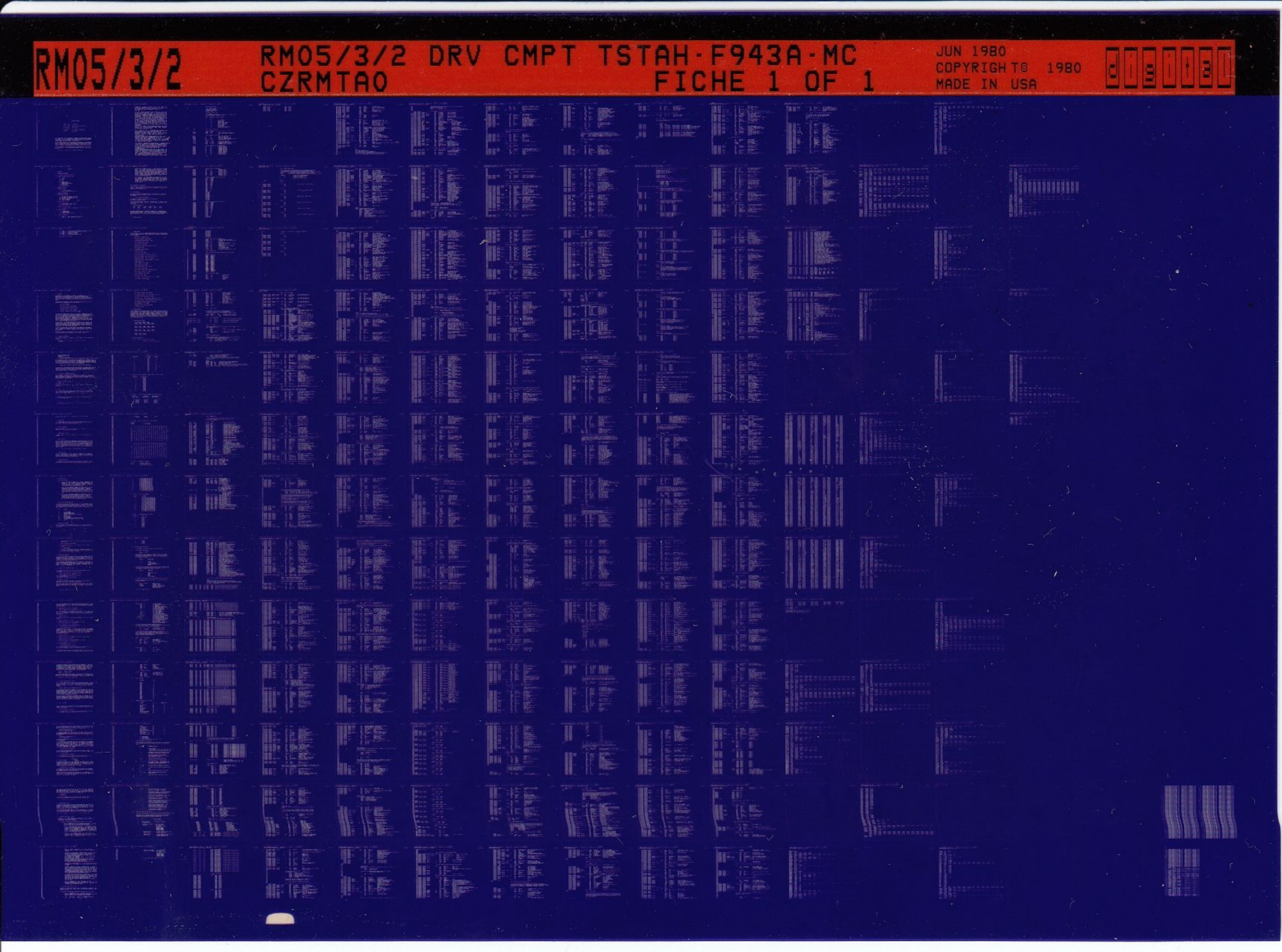
RM05/3/2

RM05/3/2 DRV CMPT TSTAH-F943A-MC
CZRMTAO

FICHE 1 OF 1



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IDENTIFICATION

PRODUCT CODE:	AC-F942A-MC
PRODUCT NAME:	CZRMTA0 RM05/3/2 DRV CMPT TST
DATE CREATED:	APRIL 1980
MAINTAINER:	CX DIAGNOSTIC ENGINEERING
AUTHOR:	MIKE LEAVITT

CONTENTS

1.0 ABSTRACT

THE PURPOSE OF THIS PROGRAM IS TO VERIFY THE COMPATIBILITY OF UP TO 16 RM05/3/2 DRIVES WHICH MAY RESIDE ON 1 OR MORE RH/RM SUBSYSTEMS. COMPATIBILITY IS DEFINED HERE AS THE ABILITY OF A DRIVE TO WRITE DATA WHICH CAN BE READ SUCCESSFULLY BY ALL OTHER DRIVES, AND ADDITIONALLY THE ABILITY OF A DRIVE TO COMPLETELY OVER-WRITE DATA WRITTEN BY ALL OTHER DRIVES.

THE PROGRAM IS DESIGNED TO DETECT THE FOLLOWING CONDITIONS WHICH MOST COMMONLY CAUSE INCOMPATIBILITY BETWEEN DRIVES:

1. HEAD MIS-ALIGNMENT
2. POSITIONER LATERAL MISALIGNMENT
3. SPINDLE-CARTRIDGE INTERFACE RUNOUT
4. IMPROPER LEVELS OF WRITE CURRENT
5. INCORRECT ADDRESSING OF READ/WRITE HEADS

THE TESTING IS DONE IN TWO PASSES. IN PASS 1, COMPATIBILITY DATA PATTERNS ARE WRITTEN BY ALL THE DRIVES UPON THE SAME DISK CARTRIDGE, AND THE BASIC READ/WRITE CAPABILITY OF EACH DRIVE IS DEMONSTRATED. IN PASS 2, THE COMPATIBILITY DATA FROM ALL DRIVES IS READ BY EACH DRIVE, WITH HEAD OFFSET, AND THIS IS COMPARED WITH EACH DRIVE'S ABILITY TO READ ITS OWN DATA. IN ADDITION, EACH DRIVE'S CAPABILITY TO OVERWRITE DATA WRITTEN BY ALL OTHER DRIVES IS TESTED ON THE SECOND PASS. (FOR THE REMAINDER OF THIS SPECIFICATION, THE ABOVE DEFINITIONS OF THE FIRST AND SECOND PASS SHALL APPLY).

IN BOTH PASSES, THE PROGRAM DIRECTS THE OPERATOR IN THE LOADING AND UNLOADING OF DRIVES AND THE MOVEMENT OF THE CARTRIDGE FROM DRIVE TO DRIVE, THROUGH MESSAGES AT THE CONSOLE TERMINAL. AT THE COMPLETION OF TESTING ON EACH DRIVE DURING THE SECOND PASS A SUMMARY IS PRINTED OF COMPATIBILITY TEST RESULTS FOR THAT DRIVE.

WITHIN THE VARIOUS TESTS OF BOTH PASSES, THE CAPABILITY IS PROVIDED TO LOOP ON CURRENT OPERATIONS, AND SWITCH REGISTER OPTIONS ARE PROVIDED, FOR A VARIETY OF LOOPING, RUNNING, AND REPORTING MODES (SEE SECTION 6.2).

UNEXPECTED ERRORS WILL BE REPORTED AS THEY OCCUR. THE REPORT WILL INCLUDE DESCRIPTION AND APPLICABLE DEVICE REGISTER CONTENTS.

2.0 HARDWARE REQUIREMENTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE RM05/3/2 DRIVE COMPATIBILITY PROGRAM.

PDP-11/04, (05,10 MFG. ONLY), 20,30,34,35,40,45,50,70
16K MEMORY

```
58                                      KW11-L OR KW11-P CLOCK
59                                      PROGRAM LOADING DEVICE
60                                      TERMINAL
61                                      RH11 OR RH70 CONTROLLER
62                                      1 TO 8 DISK DRIVES PER CONTROLLER (ANY COMBINATION OF RM05'S, RM03'S OR RM02'S)
63
64                              ANY COMBINATION OF DRIVE TYPES MAY BE MIXED TOGEHTER ON A CONTROLLER. BUT, DO
65                              TO THE PHYSICAL SIZE OF THE DISK PACKS, THE RM03/2'S AND THE RM05'S CANNOT BE
66                              SELECTED FOR COMPATIBILITY TOGETHER. IF FOR SOME REASON AN RM03/2 AND AN RM05
67                              ARE SELECTED FOR COMPATIBILITY TOGETHER, THE PROGRAM WILL RECOGNIZE THIS UPON
68                              THE DIFFERENT DRIVE TYPE AND TYPE THE FOLLOWING MESSAGE:
69
70                                      ?CANNOT SELECT RM03/2'S AND RM05'S TOGETHER (NOT COMPATIBLE)
71
72
73                              IN ADDITION, A SINGLE RM03/2 OR RM05 DISK CARTRIDGE IS REQUIRED WHICH MUST BE
74                              FORMATTED IN 32 SECTOR FORMAT, ON A RELIABLE WELL-ALIGNED(REFERENCE PACK)
75                              RM03/2 OR RM05 DRIVE. THIS CARTRIDGE WILL BE MOVED FROM DRIVE TO DRIVE, (ON UP
76                              TO 16 DRIVES) ON EACH OF THE TWO PASSES.
77
78
79
80                              3.0  PRELIMINARY PROGRAM REQUIREMENTS
81
82                              BEFORE RUNNING THE RM05/3/2 DRIVE COMPATIBILITY PROGRAM, THE  SUBSYSTEM(S)
83                              UNDER TEST SHOULD BE CAPABLE OF PASSING THE CONTROLLER DIAGNOSTICS AND THE
84                              DRIVE DIAGNOSTICS. IN ADDITION, THE CARTRIDGE MUST BE FORMATTED IN 32 SECTOR
85                              FORMAT USING THE PACK FORMATTER.
86
87
88
89                              4.0  GENERAL PROGRAM CONSIDERATIONS
90
91                              4.1  SYSMAC
92
93                              THIS PROGRAM USES PORTIONS  OF  THE  SYSMAC  DIAGNOSTIC  SYSTEM  MACRO
94                              PACKAGE.
95
96
97
98                              4.2  XXDP
99
100                             THIS PROGRAM MAY BE LOADED UNDER XXDP, AND MAY BE  RUN  IN  DUMP  MODE
101                             ONLY.   DUE  TO MANUAL INTERVENTION AND LACK OF END-OF-PASS HOOKS, THE
102                             PROGRAM IS NOT XXDP CHAINABLE.
103
104
105                             4.3  ACT
106
107                             THIS PROGRAM MAY BE LOADED UNDER ACT AND MAY BE RUN IN DUMP MODE ONLY.
108                             IT IS NOT CHAINABLE UNDER ACT.
109
110
111
112                             4.4  APT
113
114                             THIS PROGRAM MAY BE LOADED BY THE  APT  SYSTEM,  BUT  MAY  BE  RUN  IN
```

PROGRAM (DUMP) MODE ONLY. IT CANNOT BE RUN IN APT SCRIPT MODE.

4.5 DUAL-ACCESS

THIS PROGRAM DOES NOT UTILIZE THE DUAL-ACCESS OPTION IN ANY WAY, AND ALL DRIVES UNDER TEST SHOULD BE DE-SELECTED THROUGH THE PORT WHICH IS NOT IN USE , OR LOCKED ON THE PORT BEING TESTED.

4.6 MEMORY MANAGEMENT

MEMORY MANAGEMENT IS NOT UTILIZED IN THIS PROGRAM. IF IT IS INSTALLED, IT IS DISABLED BY THE PROGRAM.

4.7 MEMORY PARITY OPTION

IF PARITY MEMORY IS INSTALLED, MEMORY PARITY TRAPS ARE DISABLED BY THE PROGRAM.

4.8 BAD SECTORS

THE LIST OF BAD SECTORS ON THE CARTRIDGE IS OBTAINED FROM THE FIRST DRIVE TO BE TESTED ON THE CURRENT SUBSYSTEM. ACCORDING TO A SWITCH REGISTER OPTION (SEE SECTION 6.2) THIS LIST MAY BE TYPED AT THE CONSOLE AT THE START OF THE FIRST PASS. AFTER READING THE BAD SECTOR FILE, THE PROGRAM SEARCHES THE LIST OF BAD SECTORS TO DETERMINE IF ANY BAD SPOTS EXIST IN ANY TEST AREAS ON THE DISK PACK. IF A BAD SPOT IS FOUND TO BE PRESENT IN ANY OF THE TEST AREAS, THE FOLLOWING MESSAGE WILL BE TYPED:

PACK IS NOT ACCEPTABLE, CHANGE PACK AND TRY AGAIN.

4.9 EXECUTION TIME

THE TOTAL TIME REQUIRED TO RUN THE DRIVE COMPATIBILITY PROGRAM IS DIRECTLY PROPORTIONAL TO THE NUMBER OF DRIVES TO BE TESTED AND REQUIRES ABOUT 2 MINUTES PER RM03/2 DRIVE AND ABOUT 5 MINUTES PER RM05 DRIVE, NOT INCLUDING OPERATOR INTERVENTION.

5.0 PROGRAM LOAD MEDIA

THIS PROGRAM CAN BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR FROM THE ACT OR APT SYSTEMS OR FROM ANY MEDIA SUPPORTED BY XXDP.

6.0 PROGRAM OPTIONS

6.1 STARTING ADDRESSES

200 - THIS IS THE STARTING ADDRESS FOR DEFAULT PARAMETERS AND RUNNING OF PASS 1 AND PASS 2 ON A SINGLE SUBSYSTEM. THE PROGRAM WILL USE DEFAULT RH/RM BASE ADDRESS, INTERRUPT VECTOR AND PRIORITY. THE PROGRAM WILL ASSUME ALL DRIVES TO BE TESTED RESIDE ON ONE RH/RM SUBSYSTEM ONLY.

204 - THIS IS THE STARTING ADDRESS TO RUN PASS 1 ON ALL RH/RM SUBSYSTEMS WHICH RESIDE ON THIS PDP-11 SYSTEM. THE PROGRAM WILL ASK FOR THE RH/RM BASE ADDRESS, INTERRUPT VECTOR, AND PRIORITY FOR EACH SUBSYSTEM ON THIS SYSTEM, AND IT ASKS FOR THE LETTER NAMES (A THRU H) ASSIGNED TO ALL OTHER SUBSYSTEMS, AND THE DRIVE(S) WHICH WILL BE TESTED ON EACH.

210 - THIS IS THE STARTING ADDRESS TO RUN PASS 2 ON ALL RH/RM SUBSYSTEMS WHICH RESIDE ON THIS PDP-11 SYSTEM. THE PROGRAM WILL ASK FOR THE RH/RM BASE ADDRESS, INTERRUPT VECTOR FOR EACH SUBSYSTEM ON THIS SYSTEM, AND IT ASKS FOR THE LETTER NAMES (A THRU H) ASSIGNED TO ALL OTHER SUBSYSTEMS, AND THE DRIVE(S) WHICH WILL BE TESTED ON EACH.

6.2 SWITCH REGISTER OPTIONS USED

THIS PROGRAM IS DESIGNED TO ALLOW THE USE OF THE HARDWARE SWITCH REGISTER IF PRESENT, OR THE SYSMAC-SUPPORTED SOFTWARE SWITCH REGISTER (IF HARDWARE SWR IS NOT PRESENT, OR IS SET TO ALL ONES). IN EITHER CASE, THE FOLLOWING OPTIONS ARE IMPLEMENTED WHEN THE APPROPRIATE BITS ARE SET TO 1:

BIT	OPTION
15	HALT ON ERROR
14	LOOP ON CURRENT TEST
13	INHIBIT ERROR REPORTS
12	REPORT DESCRIPTION ONLY, ON ERRORS
11	UNUSED
10	BELL ON ERROR
09	LOOP ON ERROR
08	APPLY RANDOM STALL BETWEEN OPERATIONS
07	TYPE BAD SECTOR FILES (BSF'S) AT START
06-00	UNUSED

7.0 RUNNING THE PROGRAM

ONCE THE PROGRAM HAS BEEN LOADED INTO CORE (IN A GIVEN SYSTEM, IF THERE ARE MULTIPLE SYSTEMS) THE FOLLOWING STEPS MUST BE TAKEN TO RUN THE PROGRAM:

1. INSURE THAT ALL DRIVES TO BE TESTED ARE POWERED UP AND SINGLE PORT SELECTED.

2. LOAD THE DESIRED START ADDRESS.

3. SET ANY DESIRED BITS IN THE HARDWARE SWITCH REGISTER (IF PRESENT).

4. START THE PROGRAM.

5. FOLLOW ALL INSTRUCTIONS TYPED BY THE PROGRAM PERTAINING TO THE MANUAL INTERVENTION REQUIRED, AND THE ALTERNATE USE OF MULTIPLE SYSTEMS (IF THERE ARE ANY).

8.0 OPERATIONAL DIALOGUE

THIS SECTION DESCRIBES THE CONSOLE TERMINAL DIALOGUE THROUGH WHICH THE PROGRAM DIRECTS THE OPERATOR, IN THE SELECTION OF OPTIONS AND THE LOADING AND UNLOADING OF DRIVES, AND THE MOVEMENT OF THE TEST CARTRIDGE. THE EXACT DIALOGUE WHICH IS USED DEPENDS UPON THE STARTING ADDRESS WHICH WAS CHOSEN (SEE SECTION 6.1).

IN THE FOLLOWING DISCUSSION AND IN THE PRINTOUT OF TEST RESULTS, DRIVES TO BE TESTED WILL BE REFERRED TO BY A LETTER AND A NUMBER. THE LETTER IS THE SUBSYSTEM LETTER NAME (OPERATOR ASSIGNED), AND THE NUMBER IS THE DRIVE NUMBER ON THAT SUBSYSTEM. FOR EXAMPLE, DRIVE C6 REFERS TO DRIVE 6 ON SUBSYSTEM C.

8.1 DIALOGUE FOR ADDRESS 200 START

THIS STARTING ADDRESS MAY BE USED FOR DEFAULTING PARAMETERS ON ONE SUB-SYSTEM.
THE PROGRAM FIRST IDENTIFIES ITSELF AS FOLLOWS:

    CZRMTA0 - RM05/3/2 DRIVE COMPATIBILITY TEST

THEN, THE PROGRAM ASKS THE DRIVES TO BE TESTED.
THE PROGRAM TYPES THE
DRIVE LIST, AS IN THE FOLLOWING EXAMPLE:

    DRIVES = 2,5,7<CR>

THE PROGRAM NOW PROCEEDS WITH PASS 1, AND DIRECTS THE OPERATOR IN THE MOUNTING OF THE PACK, AS DESCRIBED IN SECTION 8.4.

PLEASE NOTE THAT THERE IS ONLY ONE SUBSYSTEM ON AN ADR. 200 START, AND IT IS NAMED SUBSYSTEM A. THE DRIVES IN THE ABOVE EXAMPLE WOULD BE REFERRED TO AS A2,A5,A7 IN THE TEST RESULTS PRINTOUT AT THE END OF PASS 2.

8.2 DIALOGUE FOR ADDRESS 204 START

THIS STARTING ADDRESS MUST BE USED ON EACH SYSTEM, WHEN THERE IS MORE THAN ONE SUBSYSTEM, BUT IT MAY ALSO BE USED WHEN THERE IS JUST ONE SUBSYSTEM (TOTAL), TO SPECIFY DRIVES TO TEST AND NON-DEFAULT PARAMETER VALUES, FOR PASS 1.

THE PROGRAM IDENTIFIES ITSELF AS FOLLOWS:

    CZRMTA0 - RM05/3/2 DRIVE COMPATIBILITY TEST

THEN, THE PROGRAM ASKS THE OPERATOR FOR THE DRIVES TO BE TESTED ON EACH OF THE POSSIBLE SUBSYSTEMS (STARTING WITH A - THE NAMES RANGE FROM SUBSYS A TO SUBSYS H. THERE COULD BE UP TO 8 SUBSYSTEMS, WITH A DRIVE ON EACH):

    SUBSYS A DRIVE(S) =

THE OPERATOR THEN TYPES THE DESIRED DRIVE NUMBERS, AS IN THE FOLLOWING EXAMPLE:

    SUBSYS A DRIVE(S) = 2,5,7<CR>

THE PROGRAM THEN VERIFIES THE DRIVE NUMBERS BY TYPING:

    WILL TEST DRIVE(S) 2,5,7 ON SUBSYS A.

NEXT, THE PROGRAM ASKS THE FOLLOWING QUESTION:

    IS THERE ANOTHER SUBSYS (Y OR N)?

THE OPERATOR TYPES 'Y' OR 'N'. (IF JUST <CR> IS TYPED, THE PROGRAM ASSUMES THAT 'N' WAS TYPED). IF THE OPERATOR TYPED 'N', THE PROGRAM PROCEEDS WITH PASS 1, AND DIRECTS THE OPERATOR IN THE MOUNTING OF THE PACK, AS DESCRIBED IN SECTION 8.4. IF 'Y' WAS TYPED, THE PROGRAM ASKS FOR THE NUMBERS OF THE DRIVES TO BE TESTED ON THE NEXT SUBSYSTEM (SUBSYS B) AS FOLLOWS:

    SUBSYS B DRIVE(S) =

THE OPERATOR TYPES THE DRIVE NUMBERS, AS IN THE FOLLOWING EXAMPLE:

    SUBSYS B DRIVE(S) = 2,3<CR>

THE PROGRAM THEN VERIFIES THE DRIVE NUMBERS. BY TYPING:

    WILL TEST DRIVE(S) 2,3 ON SUBSYS B.

NEXT, THE PROGRAM WILL ASK:

    IS THERE ANOTHER SUBSYS (Y OR N)?

AND IN THE SAME MANNER, THE OPERATOR SPECIFIES THE DRIVES ON EACH OF THE REMAINING SUBSYSTEMS, UNTIL ALL HAVE BEEN SPECIFIED.

ALL SUBSYSTEMS MUST BE TESTED IN THE ORDER IN WHICH THE LETTERS ARE ASSIGNED (A THRU H). NEXT, THE PROGRAM ALLOWS THE OPERATOR TO ALTER

THE RH/RM BUS ADDRESS, VECTOR ADDRESS FOR THIS SUBSYSTEM. FOR EACH PARAMETER THE CURRENT VALUE IS TYPED, AND THE OPERATOR IS GIVEN THE OPPORTUNITY TO TYPE IN A NEW VALUE, PLUS <CR>. IF JUST <CR> IS TYPED, THE PARAMETER IS NOT CHANGED. WHEN THE PROGRAM IS FIRST LOADED, THE FOLLOWING DEFAULT VALUES ARE ASSIGNED: RH/RM BUS ADDRESS = 177670, VECTOR ADDRESS = 240, (IF 200 START). THE FOLLOWING EXAMPLE SHOWS A PRINTOUT IN WHICH BUS ADDRESS AND VECTOR WERE CHANGED:

```
RMCS1  =  000000   177670
RMVEC  =     000   254
```

THEN THE PROGRAM PROCEEDS WITH PASS 1, AND DIRECTS THE OPERATOR IN THE MOUNTING OF THE PACK, AS DESCRIBED IN SECTION 8.4. AT THE COMPLETION OF PASS 1 ON THE SUBSYSTEM, THE PROGRAM WILL INFORM THE OPERATOR HOW

TO PERFORM PASS 1 ON THE NEXT SUBSYSTEM.

8.3 DIALOGUE FOR ADDRESS 210 START

THIS STARTING ADDRESS MUST BE USED ON EACH SYSTEM, WHEN THERE IS MORE THAN 1 SUBSYSTEM, BUT IT MAY ALSO BE USED WHEN THERE IS JUST ONE SUBSYSTEM (TOTAL) , TO SPECIFY DRIVES TO TEST AND NON-DEFAULT PARAMETER VALUES, FOR PASS 2. THE PROGRAM IDENTIFIES ITSELF, AS FOLLOWS:

```
CZRMTAO - RM05/3/2 DRIVE COMPATIBILITY TEST
```

THE DIALOGUE FOR 210 START IS IDENTICAL TO THE DIALOGUE FOR THE 204 START DESCRIBED ABOVE (SECTION 8.2), FOR THE SELECTION OF SUBSYSTEM PARAMETERS AND THE SPECIFICATION OF ALL DRIVES TO BE TESTED ON THE VARIOUS SUBSYSTEMS. HOWEVER, AFTER THIS DIALOGUE IS COMPLETED, THE PROGRAM PROCEEDS WITH PASS 2, AND DIRECTS THE OPERATOR IN THE MOVEMENT OF THE PACK, AS DESCRIBED IN SECTION 8.5.

NOTE THAT SINCE THE APPROPRIATE PROCESSOR MUST BE STARTED AT THE STARTING ADDRESS FOR EACH SUBSYSTEM TO BE TESTED, THE COMPATIBILITY TEST MAY BE PERFORMED IN STEPS, AT VARIOUS TIMES AND BETWEEN VARIOUS DISTANT LOCATIONS, BY MOVING THE TEST PACK AND SAVING THE PRINTOUT FROM EACH PASS ON EACH PDP-11 SYSTEM INVOLVED.

8.4 PASS 1 DIALOGUE

AFTER THE SELECTION OF PARAMETERS AND DRIVES HAS BEEN COMPLETED ON THE CURRENT SUBSYSTEM (SECTIONS 8.1-8.2), THE PROGRAM INDICATES THE START OF PASS 1 AS FOLLOWS:

```
** STARTING PASS 1 ON SUBSYS A
```

NOTE: THAT SUB-SYSTEM 'A' IS ALWAYS THE FIRST SUB-SYSTEM TO BE TESTED REGUARDLESS OF HOW MANY SUB-SYSTEMS ARE TO BE TESTED.

NEXT, THE PROGRAM SELECTS THE FIRST DRIVE TO BE TESTED ON THIS SUBSYSTEM, AND INSTRUCTS THE OPERATOR TO MOUNT THE TEST CARTRIDGE AND LOAD THE HEADS ON THAT DRIVE, AS IN THE FOLLOWING EXAMPLE:

```
     MOUNT PACK ON DRIVE A2 AND LOAD.
     TYPE <CR> WHEN DRIVE READY.
```

THE OPERATOR PERFORMS THIS TASK AND TYPES <CR> WHEN THE DRIVE IS READY. THE PROGRAM PERFORMS PASS 1 FUNCTIONS ON THIS DRIVE (SEE SECTION 9.1) AND THEN INSTRUCTS THE OPERATOR TO UNLOAD THE DRIVE AND REMOVE THE PACK AS FOLLOWS:

```
     UNLOAD DRIVE A2 AND REMOVE PACK.
     TYPE <CR> WHEN DONE.
```

THE OPERATOR PERFORMS THESE FUNCTIONS AND TYPES <CR> AFTER THE PACK HAS BEEN REMOVED.

IN THE SAME MANNER, THE PROGRAM INSTRUCTS THE OPERATOR IN THE MOVEMENT OF THE PACK THROUGHOUT THE REST OF THE DRIVES ON THE CURRENT SUBSYSTEM. WHEN THIS HAS BEEN COMPLETED, THE PROGRAM DOES ONE OF THREE THINGS: (1) IF THERE IS ONLY ONE SUBSYSTEM (FROM ADR 200 START) THE PROGRAM BEGINS PASS 2 (SEE SECTION 8.5). (2) IF THERE IS ANOTHER SUBSYSTEM, THE PROGRAM DIRECTS THE OPERATOR TO PERFORM PASS 1 ON THE NEXT SUBSYS AS FOLLOWS:

```
     ** STARTING PASS 1 ON SUBSYS B
```

(3) IF THERE ARE NO MORE DRIVES TO TEST IN PASS 1 ON ANY SUBSYS, THE PROGRAM DIRECTS THE OPERATOR TO BEGIN PASS 2 ON THE FIRST SUBSYS (SEE SECT. 8.5) AS FOLLOWS:

```
     ** STARTING PASS 2 ON SUBSYS A
```

NOTE: THAT SUB-SYSTEM 'A' IS ALWAYS THE FIRST SUB-SYSTEM TO BE TESTED REGARDLESS OF HOW MANY SUB-SYSTEMS ARE TO BE TESTED.

8.5 PASS 2 DIALOGUE

THE OPERATOR RETURNS TO THE FIRST SUBSYSTEM TO PERFORM PASS 2 EITHER THROUGH THE DIALOGUE OF THE ADR 200 START, OR AFTER THE SELECTION OF PARAMETERS AND DRIVES HAS BEEN COMPLETED IN ACCORDANCE WITH THE DIALOGUE OF THE ADR 210 START (SEE SECTION 8.3). IN EITHER CASE, THE PROGRAM INDICATES THE START OF PASS 2 BY TYPING:

```
     ** STARTING PASS 2 ON SUBSYS A
```

THE PROGRAM THEN DIRECTS THE OPERATOR IN THE UNLOADING, PACK MOVEMENT, AND LOADING OF ALL DRIVES ON THE FIRST SUBSYSTEM, IN THE SAME MANNER AS DESCRIBED FOR PASS 1 (SEE SECTION 8.4).

HOWEVER, AFTER PASS 2 TESTING (SEE SECTION 9.2) IS COMPLETED ON A GIVEN DRIVE, THE ENTIRE TEST RESULTS FOR THAT DRIVE ARE TYPED. THE DETAILS OF THIS PRINTOUT ARE DESCRIBED IN SECTION 10, AFTER THE DETAILS OF THE TESTING ARE DESCRIBED.

WHEN PASS 2 HAS BEEN COMPLETED FOR ALL DRIVES ON THE FIRST SUBSYSTEM, THE PROGRAM DOES ONE OF TWO THINGS: (1) IF THERE IS ONLY ONE SUBSYSTEM (FROM ADR 200 START) OR IF ALL DRIVES ON ALL SUBSYSTEMS HAVE BEEN TESTED IN PASS 2 (FROM ADR 210 START), THE ENTIRE TESTING AND REPORTING HAVE BEEN COMPLETED, AND THE PROGRAM TYPES:

```
TEST COMPLETE
**************
```

(2) IF THERE IS ANOTHER SUBSYSTEM, HOWEVER, THE PROGRAM DIRECTS THE OPERATOR TO PERFORM PASS 2 ON THE NEXT SUBSYSTEM AS FOLLOWS:

```
** STARTING PASS 2 ON SUBSYS B
```

9.0 DESCRIPTION OF TESTS

THE MAIN FUNCTIONAL BLOCKS OF CODE IN THE PROGRAM ARE ASSIGNED TEST NUMBERS, FOR THE PURPOSE OF IDENTIFICATION IN ERROR PRINTOUTS. TEST 0 REFERS TO THE OPERATOR INPUT DIALOGUE ROUTINES DESCRIBED IN SECTIONS 8.1-8.3. THE OTHER TEST NUMBERS ARE ASSIGNED BELOW, IN THE DESCRIPTION OF PASS 1 AND PASS 2 TESTING.

IN THE FOLLOWING SECTIONS, TABLES A-G ARE REFERRED TO. IN THESE TABLES, DRIVES ARE NAMED FROM 0-7 FOR ILLUSTRATIVE PURPOSES, ALTHOUGH THE DRIVES ARE NAMED THE FOLLOWING WAY IN AN ACTUAL SITUATION:

A0,A1, A2,...B0,B1,B2,...C0,C1,C2,... ETC. (SEE SECTION 8.0).

9.1 DESCRIPTION OF PASS 1 TESTS

IN PASS 1, THE BASIC READ/WRITE CAPABILITY OF EACH DRIVE IS DEMONSTRATED, AND COMPATIBILITY DATA PATTERNS ARE WRITTEN BY ALL DRIVES UPON THE SAME TEST CARTRIDGE.

THE SEQUENCE OF OPERATIONS PERFORMED ON EACH DRIVE IS AS FOLLOWS:

1. TEST 1 - MOUNTING OF TEST CARTRIDGE FOR PASS 1 - THE OPERATOR MOUNTS THE PACK ON THIS DRIVE AND MANUALLY LOADS THE HEADS, AS DIRECTED BY THE PROGRAM (SEE SECTION 8.4).

2. TEST 2 - BASIC READ/WRITE DATA TEST - THE PROGRAM PERFORMS A WRITE AND WRITE CHECK OPERATION USING A 'WORST CASE' DATA PATTERN, AT THE APPROPRIATE SECTOR FOR THIS DRIVE (SEE TABLE A) ON ALL SURFACES. THE PURPOSE OF THIS OPERATION IS TO VERIFY THE BASIC READ/WRITE CAPABILITY OF THE DRIVE ON PASS 1. THE ENTIRE SECTOR IS WRITTEN WITH THE REPETITION OF THE DATA PATTERN SHOWN IN TABLE B.

3. TEST 3 - THE PROGRAM WRITES ALL SECTORS FOR THIS DRIVE WITHIN THE CYLINDER BLOCKS SHOWN IN TABLE C ON ALL SURFACES USING A SINGLE REPEATED WORD OF THE PATTERN IN TABLE G. DRIVE 0 USES WORD 0, DRIVE 1 USES

WORD 1, DRIVE 7 USES WORD 7, ETC. THUS, THE DATA FROM EACH DRIVE IS UNIQUE. TABLE C HAS BEEN DETERMINED AS FOLLOWS:

IN EACH OF THE SEVEN WRITE CURRENT ZONES ON EACH SURFACE, SECTORS ARE WRITTEN WITHIN TWO DISTINCT CYLINDER BLOCKS. THE FIRST 16 CYLINDERS OF EACH WRITE CURRENT ZONE IS THE FIRST BLOCK USED FOR WRITE TEST IN PASS 2. THE LAST 16 CYLINDERS OF EACH CURRENT ZONE (EXCEPT THE INNERMOST ZONE) IS THE SECOND BLOCK USED FOR READ TEST IN PASS 2. WITHIN EACH CURRENT ZONE, THESE TWO BLOCKS ARE IDENTICALLY WRITTEN. HOWEVER, THE SECTORS DESIGNATED TO EACH DRIVE ARE ROTATED FROM ZONE TO ZONE SO THAT THE DATA APPEARS AT VARIOUS ANGULAR POSITIONS ON THE PACK.

WITHIN EACH CYLINDER BLOCK, UP TO 32 SECTORS ARE WRITTEN (DEPENDING ON THE NUMBER OF DRIVES BEING TESTED) ON EACH CYLINDER.

THE BASIC AYOUT OF A TYPICAL CYLINDER BLOCK IS SHOWN IN TABLE D, WHERE THE BLOCK SHOWN IS THE READ TEST BLOCK FOR ZONE 1, WHICH STARTS ON CYLINDER 112, AND HAS THE ROTATING STARTING SECTOR = SECTOR 0. EACH NUMBER INSIDE THE BLOCK IS THE NUMBER OF THE DRIVE WHICH WRITES THAT SECTOR. TABLE D SHOWS THE BLOCKS WRITTEN BY EACH OF 16 DRIVES. IF ANY OF THE DRIVES SHOWN ARE NOT PRESENT, HOWEVER, THE BLOCKS RESERVED FOR THE MISSING DRIVES ARE SIMPLY NOT WRITTEN.

THE ABOVE PATTERN OF SECTOR WRITES INSURES THAT DATA FROM EACH DRIVE IS WRITTEN ON ADJACENT CYLINDERS TO DATA FROM EVERY OTHER DRIVE, IN BOTH DIRECTIONS. IN ADDITION, THE ROTATION OF THE ABOVE SECTORS FROM CURRENT ZONE TO CURRENT ZONE INSURES THAT WRITE TEST AND READ TEST ARE DONE AT SEVERAL DIFFERENT ANGULAR POSITIONS WITH RESPECT TO THE CARTRIDGE.

4. TEST 4 - DISMOUNTING OF TEST CARTRIDGE IN PASS 1 - THE OPERATOR UNLOADS THE DRIVE AND DISMOUNTS THE PACK, AS DIRECTED BY THE PROGRAM (SEE SECTION 8.4), TO PROCEED WITH THE ABOVE STEPS ON THE NEXT DRIVE.

9.2 DESCRIPTION OF PASS 2 TESTS

IN PASS 2, THE ABILITY OF EACH DRIVE TO COMPLETELY OVERWRITE DATA WRITTEN BY ALL OTHER DRIVES AND TO READ DATA WRITTEN BY ALL OTHER DRIVES, IS TESTED.

THE SEQUENCE OF OPERATIONS PERFORMED BY EACH DRIVE IS AS FOLLOWS:

1. TEST 5 - MOUNTING OF TEST CARTRIDGE FOR PASS 2 - THE OPERATOR MOUNTS THE PACK ON THIS DRIVE AND MANUALLY LOADS THE HEADS, AS DIRECTED BY THE PROGRAM (SEE SECTION 8.5).

