 RM05:  MOV     PS,-(SP)      ;SAVE THE CALLING STATUS
361 030622 013746 177776      MOV     RMVEC+2,PS      ;DON'T ALLOW ANY RM INTERRUPTS
362 030626 013737 030040 177776      MOVB    #1,ACTDRV      ;SET 'ACTIVE DRIVER' FLAG
363 030634 112737 000001 027752      SAVREG
364 030642 104412      MOV     (R0),R2      ;SAVE R0 - R5
365 030644 011002      MOV     16(R2)      ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
366 030646 005062 000016      CLR     16(R2)      ;CLEAR THE STATUS/ERROR INDICATOR
367 030652 111201      MOVB    (R2),R1      ;PICKUP THE DRIVE NUMBER
368 030654 013704 030034      MOV     RMADR,R4      ;UNIBUS ADDRESS OF RMCS1
369 030660 105761 027706      TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
```



```
368 030664 003014          BGT      1$          ;BR IF ONLINE
369 030666 105761 027754    TSTB     ULDFLG(R1)    ;UNLOAD COMMAND IN QUEUE?
370 030672 001036          BNE      3$          ;BR IF YES
371 030674 105761 027726    TSTB     DPINT(R1)    ;TRYING TO INIT THE DRIVE
372 030700 001042          BNE      5$          ;BR IF YES
373 030702 004037 030264    JSR      RO,DRVINT    ;GO INIT. THE DRIVE
374 030706 000434          BR       4$          ;ERROR RETURN
375 030710 105761 027706    TSTB     DRVSTA(R1)    ;IS DRIVE STATUS ONLINE?
376 030714 003445          BLE      6$          ;BR IF NOT
377 030716 105761 027736    1$:      TSTB     DPRQS(R1)    ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
378 030722 001031          BNE      5$          ;BR IF YES
379 030724 010164 000010    MOV      R1,RMCS2(R4)    ;SELECT THE DRIVE
380 030730 004037 036036    JSR      RO,DRVQUE    ;PUT THIS REQUEST IN QUEUE
381 030734 000460          BR       9$          ;QUEUE IS FULL
382 030736 122762 000103 000002 CMPB     #103,2(R2)    ;IS THIS REQ. FOR AN UNLOAD?
383 030744 001003          BNE      2$          ;BR IF NO
384 030746 112761 177777 027754    MOVB     #-1,ULDFLG(R1)    ;SET THE 'UNLOAD IN QUEUE' FLAG
385 030754 105761 027676    2$:      TSTB     DRVACT(R1)    ;IS THIS DRIVE ACTIVE?
386 030760 001043          BNE      8$          ;BR IF YES
387 030762 004737 031114    JSR      PC,OPT      ;CALL THE OPTIMIZER
388 030766 000440          BR       8$
389 030770 012762 120000 000016 3$:      MOV     #BIT15:BIT13,16(R2)    ;SET THE 'UNLOAD IN QUEUE' ERROR FLAG
390 030776 000434          BR       8$          ;EXIT
391 031000 004737 032174    4$:      JSR      PC,C17      ;GO HANDLE THE PARITY ERROR
392 031004 000431          BR       8$
393 031006 004037 036036    5$:      JSR      RO,DRVQUE    ;PUT REQUEST IN QUEUE
394 031012 000431          BR       9$          ;QUEUE IS FULL
395 031014 032714 000100    BIT      #BIT06,(R4)    ;IE BIT SET ?
396 031020 001023          BNE      8$          ;YES
397 031022 004737 035374    JSR      PC,SET.IE    ;SET THE INTERRUPT
398 031026 000420          BR       8$          ;RETURN
399 031030 105761 027706    6$:      TSTB     DRVSTA(R1)    ;SEE IF DRIVE OFFLINE OR UNSAFE
400 031034 002412          BLT      7$          ;BR IF UNSAFE
401 031036 012762 140000 000016    MOV     #BIT15:BIT14,16(R2)    ;SET OFFLINE ERROR INDICATOR
402 031044 105761 027716    TSTB     DRVTP(R1)    ;SEE IF OFFLINE OR NONEXISTENT
403 031050 001007          BNE      8$          ;BR IF OFFLINE
404 031052 012762 100002 000016    MOV     #BIT15:BIT01,16(R2)    ;REPORT DRIVE NONEXISTENT
405 031060 000403          BR       8$          ;GO TO EXIT
406 031062 012762 110000 000016 7$:      MOV     #BIT15:BIT12,16(R2)    ;DRIVE IS UNSAFE
407 031070 104413          8$:      RESREG    ;RESTORE R0 - R5
408 031072 005720          TST      (R0)+      ;SETUP FOR NORMAL RETURN
409 031074 000401          BR       10$         ;FINISH UP, THEN EXIT
410 031076 104413          9$:      RESREG    ;RESTORE R0 - R5
411 031100 005720          10$:     TST      (R0)+      ;CORRECT THE RETURN ADDRESS
412 031102 105037 027752    CLRB     ACTDRV    ;CLEAR 'ACTIVE DRIVER' FLAG
413 031106 012637 177776    MOV      (SP)+,PS    ;RETURN 'PS' TO USER LEVEL
414 031112 000200          RTS      RO      ;RETURN TO CALLER
415
416          ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
417
418          ;CALL
419
420          MOV      #DRVNUM,R1    ;DRIVE NUMBER TO R1
421          JSR      PC,OPT      ;SETUP A COMMAND
422 031114 104412          OPT:     SAVREG    ;SAVE R0 - R5
423 031116 013746 177776    MOV      PS,-(SP)    ;SAVE PROC. STATUS
424 031122 146137 030022 027750    BICB     ATABIT(R1),SRCHWT    ;CLEAR LA SEACH FLAG
```

```
425 031130 105061 027736      CLRB    DPRQS(R1)      ;RESET THE PORT REQ FLAG ****
426 031134 004737 036112      JSR     PC,GETREQ    ;GET "DPB" POINTER OF REQUEST
427 031140 005702              TST     R2              ;IS THERE A REQUEST IN QUEUE?
428 031142 001472              BEQ     7$              ;NO--BR TO EXIT
429 031144 010164 000010      MOV     R1,RMCS2(R4) ;LOAD THE DRIVE ADDRESS *****
430 031150 012764 000111 000000 MOV     #111,RMCS1(R4) ;CLEAR THE DRIVE
431 031156 032764 004000 000000 BIT     #BIT11,RMCS1(R4) ;DVA SET ?
432 031164 001446              BEQ     5$              ;TO PROT REQUEST, IF NOT
433 031166 105761 027706      TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
434 031172 003014              BGT     1$              ;YES
435 031174 004737 036134      JSR     PC,POPQUE    ;NO--REMOVE REQUEST FROM QUEUE
436 031200 012762 140000 000016 MOV     #BIT15:BIT14,16(R2) ;SET OFFLINE STATUS/ERROR INDICATOR
437 031206 105761 027706      TSTB    DRVSTA(R1)      ;IS DRIVE UNSAFE ?
438 031212 100053              BPL     8$              ;BR TO EXIT IF NOT
439 031214 012762 110000 000016 MOV     #BIT15:BIT12,16(R2) ;SET UNSAFE STATUS/ERROR INDICATOR
440 031222 000447              BR      8$              ;BR TO EXIT
441 031224              1$:
442              :
443              :
444              :
445              :
446              :
447              :
448 031224 122762 000150 000002 CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
449 031232 002403              BLT     2$              ;YES
450 031234 004737 031560      JSR     PC,C14          ;CALL THE COMMAND INITIATOR
451 031240 000440              BR      8$              ;BR TO EXIT
452 031242 005737 030020      TST     DTUW          ;DATA TRANSFER UNDERWAY?
453 031246 002012              BGE     4$              ;YES--GO START A SEARCH
454 031250 005737 027776      TST     SEEKFG        ;DO IMPLIED SEEKS?
455 031254 100404              BMI     3$              ;YES
456 031256 004037 032532      JSR     R0,LA          ;NO--DO LOOK AHEAD
457 031262 000427              BR      8$              ;RETURN HERE ON A PARITY ERROR
458 031264 000403              BR      4$              ;GO START A SEARCH
459 031266 004737 031352      JSR     PC,C11          ;START A DATA TRANSFER
460 031272 000423              BR      8$              ;
461 031274 004737 031460      JSR     PC,C13          ;START A SEARCH
462 031300 000420              BR      8$              ;GO TO THE EXIT
463 031302 112761 177777 027736 5$: MOVB    #-1,DPRQS(R1) ;SET PORT REQUEST INDICATOR
464 031310 010103              MOV     R1,R3          ;SET UP TO ADDRESS WORDS
465 031312 006303              ASL     R3              ;CONVERT TO WORD INDEX
466 031314 012763 060000 030000 MOV     #60000,TIMER(R3) ;START 10 SEC TIMER
467 031322 000402              BR      7$              ;EXIT
468 031324 004737 032174      JSR     PC,C17          ;PROCESS THE PARITY ERROR
469 031330 032714 000100      6$: BIT     #BIT06,(R4)      ;SEE IF 'IE' ALREADY SET
470 031334 001002              7$: BNE     8$              ;BR IF SET
471 031336 004737 035374      JSR     PC,SET.IE      ;SET "IE" WITHOUT A "TRE"
472 031342 012637 177776      8$: MOV     (SP)+,PS      ;RESTORE PROC. STATUS
473 031346 104413              RESREG    ;RESTORE R0 - R5
474 031350 000207              RTS     PC
475
476      ;COMMAND INITIATOR
477      :
478      :
479      :CALL
480      :
481      :      MOV     #DRVNUM,R1      ;DRIVE NUMBER
482      :      MOV     #DPB,R2         ;ADDRESS OF DPB
483      :      JSR     PC,C1?          ;C1?= C11,C13, OR C14
```


Address	Hex	Hex	Hex	Label	Instruction	Comment
482						
483						
484						
485						
486						
487	031352	004737	036134	C11:	JSR PC,POPQUE	;REMOVE REQUEST FROM 'DRIVES WAIT' QUEUE
488	031356	010237	027746		MOV R2,TRNSWT	;PUT REQ. IN TRANSFER WAIT QUEUE
489	031362	010203			MOV R2,R3	;DPB ADDRESS TO R3
490	031364	013704	030034		MOV RMADR,R4	;RMCS1 ADDRESS
491	031370	010164	000010		MOV R1,RMCS2(R4)	;SELECT DRIVE
492	031374	062703	000004		ADD #4,R3	;DESIRED WORD COUNT
493	031400	062704	000002		ADD #2,R4	;RMWC ADDRESS
494	031404	012324			MOV (R3)+,(R4)+	;LOAD WORD COUNT
495	031406	012324			MOV (R3)+,(R4)+	;LOAD BUFFER ADDRESS
496	031410	012346			MOV (R3)+,-(SP)	;LOAD SECTOR AND TRACK
497	031412	004037	035064		JSR R0,WRT.RM	;CALL THE LOAD(WRITE) ROUTINE
498	031416	000006			RMDA	;INDEX OF REGISTER TO LOAD
499	031420	032174			C17	;ERROR RETURN ADDRESS
500	031422	012346			MOV (R3)+,-(SP)	;LOAD CYLINDER ADDRESS
501	031424	004037	035064		JSR R0,WRT.RM	
502	031430	000034			RMDC	
503	031432	032174			C17	
504	031434	016246	000002		MOV 2(R2),-(SP)	;LOAD 'COMMAND+GO', 'A17&A16', AND 'PSEL'
505	031440	004037	035064		JSR R0,WRT.RM	
506	031444	000000			RMCS1	
507	031446	032174			C17	
508	031450	010137	030020		MOV R1,DTUW	;SET 'DATA TRANSFER UNDERWAY'
509	031454	000137	032136		JMP C15	
510	031460	013704	030034	C13:	MOV RMADR,R4	;RMCS1 ADDRESS
511	031464	010164	000010		MOV R1,RMCS2(R4)	;SELECT DRIVE
512	031470	016246	000012		MOV 12(R2),-(SP)	;DESIRED CYLINDER ADDRESS
513	031474	004037	035064		JSR R0,WRT.RM	
514	031500	000034			RMDC	
515	031502	032174			C17	
516	031504	116203	000010		MOVB 10(R2),R3	;PICKUP SECTOR ADDRESS
517					SUB MXWNDW,R3	;BACKUP BY MAX. SEARCH FOR I/O WINDOW
518					BGE 1\$	
519					ADD #32,R3	
520	031510	010346		1\$:	MOV R3,-(SP)	;COMBINE THE ADJUSTED SECTOR WITH
521	031512	042716	177740		BIC #177740,(SP)	;CHOP OF ALL EXENTED BITS ,IF ANY
522	031516	116266	000011	000001	MOVB 11(R2),1(SP)	;THE DESIRED TRACK
523	031524	004037	035064		JSR R0,WRT.RM	;LOAD DESIRED TRACK & SECTOR
524	031530	000006			RMDA	
525	031532	032174			C17	
526	031534	012746	000131		MOV #131,-(SP)	;START A SEARCH
527	031540	004037	035064		JSR R0,WRT.RM	
528	031544	000000			RMCS1	
529	031546	032174			C17	
530	031550	156137	030022	027750	BISB ATABIT(R1),SRCHWT	;SET 'SEARCH WAIT' KEY
531	031556	000567			C15	
532	031560	013704	030034	C14:	MOV RMADR,R4	;RMCS1 ADDRESS
533	031564	010164	000010		MOV R1,RMCS2(R4)	;SELECT DRIVE
534	031570	116203	000002		MOVB 2(R2),R3	;PICKUP THE REQUESTED COMMAND
535	031574	122703	000131		CMPB #131,R3	;IS IT A SEARCH COMMAND?
536	031600	001007			BNE 1\$	;BR IF NO
537	031602	016246	000010			

539	031612	000006			RMDA		
540	031614	032174			C17		
541	031616	000403			BR	2\$	:GO LOAD CYLINDER
542	031620	122703	000105	1\$:	CMPB	#105,R3	:IS IT A SEEK COMMAND
543	031624	001007			BNE	3\$	:BR IF NO
544	031626	016246	000012	2\$:	MOV	12(R2),-(SP)	:LOAD DESIRED CYLINDER
545	031632	004037	035064		JSR	RO,WRT.RM	
546	031636	000034			RMDC		
547	031640	032174			C17		
548	031642	000546			BR	C16	
549	031644	122703	000115	3\$:	CMPB	#115,R3	:IS IT AN 'OFFSET' COMMAND?
550	031650	001013			BNE	4\$	:BR IF NO
551	031652	004037	034704		JSR	RO,RD.RM	:MERGE THE OFFSET VALUE INTO RMOF
552	031656	000032			RMOF		:BUT DON'T CHANGE THE UPPER
553	031660	032174			C17		
554	031662	116216	000001		MOVB	1(R2),(SP)	:BYTE WHEN LOADING THE
555	031666	004037	035064		JSR	RO,WRT.RM	:REGISTER (RMOF)
556	031672	000032			RMOF		
557	031674	032174			C17		
558	031676	000530			BR	C16	:GO START THE COMMAND
559	031700	122703	000107	4\$:	CMPB	#107,R3	:IS IT A 'RECALIBRATE' COMMAND?
560	031704	001525			BEQ	C16	:BR IF YES
561	031706	122703	000117		CMPB	#117,R3	:IS IT A RETURN TO CENTER?
562	031712	001522			BEQ	C16	:BR IF YES
563	031714	122703	000103		CMPB	#103,R3	:IS IT AN 'UNLOAD' COMMAND?
564	031720	001016			BNE	5\$	:BR IF NO
565	031722	112761	000001	027676	MOVB	#1,DRVACT(R1)	:SET THE DRIVE ACTIVE INDICATOR
566	031730	105061	027706		CLRB	DRVSTA(R1)	:PUT DRIVE STATUS TO OFFLINE
567	031734	112761	000001	027754	MOVB	#1,ULDFLG(R1)	:SET 'UNLOAD IN PROGRESS' FLAG
568	031742	010346			MOV	R3, -(SP)	:START THE 'UNLOAD' COMMAND
569	031744	004037	035064		JSR	RO,WRT.RM	
570	031750	000000			RMCS1		
571	031752	032174			C17		
572	031754	000207			RTS	PC	:RETURN TO USER
573	031756	122703	000143	5\$:	CMPB	#143,R3	:IS IT A 'SET FORMAT' COMMAND?
574	031762	001014			BNE	6\$	:BR IF NO
575	031764	004037	034704		JSR	RO,RD.RM	:READ THE OFFSET REGISTER
576	031770	000032			RMOF		
577	031772	032174			C17		
578	031774	116266	000001	000001	MOVB	1(R2),1(SP)	:COMBINE 'FMT16','ECI', AND 'HCI'
579	032002	004037	035064		JSR	RO,WRT.RM	:LOAD 'FMT16', 'ECI', AND/OR 'HCI'.
580	032006	000032			RMOF		
581	032010	032174			C17		
582	032012	000436			BR	12\$	
583	032014	122703	000141	6\$:	CMPB	#141,R3	:IS IT A 'GET REGISTER' COMMAND?
584	032020	001023			BNE	10\$	:BR IF NO
585	032022	016203	000006	7\$:	MOV	6(R2),R3	:POINTS TO 1ST ADDRESS OF WHERE
586							:TO PUT THE REGISTER(S)
587	032026	116237	000010	032044	MOVB	10(R2),9\$	:INIT. THE INDEX FOR THE FIRST REG.
588	032034	116205	000011		MOVB	11(R2),R5	:INDEX OF LAST REG. TO MOVE
589	032040	004037	034704	8\$:	JSR	RO,RD.RM	:READ RH/RM REGISTER
590	032044	000000		9\$:	RMCS1		:INDEX OF REG. TO READ
591	032046	032174			C17		
592	032050	012623			MOV	(SP)+,(R3)+	:GET THE CONTENTS OF RH/RM REG.
593	032052	023705	032044		CMP	9\$,R5	:LAST REG. BEEN READ?
594	032056	001414			BEQ	12\$	:GET OUT IF YES
595	032060	062737	000002	032044	ADD	#2,9\$	:INCREASE THE INDEX BY 2