2. TEST 6 - WRITE TEST - NEXT, THE PROGRAM PROCEEDS TO TEST THIS DRIVE'S OVERWRITE CAPABILITY. FIRST, THE

```
571                                     APPROPRIATE  CYLINDERS  IN  TABLE E  FOR   THIS  DRIVE   ARE
572                                     OVERWRITTEN,  ON EACH SURFACE.  THE DATA USED IS A REPETITION
573                                     OF A SINGLE WORD OF THE PATTERN IN TABLE G,   DRIVE  0
574                                     USES  WORD  0,   DRIVE 1 USES WORD 1,  DRIVE 7
575                                     USES WORD 7, ETC.
576
577                                     THEN, EACH CYLINDER OVERWRITTEN IS READ BACK  BY  THIS  DRIVE
578                                     IN  EACH  OFFSET  DIRECTION (+ AND -).  THE PROGRAM SCANS FOR
579                                     READ ERRORS (DCK,HCRC,ETC.) DURING  THIS  READ,  AND  IF  ONE
580                                     OCCURS,  THE  PROGRAM  DETERMINES  WHICH DRIVE'S DATA HAS NOT
581                                     BEEN CORRECTLY OVERWRITTEN, AND A SCORE  FOR  THAT  DRIVE  IS
582                                     DECREMENTED.   THEN,  THE  TRANSFER  IS CONTINUED AT THE NEXT
583                                     SECTOR, WITH THAT OFFSET VALUE.  THE READS ARE DONE WITH  ALL
584                                     OF  THE  ABOVE OFFSETS APPLIED  AND A SEPARATE SCORE FOR EACH
585                                     DRIVE IS KEPT, WHILE  THE  CURRENT  DRIVE  IS  PERFORMING  THE
586                                     OVERWRITES.  FOR EACH TRACK , SCORES ARE AVERAGED OVER
587                                     ALL CYLS TESTED, IN EACH OFFSET DIRECTION.  AT THE COMPLETION
588                                     OF  THE  OVERWRITE  TEST ON THIS DRIVE, THE SCORES OF ALL THE
589                                     DRIVES ARE CONVERTED AND STORED, FOR PRINTING AT THE  END  OF
590                                     PASS  2  (AS  DESCRIBED  IN  SECTION  10.2).   EACH  SCORE
591                                     PROPORTIONAL TO THE OFFSET IN A GIVEN DIRECTION BY THE CURRENT
592                                     DRIVE WHILE
593                                     SUCCESSFULLY READING THE DATA IT WROTE OVER ONE OF THE  OTHER
594                                     DRIVE'S  DATA.   THUS,  THE PRINTOUT REVEALS WHICH DRIVES ARE
595                                     INVOLVED, IN A SITUATION IN WHICH A  DRIVE  CANNOT  OVERWRITE
596                                     ONE OR SEVERAL OTHER DRIVE'S DATA.
597
598                                 3.  TEST 7 - DRIVE SELF-TEST  -  THE PROGRAM NEXT  EVALUATES  THE
599                                     DRIVE'S  ABILITY  TO  WRITE AND READ ITS OWN DATA, AT VARIOUS
600                                     POSITIONS ON THE PACK.  FIRST, ALL SECTORS  OF  THE
601                                     APPROPRIATE  CYLINDERS  SHOWN  IN  TABLE F FOR THIS DRIVE ARE
602                                     WRITTEN WITH THE DATA  PATTERN  SHOWN  IN  TABLE B,  FOR  ALL
603                                     SURFACES.   THEN,  THE  SECTORS  ARE  READ WITH OFFSET
604                                     IN EACH DIRECTION.
605                                     THE PROGRAM SCANS FOR READ ERRORS DURING EACH  READ,  AND  IT
606                                     COMPUTES  A SCORE WHICH IS PROPORTIONAL TO THE FAILING OFFSET.
607                                     THEN, THE SCORES FOR ALL  SECTORS READ  IN  THIS
608                                     CYLINDER  BLOCK  ARE  AVERAGED,  TO  COME  UP  WITH  A DRIVE
609                                     SELF-TEST SCORE FOR EACH SURFACE FOR EACH  OFFSET  DIRECTION.
610                                     THIS SCORE IS SAVED FOR LATER USE, TO BECOME THE STANDARD FOR
611                                     THE  READS WHICH ARE TO FOLLOW.
612
613                                 4.  TEST 10(OCTAL) - COMPATIBILITY DATA READ TEST  -  HAVING ESTABLISHED
614                                     A  SELF-TEST  SCORE  FOR  THIS DRIVE, THE PROGRAM PROCEEDS TO
615                                     PERFORM THE COMPATIBILITY DATA READS OF THE PATTERNS  WRITTEN
616                                     BY  ALL  THE DRIVES IN EACH CYLINDER BLOCK (ON EACH SURFACE).
617                                     EACH COMPATIBILITY CYLINDER BLOCK SHOWN IN TABLE C IS READ, A
618                                     CYLINDER  AT  A TIME IN EACH OFFSET DIRECTION.
619                                     THE PROGRAM SCANS
620                                     FOR READ ERRORS DURING EACH  READ  AND  IF  ONE  OCCURS,  THE
621                                     PROGRAM  DETERMINES WHICH DRIVE'S DATA WAS BEING READ AT THAT
622                                     INSTANT AND A SCORE FOR  THAT DRIVE IS DECREMENTED.  THEN, THE
623                                     TRANSFER  IS  CONTINUED  AT THE NEXT SECTOR, WITH THAT OFFSET
624                                     VALUE.  THE READS ARE DONE WITH  OFFSETS  IN EACH DIRECTION.
625                                     AND  A SEPARATE SCORE FOR EACH DRIVE IS KEPT, WHILE
626                                     THE CURRENT DRIVE IS READING THE COMPATIBILITY  DATA.   THEN,
627                                     EACH SCORE IS APPROPRIATELY ADJUSTED TO REFLECT THE SELF-TEST
```

SCORE FOR THE CURRENT DRIVE AT THAT PARTICULAR CYLINDER BLOCK. THE SCORES ARE THEN AVERAGED OVER ALL CYLINDER BLOCKS. EACH SCORE IS PROPORTIONAL TO THE CAPABILITY OF THE CURRENT DRIVE TO SUCCESSFULLY READ THE DATA WRITTEN BY ONE OF THE OTHER DRIVES, AND SCORES ARE COMPUTED SEPARATELY FOR EACH SURFACE (TRACK), FOR EACH OFFSET DIRECTION. THUS, THE PRINTOUT REVEALS WHICH DRIVES ARE INVOLVED IN A SITUATION IN WHICH A PARTICULAR DRIVE HAS DIFFICULTY IN READING THE DATA OF ONE OR SEVERAL OTHER DRIVES.

5. TEST 11(OCTAL) - TYPE TEST SCORES AND DISMOUNT PACK IN PASS 2 - THE OVERWRITE AND COMPATIBILITY DATA READ TEST SCORES FOR THIS DRIVE ARE CONVERTED AND TYPED. THEN, THE OPERATOR UNLOADS THE DRIVE AND DISMOUNTS THE PACK AS DIRECTED BY THE PROGRAM (SEE SECTION 8.5), TO PROCEED WITH THE ABOVE STEPS ON THE NEXT DRIVE.

10.0 PRINTOUT OF TEST RESULTS

THE TEST RESULTS ARE PRINTED AT THE END OF PASS 2 ON EACH DRIVE BEING TESTED. THESE RESULTS PERTAIN TO THE OVERWRITE TEST AND THE COMPATIBILITY DATA READ TEST.

10.1 TEST RESULTS

THE RESULTS OF BOTH THE OVERWRITE AND OF THE COMPATIBILITY DATA READ ARE PRINTED, REGARD OF DEGREE OF SUCCESS. IF THE TEST IS SUCCESSFUL, THE MESSAGES:

```
        ** ALL DRIVES ARE COMPATIBLE **
```

IS PRINTED. IF THE TEST IS FAILURE, THE TEST RESULTS ARE TABULAR IN FORM AS SHOWN.

IN THE FOLLOWING EXAMPLE, THERE ARE 2 SYSTEMS, AND THE DRIVES BEING TESTED ARE A0,A1,A2,B0, AND B5. THE TEST RESULTS FOR DRIVE A1 ARE SHOWN BELOW:

```
     SCORES FOR DRIVE A1:

     TRACK    DRIVE      OVRWRT     OVRWRT     READ       READ
      NO.     READ       OFST-      OFST+      OFST-      OFST+

       0       A2        * 0        * 0
```

THE ABOVE EXAMPLE REVEALS A POSSIBLE COMPATIBILITY PROBLEM EXISTS BETWEEN DRIVES A1 AND A2. NOTICE THAT ON TRACK 0, THAT THE OVERWRITE SCORES WERE UNACCEPTABLY LOW (0), AND THE PROGRAM NOTED THESE BAD SCORES WITH AN ASTERISK (*). ALL ACCEPTABLE TEST RESULTS ARE NOT PRINTED.

11.0 ERROR REPORTING

11.1 COMMON ERRORS

THE FOLLOWING IS A LIST OF COMMON ERROR MESSAGES WHICH ACCOMPANY ERROR TYPEOUTS FROM THE RM05/3/2 DRIVE COMPATIBILITY PROGRAM. THE ERRORS ARE SELF-EXPLANATORY.

ADDRESS PLUG CHANGE BIT SET

RH DIDN'T RESPOND TO ADDRESSING

UNCORRECTABLE MASSBUS PARITY ERROR

FATAL MASSBUS PARITY ERROR

PERSISTENT DEVICE UNSAFE

OPERATION NOT COMPLETED WITHIN TIME LIMIT

DRIVE WENT OFFLINE

NO RESPONSE TO PORT REQUEST

HEADER CRC ERROR

DATA CHECK 'DCK' ERROR

WRITE CHECK ERROR - DATA CHECK 'DCK' SET

WRITE CHCKE ERROR - DATA CHECK 'DCK' NOT SET

HEADER READ ERROR - 'FMT' BIT DROPPED

HEADER READ ERROR - HEADER COMPARE 'HCE' ERROR

FORMAT ERROR 'FER'

HEADER COMPARE 'HCE' ERROR

MISCELLANEOUS DRIVE ERROR

OPERATION INCOMPLETE 'OPI' ERROR

DRIVE TIMING 'DTE' ERROR

PARITY 'PAR' ERROR AFTER OPERATION STARTED

WRITE CLOCK FAILURE 'WCF' ERROR

INVALID ADDRESS 'IAE' ERROR

WRITE LOCK 'WLE' ERROR

DATA CHECK 'DCK' SET DURING WRITE CHECK COMMAND

RH OR UNIBUS TRANSFER ERROR

BUS ADDRESS OR WORD COUNT INCORRECT

DATA COMPARE ERRORS - NO OTHER ERROR(S) DETECTED

CAN'T MATCH DATA READ WITH A PATTERN

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

ECC LOGIC FAILURE - POSITION REGISTER VALUE NOT VALID

BUS ADDRESS AND WORD COUNT NOT CONSISTENT

SEEK INCOMPLETE 'SKI' ERROR

PROGRAM DETECTED POSITIONING ERROR

DRIVE UNSAFE ERROR

11.2 ERROR HANDLING

ERRORS REPORTED BY THE PROGRAM CONSIST OF COMMON FAILURES RESULTING FROM ATTEMPTED SUBSYSTEM FUNCTIONS, AS WELL AS CERTAIN ERRORS UNIQUE TO PARTICULAR TESTS. EACH ERROR PRINTOUT CONSISTS OF AN ERROR DESCRIPTION AND TEST NUMBER, POSSIBLY FOLLOWED BY HEADER LINES, COLUMN HEADINGS, AND COLUMNS OF REGISTER CONTENTS IN OCTAL. AS MUCH MEANINGFUL REGISTER DATA AS POSSIBLE (FOR EXAMPLE, RH/RM REGISTERS) ARE REPORTED IN A GIVEN ERROR. OTHER ERROR REPORTS MAY CONSIST OF A SINGLE DESCRIPTIVE LINE.

11.3 ERROR PRINTOUT EXAMPLE

```
RH OR UNIBUS TRANSFER ERROR
DRIVE   RMCS1   RMWC    RMBA     RMDA
000001  144250  174400  0055030  000431

RMCS2   RMDS    RMER1   RMAS     RMDB
000100  010700  000000  000000   000000

RMMR1   RMDT    RMOF    RMDC     RMMR2
000050  024024  010000  000716   011777

RMER2   RMEC1   RMEC2
000000  004066  000000
```

12.0 TABLE DESCRIPTIONS

12.1 TABLE A - BASIC READ/WRITE TEST SECTORS

ADDRESS OF SECTOR ON EACH SURFACE

DRIVE NO.	CYLINDER	SECTORS
0	620	0
1	620	1
2	620	2
3	620	3
4	620	4
5	620	5
6	620	6
7	620	7
8	620	8
9	620	9
10	620	10
11	620	11
12	620	12
13	620	13
14	620	14
15	620	15

12.2 TABLE B - WORST CASE DATA PATTERN (REPEATS EVERY 16 WORDS)

WORD NO.	DATA (OCTAL)
0	066666
1	155554
2	133331
3	066663
4	155546
5	133315
6	066633
7	155466
8	133155
9	066333
10	154666
11	131555
12	063333
13	146666
14	115555
15	033333

12.3 TABLE C - CYLINDER BLOCK ASSIGNMENT FOR A GIVEN SURFACE

CURRENT ZONE - RANGE	OVERWRITE CYL BLOCK RANGE	COMPATIBILITY CYL BLOCK RANGE
1 - CYL 0-127	CYL 0-15	CYL 112-127
2 - 128-255	128-143	240-255
3 - 256-383	256-271	368-383
4 - 384-511	384-399	496-511
5 - 512-639	512-527	624-639

6 - 640-767	640-655	752-767
7 - 768-822	768-783	---

12.4 TABLE D - BASIC CYLINDER BLOCK LAYOUT EXAMPLE

CYLNDER NUMBERS	SECTOR NUMBERS																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
112	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	->
113	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	->
114	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	->
115	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	->
116	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	->
117	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	->
118	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	->
119	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	->
120	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	->
121	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	->
122	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	->
123	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	->
124	14	15	0	1	2	3	4	5	6	,	8	9	10	11	12	13	->
125	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	->
126	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	->
127	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	->

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
->	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0
->	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2
->	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5
->	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9
->	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
->	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4
->	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11
->	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3
->	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12
->	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6
->	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1
->	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13
->	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10
->	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8
->	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7

12.5 TABLE E - OVERWRITE CYLINDERS

DRIVE #	CYLINDERS OVERWRITTEN
0	0,128,256,384,512,640,768

1	1,129,257,385,513,641,769
2	2,130,258,386,514,642,770
3	3,131,259,387,515,643,771
4	4,132,260,388,516,644,772
5	5,133,261,389,517,645,773
6	6,134,262,390,518,646,774
7	7,135,263,391,519,647,775
8	8,136,264,392,520,648,776
9	9,137,265,393,521,649,777
10	10,138,266,394,522,650,778
11	11,139,267,395,523,651,779
12	12,140,268,396,524,652,780
13	13,141,269,397,525,653,781
14	14,142,270,398,526,654,782
15	15,143,271,399,527,655,783

12.6 TABLE F - SELF-TEST CYLINDERS

DRIVE #	CYLINDERS
0	17,145,273,401,529,657,785
1	18,146,274,402,530,658,786
2	19,147,275,403,531,659,787
3	20,148,276,404,532,660,788
4	21,149,277,405,533,661,789
5	22,150,278,406,534,662,790
6	23,151,279,407,535,663,791
7	24,152,280,408,536,664,792
8	25,153,281,409,537,665,793
9	26,154,282,410,538,666,794
10	27,155,283,411,539,667,795
11	28,156,284,412,540,668,796
12	29,157,285,413,541,669,797
13	30,158,286,414,542,670,798
14	31,159,287,415,543,671,799
15	32,160,288,416,544,672,800

12.8 TABLE G - PSEUDO-RANDOM DATA PATTERN

WORD #	DATA (OCTAL)
0	040135
1	177070
2	070414
3	064531
4	174473
5	062422
6	114352
7	036620
8	010031
9	052336
10	017310
11	011347

```
                                        12          102367
                                        13          152567
                                        14          C01246
                                        15          160073



                        13.0 RM SOFTWARE DRIVER DOCUMENT

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

                        13.1    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
                                          5             RM02
                                          4             RM03
                                          7             RM05
                                         -1             NOT AN RM05/3/2

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

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

                                CALL:
                                        JSR     R0,RM05         ;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)
```

```
1027
1028                    PNTDPB: .BYTE   0               ;(0) DRIVE NUMBER
1029                            .BYTE   0               ;(1) OFFSET VALUE OR FMT16, ECT, AND HCI
1030                            .BYTE   0               ;(2) COMMAND
1031                            .BYTE   0               ;(3) PSEL AND A17 AND A16
1032                            .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
1033                            .WORD   0               ;(6) BUFFER ADDRESS OR
1034                                                    ;REGISTER TABLE POINTER
1035                            .BYTE   0               ;(10) SECTOR ADDRESS OR
1036                                                    ;FIRST REG. INDEX
1037                            .BYTE   0               ;(11) TRACK ADDRESS OR
1038                                                    ;LAST REG. INDEX
1039                            .WORD   0               ;(12) CYLINDER ADDRESS
1040                            .WORD   0               ;(14) ERROR TABLE POINTER
1041                                                    ;POINTS TO THE FIRST OF TWENTY
1042                                                    ;LOCATIONS OF WHERE THE DRIVER
1043                                                    ;IS TO STORE THE RH/RM
1044                                                    ;REGISTERS ON AN ERROR. IF LEFT
1045                                                    ;ZERO REGISTERS ARE NOT SAVED.
1046                            .WORD   0               ;(16) STATUS/ERROR INDICATOR
1047                                                    ;BIT15=1=>ERROR OCCURRED
1048                                                    ;BIT07=1=>DONE
1049                                                    ;BIT14-BIT09 AND BIT06-BIT03
1050                                                    ;INDICATE TYPE OF ERROR
1051
1052            13.3    THE DRIVER PROVIDES A SOFTWARE TIMEOUT CAPABILITY.
1053                    TO UTILIZE THIS CAPABILITY YOU MUST SUPPLY THE 'RM TIMER' ROUTINE
1054                    WITH THE ELAPSED TIME IN THE FOLLOWING MANNER:
1055
1056                            MOV     #16.,-(SP)      ;16 MILLISECONDS BETWEEN
1057                                                    ;CLOCK TICKS
1058                            JSR     PC,RMTMR        ;CALL THE TIMER ROUTINE
1059
1060                    IT SHOULD BE NOTED THAT YOU MUST PROVIDE THE CODE TO DRIVE THE
1061                    CLOCK.  AND THE ELAPSED TIME MUST BE IN MILLISECONDS.
1062                    THE DRIVER WILL SET THE TIMEOUT TO 1 SECOND FOR ALL POSITIONING
1063                    AND DATA TRANSFER OPERATIONS AND WILL SET THE TIMOUT TO 30
1064                    SECONDS FOR ERROR RECOVERY OPERATIONS.
1065
1066
1067            13.4    EXAMPLE - WRITE 1000. WORDS
1068
1069                    1$:     JSR     R0,RM05         ;CALL THE DRIVER
1070                            WRTDPB                  ;DPB ADDRESS
1071                            BR      1$              ;WAIT FOR QUEUE IF FULL
1072                    2$:     TST     WRTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
1073                            BEQ     2$
1074                            BMI     ERROR1          ;ERROR OCCURRED
1075                            .
1076                            .
1077                            .
1078
1079                    WRTDPB: .BYTE   5               ;DRIVE #5
1080                            .BYTE   0               ;
1081                            .BYTE   161             ;WRITE COMMAND
1082                            .BYTE   0               ;
1083                            .WORD   -1000.          ;WORD COUNT
```

```
                                .WORD   WRTBUF          ;BUFFER ADDRESS
                                .BYTE   3               ;SECTOR
                                .BYTE   5               ;TRACK
                                .WORD   400             ;CYLINDER
                                .WORD   ERRTB5          ;ERROR TABLE
                                .WORD   0               ;STATUS/ERROR INDICATOR

                                ALTERNATE DPB SETUP

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

                13.5    RH/RM REGISTERS

                                MNEMONIC                INDEX
                                --------                -----

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

                13.6    COMMANDS PERFORMED BY THE DRIVER

                                COMMAND                 CODE            COMMAND TYPE
                                -------                 ----            ------------

                                NO OPERATION            101                 N
                                UNLOAD                  103                 N
                                SEEK                    105                 P
                                RECALIRATE              107                 P
                                DRIVE CLEAR             111                 N
                                RELEASE                 113                 N
                                OFFSET                  115                 P
                                RETURN TO CENTER        117                 P
                                READIN PRESET           121                 N
                                PACK ACKNOWLEDGE        123                 N
```

SEARCH	131	P
GET REGISTER(S)	141	S
SET FORMAT	143	S
SELECT DRIVE	145	S
WRITE CHECK DATA	151	D
WRITE CHK HEADER & 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

13.7 DPB STATUS/ERROR INDICATOR WORD

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

BIT NO.	MEANING IF ON A "1"
15	ERROR OCCURRED DONE (BIT07=0); BITS 14-10 SPECIFIES TYPE DONE (BIT07=1); BITS 06-03 SPECIFIES TYPE
14(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON AN OFFLINE OR UNSAFE DRIVE
13(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON A DRIVE THAT HAS AN UNLOAD REQUEST IN QUEUE.
12(2)	PERSISTENT UNSAFE CONDITION EXIST.
11(2)	UNCORRECTABLE PARITY ERROR OCCURRED
10(2)(4)	FATAL PARITY ERROR. A MASSBUS CLEAR WAS PERFORMED, ALL QUEUES WERE EMPTIED, AND ALL DRVACT'S SET TO THE IDLE STATE
9(3)(4)	SOFTWARE TIMEOUT OCCURRED ON THIS DRIVE
8(4)	SOFTWARE TIMEOUT OCCURRED ON ANOTHER DRIVE
7	DONE
6(2)	ERROR OCCURRED DURING AN I/O OPERATION
5(2)	ERROR OCCURRED DURING AN OPERATION OTHER THAN I/O.
4(2)	CORRECTABLE UNSAFE CONDITION OCCURRED

3(2)		DRIVE ERROR OCCURRED THAT CAUSED AN AUTOMATIC ''RECALIBRATE'' SEQUENCE
2		PORT REQUEST TIMEOUT. THE DRIVER REQUESTED THE DRIVE BUT THE OPPOSITE PORT DID NOT RELEASE THE DRIVE WITHIN 20 SECONDS.
1		NON-EXISTENT DRIVE REQUESTED. USER MADE A REQUEST FOR A NON-EXISTENT DRIVE.
(1)	=>	REQUEST WASN'T PUT IN QUEUE. (RH/RM REGISTERS WERE NOT SAVED)
(2)	=>	REQUEST QUEUE HAS BEEN EMPTIED. THE DRIVER ISSUED A ''DRIVE CLEAR'' TO THE DRIVE. NOTE: ALL RH/RM REGISTERS ARE SAVED AS PER DPB+14 BEFORE THE ''DRIVE CLEAR''.
(3)	=>	REQUEST QUEUE HAS BEEN EMPTIED. THE DRIVER ISSUED A MASSBUS INIT. ALL RH/RM REGISTERS FOR THE DRIVE WERE SAVED AS PER DPB+14 BEFORE THE INIT.
(4)	=>	A ''RECALIBRATE'' SHOULD BE ISSUED BEFORE ANY OTHER COMMAND.

13.8 ERROR CALLS MADE BY THE DRIVER.

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

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

N	TYPE	DATA AVAILABLE
1	RH70 INTERRUPT OCCURRED (RHAS=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

```
1255
1256                                    5       ADDRESS PLUG CHANGE       R1= DRIVE NUMBER
1257                                            BIT SET ('OPE' ERROR)     R3= ATA BIT
1258                                                                     *R4= RMCS1'S ADDRESS
1259                                                                      R5= (RMAS)
1260                                                                      RMERRS  =RMDS
1261                                                                      RMERRS+2=RMER1
1262                                                                      RMERRS+4=RMER2
1263                                                                      RMERRS+6=RMMR2
1264
1265                                    * THIS IS THE ACTUAL UNIBUS ADDRESS (176700)
1266
1267                            @
```

```
                        ;PROGRAM REVISION #001

                        .TITLE  CZRMTA0 RM05/3/2 DR CMPT TST
                        ;*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
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            INHIBIT TRACE TRAP
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>
                        ;*         7            TYPE THE BAD SECTOR FILE

                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK   = 1100
104000                  ERROR   = EMT           ;;BASIC DEFINITION OF ERROR CALL
000004                  SCOPE   = IOT           ;;BASIC DEFINITION OF SCOPE CALL

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

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

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

                        ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15    = 100000
040000                  SW14    = 40000
020000                  SW13    = 20000
010000                  SW12    = 10000
004000                  SW11    = 4000
002000                  SW10    = 2000
001000                  SW09    = 1000
000400                  SW08    = 400
000200                  SW07    = 200
000100                  SW06    = 100
000040                  SW05    = 40
000020                  SW04    = 20
000010                  SW03    = 10
000004                  SW02    = 4
000002                  SW01    = 2
000001                  SW00    = 1
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
     68
     69                         .SBTTL  RM REGISTERS
     70
     71                         ;INDEX OF STATUS AND REGISTER WORDS RELATIVE TO FMTDPB
     72
     73         000016          $TATUS  = 16
     74         000020          $RMCS1  = $TATUS+2
     75         000022          $RMWC   = $RMCS1+2
     76         000024          $RMBA   = $RMWC+2
     77         000026          $RMDA   = $RMBA+2
     78         000030          $RMCS2  = $RMDA+2
     79         000032          $RMDS   = $RMCS2+2
     80         000034          $RMER1  = $RMDS+2
     81         000036          $RMAS   = $RMER1+2
     82         000040          $RMLA   = $RMAS+2
     83         000042          $RMDB   = $RMLA+2
     84         000044          $RMMR1  = $RMDB+2
     85         000046          $RMDT   = $RMMR1+2
     86         000050          $RMSN   = $RMDT+2
     87         000052          $RMOF   = $RMSN+2
     88         000054          $RMDC   = $RMOF+2
     89         000056          $RMHR   = $RMDC+2
     90         000060          $RMMR2  = $RMHR+2
     91         000062          $RMER2  = $RMMR2+2
     92         000064          $RMEC1  = $RMER2+2
     93         000066          $RMEC2  = $RMEC1+2
     94
     95                         .SBTTL  RM DRIVER COMMANDS
     96
     97         000101          RNOP    = 101                   ;NO OPERATION
     98         000105          SEEK    = 105                   ;SEEK
     99         000107          RECAL   = 107                   ;RECALIBRATE
    100         000111          DRVCLR  = 111                   ;DRIVE CLEAR
    101         000113          RELSE   = 113                   ;RELEASE
    102         000115          OFFSET  = 115                   ;OFFSET
```

```
                                RTC     = 117                   ;RETURN TO CENTER LINE
                                READIN  = 121                   ;READ IN PRESET
                                ACK     = 123                   ;PACK ACKNOWLEDGE
                                SEARCH  = 131                   ;SEARCH
                                GETREG  = 141                   ;GET REGISTERS
                                SETFMT  = 143                   ;SET FORMAT (& ECI OR HCI)
                                SELDRV  = 145                   ;SELECT DRIVE
                                WCKD    = 151                   ;WRITE CHECK DATA
                                WCKHD   = 153                   ;WRITE CHECK HEADER & DATA
                                WRTDAT  = 161                   ;WRITE DATA
                                WRTHD   = 163                   ;WRITE HEADER & DATA
                                RDDAT   = 171                   ;READ DATA
                                RDHD    = 173                   ;READ HEADER & DATA

                                ABASE   = 176700
                                AVECT1  = 254


                                .SBTTL  TRAP CATCHER

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

                                .SBTTL  STARTING ADDRESS(ES)

000200 000137 005502                    JMP     @#START         ;;JUMP TO STARTING ADDRESS OF PROGRAM

000204 000137 005520                    JMP     @#START1        ;CHANGE THE RH/RM UNIBUS ADDRESS

000210 000137 005536                    JMP     @#START2        ;SECOND PASS STARTING ADDRESS


                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************************
                                ;HOOKS REQUIRED BY ACT11
                                        $SVPC=.                 ;SAVE PC
                                        .=46
000046 023506                           $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                        .=52
000052 040000                           .WORD   40000           ;;2)SET LOC.52 TO 40000
                                        .=$SVPC                 ;; RESTORE PC


                                .=1100
                                .SBTTL  APT PARAMETER BLOCK

                                ;;**************************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**************************************************************************
                                        .$X=.   ;;SAVE CURRENT LOCATION
                                        .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024 000200                           200     ;;FOR APT START UP
```

```
                000044                          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
        000044  001100                         $APTHDR ;;POINT TO APT HEADER BLOCK
                001100                          .=.$X   ;;RESET LOCATION COUNTER
                                        ;;*****************************************************************
                                        ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                        ;INTERFACE SPEC.

        001100                          $APTHD:
        001100  000000                  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
        001102  001212                  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
        001104  000764                  $TSTM:  .WORD   500.    ;;RUN TIM OF LONGEST TEST
        001106  000764                  $PASTM: .WORD   500.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
        001110  000764                  $UNITM: .WORD   500.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDED UNIT
        001112  000032                          .WORD   $ETEND-$MAIL/2  ;;LENGTH MAILBOX-ETABLE(WORDS)
    133         001114              TAB.XY=.
    134
```

```
      0                         .SBTTL  COMMON TAGS

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

            001114                      .=TAB.XY
      001114                    $CMTAG:                         ;;START OF COMMON TAGS
      001114  000000                    .WORD   0
      001116     000            $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
      001117     000            $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
      001120  000000            $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
      001122  000000            $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
      001124  000000            $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
      001126  000000            $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
      001130     000            $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
      001131     001            $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
      001132  000000            $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
      001134  000000            $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
      001136  000000            $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
      001140  000000            $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
      001142  000000            $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
      001144  000000                    .WORD   0               ;;RESERVED--NOT TO BE USED
      001146  000000                    .WORD   0
      001150     000            $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
      001151     000            $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
      001152  000000                    .WORD   0
      001154  177570            SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
      001156  177570            DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
      001160  177560            $TKS:   177560                  ;;TTY KBD STATUS
      001162  177562            $TKB:   177562                  ;;TTY KBD BUFFER
      001164  177564            $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
      001166  177566            $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
      001170     000            $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
      001171     002            $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
      001172     012            $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
      001173     000            $TPFLG: .BYTE   0               ;;'TERMINAL AVAILABLE'' FLAG (BIT<07>=0=YES)
      001174  000000            $TMP0:  .WORD   0               ;;USER DEFINED
      001176  000000            $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
      001200  000000            $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
      001202     207     377 377$BELL:   .ASCIZ  <207><377><377> ;;CODE FOR BELL
      001206     077            $QUES:  .ASCII  /?/             ;;QUESTION MARK
      001207     015            $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
      001210     012     000    $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;**********************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

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

```
001230  000000                  $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
001232                          $ETABLE:                ;;APT ENVIRONMENT TABLE
001232     000                  $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
001233     000                  $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
001234  000000                  $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
001236  000000                  $USWR:  .WORD   AUSWR   ;;USER SWITCHES
001240  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
001242     000                  $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
001243     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
001244  000000                  $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
                                ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF 'TYPE'' ABOVE
001246     000                  $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
001247     000                  $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
001250  000000                  $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
001252     000                  $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
001253     000                  $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
001254  000000                  $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
001256     000                  $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
001257     000                  $MTYP4: .BYTE   AMTYP4  ;;MEM.1YPE,BLK#4
001260  000000                  $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
001262  000254                  $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
001264  000000                  $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
001266  176700                  $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
001270  000000                  $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
001272  000000                  $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
001274  000000                  $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
001276                          $ETEND:
                                .MEXIT
```

```
0                                       .SBTTL  USER DEFINED TAGS

001276  176700                  $RMADR: .WORD   176700  ;FIRST ADDRESS OF RH/RM REGISTERS
001300  000254                  $RMVEC: .WORD   254     ;VECTOR ADDRESS
001302  172540                  $LKCSR: .WORD   172540  ;ADDR OF KW11-P STATUS REGISTER
001304  172542                  $LKCSB: .WORD   172542  ;ADDR OF KW11-P COUNTER BUFFER
001306  000104                  $LPVEC: .WORD   104     ;ADDR OF KW11-P VECTOR
001310  177546                  $LKS:   .WORD   177546  ;ADDR OF KW11-L STATUS REGISTER
001312  000100                  $LLVEC: .WORD   100     ;ADDR OF KW11-L VECTOR
001314  177777                  PCLOCK: .WORD   -1      ;'0' IF KW11-P IS ON SYSTEM
001316  177777                  CLKFLG: .WORD   -1      ;'0' IF A CLOCK IS AVAILABLE
001320  000074                  HZ:     .WORD   74      ;74 (8) IF 60 HZ SYSTEM; 62 (8) IF 50 HZ SYSTEM
001322  000000                  STATIN: .WORD   0       ;'TYPE STATISTICS' INDICATOR
001324  000000                  PACK:   .WORD   0       ;ENTRY TO THE TABLE D
        001224                  DRIVE   = $UNIT         ;DRIVE # STORAGE:
001326  000000                  ATTN:   .WORD   0       ;ATTN REG STORAGE:
001330  000000                  UNIT:   .WORD   0       ;DRIVE # STORAGE FOR PRINTOUT
                                                        ;RETRY COUNT IN THE UPPER BYTE
001332  000000                  LSTAD:  .WORD   0       ;STORE LAST MEMORY ADDRESS HERE
001334  000000                  CHGADR: .WORD   0       ;CHANGE RH/RM UNIBUS ADDRESS FLAG
001336  000000                  CFLAG:  .WORD   0       ;'CONTROL C' FLAG
001340  000000                  TSTNM:  .WORD   0       ;TEST NUMBER FOR PRINT AND SCORE RT.
001342  000000                  BADSEC: .WORD   0       ;BAD SECTOR/TRACK FLAG
001344  000000                  HOUR:   .WORD   0       ;HOUR COUNT STORED HERE (MAXIMUM - 999.)
001346  000000                  MINUTE: .WORD   0       ;MINUTE'S COUNT STORED HERE
001350  000000                  SECOND: .WORD   0       ;SECOND'S COUNT STORED HERE
001352  000000                  SIXTEE: .WORD   0       ;TIMER ROUTINE COUNTER (FOR ONE SECOND)
001354  000000                  CMCNT:  .WORD   0       ;ZONE COUNT
001356  000000                  CMCYL:  .WORD   0       ;CYLINDER ADDRESS
001360  000000                  STARSC: .WORD   0       ;STARTING SECTOR (FOR TEST 6,8)
001362  000000                  CMSEC:  .WORD   0       ;DALTA CYLINDER COUNT
001364  000000                  CMTRK:  .WORD   0       ;TRACK ADDRESS
001366  000000                  NULINE: .WORD   0       ;NEW LINE FLAG AND COLUMN CTR
001370  000037                  SECLMT: .WORD   31.     ;SECTOR ADDRESS LIMIT
001372  000000                  TRKLMT: .WORD   0       ;TRACK ADDRESS LIMIT, RM03/2 = 4. AND RM05 = 18.
001374  001466                  CYLIMT: .WORD   822.    ;CYLINDER ADDRESS LIMIT
001376  000000                  FAULT:  .WORD   0       ;=1, IF ALL DRIVES NOT COMPATIBLE
001400  000000                  RSTART: .WORD   0       ;CONTAINS PROGRAM RESTARTING ADDRESS
001402  000000                  DTYP:   .WORD   0       ;CONTAINS DRIVE TYPE CODE OF DRIVE BEING TESTED
001404  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.

                                        .SBTTL  TABLES, CONSTANTS, AND VARIABLE LOCATIONS

                                        ;TABLE D
                                        ;TABLE LISTED BELOW SPECIFIES THE SECTORS TO BE WRITTEN
                                        ;BY A LOGICAL DRIVE.  EACH LOGICAL DRIVE WRITES TWO SECTORS ON ONE
                                        ;CYLINDER , 16 CYLINDERS IN ONE BLOCK, 2 BLOCKS IN ONE WRITE-CURRENT
                                        ;ZONE AND 7 CURRENT ZONES IN A PACK.