```
596 032066 000764          BR      8$          ;LOOP--MORE TO READ
597 032070 122703 000145    10$:  CMPB    #145,R3      ;IS IT A 'SELECT DRIVE' COMMAND?
598 032074 001405          BEQ      12$          ;BR IF YES
599 032076 010346          11$:  MOV      R3,-(SP)      ;LOAD THE COMMAND
600 032100 004037 035064    JSR      R0,WRT.RM
601 032104 000000          RMCS1
602 032106 032174          CI7
603 032110 004737 036134    12$:  JSR      PC,POPQUE    ;REMOVE REQ. FROM QUEUE
604 032114 052762 000200 000016  BIS    #BIT07,16(R2) ;SET THE 'DONE' BIT
605 032122 005737 027774    TST      SAVEFG        ;SAVE THE RH/RM REGISTERS?
606 032126 100002          BPL      13$          ;BR IF NO
607 032130 004737 035256    JSR      PC,SVRH70      ;YES--GO SAVE THE REGISTERS
608 032134 000207          13$:  RTS      PC          ;RETURN TO USER
609 032136 006301          C15:  ASL      R1
610 032140 012761 060000 030000  MOV    #60000,TIMER(R1) ;SET A ONE SECOND TIMER
611 032146 006201          ASR      R1
612 032150 112761 000001 027676  MOVB   #1,DRVACT(R1) ;SET THE DRIVE ACTIVE
613 032156 000207          RTS      PC          ;RETURN TO THE USER
614 032160 010346          C16:  MOV      R3,-(SP)      ;LOAD THE COMMAND
615 032162 004037 035064    JSR      R0,WRT.RM
616 032166 000000          RMCS1
617 032170 032174          CI7
618 032172 000761          BR      C15
619 032174 032764 010000 000010 C17:  BIT    #BIT12,RMCS2(R4) ;DRIVE NON-EXISTENT ?
620          BNE      C18
621 032202 005702          1$:  TST      R2          ;BR IF YES
622          BEQ      C17B      ;ANYTHING IN QUEUE ?
623 032204 001001          BNE      2$          ;BR IF NOT
624 032206 000207          RTS      PC          ;BR IF QUEUE IS THERE
625 032210 012762 104000 000016 2$:  MOV    #BIT15!BIT11,16(R2) ;OTHERWISE EXIT
626          JSR      PC,SVRH70      ;SET 'PARITY' ERROR INDICATOR
627 032216 012746 000111 000111 C17B: MOV    #111,-(SP) ;GO SAVE THE RH/RM REGISTERS
628 032222 004037 035064    JSR      R0,WRT.RM      ;DO A 'DRIVE CLEAR'
629 032226 000000          RMCS1
630 032230 032274          CI8
631 032232 004737 036016    2$:  JSR      PC,EMPTYQ    ;EMPTY THE QUEUE
632 032236 105061 027736    CLRB    DPRQS(R1)      ;CLEAR THE PORT REQUEST FLAG
633 032242 105061 027754    CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
634 032246 105061 027676    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
635 032252 020237 027746    CMP      R2,TRNSWT      ;IF THIS DRIVE HAD AN I/O REQUEST
636          CMP      R1,DTUW        ;IF THIS DRIVE HAD AN I/O REQUEST
637 032256 001005          BNE      1$          ;IN PROGRESS CLEAR ALL OF THE FLAGS
638 032260 005037 027746    CLR      TRNSWT
639 032264 012737 177777 030020  MOV    #-1,DTUW
640 032272 000207          1$:  RTS      PC
641 032274 104412          C18:  SAVREG
642 032276 032764 010000 000010 BIT    #BIT12,RMCS2(R4) ;SAVE R0 - R5
643          BNE      1$          ;IS 'NED' SET ?
644 032304 005001          CLR      R1          ;BR IF YES
645 032306 005003          CLR      R3
646 032310 105761 027676    1$:  TSTB   DRVACT(R1) ;DRIVE ACTIVE?
647          BEQ      5$          ;BR IF NO
648 032314 001003          BNE      22$         ;BR IF IN ACTIVE
649 032316 105761 027736    TSTB   DPRQS(R1)      ;PORT REQUEST
650 032322 001443          BEQ      5$          ;BR IF NOT
651 032324 013702 027746    22$:  MOV      TRNSWT,R2 ;GET THE 'TRANSFER WAIT' QUEUE
652 032330 020137 030020    CMP      R1,DTUW      ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
```

```
653 032334 001402 BEQ 2$ ;BR IF YES
654 032336 004737 036112 JSR PC,GETREQ ;GET THE DPB POINTER
655 032342 005702 2$: TST R2 ;QUEUE ENTRY FOR DRIVE ?
656 032344 001413 BEQ 4$ ;BR IF NOT
657 032346 032764 010000 000010 BIT #BIT12,RMCS2(R4) ;'NED' SET ?
658 032354 001404 BEQ 3$ ;BR IF NOT
659 032356 012762 100002 000016 MOV #BIT15!BIT01,16(R2) ;SET 'DRIVE NON-EXISTENT' INDICATOR
660 032364 000403 BR 4$ ;CONTINUE
661 032366 012762 102000 000016 3$: MOV #BIT15!BIT10,16(R2) ;SET 'NON-CLEARABLE PARITY' ERROR INDICATOR
662 JSR PC,SVRH70 ;SAVE RH/RM REGISTERS
663 032374 012763 177777 030000 4$: MOV #-1,TIMER(R3) ;STOP THE TIMER
664 032402 105061 027676 CLRB DRVACT(R1) ;SET 'DRIVE ACTIVE' TO IDLE
665 032406 105061 027736 CLRB DPRQS(R1) ;CLEAR PORT REQUEST FLAG
666 032412 020137 030020 CMP R1,DTUW ;IS THIS DRIVE SETUP FOR A TRANSFER
667 032416 001005 BNE 5$ ;BR IF NOT
668 032420 012737 177777 030020 MOV #-1,DTUW ;RESET THE INDICATOR
669 032426 005037 027746 CLR TRNSWT ;CLEAR THE TRANSFER QUEUE
670 032432 105061 027754 5$: CLRB ULDFLG(R1) ;CLEAR UNLOAD FLAG
671 032436 032764 010000 000010 BIT #BIT12,RMCS2(R4) ;'NED' SET ?
672 BNE 6$ ;BR IF YES
673 032444 005201 INC R1 ;MOVE TO THE NEXT DRIVE
674 032446 062703 000002 ADD #2,R3
675 032452 042701 177770 BIC #C7,R1
676 032456 001314 BNE 1$ ;BR IF MORE DRIVES
677 032460 012737 177777 030020 MOV #-1,DTUW ;NO DATA TRANSFERS UNDERWAY
678 032466 005037 027746 CLR TRNSWT ;CLEAR THE 'TRANSFER WAIT' QUEUE
679 032472 004737 035740 JSR PC,CLRQUE ;CLEAR ALL OF THE REQUEST QUEUES
680 032476 012764 000040 000010 MOV #CLR,RMCS2(R4) ;DO A MASSBUS INIT.
681 032504 000406 BR 7$ ;CONTINUE
682 032506 004737 036016 6$: JSR PC,EMPTYQ ;CLEAR THE DRIVE'S QUEUE
683 032512 105061 027706 CLRB DRVSTA(R1) ;SET DRIVE TO OFFLINE
684 032516 105061 027716 CLRB DRVTP(R1) ;CLEAR THE DRIVE TYPE INDICATOR
685 032522 004737 035374 7$: JSR PC,SET.IE ;SET 'IE' WITHOUT 'TRE'
686 032526 104413 RESREG ;RESTORE R0 - R5
687 032530 000207 RTS PC ;RETURN
688
689 ;LOOK AHEAD ROUTINE
690
691 ;CALL
692
693 MOV #DRVNUM,R1 ;DRIVE NUMBER
694 MOV #DPB,R2 ;POINT TO DPB
695 JSR R0,LA ;GO CHECK THE WINDOW
696 RETURN1 ;ERROR RETURN
697 RETURN2 ;START A SEARCH
698 RETURN3 ;START A DATA TRANSFER
699
700 032532 013704 030034 LA: MOV RMADR,R4 ;GET RMCS1'S ADDRESS
701 032536 010164 000010 MOV R1,RMCS2(R4) ;SELECT DRIVE
702 032542 004037 034704 JSR R0,RD.RM ;READ DRIVE STATUS
703 032546 000012 RMDS
704 032550 032700 4$ ;ERROR RETURN ADDRESS
705 032552 042716 157577 BIC #C020200,(SP) ;ON CYLINDER ?
706 032556 022726 000200 CMP #200,(SP)+ ;PIP=0,DRY=1?
707 032562 001044 BNE 3$ ;NO
708 032564 105261 027764 INCB LACNT(R1) ;INCREMENT THE LOOK AHEAD COUNT
709 032570 126137 027764 030042 CMPB LACNT(R1),MXLACT ;EXCEED MAX?
710 032576 003033 BGT 2$ ;BR IF YES
```



```
710 032600 116203 000010      MOVB 10(R2),R3      ;GET DESIRED SECTOR ADDRESS AND
711 032604 000303      SWAB R3      ;MULT. BY 64--ALIGN WITH
712 032606 006203      ASR R3      ;LOOK AHEAD REGISTER
713 032610 006203      ASR R3
714 032612 012737 000340 177776 6$: MOV #340,PS      ;PRIORITY LEVEL '7'
715 032620 004037 034704      JSR R0,RD.RM      ;READ LOOK AHEAD REGISTER
716 032624 000020      RMLA 4$
717 032626 032700      4$
718 032630 021664 000020      CMP (SP),RMLA(R4)      ;CORRECT LA NUMBER ?
719 032634 001402      BEQ 7$      ;YES
720 032636 005726      TST (SP)+      ;NO,CLEAR STACK
721 032640 000415      BR 3$
722 032642 162603 7$: SUB (SP)+,R3      ;CALCULATE THE DELTA
723 032644 002002      BGE 1$
724 032646 062703 004000      ADD #<32.*64.>,R3      ;MAKE THE DELTA POSITIVE
725 032652 023703 030044 1$: CMP MXDLTA,R3      ;CHECK THE DELTA TO SEE
726 032656 002406      BLT 3$      ;IF IT IS WITHIN THE
727 032660 023703 030046      CMP MNDLTA,R3      ;WINDOW---IF YES, ZERO
728 032664 002003      BGE 3$      ;THE LOOK AHEAD COUNT
729 032666 105061 027764 2$: CLRB LACNT(R1)      ;AND TAKE THE I/O EXIT
730 032672 005720      TST (R0)+
731 032674 005720 3$: TST (R0)+      ;ADJUST THE RETURN ADDRESS
732 032676 000402      BR 5$      ;EXIT
733 032700 004737 032174 4$: JSR PC,C17      ;PROCESS THE ERROR
734 032704 000200 5$: RTS R0      ;RETURN
735
736      ;INTERRUPT SERVICE ROUTINE
737
738 032706 112737 000001 027752 1SR: MOVB #1,ACTDRV      ;SET 'ACTIVE DRIVER' FLAG
739 032714 104412      SAVREG      ;SAVE R0 - R5
740 032716 013704 030034      MOV RMADR,R4      ;ADDRESS OF RHSCS1
741 032722 013701 030020      MOV DTUW,R1      ;GET 'DATA TRANSFER UNDERWAY' INDICATOR
742 032726 002403      BLT 1$      ;BR IF NO DATA TRANSFER UNDERWAY
743 032730 004737 032752      JSR PC,TD      ;CALL TRANSFER DONE
744 032734 000402      BR 2$      ;EXIT
745 032736 004737 033122 1$: JSR PC,SC      ;CALL SPECIAL CONDITIONS
746 032742 104413 2$: RESREG      ;RESTORE R0 - R5
747 032744 105037 027752      CLRB ACTDRV      ;CLEAR 'ACTIVE DRIVER' FLAG
748 032750 000002      RTI      ;RETURN
749
750      ;TRANSFER DONE ROUTINE
751
752 032752 105061 027676 030020 TD: CLRB DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
753 032756 012737 177777      MOV #-1,DTUW      ;NO DATA TRANSFERS UNDERWAY
754 032764 006301      ASL R1
755 032766 012761 177777 030000      MOV #-1,TIMER(R1)      ;CANCEL TIMEOUT
756 032774 006201      ASR R1
757 032776 013702 027746      MOV TRNSWT,R2      ;GET 'DPB' ADDRESS FROM THE
758 033002 005037 027746      CLR TRNSWT      ;TRANSFER WAIT QUEUE--CLEAR QUEUE
759 033006 052762 000200 000016      BIS #BIT07,16(R2)      ;SET DONE
760 033014 010164 000010      MOV R1,RMCS2(R4)      ;SELECT THE DRIVE
761 033020 004037 034704      JSR R0,RD.RM      ;TRANSFER ERROR(TRE=1)?
762 033024 000000      RMCS1
763 033026 032174      C17
764 033030 006126      ROL (SP)+
765 033032 100417      BMI 3$      ;BR IF YES
766 033034 005737 027774      TST SAVEFG      ;SAVE THE RH/RM REGISTERS?
```

```
767 033040 100002          BPL      1$          ;BR IF NO
768 033042 004737 035256    JSR      PC,SVRH70    ;YES--SAVE THE REGISTERS
772 033046          1$:          ;
774 033046 004737 036112    JSR      PC,GETREQ    ;GET DPB POINTER
775 033052 005702          TST      R2          ;ENTRY FOR DRIVE ?
776 033054 001403          BEQ      2$          ;BR IF NOT
777 033056 004737 031114    JSR      PC,OPT      ;CALL OPTIMIZER
778 033062 000417          BR       SC          ;CHECK OTHER DRIVES
779          ;THE RELEASE DRIVE COMMAND IS FORECD TO ENTER FOR DUAL PORT OPERATION
780 033064 012714 000113    2$:      MOV      #113,(R4) ;RELEASE THE DRIVE
781 033070 000414          BR       SC          ;CHECK FOR OTHER DRIVES
782 033072 052762 100100 000016 3$:    BIS      #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
783 033100 004737 036016    JSR      PC,EMPTYQ    ;EMPTY THE 'DRIVE'S WAIT' QUEUE
784 033104 004737 035256    JSR      PC,SVRH70    ;SAVE THE RH/RM REGISTERS
785 033110 012714 040111    MOV      #40111,(R4) ;ISSUE A 'DRIVE CLEAR'
786 033114 012714 000113    MOV      #113,(R4) ;ISSUE A RELEASE TO THE DRIVE
787 033120 000400          BR       SC          ;CHECK FOR OTHER DRIVES
788
789
806
807          ;SPECIAL CONDITION ROUTINE
808
809 033122 116403 000016    SC:      MOVB     RMAS(R4),R3 ;READ 'RMAS'
810 033126 001014          BNE      2$          ;BR IF ANY 'ATA' BITS SET
811 033130 004037 034704    JSR      R0,RD.RM      ;READ CONTROL AND STATUS REGISTER
812 033134 000000          RMCS1
813 033136 032274          C18
814          ;
815 033140 106126          1$          ;EXIT IF FAIL TO READ
816 033142 100405          ROLB     (SP)+        ;IS 'IE'=1?
817 033144 004037 036202    BMI      1$          ;YES, NO DRIVES TO CHECK
818 033152 004737 035374    JSR      R0,ES.SAV    ;SAVE THE ADDRESS IN '$ESCAPE'
819 033156 000207          EMT      1          ;REPORT AN ILLEGAL INTERRUPT
820 033160 005046          JSR      PC,SET.IE    ;SET INTERRUPT ENABLE
821 033162 110316          1$:      RTS      PC    ;RETURN
822 033164 012703 000001    2$:      CLR      -(SP) ;PROCESS ALL DRIVES THAT HAVE
823 033170 005001          MOVB     R3,(SP)      ;AN 'ATA'=1
824 033172 030316          MOV      #1,R3
825 033174 001005          CLR      R1
826 033176 005201          SC3:     BIT      R3,(SP) ;ATA=1?
827 033200 106303          BNE      SC5          ;YES
828 033202 001373          SC4:     INC      R1    ;MOVE TO THE NEXT DRIVE
829 033204 005726          ASLB     R3
830 033206 000207          BNE      SC3          ;BR IF MORE TO CHECK?
831 033210 105761 027726    TST      (SP)+      ;CLEAN OFF THE STACK
832 033214 001402          RTS      PC          ;RETURN TO USER
833 033216 000137 034134    TSTB     DPINT(R1)   ;INITIALIZING THE DRIVE ?
834 033222 105761 027736    BEQ      1$          ;BR IF NOT
835 033226 001402          JMP      SC13        ;PROCESS THE DRIVE
836 033230 000137 034134    1$:      DPRQS(R1) ;PORT REQUEST OUTSTANDING ?
837 033234 105761 027706    BEQ      2$          ;BR IF NOT
838 033240 003023          JMP      SC13        ;START THE OUTSTANDING COMMAND
839 033242 105761 027754    TSTB     DRVSTA(R1) ;CHECK THE DRIVE STATUS
840 033246 003420          BGT      5$          ;BR IF ONLINE
841 033250 004737 036112    BLE      5$          ;UNLOAD IN PROGRESS?
842 033254 004737 035256    JSR      PC,GETREQ    ;BR IF NOT
                        JSR      PC,SVRH70    ;GET DPB POINTER
                        ;SAVE THE RH/RM REGISTERS
```


843	033260	004737	034064		JSR	PC,SC12	;SAVE RMD5, RMER1, RMER2, AND RMMR2
844							;ALSO DO A DRIVE INIT (DRVINT)
845	033264	105761	027706		TSTB	DRVSTA(R1)	;DID DRIVE COME ONLINE?
846	033270	003414			BLE	6\$	;NO
847	033272	032737	040000	027666	BIT	#BIT14,RMERRS	;WAS THERE AN ERROR?
848	033300	001000			BNE	3\$	;BR IF ERROR
849					JMP	SC11	;NO ERROR
850	033302	013705	027670	3\$:	MOV	RMERRS+2,R5	;YES -- PICKUP RMER1 AND
851	033306	000504			BR	SC6A	;GO PROCESS THE ERROR
852	033310	105761	027676	5\$:	TSTB	DRVACT(R1)	;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
853	033314	001033			BNE	SC6	;BR IF EITHER
854	033316	004737	034064		JSR	PC,SC12	;SAVE RMD5, RMER1, RMER2, AND RMMR2
855							;ALSO DO A DRVINT
856	033322	105761	027726	6\$:	TSTB	DPINT(R1)	;TRYING TO INIT THE DRIVE ?
857	033326	001323			BNE	SC4	;BR IF YES, CHECK ON MORE DRIVES
858	033330	105761	027706		TSTB	DRVSTA(R1)	;CHECK ON DRIVE'S STATUS
859	033334	100412			BMI	7\$	;BR IF UNSAFE
860	033336	032737	020000	027672	BIT	#BIT13,RMERRS+4	;ADDRESS PLUG CHANGED ?
861	033344	001013			BNE	8\$	;BR IF YES
862					MOV	#113,-(SP)	;RELEASE COMMAND
863	033346	012746	000111		MOV	#111,-(SP)	;DRIVE CLEAR
864	033352	004037	035064		JSR	RO,WRT.RM	;WRITE THE COMMAND INTO RMCS1
865	033356	000000			RMCS1		;REGISTER INDEX
866	033360	033724			SC8		;PARITY EXIT ADDRESS
867	033362	011605		7\$:	MOV	(SP),R5	;PICKUP (RMAS) BEFORE THE ERROR CALL
868	033364	004037	036202		JSR	RO,ES.SAV	;SAVE THE ADDRESS IN '\$ESCAPE'
	033370	104002			EMT	2	;REPORT THE UNEXPECTED ATTENTION
869	033372	000701			BR	SC4	;GO CHECK FOR MORE ATA'S
870	033374			8\$:			
	033374	004037	036202		JSR	RO,ES.SAV	;SAVE THE ADDRESS IN '\$ESCAPE'
	033400	104005			EMT	5	;REPORT THE ADDRESS PLUG CHANGE
871	033402	000675			BR	SC4	;CHECK FOR MORE DRIVES
872	033404	006301		SC6:	ASL	R1	;SETUP TO ADDRESS WORDS
873	033406	012761	177777	030000	MOV	#-1,TIMER(R1)	;STOP THE TIMER
874	033414	006201			ASR	R1	;RESTORE THE DRIVE ADDRESS
875	033416	004737	036112		JSR	PC,GETREQ	;GET THE DPB POINTER FROM THE QUEUE
876	033422	010164	000010		MOV	R1,RMCS2(R4)	;SELECT DRIVE
877	033426	000137	033754		JMP	SC11	;PROCESS THE SEARCH
878	033432	004037	034704		JSR	RO,RD.RM	;READ THE RM'S STATUS REG.
879	033436	000012			RMD5		
880	033440	033724			SC8		
881	033442	011605			MOV	(SP),R5	;AND PUT IT IN R5
882	033444	006126			ROL	(SP)+	;WAS THERE AN ERROR?
883	033446	100407			BMI	1\$	;BR IF ERROR
884	033450	105761	027676		TSTB	DRVACT(R1)	;CHECK DRIVE'S STATE
885	033454	003137			BGT	SC11	;BR IF DRIVE ACTIVE WITH ORDER
886	033456	052762	100210	000016	BIS	#BIT15:BIT07:BIT03,16(R2)	;INFORM USER OF ERROR RECOVER COMPLETION
887	033464	000470			BR	SC7	
888	033466	004037	034704	1\$:	JSR	RO,RD.RM	;READ ERROR REGISTER #1
889	033472	000014			RMER1		
890	033474	033724			SC8		
891	033476	012605			MOV	(SP)+,R5	;AND SAVE IT IN R5
892	033500	004737	035256		JSR	PC,SVRH70	;SAVE RH/RM REGISTERS
893	033504	012746	000111		MOV	#111,-(SP)	;ISSUE A DRIVE CLEAR
894	033510	004037	035064		JSR	RO,WRT.RM	
895	033514	000000			RMCS1		
896	033516	033724			SC8		