001406  000  017  015  LOG0:   .BYTE   0,15.,13.,10.,6,1,11.,4,12.,13.,9.,14.,2,5,7,8.
001426  001  000  016  LOG1:   .BYTE   1,0,14.,11.,7,2,12.,5,13.,4,10.,15.,3,6,8.,9.
001446  002  001  017  LOG2:   .BYTE   2,1,15.,12.,8.,3,13.,6,14.,5,11.,0,4,7,9.,10.
001466  003  002  000  LOG3:   .BYTE   3,2,0,13.,9.,4,14.,7,15.,6,12.,1,5,8.,10.,11.
001506  004  003  001  LOG4:   .BYTE   4,3,1,14.,10.,5,15.,8.,0,7,13.,2,6,9.,11.,12.
001526  005  004  002  LOG5:   .BYTE   5,4,2,15.,11.,6,0,9.,1,8.,14.,3,7,10.,12.,13.
```

```
001546  006  005  003  LOG6:   .BYTE  6,5,3,0,12.,7,1,10.,2,9.,15.,4,8.,11.,13.,14.
001566  007  006  004  LOG7:   .BYTE  7,6,4,1,13.,8.,2,11.,3,10.,0,5,9.,12.,14.,15.
001606  010  007  005  LOG8:   .BYTE  8.,7,5,2,14.,9.,3,12.,4,11.,1,6,10.,13.,15.,0
001626  011  010  006  LOG9:   .BYTE  9.,8.,6,3,15.,10.,4,13.,5,12.,2,7,11.,14.,0,1
001646  012  011  007  LOG10:  .BYTE  10.,9.,7.,4,0,11.,5,14.,6,13.,3,8.,12.,15.,1,2
001666  013  012  010  LOG11:  .BYTE  11.,10.,8.,5,1,12.,6,15.,7,14.,4,9.,13.,0,2,3
001706  014  013  011  LOG12:  .BYTE  12.,11.,9.,6,2,13.,7,0,8.,15.,5,10.,14.,1,3,4
001726  015  014  012  LOG13:  .BYTE  13.,12.,10.,7,3,14.,8.,1,9.,0,6,11.,15.,2,4,5
001746  016  015  013  LOG14:  .BYTE  14.,13.,11.,8.,4,15.,9.,2,10.,1,7,12.,0,3,5,6
001766  017  016  014  LOG15:  .BYTE  15.,14.,12.,9.,5,0,10.,3,11.,2,8.,13.,1,4,6,7

002006  000000       ASNLST: .WORD   0       ;A BIT SET IS AN ASSIGNED LOGICAL DRIVE
002010  000000       ASSGN1: .WORD   0       ;A BIT SET IS AN ASSIGNED LOGICAL DRIVE FOR PASS 1
002012  000000       ASSGN2: .WORD   0       ;A BIT SET IS AN ASSIGNED LOGICAL DRIVE FOR PASS 2
002014               SYSADR: .BLKW   16.     ;SUB SYSTEM ADDRESS TABLE
002054  000000       TABLEX: .WORD   0       ;CURRENT SELECTED SCORE BOARD

                     ;SCORE BOARD TABLES
                     ;TABLE OF OVERWRITE SCORE,NEGATIVE OFFSET SCORE

002056  000  000  000  OVWN0:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 0
002076  000  000  000  OVWN1:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 1
002116  000  000  000  OVWN2:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 2
002136  000  000  000  OVWN3:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 3
002156  000  000  000  OVWN4:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 4
002176  000  000  000  OVWN5:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 5
002216  000  000  000  OVWN6:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 6
002236  000  000  000  OVWN7:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 7
002256  000  000  000  OVWN8:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 8
002276  000  000  000  OVWN9:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 9
002316  000  000  000  OVWN10: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 10
002336  000  000  000  OVWN11: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 11
002356  000  000  000  OVWN12: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 12
002376  000  000  000  OVWN13: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 13
002416  000  000  000  OVWN14: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 14
002436  000  000  000  OVWN15: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 15
002456  000  000  000  OVWN16: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 16
002476  000  000  000  OVWN17: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 17
002516  000  000  000  OVWN18: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 18

                     ;TABLE OF OVERWRITE SCORE,POSITIVE OFFSET SCORE

002536  000  000  000  OVWP0:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 0
002556  000  000  000  OVWP1:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 1
002576  000  000  000  OVWP2:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 2
002616  000  000  000  OVWP3:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 3
002636  000  000  000  OVWP4:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 4
002656  000  000  000  OVWP5:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 5
002676  000  000  000  OVWP6:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 6
002716  000  000  000  OVWP7:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 7
002736  000  000  000  OVWP8:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 8
002756  000  000  000  OVWP9:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 9
002776  000  000  000  OVWP10: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 10
003016  000  000  000  OVWP11: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 11
003036  000  000  000  OVWP12: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 12
003056  000  000  000  OVWP13: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 13
003076  000  000  000  OVWP14: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 14
```

```
003116  000  000  000  OVWP15: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 15
003136  000  000  000  OVWP16: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 16
003156  000  000  000  OVWP17: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 17
003176  000  000  000  OVWP18: .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 18

                        ;TABLE OF READ SCORE,NEGATIVE OFFSET SCORE

003216  000  000  000  RDN0:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 0
003236  000  000  000  RDN1:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 1
003256  000  000  000  RDN2:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 2
003276  000  000  000  RDN3:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 3
003316  000  000  000  RDN4:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 4
003336  000  000  000  RDN5:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 5
003356  000  000  000  RDN6:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 6
003376  000  000  000  RDN7:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 7
003416  000  000  000  RDN8:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 8
003436  000  000  000  RDN9:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 9
003456  000  000  000  RDN10:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 10
003476  000  000  000  RDN11:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 11
003516  000  000  000  RDN12:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 12
003536  000  000  000  RDN13:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 13
003556  000  000  000  RDN14:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 14
003576  000  000  000  RDN15:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 15
003616  000  000  000  RDN16:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 16
003636  000  000  000  RDN17:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 17
003656  000  000  000  RDN18:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 18

                        ;TABLE OF READ SCORE,POSITIVE OFFSET SCORE

003676  000  000  000  RDP0:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 0
003716  000  000  000  RDP1:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 1
003736  000  000  000  RDP2:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 2
003756  000  000  000  RDP3:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 3
003776  000  000  000  RDP4:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 4
004016  000  000  000  RDP5:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 5
004036  000  000  000  RDP6:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 6
004056  000  000  000  RDP7:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 7
004076  000  000  000  RDP8:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 8
004116  000  000  000  RDP9:   .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 9
004136  000  000  000  RDP10:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 10
004156  000  000  000  RDP11:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 11
004176  000  000  000  RDP12:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 12
004216  000  000  000  RDP13:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 13
004236  000  000  000  RDP14:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 14
004256  000  000  000  RDP15:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 15
004276  000  000  000  RDP16:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 16
004316  000  000  000  RDP17:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 17
004336  000  000  000  RDP18:  .BYTE  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ;TRACK 18

                        ;TABLE OF SELF TEST SCORE

004356  000  000       SELF0:  .BYTE  0,0                              ;TRACK 0
004360  000  000       SELF1:  .BYTE  0,0                              ;TRACK 1
004362  000  000       SELF2:  .BYTE  0,0                              ;TRACK 2
004364  000  000       SELF3:  .BYTE  0,0                              ;TRACK 3
004366  000  000       SELF4:  .BYTE  0,0                              ;TRACK 4
004370  000  000       SELF5:  .BYTE  0,0                              ;TRACK 5
```

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004372  000  000          SELF6:  .BYTE   0,0                     ;TRACK 6
004374  000  000          SELF7:  .BYTE   0,0                     ;TRACK 7
004376  000  000          SELF8:  .BYTE   0,0                     ;TRACK 8
004400  000  000          SELF9:  .BYTE   0,0                     ;TRACK 9
004402  000  000          SELF10: .BYTE   0,0                     ;TRACK 10
004404  000  000          SELF11: .BYTE   0,0                     ;TRACK 11
004406  000  000          SELF12: .BYTE   0,0                     ;TRACK 12
004410  000  000          SELF13: .BYTE   0,0                     ;TRACK 13
004412  000  000          SELF14: .BYTE   0,0                     ;TRACK 14
004414  000  000          SELF15: .BYTE   0,0                     ;TRACK 15
004416  000  000          SELF16: .BYTE   0,0                     ;TRACK 16
004420  000  000          SELF17: .BYTE   0,0                     ;TRACK 17
004422  000  000          SELF18: .BYTE   0,0                     ;TRACK 18

                         ;THE START LOGICAL DRIVE # TO WRITE ON EACH CYLINDER OF A BLOCK
                         ;16 CYLINDERS,2 BLOCKS,TOTAL 32 CYLINDERS IN ONE ZONE

004424  000  001  003   INDST:  .BYTE   0,1,3,6,10.,15.,5,12.,4,13.,7,2,14.,11.,9.,8.


004444                 BLKADR:
004444  004622                  .WORD   DRIV0           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 0
004446  004644                  .WORD   DRIV1           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 1
004450  004666                  .WORD   DRIV2           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 2
004452  004710                  .WORD   DRIV3           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 3
004454  004732                  .WORD   DRIV4           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 4
004456  004754                  .WORD   DRIV5           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 5
004460  004776                  .WORD   DRIV6           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 6
004462  005020                  .WORD   DRIV7           ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 7
004464  005042                  .WORD   DRIV10          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 10
004466  005064                  .WORD   DRIV11          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 11
004470  005106                  .WORD   DRIV12          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 12
004472  005130                  .WORD   DRIV13          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 13
004474  005152                  .WORD   DRIV14          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 14
004476  005174                  .WORD   DRIV15          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 15
004500  005216                  .WORD   DRIV16          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 16
004502  005240                  .WORD   DRIV17          ;ADDRESS OF THE PARAMETER BLOCK FOR DRIVE 17


004504  000000   OFFCOD: .WORD   0               ;OFFSET CODE TABLE
                                                ;NUMBER FOR NEGATIVE OFFSET (DIR = OUT)
                                                ;NUMBER FOR POSITIVE OFFSET (DIR = IN)

                         ;DATA/PARAMETER BLOCK

004506  000   FMTDPB:  .BYTE   0       ;DRIVER PARAMETER BLOCK, DRIVE #
004507  000           .BYTE   0       ;OFFSET VALUE OR FMT16, HCI OR ECI
004510  000           .BYTE   0       ;COMMAND CODE
004511  000           .BYTE   0       ;PSEL, A16 AND A17
004512  000000        .WORD   0       ;WORD COUNT (NEG)
004514  043032        .WORD   BUFFER  ;BUFFER ADDRESS
004516  000           .BYTE   0       ;SECTOR ADDRESS
004517  000           .BYTE   0       ;TRACK ADDRESS
004520  000000        .WORD   0       ;CYLINDER ADDRESS
004522  004526        .WORD   RM.REG  ;ADDRESS TO SAVE ALL RH/RM REG'S
004524  000000        .WORD   0       ;STATUS WORD
```

```
004526  000000          RM.REG: .WORD   0       ;RMCS1
004530  000000                  .WORD   0       ;RMWC
004532  000000                  .WORD   0       ;RMBA
004534  000000                  .WORD   0       ;RMDA
004536  000000                  .WORD   0       ;RMCS2
004540  000000                  .WORD   0       ;RMDS
004542  000000                  .WORD   0       ;RMER1
004544  000000                  .WORD   0       ;RMAS
004546  000000                  .WORD   0       ;RMLA
004550  000000                  .WORD   0       ;RMDB
004552  000000                  .WORD   0       ;RMMR1
004554  000000                  .WORD   0       ;RMDT
004556  000000                  .WORD   0       ;RMSN
004560  000000                  .WORD   0       ;RMOF
004562  000000                  .WORD   0       ;RMCA
004564  000000                  .WORD   0       ;RMDC
004566  000000                  .WORD   0       ;RMER2
004570  000000                  .WORD   0       ;RMMR2
004572  000000                  .WORD   0       ;RMEC1
004574  000000                  .WORD   0       ;RMEC2

                        ;GENERAL PURPOSE PARAMETER BLOCK

004576     000          GENDPB: .BYTE   0       ;DRIVER PARAMETER BLOCK, DRIVE #
004577     000                  .BYTE   0       ;OFFSET VALUE OR FMT16, HCI OR ECI
004600     000                  .BYTE   0       ;COMMAND CODE
004601     000                  .BYTE   0       ;PSEL, A16 AND A17
004602  177776                  .WORD   -2      ;WORD COUNT (NEG)
004604  004616                  .WORD   CYLNDR  ;BUFFER ADDRESS
004606     000                  .BYTE   0       ;SECTOR ADDRESS
004607     000                  .BYTE   0       ;TRACK ADDRESS
004610  000000                  .WORD   0       ;CYLINDER ADDRESS
004612  004526                  .WORD   RM.REG  ;ADDRESS TO SAVE ALL RH/RM REG'S
004614  000000                  .WORD   0       ;STATUS WORD

004616                  CYLNDR: .BLKW   2       ;BUFFER

                        ;HISTORY FILE FOR 16. LOGICAL DRIVES:(0-17 OCTAL)

        000001          $FMT    = 1
        000002          $COMND  = $FMT+1                ;COMMAND CODE
        000003          $PSEL   = $FMT+2                ;PROT SELECT AND A16,A17
        000004          $WRDM   = $FMT+3                ;WORD COUNT
        000006          $BUF    = $FMT+5                ;BUFFER ADDRESS
        000010          $SEC    = $FMT+7                ;SECTOR ADDRESS
        000011          $TRK    = $FMT+10               ;TRACK ADDRESS
        000012          $CYL    = $FMT+11               ;CYLINDER ADDRESS
        000014          $SYSNM  = $FMT+13               ;SUB SYSTEM A-H
        000015          $PHYDR  = $FMT+14               ;PHYSICAL DRIVE CODE (ASCII )
        000016          $GAP    = $FMT+15               ;LEFT TWO NULL BYTES
        000022          $EMTAB  = $GAP+4                ;END OF HISTORY TABLE

004622     000     000  DRIV0:  .BYTE 7&0,0     ;HISTORY BLOCK OF LOGICAL DRIVE 0
                        .BLKB   $EMTAB-$COMND
004644     001     000  DRIV1:  .BYTE 7&1,0     ;HISTORY BLOCK OF LOGICAL DRIVE 1
                        .BLKB   $EMTAB-$COMND
004666     002     000  DRIV2:  .BYTE 7&2,0     ;HISTORY BLOCK OF LOGICAL DRIVE 2
```

```
                                        .BLKB   $EMTAB-$COMND
004710  003     000             DRIV3:  .BYTE   7&3,0          ;HISTORY BLOCK OF LOGICAL DRIVE 3
                                        .BLKB   $EMTAB-$COMND
004732  004     000             DRIV4:  .BYTE   7&4,0          ;HISTORY BLOCK OF LOGICAL DRIVE 4
                                        .BLKB   $EMTAB-$COMND
004754  005     000             DRIV5:  .BYTE   7&5,0          ;HISTORY BLOCK OF LOGICAL DRIVE 5
                                        .BLKB   $EMTAB-$COMND
004776  006     000             DRIV6:  .BYTE   7&6,0          ;HISTORY BLOCK OF LOGICAL DRIVE 6
                                        .BLKB   $EMTAB-$COMND
005020  007     000             DRIV7:  .BYTE   7&7,0          ;HISTORY BLOCK OF LOGICAL DRIVE 7
                                        .BLKB   $EMTAB-$COMND
005042  000     000             DRIV10: .BYTE   7&10,0         ;HISTORY BLOCK OF LOGICAL DRIVE 10
                                        .BLKB   $EMTAB-$COMND
005064  001     000             DRIV11: .BYTE   7&11,0         ;HISTORY BLOCK OF LOGICAL DRIVE 11
                                        .BLKB   $EMTAB-$COMND
005106  002     000             DRIV12: .BYTE   7&12,0         ;HISTORY BLOCK OF LOGICAL DRIVE 12
                                        .BLKB   $EMTAB-$COMND
005130  003     000             DRIV13: .BYTE   7&13,0         ;HISTORY BLOCK OF LOGICAL DRIVE 13
                                        .BLKB   $EMTAB-$COMND
005152  004     000             DRIV14: .BYTE   7&14,0         ;HISTORY BLOCK OF LOGICAL DRIVE 14
                                        .BLKB   $EMTAB-$COMND
005174  005     000             DRIV15: .BYTE   7&15,0         ;HISTORY BLOCK OF LOGICAL DRIVE 15
                                        .BLKB   $EMTAB-$COMND
005216  006     000             DRIV16: .BYTE   7&16,0         ;HISTORY BLOCK OF LOGICAL DRIVE 16
                                        .BLKB   $EMTAB-$COMND
005240  007     000             DRIV17: .BYTE   7&17,0         ;HISTORY BLOCK OF LOGICAL DRIVE 17
                                        .BLKB   $EMTAB-$COMND

                                        .BLKB   $EMTAB-$COMND

                                        ;STANDARD DATA PATTERN

005262  066666                  STNDAT: .WORD   066666
005264  155554                          .WORD   155554
005266  133331                          .WORD   133331
005270  066663                          .WORD   066663
005272  155546                          .WORD   155546
005274  133315                          .WORD   133315
005276  066633                          .WORD   066633
005300  155466                          .WORD   155466
005302  133155                          .WORD   133155
005304  066333                          .WORD   066333
005306  154666                          .WORD   154666
005310  131555                          .WORD   131555
005312  063333                          .WORD   063333
005314  146666                          .WORD   146666
005316  115555                          .WORD   115555
005320  033333                          .WORD   033333

005322  040135                  PSEUDO: .WORD   040135
005324  177070                          .WORD   177070
005326  070414                          .WORD   070414
005330  064531                          .WORD   064531
005332  174473                          .WORD   174473
005334  062422                          .WORD   062422
005336  114352                          .WORD   114352
005340  036620                          .WORD   036620
005342  010031                          .WORD   010031
005344  052336                          .WORD   052336
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005346  017310                          .WORD   017310
005350  011347                          .WORD   011347
005352  102367                          .WORD   102367
005354  152567                          .WORD   152567
005356  001246                          .WORD   001246
005360  160073                          .WORD   160073
```

```
      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


    005362                              $ERRTB:
  1
  2                                     ;ERROR 1
  3
  4 005362  036166                              EM1                     ;RH70 INTERRUPT OCCURRED (RMAS = 0)
  5 005364  040570                              DH1
  6 005366  041212                              DT1
  7 005370  041336                              DF1
  8
  9                                     ;ERROR 2
 10
 11 005372  036227                              EM2                     ;UNEXPECTED ATTENTION OCCURRED
 12 005374  040577                              DH2
 13 005376  041216                              DT2
 14 005400  041337                              DF2
 15
 16                                     ;ERROR 3
 17
 18 005402  036265                              EM3                     ;MASSBUS PARITY ERROR (MCPE-1)
 19 005404  040661                              DH3
 20 005406  041234                              DT3
 21 005410  041345                              DF3
 22
 23                                     ;ERROR 4
 24
 25 005412  036323                              EM4                     ;MASSBUS PARITY ERROR (PAR-1)
 26 005414  040712                              DH4
 27 005416  041244                              DT4
 28 005420  041350                              DF4
 29
 30                                     ;ERROR 5
 31
 32 005422  036360                              EM5                     ;ADDRESS PLUG BIT CHANGED
 33 005424  040577                              DH2
 34 005426  041216                              DT2
 35 005430  041337                              DF2
 36
 37                                     ;ERROR 6
 38
 39 005432  036414                              EM6                     ;RH DIDN'T RESPOND TO ADDRESSING
 40 005434  040754                              DH6
 41 005436  041256                              DT6
 42 005440  041336                              DF1
```

```
                                ;* ERRORS 7 - 12 ARE PART OF THE 'DUMP' SUBROUTINE
                                ;ERROR 7
005442  000000                          0
005444  040765                          DH7
005446  041262                          DT7
005450  000000                          0
                                ;ERROR 10
005452  000000                          0
005454  041036                          DH10
005456  041276                          DT10
005460  000000                          0
                                ;ERROR 11
005462  000000                          0
005464  041107                          DH11
005466  041312                          DT11
005470  000000                          0
                                ;ERROR 12
005472  000000                          0
005474  041160                          DH12
005476  041326                          DT12
005500  000000                          0
```

```
                                        .SBTTL  START OF PROGRAM

005502  012737  005502  001400  START:  MOV     #.,RSTART       ;SETUP RESTART ADDRESS
005510  012737  000400  001334          MOV     #400,CHGADR     ;200 START ADDRESS FLAG
005516  000414                          BR      START3

005520  012737  005520  001400  START1: MOV     #.,RSTART       ;SETUP RESTART ADDRESS
005526  012737  177777  001334          MOV     #-1,CHGADR      ;204 START ADDRESS FLAG
005534  000405                          BR      START3

005536  012737  005536  001400  START2: MOV     #.,RSTART       ;SETUP RESTART ADDRESS
005544  005037  001334                  CLR     CHGADR          ;210 START ADDRESS FLAG

005550  000240                  START3: NOP
005552  005227  000000                  INC     #0              ;TTY LOOP, WAIT FOR INCREMENT
005556  001375                          BNE     .-4             ;OF WORD
005560  000005                          RESET                   ;CLEAR THE WORLD

                                        .SBTTL  INITIALIZE THE COMMON TAGS
                                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
005562  012706  001114                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
005566  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
005570  022706  001154                  CMP     #SWR,R6         ;;DONE?
005574  001374                          BNE     .-6             ;;LOOP BACK IF NO
005576  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                        ;;INITIALIZE A FEW VECTORS
005602  012737  026630  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
005610  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
005616  012737  023562  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
005624  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
005632  012737  027242  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
005640  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
005646  012737  024720  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
005654  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
005662  013737  023454  023446          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
005670  005037  001176                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
005674  005037  001200                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
005700  112737  000001  001131          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                        ;;INITIALIZE THE "T-BIT" TRAP VECTOR. THEN LOAD LOCATION "$RTRN", IN
                                        ;;THE "END-OF-PASS" ($EOP) ROUTINE, WITH A "RTI" OR "RTT".
005706  012737  023552  000014          MOV     #$RTRN,@#TBITVEC ;;SET "T" BIT VECTOR TO $RTRN
005714  012737  000340  000016          MOV     #340,@#TBITVEC+2 ;;LEVEL 7
005722  012737  000002  023552          MOV     #RTI,$RTRN      ;;SET $RTRN TO A RTI
005730  012737  005756  000010          MOV     #65$,@#RESVEC   ;;TRY TO DO A RTT
005736  005046                          CLR     -(SP)           ;;DUMMY PS
005740  012746  005746                  MOV     #64$,-(SP)      ;;AND PC
005744  000006                          RTT                     ;;TRY THE RTT
005746  012737  000006  023552  64$:    MOV     #RTT,$RTRN      ;;RTT IS LEGAL--SET $RTRN TO A RTT
005754  000402                          BR      66$
005756  062706  000010          65$:    ADD     #10,SP          ;;RTT ILLEGAL--CLEAN OFF THE STACK
005762  012737  000012  000010  66$:    MOV     #RESVEC+2,@#RESVEC ;;RESTORE TRAP CATCHER
005770  005037  023560                  CLR     $TBIT           ;;CLEAR "T" BIT SWITCH
005774  012737  005774  001122          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
006002  012737  006002  001124          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
006010  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
```

```
006014  012737  006050  000004          MOV     #67$,@#ERRVEC   ;;SET UP ERROR VECTOR
006022  012737  177570  001154          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
006030  012737  177570  001156          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
006036  022777  177777  173110          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
006044  001012                          BNE     69$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
006046  000403                          BR      68$             ;;BRANCH IF NO TIMEOUT
006050  012716  006056          67$:    MOV     #68$,(SP)       ;;SET UP FOR TRAP RETURN
006054  000002                          RTI
006056  012737  000176  001154  68$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
006064  012737  000174  001156          MOV     #DISPREG,DISPLAY
006072  012637  000004          69$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

006076  005037  001220                  CLR     $PASS           ;;CLEAR PASS COUNT
006102  132737  000200  001233          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
006110  001403                          BEQ     70$             ;;YES,USE NON-APT SWITCH
006112  012737  001234  001154          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
006120                          70$:
    20                          .SBTTL  TYPE PROGRAM NAME
                                ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
006120  005227  177777                  INC     #-1             ;;FIRST TIME?
006124  001056                          BNE     71$             ;;BRANCH IF NO
006126  022737  023506  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
006134  001452                          BEQ     71$             ;;BRANCH IF YES
006136  104401  006204                  TYPE    ,72$            ;;TYPE ASCIZ STRING
                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
006142  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
006146  001012                          BNE     73$             ;;BRANCH IF YES
006150  123727  001232  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
006156  001406                          BEQ     73$             ;;BRANCH IF YES
006160  023727  001154  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
006166  001005                          BNE     74$             ;;BRANCH IF NO
006170  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
006172  000403                          BR      74$
006174  112737  000001  001150  73$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
006202                          74$:
006202  000427                          BR      71$             ;;GET OVER THE ASCIZ
                                ;;72$:  .ASCIZ  <CRLF>@CZRMTA0 - RM05/3/2 DRIVE COMPATIBILITY TST@<CRLF>
006262                          71$:
    21
    22                          ;THE FOLLOWING FINDS OUT THE PROGRAM CONTROL MODE:
    23                          ;PAPER TAPE (MANUAL), ACT11, XXDP CHAIN OR DUMP
    24
    25 006262  005037  001404           CLR     XXDP            ;CLEAR 'XXDP' LOAD DEVICE STORAGE
    26 006266  122737  000016  000041   CMPB    #16,@#41        ;LOADED FROM AN RM05/3/2 ?
    27 006274  001160                   BNE     3$              ;BR IF NOT
    28 006276  013737  000040  001404   MOV     @#40,XXDP       ;GET DEVICE INDICATOR AND NUMBER
    29 006304  122737  000007  001404   CMPB    #7,XXDP         ;IS IT A VALID NUMBER ?
    30 006312  103002                   BHIS    1$              ;YES
    31 006314  105037  001404           CLRB    XXDP            ;NO, DEFAULT TO DRIVE 0
    32 006320  005737  000042   1$:     TST     @#42            ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
    33 006324  001425                   BEQ     2$              ;BR IF NEITHER
    34 006326  104401  006334           TYPE    ,76$            ;;TYPE ASCIZ STRING
006332  000412                          BR      75$             ;;GET OVER THE ASCIZ
                                ;;76$:  .ASCIZ  <CRLF>/NOT TESTING DRIVE /
006360                          75$:
    35 006360  005046                   CLR     -(SP)           ;CLEAR WORD ON STACK
```

```
                                                MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
                                                TYPOS                   ;TYPE THE ADDRESS
                                                .BYTE   1               ;ONLY 1 CHARACTER
                                                .BYTE   0               ;SUPRESS LEADING ZEROS
                                                TYPE    ,$CRLF          ;CR-LF
                                                BR      3$              ;GET NUMBER OF DRIVES

                                        2$:     INC     #-1             ;FIRST TIME THRU HERE ?
                                                BNE     3$              ;NO
                                                TYPE    ,78$            ;;TYPE ASCIZ STRING
                                                BR      77$             ;;GET OVER THE ASCIZ
                                        ;;78$:  .ASCIZ  <CRLF>/TO TEST DRIVE /
                                        77$:
                                                CLR     -(SP)           ;CLEAR WORD ON STACK
                                                MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
                                                TYPOS                   ;TYPE DRIVE ADDRESS
                                                .BYTE   1               ;ONLY 1 CHARACTER
                                                .BYTE   0               ;SUPRESS LEADING ZEROS
                                                TYPE    ,80$            ;;TYPE ASCIZ STRING
                                                BR      79$             ;;GET OVER THE ASCIZ
                                        ;;80$:  .ASCIZ  /, HALT PROGRAM, REMOVE RRDP PACK AND REPLACE IT/<CRLF>
                                        79$:
                                                TYPE    ,81$            ;;TYPE ASCIZ STRING
                                                BR      3$              ;;GET OVER THE ASCIZ
                                        ;;81$:  .ASCIZ  /WITH A WORK PACK, CLEAR LOCATION 40 AND RESTART PROGRAM./<CRLF>
                                        3$.
                                                JSR     PC,$TKINT       ;TURN ON THE KEYBOARD INTERRUPT
                                                MOV     $RMADR,RMADR    ;RH/RM ADDRESS
                                                MOV     $RMVEC,RMVEC    ;VECTOR ADDRESS
                                                MOV     #ASNLST,R5      ;START OF AREA TO CLEAR
                                        4$:     CLR     (R5)+
                                                CMP     #INDST,R5       ;LOOK FOR END OF CLEAR AREA
                                                BNE     4$              ;BR IF NOT FINISHED
                                                MOV     #STACK,SP       ;SETUP THE STACK POINTER
                                                CLR     PS              ;CLEAR THE PROCESSOR STATUS WORD
                                                MOV     HZ,SIXTEE       ;1/60 TH OR 1/50 TH SECOND COUNTER VALUE
                                                CLR     HOUR            ;CLEAR THE HOUR'S COUNTER
                                                CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
                                                CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
                                                CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG

                                        ;ROUTINE TO DETERMINE BUFFER AREA SIZE

                                        SIZMEM: INC     #-1             ;SEE IF TIME TO SIZE MEMORY
                                                BNE     1$              ;BR IF NOT
                                                JSR     PC,$SIZE        ;SEE HOW MUCH MEMORY ON SYSTEM
                                        1$:     MOV     $LSTAD,LSTAD    ;SAVE THE LAST ADDRESS
                                                CMP     LSTAD,#160000   ;OVER 28K ?
                                                BLOS    2$              ;NO,THEN DON'T SET THE NEW LIMIT
                                                MOV     #160000,LSTAD   ;SET NEW LIMIT
                                        2$:     SUB     #1500.*2,LSTAD  ;SAVE XXDP LOADER AND ABSOLUTE LOADER

                                        ;SET UP THE OTHER SYSTEM DEVICES THAT THE PROGRAM WILL USE

                                        SETVEC: JSR     PC,CKCLK        ;START THE CLOCK
                                                MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
```

```
                                        ;SETUP IF 'XXDP' OR 'ACT11' OPERATION
                                        MONTR:  CLR     R1              ;DRIVE #
                                                CLR     R2              ;AVAIL TABLE INDEX
                                                CLR     R3              ;DRIVE# X 2
007006  005001                          1$:     MOV     BLKADR(R3),R0   ;LOAD DPB ADDRESS
007010  005002                                  JSR     PC,CLRDPB       ;CLEAR DPB BLOCK
007012  005003                          2$:     CMP     (R3)+,(R2)+     ;INCREMENT INDEX
007014  016300  004444                          INC     R1              ;NEXT DRIVE
007020  004737  021620                          CMP     #7,R1           ;ALL DRIVE ASSIGN ?
007024  022322                                  BGE     1$              ;NO
007026  005201
007030  022701  000007
007034  002367

                                        ;ASSIGN LOGICAL DRIVES TO BE TEST IN THE PASS1 AND PASS 2
                                        ;THREE WORDS ARE USED IN THE BIT MAPS:
                                        ;       ASNLST  = SPECIFIES THE LOGICAL DRIVES ASSIGNED
                                        ;       ASSGN1  = SPECIFIES THE LOGICAL DRIVES WILL BE TESTED IN PASS1.
                                        ;       ASSGN2  = SPECIFIES THE LOGICAL DRIVES WILL BE TESTED IN PASS2.
                                        ;
                                        ;EACH LOGICAL DRIVE HAS A HISTORY FILE LABELED DIRV'Z (Z=0 TO 17)
                                        ;THE LOCATIONS LABELED $SYSNM AND $PHYRD IN THE HISTORY FILE
                                        ;STORE THE SYSTEM NAME (A TO H) AND PHYSICAL DRIVE NUMBER
                                        ;(0 TO 7).
                                        ;THE SUB-SYSTEM ADDRESS AND INTERRUPT VECTOR ARE STORED
                                        ;IN THE TABLE LABELED ''SYSADR:''.
                                        ;
                                        ;THE LOCATIONS SYSADR AND SYSADR+2 FOR SUB-SYSTEM A,SYSADR+4
                                        ;AND SYSADR+6 FOR SUBSYSTEM B , ETC,THE FIRST WORD
                                        ;IS THE SUB SYSTEM ADDRESS WHILE THE SECOND WORD IS THE VECTOR
                                        ;
                                        ;THE LOGICAL DRIVES ARE ASSIGNED FROM CONSOLE KEYBOARD.

007036  012700  002006                  MOD00:  MOV     #ASNLST,R0      ;ADDRESS OF 1ST BIT MAPS IN R0
007042  012701  004424                          MOV     #INDST,R1       ;LAST ADDRESS TO CLEAR
007046  005020                          1$:     CLR     (R0)+           ;CLEAR CURRENT POINTED ADDRESS
007050  020100                                  CMP     R1,R0           ;ALL DONE ?
007052  101375                                  BHI     1$              ;NO,THEN BRANCH BACK
007054  012737  000101  001274                  MOV     #'A,$CDW2       ;TEMP STORAGE OF SYS NAME

007062  005037  001224                  MOD21:  CLR     DRIVE           ;TEMP STORAGE OF PHYSICAL DRIVE BIT MAP
007066  104401  001207                          TYPE    ,$CRLF          ;CR-LF
007072  104401  041354                          TYPE    ,MESG1          ;SUB-SYSTEM
007076  104401  042222                          TYPE    ,QUOTM          ;TYPE '''' QUOTATION MARK
007102  104401  001274                          TYPE    ,$CDW2          ;SYS-NAME(A TO H)
007106  104401  042222                          TYPE    ,QUOTM          ;TYPE '''' QUOTATION MARK
007112  104401  042330                          TYPE    ,BLNKS1         ;TYPE 1 BLANK
007116  104401  041364                          TYPE    ,MESG2          ;DRIVE(S)

007122  104411                                  RDLIN                   ;READ IN THE DRIVE NUMBERS
007124  012601                                  MOV     (SP)+,R1        ;GET THE INPUT LINE ADDRESS
007126  105711                          1$:     TSTB    (R1)            ;END OF STRING <CR> ?
007130  001437                                  BEQ     3$              ;YES
007132  004537  022310                          JSR     R5,CK.OCT       ;CHECK THE DIGIT MUST 0 TO 7,RETURN VALUE IN R2
007136  000751                                  BR      MOD21           ;INCORRECT DRIVE NUMBER,ENTER AGAIN
007140  156237  027464  001224                  BISB    ATABIT(R2),DRIVE  ;SET THE PHYS. DRIVE BIT, R2 = DRIVE NUMBER
007146  022737  176700  001276                  CMP     #176700,$RMADR  ;IS IT STANDARD RH/RM ADDRESS ?
```

```
144 007154  001016                    BNE     2$              ;BR IF NO
145 007156  005737  001404            TST     XXDP            ;IS THIS LOAD DEVICE ?
146 007162  001413                    BEQ     2$              ;BR IF NO
147 007164  123702  001404            CMPB    XXDP,R2         ;IS THIS THE DRIVE ?
148 007170  001010                    BNE     2$              ;BR IF NO
149 007172  104401  042704            TYPE    ,QDRIV          ;TYPE ' ?DRIVE'
150 007176  010246                    MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
    007200  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
    007202     002                    .BYTE   2               ;;TYPE 2 DIGIT(S)
    007203     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
151 007204  104401  042714            TYPE    ,LODEV          ;TYPE 'IS LOAD DEVICE'
152 007210  000724                    BR      MOD21           ;TRY AGAIN
153 007212  005201              2$:   INC     R1              ;
154 007214  105711                    TSTB    (R1)            ;END OF STRING <CR> ?
155 007216  001404                    BEQ     3$              ;YES
156 007220  122721  000054            CMPB    #',,(R1)+       ;MUST BE A COMMA
157 007224  001316                    BNE     MOD21           ;ENTER AGAIN ,IF NOT
158 007226  000737                    BR      1$              ;LOCATE NEXT DRIVE
159
160 007230  005737  001334      3$:   TST     CHGADR          ;START AT 200 ?
161 007234  003035                    BGT     MOD22           ;BRANCH IF SO
162 007236  013701  001274            MOV     $CDW2,R1        ;SYS NAME ASCII FROM A TO H
163 007242  042701  177760            BIC     #177760,R1      ;LEFT ONLY 4 BITS
164 007246  005301                    DEC     R1              ;ADJUST INDEX VALUE
165 007250  006301                    ASL     R1              ;2 WORD INDEX VALUE
166 007252  006301                    ASL     R1              ;
167 007254  062701  002014            ADD     #SYSADR,R1      ;SYS ADDRESS TABLE ADDRESS
168 007260  010137  001272            MOV     R1,$CDW1        ; SYS ADDRESS TABLE'S ENTRY TO CDW1
169
170 007264  005737  001224      MOD23:TST     DRIVE           ;CHECK IF ANY PHYSICAL DRIVE(S) ASSIGNED
171 007270  001416                    BEQ     2$              ;BRANCH IF NONE
172 007272  013700  001272      1$:   MOV     $CDW1,R0        ;SYS ADDRESS TABLE ENTRY
173 007276  011037  001276            MOV     (R0),$RMADR     ; SYS ADDRESS
174 007302  016037  000002  001300    MOV     2(R0),$RMVEC    ; SYS VECTOR
175 007310  004737  035670            JSR     PC,BUSADR       ;CHECK THE ADDRESS WITH THE OPERATOR
176 007314  013710  001276            MOV     $RMADR,(R0)     ;NEW RH/RM ADDRESS  INTO TABLE
177 007320  013760  001300  000002    MOV     $RMVEC,2(R0)    ;NEW VECTOR OF RH/RM INTO TABLE
178 007326  000406              2$:   BR      MOD11           ;BRANCH TO NEXT MODULE
179
180 007330  013737  001276  002014  MOD22:MOV     $RMADR,SYSADR   ;LOAD THE SYSTEM ADDRESS TABLE
181 007336  013737  001300  002016        MOV     $RMVEC,SYSADR+2 ;LOAD THE VECTOR
182
183                               ;$CDW2  = ASCII NAME OF SUB SYSTEM (A TO H)
184                               ;$CDW1  = ENTRY TO THE SYS ADDRESS TABLE
185                               ;DRIVE  = PHYSICAL DRIVES TO BE ASSIGNED
186                               ;
187                               ;THIS SECTION OF CODING USES THE ABOVE PARAMETERS
188                               ;TO SET UP THE BIT MAP OF ASNLST,ASSGN1,ASSGN2
189
190 007344  005737  001224      MOD11:TST     DRIVE           ;ANY DRIVE ASSIGN ?
191 007350  001002                    BNE     MOD30           ;BR IF YES
192 007352  000137  007524            JMP     MOD12           ;BRANCH,IF NONE
193
194 007356  022737  177777  002006  MOD30:CMP     #-1,ASNLST      ·HAVE ALL 16 LOGICAL DRIVES BEEN ASSIGNED ?
195 007364  001457                    BEQ     5$              ;BR IF YES
196 007366  013700  002006            MOV     ASNLST,R0       ;FOUND THE AVAILABLE LOGICAL DRIVE LOCATION
197 007372  012701  000001            MOV     #1,R1           ;START FROM LOGICAL DRIVE 0
```

```
                                                ;INDEX VALUE
                                1$:     BIT     R1,R0           ;IS THE LOGICAL DRIVE AVAILABLE ?
                                        BEQ     2$              ;YES
                                        CLC
                                        ROL     R1              ;NEXT LOGICAL DRIVE
                                        BCS     5$              ;BRANCH IF NONE IS AVAILABLE
                                        ADD     #2,R2           ;INCREMENT INDEX VALUE
                                        BR      1$              ;LOCATE NEXT LOGICAL DRIVE
                                2$:     MOV     BLKADR(R2),R4   ;GET THE LOGICAL DRIVE'S HISTORY FILE
                                        MOVB    $CDW2,$SYSNM(R4)  ;LOAD THE ASCII SYS NAME
                                        BIS     R1,ASNLST       ;SET LOGICAL DRIVE ASSIGN BIT
                                        BIS     R1,ASSGN1       ;SET PASS 1 BIT
                                        BIS     R1,ASSGN2       ;SET PASS 2 BIT
                                        CLR     R2              ;DRIVE #
                                3$:     BITB    ATABIT(R2),DRIVE        ;IS THIS DRIVE ASSIGNED ?
                                        BNE     4$              ;BR IF YES
                                        INC     R2              ;PHYSICAL DRIVE NUMBER
                                        CMP     R2,#7           ;ALL DRIVES DONE YET ?
                                        BLE     3$              ;BR IF NO
                                        BR      5$              ;YES, EXIT
                                4$:     MOVB    R2,(R4)         ;LOAD THE PHYSICAL DRIVE # INTO HISTORY FILE
                                        MOVB    (R4),$PHYDR(R4) ;GET PHYSICAL DRIVE NUMBER AND
                                        BISB    #'0,$PHYDR(R4)  ;MAKE IT ASCII.
                                        MOVB    #HT,$GAP(R4)    ;MAKE UP FOR SCORE TYPE
                                        BICB    ATABIT(R2),DRIVE        ;DEASSIGN DRIVE BIT FROM LIST
                                        BNE     MOD30           ;BRANCH IF NOT ALL DONE
                                5$:

                                MOD12:  TST     CHGADR          ;200 START ?
                                        BGT     7$              ;YES,THEN EXIT
                                1$:     CMP     #-1,ASNLST      ;FULL HOUSE
                                        BEQ     7$              ;YES,THEN EXIT
                                2$:     TYPE    ,MESG5          ;WILL TEST
                                        TYPE    ,MESG2          ;DRIVE(S)
                                        CLR     R3              ;INDEX TO LOGICAL DRIVE HISTORY FILE
                                        MOV     #1,R4           ;BIT MAP OF ASNLST
                                3$:     BIT     R4,ASNLST       ;ASSIGNED LOGICAL DRIVE ?
                                        BEQ     5$              ;NO
                                        MOV     BLKADR(R3),R5   ;LOAD THE HISTORY FILE ADDRESS
                                        CMPB    $SYSNM(R5),$CDW2  ;ON THE SAME SYSTEM ?
                                        BNE     4$              ;NO
                                        MOVB    (R5),-(SP)      ;TYPE THE PHYSICAL DRIVE #
                                        TYPOS
                                        .BYTE   1
                                        .BYTE   0
                                        TYPE    ,BLNKS1         ;TYPE 1 BLANK
                                4$:     ADD     #2,R3           ;INCREMENT TO NEXT LOGICAL DRIVE
                                        CLC
                                        ROL     R4              ;BIT MAP OF THE NEXT LOGICAL DRIVE
                                        BCS     5$              ;BRANCH IF ALL LOGICAL DRIVE'S CHECKED
                                        BR      3$              ;BRANCH BACK
                                5$:     TYPE    ,MESG6          ;ON
                                        TYPE    ,MESG1          ;SUB SYSTEM
                                        TYPE    ,QUOTM          ;TYPE """ QUOTATION MARK
                                        TYPE    ,$CDW2          ; A TO H
                                        TYPE    ,QUOTM          ;TYPE """ QUOTATION MARK
```

```
                                                INC     $CDW2           ;CHECK NEXT SUB SYSTEM
                                                CMPB    #'H,$CDW2       ;ALL EIGHT SUB SYSTEMS CHECKED?
                                                BLO     7$              ;YES
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG7          ;ASK FOR OTHER SUB SYSTEM
                                                RDCHR                   ;READ IN A LINE
                                                MOV     (SP)+,$TMP0     ;GET INPUT CHARACTER
                                                CMP     $TMP0,#'Y       ;IS IT INPUT 'YES' ?
                                                BNE     6$              ;BR IF NO
                                                TYPE    ,Y              ;TYPE 'Y' CHARACTER
                                                JMP     MOD21           ;SET UP OTHER SUB SYSTEM
                                        6$:     TYPE    ,N              ;TYPE 'N' CHARACTER
                                        7$:     TST     CHGADR          ;START AT 210
                                                BEQ     8$              ;YES,EXECUTE PASS2 ONLY
                                                JMP     XPASS1          ;TO PASS1
                                        8$:     CLR     ASSGN1          ;CLEAR THE PASS1 BIT MAP
                                                JMP     XPASS2          ;BRANCH TO PASS2

                                        ;PASS ONE, THE VARIABLES ARE ASSIGNED AS FOLLOWS:
                                        ;       $CDW1   = ADDRESS OF THE CURRENT LOGICAL DRIVE HISTORY FILE
                                        ;       $CDW2   = SYSTEM NAME A THROUGH H
                                        ;       $DEVM   = CURRENT LOGICAL DRIVE #
                                        ;       ASNLST  = ASSIGNED LOGICAL DRIVES
                                        ;       ASSGN1  = ASSIGNED LOGICAL DRIVES IN THIS PASS
                                        ;       R0      = ADDRESS OF DPB BLOCK FEEDED INTO DRIVER-HANDLER
                                        ;       R1      = TEMP STORAGE OF ADDRESS OF THE LOGICAL BLOCK

                                        XPASS1: TST     ASSGN1          ;ANY DRIVES ASSIGNED FOR PASS1
                                                BNE     1$              ;BR IF YES, ELSE GO TO
                                                JMP     ENDX1           ;END OF PASS 1

                                        1$:     CLR     $DEVM           ;INDEX OF LOGICAL BLOCK
                                                MOV     BLKADR,$CDW1    ;ADDRESS OF LOGICAL BLOCK 0
                                                MOVB    #'A,$CDW2       ;SYS NAME STARTS FROM A
                                                MOV     SYSADR,RMADR    ;LOAD SYS-TEM A INTO
                                                MOV     SYSADR+2,RMVEC  ;DIRVER-HANDLER
                                                MOV     $CDW1,R1        ;R1=ADDRESS OF LOGICAL BLOCK 1
                                                MOV     #IDLEX,@RMVEC   ;RESET ALL INTERRUPT VECTOR
                                                CLR     @RMVEC+2        ;CLEAR THE INTERRUPT LEVEL
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG3          ;** STARTING PASS 1
                                                TYPE    ,MESG6          ;ON
                                                TYPE    ,MESG1          ;SUB-SYSTEM
                                                TYPE    ,QUOTM          ;TYPE '"' QUOTATION MARK
                                                TYPE    ,$CDW2          ;SYS-NAME(A TO H)
                                                TYPE    ,QUOTM          ;TYPE '"' QUOTATION MARK
                                                MOVB    (R1),DRIVE      ;LOAD THE PHYSICAL DRIVE #
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG4          ;MOUNT PACK ON THE DRIVE
                                                TYPE    ,$CDW2          ;SYS-NAME(A - H)
                                                MOVB    DRIVE,-(SP)     ;TYPE THE DRIVE #
                                                TYPOS
                                                .BYTE   1
                                                .BYTE   0
                                                TYPE    ,BLNKS1         ;TYPE 1 BLANK
                                                TYPE    ,MESG8
                                                TYPE    ,$CRLF          ;CR-LF
```