```
897 033520 006105          SC6A: ROL    R5          ;WAS "UNSAFE" CONDITION =1?
898 033522 100406          BMI    1$          ;BR IF YES
899 033524 005702          TST    R2          ;ANYTHING IN QUEUE ?
900 033526 001447          BEQ    SC7          ;BR IF NOT
901 033530 052762 100240 000016 BIS    #BIT15:BIT07:BIT05,16(R2) ;INFORM USER OF ERROR
902 033536 000443          BR     SC7
903 033540 004037 034704 1$: JSR    R0,RD.RM ;READ DRIVE STATUS REG. #1
904 033544 000012          RMD5
905 033546 033724          SC8
906 033550 011605          MOV    (SP),R5 ;SAVE RMD5 IN R5
907 033552 006126          ROL    (SP)+ ;"ERR"=1?
908 033554 100011          BPL    2$          ;BR IF NO--UNSAFE CLEARED
909 033556 112761 177777 027706 MOVB  #-1,DRVSTA(R1) ;DRIVE IS UNSAFE
910 033564 004737 035256          JSR    PC,SVRH70 ;SAVE RH/RM REGISTERS
911 033570 052762 110000 000016 BIS    #BIT15:BIT12,16(R2) ;INFORM USER OF UNSAFE ERROR
912 033576 000423          BR     SC7
913 033600 032705 010000 2$: BIT    #BIT12,R5 ;"MOL" = 1 ?
914 033604 001015          BNE    3$          ;BR IF YES
915 033606 112761 177777 027676 MOVB  #-1,DRVACT(R1) ;ACTIVE ERROR RECOVER
916 033614 112761 000001 027706 MOVB  #1,DRVSTA(R1) ;ONLINE
917 033622 006301          ASL    R1
918 033624 012761 072460 030000 MOV    #30000.,TIMER(R1) ;START 30 SECOND TIMER
919 033632 006201          ASR    R1
920 033634 000137 033176          JMP    SC4
921 033640 052762 100220 000016 3$: BIS    #BIT15:BIT07:BIT04,16(R2) ;INFORM USER OF ERROR
922 033646 105061 027676          SC7: CLRB   DRVACT(R1) ;DRIVE IS IDLE
923          ; JSR    PC,EMPTYQ ;DUMP THE QUEUE
924 033652 004737 036134          JSR    PC,POPQUE ;REMOVE THE QUEUE
925 033656 105761 027754          TSTB  ULDFLG(R1) ;UNLOAD IN RMOGRESS OR QUEUE?
926 033662 003002          BGT    1$          ;BR IF NOT
927 033664 105061 027754          CLRB   ULDFLG(R1) ;CLEAR UNLOAD FLAG
928 033670 116164 030022 000016 1$: MOVB  ATABIT(R1),RMAS(R4) ;CLEAR ATTENTION BIT
929 033676 105761 027706          TSTB  DRVSTA(R1) ;IS THE DRIVE UNSAFE ?
930 033702 100406          BMI    2$          ;BR IF IT IS
931          ; MOV    #113,-(SP) ;RELEASE COMMAND
932 033704 012746 000111          MOV    #111,-(SP) ;DRIVE CLEAR COMMAND
933 033710 004037 035064          JSR    R0,WRT.RM ;WRITE THE COMMAND INTO RPCS1
934 033714 000000          RMCS1
935 033716 033724          SC8
936 033720 000137 033176 2$: JMP    SC4 ;CHECK FOR MORE DRIVES
937 033724 105761 027676          SC8: TSTB  DRVACT(R1) ;IS DRIVE IDLE?
938 033730 001405          BEQ    1$          ;YES
939 033732 004737 036112          JSR    PC,GETREQ ;GET DPB POINTER
940 033736 004737 032174          JSR    PC,C17 ;PROCESS THE PARITY ERROR
941 033742 000402          BR     2$          ;CONTINUE
942 033744          1$:
943          ; JSR    PC,C17 ;PROCESS THE PARITY ERROR
944 033744 004737 032216          JSR    PC,C17B ;PROCESS THE UNCORRECTABLE PARITY ERROR
945 033750 000137 033176 2$: JMP    SC4 ;CHECK MORE DRIVES
946 033754 105761 027754          SC11: TSTB  ULDFLG(R1) ;"UNLOAD IN PROGRESS"?
947 033760 003402          BLE    1$          ;BR IF NO
948 033762 105061 027754          CLRB   ULDFLG(R1) ;CLEAR UNLOAD FLAG
949 033766 105061 027676 1$: CLRB   DRVACT(R1) ;SET DRIVE IDLE
950 033772 136137 030022 027750 BITB  ATABIT(R1),SRCHWT ;DOING A SEARCH OPERATION FOR
951          ; AN I/O COMMAND?
952 034000 001012          BNE    2$          ;BR IF YES
953 034002 004737 036134          JSR    PC,POPQUE ;REMOVE REQUEST FROM QUEUE
```



```
954 034006 052762 000200 000016      BIS      #BIT07,16(R2)      ;SET "DONE" BIT
955 034014 005737 027774                IST      SAVEFG          ;SAVE THE REGISTERS?
956 034020 100002                BPL      2$                ;BR IF NO
957 034022 004737 035256                JSR      PC,SVRH70        ;YES--SAVE ALL OF THE RH/RM REG'S
958 034026 116164 030022 000016 2$:      MOV      ATABIT(R1),RMAS(R4)      ;CLEAR ATTENTION BIT
959 034034 146137 030022 027750          BICB     ATABIT(R1),SRCHWT      ;CLEAR IMPLIED SEEK SET
960 034042 006301                ASL      R1                ;WORD INDEX
961 034044 012761 177777 030000          MOV      #-1,TIMER(R1)      ;STOP CLOCK
962 034052 006201                ASR      R1                ;RESTORE R1
963 034054 004737 031114                JSR      PC,OPT          ;START A REQUEST
964 034060 000137 033176                JMP      SC4            ;CHECK FOR MORE DRIVES
965 034064 010164 000010                MOV      R1,RMCS2(R4)      ;SELECT DRIVE
966 034070 016437 000012 027666          MOV      RMD5(R4),RMERRS      ;SAVE THE FOUR REGISTERS THAT
967 034076 016437 000014 027670          MOV      RMER1(R4),RMERRS+2      ;WILL TELL US SOMETHING
968 034104 016437 000042 027672          MOV      RMER2(R4),RMERRS+4
969 034112 016437 000040 027674          MOV      RMMR2(R4),RMERRS+6
970 034120 004037 030264                JSR      RO,DRVINT        ;INIT. THE STATE OF THE DRIVE
971 034124 000401                BR      1$                ;TAKE ERROR EXIT
972 034126 000207                RTS      PC                ;RETURN
973 034130 005726                1$:      TST      (SP)+          ;POP PC OFF OF THE STACK
974 034132 000674                BR      SC8            ;PROCESS THE PARITY ERROR
975 034134 006301                SC13:   ASL      R1                ;SETUP TO ADDRESS WORDS
976 034136 012761 177777 030000          MOV      #-1,TIMER(R1)      ;STOP THE TIMER
977 034144 006201                ASR      R1                ;
978 034146 010164 000010                MOV      R1,RMCS2(R4)      ;SELECT THE DRIVE
979 034152 116164 030022 000016          MOV      ATABIT(R1),RMAS(R4)      ;CLEAR THE ATTENTION BIT
980 034160 105761 027726                1$:      TSTB     DPINT(R1)      ;INITIALIZING THE DRIVE ?
981 034164 001424                BEQ      2$                ;BR IF NOT
982 034166 105061 027726                CLRB     DPINT(R1)      ;CLEAR THE INIT INDICATOR
983 034172 004037 030264                JSR      RO,DRVINT        ;GO INIT THE DRIVE
984 034176 000240                NOP                     ;DUMMY PARITY ERROR RETURN
985 034200 105761 027706                TSTB     DRVSTA(R1)      ;DRIVE ONLINE ?
986 034204 003014                BGT      2$                ;BR IF YES -- START ORDER
987 034206 005702                TST      R2                ;QUEUE ENTRY FOR THE DRIVE
988 034210 001426                BEQ      3$                ;BR IF NOT
989 034212 004737 036112                JSR      PC,GETREQ      ;GET DPB ADDRESS
990 034216 052762 140000 000016          BIS      #BIT15!BIT14,16(R2)      ;INFORM USER THAT DRIVE OFFLINE
991 034224 004737 035256                JSR      PC,SVRH70        ;SAVE THE REGISTERS
992                                ;      JSR      PC,EMPTYQ      ;EMPTY THE REQUEST QUEUE
993 034230 004737 036134                JSR      PC,POPQUE      ;REMOVE THE QUEUE
994 034234 000414                BR      3$                ;
995 034236 032764 004000 000000 2$:      BIT      #BIT11,RMCS1(R4)      ;DVA SET ?
996 034244 001006                BNE     4$                ;SET THEN CALL OPT
997 034246 006301                ASL      R1                ;
998 034250 012761 060000 030000          MOV      #60000,TIMER(R1)
999 034256 006201                ASR      R1                ;
1000 034260 000402                BR      3$                ;
1001 034262 004737 031114                4$:      JSR      PC,OPT          ;START THE PENDING REQUEST
1002 034266 000137 033176                3$:      JMP      SC4            ;PROCESS OTHER DRIVES
1003
1004                                ;RM TIMER ROUTINE
1005                                ;CALL
1006                                ;
1007                                ;      MOV      #TIME,-(SP)      ;ELAPSED TIME IN MILLISECONDS ON THE STACK
1008                                ;      JSR      PC,RMTMR        ;CALL RM05 TIME ROUTINE
1009 034272 005737 027752                RMTMR:  TST      ACTDRV        ;CHECK "ACTDRV & ACTSTR"
1010 034276 001027                BNE     4$                ;IF NON ZERO EXIT
```

```
1011 034300 112737 000001 027753      MOVB    #1,ACTSTR      ;SET 'ACTSTR'
1012 034306 104412                      SAVREG      ;SAVE R0 - R5
1013 034310 005001                      CLR      R1      ;START WITH DRIVE 0
1014 034312 005003                      CLR      R3
1015 034314 005763 030000      1$:    TST      TIMER(R3)      ;IS THE TIMER RUNNING?
1016 034320 002406                      BLT      2$      ;BR IF NO
1017 034322 166663 000002 030000      SUB      2(SP),TIMER(R3) ;COUNT THE INTERVAL
1018 034330 003002                      BGT      2$      ;BR IF NO SOFTWARE TIMEOUT
1019 034332 004737 034362      JSR      PC,STO      ;CALL SOFTWARE TIMEOUT ROUTINE
1020 034336 005201      2$:    INC      R1      ;MOVE TO NEXT DRIVE
1021 034340 005723                      TST      (R3)+
1022 034342 022701 000010      CMP      #8.,R1      ;OUT OF DRIVES?
1023 034346 003362                      BGT      1$      ;BR IF NO
1024 034350 104413      3$:    RESREG
1025 034352 105037 027753      CLRB     ACTSTR      ;RESTORE R0 - R5
1026 034356 012616      4$:    MOV      (SP)+,(SP)      ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
1027 034360 000207      RTS      PC      ;ADJUST THE STACK
1028                                     ;RETURN
1029                                     ;SOFTWARE TIMEOUT ROUTINE
1030                                     ;
1031                                     ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
1032                                     ;OR GREATER
1033                                     ;
1034                                     ;CALL:
1035                                     ;STO
1036                                     ;MOV      #DRVNUM,R1      ;DRIVE NUMBER
1037                                     ;JSR      PC,STO      ;CALL
1038                                     ;RETURN
1039 034362 010146      STO:    MOV      R1,-(SP)      ;SAVE R1
1040 034364 010246      MOV      R2,-(SP)      ;SAVE R2
1041 034366 010346      MOV      R3,-(SP)      ;SAVE R3
1042 034370 010446      MOV      R4,-(SP)      ;SAVE R4
1043 034372 013704 030034      MOV      RMADR,R4      ;GET ADDRESS OF 'RMCS1'
1044 034376 010164 000010      MOV      R1,RMCS2(R4)      ;SELECT THE DRIVE
1045 034402 004037 034704      JSR      R0,RD.RM      ;READ 'DRIVE STATUS REG'
1046 034406 000012      RMD5
1047      ;
1048 034410 034672      ;
1049 034412 105726      ;
1050 034414 100436      ;
1051 034416 105761 027726      ST01:   TSTB     (SP)+      ;IS 'DRY'=1?
1052 034422 001033      BMI      ST02      ;BR IF YES
1053 034424 105761 027736      TSTB     DPINT(R1)      ;TRYING TO INITIALIZE THE DRIVE ?
1054 034430 001030      BNE      ST02      ;BR IF YES
1055 034432 013702 027746      TSTB     DPRQS(R1)      ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
1056 034436 020137 030020      BNE      ST02      ;BR IF YES
1057 034442 001404      MOV      TRNSWT,R2      ;PICKUP TRANSFER WAIT QUEUE
1058 034444 000137 034672      CMP      R1,DTUW      ;TRANSFER UNDERWAY ON THIS DRIVE?
1059 034450 004737 036112      BEQ      1$      ;BR IF YES
1060 034454 052762 101000 000016 1$:    JMP      ST09      ;IF NOT DON'T BOTHER DRIVES
1061 034462 004737 035256      JSR      PC,GETREQ      ;GET DPB ADDRESS
1062      ;
1063 034466 105061 027676      BIS      #BIT15:BIT09,16(R2) ;SET THE ERROR FLAGS
1064 034472 105061 027754      JSR      PC,SVRH70      ;SAVE RH/RM REGISTERS
1065 034476 005037 027746      MOV      #CLR,RMCS2(R4) ;'INIT' THE MASS BUS
1066 034502 012737 177777 030020      CLRB     DRVACT(R1) ;DRIVE IS IDLE
1067 034510 000470      CLRB     ULDFLG(R1) ;CLEAR THE UNLOAD FLAG
1068                                     CLR      TRNSWT ;CLEAR DPB ADDRESS
1069                                     MOV      #-1,DTUW ;CLEAR THE TRANSFER DRIVE #
1070                                     BR      ST09      ;DON'T BOTHER OTHER DRIVES
```