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                312 010140  104401  041464                  TYPE    ,MESG9
                313 010144  104401  042330                  TYPE    ,BLNKS1         ;TYPE 1 BLANK
                314
                315 010150  104411                  2$:     RDLIN                   ;CHECK IF O.P. READY
                316 010152  012602                          MOV     (SP)+,R2        ;LOCATE THE INPUT LINE
                317 010154  105712                          TSTB    (R2)            ;FOLLOW BY <CR> ?
                318 010156  001374                          BNE     2$              ;BRANCH IF NOT
                319 010160  004737  027514                  JSR     PC,RMINIT       ;INITIALIZE THE SUB SYSTEM
                320 010164  012737  177777  027436          MOV     #-1,SAVEFG      ;SAVE ALL RH/RM REGISTERS
                321 010172  012737  177777  027440          MOV     #-1,SEEKFG      ;DON'T DO IMPLY SEEK
                322 010200  013700  001224                  MOV     DRIVE,R0        ;R0=PHYSICAL DRIVE # OF THE SUB SYSTEM
                323 010204  105760  027350                  TSTB    DRVSTA(R0)      ;DRIVE EXIST AND ON LINE ?
                324 010210  003467                          BLE     6$              ;BRANCH IF NOT
                325 010212  105760  027360                  TSTB    DRVTYP(R0)      ;DRIVE IS AN RM05/3/2 ?
                326 010216  003464                          BLE     6$              ;BRANCH IF NOT
                327 010220  116037  027360  001402          MOVB    DRVTYP(R0),DTYP ;GET DRIVE TYPE TO BE TESTED
                328 010226  012737  000022  001372          MOV     #18.,TRKLMT     ;GET LAST TRACK FOR AN RM05
                329 010234  122760  000007  027360          CMPB    #7,DRVTYP(R0)   ;IS DRIVE AN RM05 ?
                330 010242  001403                          BEQ     3$              ;BR IF YES
                331 010244  012737  000004  001372          MOV     #4,TRKLMT       ;GET LAST TRACK FOR AN RM03/2
                332
                333 010252  012700  004506          3$:     MOV     #FMTDPB,R0      ;DPB ADDRESS
                334 010256  113710  001224                  MOVB    DRIVE,(R0)      ;LOAD THE DRIVE NUMBER
                335 010262  012760  043032  000006          MOV     #BUFFER,$BUF(R0)  ;LOAD BUFFER ADDRESS
                336 010270  012760  004526  000014          MOV     #RM.REG,14(R0)    ;AREA TO SAVE ALL RH/RM REG'S
                337 010276  012760  177400  000004          MOV     #-256.,$WRDM(R0) ;WORD COUNT (NEG)
                338 010304  013760  001374  000012          MOV     CYLIMT,$CYL(R0) ;CYLINDER 822.
                339 010312  113760  001372  000011          MOVB    TRKLMT,$TRK(R0) ;GET TRACK ADDRESS
                340 010320  105060  000010                  CLRB    $SEC(R0)        ;SEC 0
                341 010324  112760  000171  000002          MOVB    #RDDAT,$COMND(R0) ;READ DATA COMMAND
                342
                343 010332  004037  030264          4$:     JSR     R0,RM05         ;CALL THE DRIVER-HANDLER
                344 010336  004506                          FMTDPB                  ;PARAMETER ADDRESS
                345 010340  000774                          BR      4$              ;LOOPING IF QUEUE IS NOT SUCCESSFUL
                346 010342  005737  004524          5$:     TST     FMTDPB+16       ;COMMAND DONE ?
                347 010346  001775                          BEQ     5$              ;BRANCH IF NOT
                348 010350  100015                          BPL     7$              ;BRANCH IF DONE, WITHOUT ERROR
                349 010352  062737  000002  004516          ADD     #2,FMTDPB+10    ;TRY NEXT SECTOR (0,2,4,6,8)
                350 010360  122737  000010  004516          CMPB    #8.,FMTDPB+10   ;ALL FIVE SECTORS CHECKED ?
                351 010366  101361                          BHI     4$              ;NO,THEN TRY AGAIN
                352
                353 010370  104401  001207          6$:     TYPE    ,$CRLF          ;CR-LF
                354 010374  104401  041520                  TYPE    ,MESG10         ;DRIVE IS NOT READY
                355 010400  000137  010704                  JMP     ENDX1           ;STOP THE TEST
                356
                357                                 ;BAD SPOT FILE IS RETRIVED, IS STORED FROM BUFFER+4 TO BUFFER+256. FIRST
                358                                 ;WORD CYLINDER #, SECOND WORD TRK AND SEC NUMBERS, FILE IS TERMINATED BY
                359                                 ;A -1 IN THE CYLINDER NUMBER.
                360
                361 010404  012704  043042          7$:     MOV     #BUFFER+10,R4   ;R4 ADDRESS OF BAD SPOT FILE
                362 010410  022714  177777          8$:     CMP     #-1,(R4)        ;END OF BAD SPOT FILE ?
                363 010414  001411                          BEQ     9$              ;YES
                364 010416  022704  044032                  CMP     #BUFFER+1000,R4 ;END OF BAD SPOT FILE ?
                365 010422  101406                          BLOS    9$              ;BRANCH IF IT IS
                366 010424  004537  010536                  JSR     R5,SPOTX        ;CHECK THE CYLINDER POINTED BY (R4)
                367 010430  000422                          BR      11$             ;BRANCH IF BAD SPOT IN THE TEST ZONES
                368 010432  062704  000004                  ADD     #4,R4           ;NEXT BAD SPOT ADDRESS
```

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                010436  000764                          BR      8$              ;LOOPING BACK
                010440  032777  000200  170506  9$:     BIT     #BIT7,@SWR      ;SWITCH 7 SET ?
                010446  001404                          BEQ     10$             ;BRANCH IF NOT SET
                010450  012700  004506                  MOV     #FMTDPB,R0      ;DPB ADDRESS
                010454  004737  020602                  JSR     PC,PRTBAD       ;PRINT THE BAD SPOT FILE
                010460  105760  000010          10$:    TSTB    $SEC(R0)        ;SECTOR 10 HAS BEEN READ ?
                010464  001022                          BNE     13$             ;BRANCH IF SO
                010466  112760  000012  000010          MOVB    #10.,$SEC(R0)   ;READ SECTOR 10
                010474  000716                          BR      4$              ;LOOPING BACK
                010476  104401  041565          11$:    TYPE    ,MESG11         ;PACK NOT ACCEPTABLE
                010502  104401  001207                  TYPE    ,$CRLF          ;CR-LF
                010506  032777  000200  170440          BIT     #BIT7,@SWR      ;SWITCH 7 SET ?
                010514  001404                          BEQ     12$             ;BRANCH IF NOT SET
                010516  012700  004506                  MOV     #FMTDPB,R0      ;DPB ADDRESS
                010522  004737  020602                  JSR     PC,PRTBAD       ;TYPE THE BAD SPOT FILE
                010526  000137  007754          12$:    JMP     XPASS1          ;RESTART PASS 1
                010532  000137  010720          13$:    JMP     TST1            ;PROCEED TO TEST 1


                                                ;SUBROUTINE SPOTX
                                                ;SEE IF THE CYLINDER POINTED BY (R4) IS IN THE TESTING ZONES
                                                ;BELOW:
                                                ;
                                                ;(0-15, 128-143, 256-271  384-399, 512-527, 640-655, 768-783,
                                                ;112-127, 240-255, 368-383, 496-511, 624-639, 752-767, 17-32,
                                                ;145-160, 273-288, 401-416, 529-544, 657-672, 785-800 AND 620)
                                                ;
                                                ;CALL
                                                ;       JSR     R5,SPOTX        ;R4=POINT TO CYLINDER NUMBER
                                                ;       RET1                    ;ERROR RET
                                                ;       RET2                    ;NORMAL RET1

                010536  010146          SPOTX:  MOV     R1,-(SP)        ;SAVE R1 THROUGH R3
                010540  010246-                 MOV     R2,-(SP)
                010542  010346                  MOV     R3,-(SP)

                010544  005003                  CLR     R3              ;ERROR FLAG
                010546  005046                  CLR     -(SP)           ;DUMMY PAIR
                010550  005046                  CLR     -(SP)           ;DUMMY PAIR
                010552  005046                  CLR     -(SP)           ;ZONE STARTING ADDRESS
                010554  012746  000007          MOV     #7,-(SP)        ;SEGMENT NUMBER
                010560  012746  000021          MOV     #17.,-(SP)      ;ZONE STARTING ADDRESS
                010564  012746  000007          MOV     #7,-(SP)        ;SEGMENT NUMBER
                010570  012701  000160          MOV     #112.,R1        ;R1=ZONE STARTING ADDRESS
                010574  012702  000006          MOV     #6,R2           ;R2=SEGMENT NUMBER
                010600  021401          1$:     CMP     (R4),R1         ;CYL IN THE ZONE ?
                010602  103410                  BLO     3$              ;BRANCH IF NOT
                010604  062701  000017          ADD     #15.,R1         ;CHECK WITH THE UPPER BOND
                010610  021401                  CMP     (R4),R1         ;CYL IN THE ZONE ?
                010612  101002                  BHI     2$              ;BRANCH IF NOT
                010614  052703  000002          BIS     #BIT1,R3        ;SET THE ERROR FLAG

                010620  162701  000017  2$:     SUB     #15.,R1         ;RESTORE TO THE LOWER BOND
                010624  005302          3$:     DEC     R2              ;DECREMENT THE SEGMENT COUNT
                010626  001403                  BEQ     4$              ;ALL SEGMENT CHECKED ?
```

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                                                ADD     #128.,R1        ;ADJUST ZONE STARTING ADDRESS
                                                BR      1$              ;LOOPING BACK UNTIL ALL SEGMENTS ARE CHECKED

                                        4$.     MOV     (SP)+,R2        ;POP THE NEXT SET OF ZONE PARAMETERS
                                                MOV     (SP)+,R1
                                                TST     R2              ;DUMMY PAIR
                                                BNE     1$              ;BRANCH IF NOT
                                                TST     R1              ;DUMMY PAIR
                                                BNE     1$              ;BRANCH IF NOT

                                        5$:     CMP     (R4),#620.      ;ON CYLINDER 620 ?
                                                BNE     6$              ;NO
                                                BIS     #BIT1,R3        ;SET ERROR FLAG
                                        6$:     TST     R3              ;ANY ERROR ?
                                                BNE     7$              ;YES
                                                ADD     #2,R5           ;ADJUST FOR NORMAL RETURN
                                        7$:     MOV     (SP)+,R3        ;RESTORE R3 THROUGH R1
                                                MOV     (SP)+,R2
                                                MOV     (SP)+,R1
                                                RTS     R5              ;EXIT

                                        ENDX1:  TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG21         ;DRIVE NOT ONLINE OR NOT ASSIGNED
                                                JMP     @RSTART         ;JUMP TO RESTART

                                        ;THE FOLLOWING CODING FOR TEST 1 THROUGH TEST 4
                                        ;PARAMETER IN TST 1
                                        ;       $CDW1   = ADDRESS OF LOGICAL DRIVE BLOCK
                                        ;       DRIVE   = PHYSICAL DRIVE #
                                        ;       $DEVM   = LOGICAL DRIVE # 0-17
                                        ;       ASSGN1  = ASSIGN LOGICAL DRIVE BIT MAP
                                        ;       ASNLST  = ASSIGNED LOGICAL DRIVE MAP INDICATOR
                                        ;       $CDW2   = SYS-NAME
                                        ;
                                        ;$CDW2,DRIVE ARE ONLY CHANGED IN TST1 DURING PASS 1
                                        ;$DEVM,ASSGN1,$CDW1 ARE CHANGED BY THE TEST 4

                                        ;TST 1:DIRECT OPERATOR TO MOUNT AND LOAD PACKS

                                        ;;*****************************************************************
    010720  000004                      TST1:   SCOPE
    010722  012737  000001  001176              MOV     #1,$TIMES       ;;DO 1 ITERATION
                                                MOV     #1,TSTNM        ;LOAD THE TEST NUMBER
                                                MOV     #STACK,SP       ;INITIALIZE THE STACK POINT
                                                CMP     $CDW1,BLKADR    ;LOGICAL DRIVE 0
                                                BEQ     6$              ;THEN EXIT
                                                MOV     $CDW1,R1        ;R1=LOGICAL DRIVE BLOCK ADDRESS
                                                CMPB    $SYSNM(R1),$CDW2 ;STILL ON THE SAME SYSTEM ?
                                                BEQ     1$              ;THEN ,EXIT
                                                MOVB    $SYSNM(R1),$CDW2 ;LOAD THE NEW SUB SYSTEM NAME
                                                MOV     #IDLEX,@RMVEC   ;RESET THE INTERRUPT VECTOR
                                                CLR     @RMVEC+2        ;CLEAR THE INTERRUPT LEVEL
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG3          ;** STARTING PASS 1
                                                TYPE    ,MESG6          ;ON
                                                TYPE    ,MESG1          ;SUB-SYSTEM
                                                TYPE    ,QUOTM          ;TYPE '"' QUOTATION MARK
```

```
                                                TYPE    ,$CDW2          ;SYS-NAME(A TO H)
                                                TYPE    ,QUOTM          ;TYPE '"' QUOTATION MARK
                                        1$:     MOVB    (R1),DRIVE      ;LOAD THE PHYSICAL DRIVE #
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG4          ;MOUNT PACK ON THE DRIVE
                                                TYPE    ,$CDW2          ;SYS-NAME(A TO H)
                                                MOVB    DRIVE,-(SP)     ;THE PHYSICAL DRIVE #
                                                TYPOS
                                                .BYTE   1
                                                .BYTE   0
                                                TYPE    ,BLNKS1         ;TYPE 1 BLANK
                                                TYPE    ,MESG8          ;AND LOAD
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG9

                                        2$:     RDLIN
                                                MOV     (SP)+,R5        ;LOCATE THE READIN LINE
                                                TSTB    (R5)            ;NOT CORRECT INPUT LINE FORMAT
                                                BNE     2$              ;BRANCH IF NOT
                                                MOVB    $CDW2,R1        ;LOCATE THE SYSTEM ADDRESS TABLE
                                                BIC     #177760,R1      ;LEFT ON 4 BITS
                                                DEC     R1              ;ADJUST THE INDEX VALUE
                                                ASL     R1              ;FOUR WORD INDEX VALUE
                                                ASL     R1
                                                MOV     SYSADR(R1),RMADR  ;LOAD THE SYSTEM ADDRESS
                                                MOV     SYSADR+2(R1),RMVEC ;LOAD THE SYSTEM INTERRUPT VECTOR
                                                JSR     PC,RMINIT       ;INITIALIZE THE SYSTEM
                                                MOV     #-1,SAVEFG      ;SAVE ALL RH/RM REGISTER
                                                MOV     #-1,SEEKFG      ;DON'T DO ANY IMPLY SEEK
                                                MOV     DRIVE,R0        ;R0=PHYSICAL DRIVE #
                                                TSTB    DRVSTA(R0)      ;ON-LINE ?
                                                BLE     5$              ;BRANCH IF NOT
                                                TSTB    DRVTYP(R0)      ;CHECK DRIVE TYPE
                                                BLE     5$              ;BR IF NOT AN RM05/3/2
                                                CMPB    #7,DTYP         ;WHAT WAS FIRST DRIVE TESTED ?
                                                BNE     3$              ;BRANCH IF AN RM02 OR RM03, ELSE
                                                CMPB    #7,DRVTYP(R0)   ;SEE IF DRIVE IS STILL AN RM05.
                                                BEQ     6$              ;BR IF YES
                                                BR      4$              ;ERROR ENCOUNTERED
                                        3$:     CMPB    #7,DRVTYP(R0)   ;SEE IF DRIVE IS STILL AN RM02 OR RM03.
                                                BNE     6$              ;BR IF YES
                                        4$:     TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,NOTST          ;CANNOT SELECT RM03/2'S AND RM05'S TOGETHER
                                                JMP     @RSTART         ;JUMP TO RESTART

                                        5$:     TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG10         ;DRIVE NOT READY
                                                BR      TST1            ;TRY AGAIN
                                        6$:

                                        ;TEST 2
                                        ;BASIC READ AND WRITE TEST
                                        ;ALL LOGICAL DRIVE ACCESS CYLINDER 620
                                        ;AND SECTOR ADDRESS IS CORESPONDING TO THE LOGICAL DRIVE #
                                        ;EACH LOGICAL DRIVE PERFORM WRITE AND WRITE CHECK ON ALL TRACKS.
                                        ;(TRK0 - TRK4 ON AN RM03/2 AND TRK0 - TRK18 ON AN RM05)
```

```
538                                     ;;*****************************************************************
    011274  000004                      TST2:   SCOPE
    011276  012737  000001  001176              MOV     #1,$TIMES       ;;DO 1 ITERATION
539 011304  012737  000002  001340              MOV     #2,TSTNM        ;LOAD TEST NUMBER
540 011312  012706  001100                      MOV     #STACK,SP       ;INITIAL THE STACK POINTER
541 011316  012700  004506                      MOV     #FMTDPB,R0      ;DPB BLOCK ADDRESS
542 011322  013701  001272                      MOV     $CDW1,R1        ;ADDRESS OF THE LOGICAL DRIVE BLOCK
543 011326  113710  001224                      MOVB    DRIVE,(R0)      ;PHYSICAL DRIVE #
544 011332  013760  001270  000010              MOV     $DEVM,$SEC(R0)  ;LOAD THE SECTOR #,FROM THE LOGICAL DRIVE NUMBER.
545 011340  012760  001154  000012              MOV     #620.,$CYL(R0)  ;LOAD CYLINDER NUMBER
546 011346  012760  177400  000004              MOV     #-256.,$WRDM(R0) ;LOAD NEG WORD COUNT
547 011354  012760  043032  000006              MOV     #BUFFER,$BUF(R0) ;LOAD BUFFER ADDRESS
548 011362  012760  004526  000014              MOV     #RM.REG,14(R0)   ;ADDRESS TO SAVE ALL RH/RM REG'S
549 011370  105060  000011                      CLRB    $TRK(R0)        ;START FROM TRACK 0
550 011374  112760  000161  000002              MOVB    #WRTDAT,$COMND(R0)      ;WRITE DATA COMMAND
551 011402  004737  020742                      JSR     PC,FILBUF       ;FILL THE BUFFER WITH STANDARD PATTERN
552 011406  004037  030264          2$:         JSR     R0,RM05         ;CALL THE DRIVER
553 011412  004506                              FMTDPB
554 011414  000774                              BR      2$              ;BRANCH IF NOT QUEUE SUCCESSFULLY
555 011416  005737  004524          3$:         TST     FMTDPB+16
556 011422  001775                              BEQ     3$              ;BRANCH IF NOT DONE
557 011424  012700  004506                      MOV     #FMTDPB,R0      ;R0=FMTDPB ADDRESS
558 011430  004737  017352                      JSR     PC,PPOCESS      ;CHECK THE TERMINATION
559 011434  005760  000016                      TST     16(R0)          ;ERROR FLAG SET ?
560 011440  100433                              BMI     6$              ;BRANCH IF SO
561 011442  112760  000151  000002              MOVB    #WCKD,$COMND(R0) ;CHANGE TO THE WRITE CHECK DATA COMMAND
562 011450  004037  030264          4$:         JSR     R0,RM05         ;CLLL THE DRIVER
563 011454  004506                              FMTDPB
564 011456  000774                              BR      4$              ;BRANCH IF NOT QUEU SUCCESSFULLY
565 011460  005737  004524          5$:         TST     FMTDPB+16       ;DONE ?
566 011464  001775                              BEQ     5$              ;BRANCH IF NOT DONE
567 011466  012700  004506                      MOV     #FMTDPB,R0      ;
568 011472  004737  017352                      JSR     PC,PROCES       ;PROCESS IF ANY ERROR HAPPENS ?
569 011476  005760  000016                      TST     16(R0)          ;ERROR FLAG SET ?
570 011502  100412                              BMI     6$              ;BRANCH IF SO
571 011504  112760  000161  000002              MOVB    #WRTDAT,$COMND(R0) ;RESET TO WRITE DATA COMMAND
572 011512  105260  000011                      INCB    $TRK(R0)        ;INCREMENT TO THE NEXT TRACK
573 011516  126037  000011  001372              CMPB    $TRK(R0),TRKLMT ;ALL TRACKS DONE ?
574 011524  003730                              BLE     2$              ;NO
575 011526  000410                              BR      TST3            ;BRANCH TO NEXT TEST
576 011530  104401  001207          6$:         TYPE    ,$CRLF          ;CR-LF
577 011534  104401  042503                      TYPE    ,HALT1
578 011540  104401  042464                      TYPE    ,HALTX
579 011544  000177  167630                      JMP     @RSTART         ;JUMP TO RESTART
580
581                                     ;TEST 3
582                                     ;WRITE 7 ZONES FOR WRITE TEST IN PASS 2
583                                     ;WRITE 6 ZONES FOR READ TEST IN PASS2
584                                     ;       $DEVM   = LOGICAL DRIVE #
585                                     ;       $CDW1   = ADDRESS OF LOGICAL DRIVE HISTORY BLOCK FILE
586                                     ;       $CDW2   = SYS NAME
587                                     ;       DRIVE   = PHYSICAL DRIVE # OF THIS LOGICAL DRIVE
588                                     ;       PACK    = ENTRY OF TABLE-D
589                                     ;       CMCNT   = ZONE COUNT
590                                     ;       CMSEC   = DELTA CYLINDER COUNT
591                                     ;       R4      = ENTRY POINTER OF TABLE-D, CANNOT BE DESTORYED.
592                                     ;       R0      = ADDRESS OF FMTDPB
```

```
                                ;;*****************************************************************
011550  000004                  TST3:   SCOPE
011552  012737  000001  001176          MOV     #1,$TIMES       ;;DO 1 ITERATION
011560  012737  000003  001340          MOV     #3,TSTNM        ;LOAD THE TEST NUMBER
011566  012706  001100                  MOV     #STACK,SP       ;INITIAL THE STACK POINTER
011572  012704  001406                  MOV     #LOGO,R4        ;ADDRESS OF TABLE-D
011576  013700  001270                  MOV     $DEVM,R0        ;LOGICAL DRIVE #
011602  001404                          BEQ     2$              ;BRANCH IF LOGICAL DRIVE 0
011604  062704  000020          1$:     ADD     #16.,R4         ;EACH LOGICAL DRIVE TAKES 16 BYTES IN THE TABLE
011610  005300                          DEC     R0              ;DECREMENT THE DRIVE # COUNT
011612  001374                          BNE     1$              ;BRANCH ,UNTIL THE ENTRY IS LOCATED
011614  010437  001324          2$:     MOV     R4,PACK         ;SAVE THE TABLE-D ENTRY IN PACK
                                                                ;SET UP THE FMTDPB BLOCK
011620  012700  004506                  MOV     #FMTDPB,R0      ;ADDRESS OF FMTDPB
011624  113710  001224                  MOVB    DRIVE,(R0)      ;PHYSICAL DRIVE NUMBER
011630  112760  000161  000002          MOVB    #WRTDAT,$COMND(R0)      ;WRITE DATA COMMAND
011636  012760  043032  000006          MOV     #BUFFER,$BUF(R0) ;BUFFER ADDRESS
011644  012760  004526  000014          MOV     #RM.REG,14(R0)  ;ADDRESS TO SAVE ALL RH/RM REG'S
011652  012760  177400  000004          MOV     #-256.,$WRDM(R0)        ;NEG WORD COUNT
011660  013701  001270                  MOV     $DEVM,R1        ;LOGICAL DRIVE #
011664  006301                          ASL     R1              ;WORD INDEX
011666  016104  005322                  MOV     PSEUDO(R1),R4   ;LOAD THE DATA PATTERN
011672  016002  000006                  MOV     $BUF(R0),R2     ;BUFFER ADDRESS IN R2
011676  012703  000400                  MOV     #256.,R3        ;POS WORD COUNT
011702  010422                  3$:     MOV     R4,(R2)+        ;FULL THE BUFFER WITH SIGLE WORD PATTERN
011704  005303                          DEC     R3              ;DECREMENT THE WORD COUNT
011706  001375                          BNE     3$              ;BRANCH,UNTIL IT IS FULL

011710  005046                          CLR     -(SP)           ;DUMY PAIR OF ZONE COUNT
011712  005046                          CLR     -(SP)           ;DUMY STARTING CYLINDER NUMBER
011714  012746  000006                  MOV     #6,-(SP)        ;ZONE COUNT
011720  012746  000160                  MOV     #112.,-(SP)     ;STARTING CYLINDER NUMBER
011724  012737  000007  001354          MOV     #7,CMCNT        ;ZONE COUNT
011732  005037  001356                  CLR     CMCYL           ;STARTING CYLINDER NUMBER
011736  012737  000020  001362  4$:     MOV     #16.,CMSEC      ;DELTA CYLINDER NUMBER
011744  012700  004506                  MOV     #FMTDPB,R0      ;R0 DPB ADDRESS
011750  013704  001324                  MOV     PACK,R4         ;R4 ENTRY TO TABLE-D
011754  013760  001356  000012  5$:     MOV     CMCYL,$CYL(R0)  ;STARTING CYLINDER
011762  105060  000011                  CLRB    $TRK(R0)        ;STARTS FROM TRACK 0
011766  111460  000010          6$:     MOVB    (R4),$SEC(R0)   ;LOAD SECTOR NUMBER FROM TABLE-D
011772  004037  030264          7$:     JSR     R0,RM05         ;CALL THE DRIVER
011776  004506                          FMTDPB
012000  000774                          BR      7$              ;BRANCH IF QUEU IS NOTSUCCESSFUL
012002  005737  004524          8$:     TST     FMTDPB+16       ;DONE ?
012006  001775                          BEQ     8$              ;BRANCH IF NOT
012010  012700  004506                  MOV     #FMTDPB,R0
012014  004737  017352                  JSR     PC,PROCES       ;PROCESS TO CHECK IF ANY ERROR
012020  005760  000016                  TST     16(R0)          ;ERROR FLAG SET ?
012024  100453                          BMI     9$              ;BRANCH IF SO
012026  062760  000020  000010          ADD     #16.,$SEC(R0)   ;WRITE TWO SECTORS ON ONE CYLINDER
012034  122760  000037  000010          CMPB    #31.,$SEC(R0)   ;ALL DONE-TWO SECTORS
012042  103353                          BHIS    7$              ;BRANCH IF NOT
012044  111460  000010                  MOVB    (R4),$SEC(R0)   ;RESTORE SECTOR #
012050  105260  000011                  INCB    $TRK(R0)        ;INCREMENT TO NEXT TRACK
012054  126037  000011  001372          CMPB    $TRK(R0),TRKLMT ;LAST TRACK ?
```

```
                                        BLE     7$              ;NO, THEN BRANCH
                                        CLRB    $TRK(R0)        ;RESTORE TO TRACK-0
                                        INC     $CYL(R0)        ;INCREMENT CYLINDER NUMBER
                                        INC     R4              ;INCREMENT TABLE-D ENTRY
                                        DEC     CMSEC           ;DECREMENT THE DELTA CYLINDER COUNT
                                        BNE     6$              ;BRANCH IF NOT END OF THIS BLOCK
                                        ADD     #112.,$CYL(R0)  ;INCREMENTTHE CYLINDER NUMBER TO NEXT ZONE
                                        MOV     $CYL(R0),CMCYL  ;INITAIL THE STARTING CYLINDER IN THE BLOCK
                                        DEC     CMCNT   ;DECREMENT THE ZONE COUNT
                                        BNE     4$              ;LOOPING IF NOT END OF ZONE
                                        MOV     (SP)+,CMCYL     ;LOAD NEW PAIR OF STARTING CYLINDER
                                        MOV     (SP)+,CMCNT     ;AND ZONE COUNT
                                        TST     CMCYL           ;NOT END YET ?
                                        BNE     4$              ;BRANCH IF NOT
                                        TST     CMCNT           ;BRANCH IF NOT END
                                        BNE     4$              ;LOOPING BACK

                                        BR      TST4            ;BRANCH TO THE NEXT TEST
                                9$:     TYPE    ,$CRLF          ;CR-LF
                                        TYPE    ,HALT2
                                        TYPE    ,HALTX
                                        JMP     @RSTART         ;JUMP TO RESTART

                                ;TEST 4
                                ;UPDATE THE PARAMETERS,$CDW1,$DEVM,ASSGN1
                                ;DIRECT THE OPERATOR TO DISMOUNT PACK AND LOAD TO OTHER DRIVE
                                ;
                                ;$CDW2,DRIVE ARE CHANGED BY TEST ONE ONLY AFTER THE TEST LOOPING TO TEST1

                                ;;**************************************************************
 012174  000004                 TST4:   SCOPE
 012176  012737  000001  001176         MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        MOV     #4,TSTNM        ;LOAD THE TEST NUMBER
                                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                        MOV     #IDLEX,@RMVEC   ;RESET THE INTERRUPT VECTOR
                                        CLR     @RMVEC+2        ;CLEAR THE INTERRUPT LEVEL
                                        TYPE    ,$CRLF          ;CR-LF
                                        TYPE    ,MESG12         ;UNLOAD DRIVE
                                        TYPE    ,$CDW2          ;SYS-NAME(A - H)
                                        MOV     DRIVE,-(SP)     ;PHYSICAL DRIVE #
                                        TYPOS
                                        .BYTE   1
                                        .BYTE   0
                                        TYPE    ,MESG13
                                        MOV     #1,R1
                                        CLR     R2
                                1$:     CMP     R2,$DEVM        ;LOCATE THE CORESPONDING BIT MAP
                                        BEQ     2$              ;BRANCH IF LOCATED
                                        CLC                     ;LOCATE NEXT DRIVE
                                        ROL     R1              ;
                                        INC     R2              ;NEXT DRIVE #
                                        BR      1$              ;LOCATE THE BIT MAP
                                2$:     BIC     R1,ASSGN1       ;DEASSIGN THE LOGICAL DRIVE FOR PASS 1
                                        BEQ     4$              ;NO MORE DRIVES
                                3$:     INC     R2              ;GET NEXT LOGICAL DRIVE #
                                        ASL     R2              ;WORD INDEX
                                        MOV     BLKADR(R2),$CDW1        ;LOAD THE NEW DPB ADDRESS
```

```
                                                ASR     R2              ;RESTORE R2
012326  010237  001270                          MOV     R2,$DEVM        ;LOAD THE NEW LOCICAL DRIVE #

012332  104411                          4$:     RDLIN                   ;WAIT UNTIL IT IS DONE
012334  012605                                  MOV     (SP)+,R5        ;LOCATE THE INPUT LINE
012336  105715                                  TSTB    (R5)            ;TERMINATOR ?
012340  001374                                  BNE     4$              ;BRANCH IF NOT
012342  005737  002010                          TST     ASSGN1          ;OTHER DRIVES ?
012346  001002                                  BNE     5$              ;BRANCH IF MORE DRIVES IN TEST
012350  000137  012360                          JMP     XPASS2          ;BRANCH TO PASS 2
012354  000137  010720                  5$:     JMP     TST1            ;JUMP TO TEST 1


                                        ;XPASS2         INITILIZE FOR PASS 2 TEST
                                        ;
                                        ;       $CDW1   = ADDRESS OF THE CURRENT LOGICAL DRIVE HISTORY FILE
                                        ;       $CDW2   = SYSTEM NAME A THROUGH H
                                        ;       $DEVM   = CURRENT LOGICAL DRIVE # 0 TO 15.
                                        ;       ASSGN2  = ASSIGNED LOGICAL DRIVE FOR PASS 2
                                        ;       ASNLST  = ASSIGNED LOGICAL DRIVE
                                        ;       DRIVE   = PHYSICAL DRIVE # OF CURRENT RH/RM SYSTEM

012360  005737  002012                  XPASS2: TST     ASSGN2          ;ANYTHING IN TEST FOR PASS 2
012364  001002                                  BNE     1$              ;YES,THEN GO ON
012366  000137  017046                          JMP     XEND2           ;JUMP TO END OF PASS 2

012372  005037  001270                  1$:     CLR     $DEVM           ;START FROM LOGICAL DRIVE 0
012376  013737  004444  001272                  MOV     BLKADR,$CDW1    ;ADDRESS OF LOGICAL BLOCK DRIVE 0
012404  112737  000101  001274                  MOVB    #'A,$CDW2       ;LOAD SYSTEM NAME ''A''
012412  013737  002014  027476                  MOV     SYSADR,RMADR    ;LOAD SYSTEM-A ADDRESS TO DRIVER
012420  013737  002016  027500                  MOV     SYSADR+2,RMVEC  ;LOAD SYSTEM-A VECTOR TO DRIVER
012426  013701  001272                          MOV     $CDW1,R1        ;R1=ADDRESS OF LOGICAL BLOCK
012432  012777  017344  015040                  MOV     #IDLEX,@RMVEC   ;RESET THE INTERRUPT VECTOR
012440  005077  015036                          CLR     @RMVEC+2        ;CLEAR THE INTERRUPT LEVEL
012444  005037  001376                          CLR     FAULT           ;RESET THE NOT COMPATIBLE FLAG
012450  104401  001207                          TYPE    ,$CRLF          ;CR-LF
012454  104401  041734                          TYPE    ,MESG14         ;START THE PASS 2
012460  104401  042242                          TYPE    ,MESG6          ;ON
012464  104401  041354                          TYPE    ,MESG1          ;SUB-SYSTEM
012470  104401  042222                          TYPE    ,QUOTM          ;TYPE '''' QUOTATION MARK
012474  104401  001274                          TYPE    ,$CDW2          ;SYS-NAME(A TO H)
012500  104401  042222                          TYPE    ,QUOTM          ;TYPE '''' QUOTATION MARK
012504  111137  001224                          MOVB    (R1),DRIVE      ;LOCATE THE PHYSICAL DRIVE #
012510  104401  001207                          TYPE    ,$CRLF          ;CR-LF
012514  104401  041423                          TYPE    ,MESG4          ;MOUNT PACK ON DRIVE
012520  104401  001274                          TYPE    ,$CDW2          ;SYSTEM NAME
012524  111146                                  MOVB    (R1),-(SP)
012526  104403                                  TYPOS
012530     001                                  .BYTE   1
012531     000                                  .BYTE   0
012532  104401  042330                          TYPE    ,BLNKS1         ;TYPE 1 BLANK
012536  104401  041451                          TYPE    ,MESG8          ;AND LOAD
012542  104401  001207                          TYPE    ,$CRLF          ;CR-LF
012546  104401  041464                          TYPE    ,MESG9          ;TYPE <CR> WHEN DRIVE IS READY