```
1068 034512 116405 000016      ST02:  MOV B   RMAS(R4),R5      ;READ ATTENTION REG
1069 034516 136105 030022      BIT B   ATABIT(R1),R5      ;IS ATTENTION FOR THIS DRIVE UP ?
1070 034522 001007              BNE      ST03              ;YES
1071 034524 105761 027726      TST B   DPINT(R1)          ;TRYING TO INITIALIZE THE DRIVE ?
1072 034530 001021              BNE      ST06              ;BR IF YES - DRIVE NOT ONLINE
1073 034532 105761 027736      TST B   DPRQS(R1)          ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
1074 034536 001035              BNE      ST07              ;BR IF YES - NO RESPONSE TO REQUEST
1075 034540 000454              BR       ST09              ;OTHER WISE EXIT
1076 034542 105761 027726      ST03:  TST B   DPINT(R1)          ;INITIALIZING THE DRIVE ?
1077 034546 001003              BNE      1$              ;BR IF INIT PENDING
1078 034550 105761 027736      TST B   DPRQS(R1)          ;PORT REQUEST PENDING ?
1079 034554 001446              BEQ      ST09              ;BR IF NOT
1080 034556 012763 177777 030000 1$:  MOV     #-1,TIMER(R3)      ;STOP THE TIMER
1081 034564 000442              BR       ST09              ;EXIT
1082 034566 004737 032274      ST05:  JSR     PC,C18          ;GO HANDLE THE PARITY ERROR
1083 034572 000437              BR       ST09
1084 034574 105061 027726      ST06:  CLRB    DPINT(R1)          ;CLEAR THE INITIALIZE INDICATOR
1085 034600 105061 027706      CLRB    DRVSTA(R1)          ;SET UNIT OFFLINE
1086 034604 012763 177777 030000  MOV     #-1,TIMER(R3)      ;STOP THE TIMER
1087 034612 004737 036112      JSR     PC,GETREQ          ;GET THE DPB ADDRESS
1088 034616 005702              TST     R2              ;REQUEST IN QUEUE ?
1089 034620 001424              BEQ      ST09              ;BR IF NOT
1090 034622 052762 140000 000016  BIS     #BIT15!BIT14,16(R2)      ;INFORM THE USER DRIVE NOT AVAILABLE
1091 034630 000414              BR       ST08
1092 034632 012763 177777 030000  ST07:  MOV     #-1,TIMER(R3)      ;STOP THE TIMER
1093 034640 105061 027736      CLRB    DPRQS(R1)          ;CLEAR PORT REQUEST INDICATOR
1094 034644 004737 036112      JSR     PC,GETREQ          ;GET DPB ADDRESS
1095 034650 005702              TST     R2              ;QUEUE ENTRY FOR DRIVE ?
1096 034652 001407              BEQ      ST09              ;BR IF NONE
1097 034654 012762 100004 000016  MOV     #BIT15!BIT2,16(R2)      ;INFORM USER OF PORT REQUEST ERROR
1098 034662 004737 036016      ST08:  JSR     PC,EMPTYQ          ;CLEAR THE QUEUE FOR THE DRIVE
1099 034666 004737 035256      JSR     PC,SVRH70          ;SAVE THE REGISTERS
1100 034672 012604              ST09:  MOV     (SP)+,R4          ;RESTORE R4
1101 034674 012603              MOV     (SP)+,R3          ;RESTORE R3
1102 034676 012602              MOV     (SP)+,R2          ;RESTORE R2
1103 034700 012601              MOV     (SP)+,R1          ;RESTORE R1
1104 034702 000207              RTS      PC              ;RETURN
1105
1106      ;ROUTINE TO READ A RH/RM REGISTER
1107      ;CALL
1108      ;JSR     RO,RD.RM          ;GO READ A REGISTER
1109      ;INDEX   ;REG. INDEX FROM BASE
1110      ;ERRADR  ;ERROR ADDRESS--PROCESS ERROR STARTING
1111      ;        ;AT THIS ADDRESS
1112      ;        ;CONTENTS OF REG. IS ON THE STACK
1113      ;RETURN
1114
1115 034704 013737 030032 035052  RD.RM:  MOV     MCPMX,RD.RM2      ;MAX. RETRYs ALLOWED
1116 034712 011646              MOV     (SP),-(SP)          ;SAVE R0 FOR RETURN
1117 034714 013737 030034 034730      MOV     RMADR,RD.ADR      ;FORM THE DESIRED ADDRESS
1118 034722 062037 034730      ADD     (R0)+,RD.ADR      ;USING THE BASE AND THE INDEX
1119 034726 013727              RD.RM1: MOV     @ (PC)+,(PC)+      ;READ THE DESIRED REGISTER OF THE RM DRIVE
1120 034730 000000              RD.ADR: .WORD    0          ;ADDRESS IS FORMED HERE
1121 034732 000000              RD.WRD: .WORD    0          ;REG. CONTENTS PUT HERE
1122 034734 013766 034732 000002      MOV     RD.WRD,2(SP)      ;RETURN IT TO THE USER
1123 034742 013746 030034      MOV     RMADR, -(SP)          ;PUT THE ADDRESS ON THE STACK
1124 034746 062716 000010      ADD     #RMCS2,(SP)      ;FORM THE ADDRESS OF RMCS2
```

```
1125 034752 032736 010000      BIT    #BIT12,@(SP)+    ;CHECK THE 'NED' BIT
1126 034756 001037              BNE    RD.RM3          ;BR IF DRIVE NON-EXISTENT
1127 034760 017746 173050      MOV    @RMADR,-(SP)      ;READ RMCS1
1128 034764 032716 020000      BIT    #BIT13,(SP)      ;DID MCPE SET?
1129 034770 001002              BNE    1$             ;BR IF YES
1130 034772 022620              CMP    (SP)+,(RO)+      ;ADJUST FOR RETURN
1131 034774 000432              BR     RD.RM4          ;EXIT
1132 034776              1$:
    034776 004037 036202      JSR    RO,ES.SAV          ;SAVE THE ADDRESS IN '$ESCAPE'
    035002 104003              EMT    3                ;REPORT 'MCPE' ERROR
1133 035004 005737 030020      TST    DTUW            ;DATA TRANSFER UNDERWAY?
1134 035010 100405              BMI    2$             ;NO
1135 035012 032716 040000      BIT    #BIT14,(SP)      ;'TRE' = 1 ?
1136 035016 001402              BEQ    2$             ;NO
1137 035020 005726              TST    (SP)+          ;YES--CLEAN OFF THE STACK AND
1138 035022 000415              BR     RD.RM3          ;TAKE THE FATAL ERROR EXIT
1139 035024 052716 040000      2$: BIS    #BIT14,(SP)    ;CLEAR 'MCPE' BY SENDING A '1' TO 'TRE'
1140 035030 000316              SWAB   (SP)            ;POSITION BEFORE WRITING
1141 035032 013737 030034 035046 MOV    RMADR,3$      ;FORM ADDRESS OF HIGH BYTE
1142 035040 005237 035046      INC    3$
1143 035044 112637              MOVB   (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RMCS1
1144 035046 000000      3$: .WORD 0          ;ADDRESS STORAGE
1145 035050 005327              DEC    (PC)+          ;EXCEEDED MAX. RETRYS
1146 035052 000003      RD.RM2: .WORD 3
1147 035054 002324              BGE    RD.RM1          ;BR IF NO
1148 035056 011000      RD.RM3: MOV    (RO),RO        ;FATAL ERROR EXIT
1149 035060 012616              MOV    (SP)+,(SP)
1150 035062 000200      RD.RM4: RTS    RO
1151
1152      ;ROUTINE TO WRITE A REGISTER
1153      ;CALL
1154      ;
1155      ;      MOV    DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
1156      ;      JSR    RO,WRT.RM        ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
1157      ;      INDEX  ERRADR           ;INDEX OF THE REGISTER TO BE LOADED
1158      ;      ;                     ;ADDRESS TO RETURN TO ON AN ERROR
1159      ;      ;                     ;ERROR FREE RETURN
1160      ;
1161 035064 013737 030032 035242 WRT.RM: MOV    MCPEMX,WRT.R2 ;MAX RETRYS ALLOWED
1162 035072 016637 000002 035152      MOV    2(SP),WRT.WD ;SAVE THE WORD TO WRITE
1163 035100 012616              MOV    (SP)+,(SP)      ;ADJUST THE STACK
1164 035102 012037 035154      MOV    (RO)+,WRT.AD      ;GET INDEX OF REGISTER TO BE WRITTEN
1165 035106 001015              BNE    1$             ;BR IF NOT RMCS1
1166 035110 122737 000150 035152      CMPB   #150,WRT.WD ;IS THE COMMAND FOR DATA TRANSFERS?
1167 035116 002411              BLT    1$             ;YES--DON'T GET THE OLD A16 & A17, & PSEL
1168 035120 004037 034704      JSR    RO,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
1169 035124 000000              RMCS1  ;THE COMMAND BEFORE SENDING IT TO
1170 035126 035246              WRT.R3  ;THE RH/RM
1171 035130 000316              SWAB   (SP)
1172 035132 042716 177770      BIC    #^C7,(SP)
1173 035136 112637 035153      MOVB   (SP)+,WRT.WD+1
1174 035142 063737 030034 035154 1$: ADD    RMADR,WRT.AD ;FORM THE ADDRESS OF THE DISK REG.
1175 035150 012737      WRT.R1: MOV    (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
1176 035152 000000      WRT.WD: .WORD 0          ;WORD TO WRITE GOES HERE
1177 035154 000000      WRT.AD: .WORD 0          ;ADDRESS IS FORMED HERE
1178 035156 013746 030034      MOV    RMADR,-(SP)      ;PUT THE ADDRESS ON THE STACK
1179 035162 062716 000010      ADD    #RMCS2,(SP)      ;FORM THE ADDRESS OF RMCS2
```



```
1180 035166 032736 010000      BIT    #BIT12,@(SP)+    ;CHECK THE 'NED' BIT
1181 035172 001025      BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
1182 035174 004037 034704      JSR     RO,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
1183 035200 000014      RMER1
1184 035202 035246      WRT.R3
1185 035204 032726 000010      BIT    #BIT03,(SP)+
1186 035210 001420      BEQ     WRT.R4          ;BR IF 'PAR=0'
1187 035212 016037 177776 035224  MOV    -2(R0),1$    ;PICKUP THE INDEX
1188 035220 004037 034704      JSR     RO,RD.RM        ;READ THE REG.
1189 035224 000000      1$: .WORD    0              ;REG. INDEX
1190 035226 035246      WRT.R3          ;RETURN TO THIS ADDRESS ON ERROR
1191 035230 004037 036202      JSR     RO,ES.SAV        ;SAVE THE ADDRESS IN '$ESCAPE'
1192 035234 104004      EMT     4              ;REPORT THE PARITY ON WRITE ERROR
1193 035236 005726      TST     (SP)+          ;CLEAR OFF THE STACK
1194 035240 005327      DEC     (PC)+          ;DECREMENT THE ERROR COUNT
1195 035242 000003      WRT.R2: .WORD    3              ;RETRY COUNTER
1196 035244 002341      BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
1197 035246 011000      WRT.R3: MOV    (R0),R0        ;TAKE THE 'PARITY ON WRITE' ERROR EXIT
1198 035250 000401      BR      WRT.R5          ;EXIT
1199 035252 005720      WRT.R4: TST    (R0)+          ;ADJUST FOR ERROR FREE EXIT
1200 035254 000200      WRT.R5: RTS     RO
1201      ;ROUTINE TO SAVE THE RH/RM REGISTERS AS PER DPB+14
1202      ;CALL
1203      ;
1204      ;      MOV    #DPBNUM,R2          ;DPB POINTER TO R2
1205      ;      JSR     PC,SVRH70          ;SAVE THE DRIVES REG'S
1206      ;
1207 035256 104412      SVRH70: SAVREG          ;SAVE R0 - R5
1208 035260 005702      TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
1209 035262 001442      BEQ     6$              ;BR IF NONE
1210 035264 013704 030034      MOV    RMADR,R4
1211 035270 111264 000010      MOV    (R2),RMCS2(R4) ;SELECT DRIVE
1212 035274 016203 000014      MOV    14(R2),R3    ;GET THE ERROR TABLE POINTER
1213 035300 001433      BEQ     6$              ;EXIT IF NO ADDRESS
1214 035302 005037 035336      CLR     3$          ;COUNTER & POINTER
1215 035306 023727 035336 000022 1$: CMP    3$,#RMDB ;REACHED THE BUFFER REGISTER ?
1216 035314 001006      BNE     2$              ;BR IF NOT
1217 035316 032764 000200 000010      BIT    #BIT07,RMCS2(R4) ;'OR' SET ?
1218 035324 001002      BNE     2$              ;BR IF SET
1219 035326 005023      CLR     (R3)+          ;STORE RMDB AS ZEROES
1220 035330 000405      BR      4$              ;CONTINUE
1221 035332 004037 034704      2$: JSR     RO,RD.RM        ;READ THE SELECTED REGISTER
1222 035336 000000      3$: .WORD    0              ;REGISTER INDEX
1223 035340 035364      5$              ;ERROR RETURN ADDRESS
1224 035342 012623      MOV    (SP)+,(R3)+      ;STORE THE REGISTER CONTENTS
1225 035344 023727 035336 000046 4$: CMP    3$,#RMEC2 ;REACHED THE END ?
1226 035352 001406      BEQ     6$              ;BR IF YES
1227 035354 062737 000002 035336      ADD    #2,3$    ;INCREMENT THE REGISTER INDEX
1228 035362 000751      BR      1$              ;CONTINUE READING THE REGISTERS
1229 035364 004737 032174      5$: JSR     PC,C17        ;PROCESS THE UNCORRECTABLE PARITY ERROR
1230 035370 104413      6$: RESREG          ;RESTORE R0 - R5
1231 035372 000207      RTS     PC              ;RETURN
1232
1233      ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A 'TRE'
1234      ;CALL
1235      ;      MOV    #DRVNUM,R1          ;DRIVE NUMBER TO R1
```

```
1236      :      JSR      PC,SET.IE      ;SET "IE"
1237      :      RETURN
1238
1239 035374 010446      SET.IE: MOV      R4,-(SP)      ;SAVE R4
1240 035376 013704 030034      MOV      RMADR,R4      ;PICKUP ADDRESS OF RMCS1
1241 035402 010164 000010      MOV      R1,RMCS2(R4)      ;SELECT DRIVE
1242 035406 011446      MOV      (R4),-(SP)      ;READ RMCS1
1243 035410 052716 040000      BIS      #BIT14,(SP)      ;SET THE "TRE" BIT OF THE WORD READ
1244 035414 000316      SWAB      (SP)      ;ADJUST FOR DATO
1245 035416 112714 000100      MOV      #BIT06,(R4)      ;SET "IE"
1246 035422 032764 010000 000010      BIT      #BIT12,RMCS2(R4)      ;IS "NED"=1?
1247 035430 001002      BNE      1$      ;YES--CLEAR "TRE"
1248 035432 005726      TST      (SP)+      ;CLEAN OFF THE STACK
1249 035434 000402      BR      2$
1250 035436 112664 000001      1$: MOV      (SP)+,1(R4)      ;CLEAR "TRE"
1251 035442 012604      2$: MOV      (SP)+,R4      ;RESTORE R4
1252 035444 000207      RTS      PC      ;RETURN TO CALLER
1253
1254      ;QUEUE COUNT
1255      QCNT: .BYTE      0      ;DRIVE 0
1256      .BYTE      0      ;DRIVE 1
1257      .BYTE      0      ;DRIVE 2
1258      .BYTE      0      ;DRIVE 3
1259      .BYTE      0      ;DRIVE 4
1260      .BYTE      0      ;DRIVE 5
1261      .BYTE      0      ;DRIVE 6
1262      .BYTE      0      ;DRIVE 7
1263
1264      ;QUEUE INPUT POINTERS
1265
1266 035456 035540      QINPT: .WORD      QDRV0      ;DRIVE 0
1267 035460 035560      .WORD      QDRV1      ;DRIVE 1
1268 035462 035600      .WORD      QDRV2      ;DRIVE 2
1269 035464 035620      .WORD      QDRV3      ;DRIVE 3
1270 035466 035640      .WORD      QDRV4      ;DRIVE 4
1271 035470 035660      .WORD      QDRV5      ;DRIVE 5
1272 035472 035700      .WORD      QDRV6      ;DRIVE 6
1273 035474 035720      .WORD      QDRV7      ;DRIVE 7
1274
1275      ;QUEUE OUTPUT POINTERS
1276
1277 035476 035540      QOUTPT: .WORD      QDRV0      ;DRIVE 0
1278 035500 035560      .WORD      QDRV1      ;DRIVE 1
1279 035502 035600      .WORD      QDRV2      ;DRIVE 2
1280 035504 035620      .WORD      QDRV3      ;DRIVE 3
1281 035506 035640      .WORD      QDRV4      ;DRIVE 4
1282 035510 035660      .WORD      QDRV5      ;DRIVE 5
1283 035512 035700      .WORD      QDRV6      ;DRIVE 6
1284 035514 035720      .WORD      QDRV7      ;DRIVE 7
1285
1286 035516 035540      QSTART: .WORD      QDRV0      ;DRIVE 0 START ADDRESS
1287 035520 035560      QSTOP:  .WORD      QDRV1      ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
1288 035522 035600      .WORD      QDRV2      ;STOP DRIVE 1--START DRIVE 2
1289 035524 035620      .WORD      QDRV3      ;STOP DRIVE 2--START DRIVE 3
1290 035526 035640      .WORD      QDRV4      ;STOP DRIVE 3--START DRIVE 4
1291 035530 035660      .WORD      QDRV5      ;STOP DRIVE 4--START DRIVE 5
1292 035532 035700      .WORD      QDRV6      ;STOP DRIVE 5--START DRIVE 6
```



```
1293 035534 035720          .WORD  QDRV7          ;STOP DRIVE 6--START DRIVE 7
1294 035536 035740          .WORD  QTERM         ;STOP DRIVE 7
1295
1296          ;DRIVE REQUEST QUEUES
1297
1298 035540  QDRV0: .BLKW 10
1299 035560  QDRV1: .BLKW 10
1300 035600  QDRV2: .BLKW 10
1301 035620  QDRV3: .BLKW 10
1302 035640  QDRV4: .BLKW 10
1303 035660  QDRV5: .BLKW 10
1304 035700  QDRV6: .BLKW 10
1305 035720  QDRV7: .BLKW 10
1306          QTERM=.
1307          035740
1308
1309          ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
1310          ;CALL
1311          ;
1312          JSR      PC,CLRQUE
1313 035740 104412 035446 CLRQUE: SAVREG          ;SAVE R0 - R5
1314 035742 012702          MOV      #QCNT,R2          ;ZERO THE QUEUE COUNTS
1315 035746 005022          CLR      (R2)+          ;DRIVES 0 & 1
1316 035750 005022          CLR      (R2)+          ;DRIVES 2 & 3
1317 035752 005022          CLR      (R2)+          ;DRIVES 4 & 5
1318 035754 005022          CLR      (R2)+          ;DRIVES 6 & 7
1319 035756 012703 000010  MOV      #8.,R3          ;MOVE THE STARTING
1320 035762 012701 035516  MOV      #QSTART,R1        ;ADDRESS OF THE QUEUE INTO
1321 035766 012122          1$: MOV      (R1)+,(R2)+    ;THE QUEUE INPUT POINTER
1322 035770 005303          DEC      R3
1323 035772 001375          BNE      1$
1324 035774 012703 000010  MOV      #8.,R3          ;MOVE THE STARTING ADDRESS
1325 036000 012701 035516  MOV      #QSTART,R1        ;OF THE QUEUE INTO THE
1326 036004 012122          2$: MOV      (R1)+,(R2)+    ;QUEUE OUTPUT POINTER
1327 036006 005303          DEC      R3
1328 036010 001375          BNE      2$
1329 036012 104413          RESREG
1330 036014 000207          RTS      PC          ;RESTORE R0 - R5
1331
1332          ;EMPTY THE QUEUE SPECIFIED BY R1
1333          ;CALL
1334          ;
1335          MOV      DRVNUM,R1          ;DRIVE NUMBER TO R1
1336          JSR      PC,EMPTYQ
1337
1338 036016 105061 035446 EMPTYQ: CLRB      QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
1339 036022 006301          ASL      R1
1340 036024 016161 035456 035476  MOV      QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
1341 036032 006201          ASR      R1
1342 036034 000207          RTS      PC
1343
1344          ;ROUTINE TO PUT A REQUEST IN QUEUE
1345          ;CALL
1346          ;
1347          MOV      #DRVNUM,R1          ;DRIVE NUMBER
1348          MOV      #DPB,R2          ;ADDRESS OF PARAMETER BLOCK
1349          JSR      R0,DRVQUE          ;GO PUT REQUEST IN QUEUE
```