012552  104411                          2$:     RDLIN
012554  012602                                  MOV     (SP)+,R2        ;LOCATE THE READ IN LINE
```

```
                                        TSTB    (R2)            ;CARRIAGE RETURN ?
                                        BNE     2$              ;BR IF NO
                                        JSR     PC,RMINIT
                                        MOV     #-1,SAVEFG      ;SAVE ALL RH/RM REGISTERS
                                        MOV     #-1,SEEKFG      ;DON'T DO IMPLY SEEK
                                        MOV     DRIVE,R0        ;LOAD THE PHYSICAL DRIVE NUMBER
                                        TSTB    DRVSTA(R0)      ;DRIVE EXISTS AND ON-LINE ?
                                        BLE     4$              ;BRANCH IF NOT
                                        TSTB    DRVTYP(R0)      ;CHECK DRIVE TYPE
                                        BLE     4$              ;BR IF NOT AN RM05/3/2
                                3$:     MOVB    DRVTYP(R0),DTYP ;GET DRIVE TYPE TO BE TESTED
                                        MOV     #18.,TRKLMT     ;GET LAST TRACK FOR AN RM05
                                        CMPB    #7,DRVTYP(R0)   ;IS DRIVE AN RM05 ?
                                        BEQ     5$              ;BR IF YES
                                        MOV     #4,TRKLMT       ;GET LAST TRACK FOR AN RM03/2
                                        BR      5$

                                4$:     TYPE    ,$CRLF          ;CR-LF
                                        TYPE    ,MESG10         ;DRIVE IS NOT READY
                                        JMP     ENDX1
                                5$:

                                ;       $CDW1   = ADDRESS OF CURRENT LOGICAL DRIVE BLOCK,ONLY CHANGED BY TST9
                                ;       $CDW2   = SYSTEM-NAME, ONLY CHANGED BY TEST 5
                                ;       $DEVM   = CURRENT LOGICAL DRIVE #
                                ;       ASSGN2  = ASSIGNED LOGICAL DRIVE'S BIT MAP FOR PASS 2
                                ;       DRIVE   = PHYSICAL DRIVE #
                                ;       ASNLST  = ASSIGNED LOGICAL DRIVE IN THE TEST
                                ;
                                ;IN TEST 5 DIRECT OPERATOR TO CHANGE, LOAD THE PACK

                                ;;*****************************************************************
                                TST5:   SCOPE
                                        MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        MOV     #5,TSTNM        ;LOAD THE TEST NUMBER
                                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                        CMP     $CDW1,BLKADR    ;LOGICAL DRIVE 0
                                        BEQ     6$              ;THEN EXIT
                                        MOV     $CDW1,R1        ;ADDRESS OF THE HISTORY FILE
                                        CMPB    $SYSNM(R1),$CDW2        ;ON THE SAME SUB-SYSTEM
                                        BEQ     1$              ;THEN DON'T UPDATE SYSTEM ADDRESS
                                        MOVB    $SYSNM(R1),$CDW2
                                        MOV     #IDLEX,@RMVEC   ;RESET THE INTERRUPT VECTOR
                                        CLR     @RMVEC+2        ;CLEAR THE INTERRUPT LEVEL
                                        MOV     $CDW2,R0        ;LOCATE SYSTEM ADDRESS TABLE
                                        DEC     R0              ;ADJUST FOR INDEX FORM 0
                                        BIC     #177760,R0      ;LEFT ON FOUR BITS
                                        ASL     R0
                                        ASL     R0              ;INDEX FOR TWO WORD
                                        MOV     SYSADR(R0),RMADR ;SYSTEM ADDRESS
                                        MOV     SYSADR+2(R0),RMVEC ;SYSTEM INTERRUP VECTOR
                                        TYPE    ,$CRLF          ;CR-LF
                                        TYPE    ,MESG14         ;START THE PASS 2
                                        TYPE    ,MESG6          ;ON
                                        TYPE    ,MESG1          ;SUB-SYSTEM
                                        TYPE    ,QUOTM          ;TYPE "'" QUOTATION MARK
                                        TYPE    ,$CDW2          ;SYS-NAME(A TO H)
```

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                                                TYPE    ,QUOTM          ;TYPE '"' QUOTATION MARK
                                        1$:     MOVB    (R1),DRIVE      ;LOCATE THE PHYSICAL DRIVE #
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG4          ;MOUNT PACK ON DRIVE
                                                TYPE    ,$CDW2          ;SYSTEM NAME
                                                MOVB    (R1),-(SP)
                                                TYPOS
                                                .BYTE   1
                                                .BYTE   0
                                                TYPE    ,BLNKS1         ;TYPE 1 BLANK
                                                TYPE    ,MESG8          ;AND LOAD
                                                TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG9          ;TYPE <CR> WHEN DRIVE IS READY

                                        2$:     RDLIN
                                                MOV     (SP)+,R2        ;LOCATE THE READ IN LINE
                                                TSTB    (R2)            ;CARRIAGE RETURN ?
                                                BNE     2$              ;BR IF NO
                                                JSR     PC,RMINIT
                                                MOV     #-1,SAVEFG      ;SAVE ALL RH/RM REGISTERS
                                                MOV     #-1,SEEKFG      ;DON'T DO IMPLY SEEK
                                                MOV     DRIVE,R0        ;LOAD THE PHYSICAL DRIVE NUMBER
                                                TSTB    DRVSTA(R0)      ;DRIVE EXISTS AND ON-LINE ?
                                                BLE     5$              ;BRANCH IF NOT
                                                TSTB    DRVTYP(R0)      ;CHECK DRIVE TYPE
                                                BLE     5$              ;BR IF NOT AN RM05/3/2
                                                CMPB    #7,DTYP         ;WHAT WAS FIRST DRIVE TESTED ?
                                                BNE     3$              ;BRANCH IF AN RM02 OR RM03, ELSE
                                                CMPB    #7,DRVTYP(R0)   ;SEE IF DRIVE IS STILL AN RM05.
                                                BEQ     6$              ;BR IF YES
                                                BR      4$              ;ERROR ENCOUNTERED
                                        3$:     CMPB    #7,DRVTYP(R0)   ;SEE IF DRIVE IS STILL AN RM02 OR RM03.
                                                BNE     6$              ;BR IF YES
                                        4$:     TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,NOTST          ;CANNOT SELECT RM03/2'S AND RM05'S TOGETHER
                                                JMP     @RSTART         ;JUMP TO RESTART

                                        5$:     TYPE    ,$CRLF          ;CR-LF
                                                TYPE    ,MESG10         ;DRIVE IS NOT READY
                                                BR      TST5            ;TRY AGAIN
                                        6$:

                                        ;       DRIVE   = PHYSICAL DRIVE NUMBER
                                        ;       $CDW1   = DPB BLOCK OF THIS LOGICAL DRIVE
                                        ;       $DEVM   = LOGICAL DRIVE #
                                        ;       $CDW2   = SUB-SYSTEM NAME
                                        ;       RMADR   = SUB-SYSTEM BASE REGISTER ADDRESS
                                        ;       RMVEC   = SUB-SYSTEM INTERRUPT VECTOR

                                        ;THE ABOVE PARAMETERS CANNOT BE MODIFIED BY THIS TEST (TST6)
                                        ;THE FOLLOWING REG'S ARE ASSIGNED AS:
                                        ;       R0      = ADDRESS OF DPB FIELD INTO DRIVER HANDLER=FMTDPB
                                        ;       R1      = ADDRESS OF THE HISTORY FILE BLOCK OF THE LOGICAL DRIVE=$CDW1

                                        ;IN TEST 6, EACH LOGICAL DRIVE WRITES 7 CYLINDERS ON EACH TRACK WITH
                                        ;A UNIQUE DATA PATTERN.  THESE 7 CYLINDERS HAVE BEEN WRITTEN BY OTHER
                                        ;DRIVES IN PASS 1.
```

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                                        ;THEN, THIS LOGICAL DRIVE EXECUTES 'WRITE CHECK DATA'' TO SEE IF THIS
                                        ;LOGICAL DRIVE CAN OVER-WRITE ALL DATA WRITTEN BY OTHER DRIVES.
                                        ;THESE 7 CYLINDERS ARE SPECIFIED AS $DEVM, $DEVM+128, $DEVM+256, $DEVM+384,
                                        ;$DEVM+512, $DEVM+640 AND $DEVM+768.
                                        ;THE OVER-WRITE TEST IS PERFORMED WITH OFFSETS IN BOTH DIRECTIONS.
                                        ;;*****************************************************************
 013244  000004                 TST6:   SCOPE
 013246  012737  000001  001176         MOV     #1,$TIMES       ;;DO 1 ITERATION
881 013254  012737  000006  001340      MOV     #6,TSTNM        ;LOAD TEST NUMBER
882 013262  012706  001100              MOV     #STACK,SP       ;INITIAL THE STACK POINT
883 013266  012703  002056              MOV     #OVWNO,R3       ;1 ST ADDRESS TO CLEAR
884 013272  012704  003216              MOV     #RDNO,R4        ;LAST ADDRESS+2
885 013276  005023              1$:     CLR     (R3)+           ;RESET ALL SCORE BOARD
886 013300  020403                      CMP     R4,R3           ;ALL LOCATIONS ARE CLEARED ?
887 013302  101375                      BHI     1$              ;BRANCH IF NOT
888
889 013304  012700  004506              MOV     #FMTDPB,R0      ;SET UP STARTING ADDRESS OF DPB
890 013310  013701  001272              MOV     $CDW1,R1        ;HISTORY FILE BLOCK
891 013314  113710  001224              MOVB    DRIVE,(R0)      ;LOAD THE PHYSICAL DRIVE #
892 013320  012760  160000  000004      MOV     #-8192.,$WRDM(R0) ;LOAD THE WORD COUNT (ONE TRACK)
893 013326  005060  000010              CLR     $SEC(R0)        ;START FROM TRACK = 0, SECTOR = 0
894 013332  112760  000161  000002      MOVB    #WRTDAT,$COMND(R0)  ;WRITE DATA COMMAND
895 013340  013760  001270  000012      MOV     $DEVM,$CYL(R0)  ;LOAD THE STARTING CYLINDER
896 013346  012760  043032  000006      MOV     #BUFFER,$BUF(R0) ;LOAD THE BUFFER ADDRESS
897 013354  012760  004526  000014      MOV     #RM.REG,14(R0)  ;REG'S SAVE ADDRESS
898 013362  013702  001270              MOV     $DEVM,R2        ;LOCATE THE DATA PATTERN
899 013366  006302                      ASL     R2              ;WORD INDEX
900 013370  016202  005322              MOV     PSEUDO(R2),R2   ;LOAD R2 WITH THE DATA PATTERN POINTER
901 013374  016003  000006              MOV     $BUF(R0),R3     ;BUFFER ADDRESS
902 013400  012704  020000              MOV     #8192.,R4       ;WORD COUNT
903 013404  010223              2$:     MOV     R2,(R3)+        ;FILL THE BUFFER
904 013406  005304                      DEC     R4              ;DECREMENT WORD CTR
905 013410  001375                      BNE     2$              ;BRANCH IF NOT DONE
906
907                                     ;START TO WRITE ONE CYLINDER ON EACH TRACK OF EACH WRITE CURRENT ZONE
908                                     ;(7 ZONES ON EACH PACK)
909
910 013412  004037  030264      3$:     JSR     R0,RM05         ;CALL THE DRIVER
911 013416  004506                      FMTDPB                  ;PARAMETER BLOCK
912 013420  000774                      BR      3$              ;BRANCH IF QUEUE FAIL
913 013422  005737  004524      4$:     TST     FMTDPB+16       ;WRITE COMMAND DONE ?
914 013426  001775                      BEQ     4$              ;NO,THEN WAIT
915 013430  012700  004506              MOV     #FMTDPB,R0      ;PROCESS IF ANY ERROR
916 013434  004737  017352              JSR     PC,PROCES
917 013440  005760  000016              TST     16(R0)          ;ERROR FLAG SET ?
918 013444  100010                      BPL     22$             ;BRANCH IF NOT
919 013446  004737  027514              JSR     PC,RMINIT       ;INITIAL THE DRIVE
920 013452  012737  177777  027436      MOV     #-1,SAVEFG
921 013460  012737  177777  027440      MOV     #-1,SEEKFG
922 013466  105260  000011      22$:    INCB    $TRK(R0)        ;NEXT TRACK
923 013472  126037  000011  001372      CMPB    $TRK(R0),TRKLMT ;LAST TRACK IS DONE ?
924 013500  003744                      BLE     3$              ;NO,THEN BRANCH
925 013502  105060  000011              CLRB    $TRK(R0)        ;RESET TRACK NUMBER
926 013506  062760  000200  000012      ADD     #128.,$CYL(R0)  ;MOVE TO NEXT ZONE
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927 013514  022760  001417  000012          CMP     #783.,$CYL(R0)  ;LAST ZONE IS DONE ?
928 013522  103333                          BHIS    3$              ;BRANCH IF NOT
929
930                                 ;RESET THE FMTDPB BLOCK AND EXECUTE WRITE-CHECK COMMAND TO DETECT ANY
931                                 ;COMPATIBLE PROBLEM. THE FOLLOWING SUBROUTINE ARE CALLED SCORE, OFFST
932                                 ;AND MAKEUP.
933
934 013524  005037  004504                CLR     OFFCOD          ;SET NEGATIVE OFFSET DIRECTION FLAG
935 013530  012700  004506          LOOP1: MOV    #FMTDPB,R0      ;R0=FMTDPB ADDRESS
936 013534  005060  00C010                CLR     $SEC(R0)        ;START FROM SECTOR 0,TRACK 0
937 013540  013760  001270  000012        MOV     $DEVM,$CYL(R0)  ;STARTING CYLINDER NUMBER
938                                                               ;TOTAL 7 CYLINDERS ON ONE TRACK
939 013546  112760  000151  000002  LOOP2: MOVB    #WCKD,$COMND(R0)        ;WRITE-CHECK-DATA COMMAND
940 013554  012760  043032  000006        MOV     #BUFFER,$BUF(R0)        ;RESET BUFFER ADDRESS
941 013562  012760  004526  000014        MOV     #RM.REG,14(R0)  ;ADDRESS TO SAVE RH/RM REG'S
942 013570  004037  030264          1$:   JSR     R0,RM05         ;CALL THE DRIVER
943 013574  004506                        FMTDPB                  ;PARAMETER BLOCK ADDRESS
944 013576  000774                        BR      1$              ;BRANCH IF QUEUE FAILURE
945 013600  005737  004524          2$:   TST     FMTDPB+16       ;TEST IF COMMAND IS DONE ?
946 013604  001775                        BEQ     2$              ;BRANCH , IF NOT
947 013606  012700  004506                MOV     #FMTDPB,R0      ;LOAD THE PARAMETER BLOCK ADDRESS
948 013612  004737  017352                JSR     PC,PROCES       ;REPORT IF ANY ERROR
949 013616  004737  014734                JSR     PC,LABAD        ;LOCATE STARTING AND ENDING SECTORS
950 013622  005760  000016                TST     16(R0)          ;ANY ERROR ?
951 013626  100011                        BPL     3$              ;BRANCH IF NONE
952 013630  004737  027514                JSR     PC,RMINIT       ;INITIAL THE SYSTEM
953 013634  012737  177777  027436        MOV     #-1,SAVEFG
954 013642  012737  177777  027440        MOV     #-1,SEEKFG
955 013650  000414                        BR      5$              ;NOT UPDATE THE SCORE
956 013652  004737  014514          3$:   JSR     PC,SCORE        ;INCREMENT SCORE
957 013656  005760  000022          4$:   TST     $RMWC(R0)       ;WORD COUNT = 0 /
958 013662  001407                        BEQ     5$              ;BRANCH, IF WORD COUNT IS 0
959 013664  116060  000026  000010        MOVB    $RMDA(R0),$SEC(R0)  ;UPDATE STARTING SECTOR
960 013672  016060  000022  000004        MOV     $RMWC(R0),$WRDM(R0) ;UPDATE WORD COUNT
961 013700  000733                        BR      1$              ;TO READ THE REST SECTORS
962
963                                 ;THE FOLLOWING CODING TEST THE COMPATIBLE PROBLEM IN OFFSET MODE OFFCOD = 0
964                                 ;(NEGATIVE) AND OFFCOD = 1(POSITIVE).
965
966 013702  012700  004506          5$:   MOV     #FMTDPB,R0      ;RESET THE DPB BLOCK
967 013706  012760  160000  000004        MOV     #-8192.,$WRDM(R0)   ;FULL TRACK WORD COUNT
968 013714  105060  000010                CLRB    $SEC(R0)        ;RESET TO SECTOR 0,TRACK NOT CHANGED
969 013720  012760  043032  000006        MOV     #BUFFER,$BUF(R0)        ;BUFFER ADDRESS
970 013726  012760  004526  000014        MOV     #RM.REG,14(R0)  ;ADDRESS TO SAVE ALL RH/RM REG'S
971 013734  004537  014144          6$:   JSR     R5,OFFST        ;CALL OFFSET
972 013740  000443                        BR      10$             ;BRANCH TO NEXT CYLINDER,IF OFFSET FAILS
973 013742  004737  014376                JSR     PC,MAKEUP       ;CALL WRITE CHECK IN OFFSET MODE
974 013746  005737  004524          7$:   TST     FMTDPB+16       ; OFFSET WRITE CHECK IS DONE ?
975 013752  001775                        BEQ     7$              ;BRANCH IF NOT
976
977 013754  012700  004506                MOV     #FMTDPB,R0      ;LOAD THE DPB ADDRESS
978 013760  004737  017352                JSR     PC,PROCES       ;REPORT , IF ANY ERROR
979 013764  004737  014734                JSR     PC,LABAD        ;LOCATE STARTINF AND ENDING SECTORS
980 013770  005760  000016                TST     16(R0)          ;ANY ERROR ?
981 013774  100011                        BPL     8$              ;BRANCH, IF NONE
982 013776  004737  027514                JSR     PC,RMINIT       ;INITIAL THE SYSTEM
983 014002  012737  177777  027436        MOV     #-1,SAVEFG
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 984 014010  012737  177777  027440          MOV     #-1,SEEKFG
 985 014016  000414                          BR      10$                     ;NOT UPDATE THE SCORE
 991 014020  004737  014514          8$:     JSR     PC,SCORE                ;UPDATE THE TEST SCORE
 992 014024  005760  000022          9$:     TST     $RMWC(R0)               ;WORD CTR = 0 ?
 993 014030  001407                          BEQ     10$                     ;IF WORD CTR = 0 ,BRANCH TO NEXT OP
 994 014032  116060  000026  000010          MOVB    $RMDA(R0),$SEC(R0) ;UPDATE THE NEW STARTING ADDRESS
 995 014040  016060  000022  000004          MOV     $RMWC(R0),$WRDM(R0) ;UPDATE THE NEW WORD COUNT
 996 014046  000732                          BR      6$
 997 014050  062760  000200  000012  10$:     ADD     #128.,$CYL(R0)  ;ADJUST CYLINDER ADDRESS TO NEXT ZONE
 998 014056  022760  001417  000012          CMP     #783.,$CYL(R0)  ;ALL 7 ZONES HAVE BEEN TESTED ?
 999 014064  103402                          BLO     11$             ;BRANCH, IF ALL DONE
1000 014066  000137  013546                  JMP     LOOP2           ;TO NEXT WRITE CURRENT ZONE
1001 014072  013760  001270  000012  11$:     MOV     $DEVM,$CYL(R0)  ;RESET CYLINDER ADDRESS
1002 014100  105260  000011                  INCB    $TRK(R0)        ;INCREMENT TO NEXT TRACK
1003 014104  126037  000011  001372          CMPB    $TRK(R0),TRKLMT ;ALL TRACKS ARE TESTED ?
1004 014112  003002                          BGT     12$             ;BRANCH IF ALL DONE
1005 014114  000137  013546                  JMP     LOOP2           ;TO NEXT TRACK
1006 014120  005737  004504          12$:    TST     OFFCOD          ;FINISHING TEST THE POSITIVE OFFSET ?
1007 014124  001005                          BNE     13$             ;BRANCH IF ALL DONE
1008 014126  012737  000001  004504          MOV     #1,OFFCOD       ;SET POSITIVE OFFSET DIRECTION FLAG
1009 014134  000137  013530                  JMP     LOOP1           ;RESTART LOCATION
1010 014140  000137  015040          13$:    JMP     TST7            ;BRANCH TO NEXT TEST
1011
1012                                 ;OFFST ROUTINE
1013                                 ;OFFSET THE HEAD IN THE DIRECTION TOWARD SPINDLE OR AWAY FROM THE SPINDLE
1014                                 ;       OFFCOD  = 1, TOWARD SPINDLE (POSITIVE)
1015                                 ;       OFFCOD  = 0, AWAY FROM SPINDLE (NEGATIVE)
1016                                 ;       DRIVE   = PHYSICAL DRIVE NUMBER
1017                                 ;       R0      = DPB ADDRESS
1018                                 ;       RETRY   = 3 TIMES
1019                                 ;
1020                                 ;CALL
1021                                 ;       JSR     R5,OFFST
1022                                 ;       RET1                    OFFSET FAIL RETURN ADDRESS
1023                                 ;       RET2                    OFFSET SUCCESSFUL RETURN
1024
1025 014144  010146                  OFFST:  MOV     R1,-(SP)                        ;SAVE ALL REGISTERS
1026 014146  010246                          MOV     R2,-(SP)
1027 014150  010346                          MOV     R3,-(SP)
1028 014152  010446                          MOV     R4,-(SP)
1029 014154  012700  004506                  MOV     #FMTDPB,R0      ;R0 DPB ADDRESS
1030 014160  116046  000002                  MOVB    $COMND(R0),-(SP)        ;SAVE THE I/O COMMAND
1031 014164  113710  001224                  MOVB    DRIVE,(R0)      ;LOAD THE DRIVE NUMBER
1032 014170  112760  000117  000002          MOVB    #117,$COMND(R0) ;RETURN TO CENTER COMMAND
1033 014176  004037  030264                  JSR     R0,RM05         ;CALL THE DRIVE HANDLE
1034 014202  004506                          FMTDPB
1035 014204  000465                          BR      6$              ;BRANCH IF QUEUE FAILS
1036 014206  005737  004524          1$:     TST     FMTDPB+16       ;COMMAND DONE ?
1037 014212  001775                          BEQ     1$              ;BRANCH IF NOT
1038 014214  100461                          BMI     6$              ;BRANCH IF ERROR EXIST
1039 014216  013746  177776                  MOV     @#PS,-(SP)      ;SAVE THE PSW
1040 014222  012737  000240  177776          MOV     #<5*32.>,@#PS   ;LOAD PS 5
1041 014230  012700  004506                  MOV     #FMTDPB,R0      ;DPB ADDRESS
1042 014234  013704  027476                  MOV     RMADR,R4        ;MUSS BUS ADDRESS
1043 014240  013701  001224                  MOV     DRIVE,R1        ;DRIVE NUMBER
1044 014244  010164  000010                  MOV     R1,RMCS2(R4)    ;LOAD THE DRIVE NUMBER INTO CONTROLLER
1045 014250  016064  000012  000034          MOV     $CYL(R0),RMDC(R4) ;CYLINDER NUMBER
```

```
 1046 014256  016064  000010  000006          MOV     $SEC(R0),RMDA(R4) ;SECTOR AND TRACK NUMBER
 1047 014264  016064  000004  000002          MOV     $WRDM(R0),RMWC(R4) ;WORD COUNT
 1048 014272  016064  000006  000004          MOV     $BUF(R0),RMBA(R4) ;BUFFER ADDRESS
 1049 014300  012637  177776                  MOV     (SP)+,@#PS      ;LOAD THE PSW BACK
 1050 014304  112760  000200  000001          MOVB    #BIT7,$FMT(R0)  ;LOAD THE OFFSET DIRECTION
 1051 014312  005737  004504                  TST     OFFCOD          ;NEG ?
 1052 014316  001003                          BNE     2$              ;BRANCH IF NOT
 1053 014320  112760  000000  000001          MOVB    #0,$FMT(R0)     ;CHANGE TO OTHER DIRECTION
 1054 014326  112760  000115  000002  2$:     MOVB    #115,$COMND(R0) ;LOAD THE OFFSET COMMAND
 1055 014334  004037  030264                  JSR     R0,RM05         ;CALL THE DRIVE HANDLE
 1056 014340  004506                          FMTDPB
 1057 014342  000406                          BR      6$              ;BRANCH IF QUEUE FAILS
 1058 014344  005737  004524          3$:     TST     FMTDPB+16       ;OFFSET DONE ?
 1059 014350  001775                          BEQ     3$              ;BRANCH IF SO
 1060 014352  100402                          BMI     6$              ;BRANCH IF ERROR
 1061 014354  062705  000002                  ADD     #2,R5           ;ADJUST RETURN ADDRESS
 1062 014360                          6$:
 1063 014360  112637  004510                  MOVB    (SP)+,FMTDPB+$COMND     ;RESTORF THE I/O COMMAND
 1064 014364  012604                          MOV     (SP)+,R4        ;RESTORE REG
 1065 014366  012603                          MOV     (SP)+,R3
 1066 014370  012602                          MOV     (SP)+,R2
 1067 014372  012601                          MOV     (SP)+,R1
 1068 014374  000205                          RTS     R5              ;EXIT
 1069
 1070
 1071                                 ;MAKEUP ROUTINE
 1072                                 ;THIS ROUTINE ISSUES A WRITE CHECK OR READ  COMMAND TO THE SELECTED DRIVE
 1073                                 ;IN OFFSET MODE.
 1074                                 ;AND SET UP THE FOLLOWING PARAMETERS
 1075                                 ;
 1076                                 ;       DTUW    = PHYSICAL DRIVE NUMBER
 1077                                 ;       TRNSWT  = FMTDPB
 1078                                 ;       DRVACT  = 1
 1079                                 ;       TIMER   = 1 SECOND
 1080                                 ;
 1081                                 ;CALL
 1082                                 ;       JSR     PC,MAKEUP
 1083                                 ;       RET
 1084                                 ;
 1085                                 ;MAIN PURPOSE OF THIS ROUTINE,TO EXECUTE A COMMAND WHILE ASSURE THAT
 1086                                 ;THIS READ OR WRITE-CHECK COMMAND BEING EXECUTED IN OFFSET MODE.
 1087                                 ;ROUTINES USED TD,SC,STO,( IN DRIVE HANDLER )
 1088
 1089 014376  010146                  MAKEUP: MOV     R1,-(SP)
 1090 014400  010246                          MOV     R2,-(SP)
 1091 014402  010446                          MOV     R4,-(SP)
 1092 014404  012702  000151                  MOV     #WCKD,R2        ;WRITE CHECK DATA IN TEST 6
 1093 014410  022737  000010  001340          CMP     #10,TSTNM       ;ON TEST 8 ?
 1094 014416  001002                          BNE     1$              ;BRANCH IF NOT
 1095 014420  012702  000171                  MOV     #RDDAT,R2       ;READ DATA COMMAND IN TEST 8
 1096 014424  005037  004524          1$:     CLR     FMTDPB+16       ;CLEAR THE STATUS WORD
 1097 014430  110237  004510                  MOVB    R2,FMTDPB+$COMND ;LOAD THE COMMAND INTO PDB
 1098 014434  013737  001224  027462          MOV     DRIVE,DTUW      ;ACTIVE DRIVE NUMBER
 1099 014442  012737  004506  027410          MOV     #FMTDPB,TRNSWT  ;TRANSFER UNDERWAY FLAG
 1100 014450  013701  001224                  MOV     DRIVE,R1        ;DRIVE NUMBER
 1101 014454  013704  027476                  MOV     RMADR,R4        ;RH/RM BASE ADDRESS
 1102 014460  112761  000001  027340          MOVB    #1,DRVACT(R1)   ;ACTIVE DRIVE FLAG
```

```
1103 014466 006301                          ASL     R1              ;WORD INDEX
1104 014470 012761 060000 027442            MOV     #60000,TIMER(R1) ; ONE SECOND TIMER
1105 014476 006201                          ASR     R1
1106 014500 010264 000000  .                MOV     R2,RMCS1(R4)    ;ISSURE WRITE CHECK OR READ COMMAND
1107 014504 012604                          MOV     (SP)+,R4        ;RESTORE REG 4, 1
1108 014506 012602                          MOV     (SP)+,R2
1109 014510 012601                          MOV     (SP)+,R1
1110 014512 000207                          RTS     PC              ;EXIT
1111
1112                                ;SCORE ROUTINE
1113                                ;ROUTINE TO UPDATE THE TEST SCORE
1114                                ;       TABLEX  = ADDRESS OF CURRENT SCORE BOARD
1115                                ;       $DEVM   = LOGICAL DRIVE #
1116                                ;       DRIVE   = PHYSICAL DRIVE NUMBER
1117                                ;       CMSEC   = END SECTOR ADDRESS
1118                                ;       STARSC  = START SECTOR ADDRESS
1119                                ;
1120                                ;CALL
1121                                ;       JSR     PC,SCORE
1122                                ;       RET
1123
1124 014514                         SCORE:
     014514 010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
     014516 010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
     014520 010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
     014522 010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
1125 014524 023737 001362 001360            CMP     CMSEC,STARSC    ;CORRECT START AND STOP ADDRESSES
1126 014532 003473                          BLE     9$              ;BRANCH IF NOT
1127 014534 022737 000010 001340            CMP     #10,TSTNM       ;ON TEST 8
1128 014542 001011                          BNE     2$              ;BRANCH IF NOT (MUST BE TEST 6)
1129 014544 005737 004504                   TST     OFFCOD          ;NEGATIVE OFFSET ?
1130 014550 001403                          BEQ     1$              ;BRANCH IF NEGATIVE OFFSET
1131 014552 012703 003676                   MOV     #RDP0,R3        ;SCORE BOARD ADDRESS
1132 014556 000413                          BR      4$
1133 014560 012703 003216           1$:     MOV     #RDN0,R3        ;SCORE BOARD ADDRESS
1134 014564 000410                          BR      4$
1135 014566 005737 004504           2$:     TST     OFFCOD          ;NEGATIVE OFFSET
1136 014572 001403                          BEQ     3$              ;BRANCH,IF NEGATIVE OFFSET
1137 014574 012703 002536                   MOV     #OVWP0,R3       ;SCORE BOARD ADDRESS
1138 014600 000402                          BR      4$
1139 014602 012703 002056           3$:     MOV     #OVWN0,R3       ;SCORE BOARD ADDRESS
1140 014606 113702 004517           4$:     MOVB    FMTDPB+$TRK,R2  ;LOAD THE TRACK NUMBER
1141 014612 005702                          TST     R2              ;ON TRACK 0
1142 014614 001404                          BEQ     6$              ;BRANCH IF IT IS
1143 014616 062703 000020           5$:     ADD     #16.,R3         ;EACH SCORE BOARD TAKES 16 BYTES
1144 014622 005302                          DEC     R2              ;LOCATED ?
1145 014624 001374                          BNE     5$              ;BRANCH IF NOT
1146 014626 010337 002054           6$:     MOV     R3,TABLEX       ;STORE THE TABLE STARTING ADDRESS
1147 014632 010301                          MOV     R3,R1           ;RE ASSIGN REGISTERS
1148 014634 013702 001270                   MOV     $DEVM,R2        ;LOGICAL DRIVE #
1149 014640 013703 001360                   MOV     STARSC,R3       ;START SECTOR
1150 014644 116204 004424                   MOVB    INDST(R2),R4    ;LOCATE THE STARTING POINT FOR SCORE BOARD
1151 014650 060304                          ADD     R3,R4           ;UPDATE POINTER
1152 014652 022704 000017           11$:    CMP     #15.,R4         ;SHOULD POINTER BE ADJUSTED ?
1153 014656 003003                          BGT     7$              ;BR IF NO
1154 014660 162704 000020                   SUB     #16.,R4         ;ENTRY POINT AT THE SCORE BOARD
1155 014664 000772                          BR      11$             ;
```

```
1156 014666  060401                    7$:     ADD     R4,R1           ;
1157 014670  023703  001362            8$:     CMP     CMSEC,R3        ;ENDING SECTOR REACHED ?
1158 014674  002412                            BLT     9$              ;BRANCH IF IT IS
1159 014676  105221                            INCB    (R1)+           ;INC SCORE AND POINT TO NEXT LOGICAL DRIVE
1160 014700  005204                            INC     R4              ;INCREMENT LOGICAL DRIVE #
1161 014702  005203                            INC     R3              ;INCREMENT SECTOR COUNT
1162 014704  022704  000017                    CMP     #15.,R4         ;TIME TO RESET TABLE ?
1163 014710  002367                            BGE     8$              ;BRANCH IF NOT
1164 014712  013701  002054                    MOV     TABLEX,R1       ;RESET TABLE ADDRESS
1165 014716  005004                            CLR     R4              ;LOGICAL DRIVE 0
1166 014720  000763                            BR      8$              ;LOOPING BACK
1167 014722                            9$:
     014722  012604                            MOV     (SP)+,R4        ;;POP STACK INTO R4
     014724  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
     014726  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
     014730  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
1168 014732  000207                            RTS     PC
1169
1170
1171                                   ;LABAD ROUTINE
1172                                   ;LOCATE THE START SECTOR AND THE TERMINATE SECTOR OF THE PREVIOUS
1173                                   ;OPERATION.
1174                                   ;       STARSC  = STARTING SECTOR
1175                                   ;       CMSEC   = ENDING SECTOR
1176                                   ;
1177                                   ;INFORMATION FROM $RMDA(FMTDPB),$RMWC(FMTDPB),$SEC(FMTDPB)
1178                                   ;                 $SEC(FMTDPB),$WRDM(FMTDPB)
1179                                   ;CALL
1180                                   ;       JSR     PC,LABAD
1181                                   ;       RET
1182
1183 014734                            LABAD:
     014734  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
     014736  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
1184 014740  012700  004506                    MOV     #FMTDPB,R0      ;DPB ADDRESS
1185 014744  116002  000026                    MOVB    $RMDA(R0),R2    ;HARDWARE TERMINATING SECTOR
1186 014750  042702  177740                    BIC     #177740,R2      ;CHOP OFF HIGH ORDER BITS IF ANY
1187 014754  116037  000010  001360            MOVB    $SEC(R0),STARSC ;STARTING SECTOR ADDRESS
1188 014762  005702                            TST     R2              ;TERMINATOR AT 0 SECTOR
1189 014764  001404                            BEQ     1$              ;BRANCH IF IT IS
1190 014766  005302                            DEC     R2              ;DECREMENT ONE SECTOR COUNT
1191 014770  010237  001362                    MOV     R2,CMSEC        ;ENDING SECTOR ADDRESS
1192 014774  000416                            BR      3$              ;EXIT
1193 014776  005760  000022            1$:     TST     $RMWC(R0)       ;WORD COUNT = 0
1194 015002  001410                            BEQ     2$              ;BRANCH IF IT IS
1195 015004  026060  000022  000004            CMP     $RMWC(R0),$WRDM(R0) ; WORD COUNT CHANGED AT ALL ?
1196 015012  001004                            BNE     2$              ;BRANCH IF CHANGED
1197 015014  116037  000010  001362            MOVB    $SEC(R0),CMSEC ;END SECTOR = START SECTOR
1198 015022  000403                            BR      3$              ;EXIT
1199 015024  112737  000037  001362    2$:     MOVB    #31.,CMSEC      ;END AT SECTOR 31
1200 015032                            3$:
     015032  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
     015034  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
1201 015036  000207                            RTS     PC
1202
1203                                   ;TEST 7
1204                                   ;SELF TEST:WRITE CYLINDERS $DEVM+17,$DEVM+17+128,$DEVM+17+128X2,ETC.
```

```
                                        ;THEN EXECUTE WRITE CHECK TO DETECT ANY DATA OR HEADER PROBLEM
                                        ;FOR THE SELECTED LOGICAL DRIVE
                                        ;$DEVM: LOGICAL DRIVE #
                                        ;DRIVE:         PHYSICAL DRIVE #
                                        ;
                                        ;*****************************************************************
015040  000004                  TST7:   SCOPE
015042  012737  000001  001176          MOV     #1,$TIMES       ;;DO 1 ITERATION
015050  004737  027514                  JSR     PC,RMINIT       ;INITIAL THE DRIVE
015054  012737  177777  027436          MOV     #-1,SAVEFG      ;SAVE THE RH REG'S
015062  012737  177777  027440          MOV     #-1,SEEKFG
015070  012737  000007  001340          MOV     #7,TSTNM        ;LOAD TEST NUMBER
015076  012706  001100                  MOV     #STACK,SP       ;INITIAL THE STACK
015102  012702  004356                  MOV     #SELF0,R2       ;CLEAR THE SELF TEST SCORE BOARDS
                                1$:     CLR     (R2)+           ;
015106  022702  004422                  CMP     #SELF18,R2      ;ALL DONE ?
015110  103374                          BHIS    1$              ;BRANCH IF NOT
015114  012700  004506                  MOV     #FMTDPB,R0              ;SET UP DPB
015116  012760  160000  000004          MOV     #-8192.,$WRDM(R0) ;LOAD FULL TRACK WORD COUNT
015122  112760  000161  000002          MOVB    #WRTDAT,$COMND(R0)      ;WRITE DATA COMMAND
015130  005060  000010                  CLR     $SEC(R0)                ;SECTOR 0,TRACK 0
015136  113710  001224                  MOVB    DRIVE,(R0)              ;LOAD PHY. DRIVE
015142  013702  001270                  MOV     $DEVM,R2                ;LOCATE THE STARTING CYLINDER
015146  062702  000021                  ADD     #17.,R2
015152  010260  000012                  MOV     R2,$CYL(R0)             ;CYLINDER ADDRESS
015156  012760  043032  000006          MOV     #BUFFER,$BUF(R0)        ;RESET BUFFER ADDRESS
015162  012760  004526  000014          MOV     #RM.REG,14(R0)          ;ADDRESS TO SAVE ALL RH/RM REG'S
015170  004737  020742                  JSR     PC,FILBUF               ;FILL THE BUFFER WITH WORSE CASE PATTERN
015176  004037  030264          2$:     JSR     R0,RM05                 ;CALL DRIVER HANDLER
015202  004506                          FMTDPB
015206  000774                          BR      2$                      ;BRANCH IF QUEUE FAILS
015210  005737  004524          3$:     TST     FMTDPB+16               ;ALL DONE ?
015212  001775                          BEQ     3$                      ;BRANCH IF NOT
015216  012700  004506                  MOV     #FMTDPB,R0              ;REPORT IF ANY ERROR
015220  004737  017352                  JSR     PC,PROCES
015224  005760  000016                  TST     16(R0)          ;ERROR FLAG SET ?
015230  100010                          BPL     22$             ;BRANCH IF NOT
015234  004737  027514                  JSR     PC,RMINIT       ;INITIAL THE DRIVE
015236  012737  177777  027436          MOV     #-1,SAVEFG
015242  012737  177777  027440          MOV     #-1,SEEKFG
015250  105260  000011          22$:    INCB    $TRK(R0)        ;NEXT TRACK
015256  126037  000011  001372          CMPB    $TRK(R0),TRKLMT ;ALL TRACK ARE DONE ?
015262  003744                          BLE     2$              ;BRANCH IF NOT
015270  005060  000010                  CLR     $SEC(R0)        ;RESET SECTOR AND TRACK
015272  062760  000200  000012          ADD     #128.,$CYL(R0)  ;ADVANCE TO NEXT ZONE
015276  022760  001440  000012          CMP     #800.,$CYL(R0)  ; ALL 7 ZONES ARE DONE ?
015304  103333                          BHIS    2$              ;BRANCH IF NOT
015312
                                        ;EXECUTE WRITE CHECK TO DETECT ANY DATA OR HEADER PROBLEM
015314  112760  000151  000002          MOVB    #WCKD,$COMND(R0)        ;CHANGE TO WRITE CHECK COMMAND
015322  012702  004356                  MOV     #SELF0,R2               ;R2 POINTS TO SCORE BOARD
                                                                        ;CAN NOT BE DESTORIED
015326  013703  001270                  MOV     $DEVM,R3                ;LOACATE STARTING ADDRESS
015332  062703  000021                  ADD     #17.,R3
015336  010360  000012                  MOV     R3,$CYL(R0)             ;STARTING CYLINDER
015342  005037  004504                  CLR     OFFCOD                  ;SET NEGATIVE OFFSET FLAG
```