```
1350      ;      RETURN1      ;RETURN HERE IF QUEUE IS FULL
1351      ;      RETURN2      ;RETURN HERE IF REQUEST IS IN QUEUE
1352
1353 036036 122761 000010 035446 DRVQUE: CMPB    #10,QCNT(R1) ;IS QUEUE FULL?
1354 036044 001421      BEQ      2$      ;BR IF YES-TAKE RETURN1
1355 036046 105261 035446      INCB    QCNT(R1) ;INCREMENT QUEUE COUNT
1356 036052 006301      ASL      R1
1357 036054 010271 035456      MOV     R2,@QINPT(R1) ;PUT THIS REQUEST IN QUEUE
1358 036060 062761 000002 035456      ADD     #2,QINPT(R1) ;UPDATE THE QUEUE POINTER
1359 036066 026161 035456 035520      CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
1360 036074 001003      BNE      1$      ;BR IF NO
1361 036076 016161 035516 035456      MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
1362 036104 006201      1$:      ASR      R1
1363 036106 005720      TST      (R0)+      ;TAKE RETURN 2
1364 036110 000200      2$:      RTS      R0      ;RETURN TO USER
1365
1366      ;ROUTINE TO GET THE 'DPB' ADDRESS OF NEXT REQUEST IN QUEUE
1367
1368      ;CALL
1369      ;      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
1370      ;      JSR     PC,GETREQ      ;GO GET THE REQUEST
1371      ;      RETURN      ;R2='DPB' ADDRESS OF THE REQUEST
1372      ;      ;R2=0 IF NO REQUEST IN QUEUE
1373
1374 036112 005002      GETREQ: CLR      R2
1375 036114 105761 035446      TSTB    QCNT(R1) ;IS THERE ANY REQUEST IN QUEUE?
1376 036120 001404      BEQ      2$      ;NO
1377 036122 006301      1$:      ASL      R1
1378 036124 017102 035476      MOV     @QOUTPT(R1),R2 ;PICKUP 'DPB' POINTER FOR THIS DRIVE
1379 036130 006201      ASR      R1
1380 036132 000207      2$:      RTS      PC      ;RETURN TO USER
1381
1382      ;ROUTINE TO 'POP' THE REQUEST FROM QUEUE
1383
1384      ;CALL
1385      ;      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
1386      ;      JSR     PC,POPQUE      ;CALL TO REMOVE REQUEST
1387      ;      RETURN      ;R2=ADDRESS OF DPB REMOVED
1388
1389 036134 105361 035446      POPQUE: DECB    QCNT(R1) ;DECREMENT QUEUE COUNT
1390 036140 006301      ASL      R1
1391 036142 017102 035476      MOV     @QOUTPT(R1),R2 ;GET THE 'DPB' POINTER
1392 036146 005071 035476      CLR      @QOUTPT(R1) ;REMOVE DPB ADDRESS FROM THE QUEUE
1393 036152 062761 000002 035476      ADD     #2,QOUTPT(R1) ;UPDATE THE QUEUE POINTER
1394 036160 026161 035476 035520      CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
1395 036166 001003      BNE      1$      ;NO--BR TO EXIT
1396 036170 016161 035516 035476      MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
1397 036176 006201      1$:      ASR      R1
1398 036200 000207      RTS      PC      ;RETURN TO USER
1399
1401      ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
1402      ;REPORTS AN ERROR DIRECTLY.
1403
1404      ;CALL
1405      ;      JSR     R0,ES.SAV      ;:THE ERROR CALL
1406      ;      ERROR    N      ;:THE RETURN IS PAST THE ERROR CALL
1407      ;      RETURN
```


1408					
1409	036202	012037	036216	ES.SAV: MOV	(R0)+,1\$;GET THE ERROR CALL
1410	036206	013746	001176	MOV	\$ESCAPE,-(SP) ;SAVE THE ADDRESS IN '\$ESCAPE'
1411	036212	005037	001176	CLR	\$ESCAPE ;CLEAR THE ESCAPE RETURN
1412	036216	000000		1\$: .WORD	0 ;THE ERROR CALL IS MOVED HERE
1413	036220	012637	001176	MOV	(SP)+,\$ESCAPE ;RESTORE THE ESCAPE ADDRESS
1414	036224	000200		RTS	R0 ;RETURN
1416					

```
1
2
3 036226 040 117 106 UNTOFF: .ASCIZ / OFFLINE/
4 036237 040 117 116 UNTON: .ASCIZ / ONLINE/
5 036247 040 116 117 NOTRM: .ASCIZ @ NOT AN RM05/3/2@
6 036270 040 116 117 NOTPRS: .ASCIZ / NOT PRESENT/
7 036305 040 125 116 NOTSAF: .ASCIZ / UNSAFE/
8 036315 040 111 123 LODEV: .ASCIZ / IS LOAD DEVICE/
9 036335 122 115 060 $RM02: .ASCIZ /RM02/
10 036342 122 115 060 $RM03: .ASCIZ /RM03/
11 036347 122 115 060 $RM05: .ASCIZ /RM05/
12 036354 200 125 116 UNSTAT: .ASCIZ <CRLF>/UNIT STATUS:/
13 036372 200 104 122 MUNIT: .ASCIZ <CRLF>/DRIVE: /
14 036403 060 000 ZERO: .ASCIZ /0/
15 036405 040 057 040 SLASH: .ASCIZ @ / @
16 036411 103 000 C: .ASCIZ /C/
17 036413 106 000 F: .ASCIZ /F/
18 036415 124 000 T: .ASCIZ /T/
19 036417 131 000 Y: .ASCIZ /Y/
20 036421 062 000 TWO: .ASCIZ /2/
21 036423 040 BLNKS4: .ASCII / /
22 036424 040 BLNKS3: .ASCII / /
23 036425 040 BLNKS2: .ASCII / /
24 036426 040 000 BLNKS1: .ASCIZ / /
25 036430 105 116 124 ENTADR: .ASCIZ /ENTER ADDRESS LIMITS:/<CRLF>
26 036457 040 077 104 MOFFLN: .ASCIZ / ?DRIVE OFFLINE/<CRLF>
27 036500 040 077 104 MDRNP: .ASCIZ / ?DRIVE NOT PRESENT/<CRLF>
28 036525 040 077 104 MER11: .ASCIZ / ?DRIVE NOT AVAILABLE/<CRLF>
29 036554 040 077 104 MUSDR: .ASCIZ / ?DRIVE UNSAFE/<CRLF>
30 036574 040 077 104 MLODEV: .ASCIZ / ?DRIVE IS LOAD DEVICE/<CRLF>
31 036624 040 123 105 MSEL: .ASCIZ / SELECTED/
32 036636 200 120 122 MMODE: .ASCIZ <CRLF>/PROGRAM MODE (F, C OR V): /
33 036672 200 106 117 MFORMT: .ASCIZ <CRLF>/FORMAT & VERIFY/
34 036713 200 106 117 MCHK: .ASCIZ <CRLF>/FORMAT & VERIFY WITH ROTATING DATA PATTERN/
35 036767 200 126 105 MVERFY: .ASCIZ <CRLF>/VERIFY ONLY/
36 037004 200 117 120 MSIZE: .ASCIZ <CRLF>/OPERATE IN 32 SECTOR MODE (Y OR N) ? /
37 037053 200 117 120 MSEC30: .ASCIZ <CRLF>/OPERATION WILL BE IN 30 SECTOR (18 BIT) MODE/<CRLF>
38 037132 200 117 120 MSEC32: .ASCIZ <CRLF>/OPERATION WILL BE IN 32 SECTOR (16 BIT) MODE/<CRLF>
39 037211 111 116 126 BADENT: .ASCIZ /INVALID ENTRY/<CRLF>
40 037230 105 116 104 MADRER: .ASCIZ /ENDING DISK ADRS MUST BE EQUAL TO OR GREATER/<CRLF>
41 037305 124 110 101 .ASCIZ /THAN STARTING ADRS/<CRLF>
42 037331 200 123 105 MSELF: .ASCIZ <CRLF>/SELECT DATA PATTERN/<CRLF>
43 037356 040 050 060 .ASCIZ / (0) ZERO'S /<CRLF>
44 037373 040 050 061 .ASCIZ / (1) ONE'S/<CRLF>
45 037406 040 050 062 .ASCIZ / (2) WORST CASE/<CRLF>
46 037426 105 116 124 .ASCIZ /ENTER (0, 1 OR 2): /
47 037452 200 123 124 MSFOR: .ASCIZ <CRLF>/STARTING FORMAT ON DRIVE /
48 037505 200 123 124 MSCHK: .ASCIZ <CRLF>/STARTING CHECK ON DRIVE /
49 037537 200 123 124 MSQVER: .ASCIZ <CRLF>/STARTING QUICK VERIFY ON DRIVE /
50 037600 200 123 124 MSVER: .ASCIZ <CRLF>/STARTING VERIFY ON DRIVE /
51 037633 200 106 117 MFCMPT: .ASCIZ <CRLF>/FORMAT COMPLETE, /
52 037656 200 103 110 MCCMPT: .ASCIZ <CRLF>/CHECK COMPLETE, /
53 037700 200 126 105 MVCMPT: .ASCIZ <CRLF>/VERIFY COMPLETE, /
54 037723 124 117 124 NUMERR: .ASCIZ /TOTAL ERRORS DETECTED: /
55 037753 200 052 052 STARS: .ASCIZ <CRLF>/*****/<CRLF>
56 037775 120 122 105 ADDRIS: .ASCIZ /PRESENT ADDRESS IS: /
57 040022 105 116 124 MESG1: .ASCIZ /ENTER THE SERIAL NUMBER (MAX. 10 OCTAL DIGITS)/
```



```
58 040101      200      123      116 SN1:      .ASCIZ <CRLF>/SN # : /
59 040112      200      117      126 MSG3:      .ASCII <CRLF>/OVER 126. BAD SECTORS HAVE BEEN DETECTED/<CRLF>
60 040164      120      101      103      .ASCIZ /PACK NOT ACCEPTABLE !/
61 040212      200      111      116 MSG2:      .ASCII <CRLF>/INCORRECT MANUFACTURES DEFINED BAD SECTOR INFORMATION/
62 040300      200      012      111      .ASCIZ <CRLF><LF>/INITIALIZE THE BAD SECTOR FILE (Y OR N) ?/
63 040354      200      101      114 MSG4:      .ASCII <CRLF>/ALIGNMENT PACK/
64 040373      200      120      122 MHALT:      .ASCIZ <CRLF>/PROGRAM HALTED !/
65 040415      200      123      105 MSGBLK:      .ASCII <CRLF>/SELECT ONE OF THE FOLLOWING FUNCTIONS/<CRLF>
66 040464      113      105      131      .ASCII /KEYIN U.S.R. BAD SECTORS .....0/<CRLF>
67 040544      120      122      111      .ASCII /PRINT M.F.G. BAD SECTORS.....1/<CRLF>
68 040624      120      122      111      .ASCII /PRINT U.S.R. BAD SECTORS.....2/<CRLF>
69 040704      111      116      111      .ASCII /INITIALIZE U.S.R. BAD SECTOR FILE.....3/<CRLF>
70 040764      120      122      111      .ASCII /PRINT A SECTOR OF THE LAST TRACK.....4/<CRLF>
71 041044      120      122      111      .ASCII /PRINT THIS MESSAGE.....5/<CRLF>
72 041124      105      130      111      .ASCIZ /EXIT .....<CR>/
73 041204      200      105      116 MUTLTY:      .ASCIZ <CRLF>/ENTER UTILITY FUNCTION: /
74 041236      200      105      116 MSG5:      .ASCIZ <CRLF>/ENTER 16 BIT M.F.G. BAD SECTOR ADDRESS IN DECIMAL/
75 041321      200      105      116 MSG6:      .ASCIZ <CRLF>/ENTER 18 BIT M.F.G. BAD SECTOR ADDRESS IN DECIMAL/
76 041404      200      105      116 MSG7:      .ASCIZ <CRLF>/ENTER 16 BIT U.S.R. BAD SECTOR ADDRESS IN DECIMAL/
77 041467      200      105      116 MSG8:      .ASCIZ <CRLF>/ENTER 18 BIT U.S.R. BAD SECTOR ADDRESS IN DECIMAL/
78 041552      200      061      066 MSG9:      .ASCIZ <CRLF>/16 BIT M.F.G. BAD SECTOR FILE IN OCTAL/
79 041622      200      061      070 MSG10:      .ASCIZ <CRLF>/18 BIT M.F.G. BAD SECTOR FILE IN OCTAL/
80 041672      200      061      066 MSG11:      .ASCIZ <CRLF>/16 BIT U.S.R. BAD SECTOR FILE IN OCTAL/
81 041742      200      061      070 MSG12:      .ASCIZ <CRLF>/18 BIT U.S.R. BAD SECTOR FILE IN OCTAL/
82 042012      105      116      124 MSG13:      .ASCIZ /ENTER SECTOR NUMBER : /
83 042041      104      117      116 MSG14:      .ASCIZ /DONE !/<CRLF>
84 042051      200      105      116 MSG15:      .ASCIZ <CRLF>/ENTER M.F.G. BAD SECTOR ADDRESS IN DECIMAL/<CRLF>
85      ;MSG16:      .ASCIZ /ILLEGAL BAD SECTOR, PACK NOT ACCEPTABLE !/<CRLF>
86 042126      127      122      111 MSG17:      .ASCII /WRITE BAD SECTOR FILE NOT SUCCESSFUL,/<CRLF>
87 042174      120      101      103      .ASCIZ /PACK IS NOT ACCEPTABLE !/<CRLF>
88
89      .EVEN
90
```

				.SBTTL	ERROR MESSAGES
1					
2					
3	042226	122	110	057	EM1: .ASCII @RH/RM INTERRUPT OCCURRED (RMAS=0)@
4	042270	125	116	105	EM2: .ASCII /UNEXPECTED ATTENTION OCCURRED/
5	042326	115	101	123	EM3: .ASCII /MASSBUS PARITY ERROR (MCPE=1)/
6	042364	115	101	123	EM4: .ASCII /MASSBUS PARITY ERROR (PAR=1)/
7	042421	101	104	104	EM5: .ASCII /ADDRESS PLUG CHANGE BIT SET/
8	042455	122	110	057	EM6: .ASCII @RH/RM DIDN'T RESPOND TO ADDRESSING@
9	042520	124	122	101	EM7: .ASCII @TRACK/SECTOR FIELD IN HEADER IS INCORRECT@
10	042572	104	122	111	EM10: .ASCII /DRIVE OFFLINE/
11	042610	120	105	122	EM11: .ASCII /PERSISTENT DRIVE UNSAFE ERROR/
12	042646	125	116	103	EM12: .ASCII /UNCORRECTABLE MASSBUS PARITY ERROR/
13	042711	123	117	106	EM13: .ASCII /SOFTWARE TIMEOUT/
14	042732	104	122	111	EM14: .ASCII /DRIVE UNSAFE ERROR/
15	042755	103	117	116	EM15: .ASCII @CONTROLLER/DRIVE ERROR DURING WRITE@
16	043021	103	117	116	EM16: .ASCII @CONTROLLER/DRIVE ERROR DURING WRITE CHECK@
17	043073	122	105	124	EM17: .ASCII @RETRIES NOT SUCCESSFUL - SECTOR NOT ACCEPTABLE@
18	043151	104	101	124	EM20: .ASCII @DATA ERROR DURING WRITE CHECK@
19	043207	103	117	116	EM21: .ASCII @CONTROLLER/DRIVE ERROR VERIFYING HEADERS@
20	043260	047	110	103	EM22: .ASCII @'HCE' OR 'HCRC' ERROR VERIFYING HEADERS@
21	043330	103	131	114	EM23: .ASCII @CYLINDER FIELD IN HEADER IS NOT CORRECT@
22	043400	127	122	111	EM24: .ASCII @WRITE CHECK ERROR@
23	043422	111	114	114	EM25: .ASCII /ILLEGAL BAD SECTOR, PACK NOT ACCEPTABLE/
24					

[illegible]

1	045030	001372	005560	005574	DT1:	.WORD	ATTN, RM.REG, RM.REG+14, RM.REG+42, RM.REG+12, RM.REG+34, RM.REG+6
2	045046	001370	027666	027670	DT2:	.WORD	DDRIVE, RMERRS, RMERRS+2, RMERRS+4, ATTN, RMCS1
3	045062	001370	034730	034732	DT3:	.WORD	DDRIVE, RD.ADR, RD.WRD, RM.REG, RM.REG+14, RM.REG+42
4	045076	001370	035154	035152	DT4:	.WORD	DDRIVE, WRT.AD, WRT.WD, RD.WRD, RM.REG, RM.REG+14, RM.REG+42
5	045114	001274			DT6:	.WORD	\$RMADR
6	045116	001222	001132	045772	DT7:	.WORD	DRIVE, \$ERRPC, RBUF+6, RBUF+2
7	045126	001222	001132	005560	DT10:	.WORD	DRIVE, \$ERRPC, RM.REG, RM.REG+10, RM.REG+12, RM.REG+14, RM.REG+42
8	045144	005624	005626	005562		.WORD	RM.REG+44, RM.REG+46, RM.REG+2, RM.REG+4, RM.REG+6, RM.REG+16, RM.REG+20
9	045162	005602	005604	005606		.WORD	RM.REG+22, RM.REG+24, RM.REG+26, RM.REG+30, RM.REG+32, DS.CYL, DS.TRK
10	045200	001222	001132	001364	DT17:	.WORD	DRIVE, \$ERRPC, DS.CYL, DS.TRK, SAVSEC
11	045212	001222	001132	001364	DT20:	.WORD	DRIVE, \$ERRPC, DS.CYL, DS.TRK, SAVSEC
12	045224	005560	005570	005572		.WORD	RM.REG, RM.REG+10, RM.REG+12, RM.REG+14, RM.REG+42, RM.REG+40, RM.REG+44, RM.REG+46
13	045244	005562	005564	005566		.WORD	RM.REG+2, RM.REG+4, RM.REG+6, RM.REG+16, RM.REG+20, RM.REG+22, RM.REG+24, RM.REG+26
14	045264	005610	005612	001364		.WORD	RM.REG+30, RM.REG+32, DS.CYL, DS.TRK
15	045274	001222	001132	045770	DT23:	.WORD	DRIVE, \$ERRPC, RBUF+4, RBUF
16	045304	001222	001132	001364	DT24:	.WORD	DRIVE, \$ERRPC, DS.CYL, DS.TRK, SAVSEC, \$GDDAT, RM.REG+22
17	045322	005560	005570	005572		.WORD	RM.REG, RM.REG+10, RM.REG+12, RM.REG+14, RM.REG+42, RM.REG+40, RM.REG+44, RM.REG+46
18	045342	005562	005564	005566		.WORD	RM.REG+2, RM.REG+4, RM.REG+6, RM.REG+16, RM.REG+20, RM.REG+22, RM.REG+24, RM.REG+26
19	045362	005610	005612	001364		.WORD	RM.REG+30, RM.REG+32, DS.CYL, DS.TRK
20							
21	045372	001222	005552	001366	DT25:	.WORD	DRIVE, FMTDPB+12, DS.TRK, SAVSEC
22							

1	045402	000001		DF1:	.WORD	1
2	045404	007	000		.BYTE	7,0
3	045406	000001		DF2:	.WORD	1
4	045410	006	000		.BYTE	6,0
5	045412	000001		DF3:	.WORD	1
6	045414	006	000		.BYTE	6,0
7	045416	000001		DF4:	.WORD	1
8	045420	007	000		.BYTE	7,0
9	045422	000001		DF6:	.WORD	1
10	045424	001	000		.BYTE	1,0
11	045426	000003		DF10:	.WORD	3
12	045430	007	000		.BYTE	7,0
13	045432	044046			.WORD	DH10A
14	045434	007	000		.BYTE	7,0
15	045436	044132			.WORD	DH10B
16	045440	007	140		.BYTE	7,140
17	045442	000001		DF17:	.WORD	1
18	045444	005	034		.BYTE	5,34
19	045446	000004		DF20:	.WORD	4
20	045450	005	034		.BYTE	5,34
21	045452	044326			.WORD	DH20A
22	045454	010	000		.BYTE	8,0
23	045456	044423			.WORD	DH20B
24	045460	010	000		.BYTE	8,0
25	045462	044521			.WORD	DH20C
26	045464	004	014		.BYTE	4,14
27	045466	000001		DF23:	.WORD	1
28	045470	005	000		.BYTE	5,0
29	045472	000004		DF24:	.WORD	4
30	045474	007	034		.BYTE	7,34
31	045476	044326			.WORD	DH20A
32	045500	010	000		.BYTE	8,0
33	045502	044423			.WORD	DH20B
34	045504	010	000		.BYTE	8,0
35	045506	044521			.WORD	DH20C
36	045510	004	014		.BYTE	4,14
37	045512	000001		DF25:	.WORD	1
38	045514	004	000		.BYTE	4,0
39						