```
1260 015346  004037  030264          4$:   JSR     R0,RM05         ·CALL DRIVE HANDLER
1261 015352  004506                        FMTDPB
1262 015354  000774                        BR      4$              ;BRANCH IF QUEUE FAILS
1263 015356  005737  004524          5$:   TST     FMTDPB+16       ;ALL DONE ?
1264 015362  001775                        BEQ     5$              ;BRANCH IF NOT
1265 015364  012700  004506                MOV     #FMTDPB,R0
1266 015370  004737  017352                JSR     PC,PROCFS
1267 015374  005760  000016                TST     16(R0)          ;ANY ERROR
1268 015400  100401                        BMI     6$              ;YES,THEN DON'T INCREMENT SCORE
1269 015402  105212                        INCB    (R2)            ;INCREMENT SCORE
1270 015404  004537  014144          6$:   JSR     R5,OFFST        ;OFFSET
1271 015410  000415                        BR      8$              ;BRANCH IF OFFSET FAILS
1272 015412  004737  014376                JSR     PC,MAKEUP       ;EXECUTE WRITE CHECK IN OFFSET MODE
1273 015416  005737  004524          7$:   TST     FMTDPB+16       ;ALL DONE /
1274 015422  001775                        BEQ     7$              ;BRANCH IF NOT
1275 015424  012700  004506                MOV     #FMTDPB,R0
1276 015430  004737  017352                JSR     PC,PROCES       ;REPORT IF ANY ERROR
1277 015434  005760  000016                TST     16(R0)          ;ERROR BIT SET ?
1278 015440  100401                        BMI     8$              ;DON'T INCREMENT SCORE
1279 015442  105212                        INCB    (R2)            ;INCREMENT SCORE
1280 015444  005737  004504          8$:   TST     OFFCOD          ;POSITIVE OFFSET IS DONE ?
1281 015450  001006                        BNE     9$              ;BRANCH ,IF DONE
1282 015452  005202                        INC     R2              ;INCREMENT SCORE BOARD POINTER
1283 015454  012737  000001  004504        MOV     #1,OFFCOD       ;SET POSITIVE OFFSET FLAG
1284 015462  000137  015346                JMP     4$              ;POSITIVE OFFSET TEST
1285 015466  105260  000011          9$:   INCB    $TRK(R0)        ;INCREMENT TO NEXT TRACK
1286 015472  005202                        INC     R2              ;ADVANCE SCORE BOARD POINTER
1287 015474  126037  000011  001372        CMPB    $TRK(R0),TRKLMT ;ALL TRACKS ARE DONE ?
1288 015502  003004                        BGT     10$             ;BRANCH , IF ALL DONE
1289 015504  005037  004504                CLR     OFFCOD          ;RESET OFFSET DIRECTION
1290 015510  000137  015346                JMP     4$              ;TRY THE NEXT TRACK
1291 015514  005060  000010          10$:  CLR     $SEC(R0)        ;TRACK 0, SECTOR 0
1292 015520  012702  004356                MOV     #SELF0,R2       ;RESET SCORE BOARD
1293 015524  062760  000200  000012        ADD     #128.,$CYL(R0)  ;ADVANCE TO NEXT ZONE
1294 015532  022760  001440  000012        CMP     #800.,$CYL(R0)  ;ALL 7 ZONES ARE DONE ?
1295 015540  103404                        BLO     11$             ;BRANCH ,IF ALL DONE
1296 015542  005037  004504                CLR     OFFCOD          ;RESET OFFSET FLAG
1297 015546  000137  015346                JMP     4$              ;TO NEXT ZONE
1298 015552  000240                11$:    NOP                     ;TO NEXT TEST
1299
1300                                ;TEST10  TEST 8     READ COMPATIBLE TEST
1301                                ;CYLINDERS TESTED : $DEVM+112,$DEVM+112+128XN   N=1 TO 5
1302                                ;THIS TEST SELECT ONE CYLINDER FOR EACH LOGICAL DRIVE FROM
1303                                ;ZONE 1 TO ZONE 6
1304                                ;
1305                                ;       $DEVM   = LOGICAL DRIVE #
1306                                ;       DRIVE   = PHYSICAL DRIVE #
1307
1308                                ;;*****************************************************************
     015554  000004                TST10:  SCOPE
     015556  012737  000001  001176        MOV     #1,$TIMES       ;;DO 1 ITERATION
1309 015564  012737  000010  001340        MOV     #10,TSTNM       ;LOAD TEST NUMBER
1310 015572  012706  001100                MOV     #STACK,SP       ;INITAIL THE STACK POINTER
1311 015576  012702  003216                MOV     #RDN0,R2        ;CLEAR THE SCORE BOARD OF READ TEST
1312 015602  005022                1$:     CLR     (R2)+
1313 015604  022702  004356                CMP     #RDP18+16.,R2   ;ALL DONE
1314 015610  101374                        BHI     1$              ;BRANCH IF NOT
```

```
1315 015612  005037  004504                    CLR     OFFCOD          ;SET NEGATIVE OFFSET FLAG
1316 015616  012700  004506          LOOP3:    MOV     #FMTDPB,R0      ;SET UP DPB BLOCK
1317 015622  012760  160000  000004            MOV     #-8192.,$WRDM(R0) ;LOAD THE WORD CTR,FULL TRACK
1318 015630  005060  000010                    CLR     $SEC(R0)        ;TRACK 0 AND SECTOR 0
1319 015634  112760  000171  000002            MOVB    #RDDAT,$COMND(R0) ;LOAD THE READ DATA COMMAND
1320 015642  012760  043032  000006            MOV     #BUFFER,$BUF(R0) ;RESET BUFFER ADDRESS
1321 015650  012760  004526  000014            MOV     #RM.REG,14(R0)  ;ADDRESS TO SAVE ALL RH/RM ADDRESS
1322 015656  113710  001224                    MOVB    DRIVE,(R0)      ;LOAD PHY. DRIVE ADDRESS
1323 015662  013703  001270                    MOV     $DEVM,R3        ;LOCATE STARTING CYL
1324 015666  062703  000160                    ADD     #112.,R3
1325 015672  010360  000012                    MOV     R3,$CYL(R0)     ;STARTING CYL ADDRESS
1326 015676  004037  030264          1$:       JSR     R0,RM05         ;CALL THE DRIVE HANDLER
1327 015702  004506                            FMTDPB
1328 015704  000774                            BR      1$
1329 015706  005737  004524          2$:       TST     FMTDPB+16       ;COMMAND DONE ?
1330 015712  001775                            BEQ     2$              ;BRANCH IF NOT
1331 015714  012700  004506                    MOV     #FMTDPB,R0
1332 015720  004737  017352                    JSR     PC,PROCES       ;REPORT IF ANY ERROR
1333 015724  004737  014734                    JSR     PC,LABAD        ;LOACATE START AND STOP ADDRESS
1334 015730  005760  000016                    TST     16(R0)          ;ANY ERROR ?
1335 015734  100011                            BPL     3$              ;BRANCH,IF NONE
1336 015736  004737  027514                    JSR     PC,RMINIT       ;INITIAL THE SYSTEM
1337 015742  012737  177777  027436            MOV     #-1,SAVEFG
1338 015750  012737  177777  027440            MOV     #-1,SEEKFG
1339 015756  000414                            BR      5$              ;NOT INCREMENT THE SCORE
1345 015760  004737  014514          3$:       JSR     PC,SCORE        ;UPDATE THE SCORE
1346 015764  005760  000022          4$:       TST     $RMWC(R0)       ;WORD COUNT= 0
1347 015770  001407                            BEQ     5$              ;BRANCH IIF IT IS
1348 015772  116060  000026  000010            MOVB    $RMDA(R0),$SEC(R0) ;UPDATE THE NEW STARTING SECTOR
1349 016000  016060  000022  000004            MOV     $RMWC(R0),$WRDM(R0) ;UPDATE WORD COUNT
1350 016006  000733                            BR      1$              ;CONTINUE
1351 016010  012700  004506          5$:       MOV     #FMTDPB,R0      ;RESET THE DPB BLOCK
1352 016014  012760  160000  000004            MOV     #-8192.,$WRDM(R0)   ;FULL TRACK WORD COUNT
1353 016022  105060  000010                    CLRB    $SEC(R0)        ;RESET TO SECTOR 0,TRACK NOT CHANGED
1354 016026  004537  014144          6$:       JSR     R5,OFFST        ;CALL OFFSET
1355 016032  000443                            BR      10$             ;BRANCH IF OFFSET FAILS
1356 016034  004737  014376                    JSR     PC,MAKEUP       ;EXECUTE READ DATA IN OFFSET MODE
1357 016040  005737  004524          7$:       TST     FMTDPB+16       ;OFFSET READ IS DONE ?
1358 016044  001775                            BEQ     7$              ;BRANCH IF NOT
1359 016046  012700  004506                    MOV     #FMTDPB,R0      ;REPORT IF ANY ERROR
1360 016052  004737  017352                    JSF     PC,PROCES
1361 016056  004737  014734                    JSR     PC,LABAD        ;LOCATE THE START AND STOP ADDRESSES
1362 016062  005760  000016                    TST     16(R0)          ;ANY ERROR ?
1363 016066  100011                            BPL     8$              ;BRANCH,IF NONE
1364 016070  004737  027514                    JSR     PC,RMINIT       ;INITIAL THE SYSTEM
1365 016074  012737  177777  027436            MOV     #-1,SAVEFG
1366 016102  012737  177777  027440            MOV     #-1,SEEKFG
1367 016110  000414                            BR      10$             ;NOT UPDATE THE SCORE
1373 016112  004737  014514          8$:       JSR     PC,SCORE        ;UPDATE THE SCORE
1374 016116  005760  000022          9$:       TST     $RMWC(R0)       ;WORD COUNT IS 0
1375 016122  001407                            BEQ     10$             ;BRANCH IF IT IS
1376 016124  116060  000026  000010            MOVB    $RMDA(R0),$SEC(R0)  ;UPDATE SECTOR ADDRESS
1377 016132  016060  000022  000004            MOV     $RMWC(R0),$WRDM(R0) ;UPDATE WORD COUNT
1378 016140  000732                            BR      6$              ;LOOPING UNTIL CURRENT TRACK IS DONE
1379 016142  062760  000200  000012  10$:       ADD     #128.,$CYL(R0)  ;ADJUST CYLINDER TO NEXT ZONE
1380 016150  022760  001377  000012            CMP     #767.,$CYL(R0)          ;ALL 6 ZONES ARE DONE ?
1381 016156  103402                            BLO     11$             ;BRANCH IF ALL DONE
```

```
1382 016160  000137  015676                    JMP     1$
1383
1384 016164  013703  001270          11$:      MOV     $DEVM,R3        ;LOCATE STARTING CYLINDER
1385 016170  062703  000160                    ADD     #112.,R3        ;
1386 016174  010360  000012                    MOV     R3,$CYL(R0)     ;STARTING CYLINDER
1387 016200  105260  000011                    INCB    $TRK(R0)        ;TO NEXT TRACK
1388 016204  126037  000011  001372            CMPB    $TRK(R0),TRKLMT ;ALL SRUFACE ARE DONE ?
1389 016212  003002                            BGT     12$             ;BRANCH IF ALL DONE
1390 016214  000137  015676                    JMP     1$              ;LOOPING UNTIL CURRENT TRACK IS DONE
1391
1392 016220  005737  004504          12$:      TST     OFFCOD          ;OFFSET CODE = POSITIVE ?
1393 016224  001005                            BNE     13$             ;IF EQUAL,THEN ALL DONE
1394 016226  012737  000001  004504            MOV     #1,OFFCOD       ;SET POSITIVE OFFSET FLAG
1395 016234  000137  015616                    JMP     LOOP3
1396 016240  000240                  13$:      NOP                     ;TO NEXT TEST
1397
1398                                 ;TEST11  TEST 9
1399                                 ;REPORT THE TEST SCORES
1400                                 ;DIRECT THE OPERATOR TO CHANGE PACK AND MOUNT TO OTHER DIRVE
1401                                 ;
1402                                 ;       $DEVM   = LOGICAL DRIVE #, SHOULD NOT BE UPDATED BEFORE THE
1403                                 ;                 REPORT IS COMPLETED.
1404                                 ;
1405                                 ;       BADSEC  = 0, (DRIVES ARE COMPATIBLE)
1406                                 ;               = -1, (DRIVES NOT COMPATIBLE)
1407                                 ;
1408                                 ;       CMTRK   = TRACK NUMBER FOR CONTROLLING THE SCORE TYPING.
1409
1410                                 ;;*****************************************************************
     016242  000004                  TST11:  SCOPE
     016244  012737  000001  001176          MOV     #1,$TIMES       ;;DO 1 ITERATION
1411 016252  012737  000011  001340          MOV     #11,TSTNM       ;LOAD THE TEST NUMBER
1412 016260  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
1413 016264  005046                          CLR     -(SP)           ;DUMMY SCORE BOARD ADDRESSES
1414 016266  005046                          CLR     -(SP)           ;       ''      ''
1415 016270  012746  004357                  MOV     #SELF0+1,-(SP)  ;POSITIVE OFFSET READ TEST SCORE ADDRESS
1416 016274  012746  003676                  MOV     #RDP0,-(SP)     ;POSITIVE OFFSET TEST SCORE
1417 016300  012702  004356                  MOV     #SELF0,R2       ;NEGATIVE OFFSET READ TEST SCORE
1418 016304  012703  003216                  MOV     #RDN0,R3        ;NEGATIVE OFFSET READ COMPATIBLE TEST SCORE
1419 016310  013701  001372          1$:     MOV     TRKLMT,R1       ;R1= TRACK NUMBER
1420 016314  122712  000007          2$:     CMPB    #7,(R2)         ;SELF READ TEST SCORE IS TOO LOW
1421 016320  101411                          BLOS    4$              ;BRANCH IF NOT
1422 016322  012705  000020                  MOV     #16.,R5         ;INCREMENT READ COMPATIBLE SCORE FOR ALL 16 DIRVES
1423 016326  111304          3$:     MOVB    (R3),R4         ;ADJUST SCORE BY ADDING 6
1424 016330  062704  000006                  ADD     #6,R4
1425 016334  110423                          MOVB    R4,(R3)+        ;UPDATE SCORE AND POINTS TO NEXT DRIVE
1426 016336  005305                          DEC     R5              ;ALL DRIVES ARE UPDATED ?
1427 016340  001372                          BNE     3$              ;BRANCH IF NOT
1428 016342  000402                          BR      5$
1429 016344  062703  000020          4$:     ADD     #16.,R3         ;ADJUST POINTER OF SCORE BOARD ADDRESS
1430 016350  062702  000002          5$:     ADD     #2,R2           ;UPDATE THE SELF TEST SCORE ADDRESS
1431 016354  005301                          DEC     R1              ;ALL TRACKS DONE ?
1432 016356  002356                          BGE     2$              ;BRANCH IF NOT
1433 016360  012603                          MOV     (SP)+,R3        ;GET NEXT PAIR
1434 016362  012602                          MOV     (SP)+,R2
1435 016364  001351                          BNE     1$
1436
```

```
1437                                    ;SET ACCEPTANCE FLAG, INITIALIZE THE TABLE POINTERS AND TRACK NUMBER
1438
1439 016366  005037  001342                    CLR     BADSEC              ;SET ACCEPTANCE FLAG
1440 016372  005037  001364                    CLR     CMTRK               ;START FROM TRACK 0
1441 016376  005001                            CLR     R1                  ;START FROM LOG DRV 0
1442 016400  012702  002056                    MOV     #OVWN0,R2           ;SCORE BOARD BASE ADDRESS
1443 016404  012703  000001                    MOV     #BIT0,R3            ;BIT POSITION FOR LOG DRV 0
1444 016410  030337  002006            LOOP4:  BIT     R3,ASNLST           ;IS THE LOG DRV UNDER TEST ?
1445 016414  001502                            BEQ     LOOP5               ;BRANCH IF NOT
1446 016416  005037  001366                    CLR     NULINE              ;NEW LINE INDICATOR
1447 016422  123701  001270                    CMPB    $DEVM,R1            ;SELF SCORE ?
1448 016426  001434                            BEQ     SPATH               ;BRANCH IF IT IS
1449 016430  122712  000016            KPATH:  CMPB    #14.,(R2)           ;OVERWRITE NEG OFFSET < 14 ?
1450 016434  101403                            BLOS    1$                  ;BRANCH IF NOT
1451 016436  004537  017052                    JSR     R5,PRINT            ;REPORT EXCEPTIONS
1452 016442  000001                            000001                      ;COLUMN POSITION ON REPORT
1453 016444  122762  000016  000460    1$:     CMPB    #14.,OVWP0-OVWN0(R2)    ;OVERWRITE POS OFFSET < 14 ?
1454 016452  101403                            BLOS    2$                  ;BRANCH IF NOT
1455 016454  004537  017052                    JSR     R5,PRINT            ;REPORT EXECPTIONS
1456 016460  000002                            000002                      ;COLUMN POSITION ON REPORT
1457 016462  122762  000014  001140    2$:     CMPB    #12.,RDN0-OVWN0(R2)     ;READ NEG OFFSET < 6
1458 016470  101403                            BLOS    3$                  ;BRANCH IF NOT
1459 016472  004537  017052                    JSR     R5,PRINT            ;REPORT EXCEPTIONS
1460 016476  000003                            000003                      ;COLUMN POSITION ON REPORT
1461 016500  122762  000014  001620    3$:     CMPB    #12.,RDP0-OVWN0(R2)     ;READ POS OFFSET < 12 ?
1462 016506  101403                            BLOS    4$                  ;BRANCH IF NOT
1463 016510  004537  017052                    JSR     R5,PRINT            ;REPORT EXECPTIONS
1464 016514  000004                            000004                      ;COLUMN POSITION ON REPORT
1465 016516  000441                    4$:     BR      LOOP5               ;EXIT
1466
1467 016520  122712  000016            SPATH:  CMPB    #14.,(R2)           ;OVERWRITE NEG OFF < 14
1468 016524  101403                            BLOS    1$                  ;BRANCH IF NOT
1469 016526  004537  017052                    JSR     R5,PRINT            ;REPORT EXECPTION
1470 016532  000001                            000001                      ;COLUMN POSITION ON REPORT
1471 016534  122762  000016  000460    1$:     CMPB    #14.,OVWP0-OVWN0(R2)    ;OVERWRITE POS OFFSET < 14
1472 016542  101403                            BLOS    2$                  ;BRANCH IF NOT
1473 016544  004537  017052                    JSR     R5,PRINT            ;REPORT EXCEPTION
1474 016550  000002                            000002                      ;COLUMN POSITION ON REPORT
1475 016552  013704  001364            2$:     MOV     CMTRK,R4            ;LOCATE THE SELF TEST SCORE
1476 016556  006304                            ASL     R4                  ;WORD INDEX
1477 016560  122764  000006  004356            CMPB    #6,SELF0(R4)        ;SELF READ NEG OFFSET < 6 ?
1478 016566  101403                            BLOS    3$                  ;BRANCH IF NOT
1479 016570  004537  017052                    JSR     R5,PRINT
1480 016574  000003                            000003                      ;REPORT EXCEPTIONS
1481 016576  013704  001364            3$:     MOV     CMTRK,R4            ;LOCATE THE SELF TEST SCORE
1482 016602  006304                            ASL     R4                  ;WORD INDEX
1483 016604  122764  000006  004357            CMPB    #6,SELF0+1(R4)      ;SELF READ POS OFFSET < 6 ?
1484 016612  101403                            BLOS    4$                  ;BRANCH IF NOT
1485 016614  004537  017052                    JSR     R5,PRINT            ;REPORT EXCEPTIONS
1486 016620  000004                            C00004                      ;COLUMN POSITION FOR REPORT PRINTING
1487 0'6622                             4$:
1488
1489 016622  005201                    LOOP5:  INC     R1                  ;INCREASE THE LOGICAL DRIVE #
1490 016624  000241                            CLC                         ;ADJUST THE BIT POSITION
1491 016626  006103                            ROL     R3                  ;POINTS TO NEXT DRIVE
1492 016630  005202                            INC     R2                  ;UPDATE SCORE BOARD BASE ADDRESS
1493 016632  022701  000017                    CMP     #15.,R1             ;ALL DRIVES ARE CHECK ?
```

```
1494 016636  103264                    BHIS    LOOP4           ;BRANCH IF NOT ALL DONE
1495 016640  005237  001364    LOOP6:  INC     CMTRK           ;NEXT TRACK
1496 016644  012702  002056            MOV     #OVWNO,R2       ;RESET SCORE BOARD BASE ADDRESS
1497 016650  005001                    CLR     R1              ;LOGICAL DRIVE START FROM 0
1498 016652  013703  001364            MOV     CMTRK,R3        ;LOCATE THE SCORE BOARD BASE ADDRESS
1499 016656  001404                    BEQ     2$              ;BRANCH IF ON TRACK 0
1500 016660  062702  000020    1$:     ADD     #16.,R2         ;FOR EACH TRACK, 16 BYTES
1501 016664  005303                    DEC     R3              ;ALL TRACK DONE ?
1502 016666  001374                    BNE     1$              ;BRANCH IF NOT
1503 016670  012703  000001    2$:     MOV     #BIT0,R3        ;BIT MAP POSITION FOR DRIVE 0
1504
1505                           ;AT THIS POINT:
1506                           ;       R1      = LOGICAL DRIVE # START FROM 0
1507                           ;       R2      = ADDRESS OF SCORE BOARD BASE ADDRESS
1508                           ;       R3      = BIT MAP, INDICATE LOGICAL DRIVE 0=1
1509
1510 016674  123737  001364  001372      CMPB    CMTRK,TRKLMT    ;ALL TRACKS ARE DONE ?
1511 016702  003642                    BLE     LOOP4           ;NO
1512 016704  005737  001342            TST     BADSEC          ;WAS SCORE PRINTED ?
1513 016710  001402                    BEQ     DISMNT          ;BR IF NO
1514 016712  104401  001207            TYPE    ,$CRLF          ;CR-LF
1518
1519 016716  104401  001207    DISMNT: TYPE    ,$CRLF          ;CR-LF
1520 016722  012777  017344  010550    MOV     #IDLEX,@RMVEC   ;RESET THE INTERRUPT VECTOR
1521 016730  005077  010546            CLR     @RMVEC+2        ;CLEAR THE INTERRUPT VECTOR
1522 016734  104401  041650            TYPE    ,MESG12         ;UNLOAD AND DISMOUNT MESSAGE
1523 016740  104401  001274            TYPE    ,$CDW2          ;SYSTEM NAME
1524 016744  013746  001224            MOV     DRIVE,-(SP)     ;PHYSICAL DRIVE NUMBER
1525 016750  104403                    TYPOS
1526 016752     001                    .BYTE   1
1527 016753     000                    .BYTE   0
1528 016754  104401  041666            TYPE    ,MESG13         ;MESSAGE TYPE <CR> WHEN READY
1529
1530 016760  104411    1$:     RDLIN                           ;READ IN ONE LINE
1531 016762  012605            MOV     (SP)+,R5        ;LOCATE THE READ IN LINE
1532 016764  105715            TSTB    (R5)            ;CARRIAGE RETURN ?
1533 016766  001374            BNE     1$              ;BR IF NO
1534 016770  005002    DEASG:  CLR     R2              ;LOGICAL DRIVE NUMBER
1535 016772  012703  000001    MOV     #BIT0,R3        ;BIT MAP OF ASSIGNED DRIVE
1536 016776  020237  001270    1$:     CMP     R2,$DEVM        ;IS THE LOGICAL DRIVE UNDER TEST ?
1537 017002  001404            BEQ     2$              ;BRANCH IF IT IS
1538 017004  000241            CLC                     ;SHIFT THE BIT MAP FOR
1539 017006  006103            ROL     R3              ;NEXT DRIVE
1540 017010  005202            INC     R2              ;INCREMENT THE LOGICAL DRIVE #
1541 017012  000771            BR      1$              ;LOOPING ,UNTIL THE LOGICAL DRIVE LOCATED
1542 017014  040337  002012    2$:     BIC     R3,ASSGN2       ;CLEAR THE ASSIGNED BIT
1543 017020  001412            BEQ     XEND2           ;BRANCH IF NO MORE DRIVES
1544 017022  005237  001270            INC     $DEVM           ;INCREMENT THE LOGICAL DRIVE #
1545 017026  013702  001270            MOV     $DEVM,R2        ;UPDATE SYSTEM BLOCK ADDRESS
1546 017032  006302            ASL     R2
1547 017034  016237  004444  001272    MOV     BLKADR(R2),$CDW1        ;SYSTEM BLOCK ADDRESS
1548 017042  000137  012672            JMP     TST5            ;JUMP TO TEST 5 FOR OTHER DRIVE
1549
1550 017046  000137  023420    XEND2:  JMP     $EOP    ;END OF PASS
1551
1552
1553                           ;PRINT ROUTINE
```

```
1554                                    ;NAME PRINT
1555                                    ;PRINT EXCEPTIONS FOR TEST SCORE
1556                                    ;PARAMETER USED
1557                                    ;       NULINE  = 0     A NEW LINE TO PRINT
1558                                    ;               = 1 - 4 COLUMN NUMBER TO PRINT THE EXCEPTION MARK
1559                                    ;
1560                                    ;       BADSEC  = 0     FIRST EXCEPTION DETECTED
1561                                    ;       BADSEC  = -1    NOT FIRST EXCEPTION (DON'T PRINT THE TITLE)
1562                                    ;
1563                                    ;CALL
1564                                    ;       JSR     R5,PRINT
1565                                    ;       NUMBER                  COLUMN NUMBER
1566                                    ;       RET
1567                                    ;
1568                                    ;       R1      = LOGICAL DRIVE #
1569                                    ;       $DEVM   = LOGICAL DRIVE UNDER TEST
1570                                    ;       R3      = BIT POSITION OF LOGICAL DRIVE IN R1
1571                                    ;
1572
1573 017052                            PRINT:
       017052  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
       017054  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
       017056  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
       017060  010446                           MOV     R4,-(SP)        ;;PUSH R4 ON STACK
1574 017062  005737  001342                    TST     BADSEC          ;FIRST EXCEPTION
1575 017066  100434                            BMI     1$              ;BRANCH IF NOT,DON'T HAVE TO PRINT
1576                                                                   ;TITLE
1577 017070  104401  001207                    TYPE    ,$CRLF          ;CRLF
1578 017074  104401  042021                    TYPE    ,MESG16         ;SCORES FOR DRIVE --
1579 017100  104401  001274                    TYPE    ,$CDW2          ;SYSTEM NAME
1580 017104  013746  001224                    MOV     DRIVE,-(SP)     ;TYPE THE PHYSICAL DRIVE #
1581 017110  104403                            TYPOS
1582 017112     001                            .BYTE   1
1583 017113     000                            .BYTE   0
1584 017114  104401  001207                    TYPE    ,$CRLF          ;CR-LF
1585 017120  104401  001207                    TYPE    ,$CRLF          ;CR-LF
1586 017124  104401  042043                    TYPE    ,MESG17         ;SUB TITLE 1
1587 017130  104401  001207                    TYPE    ,$CRLF          ;CR-LF
1588 017134  104401  042124                    TYPE    ,MESG18         ;SUB TITLE 2
1589 017140  104401  001207                    TYPE    ,$CRLF          ;CR-LF
1590 017144  012737  177777  001342            MOV     #-1,BADSEC      ;RESET THE ACCEPTANCE FLAG
1591 017152  012737  000001  001376            MOV     #1,FAULT        ;NOT COMPATIBLE FLAG
1592 017160  005737  001366           1$:      TST     NULINE          ;NEW LINE ?
1593 017164  001042                            BNE     5$              ;BRANCH IF NOT
1594 017166  104401  001207                    TYPE    ,$CRLF          ;CR-LF
1595 017172  013746  001364                    MOV     CMTRK,-(SP)     ;;SAVE CMTRK FOR TYPEOUT
       017176  104405                           TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
1596 017200  104401  042213                    TYPE    ,TAB            ;TYPE 'TAB' CHARACTER
1597 017204  123701  001270                    CMPB    $DEVM,R1        ;SCORE FOR $DEVM ITSELF ?
1598 017210  001007                            BNE     2$              ;BRANCH IF NOT
1599 017212  104401  042326                    TYPE    ,BLNKS3         ;TYPE 3 BLANKS
1600 017216  104401  042206                    TYPE    ,SELFX          ;MESSAGE 'SELF'
1601 017222  104401  042213                    TYPE    ,TAB            ;TYPE TAB
1602 017226  000416                            BR      4$              ;NEXT STEP
1603 017230  006301                   2$:      ASL     R1              ;LOCATE THE SYS HISTORY FILE
1604 017232  016137  004444  017256            MOV     BLKADR(R1),3$   ;LOCATE THE SYSTEM NAME AND DRIVE #
1605 017240  006201                            ASR     R1              ;RESTORE DRIVE #
```

```
1606 017242 062737 000014 017256          ADD     #$SYSNM,3$      ;LOCATE THE SYSTEM NAME AND DRIVE #
1607 017250 104401 042326                 TYPE    ,BLNKS3         ;TYPE 3 BLANKS
1608 017254 104401                        TYPE                    ;TYPE THE SYSTEM AND DRIVE
1609 017256 000000                3$:     .WORD   0               ;ADDRESS FOR TYPING MESSAGE
1610 017260 104401 042213                 TYPE    ,TAB            ;TYPE TAB
1611 017264 012737 000001 001366  4$:     MOV     #1,NULINE       ;INDICATE PRINTER STOPS AT COULMN 1
1612 017272 012504                5$:     MOV     (R5)+,R4        ;RETRIEVE THE DESIRED COLUMN # FROM
1613                                                              ;CALLING ROUTINE
1614 017274 020437 001366         6$:     CMP     R4,NULINE       ;ON THE RIGHT COLUMN ?
1615 017300 103414                        BLO     8$              ;IF LOW NOT PRINT
1616 017302 001405                        BEQ     7$              ;BRANCH IF LOCATED
1617 017304 104401 042213                 TYPE    ,TAB            ;ADVANCE TO NEXT COLUMN
1618 017310 005237 001366                 INC     NULINE          ;INCREMENT COLUMN CTR
1619 017314 000767                        BR      6$              ;CHECK AGAIN
1620 017316 104401 042325         7$:     TYPE    ,BLNKS4         ;TYPE 4 BLANKS
1621 017322 104401 042215                 TYPE    ,MARKX          ;THE EXCEPTION MARK ''* 0''
1622 017326 005237 001366                 INC     NULINE          ;NEXT COLUMN
1623 017332               8$:
     017332 012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
     017334 012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
     017336 012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
     017340 012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
1624 017342 000205                        RTS     R5              ;EXIT
1625
1626 017344 000240                IDLEX:  NOP                     ;RESET ALL RH VECTOR FOR MOUNT AND DISMOUNT
1627 017346 000240                        NOP
1628 017350 000002                        RTI                     ;EXIT
1629
1630                              ;PROCESS THE ORDER TERMINATION
1631
1632 017352 111037 001330         PROCES: MOVB    (R0),UNIT       ;DRIVE NUMBER FOR ANY ERROR MESSAGES
1633 017356 005760 000016                 TST     $TATUS(R0)      ;SEE IF DRIVER SIGNALED AN ERROR
1634 017362 100431                        BMI     ERPROC          ;BR IF ERROR
1635 017364 032760 100000 000020          BIT     #BIT15,$RMCS1(R0)  ;SEE IF 'SC' SET
1636 017372 001410                        BEQ     1$              ;BR IF NOT SET
1637 017374 032760 040000 000020          BIT     #BIT14,$RMCS1(R0)  ;SEE IF 'TRE' SET
1638 017402 001021                        BNE     ERPROC          ;BR IF SET
1639 017404 032760 040000 000032          BIT     #BIT14,$RMDS(R0)   ;SEE IF 'ERR' SET
1640 017412 001015                        BNE     ERPROC          ;BR IF SET
1641 017414 004737 020472         1$:     JSR     PC,CKERR        ;NO ERROR, CHECK ERROR BITS ANYWAY
1642 017420 004737 020540                 JSR     PC,CKBUS        ;NO ERROR, CHECK BUS ADDR & WC
1643 017424 004737 027514                 JSR     PC,RMINIT       ;INITIALIZE THE SUB SYSTEM
1644 017430 012737 177777 027436          MOV     #-1,SAVEFG      ;CLEAR THE SAVE FLAG
1645 017436 012737 177777 027440          MOV     #-1,SEEKFG      ;SET THE NOT IMP FLAG
1646 017444 000207                2$:     RTS     PC              ;RETURN
1647
1648                              ;ORDER TERMINATED WITH AN ERROR - PROCESS THE ERROR
1649
1650 017446 032760 000200 000016  ERPROC: BIT     #BIT07,$TATUS(R0) ;DONE BIT SET ?
1651 017454 001402                        BEQ     ERPRC1          ;BR IF ORDER DIDN'T COMPLETE NORMALLY
1652 017456 000137 017644                 JMP     DONE            ;PROCESS ERROR WITH 'DONE' BIT SET
1653
1654                              ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE NOT' BITS
1655
1656 017462 032760 010000 000016  ERPRC1: BIT     #BIT12,$TATUS(R0) ;SEE IF DRIVE WAS UNSAFE
1657 017470 001025                        BNE     PUNSAF          ;BR IF YES
1658 017472 032760 004000 000016          BIT     #BIT11,$TATUS(R0) ;PARITY ERROR OCCURRED
```

```
1659 017500  001025                          BNE     UCPAR           ;BR IF IT DID
1660 017502  032760  002000  000016          BIT     #BIT10,$STATUS(R0) ;FATAL PARITY ERROR?
1661 017510  001025                          BNE     FALPAR          ;BR IF THERE IS ONE
1662 017512  032760  001000  000016          BIT     #BIT09,$STATUS(R0) ;TIMEOUT?
1663 017520  001025                          BNE     SWTIM           ;BR IF YES
1664 017522  032760  040002  000016          BIT     #BIT14!BIT01,$STATUS(R0)  ;DRIVE WENT OFFLINE ?
1665 017530  001025                          BNE     OFLIN           ;BR IF IT DID
1666 017532  032760  000004  000016          BIT     #BIT2,$STATUS(R0)  ;PORT REQUEST TIME OUT ?
1667 017540  001025                          BNE     PRTIM           ;BR IF IT DID
1668 017542  000207                          RTS     PC              ;ERROR. RETURN
1669
1670                                 ;DRIVE IS PERSISTENTLY UNSAFE
1671
1672 017544                           PUNSAF:
1673 017544  104414  036552                      DISPLY  ,EM12
1674 017550  000137  017620                      JMP     DUMP2
1675
1676                                 ;UNCORRECTABLE MASSBUS PARITY ERROR OCCURRED
1677
1678 017554                           UCPAR:
1679 017554  104414  036454                      DISPLY  ,EM10
1680 017560  000137  017620                      JMP     DUMP2
1681
1682                                 ;'FATAL' MASSBUS PARITY ERROR OCCURRED
1683
1684 017564                           FALPAR:
1685 017564  104414  036517                      DISPLY  ,EM11
1686 017570  000137  017620                      JMP     DUMP2
1687
1688                                 ;SOFTWARE TIMEOUT OCCURRED
1689
1690 017574                           SWTIM:
1691 017574  104414  036603                      DISPLY  ,EM13
1692 017600  000137  017620                      JMP     DUMP2
1693
1694                                 ;DRIVE WENT OFFLINE
1695
1696 017604                           OFLIN:
1697 017604  104414  036655                      DISPLY  ,EM14
1698 017610  000137  017620                      JMP     DUMP2
1699                                 ;PORT REQUEST TIMEOUT ERROR
1700
1701 017614                           PRTIM:
1702 017614  104414  036700                      DISPLY  ,EM15
1703 017620  104401  001207          DUMP2:      TYPE    ,$CRLF          ;CR-LF
1704 017624  104401  042621                      TYPE    ,XFATL
1705 017630  104401  001207                      TYPE    ,$CRLF          ;CR-LF
1706 017634  104401  042464                      TYPE    ,HALTX
1707 017640  000177  161534                      JMP     @RSTART         ;JUMP TO RESTART
1708
1709                                 ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE' BITS SET
1710
1711 017644  032760  000030  000016  DONE:       BIT     #BIT04!BIT03,$STATUS(R0) ;UNSAFE OCCURRED
1712 017652  001402                          BEQ     .+6             ;BR IF NOT
1713 017654  000137  020430                      JMP     UNSAF           ;REPORT UNSAFE
1714 017660  032760  040000  000030          BIT     #BIT14,$RMCS2(R0)  ;IS 'WCE' SET ?
1715 017666  001402                          BEQ     .+6             ;BRANCH IF NOT SET
```

```
1716 017670  000137  020210                    JMP     WCKER           ;WRITE CHECK ERROR
1717 017674  032760  040000  000032            BIT     #BIT14,$RMDS(R0) ;CHECK 'ERR'
1718 017702  001002                            BNE     1$              ;BR IF SET
1719 017704  000137  020400                    JMP     TRFER           ;PROCESS 'TRE'
1720 017710  032760  000400  000034  1$:       BIT     #BIT08,$RMER1(R0) ;'HCRC' SET?
1721 017716  001402                            BEQ     .+6             ;BR IF NOT
1722 017720  000137  020240                    JMP     HCRCER          ;PROCESS 'HCRC'
1723 017724  032760  000020  000034            BIT     #BIT04,$RMER1(R0) ;'FMT' SET?
1724 017732  001402                            BEQ     .+6             ;BR IF NOT SET
1725 017734  000137  020260                    JMP     CKFMT           ;CHECK FORMAT ERROR
1726 017740  032760  000200  000034            BIT     #BIT07,$RMER1(R0) ;'HCE' SET?
1727 017746  001402                            BEQ     .+6             ;BR IF NOT SET
1728 017750  000137  020270                    JMP     CKHCE           ;CHECK 'HCE' ERROR
1729 017754  032760  020000  000034            BIT     #BIT13,$RMER1(R0) ;'OPI' SET?
1730 017762  001402                            BEQ     .+6             ;BR IF NOT SET
1731 017764  000137  020310                    JMP     OPIER           ;REPORT 'OPI'
1732 017770  032760  000010  000034            BIT     #BIT3,$RMER1(R0) ;'PAR' SET?
1733 017776  001402                            BEQ     .+6             ;BR IF NOT SET
1734 020000  000137  020330                    JMP     PARER           ;REPORT 'PAR'
1735 020004  032760  000040  000034            BIT     #BIT5,$RMER1(R0) ;'WCF' SET?
1736 020012  001402                            BEQ     .+6             ;BR IF NOT SET
1737 020014  000137  020420                    JMP     WCFER           ;REPORT 'WCF'
1738 020020  032760  002000  000034            BIT     #BIT10,$RMER1(R0) ;'IAE' SET?
1739 020026  001402                            BEQ     .+6             ;BR IF NOT SET
1740 020030  000137  020340                    JMP     IAEER           ;REPORT 'IAE'
1741 020034  032760  004000  000034            BIT     #BIT11,$RMER1(R0) ;'WLE' SET?
1742 020042  001402                            BEQ     .+6             ;BR IF NOT SET
1743 020044  000137  020350                    JMP     WLEER           ;REPORT 'WLE'
1744 020050  032760  001000  000034            BIT     #BIT9,$RMER1(R0) ;'AOE' SET?
1745 020056  001405                            BEQ     2$              ;BR IF NOT SET
1746 020060  032760  002000  000032            BIT     #BIT10,$RMDS(R0) ;'LST' SET?
1747 020066  001401                            BEQ     2$              ;BR IF NOT SET
1748 020070  000207                            RTS     PC              ;'AOE' & 'LST' SET, EXIT
1749 020072  032760  010000  000034  2$:       BIT     #BIT12,$RMER1(R0)  ;SEE IF 'DTE' SET
1750 020100  001402                            BEQ     .+6             ;BR IF NOT
1751 020102  000137  020320                    JMP     DTEER           ;REPORT 'DTE' ERROR
1752 020106  005760  000034                    TST     $RMER1(R0)      ;SEE IF 'DCK' SET
1753 020112  100002                            BPL     .+6             ;BR IF NOT
1754 020114  000137  020200                    JMP     DCKER           ;PROCESS 'DCK'
1755 020120  032760  060000  000062            BIT     #BIT14!BIT13,$RMER2(R0) ;'SKI' OR 'OCYL' SET
1756 020126  001006                            BNE     3$              ;BR IF IT IS
1757 020130  032760  100000  000062            BIT     #BIT15,$RMER2(R0)       ;BAD SPOT ?
1758 020136  001004                            BNE     4$              ;BRANCH IF SO
1759 020140  000137  020250                    JMP     DRVER           ;REPORT ERROR
1760 020144  000137  020410          3$:       JMP     SKIER           ;REPORT DRIVE ERROR
1761 020150  104401  001207          4$:       TYPE    ,$CRLF          ;CR-LF
1762 020154  104401  041565                    TYPE    ,MESG11
1763 020160  104007                            EMT     7
1764 020162  104010                            EMT     10
1765 020164  104011                            EMT     11
1766 020166  104012                            EMT     12
1767 020170  104401  042464                    TYPE    ,HALTX
1768 020174  000177  161200                    JMP     @RSTART         ;JUMP TO RESTART
1769
1770                                ;PROCESS DATA ('DCK') CHECK ERROR
1771
1772 020200                        DCKER:
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1773 020200  104414  036755                  DISPLY  ,EM21
1774 020204  000137  020440                  JMP     DUMP
1775
1776                                 ;WRITE CHECK ERROR PROCESSING
1777
1778 020210                          WCKER:
1779 020210  032760  100000  000034          BIT     #BIT15,$RMER1(R0)       ;DCK BIT SET ?
1780 020216  001004                          BNE     1$                      ;BRANCH IF SET
1781 020220  104414  037061                  DISPLY  ,EM23
1782 020224  000137  020440                  JMP     DUMP
1783 020230  104414  037006          1$:     DISPLY  ,EM22
1784 020234  000137  020440                  JMP     DUMP
1785
1786                                 ;REPORT 'HCRC' ERROR
1787
1788 020240                          HCRCER:
1789 020240  104414  036734                  DISPLY  ,EM20
1790 020244  000137  020440                  JMP     DUMP
1791
1792                                 ;REPORT DRIVE ERROR
1793
1794 020250                          DRVER:
1795 020250  104414  037351                  DISPLY  ,EM30
1796 020254  000137  020440                  JMP     DUMP
1797
1798                                 ;PROCESS FORMAT ('FER') ERROR
1799
1800 020260                          CKFMT:
1801 020260  104414  037140                  DISPLY  ,EM24
1802 020264  000137  020440                  JMP     DUMP
1803
1804                                 ;PROCESS HEADER COMPARE ('HCE') ERROR
1805
1806 020270                          CKHCE:
1807 020270  104414  037206                  DISPLY  ,EM25
1808 020274  000137  020440                  JMP     DUMP
1809                                 ;POSSIBLE POSITIONING ERROR
1810
1811 020300  104414  040477          POSER:  DISPLY  ,EM51
1812 020304  000137  020440                  JMP     DUMP
1813
1814                                 ;REPORT 'OPI' ERROR
1815 020310                          OPIER:
1816 020310  104414  037403                  DISPLY  ,EM31
1817 020314  000137  020440                  JMP     DUMP
1818
1819                                 ;REPORT 'DTE' ERROR
1820
1821 020320                          DTEER:
1822 020320  104414  037446                  DISPLY  ,EM32
1823 020324  000137  020440                  JMP     DUMP
1824
1825                                 ;REPORT 'PAR' ERROR
1826
1827 020330                          PARER:
1828 020330  104414  037501                  DISPLY  ,EM33
1829 020334  000137  020440                  JMP     DUMP
```

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1830
1831                                    ;REPORT '!AE' ERROR
1832
1833 020340                             IAEER:
1834 020340  104414  037620                     DISPLY  ,EM35
1835 020344  000137  020440                     JMP     DUMP
1836
1837                                    ;REPORT WLE ERROR
1838
1839 020350                             WLEER:
1840 020350  104414  037656                     DISPLY  ,EM36
1841 020354  000137  020440                     JMP     DUMP
1842
1843                                    ;REPORT FORMAT ERROR
1844
1845 020360                             FMTER:
1846 020360  104414  037267                     DISPLY  ,EM26
1847 020364  000137  020440                     JMP     DUMP
1848
1849                                    ;REPORT HEADER COMPARE ERROR
1850
1851 020370  104414  037314             HCEER:  DISPLY  ,EM27
1852 020374  000137  020440                     JMP     DUMP
1853
1854                                    ;PROCESS CONTROL/INTERFACE TRANSFER ERROR
1855
1856 020400                             TRFER:
1857 020400  104414  037771                     DISPLY  ,EM40
1858 020404  000137  020440                     JMP     DUMP
1859
1860                                    ;PROCESS 'SKI' OR 'OCYL'
1861
1862 020410                             SKIER:
1863 020410  104414  040441                     DISPLY  ,EM50
1864 020414  000137  020440                     JMP     DUMP
1865
1866                                    ;REPORT WRITE CLOCK FAILURE
1867
1868 020420                             WCFER:
1869 020420  104414  037556                     DISPLY  ,EM34
1870 020424  000137  020440                     JMP     DUMP
1871
1872                                    ;REPORT DRIVE UNSAFE ERROR
1873
1874 020430                             UNSAF:
1875 020430  104414  040542                     DISPLY  ,EM60
1876 020434  000137  020440                     JMP     DUMP
1877
1878 020440                             DUMP:
     020440  104007                             EMT     7
1879 020442  104010                             EMT     10
1880 020444  104011                             EMT     11
1881 020446  104012                             EMT     12
1882
1883 020450  004737  027514                     JSR     PC,RMINIT       ;CLEAR THE SUB-SYSTEM
1884 020454  012737  177777  027436             MOV     #-1,SAVEFG
1885 020462  012737  177777  027440             MOV     #-1,SEEKFG
```

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1886 020470  000207                        RTS     PC
1887
1888
1889                                ;CKECK ERROR BITS IN THE RH/RM REGISTERS
1890
1891 020472  032760  060000  000020  CKERR:  BIT     #60000,$RMCS1(R0)       ;SEE IF 'TRF' OR 'MCPE'
1892 020500  001012                        BNE     1$                      ;YES
1893 020502  032760  177400  000030        BIT     #177400,$RMCS2(R0)      ;ERROR BITS IN CS2 /
1894 020510  001006                        BNE     1$                      ;YES
1895 020512  005760  000034                TST     $RMER1(R0)              ;ANY ERROR IN ER1
1896 020516  001003                        BNE     1$                      ;YES
1897 020520  005760  000062                TST     $RMER2(R0)              ;ANY ERROR IN ER2
1898 020524  001404                        BEQ     2$              ;BRANCH IF NO ERROR
1899 020526  104414  040217        1$:     DISPLY  ,EM44
1900 020532  000137  020440                JMP     DUMP            ;TYPE ALL REGISTERS
1901 020536  000207                2$:     RTS     PC
1902
1903                                ;CHECK BUS ADDRESS REGISTER AND WORD COUNT REGISTER
1904
1905 020540  005760  000022        CKBUS:  TST     $RMWC(R0)               ;WORD COUNT = 0
1906 020544  001011                        BNE     1$                      ;NO
1907 020546  016046  000004                MOV     $WRDM(R0),-(SP) ;WORD LENGTH
1908 020552  005416                        NEG     (SP)            ;GET THE POSITIVE NUMBER OF WORD COUNT
1909 020554  006316                        ASL     (SP)            ;BYTE COUNT
1910 020556  066016  000006                ADD     $BUF(R0),(SP)
1911 020562  022660  000024                CMP     (SP)+,$RMBA(R0)
1912 020566  001404                        BEQ     2$
1913 020570  104414  040025        1$:     DISPLY  ,EM41
1914 020574  000137  020440                JMP     DUMP            ;TYPE ALL REGISTERS
1915 020600  000207                2$:     RTS     PC
1916                                ;ROUTINE TO DISPLAY THE SECTOR WHICH GAVE THE HARD ERROR
1917
1918 020602  104401  001207        PRTBAD: TYPE    ,$CRLF          ;CR-LF
1919 020606  104401  042342                TYPE    ,MESG19
1920 020612  104401  001207                TYPE    ,$CRLF          ;CR-LF
1921 020616  016001  000024                MOV     $RMBA(R0),R1    ;PUT THE END ADDRESS INTO R1
1922 020622  016046  000004                MOV     $WRDM(R0),-(SP) ;FIND THE BEGINNING OF THE SECTOR
1923 020626  005416                        NEG     (SP)            ;GET THE POSITIVE NUMBER OF WORD COUNT
1924 020630  066016  000022                ADD     $RMWC(R0),(SP)  ;SUBTRACT THE WORDS NOT TRANSFERED
1925 020634  005046                        CLR     -(SP)           ;MAKE THE UPPER DIVIDEND 0
1926 020636  012746  000400                MOV     #256.,-(SP)  ;DIVDE THE WORDS TRANSFERED BY THE SECTOR SIZE
1927 020642  004737  021664                JSR     PC,LINKDV       ;DIVIDE
1928 020646  005716                        TST     (SP)            ;REMANDER = 0 ?
1929 020650  001403                        BEQ     1$              ;BR IF IT IS - COMPLETE SECTOR TRANSFERED
1930 020652  006316                        ASL     (SP)            ;CONVERT THE RESIDUAL SECTOR SIZE INTO BYTE COUNT
1931 020654  161601                        SUB     (SP),R1         ;SUBTRACT IT FROM THE END ADDRESS
1932 020656  000402                        BR      2$              ;FINISH THE SIZING
1933 020660  162701  001000        1$:     SUB     #1000,R1        ;SUBTRACT FULL SECTOR SIZE FROM END ADDR
1934 020664  062706  000004        2$:     ADD     #4,SP           ;RESTORE THE STACK POINTER
1935 020670  012702  000007        3$:     MOV     #7,R2           ;R2 CONTAINS THE WORDS/LINE COUNT
1936 020674  020160  000024        4$:     CMP     R1,$RMBA(R0)    ;PRINTED ALL THE SECTOR ?
1937 020700  001415                        BEQ     5$              ;BR IF ALL PRINTED
1938 020702  104414  042330                DISPLY  ,BLNKS1         ;TYPE 1 BLANK
1939 020706  012146                        MOV     (R1)+,-(SP)     ;PUT THE DATA ON THE STACK
1940 020710  004737  021062                JSR     PC,LINOCT       ;TYPE THE DATA
1941 020714  022711  177777                CMP     #-1,(R1)        ;END OF FILE ?
1942 020720  001405                        BEQ     5$              ;BRANCH IF SO
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                                                DEC     R2              ;DECREMENT THE HORIZONTAL COUNT
                                                BNE     4$              ;BR IF NOT AT THE END OF THE LINE
                                                DISPLY  ,$CRLF          ;CR-LF
                                                BR      3$              ;RESTORE THE WORDS/LINE COUNT
                                        5$:     DISPLY  ,$CRLF          ;PRINT WHAT REMAINS IN THE BUFFER
                                        6$:     RTS     PC              ;RETURN

                                        FILBUF: SAVREG                  ;SAVE THE REGISTERS
                                                MOV     $BUF(R0),R1     ;BUFFER ADDRESS
                                                MOV     $WRDM(R0),R2    ;POSITIVE WORD COUNT
                                                NEG     R2              ;
                                                MOV     #STNDAT,R5      ;PATTERN ADDRESS
                                                MOV     #20,R3          ;PATTERN COUNT
                                        3$:     MOV     (R5)+,(R1)+     ;MOVE THE PATTERN INTO THE BUFFER
                                                DEC     R2              ;DECREMENT THE WORD COUNT
                                                BLE     4$              ;BR IF DONE (WORD COUNT = 0)
                                                DEC     R3              ;DECREMENT THE PATTERN COUNT
                                                BNE     3$              ;BR IF MORE PATTERN
                                                MOV     #20,R3          ;RESTORE PATTERN COUNT
                                                MOV     #STNDAT,R5      ;RESTORE THE ADDRESS
                                                BR      3$              ;CONTINUE DISTRIBUTING THE PATTERN
                                        4$:     RESREG                  ;RESTORE THE REGISTERS
                                                RTS     PC              ;RETURN


                                        .SBTTL  ERROR MESSAGE GENERATION ROUTINES

                                        ;PRINT LINE 1 OF ERROR MESSAGE:
                                        ;'HH:MM:SS'

021016  032777  002000  160130  LINE1:  BIT     #SW10,@SWR      ;SWITCH 10 SET ?
021024  001402                          BEQ     1$              ;BR IF NOT
021026  104401  001202                  TYPE    ,$BELL          ;RING THE BELL
021032  032777  020000  160114  1$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT ?
021040  001403                          BEQ     2$              ;BR IF NOT
021042  104414  001207                  DISPLY  ,$CRLF          ;CR-LF
021046  000404                          BR      3$              ;EXIT
021050  004737  021330          2$:     JSR     PC,$TIME        ;TYPE THE TIME
021054  104414  042330                  DISPLY  ,BLNKS1         ;TYPE 1 BLANK
021060  000207                  3$:     RTS     PC              ;RETURN & TYPE DESCRIPTION

                                        ;OCTAL TYPEOUT ROUTINE
                                        ;CALL:
                                        ;       MOV     NUM,-(SP)       ;PUT THE NUMBER ON THE STACK
                                        ;       JSR     PC,LINOCT
                                        ;       RETURN

021062  016646  000002          LINOCT: MOV     2(SP),-(SP)     ;PUT NUMBER IN PROPER LOCATION ON STACK
021066  004737  022624                  JSR     PC,$SB20        ;CONVERT THE NUMBER TO OCTAL
021072  012637  021106                  MOV     (SP)+,1$        ;GET THE ADDRESS OF THE ASCII STRING
021076  062737  000005  021106          ADD     #5.,1$          ;ADDRESS THE LAST 6 ASCII DIGITS
021104  104414                          DISPLY                  ;TYPE IT
021106  000000                  1$:     .WORD   0               ;ADDRESS
021110  012616                          MOV     (SP)+,(SP)      ;CORRECT THE STACK
021112  000207                          RTS     PC              ;RETURN
```

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

021114  016646  000002          LINDEC: MOV     2(SP),-(SP)     ;SET UP STACK FOR CONVERT
021120  004737  022574                  JSR     PC,$SB2D        ;CONVERT IT TO DECIMAL
021124  004737  022200                  JSR     PC,$SUPRS       ;TYPE IT (WITH LEADING ZEROS SUPRESSED)
021130  012616                          MOV     (SP)+,(SP)      ;RESTORE STACK POINTER
021132  000207                          RTS     PC


                                .SBTTL  GENERAL SUPPORT SUBROUTINES


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

021134  012737  177777  001316  CKCLK:  MOV     #-1,CLKFLG      ;CLEAR CLOCK AVAILABILITY FLAG
021142  012737  177777  001314          MOV     #-1,PCLOCK      ;CLEAR KW11-P CLOCK AVAILABILITY FLAG
021150  012737  021230  000004          MOV     #CKCLK1,ERRVEC  ;SET UP VECTOR FOR CLOCK CHECK
021156  005037  000006                  CLR     @#ERRVEC+2        ;NEW PSW
021162  005777  160114                  TST     @$LKCSR         ;CHECK FOR KW11-P
021166  005037  001316                  CLR     CLKFLG          ;SET CLOCK AVAILABILITY FLAG
021172  005037  001314                  CLR     PCLOCK          ;SET KW11-P CLOCK FLAG
021176  013701  001306                  MOV     $LPVEC,R1       ;KW11-P VECTOR ADDRESS
021202  012721  021426                  MOV     #CLOCK,(R1)+    ;SET UP KW11-P VECTOR
021206  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
021212  012777  174575  160064          MOV     #-1667.,@$LKCSB ;LOAD COUNTER BUFFER WITH 16.67
021220  012777  000131  160054          MOV     #131,@$LKCSR    ;SET CLOCK - CNT UP, 10US  CONT INT
021226  000434                          BR      CKCLK3
021230  062706  000004          CKCLK1: ADD     #4,SP           ;RESTORE THE STACK POINTER
021234  012737  021276  000004          MOV     #CKCLK2,@#ERRVEC  ;CHANGE ERROR VECTOR TO CHECK FOR KW11-L
021242  005777  160042                  TST     @$LKS           ;LOOK FOR KW11-L
021246  005037  001316                  CLR     CLKFLG          ;SET CLOCK FLAG
021252  013701  001312                  MOV     $LLVEC,R1       ;KW11-L VECTOR ADDRESS
021256  012721  021426                  MOV     #CLOCK,(R1)+    ;SET UP KW11-L VECTOR
021262  012711  000300                  MOV     #300,(R1)       ;PSW - PRI 6
021266  012777  000100  160014          MOV     #100,@$LKS      ;SET KW11-L INTERRUPT
021274  000411                          BR      CKCLK3
021276  062706  000004          CKCLK2: ADD     #4,SP           ;RESTORE THE STACK POINTER
021302  104401  042635                  TYPE    ,NEDCLK         ;'P OR L CLOCK MUST BE ON SYSTEM'
021306  005737  000042                  TST     42              ;UNDER MONITOR CONTROL ?
021312  001400                          BEQ     1$              ;BR IF NOT
021314  000177  160060          1$:     JMP     @RSTART         ;JUMP TO RESTART

021320  012737  000006  000004  CKCLK3: MOV     #6,@#ERRVEC     ;RESTORE THE ERROR VECTOR
021326  000207                          RTS     PC


                                ;ROUTINE TO TYPE THE TIME

021330  005737  001316          $TIME:  TST     CLKFLG          ;CLOCK ON THE SYSTEM ?
021334  001033                          BNE     1$              ;BR IF NOT
021336  104401  001207                  TYPE    ,$CRLF          ;CR-LF
```

```
2057 021342 013746 001344          MOV     HOUR,-(SP)      ;PUT 'HOURS' ON THE STACK
2058 021346 004737 022574          JSR     PC,$SB2D        ;CONVERT TO DECIMAL
2059 021352 004537 022110          JSR     R5,REPLZ        ;TYPE IT
2060 021356 000002                 .WORD   2               ;TYPE 2 DIGITS
2061 021360 104401 042332          TYPE    ,COLON          ;':'
2062 021364 013746 001346          MOV     MINUTE,-(SP)    ;PUT 'MINUTES' ON THE STACK
2063 021370 004737 022574          JSR     PC,$SB2D        ;CONVERT TO DECIMAL
2064 021374 004537 022110          JSR     R5,REPLZ        ;TYPE IT
2065 021400 000002                 .WORD   2               ;TYPE 2 DIGITS
2066 021402 104401 042332          TYPE    ,COLON          ;':'
2067 021406 013746 001350          MOV     SECOND,-(SP)    ;PUT SECONDS ON THE STACK
2068 021412 004737 022574          JSR     PC,$SB2D        ;CONVERT TO DECIMAL
2069 021416 004537 022110          JSR     R5,REPLZ        ;TYPE IT
2070 021422 000002                 .WORD   2               ;TYPE 2 DIGITS
2071 021424 000207          1$:    RTS     PC
2072
2073                               ;CLOCK HANDLER ROUTINE
2074
2075 021426 005337 001352   CLOCK: DEC     SIXTEE          ;INCREMENT THE 1/60 SECOND COUNTER
2076 021432 001033                 BNE     1$              ;BR IF A SECOND NOT COUNTED
2077 021434 013737 001320 001352   MOV     HZ,SIXTEE       ;RESTORE THE VALUE
2078 021442 005237 001350          INC     SECOND          ;COUNT THE SECOND
2079 021446 022737 000074 001350   CMP     #60.,SECOND     ;AT MAXIMUM ?
2080 021454 001022                 BNE     1$              ;BR IF NOT
2081 021456 005037 001350          CLR     SECOND          ;CLEAR THE SECOND'S COUNTER
2082 021462 005237 001346          INC     MINUTE          ;COUNT THE MINUTE
2083 021466 022737 000074 001346   CMP     #60.,MINUTE     ;AT MAXIMUM ?
2084 021474 001012                 BNE     1$              ;BR IF NOT
2085 021476 005037 001346          CLR     MINUTE          ;CLEAR THE MINUTE'S COUNTER
2086 021502 005237 001344          INC     HOUR            ;COUNT THE HOURS
2087 021506 022737 001747 001344   CMP     #999.,HOUR      ;AT MAXIMUM
2088 021514 103002                 BHIS    1$              ;BR IF NOT
2089 021516 005037 001344          CLR     HOUR            ;CLEAR THE HOURS
2090 021522 012746 000021   1$:    MOV     #17.,-(SP)      ;17 MS ON THE STACK
2091 021526 004737 033734          JSR     PC,RMTMR        ;DRIVER TIMER ROUTINE
2092 021532 000002          2$:    RTI
2093
2094                               ;COMMAND DECODE ROUTINE
2095                               ;CALL:
2096                               ;       MOV     #-1,CFLAG       ;'CFLAG' IS NORMALLY SET BY THE TTY SERVICE
2097                               ;                               ;ROUTINE IN INTERRUPT MODE
2098                               ;       JSR     PC,KSR
2099                               ;       RETURN1                 ;SYSTEM BUSY RETURN
2100                               ;       RETURN2                 ;RETURN AFTER KEYBOARD SERVICED
2101
2102 021534 104412          KSR:   SAVREG                  ;SAVE THE REGISTERS
2103 021536 012737 000200 177776   MOV     #PR4,PS         ;SET PRIORITY TO 4
2104 021544 005037 001336          CLR     CFLAG           ;CLEAR THE 'CONTROL C' FLAG
2105 021550 004737 021330          JSR     PC,$TIME        ;TYPE THE TIME
2106 021554 005777 157402          TST     @$TKB           ;CLEAR ANY GARBAGE IN THE TTY BUFFER
2107 021560 005737 001336          TST     CFLAG           ;CHECK THE CONTROL C FLAG
2108 021564 001002                 BNE     7$              ;EXIT IF 'CONTROL C' ENTERED
2109 021566 000240                 NOP                     ;DUMP CODING FOR LATER USE 3/8/77
2110 021570 000240                 NOP
2111 021572 104413          7$:    RESREG                  ;RESTORE R0 - R5
2112 021574 062716 000002          ADD     #2,(SP)         ;INCREMENT THE RETURN ADDRESS
2113 021600 005777 157356          TST     @$TKB           ;CLEAR THE TTY BUFFER
```