```

1
2
3
4
5
6
7
8
9
10
11
12
13 045516 005737 001376
14 045522 001436
15 045524 005037 001376
16 045530 104401 001205
17 045534 012700 001274
18 045540 104401 045636
19 045544 011046
20 045546 104402
21 045550 104401 036425
22 045554 104411
23 045556 012601
24 045560 004537 045654
25 045564 000763
26 045566 012700 001276
27 045572 104401 045645
28 045576 011046
29 045600 104402
30 045602 104401 036425
31 045606 104411
32 045610 012601
33 045612 004537 045654
34 045616 000763
35 045620 012700 001274
36 045624 012701 030034
37 045630 012021
38 045632 012021
39 045634 000207
40
41 045636 122 115 103 MRMCS1: .ASCIZ @RMCS1=@
42 045645 122 115 126 MRMVEC: .ASCIZ @RMVEC=@
43
44
45
46
47
48
49
50
51
52
53
54
55
56 045654 010246
57 045656 010346

.SBTTL BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS FOR RH/RM
;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
;OF THE RH/RM IS SETUP FOR THE PROPER ADDRESS.
;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
;REQUIRED.
;NOTE: THIS ROUTINE DESTROYS R0-R4
;CALL
:
: JSR PC,BUSADR
: RETURN
BUSADR: TST CHGADR ;INPUT FROM TTY REQUESTED?
        BEQ 3$ ;NO
        CLR CHGADR ;DISABLE CHANGE OF RH/RM ADDRESS
        TYPE ,%CRLF ;CR-LF
1$: MOV #RMADR,R0 ;FIRST ADDRESS
    TYPE ,MRMCS1 ;"RMCS1="
    MOV (R0),-(SP) ;PRESENT RMCS1 ADDRESS
    TYPOC ;TYPE IT
    TYPE ,BLNKS2 ;TYPE 2 SPACES
    RDLIN ;GET THE ENTRY
    MOV (SP)+,R1 ;ADDRESS OF ASCII TEXT
    JSR R5,CK.NUM ;ENTER AND STORE NEW ADDRESS
    BR 1$ ;ERROR RET
2$: MOV #RMVEC,R0 ;CHECK VERC
    TYPE ,MRMVEC ;"RMVEC="
    MOV (R0),-(SP) ;PRESENT RH/RM VECTOR ADDRESS ON THE STACK
    TYPOC ;TYPE IT
    TYPE ,BLNKS2 ;TYPE 2 SPACES
    RDLIN ;READ THE ENTRY
    MOV (SP)+,R1 ;ASCII TEXT ADDRESS
    JSR R5,CK.NUM ;ENTER AND STORE NEW ADDRESS
    BR 2$ ;ERROR RET
3$: MOV #RMADR,R0 ;FIRST ADDRESS OF NEW PARAMETERS
    MOV #RMADR,R1 ;FIRST ADDRESS OF WHERE TO PUT THEM
    MOV (R0)+,(R1)+ ;BUS ADDRESS
    MOV (R0)+,(R1)+ ;VECTOR ADDRESS
    RTS PC ;RETURN

MRMCS1: .ASCIZ @RMCS1=@
MRMVEC: .ASCIZ @RMVEC=@

.SBTTL CK.NUM - CHECK NUMBER (OCTAL)
;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL CHARACTERS
;AND FORMS AN OCTAL NUMBER IN R2
;CALL:
: MOV #ADR,R1 ;ADDRESS OF ASCII STRING
: R0=ADDRESS TO STORE THE NUMBER
: JSR R5,CK.NUM
: RET1 ERROR RETURN
: RET2 NORMAL RET

CK.NUM: MOV R2,-(SP) ;SAVE R2
        MOV R3,-(SP) ;SAVE R3

```


58	045660	010446		MOV	R4,-(SP)	:SAVE R4
59	045662	012703	000006	MOV	#6,R3	:MAX OCTAL DIGITS IN THE NUMBER
60	045666	005002		CLR	R2	:FINAL OCTAL VALUE
61	045670	112104		1\$: MOV	(R1)+,R4	:GET CURRENT POINTED BYTE
62	045672	001424		BEQ	3\$	:BR IF TERMINATOR DETECTED
63	045674	120427	000060	CMPB	R4,#'0	:SMALLER THAN ASCII-0 ?
64	045700	103425		BLO	5\$	:YES,ERROR EXIT
65	045702	120427	000067	CMPB	R4,#'7	:LARGER THAN ASCII-7 ?
66	045706	101022		BHI	5\$	:YES,ERROR EXIT
67	045710	006302		ASL	R2	:SHIFT LEFT
68	045712	103420		BCS	5\$	:
69	045714	006302		ASL	R2	:ONE
70	045716	103416		BCS	5\$	:
71	045720	006302		ASL	R2	:OCTAL DIGIT
72	045722	103414		BCS	5\$	:ERROR IF CARRY BIT SET
73	045724	042704	177770	BIC	#177770,R4	:CHOP OFF HIGHER BITS
74	045730	060402		ADD	R4,R2	:APPENDING CURRENT DIGIT
75	045732	005303		DEC	R3	:DECREMENT BYTE COUNT
76	045734	001401		BEQ	2\$	:BR IF LAST DIGIT
77	045736	000754		BR	1\$	:LOOPING BACK
78	045740	112104		2\$: MOV	(R1)+,R4	:CHECK TERMINATOR
79	045742	001004		BNE	5\$	:BR IF NOT FOUND
80	045744	005702		3\$: TST	R2	:FINAL VALUE = 0 ?
81	045746	001401		BEQ	4\$	:YES
82	045750	010210		MOV	R2,(R0)	:REPLACE THE ORIGINAL VALUE
83	045752	005725		4\$: TST	(R5)+	:ADJUST FOR NORMAL RET
84	045754	012604		5\$: MOV	(SP)+,R4	:RESTORE 4
85	045756	012603		MOV	(SP)+,R3	:RESTORE R3
86	045760	012602		MOV	(SP)+,R2	:RESTORE R2
87	045762	000205		RTS	R5	:EXIT
88						

```
1      .SBTTL  READ/WRITE BUFFERS
2
3      ;BUFFER STARTS HERE
4
5 045764 000000 000000 000000 RBUF:  .WORD  0,0,0,0      ;BUFFER FOR HEADER CHECK
6
7 045774      BUFP:  .BLKW  <258.*32.>      ;FORMAT AND CHECK BUFFER STARTS HERE AND
8      ;WILL OVERLAY ALL REMAINING CODE IN PROGRAM
9 106174      BUFV:  .BLKW  <258.*32.>      ;BUFFER FOR VERIFY ONLY MODE
10
11      000200
      .END  200
```


ABASE = 176700	ATO = 000001	BYTE16 006332	DH6 043746	EM14 042732
ACDW1 = 000000	AT1 = 000002	BYTE18 006432	DISPLA 001156	EM15 042755
ACDW2 = 000000	AT2 = 000004	C 036411	DISPRE 000174	EM16 043021
ACK = 000123	AT3 = 000010	CALIN 013322	DLT = 100000	EM17 043073
ACPUOP= 000000	AT4 = 000020	CHGADR 001376	DMD = 000001	EM2 042270
ACTDRV 027752	AT5 = 000040	C11 031352	DONE 017006	EM20 043151
ACTSTR 027753	AT6 = 000100	C13 031460	DPINT 027726	EM21 043207
ADDRIS 037775	AT7 = 000200	C14 031560	DPR = 000400	EM22 043260
ADDW0 = 000000	AUNIT = 000000	C15 032136	DPRQS 027736	EM23 043330
ADDW1 = 000000	AUSWR = 000000	C16 032160	DRIVE = 001222	EM24 043400
ADDW10= 000000	AVECT1= 000254	C17 032174	DRQ = 004000	EM25 043422
ADDW11= 000000	AVECT2= 000000	C17B 032216	DRVACT 027676	EM3 042326
ADDW12= 000000	A16 = 000400	C18 032274	DRVCLR= 000111	EM4 042364
ADDW13= 000000	A17 = 001000	CKSWR = 104407	DRVINT 030264	EM5 042421
ADDW14= 000000	BADENT 037211	CKTRK 015006	DRVQUE 036036	EM6 042455
ADDW15= 000000	BAD16 001414	CK.CHR 023410	DRVSTA 027706	EM7 042520
ADDW2 = 000000	BAD18 002420	CK.DEC 023362	DRVSTYP 027716	ENDCYL 001326
ADDW3 = 000000	BAI = 000010	CK.DIG 023462	DRY = 000200	ENDTRK 001332
ADDW4 = 000000	BEGCYL 001330	CK.NUM 045654	DSWR = 177570	ENTADR 036430
ADDW5 = 000000	BEGIN 006776	CK.OCT 023334	DS.CYL 001364	ERINDX 017204
ADDW6 = 000000	BEGIN2 007020	CLOCK 020250	DS.TRK 001366	ERR = 040000
ADDW7 = 000000	BEGTRK 001334	CLR = 000040	DTE = 010000	ERROR = 104000
ADDW8 = 000000	BIT0 = 000001	CLRQUE 035740	DTSY = 000200	ERRVEC= 000004
ADDW9 = 000000	BIT00 = 000001	CNTLC 001374	DTUW 030020	ES.SAV 036202
ADEVCT= 000000	BIT01 = 000002	CR = 000015	DT00 = 000001	F 036413
ADEVM = 000000	BIT02 = 000004	CRLF = 000200	DT01 = 000002	FER = 000020
ADRTBL 006132	BIT03 = 000010	C.ENTR 020262	DT02 = 000004	FMT = 010000
AENV = 000000	BIT04 = 000020	DCK = 100000	DT03 = 000010	FMTDPB 005540
AENVM = 000000	BIT05 = 000040	DDISP = 177570	DT04 = 000020	FMTX 005630
AFATAL= 000000	BIT06 = 000100	DDRIVE 001370	DT05 = 000040	FMT16 = 010000
AMADR1= 000000	BIT07 = 000200	DEVMP 001402	DT06 = 000100	FUNCT1 021714
AMADR2= 000000	BIT08 = 000400	DF1 045402	DT07 = 000200	FUNCT2 022116
AMADR3= 000000	BIT09 = 001000	DF10 045426	DT08 = 000400	FUNCT3 022414
AMADR4= 000000	BIT1 = 000002	DF17 045442	DT1 045030	FUNCT4 022502
AMAMS1= 000000	BIT10 = 002000	DF2 045406	DT10 045126	FUNCT5 022612
AMAMS2= 000000	BIT11 = 004000	DF20 045446	DT17 045200	FUNCT6 022710
AMAMS3= 000000	BIT12 = 010000	DF23 045466	DT2 045046	FUNCT7 023014
AMAMS4= 000000	BIT13 = 020000	DF24 045472	DT20 045212	FUNCT8 023122
AMSGAD= 000000	BIT14 = 040000	DF25 045512	DT23 045274	F1 = 000002
AMSGLG= 000000	BIT15 = 100000	DF3 045412	DT24 045304	F2 = 000004
AMSGTY= 000000	BIT2 = 000004	DF4 045416	DT25 045372	F3 = 000010
AMTYP1= 000000	BIT3 = 000010	DF6 045422	DT3 045062	F4 = 000020
AMTYP2= 000000	BIT4 = 000020	DH1 043472	DT4 045076	F5 = 000040
AMTYP3= 000000	BIT5 = 000040	DH10 043761	DT6 045114	GETREG= 000141
AMTYP4= 000000	BIT6 = 000100	DH10A 044046	DT7 045116	GETREQ 036112
AOE = 001000	BIT7 = 000200	DH10B 044132	DULP 030266	GO = 000001
APASS = 000000	BIT8 = 000400	DH17 044210	DVA = 004000	GTSWR = 104406
APRIOR= 000000	BIT9 = 001000	DH2 043540	ECH = 000100	HCE = 000200
APTCU= 000040	BLNKS1 036426	DH20 044257	ECI = 004000	HCI = 002000
APTENV= 000001	BLNKS2 036425	DH20A 044326	EDIT 001406	HCRC = 000400
APTSIZ= 000200	BLNKS3 036424	DH20B 044423	EMPTYQ 036016	HDREAD 015550
APTSPO= 000100	BLNKS4 036423	DH20C 044521	EMTVEC= 000030	HEADX 001410
ASWREG= 000000	BPTVEC= 000014	DH23 044554	EM1 042226	HEDERR 001356
ATA = 100000	BSE = 100000	DH24 044613	EM10 042572	HSET 015450
ATABIT 030022	BUFP 045774	DH25 044766	EM11 042610	HT = 000011
ATESTN= 000000	BUFV 106174	DH3 043612	EM12 042646	IAE = 002000
ATTN 001372	BUSADR 045516	DH4 043663	EM13 042711	IE = 000100

ILF = 000001	MSELD 036624	PGE = 002000	RETRY 001344	SEC30 001360
ILR = 000002	MSELP 037331	PGM = 001000	RMADR 030034	SEEK = 000105
INSERT 021602	MSFOR 037452	PIP = 020000	RMAS = 000016	SEEKFG 027776
IOTVEC= 000020	MSGBLK 040415	PIRQ = 177772	RMBA = 000004	SELDIV= 000145
IR = 000100	MSIZE 037004	PIRQVE= 000240	RMCS1 = 000000	SELPAT 013462
ISR 032706	MSQVER 037537	POPQUE 036134	RMCS2 = 000010	SERNL 012746
LA 032532	MSTCK = 000010	PRO = 000000	RMDB = 000006	SETFMT= 000143
LACNT 027764	MSVER 037600	PR1 = 000040	RMDA = 000022	SETHDR 017556
LF = 000012	MUNIT 036372	PR2 = 000100	RMDC = 000034	SETTBL 017352
LODEV 036315	MUSDR 036554	PR3 = 000140	RMDS = 000012	SETVEC 010126
LOP.CK 017304	MUTLTY 041204	PR4 = 000200	RMDT = 000026	SET.IE 035374
LST = 002000	MVCMP 037700	PR5 = 000240	RMEC1 = 000044	SKI = 040000
LSTRK 001324	MVERFY 036767	PR6 = 000300	RMEC2 = 000046	SLASH 036405
MADRER 037230	MWC 001354	PR7 = 000340	RMERRS 027666	SNGSEC 001322
MAXSEC 001362	MWR = 000040	PS = 177776	RMER1 = 000014	SN1 040101
MCCMPT 037656	MXDLTA 030044	PSEL = 002000	RMER2 = 000042	SOF SW 001316
MCHECK 036713	MXF = 001000	PSW = 177776	RMHR = 000036	SORT1 014116
MCLK = 000002	MXLACT 030042	PWRVEC= 000024	RMINIT 030052	SORT2 020710
MCPE = 020000	MXWWDW 030050	QCNT 035446	RMLA = 000020	SRCHWT 027750
MCPEMX 030032	M0 011342	QDRV0 035540	RMMR1 = 000024	STACK = 001100
MDRNP 036500	M1 010776	QDRV1 035560	RMMR2 = 000040	STARS 037753
MER11 036525	M1A 011132	QDRV2 035600	RMOF = 000032	START 007014
MSG1 040022	M1B 011306	QDRV3 035620	RMR = 000004	STCLK1 020074
MSG10 041622	M2 011720	QDRV4 035640	RMSN = 000030	STCLK2 020144
MSG11 041672	M4 012000	QDRV5 035660	RMTMR 034272	STCLK3 020150
MSG12 041742	M4A 012026	QDRV6 035700	RMVEC 030036	STKLMT= 177774
MSG13 042012	M5 012146	QDRV7 035720	RMWC = 000002	STO 034362
MSG14 042041	M5FX 010466	QINPT 035456	RM.REG 005560	STO1 034416
MSG15 042051	NBA = 100000	QOUTPT 035476	RM05 030622	STO2 034512
MSG17 042126	NED = 010000	QSTART 035516	RNOP = 000101	STO3 034542
MESG2 040212	NEM = 004000	QSTOP 035520	RTC = 000117	STO5 034566
MESG3 040112	NEXT 005536	QTERM = 035740	R6 = %000006	STO6 034574
MESG4 040354	NOTPRS 036270	RBUF 045764	R7 = %000007	STO7 034632
MESG5 041236	NOTRM 036247	RDCHR = 104410	SAVEFG 027774	STO8 034662
MESG6 041321	NOTSAF 036305	RDDAT = 000171	SAVREG= 104412	STO9 034672
MESG7 041404	NUMERR 037723	RDHD = 000173	SAVSEC 001346	ST.CLK 020016
MESG8 041467	OFDIR = 000001	RDLIN = 104411	SAVWC 001350	ST1 013462
MESG9 041552	OFFSET= 000115	RDY = 000200	SC 033122	SVRH70 035256
MF = 100000	OP1 = 020000	RD.ADR 034730	SCAWC 017530	SWR 001154
MFCMPT 037633	OPT 031114	RD.RM 034704	SCOPE = 000004	SWREG 000176
MFORMT 036672	OR = 000200	RD.RM1 034726	SC01 = 000100	SW0 = 000001
MHALT 040373	O.ENTR 020302	RD.RM2 035052	SC02 = 000200	SW00 = 000001
MINX = 000004	PACK 001404	RD.RM3 035056	SC04 = 000400	SW01 = 000002
MLODEV 036574	PAR = 000010	RD.RM4 035062	SC10 = 001000	SW02 = 000004
MMODE 036636	PARENT 020454	RD.WRD 034732	SC11 033754	SW03 = 000010
MNDLTA 030046	PAR1 005776	READIN= 000121	SC12 034064	SW04 = 000020
MODE 001320	PAR2 006011	RECAL = 000107	SC13 034134	SW05 = 000040
MOFFLN 036457	PAR3 006024	RECORD 020570	SC20 = 002000	SW06 = 000100
MOH = 020000	PAR4 006035	REJCT2 017134	SC3 033172	SW07 = 000200
MOL = 010000	PAR5 006046	REJCT3 017162	SC4 033176	SW08 = 000400
MPE = 000400	PAR6 006057	REJEC1 017112	SC5 033210	SW09 = 001000
MRD = 000020	PAR7 006070	RELSE = 000113	SC6 033404	SW1 = 000002
MRMCS1 045636	PAR8 006101	RESET 021416	SC6A 033520	SW10 = 002000
MRMVEC 045645	PAT = 000020	RESREG= 104413	SC7 033646	SW11 = 004000
MSCHK 037505	PATA 001340	RESTRT 020160	SC8 033724	SW12 = 010000
MSEC30 037053	PATB 001342	RESVEC= 000010	SEARCH= 000131	SW13 = 020000
MSEC32 037132	PATSEL 001336	RETBAD 012230	SECCU 005434	SW14 = 040000

SW15 = 100000	UPDTRK 017756	\$BDADR 001136	\$LF 001206	\$RTNAD 017004
SW2 = 000004	UPE = 020000	\$BDDAT 001142	\$LFLG 025103	\$SAVRE 027506
SW3 = 000010	USSAV 004430	\$BELL 001200	\$LKCSB 001302	\$SAVR6 027200
SW4 = 000020	USTAB 003424	\$CDW1 001270	\$LKCSR 001300	\$SB2D 027256
SW5 = 000040	US1 = 000001	\$CDW2 001272	\$LKS 001310	\$SETUP= 000116
SW6 = 000100	US2 = 000002	\$CHARC 024634	\$LLVEC 001312	\$STUP = 177777
SW7 = 000200	US4 = 000004	\$CKSWR 026064	\$LPADR 001122	\$SUPRS 027216
SW8 = 000400	VV = 000100	\$CMTAG 001114	\$LPERR 001124	\$SVPC = 000210
SW9 = 001000	WC = 001352	\$CM3 = 000000	\$LPVEC 001304	\$SWR = 123000
T 036415	WCE = 040000	\$CM4 = 000001	\$MADR1 001242	\$SWREG 001232
TABCAL 006120	WCF = 000040	\$CNTLC 026767	\$MADR2 001246	\$TESTN 001214
TABINT 012532	WCKD = 000151	\$CNTLG 027001	\$MADR3 001252	\$TKB 001162
TABLD 012614	WCKHD = 000153	\$CNTLU 026774	\$MADR4 001256	\$TKCNT 025560
TABLE 005650	WCTBL 006232	\$CPUOP 001236	\$MAIL 001210	\$TKINT 025576
TABLE2 005702	WLE = 004000	\$CRLF 001205	\$MAMS1 001240	\$TKQEN= 025575
TABLE3 005726	WRAP 001400	\$DBLK 025550	\$MAMS2 001244	\$TKQIN 025562
TABLE4 005752	WRL = 004000	\$DB2D 027312	\$MAMS3 001250	\$TKQOU 025564
TAB.XY= 001114	WRTDAT= 000161	\$DECVL 027472	\$MAMS4 001254	\$TKQSR 025566
TAP = 040000	WRTHD = 000163	\$DEVCT 001220	\$MBADR 001102	\$TKS 001160
TBITVE= 000014	WTRK 013622	\$DEVM 001266	\$MFLG 025102	\$TKSRV 025646
TD 032752	WTRKA 014320	\$DOAGN 017002	\$MNEW 027017	\$TMP0 001174
TEXT 021050	WTRKB 014436	\$DTBL 025540	\$MSGAD 001224	\$TN = 000002
TIMER 030000	WTRKC 014522	\$ENDAD 016772	\$MSGLG 001226	\$TNPWR 027422
TKVEC = 000060	WTRKD 014604	\$ENDCT 016756	\$MSGTY 001210	\$TPB 001166
TPVEC = 000064	WTRKE 014652	\$ENV 001230	\$MSWR 027006	\$TPFLG 001173
TRAPVE= 000034	WTRKF 014566	\$ENVM 001231	\$MTYP1 001241	\$TPS 001164
TRE = 040000	WTRKH 014616	\$EOP 016342	\$MTYP2 001245	\$TRAP 027602
TRKTST 017426	WTRKX 013676	\$EOPCT 016750	\$MTYP3 001251	\$TRAP2 027624
TRK1 = 004000	WTRKY 013744	\$ERFLG 001117	\$MTYP4 001255	\$TRP = 000014
TRK10 = 040000	WTRKZ 015536	\$ERMAX 001131	\$NULL 001170	\$TRPAD 027636
TRK2 = 010000	WTRK1 014270	\$ERROR 023620	\$NWTST= 000000	\$STM 001104
TRK20 = 100000	WTRK2 014666	\$ERRPC 001132	\$OCNT 025330	\$STNM 001116
TRK4 = 020000	WRT.AD 035154	\$ERRTB 006526	\$OMODE 025332	\$TTYIN 026752
TRNSWT 027746	WRT.RM 035064	\$ERTTL 001126	\$PASS 001216	\$TYPDS 025334
TRTVEC= 000014	WRT.R1 035150	\$ESCAP 001176	\$PASTM 001106	\$TYPE 024304
TST1 007020	WRT.R2 035242	\$ETABL 001230	\$POWER 027202	\$YPEC 024516
TWO 036421	WRT.R3 035246	\$ETEND 001274	\$PWRAD 027170	\$YPEX 024636
TYPADR 020354	WRT.R4 035252	\$FATAL 001212	\$PWRDN 027030	\$YPOC 025132
TYPDS = 104405	WRT.R5 035254	\$FFLG 025104	\$PWRMG 027164	\$YPON 025146
TYPE = 104401	WRT.WD 035152	\$FILLC 001172	\$PWRUP 027102	\$YPOS 025106
TYPERR 024054	XSIZE 010422	\$FILLS 001171	\$QUES 001204	\$UNIT 001222
TYPOC = 104402	XXDP 001412	\$GDADR 001134	\$RDCHR 026426	\$UNITM 001110
TYPON = 104404	Y 036417	\$GDDAT 001140	\$RDLIN 026516	\$USWR 001234
TYPOS = 104403	ZERO 036403	\$GET42 016762	\$RDSZ = 000015	\$VECT1 001260
UF = 040000	\$APTHD 001100	\$GTSWR 026154	\$RESRE 027544	\$VECT2 001262
ULDFLG 027754	\$ATYC 024664	\$HD = 000000	\$RMADR 001274	\$XOFF = 000023
UNS = 040000	\$ATY1 024640	\$HIBTS 001100	\$RMVEC 001276	\$XON = 000021
UNSTAT 036354	\$ATY3 024646	\$ICNT 001120	\$RM02 036335	\$GET4= 000000
UNTOFF 036226	\$ATY4 024656	\$ILLUP 027174	\$RM03 036342	\$OFILL 025331
UNTON 036237	\$AUTOB 001150	\$INTAG 001151	\$RM05 036347	.\$X = 001100
UPDCYL 017644	\$BASE 001264	\$ITEMB 001130		

. ABS. 146374 000
000000 001
ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 45296 WORDS (177 PAGES)

DYNAMIC MEMORY AVAILABLE FOR 69 PAGES

D 11

SEQ 0133

CZRMLAO RM05/3/2 FORMATTER
SYMBOL TABLE

MACRO V03.01 11-APR-80 13:01:23 PAGE 18-4

E 11

SEQ 0134

CZRMLA.BIC,CZRMLA/C=CZRMLA.DOC,CZRMLA,SYSMAC/M

[illegible]

[illegible]

SRDSZ 10-762 10-762#

H 11

SEQ 0137

[illegible]

STYPOS 10-?58# 10-?75

J 11

SEQ 0139

\$UNIT	5-0#	6-0				
\$UNITM	4-286#					
\$USWR	5-0#					
\$VECT1	5-0#	8-68	8-70			
\$VECT2	5-0#					
\$XOFF	10-?54	10-?54				
\$XON	10-?54	10-?54				
.\$ASTA	10-?56	10-?56				
.\$X	4-286	4-286#				
A16	4-86#					
A17	4-87#					
ABASE	4-274#	5-0	5-0			
ACDW1	5-0	5-0				
ACDW2	5-0	5-0				
ACK	4-262#					
ACPUOP	5-0	5-0				
ACTDRV	11-92#	11-361*	11-412*	11-738*	11-747*	11-:09
ACTSTR	11-98#	11-:11*	11-:25*			
ADDRIS	10-853	12-56#				
ADDW0	5-0					
ADDW1	5-0					
ADDW10	5-0					
ADDW11	5-0					
ADDW12	5-0					
ADDW13	5-0					
ADDW14	5-0					
ADDW15	5-0					
ADDW2	5-0					
ADDW3	5-0					
ADDW4	5-0					
ADDW5	5-0					
ADDW6	5-0					
ADDW7	5-0					
ADDW8	5-0					
ADDW9	5-0					
ADEVCT	5-0	5-0				
ADEVN	5-0	5-0				
ADRTBL	6-0#	10-237	10-308	10-568	10-==00	
AENV	5-0	5-0				
AENVN	5-0	5-0				
AFATAL	5-0	5-0				
AMADR1	5-0	5-0				
AMADR2	5-0	5-0				
AMADR3	5-0	5-0				
AMADR4	5-0	5-0				
AMAMS1	5-0	5-0				
AMAMS2	5-0	5-0				
AMAMS3	5-0	5-0				
AMAMS4	5-0	5-0				
AMSGAD	5-0	5-0				
AMSGLG	5-0	5-0				
AMSGTY	5-0	5-0				
AMTYP1	5-0	5-0				
AMTYP2	5-0	5-0				
AMTYP3	5-0	5-0				
AMTYP4	5-0	5-0				

AOE

4-157#

L 11

SEQ 0141

B113

4-78#

N 11

SEQ 0143

BIT4	4-78#													
BIT5	4-78#													
BIT6	4-78#													
BIT7	4-78#	8-146												
BIT8	4-78#													
BIT9	4-78#													
BLNKS1	12-24#													
BLNKS2	8-122	10-858	10-=06	10-?29	10-?38	10-?49	12-23#	17-21	17-30					
BLNKS3	12-22#													
BLNKS4	8-93	12-21#												
BPTVEC	4-78#													
BSE	4-238#	10-430												
BUFP	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0
	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0
	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0
	9-125	9-128	10-27	10-150	10-397	10-568	10-668	10-715	10-736	10-761	10-978	10-:00	10-:13	10-:16
	10-:19	10-:22	10-:25	10-:28	18-7#									
BUFV	10-398	18-9#												
BUSADR	8-62	17-13#												
BYTE16	6-0#	10-=33												
BYTE18	6-0#	10-=43												
C	10-854	12-16#												
C.ENTR	8-281	10-823#	10-852											
CALIN	9-215#													
CHGADR	6-0#	8-3*	17-13	17-15*										
C11	11-459	11-487#												
C13	11-461	11-510#												
C14	11-450	11-532#												
C15	11-509	11-531	11-609#	11-618										
C16	11-548	11-558	11-560	11-562	11-614#									
C17	11-391	11-468	11-499	11-503	11-507	11-515	11-525	11-529	11-540	11-547	11-553	11-557	11-571	11-577
	11-581	11-591	11-602	11-617	11-619#	11-733	11-763	11-940	11-<29					
C17B	11-627#	11-944												
C18	11-630	11-641#	11-813	11-:82										
CK.CHR	8-293	8-384	10->08#	10->45	10->53									
CK.DEC	10-=86#	10->14												
CK.DIG	10-888	10-<92	10->39#											
CK.NUM	17-24	17-33	17-56#											
CK.OCT	10-=68#	10->16												
CKSWR	10->86	10->86	10-?75#											
CKTRK	10-266#													
CLOCK	10-776	10-786	10-817#											
CLR	4-106#	11-242	11-680											
CLRQUE	11-224	11-679	11-=13#											
CNTLC	6-0#	8-57*	8-281*	10-842	10-852*	10-?62	10-?62							
CR	4-78#	8-219	8-248	8-287	8-378	10-803	10-?54	10-?54	14-15					
CRLF	4-78#	8-15	8-15	8-18	8-18	8-35	8-46	8-52	8-53	10-?54	10-?54	10-?65	12-12	12-13
	12-25	12-26	12-27	12-28	12-29	12-30	12-32	12-33	12-34	12-35	12-36	12-37	12-37	12-38
	12-38	12-39	12-40	12-41	12-42	12-42	12-43	12-44	12-45	12-47	12-48	12-49	12-50	12-51
	12-52	12-53	12-55	12-55	12-58	12-59	12-59	12-61	12-62	12-63	12-64	12-65	12-65	12-66
	12-67	12-68	12-69	12-70	12-71	12-73	12-74	12-75	12-76	12-77	12-78	12-79	12-80	12-81
	12-83	12-84	12-84	12-86	12-87									
DCK	4-163#	10-289												
DDISP	4-78#	5-0	8-14											
DDRIVE	6-0#	10->86*	15-2	15-3	15-4									
DEVMP	6-0#	8-88*	8-121*	8-151*	8-152*	8-153	8-184	8-192*	10-568	10-572				

DF1

7-7

16-1#

C 12

SEQ 0145

DF10	7-56	7-63	7-70	7-77	7-84	7-91	7-98	7-119	7-126	16-11#					
DF17	7-105	16-17#													
DF2	7-14	16-3#													
DF20	7-112	16-19#													
DF23	16-27#														
DF24	7-140	16-29#													
DF25	7-49	7-133	7-147	16-37#											
DF3	7-21	16-5#													
DF4	7-28	16-7#													
DF6	7-42	16-9#													
DH1	7-5	14-1#													
DH10	7-54	7-61	7-68	7-75	7-82	7-89	7-96	7-117	7-124	14-6#					
DH10A	14-7#	16-13													
DH10B	14-8#	16-15													
DH17	7-103	14-9#													
DH2	7-12	14-2#													
DH20	7-110	14-10#													
DH20A	14-11#	16-21	16-31												
DH20B	14-12#	16-23	16-33												
DH20C	14-13#	16-25	16-35												
DH23	7-47	7-131	14-14#												
DH24	7-138	14-15#													
DH25	7-145	14-17#													
DH3	7-19	14-3#													
DH4	7-26	14-4#													
DH6	7-40	14-5#													
DISPLA	5-0#	8-14*	8-14*	10->86*											
DISPRE	4-279#	8-14													
DLT	4-116#														
DMD	4-167#														
DONE	10-568	10-568	10-570#												
DPINT	11-60#	11-253	11-256	11-345*	11-371	11-831	11-856	11-980	11-982*	11-:51	11-:71	11-:76	11-:84*		
DPR	4-137#														
DPRQS	11-69#	11-377	11-425*	11-463*	11-632*	11-649	11-665*	11-834	11-:53	11-:73	11-:78	11-:93*			
DRIVE	6-0#	8-191*	8-300*	8-328	9-16	9-26	10-392	10-665	10-:59	15-6	15-7	15-10	15-11	15-15	
	15-16	15-21													
DRQ	4-200#														
DRVACT	11-29#	11-385	11-565*	11-612*	11-634*	11-646	11-664*	11-752*	11-852	11-884	11-915*	11-922*	11-937	11-949*	
	11-:63*														
DRVCLR	4-257#														
DRVINT	11-244	11-278#	11-373	11-970	11-983										
DRVQUE	11-380	11-393	11-:53#												
DRVSTA	8-94	8-193	8-314	11-39#	11-234*	11-235*	11-236*	11-237*	11-247*	11-279*	11-289*	11-333*	11-339*	11-367	
	11-375	11-399	11-433	11-437	11-566*	11-683*	11-837	11-845	11-858	11-909*	11-916*	11-929	11-985	11-:85*	
DRV TYP	8-98	8-124	8-201	8-320	8-333	11-51#	11-280*	11-296*	11-301*	11-306*	11-311*	11-402	11-684*		
DRY	4-136#														
DS.CYL	6-0	6-0	6-0	6-0#	9-241*	10-:88	10-:98	10-:08*	10-:14	10-:28*	10-:34	10-:60*	10-:65	10-:79*	
	10-:85	10-:16*	10-:22	10->86*	15-9	15-10	15-11	15-14	15-16	15-19					
DS.TRK	6-0	6-0	6-0	6-0#	9-242*	10-600*	10-:90	10-:99	10-:09*	10-:16	10-:29*	10-:36	10-:61*	10-:67	
	10-:80*	10-:87	10-:17*	10-:24	10->86*	15-9	15-10	15-11	15-14	15-16	15-19	15-21			
DSWR	4-78#	5-0	8-14												
DT00	4-191#														
DT01	4-192#														
DT02	4-193#														
DT03	4-194#														
DT04	4-195#														

DT05

4-196#

E 12

SEQ 0147

[illegible]

F2

4-127#

G 12

SEQ 0149

[illegible]

M1A

8-244#

I 12

SEQ 0151

[illegible]

MSIZE 8-245 12-36#

K 12

SEQ 0153

[illegible]

PR7

4-78#

8-87

M 12

SEQ 0155

PS	4-78	4-78#	8-87*	8-214*	8-313*	9-6*	10-9*	10-851*	11-222	11-223*	11-252*	11-260*	11-359	11-360*
PSEL	11-413*	11-423	11-472*	11-714*										
PSW	4-88#													
PWRVEC	4-78#	8-14*	8-14*	10-?64*	10-?64*	10-?64*	10-?64*	10-?64*	10-?64*					
QCNT	11-<55#	11-=14	11-=38*	11-=53	11-=55*	11-=75	11-=89*							
QDRV0	11-<66	11-<77	11-<86	11-<98#										
QDRV1	11-<67	11-<78	11-<87	11-<99#										
QDRV2	11-<68	11-<79	11-<88	11-=00#										
QDRV3	11-<69	11-<80	11-<89	11-=01#										
QDRV4	11-<70	11-<81	11-<90	11-=02#										
QDRV5	11-<71	11-<82	11-<91	11-=03#										
QDRV6	11-<72	11-<83	11-<92	11-=04#										
QDRV7	11-<73	11-<84	11-<93	11-=05#										
QINPT	11-<66#	11-=40	11-=57*	11-=58*	11-=59	11-=61*								
QOUTPT	11-<77#	11-=40*	11-=78	11-=91	11-=92*	11-=93*	11-=94	11-=96*						
QSTART	11-<86#	11-=20	11-=25	11-=61	11-=96									
QSTOP	11-<87#	11-=59	11-=94											
QTERM	11-<94	11-=06#												
R6	4-78#	8-14	8-14*	8-14*										
R7	4-78#													
RBUF	6-0	10-441*	10-442*	10-443	10-443	10-450*	10-451*	10-452	10-452	10-:50*	10-:56*	10-:57*	10-:58*	10-:62
	10-:66*	10-:69*	15-6	15-6	15-15	15-15	18-5#							
RD.ADR	11-:17*	11-:18*	11-:20#	15-3										
RD.RM	11-292	11-322	11-328	11-551	11-575	11-589	11-701	11-715	11-761	11-811	11-878	11-888	11-903	11-:45
	11-:15#	11-:68	11-:82	11-:88	11-<21									
RD.RM1	11-:19#	11-:47												
RD.RM2	11-:15*	11-:46#												
RD.RM3	11-:26	11-:38	11-:48#											
RD.RM4	11-:31	11-:50#												
RD.WRD	11-:21#	11-:22	15-3	15-4										
RDCHR	8-217	8-246	8-285	8-376	9-224	10-801	10-?62	10-?75#						
RDDAT	4-271#													
RDHD	4-272#	9-42	10-400											
RDLIN	9-158	10-886	10-<89	10-?75#	17-22	17-31								
RDY	4-85#													
READIN	4-261#													
RECAL	4-256#													
RECORD	10-295	10-908#												
REJCT2	10-599#	10-:54												
REJCT3	10-568	10-606#												
REJEC1	9-82	10-593#												
RELSE	4-258#													
RESET	10-297	10-360	10-:50#											
RESREG	10-?51	10-?71	10-?75#	11-261	11-407	11-410	11-473	11-686	11-746	11-:24	11-<30	11-=29		
RESTR1	10-96	10-797#												
RESVEC	4-78#													
RETBAD	9-24#													
RETRY	6-0#	9-24*	9-59	9-61*	9-65*	10-147*	10-257	10-259*	10-262*	10-336	10-338*	10-341*	10-568	10-568*
	10-568*	10-568*												
RM.REG	6-0	6-0#	10-274	10-286	10-288	10-300	10-424	10-426	10-428	10-430	10-568	10-657	10->86	10->86
	15-1	15-1	15-1	15-1	15-1	15-1	15-3	15-3	15-3	15-4	15-4	15-4	15-7	15-7
	15-7	15-7	15-7	15-8	15-8	15-8	15-8	15-8	15-8	15-8	15-9	15-9	15-9	15-9
	15-9	15-12	15-12	15-12	15-12	15-12	15-12	15-12	15-12	15-13	15-13	15-13	15-13	15-13
	15-13	15-13	15-13	15-14	15-14	15-16	15-17	15-17	15-17	15-17	15-17	15-17	15-17	15-17
	15-18	15-18	15-18	15-18	15-18	15-18	15-18	15-18	15-19	15-19				

RM05

9-34

9-43

10-46

10-242

10-268

10-409

10-568

^{B 13}

10-568

10-:70

11-359#

SEQ 0157

RMADR	8-63*	8-75*	11-169#	11-241	11-366	11-490	11-510	11-532	11-699	11-740	11-:43	11-;17	11-;23	11-;27
	11-:41	11-:74	11-:78	11-<10	11-<40	17-36								
RMA5	11-193#	11-327*	11-809	11-928*	11-958*	11-979*	11-:68							
RMBA	10->86	10->86	11-188#											
RMCS1	11-186#	11-283*	11-290	11-316	11-430*	11-431	11-506	11-528	11-570	11-590	11-601	11-616	11-629	11-762
	11-812	11-865	11-895	11-934	11-995	11-:69	15-2							
RMCS2	10-286	11-190#	11-242*	11-282*	11-284	11-379*	11-429*	11-491*	11-511*	11-533*	11-619	11-642	11-657	11-671
	11-680*	11-700*	11-760*	11-876*	11-965*	11-978*	11-:44*	11-;24	11-;79	11-<11*	11-<17	11-<41*	11-<46	
RMDA	10-274	10-568	11-189#	11-498	11-524	11-539								
RMDB	11-195#	11-<15												
RMDC	11-200#	11-502	11-514	11-546										
RMDS	10-300	11-191#	11-323	11-702	11-879	11-904	11-966	11-:46						
RMDT	11-197#	11-293												
RMEC1	11-204#													
RMEC2	11-205#	11-<25												
RMER1	10-288	10-657	11-192#	11-329	11-889	11-967	11-;83							
RMER2	11-203#	11-968												
RMERRS	11-22#	11-225	11-847	11-850	11-860	11-966*	11-967*	11-968*	11-969*	15-2	15-2	15-2		
RMHR	11-201#													
RMINIT	8-81	8-310	11-221#											
RMLA	11-194#	11-716	11-718											
RMMR1	11-176#													
RMMR2	11-202#	11-969												
RMOF	11-199#	11-320	11-552	11-556	11-576	11-580								
RMR	4-150#													
RMSN	11-198#													
RMTMR	10-818	11-:09#												
RMVEC	8-64*	8-71*	11-170#	11-238	11-240	11-360								
RMWC	11-187#													
RNOP	4-254#													
RTC	4-260#													
SAVEFG	8-82*	8-311*	11-124#	11-605	11-766	11-955								
SAVREG	10->94	10-?71	10-?75#	11-221	11-362	11-422	11-641	11-739	11-:12	11-<07	11-=13			
SAVSEC	6-0	6-0	6-0	6-0#	9-243*	10-274*	10-276*	10-277*	10-278*	10-305	10-306	10-359*	10-568	10-568
	10-568*	10-568*	10-923	10-:57	10-:63	10-:92	10-:00	10-:10*	10-:18	10-:30*	10-:38	10-:62*	10-:69	10-:81*
	10-:89	10-=18*	10-=26	10-=28	10-=31	10-=33	10-=38*	10-=41*	10-=43	10-=48*	15-10	15-11	15-16	15-21
SAVWC	6-0#	10-320*	10-703											
SC	11-745	11-778	11-781	11-787	11-809#									
SC01	4-207#													
SC02	4-208#													
SC04	4-209#													
SC10	4-210#													
SC11	11-877	11-885	11-946#											
SC12	11-843	11-854	11-965#											
SC13	11-833	11-836	11-975#											
SC20	4-211#													
SC3	11-824#	11-828												
SC4	11-826#	11-857	11-869	11-871	11-920	11-936	11-945	11-964	11-:02					
SC5	11-825	11-831#												
SC6	11-853	11-872#												
SC6A	11-851	11-897#												
SC7	11-887	11-900	11-902	11-912	11-922#									
SC8	11-866	11-880	11-890	11-896	11-905	11-935	11-937#	11-974						
SCAWC	10-332	10-703#												
SCOPE	4-78#													
SEARCH	4-263#													

SEC30 6-0# 8-166* 8-176* 8-260* 8-267* 9-126 10-42^{D 13} 10-74 10-720 10-988 10-990* 10-994* 10-:20 10-:26
SEQ 0159

	10-:67	10-:51	10-<23								
SECCU	6-0#	10-60	10-79	10-109	10-110	10-127	10-129*	10-138	10-140	10-160	10-353
SEEK	4-255#										
SEEKFG	8-312*	11-132#	11-226	11-454							
SELDIV	4-266#										
SELPAT	10-7#										
SERNL	9-144#										
SET.IE	11-255	11-286	11-397	11-471	11-685	11-818	11-<39#				
SETFMT	4-265#	9-33	10-45	10-568							
SETHDR	10-39	10-396	10-713#	10-993							
SETTBL	10-38	10-395	10-665#								
SETVEC	8-67	8-73	8-80#								
SKI	4-234#										
SLASH	10-885	12-15#									
SN1	9-154	12-58#									
SNGSEC	6-0#	10-402*	10-406*	10-438	10-464						
SOF SW	6-0#	10-146*	10-292	10-322*	10-324	10-326	10-328*	10-333*	10-342*	10-706*	
SORT1	10-109#										
SORT2	10-568	10-934#	10-:23	10-:43	10-:74	10-:94	10-=53	10-=55—			
SRCHWT	11-86#	11-424*	11-530*	11-950	11-959*						
ST.CLK	8-80	8-309	10-772#								
ST1	10-2#	10-385	10-583	10-587							
STACK	4-78#	8-14	9-41	9-90	10-241	10-267	10-580	10-823			
STARS	10-568	12-55#									
START	4-279	8-7#	8-57								
STCLK1	10-772	10-782#									
STCLK2	10-783	10-791#									
STCLK3	10-781	10-790	10-792#								
STKLMT	4-78#										
STO	11-:19	11-:39#									
STO1	11-:51#										
STO2	11-:50	11-:52	11-:54	11-:68#							
STO3	11-:70	11-:76#									
STO5	11-:82#										
STO6	11-:72	11-:84#									
STO7	11-:74	11-:92#									
STO8	11-:91	11-:98#									
STO9	11-:48	11-:58	11-:67	11-:75	11-:79	11-:81	11-:83	11-:89	11-:96	11-:00#	
SVRH70	11-607	11-768	11-784	11-842	11-892	11-910	11-957	11-991	11-:61	11-:99	11-<07#
SW0	4-78#	10-576									
SW00	4-78	4-78#									
SW01	4-78	4-78#									
SW02	4-78	4-78#	8-85								
SW03	4-78	4-78#									
SW04	4-78	4-78#									
SW05	4-78	4-78#									
SW06	4-78	4-78#									
SW07	4-78	4-78#									
SW08	4-78	4-78#									
SW09	4-78	4-78#	10-649								
SW1	4-78#										
SW10	4-78#										
SW11	4-78#										
SW12	4-78#										
SW13	4-78#										
SW14	4-78#										

SW15

4-78#

F 13

SEQ 0161

SW2	4-78#													
SW3	4-78#													
SW4	4-78#													
SW5	4-78#													
SW6	4-78#													
SW7	4-78#													
SW8	4-78#													
SW9	4-78#													
SWR	5-0#	8-14	8-14	8-14*	8-14*	8-14*	8-15	8-85	10-347	10-576	10-649	10->86	10->86	10->86
SWREG	10->86	10-?62	10-?62	10-?62*	10-?64	10-?64*								
T	4-279#	8-14	8-15	10-?62	10-?62	10-?62								
TAB.XY	10-859	12-18#												
TABCAL	4-287#	5-0												
TABINT	6-0#	9-235												
TABLD	9-90#	10-98												
TABLE	9-111#													
TABLE2	6-0#	8-342*	8-344*	8-351										
TABLE3	6-0#	8-342*	10-;12	10-;64										
TABLE4	6-0#	8-342*	10-;32	10-;83										
TAP	6-0#	8-342*	10-;20											
TBITVE	4-202#													
TD	4-78#													
TEXT	11-743	11-752#												
TIMER	10-568	10-978#												
TKVEC	11-137#	11-343*	11-466*	11-610*	11-663*	11-755*	11-873*	11-918*	11-961*	11-976*	11-998*	11-:15	11-:17*	11-:80*
TPVEC	11-:86*	11-:92*												
TRAPVE	4-78#	9-5*	10-8*	10-865*	10-?62*	10-?62*								
TRE	4-78#													
TRK1	4-78#	8-14*	8-14*											
TRK10	4-90#													
TRK2	4-213#													
TRK20	4-216#													
TRK4	4-214#													
TRKTST	4-217#													
TRNSWT	4-215#													
TRTVEC	10-365	10-678#												
TST1	10-824	11-78#	11-488*	11-635	11-638*	11-651	11-669*	11-678*	11-757	11-758*	11-:55	11-:65*		
TWO	4-78#													
TYPADR	8-9#													
TYPDS	8-385	12-20#												
TYPE	10-851#													
	10-568	10-884	10-?26	10-?75#										
	8-15	8-18	8-35	8-41	8-46	8-52	8-53	8-90	8-91	8-93	8-101	8-104	8-107	8-110
	8-117	8-120	8-122	8-133	8-139	8-216	8-221	8-228	8-230	8-233	8-237	8-238	8-244	8-245
	8-250	8-255	8-258	8-259	8-266	8-284	8-291	8-295	8-298	8-306	8-317	8-322	8-325	8-345
	8-349	8-360	8-375	8-382	8-385	8-391	8-394	9-12	9-15	9-17	9-152	9-153	9-154	9-222
	9-223	9-230	9-231	9-238	10-156	10-170	10-389	10-391	10-393	10-568	10-568	10-568	10-568	10-568
	10-593	10-594	10-595	10-599	10-602	10-606	10-607	10-608	10-800	10-807	10-811	10-812	10-840	10-853
	10-854	10-858	10-859	10-864	10-879	10-885	10-891	10-925	10-926	10-927	10-;06	10-;07	10-;26	10-;27
	10-;58	10-;59	10-;77	10-;78	10-<01	10-<02	10-<08	10-<10	10-<27	10-<28	10-<34	10-<35	10-<63	10-<84
	10-<88	10-=02	10-=06	10-=12	10-=15	10->86	10->86	10-?04	10-?05	10-?09	10-?10	10-?19	10-?29	10-?33
	10-?38	10-?40	10-?46	10-?49	10-?54	10-?58	10-?60	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62
	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62	10-?62
	17-16	17-18	17-21	17-27	17-30									
TYPERR	10->86	10->94#												
TYPOC	10-<05	10-<13	10-<31	10-<38	10-=05	10-?24	10-?62	10-?75#	17-20	17-29				

TYPON 10-275#

H 13

SEQ 0163

TYPOS	8-38	8-49	8-92	9-16	10-392	10-?75#								
UF	4-249#	10-440	10-717											
ULDFLG	11-105#	11-281*	11-369	11-384*	11-567*	11-633*	11-670*	11-839	11-925	11-927*	11-946	11-948*	11-:64*	
UNS	4-162#													
UNSTAT	8-90	12-12#												
UNTOFF	8-107	12-3#												
UNTON	8-120	12-4#												
UPDCYL	10-485	10-695	10-734#											
UPDTRK	10-472	10-682	10-759#											
UPE	4-114#													
US1	4-101#													
US2	4-102#													
US4	4-103#													
USSAV	6-0#	9-92	9-129	9-200*	9-202*	9-206*	10-:24	10-;49	10-;50	10-;55	10-;56	10-<22	10-<26	10-<75*
	10-<76*	10-<77												
USTAB	6-0#	9-95	9-135	9-199*	9-201*	9-209*	10-72	10-568	10-908	10-918	10-:18	10-;47	10-;48	10-;53
	10-;54	10-<21	10-<25	10-<68*	10-<69*	10-<70								
VV	4-135#													
WC	6-0#	8-169*	8-174*	8-261*	8-268*	10-26								
WCE	4-115#	10-286												
WCF	4-153#													
WCHKX	11-769	11-790												
WCKD	4-267#													
WCKHD	4-268#	10-266												
WCTBL	6-0#	10-208	10-211	10-226	10-229	10-315	10-318	10-568						
WLE	4-159#	10-657												
WRAP	6-0#	8-160*	8-275*	8-352*	8-363*	10-476	10-686	10-739						
WRL	4-140#													
WRT.AD	11-;64*	11-;74*	11-;77#	15-4										
WRT.R1	11-;75#	11-;95												
WRT.R2	11-;61*	11-;94#												
WRT.R3	11-;70	11-;81	11-;84	11-;90	11-;96#									
WRT.R4	11-;86	11-;98#												
WRT.R5	11-;97	11-;99#												
WRT.RM	11-315	11-319	11-497	11-501	11-505	11-513	11-523	11-527	11-538	11-545	11-555	11-569	11-579	11-600
	11-615	11-628	11-864	11-894	11-933	11-;61#								
WRT.WD	11-;62*	11-;66	11-;73*	11-;76#	15-4									
WRTDAT	4-269#													
WRTHD	4-270#	10-239	10-568	10-:61										
WTRK	10-38#													
WTRK1	10-146#													
WTRK2	10-239#	10-323												
WTRKA	10-154#	10-345												
WTRKB	10-168	10-183#	10-186											
WTRKC	10-181	10-205#												
WTRKD	10-162	10-176	10-195	10-200	10-222#									
WTRKE	10-215	10-235#												
WTRKF	10-175	10-199	10-217#											
WTRKH	10-220	10-225#												
WTRKX	10-54#	10-349	10-368											
WTRKY	10-69#													
WTRKZ	10-58	10-365#												
XSIZE	8-145#													
XXDP	6-0#	8-26*	8-29*	8-30	8-32*	8-37	8-48	8-113	8-115	8-195	8-197	8-302	8-304	
Y	8-258	10-811	12-19#											
ZERO	8-295	12-14#												

[illegible]