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 2114 021604  052777  000100  157346          B'S     #BIT06,@$TKS    ;SET TTY INTERRUPT ENABLE
 2115 021612  005037  177776                  CLR     PS              ;SET PRIORITY BACK TO ZERO
 2116 021616  000207                          RTS     PC              ;RETURN
 2117
 2118                                 ;ROUTINE TO CLEAR THE DPB FOR THE ASSIGNED DRIVE
 2119                                 ;CALL:
 2120                                 ;       MOV     #DPB,R0         ;DPB ADDRESS
 2121                                 ;       JSR     PC,CLRDPB
 2122                                 ;       RETURN
 2123
 2124 021620                          CLRDPB:
      021620  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
      021622  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
      021624  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
      021626  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 2125 021630  010004                          MOV     R0,R4           ;GET THE DPB ADDRESS
 2126 021632  062704  000002                  ADD     #2,R4           ;ADDRESS OF FIRST LOCN TO BE CLEARED
 2127 021636  012703  000020                  MOV     #$EMTAB-2,R3    ;NUMBER OF LOCATIONS TO CLEAR
 2128 021642  005024                  1$:     CLR     (R4)+           ;CLEAR THE STORAGE LOCATION
 2129 021644  162703  000002                  SUB     #2,R3           ;DECREMENT THE BYTE COUNT
 2130 021650  001374                          BNE     1$              ;LOOPING BACK
 2131 021652  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
      021654  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
      021656  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
      021660  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 2132 021662  000207                          RTS     PC              ;RETURN
 2133
 2134 021664  104412                  LINKDV: SAVREG                  ;STORE R0 - R5
 2135 021666  016605  000026                  MOV     26(SP),R5       ;DIVISOR
 2136 021672  005004                          CLR     R4              ;OTHER DIVISOR WORD
 2137 021674  016602  000030                  MOV     30(SP),R2       ;UPPER DIVIDEND WORD
 2138 021700  016603  000032                  MOV     32(SP),R3       ;LOWER DIVIDEND WORD
 2139 021704  005000                          CLR     R0              ;CLEAR OTHER DIVIDEND REGISTERS
 2140 021706  005001                          CLR     R1
 2141 021710  004737  021732                  JSR     PC,M.DPID       ;GO TO THE DIVIDE ROUTINE
 2142 021714  010166  000030                  MOV     R1,30(SP)       ;REMAINDER ON THE STACK
 2143 021720  010366  000032                  MOV     R3,32(SP)       ;QUOTIENT ON THE STACK
 2144 021724  104413                          RESREG                  ;RESTORE R0 - R5
 2145 021726  012616                          MOV     (SP)+,(SP)      ;MOVE RETURN UP THE STACK
 2146 021730  000207                          RTS     PC
 2147
 2148                                 ;       DIVISION UTILITY SUBROUTINE
 2149                                 ;       R0-R1-R2-R3=DIVIDEND
 2150                                 ;       R4-R5=DIVISOR
 2151                                 ;       R0-R1=REMAINDER AFTER DIVISION
 2152                                 ;       R2-R3=QUOTIENT AFTER DIVISION
 2153                                 ;       ENTER WITH JSR  PC,M.DPID
 2154                                 ;
 2155 021732  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 2156 021736  010446                          MOV     R4,-(SP)        ;HIGH ORDER
 2157 021740  010546                          MOV     R5,-(SP)        ;LOW ORDER DIVISOR TO THE STACK
 2158 021742  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
 2159 021746  005416                          NEG     @SP             ;VERSION OF THE DIVISOR
 2160 021750  005666  000002                  SBC     2(SP)
 2161 021754  061601                          ADD     @SP,R1
 2162 021756  005500                          ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
 2163 021760  066600  000002                  ADD     2(SP),R0
```

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2164 021764 103445                  BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
2165 021766 005046                  CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
2166 021770 006103          M.DP40: ROL     R3
2167 021772 006102                  ROL     R2
2168 021774 006101                  ROL     R1
2169 021776 006100                  ROL     R0
2170 022000 005716                  TST     @SP             ;TEST ''CARRY'' INDICATOR
2171 022002 001410                  BEQ     M.DP41          ;IF NO ''CARRY'' THEN ADD ELSE SUBTRACT
2172 022004 005016                  CLR     @SP             ;CLEAR UP FOR NEXT TIME
2173 022006 066601 000002           ADD     2(SP),R1
2174 022012 005500                  ADC     R0              ;ADD -(DIVISOR)
2175 022014 005516                  ADC     @SP     ;  I    ;SET ''CARRY''
2176 022016 066600 000004           ADD     4(SP),R0;<-
2177 022022 000404                  BR      M.DP42
2178 022024 060501          M.DP41: ADD     R5,R1
2179 022026 005500                  ADC     R0              ;ADD +(DIVISOR)
2180 022030 005516                  ADC     @SP     ;  I    ;SET ''CARRY''
2181 022032 060400                  ADD     R4,R0   ;<-
2182 022034 005516          M.DP42: ADC     @SP             ;SET ''CARRY''
2183 022036 005716                  TST     @SP             ;TEST THE UPDATE INDICATOR
2184 022040 001401                  BEQ     .+4     ;->     ;IF ZERO FORGET IT
2185 022042 005203                  INC     R3      ;  I    ;NO CARRY POSSIBLE HERE
2186 022044 005366 000006           DEC     6(SP)   ;<-     ;DECREMENT COUNTER
2187 022050 003347                  BGT     M.DP40          ;BRANCH IF MORE TO DO
2188 022052 006003                  ROR     R3
2189 022054 103404                  BCS     M.DP44
2190 022056 060501                  ADD     R5,R1
2191 022060 005500                  ADC     R0
2192 022062 060400                  ADD     R4,R0
2193 022064 000241                  CLC
2194 022066 006103          M.DP44: ROL     R3
2195 022070 062706 000010           ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
2196 022074 000242                  CLV
2197 022076 000207                  RTS     PC
2198 022100 062706 000006  M.DP50:  ADD     #6,SP
2199 022104 000262                  SEV
2200 022106 000207                  RTS     PC
2201
2202
2203                                ;ROUTINE TO REPLACE LEADING ZEROS IN A NUMERIC STRING WITH SPACES
2204                                ;CALL
2205                                ;       MOV     #ADR,-(SP)      ;ADDRESS OF NUMBER (IN ASCII)
2206                                ;       JSR     R5,REPLZ
2207                                ;       .WORD   N               ;'N' IS NUMBER OF DIGITS TO BE TYPED
2208
2209 022110 010046          REPLZ:  MOV     R0,-(SP)        ;SAVE R0
2210 022112 012746 000012           MOV     #10.,-(SP)      ;MAXIMUM NUMBER OF DIGITS TO BE TYPED
2211 022116 162516                  SUB     (R5)+,(SP)      ;SUBTACT DIGITS TO FORM INDEX
2212 022120 016600 000006           MOV     6(SP),R0        ;ADDRESS OF NUMBER TO R0
2213 022124 122710 000060  1$:      CMPB    #'0,(R0)        ;BYTE EQUAL TO ASCII '0' ?
2214 022130 001004                  BNE     2$              ;BR IF NOT
2215 022132 112710 000040           MOVB    #40,(R0)        ;REPLACE THE ZERO WITH A SPACE
2216 022136 005200                  INC     R0              ;INCREMENT THE BYTE ADDRESS
2217 022140 000771                  BR      1$              ;GO BACK AND LOOK FOR MORE LEADING ZEROS
2218 022142 105710          2$:     TSTB    (R0)            ;SEE IF ZERO BYTE TERMINATOR
2219 022144 001003                  BNE     3$              ;BR IF NOT
2220 022146 005300                  DEC     R0              ;BACKUP STRING POINTER
```

```
 2221 022150  112710  000060                  MOVB    #'0,(R0)        ;PUT A ZERO BACK IN
 2222 022154  016637  000006  022170  3$:     MOV     6(SP),4$        ;PUT ADDRESS IN LOCATION FOR TYPEOUT
 2223 022162  062637  022170                  ADD     (SP)+,4$        ;BEGINNING OF SIGNIFICANT DIGITS
 2224 022166  104401                          TYPE                    ;TYPE THE NUMBER
 2225 022170  000000                  4$:     .WORD   0               ;ADDRESS OF NUMBER
 2226 022172  012600                          MOV     (SP)+,R0        ;RESTORE R0
 2227 022174  012616                          MOV     (SP)+,(SP)      ;MOVE RETURN ADDRESS
 2228 022176  000205                          RTS     R5              ;RETURN
 2229
 2230                                 ;TYPE NUMERICAL ASCIZ STRING SUPRESS LEADING ZEROS
 2231
 2232                                 ;CALL
 2233                                 ;       MOV     #NUMADR,-(SP)   ;FIRST ADDRESS OF ASCIZ STRING
 2234                                 ;       JSR     PC,$SUPRS
 2235
 2236 022200  010046                  $SUPRS: MOV     R0,-(SP)        ;SAVE R0
 2237 022202  016600  000004                  MOV     4(SP),R0        ;PICKUP THE POINTER
 2238 022206  105710                  1$.     TSTB    (R0)            ;TERMINATOR ?
 2239 022210  001403                          BEQ     2$              ;BR IF YES
 2240 022212  122720  000060                  CMPB    #'0,(R0)+       ;IS THIS AN ASCII '0' ?
 2241 022216  001773                          BEQ     1$              ;BR IF YES
 2242 022220  005300                  2$:     DEC     R0              ;BACKUP BY '1'
 2243 022222  010037  022230                  MOV     R0,3$           ;SAVE FOR TYPING
 2244 022226  104414                          DISPLY                  ;GO PRINT
 2245 022230  000000                  3$:     .WORD   0               ;ASCIZ POINTER GOES HERE
 2246 022232  012600                          MOV     (SP)+,R0        ;RESTORE R0
 2247 022234  012616                          MOV     (SP)+,(SP)      ;RESTORE THE STACK
 2248 022236  000207                          RTS     PC              ;RETURN
 2249
 2250                                 ;ROUTINE TO TYPE AT PRIORITY 4
 2251
 2252 022240  013746  177776          TYPRI4: MOV     @#PS,-(SP)      ;SAVE THE PRESENT STATUS
 2253 022244  012737  000200  177776          MOV     #200,@#PS       ;CHANGE THE PRIORITY TO 4
 2254 022252  012537  022262                  MOV     (R5)+,1$        ;MESSAGE ADDRESS
 2255 022256  004737  024116                  JSR     PC,$TYPE        ;TYPE THE MESSAGE
 2256 022262  000000                  1$:     .WORD   0               ;MESSAGE ADDRESS GOES HERE
 2257 022264  000205                          RTS     R5              ;RETURN
 2258
 2259                                 ;ROUTINE TO TYPE ERRORS
 2260                                 ;CALL
 2261                                 ;       DISPLY                  ;MUST DEFINED IN 'TRAP' TABLE
 2262                                 ;       MESADR                  ;ADDRESS OF MESSAGE
 2263                                 ;       RETURN
 2264
 2265 022266  032777  020000  156660  $DSPLY: BIT     #BIT13,@SWR     ;INHIBIT ERROR TYPEOUT ?
 2266 022274  001002                          BNE     1$              ;BR IF YES
 2267 022276  000137  024116                  JMP     $TYPE           ;TYPE THE MESSAGE
 2268 022302  062716  000002          1$:     ADD     #2,(SP)         ;INCREMENT THE RETURN
 2269 022306  000002                          RTI                     ;RETURN
 2270
 2271                                 ;THIS ROUTINE IS USED TO CHECK IF AN
 2272                                 ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
 2273                                 ;CALL
 2274                                 ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
 2275                                 ;       JSR     R5,CK.OCT       ;CHECK THE CHARACTER
 2276                                 ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
 2277                                 ;       RETURN2                 ;CHARACTER IS IN R2 AS A
```

```
                                ;                               ;OCTAL DIGIT
                                ;
022310  121127  000060  CK.OCT: CMPB    (R1),#'0                ;LESS THAN ZERO?
022314  103407                 BLO     1$                      ;YES -- BRANCH
022316  121127  000067         CMPB    (R1),#'7                ;GREATER THAN SEVEN?
022322  101004                 BHI     1$                      ;YES -- BRANCH
022324  111102                 MOVB    (R1),R2                 ;GET THE CHARACTER
022326  042702  177770         BIC     #^C7,R2                 ;STRIP AWAY THE ASCII
022332  005725                 TST     (R5)+                   ;ADJUST FOR RETURN
022334  000205         1$:     RTS     R5                      ;RETURN
                                ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
                                ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                ;       JSR     R5,CK.DEC       ;CHECK THE CHARACTER
                                ;       RETURN1                 ;NOT BETWEEN 0 AND 9
                                ;       RETURN2                 ;BETWEEN 0 AND 9
                                ;                               ;R2 = DIGIT
022336  121127  000060  CK.DEC: CMPB    (R1),#'0                ;LESS THAN ZERO?
022342  103407                 BLO     1$                      ;YES -- BRANCH
022344  121127  000071         CMPB    (R1),#'9                ;GREATER THAN NINE?
022350  101004                 BHI     1$                      ;YES -- BRANCH
022352  111102                 MOVB    (R1),R2                 ;GET THE CHARACTER
022354  042702  000060         BIC     #'0,R2                  ;STRIP AWAY THE ASCII
022360  005725                 TST     (R5)+                   ;ADJUST FOR RETURN
022362  000205         1$:     RTS     R5                      ;RETURN
                                ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
                                ;DETERMINE WHAT IT IS.
                                ;CALL
                                ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                                ;       JSR     R5,CK.CHR       ;CHECK CHARACTER
                                ;       RETURN  ADR1            ;UNKNOWN CHARACTER
                                ;       RETURN  ADR2            ;CARRIAGE RETURN * (R1)=ADR+1
                                ;       RETURN  ADR3            ;COMMA * (R1)=ADR+1
                                ;       RETURN  ADR4            ;PERIOD * (R1)=ADR+1
                                ;       RETURN  ADR5            ;DIGIT BETWEEN 0 AND 7.
                                ;       RETURN  ADR6            ;DIGIT BETWEEN 8 AND 9.
                                ;                               ;R2 = DIGIT * (R1)=ADR+1
022364  105711         CK.CHR: TSTB    (R1)                    ;''CARRIAGE RETURN''?
022366  001417                 BEQ     3$                      ;YES -- BRANCH
022370  121127  000054         CMPB    (R1),#',                ;''COMMA''?
022374  001413                 BEQ     2$                      ;YES -- BRANCH
022376  121127  000056         CMPB    (R1),#'.                ;''PERIOD''?
022402  001407                 BEQ     1$                      ;YES -- BRANCH
022404  004537  022336         JSR     R5,CK.DEC               ;''DIGIT''?
022410  000410                 BR      4$                      ;NO -- BRANCH
022412  004537  022310         JSR     R5,CK.OCT               ;OCTAL ?
022416  005725                 TST     (R5)+                   ;DIGIT BETWEEN 8-9
022420  005725                 TST     (R5)+                   ;DIGIT BETWEEN 0-7
022422  005725         1$:     TST     (R5)+                   ;PERIOD
022424  005725         2$:     TST     (R5)+                   ;COMMA
022426  005725         3$:     TST     (R5)+                   ;CARRIAGE RETURN
022430  005201                 INC     R1                      ;MOVE POINTER TO NEXT CHARACTER
```

```
 2335 022432  011505                 4$:     MOV     (R5),R5         ;UNKNOWN CHARACTER
 2336 022434  000205                         RTS     R5              ;RETURN
 2337
 2338                                 ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
 2339                                 ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
 2340                                 ;CALL
 2341                                 ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
 2342                                 ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
 2343                                 ;       JSR     R5,CK.DIG       ;CHECK DIGITS
 2344                                 ;       RETURN  ADR1            ;''CR'' ONLY ENTERED -- R2=0
 2345                                 ;       RETURN  ADR2            ;'PERIOD'' ONLY ENTERED -- R2=0
 2346                                 ;       RETURN  ADR3            ;ILLEGAL CHARACTER OR INPUT TOO LARGE -- R2 ?
 2347                                 ;       RETURN  ADR4            ;''CR'' -- R2 = NUMBER
 2348                                 ;       RETURN  ADR5            ;''COMMA'' -- R2 = NUMBER
 2349                                 ;       RETURN  ADR6            ;'PERIOD'' -- R2 = NUMBER
 2350
 2351 022436  010446                 CK.DIG: MOV     R4,-(SP)        ;SAVE R4
 2352 022440  010346                         MOV     R3,-(SP)        ;SAVE R3
 2353 022442  010246                         MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
 2354 022444  005002                         CLR     R2              ;START WITH 0
 2355 022446  005003                         CLR     R3
 2356 022450  005004                         CLR     R4
 2357 022452  004537  022364                 JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
      022456  022552                         6$                      ;ILLEGAL CHARACTER
      022460  022560                         9$                      ;CARRIAGE RETURN
      022462  022552                         6$                      :''''
      022464  022554                         7$                      :..''
      022466  022472                         1$                      ;DIGIT 0-7
      022470  022472                         1$                      ;DIGIT 8-9
 2358 022472  062705  000004         1$:     ADD     #4,R5           ;STEP RETURN POINTER PAST ''CR'' & 'PERIOD'' RETURNS
 2359 022476  006303                 2$:     ASL     R3              ;INPUT NUMBER *2
 2360 022500  010346                         MOV     R3,-(SP)        ;SAVE *2
 2361 022502  006303                         ASL     R3              ;*4
 2362 022504  006303                         ASL     R3              ;*8
 2363 022506  062603                         ADD     (SP)+,R3        ;(*2)+(*8) = *10
 2364 022510  060203                         ADD     R2,R3           ;UPDATE THE INPUT NUMBER
 2365 022512  004537  022364                 JSR     R5,CK.CHR       ;CHECK ONE CHARACTER
      022516  022556                         8$                      ;ILLEGAL CHARACTER
      022520  022542                         5$                      ;CARRIAGE RETURN
      022522  022540                         4$                      :''''
      022524  022532                         3$                      :..''
      022526  022476                         2$                      ;DIGIT 0-7
      022530  022476                         2$                      ;DIGIT 8-9
 2366 022532  105711                 3$:     TSTB    (R1)            ;DOES A ''CR'' FOLLOW THE 'PERIOD''
 2367 022534  001010                         BNE     8$              ;BR IF NOT
 2368 022536  005724                         TST     (R4)+           ;INCREMENT THE RETURN
 2369 022540  005724                 4$:     TST     (R4)+           ;INCREMENT THE RETURN
 2370 022542  005724                 5$:     TST     (R4)+           ;INCREMENT THE RETURN
 2371 022544  020316                         CMP     R3,(SP)         ;CHECK THE MAGNITUDE OF THE NUMBER
 2372 022546  101004                         BHI     9$              ;BR IF ENTERED NUMBER TOO LARGE
 2373 022550  000402                         BR      8$              ;BYPASS INCREMENT
 2374 022552  005725                 6$:     TST     (R5)+           ;INCREMENT RETURN PAST INVALID RETURN
 2375 022554  005725                 7$:     TST     (R5)+           ;INCREMENT RETURN
 2376 022556  060405                 8$:     ADD     R4,R5           ;SETUP RETURN POINTER
 2377 022560  010302                 9$:     MOV     R3,R2           ;ENTERED VALUE
 2378 022562  005726                         TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
 2379 022564  012603                         MOV     (SP)+,R3        ;RESTORE R3
```

```
2380 022566  012604                        MOV     (SP)+,R4        ;RESTORE R4
2381 022570  011505                        MOV     (R5),R5         ;GET RETURN ADDRESS
2382 022572  000205                        RTS     R5              ;RETURN
2383
2384                                ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
2385                                ;UNSIGNED DECIMAL ASCIZ NUMBER.
2386                                ;CALL
2387                                ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
2388                                ;       JSR     PC,$SB2D        ;CALL
2389                                ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
2390                                ;
2391                                ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2D', NOT THE VERSION ON
2392                                ;       THE SYSMAC LIBRARY, REV C AND LATER
2393
2394 022574  016637  000002  022620 $SB2D:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
2395 022602  012746  022620              MOV     #1$,-(SP)       ;SET THE POINTER
2396 022606  004737  026314              JSR     PC,$DB2D        ;CALL THE DOUBLE LENGTH CONVERT
2397 022612  012666  000002              MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
2398 022616  000207                      RTS     PC              ;RETURN
2399 022620  000000  000000        1$:   .WORD   0,0
2400
2401                                ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
2402                                ;UNSIGNED OCTAL ASCIZ NUMBER.
2403                                ;CALL
2404                                ;       MOV     NUMBER,-(SP)    ;PUT THE NUMBER ON THE STACK
2405                                ;       JSR     PC,$SB2O        ;CALL
2406                                ;       RETURN                  ;ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
2407                                ;
2408                                ;NOTE:  THE PROGRAM REQUIRES THIS FORM OF '$SB2O', NOT THE VERSION ON
2409                                ;       THE SYSMAC LIBRARY, REV C AND LATER
2410
2411 022624  016637  000002  022650 $SB2O:  MOV     2(SP),1$        ;SAVE THE BINARY NUMBER
2412 022632  012746  022650              MOV     #1$,-(SP)       ;SET THE POINTER
2413 022636  004737  026510              JSR     PC,$DB2O        ;CALL THE DOUBLE LENGTH CONVERT
2414 022642  012666  000002              MOV     (SP)+,2(SP)     ;PICKUP THE POINTER
2415 022646  000207                      RTS     PC              ;RETURN
2416 022650  000000  000000        1$:   .WORD   0,0
2417
2418                                ;KEYBOARD INTERRUPT INITIALIZATION ROUTINE
2419                                ;CALL
2420                                ;       JSR     PC,$TKINT
2421                                ;       RETURN
2422
2423 022654  012737  022704  000060 $TKINT: MOV     #$TKSRV,TKVEC   ;SETUP VECTOR
2424 022662  012737  000240  000062        MOV     #PR5,TKVEC+2    ;PRIORITY TO 5
2425 022670  005777  156266              TST     @$TKB           ;CLEAR THE BUFFER
2426 022674  012777  000100  156250      MOV     #BIT06,@$TKS    ;SET INTERRUPT ENABLE
2427 022702  000207                      RTS     PC              ;RETURN
2428
2429                                ;KEYBOARD INTERRUPT SERVICE ROUTINE
2430                                ;CALL
2431                                ;       ENTER VIA INTERRUPT
2432
2433 022704  104410                $TKSRV: RDCHR                   ;READ THE KEYBOARD
2434 022706  112637  023046              MOVB    (SP)+,5$        ;GET THE CHARACTER
2435 022712  023727  023046  000003      CMP     5$,#3           ;'CONTROL C' ?
2436 022720  001017                      BNE     1$              ;BR IF NOT
```

```
 2437 022722  104401  001207                    TYPE    ,$CRLF          ;CR-LF
 2438 022726  104401  023352                    TYPE    ,$CNTLC         ;'^C'
 2439 022732  012737  177777  001336            MOV     #-1,CFLAG       ;SET THE 'CONTROL C' FLAG
 2440 022740  005077  156214                    CLR     @$TKS           ;CLEAR THE TTY INTERRUPT
 2441 022744  104401  001207                    TYPE    ,$CRLF          ;CR-LF
 2442 022750  104401  042464                    TYPE    ,HALTX          ;HALT THE PROGRAM
 2443 022754  000177  156420                    JMP     @RSTART         ;JUMP TO RESTART
 2444
 2445 022760  023727  001154  000176  1$:       CMP     SWR,#SWREG      ;SOFTWARE SWITCH REGISTER IN USE ?
 2446 022766  001024                            BNE     3$              ;BR IF NOT
 2447 022770  023727  023046  000007            CMP     5$,#7           ;'CONTROL G' ?
 2448 022776  001020                            BNE     3$              ;BR IF NOT
 2449 023000  104401  001207                    TYPE    ,$CRLF          ;CR-LF
 2450 023004  104401  026171                    TYPE    ,$CNTLG         ;'^G'
 2451 023010  013746  177776                    MOV     PS,-(SP)        ;PUT THE STATUS WORD ON THE STACK
 2452 023014  012746  023030                    MOV     #2$,-(SP)       ;RETURN ADDRESS
 2453 023020  005077  156134                    CLR     @$TKS           ;CLEAR THE TTY INTERRUPT ENABLE
 2454 023024  000137  025632                    JMP     $GTSWR          ;GET THE SWITCH REGISTER ENTRY
 2455 023030  012777  000100  156122  2$:       MOV     #100,@$TKS      ;ENABLE TTY KEYBOARD INTERRUPT
 2456 023036  000402                            BR      4$              ;EXIT
 2457 023040  104401  023046          3$:       TYPE    ,5$             ;ECHO THE CHARACTER
 2458 023044  000002                  4$:       RTI                     ;RETURN
 2459
 2460 023046  000000                  5$:       .WORD   0               ;ENTERED CHARACTER
 2461
                                      ;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
                                      ;
      023050  010346                  $RDLIN: MOV     R3,-(SP)        ;SAVE R3
      023052  005046                          CLR     -(SP)           ;CLEAR THE RUBOUT KEY
 2470 023054  012703  023326          1$:     MOV     #$TTYIN,R3      ;GET ADDRESS
 2471 023060  022703  023340          2$:     CMP     #$TTYIN+10.,R3  ;BUFFER FULL?
 2472 023064  101467                          BLOS    4$              ;BR IF YES
 2473 023066  104410                          RDCHR                   ;GO READ ONE CHARACTER FROM THE TTY
 2474 023070  112613                          MOVB    (SP)+,(R3)      ;GET CHARACTER
 2475 023072  122713  000177                  CMPB    #177,(R3)       ;IS IT A RUBOUT
 2476 023076  001022                          BNE     5$              ;BR IF NO
 2477 023100  005716                          TST     (SP)            ;IS THIS THE FIRST RUBOUT?
 2478 023102  001007                          BNE     6$              ;BR IF NO
 2479 023104  112737  000134  023324          MOVB    #'\,9$          ;TYPE A BACK SLASH
 2480 023112  104401  023324                  TYPE    ,9$
 2481 023116  012716  177777                  MOV     #-1,(SP)        ;SET THE RUBOUT KEY
 2482 023122  005303                  6$:     DEC     R3              ;BACKUP BY ONE
 2483 023124  020327  023326                  CMP     R3,#$TTYIN      ;STACK EMPTY?
 2484 023130  103445                          BLO     4$              ;BR IF YES
 2485 023132  111337  023324                  MOVB    (R3),9$         ;SETUP TO TYPEOUT THE DELETED CHAR.
 2486 023136  104401  023324                  TYPE    ,9$             ;GO TYPE
 2487 023142  000746                          BR      2$              ;GO READ ANOTHER CHAR.
 2488 023144  005716                  5$:     TST     (SP)            ;RUBOUT KEY SET?
 2489 023146  001406                          BEQ     7$              ;BR IF NO
 2490 023150  112737  000134  023324          MOVB    #'\,9$          ;TYPE A BACK SLASH
 2491 023156  104401  023324                  TYPE    ,9$
 2492 023162  005016                          CLR     (SP)            ;CLEAR THE RUBOUT KEY
 2493 023164  122713  000025          7$:     CMPB    #25,(R3)        ;IS CHARACTER A CTRL U?
```

```
2494 023170  001003                    BNE     10$             ;BR IF NO
2495 023172  104401  026164            TYPE    ,$CNTLU         ;TYPE A CONTROL 'U'
2496 023176  000726                    BR      1$              ;GO START OVER
2497 023200  122713  000003    1U$:    CMPB    #3,(R3)         ;IS CHARACTER A CTRL C ?
2498 023204  001006                    BNE     8$              ;BR IF NOT
2499 023206  012737  177777  001336    MOV     #-1,CFLAG       ;SET CNTRL C FLAG
2500 023214  104401  023352            TYPE    ,$CNTLC         ;ECHO IT
2501 023220  000427                    BR      11$             ;EXIT
2502 023222  122713  000012    8$:     CMPB    #12,(R3)        ;IS CHARACTER A 'LF'?
2503 023226  001011                    BNE     3$              ;BRANCH IF NO
2504 023230  105013                    CLRB    (R3)            ;CLEAR THE CHARACTER
2505 023232  104401  001207            TYPE    ,$CRLF          ;TYPE A "CR" & 'LF"
2506 023236  104401  023326            TYPE    ,$TTYIN         ;TYPE THE INPUT STRING
2507 023242  000706                    BR      2$              ;GO PICKUP ANOTHER CHACTER
2508 023244  104401  001206    4$:     TYPE    ,$QUES          ;TYPE A '?'
2509 023250  000701                    BR      1$              ;CLEAR THE BUFFER AND LOOP
2510 023252  111337  023324    3$:     MOVB    (R3),9$         ;ECHO THE CHARACTER
2511 023256  104401  023324            TYPE    ,9$
2512 023262  122723  000015            CMPB    #15,(R3)+       ;CHECK FOR RETURN
2513 023266  001274                    BNE     2$              ;LOOP IF NOT RETURN
2514 023270  105063  177777            CLRB    -1(R3)          ;CLEAR RETURN (THE 15)
2515 023274  104401  001210            TYPE    ,$LF            ;TYPE A LINE FEED
2516 023300  005726            11$:    TST     (SP)+           ;CLEAN RUBOUT KEY FROM THE STACK
2517 023302  012603                    MOV     (SP)+,R3        ;RESTORE R3
2518 023304  011646                    MOV     (SP),-(SP)      ;ADJUST THE STACK AND PUT ADDRESS OF THE
2519 023306  016666  000004  000002    MOV     4(SP),2(SP)     ;       FIRST ASCII CHARACTER ON IT
2520 023314  012766  023326  000004    MOV     #$TTYIN,4(SP)
2521 023322  000002                    RTI                     ;RETURN
2522 023324     000    9$:     .BYTE   0                       ;STORAGE FOR ASCII CHAR. TO TYPE
2523 023325     000                    .BYTE   0               ;TERMINATOR
2524 023326            $TTYIN: .BLKB   20.                     ;RESERVE 20 BYTES FOR TTY INPUT
2525 023352     136     103     200    $CNTLC: .ASCIZ  /^C/<CRLF>      ;CONTROL "C"
2526
2527                            .EVEN
2528
2529 023356  005737  001376    FINISH: TST     FAULT           ;COMPATIBLE ?
2530 023362  001004                    BNE     1$              ;BRANCH IF NOT
2531 023364  104401  001207            TYPE    ,$CRLF          ;CR-LF
2532 023370  104401  041760            TYPE    ,MESG15         ;MESSAGE: ALL DRIVE COMPATIBLE
2533 023374  104401  001207    1$:     TYPE    ,$CRLF          ;CR-LF
2534 023400  104401  042362            TYPE    ,MESG20
2535 023404  104401  042400            TYPE    ,STARS          ;TYPE STARS MESSAGE
2536 023410  104401  001207            TYPE    ,$CRLF          ;CR-LF
2537 023414  000177  155760            JMP     @RSTART         ;JUMP TO RESTART
2538
2539                            .SBTTL  END OF PASS ROUTINE

                                ;;**********************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*IF SW12=1 INHIBIT TRACE TRAP
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO FINISH

     023420                     $EOP:
     023420  000240                     NOP
     023422  005037  001116             CLR     $TSTNM          ;;ZERO THE TEST NUMBER
     023426  005037  001176             CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
```

```
023432  005237  001220          INC     $PASS           ;;INCREMENT THE PASS NUMBER
023436  042737  100000  001220  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
023444  005327                  DEC     (PC)+           ;;LOOP?
023446  000001          $EOPCT: .WORD   1
023450  003022                  BGT     $DOAGN          ;;YES
023452  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
023454  000001          $ENDCT: .WORD   1
023456  023446                  $EOPCT
023460  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
023464  001414                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
023466  005046                  CLR     -(SP)           ;;INSURE THE 'T' BIT IS CLEAR
023470  012746  023476          MOV     #$CLR.T,-(SP)   ;;SETUP FOR AN RTI OR RTT
023474  000426                  BR      $RTRN           ;;GO DO AN RTI OR RTT TO LOAD THE PSW
                                                        ;;WITH A CLEARED 'T' BIT
023476          $CLR.T:
023476  013700  000042          MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
023502  001405                  BEQ     $DOAGN          ;;RETURN ADDRESS
023504  000005                  RESET                   ;;CLEAR THE WORLD
023506  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
023510  000240                  NOP                     ;;SAVE ROOM
023512  000240                  NOP                     ;;FOR
023514  000240                  NOP                     ;;ACT11
023516          $DOAGN:
023516  104400                  TRAP                    ;;PUSH OLD PSW AND PC ON STACK
023520  042716  000020          BIC     #20,(SP)        ;;CLEAR THE 'T' BIT
023524  032777  010000  155422  BIT     #BIT12,@SWR     ;;RUN WITH TRACE TRAP?
023532  001005                  BNE     1$              ;;BR IF NO
023534  005137  023560          COM     $TBIT           ;;IS IT TIME FOR TRACE TRAP
023540  100402                  BMI     1$              ;;BR IF NO
023542  052716  000020          BIS     #20,(SP)        ;;SET TRACE TRAP
023546  012746  023554  1$:     MOV     #$LOOP,-(SP)    ;;JUMP TO START OF TEST
023552  000002          $RTRN:  RTI                     ;;RETURN--THIS IS CHANGED TO
                                                        ;;AN 'RTT' IF 'RTT' IS A LEGAL
                                                        ;;INSTRUCTION
023554          $LOOP:
023554  000137                  JMP     @(PC)+          ;;RETURN
023556  023356  $RTNAD: .WORD   FINISH
023560  000000  $TBIT:  .WORD   0                       ;;'T' BIT STATE INDICATOR
2540
2541                    .SBTTL  ERROR HANDLER ROUTINE

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

023562          $ERROR:
023562  104407                  CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
023564  105237  001117  7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
023570  001775                  BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
```

```
023572  013777  001116  155356          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
023600  032777  002000  155346          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
023606  001402                          BEQ     1$              ;;NO - SKIP
023610  104401  001202                  TYPE    ,$BELL          ;;RING BELL
023614  005237  001126          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
023620  011637  001132                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
023624  162737  000002  001132          SUB     #2,$ERRPC
023632  117737  155274  001130          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
023640  032777  020000  155306          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
023646  001004                          BNE     20$             ;;SKIP TYPEOUTS
023650  004737  023762                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
023654  104401  001207                  TYPE    ,$CRLF
023660                          20$:
023660  122737  000001  001232          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
023666  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
023670  113737  001130  023702          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
023676  004737  024170                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
023702     000                  21$:    .BYTE   0
023703     000                          .BYTE   0
023704  000777                  22$:    BR      22$             ;;APT ERROR LOOP
023706  005777  155242          2$:     TST     @SWR            ;;HALT ON ERROR
023712  100002                          BPL     3$              ;;SKIP IF CONTINUE
023714  000000                          HALT                    ;;HALT ON ERROR!
023716  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
023720  032777  001000  155226  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
023726  001402                          BEQ     4$              ;;BR IF NO
023730  013716  001124                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
023734  005737  001200          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
023740  001402                          BEQ     5$              ;;BR IF NONE
023742  013716  001200                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
023746                          5$:
023746  022737  023506  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
023754  001001                          BNE     6$              ;;BRANCH IF NO
023756  000000                          HALT                    ;;YES
023760                          6$:
023760  000002                          RTI                     ;;RETURN
2542
2543                                    .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

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

023762                                  $ERRTYP:
023762  104401  001207                  TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
023766  010046                          MOV     R0,-(SP)        ;;SAVE R0
023770  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
023772  153700  001130                  BISB    @#$ITEMB,R0
023776  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                ;;TYPE THE PC OF THE ERROR
024000  013746  001132                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
024004  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
024006  000426                          BR      6$              ;;GET OUT
024010  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
024012  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
```

```
024014  006300                  ASL     R0
024016  006300                  ASL     R0
024020  062700  005362          ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
024024  012037  024034          MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
024030  001404                  BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
024032  104401                  TYPE                    ;;TYPE THE "ERROR MESSAGE"
024034  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
024036  104401  001207          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
024042  012037  024052  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
024046  001404                  BEQ     5$              ;;SKIP TYPEOUT IF 0
024050  104401                  TYPE                    ;;TYPE THE "DATA HEADER"
024052  000000          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
024054  104401  001207          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
024060  011000          5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
024062  001004                  BNE     7$              ;;GO TYPE THE DATA
024064  012600          6$:     MOV     (SP)+,R0        ;;RESTORE R0
024066  104401  001207          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
024072  000207                  RTS     PC              ;;RETURN
024074                  7$:
024074  013046                  MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
024076  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
024100  005710                  TST     (R0)            ;;IS THERE ANOTHER NUMBER?
024102  001770                  BEQ     6$              ;;BR IF NO
024104  104401  024112          TYPE    ,8$             ;;TYPE TWO(2) SPACES
024110  000771                  BR      7$              ;;LOOP
024112    040     040     000   8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
                                .EVEN

2544
2545                            .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
                                ;*

024116  105737  001173  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
024122  100002                  BPL     1$              ;;BR IF YES
024124  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
024126  000430                  BR      3$              ;;LEAVE
024130  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
024132  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
024136  122737  000001  001232  CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
024144  001011                  BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
024146  132737  000100  001233  BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
024154  001405                  BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
024156  010037  024166          MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
024162  004737  024460          JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
```

```
024166  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
024170  132737  000040  001233  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
024176  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
024200  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
024202  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
024204  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
024206  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
024210  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
024214  000002                          RTI                     ;;RETURN
024216  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
024222  001430                          BEQ     8$
024224  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
024230  001006                          BNE     5$
024232  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
024234  104401                          TYPE                    ;;TYPE A CR AND LF
024236  001207                          $CRLF
024240  105037  024446                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
024244  000755                          BR      2$              ;;GET NEXT CHARACTER
024246  004737  024330          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
024252  123726  001172          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
024256  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
024260  013746  001170                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
024264  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
024270  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
024272  004737  024330                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
024276  105337  024446                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
024302  000770                          BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

024304  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
024310  004737  024330          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
024314  132737  000007  024446          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
024322  001372                          BNE     9$              ;;TAB STOP
024324  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
024326  000724                          BR      2$              ;;GET NEXT CHARACTER
024330                          $TYPEC:
024330  105777  154624                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?
024334  100022                          BPL     10$             ;;BR IF NOT
024336  017746  154620                  MOV     @$TKB,-(SP)     ;;GET CHAR
024342  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS
024346  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF
024352  001013                          BNE     102$            ;;BR IF NOT
024354                          101$:
024354  105777  154600                  TSTB    @$TKS           ;;WAIT FOR CHAR
024360  100375                          BPL     101$
024362  117716  154574                  MOVB    @$TKB,(SP)      ;;GET CHAR
024366  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT
024372  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?
024376  001366                          BNE     101$            ;;BR IF NOT
024400                          102$:
024400  005726                          TST     (SP)+           ;;FIX STACK
024402                          10$:
024402  105777  154556                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
024406  100375                          BPL     10$
024410  116677  000002  154550          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
```

```
024416  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
024424  001003                          BNE     1$              ;;BRANCH IF NO
024426  105037  024446                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
024432  000406                          BR      $TYPEX          ;;EXIT
024434  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
024442  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
024444  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
024446  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
024450  000207                  $TYPEX: RTS     PC

2546
2547
                                .SBTTL  APT COMMUNICATIONS ROUTINE

                                ;;**************************************************************************
024452  112737  000001  024716  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
024460  112737  000001  024714  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
024466  000403                          BR      $ATYC
024470  112737  000001  024716  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
024476                          $ATYC:
024476  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
024500  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
024502  105737  024714                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
024506  001450                          BEQ     5$              ;;IF NOT:  BR
024510  122737  000001  001232          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
024516  001031                          BNE     3$              ;;IF NOT:  BR
024520  132737  000100  001233          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
024526  001425                          BEQ     3$              ;;IF NOT:  BR
024530  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
024534  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
024542  005737  001212          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
024546  001375                          BNE     1$              ;;IF NOT:  WAIT
024550  010037  001226                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
024554  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
024556  001376                          BNE     2$
024560  163700  001226                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
024564  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
024566  010037  001230                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
024572  012737  000004  001212          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
024600  000413                          BR      5$
024602  017637  000004  024626  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
024610  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
024616  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
024622  004737  024116                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
024626  000000                  4$:     .WORD   0
024630                          5$:
024630  105737  024716          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
024634  001416                          BEQ     12$             ;;IF NOT:  BR
024636  005737  001232                  TST     $ENV            ;;RUNNING UNDER APT?
024642  001413                          BEQ     12$             ;;IF NOT:  BR
024644  005737  001212          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
024650  001375                          BNE     11$             ;;IF NOT:  WAIT
024652  017637  000004  001214          MOV     @4(SP),$FATAL   ;;GET ERROR #
024660  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
024666  005237  001212                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
024672  105037  024716          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
024676  105037  024715                  CLRB    $LFLG           ;;CLEAR LOG FLAG
024702  105037  024714                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
```

```
024706  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
024710  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
024712  000207                  RTS     PC              ;;RETURN
024714     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
024715     000          $LFLG:  .BYTE   0               ;;LOG FLAG
024716     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
                                .EVEN
        000200          APTSIZE = 200
        000001          APTENV  = 001
        000100          APTSPOOL= 100
        000040          APTCSUP = 040
2548
2549                            .SBTTL  POWER DOWN AND UP ROUTINES

                                ;;**************************************************************************
                                ;POWER DOWN ROUTINE
024720  012737  025072  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
024726  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
024734  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
024736  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
024740  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
024742  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
024744  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
024746  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
024750  017746  154200          MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
024754  010637  025076          MOV     SP,$SAVR6       ;;SAVE SP
024760  012737  024772  000024  MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
024766  000000                  HALT
024770  000776                  BR      .-2             ;;HANG UP

                                ;;**************************************************************************
                                ;POWER UP ROUTINE
025000  012737  025072  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
025004  013706  025076          MOV     $SAVR6,SP       ;;GET SP
025010  005037  025076          CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
025014  005237  025076  1$:     INC     $SAVR6          ;;WAIT FOR THE INC
025020  001375                  BNE     1$              ;;OF  WORD
025022  012677  154132          MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
025026  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
025030  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
025032  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
025034  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
025036  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
025040  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
025044  012737  024720  000024  MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
025052  012737  000340  000025  MOV     #340,@#PWRVEC+2 ;;PRIO:7
025060  104401                  TYPE                    ;REPORT THE POWER FAILURE
025062  025106          $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
025064  042766  000020  000002  BIC     #20,2(SP)       ;;CLEAR 'T' BIT
025072  005037  023560          CLR     $TBIT           ;;CLEAR THE 'T' BIT FLAG
025076  000002                  RTI
025100  000000          $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
025102  000776                  BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
025104  000000          $SAVR6: 0                       ;;PUT THE SP HERE
025106     015     012     120  $POWER: .ASCIZ  <15><12>'POWER'
                                .EVEN
2550
```

```
2551                                    .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

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

025110  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
025114  116637  000001  025333          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
025122  112637  025335                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
025126  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
025132  000406                          BR      $TYPON
025134  112737  000001  025333  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
025142  112737  000006  025335          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
025150  112737  000005  025332  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
025156  010346                          MOV     R3,-(SP)        ;;SAVE R3
025160  010446                          MOV     R4,-(SP)        ;;SAVE R4
025162  010546                          MOV     R5,-(SP)        ;;SAVE R5
025164  113704  025335                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
025170  005404                          NEG     R4
025172  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
025176  110437  025334                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
025202  113704  025333                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
025206  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
025212  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
025214  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
025216  000404                          BR      3$              ;;GO DO MSB
025220  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
025222  006105                          ROL     R5
025224  006105                          ROL     R5
025226  010503                          MOV     R5,R3
025230  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
025232  105337  025334                  DECB    $OMODE          ;;TYPE THIS DIGIT?
025236  100016                          BPL     7$              ;;BR IF NO
025240  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
025244  001002                          BNE     4$              ;;TEST FOR 0
025246  005704                          TST     R4              ;;SUPPRESS THIS 0?
025250  001403                          BEQ     5$              ;;BR IF YES
025252  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
```

```
025254  052703  000060            BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
025260  052703  000040    5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
025264  110337  025330            MOVB    R3,8$           ;;SAVE FOR TYPING
025270  104401  025330            TYPE    ,8$             ;;GO TYPE THIS DIGIT
025274  105337  025332    7$:     DECB    $OCNT           ;;COUNT BY 1
025300  003347                    BGT     2$              ;;BR IF MORE TO DO
025302  002402                    BLT     6$              ;;BR IF DONE
025304  005204                    INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
025306  000744                    BR      2$              ;;GO DO THE LAST DIGIT
025310  012605            6$:     MOV     (SP)+,R5        ;;RESTORE R5
025312  012604                    MOV     (SP)+,R4        ;;RESTORE R4
025314  012603                    MOV     (SP)+,R3        ;;RESTORE R3
025316  016666  000002  000004    MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
025324  012616                    MOV     (SP)+,(SP)
025326  000002                    RTI                     ;;RETURN
025330     000    8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
025331     000            .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
025332     000    $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
025333     000    $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
025334  000000    $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 2552
 2553                    .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

025336                  $TYPDS:
025336  010046                 MOV     R0,-(SP)        ;;PUSH R0 ON STACK
025340  010146                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
025342  010246                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
025344  010346                 MOV     R3,-(SP)        ;;PUSH R3 ON STACK
025346  010546                 MOV     R5,-(SP)        ;;PUSH R5 ON STACK
025350  012746  020200         MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
025354  016605  000020         MOV     20(SP),R5       ;;GET THE INPUT NUMBER
025360  100004                 BPL     1$              ;;BR IF INPUT IS POS.
025362  005405                 NEG     R5              ;;MAKE THE BINARY NUMBER POS.
025364  112766  000055  000001 MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
025372  005000         1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
025374  012703  025552         MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
025400  112723  000040         MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
025404  005002         2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
025406  016001  025542         MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
025412  160105         3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
025414  002402                 BLT     4$              ;;BR IF DONE
025416  005202                 INC     R2              ;;INCREASE THE BCD DIGIT BY 1
025420  000774                 BR      3$
025422  060105         4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
025424  005702                 TST     R2              ;;CHECK IF BCD DIGIT=0
025426  001002                 BNE     5$              ;;FALL THROUGH IF 0
025430  105716                 TSTB    (SP)            ;;STILL DOING LEADING 0'S?
```

```
025432  100407                          BMI     7$              ;;BR IF YES
025434  106316                  5$:     ASLB    (SP)            ;;MSD?
025436  103003                          BCC     6$              ;;BR IF NO
025440  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
025446  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
025452  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
025456  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
025460  005720                          TST     (R0)+           ;;JUST INCREMENTING
025462  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
025466  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
025470  003002                          BGT     8$              ;;GO TO EXIT
025472  010502                          MOV     R5,R2           ;;GET THE LSD
025474  000764                          BR      6$              ;;GO CHANGE TO ASCII
025476  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
025500  100003                          BPL     9$              ;;BR IF NO
025502  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
025510  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
025512  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
025514  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
025516  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
025520  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
025522  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
025524  104401  025552                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
025530  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
025536  012616                          MOV     (SP)+,(SP)
025540  000002                          RTI                     ;;RETURN TO USER
025542  023420                  $DTBL:  10000.
025544  001750                          1000.
025546  000144                          100.
025550  000012                          10.
025552                          $DBLK:  .BLKW   4

2554
2555                                    .SBTTL  TTY INPUT ROUTINE

                                        ;;******************************************************************************
                                        .ENABL  LSB

                                        ;;******************************************************************************
                                        ;*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 FLAG MODE.
025562  022737  000176  001154  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
025570  001074                          BNE     15$             ;;BRANCH IF NO
025572  105777  153362                  TSTB    @$TKS           ;;CHAR THERE?
025576  100071                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
025600  117746  153356                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
025604  042716  177600                  BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
025610  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
025614  001062                          BNE     15$             ;;NO, RETURN TO USER
025616  123727  001150  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
025624  001456                          BEQ     15$             ;;BRANCH IF YES

025626  104401  026171                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
025632  104401  026176          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
025636  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
025642  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
```

```
025644  104401  026207                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
025650  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
025652  005046                          CLR     -(SP)           ;;THE NEW SWR
025654  105777  153300          7$:     TSTB    @$TKS           ;;CHAR THERE?
025660  100375                          BPL     7$              ;;IF NOT TRY AGAIN

025662  117746  153274                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
025666  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII



025672  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
025676  001005                          BNE     10$             ;;BRANCH IF NOT
025700  104401  026164                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
025704  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
025710  000757                          BR      19$             ;;LET'S TRY IT AGAIN


025712  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
025716  001022                          BNE     16$             ;;BRANCH IF NO
025720  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
025724  001403                          BEQ     11$             ;;BRANCH IF YES
025726  016677  000002  153220          MOV     2(SP),@SWR      ;;SAVE NEW SWR
025734  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
025740  104401  001207          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
025744  123727  001151  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
025752  001003                          BNE     15$             ;;BRANCH IF NOT
025754  012777  000100  153176          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
025762  000002                  15$:    RTI                     ;;RETURN
025764  004737  024330          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
025770  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
025774  002420                          BLT     18$             ;;BRANCH IF YES
025776  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
026002  003015                          BGT     18$             ;;BRANCH IF YES
026004  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
026010  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
026014  001403                          BEQ     17$             ;;BRANCH IF YES
026016  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
026020  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
026022  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
026024  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
026030  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
026034  000707                          BR      7$              ;;GET THE NEXT ONE
026036  104401  001206          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
026042  000720                          BR      20$             ;;SIMULATE CONTROL-U
                                .DSABL  LSB


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

026044  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
```

```
026046  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
026054  105777  153100          1$:     TSTB    @$TKS           ;;WAIT FOR
026060  100375                          BPL     1$              ;;A CHARACTER
026062  117766  153074  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
026070  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
026076  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
026104  001013                          BNE     3$              ;;BRANCH IF NO
026106  105777  153046          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
026112  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
026114  117746  153042                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
026120  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
026124  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
026130  001366                          BNE     2$              ;;IF NOT DISCARD IT
026132  000750                          BR      1$              ;;YES, RESUME
026134  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
026142  002407                          BLT     4$              ;;BRANCH IF YES
026144  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
026152  003003                          BGT     4$              ;;BRANCH IF YES
026154  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
026162  000002                  4$:     RTI                     ;;GO BACK TO USER
026164     136     125     015  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
026171     136     107     015  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
026176     015     012     123  $MSWR:  .ASCIZ  <15><12>/SWR = /
026207     040     040     116  $MNEW:  .ASCIZ  /  NEW = /
  2556
  2557                                  .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

026220                          $SAVRFG:
026220  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
026222  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
026224  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
026226  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
026230  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
026232  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
026234  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
026240  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
026244  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
026250  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
026254  000002                          RTI

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

```
                                ;*      RESREG
                                $RESREG:
026256                                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
026256  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
026262  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
026266  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
026272  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
026276  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
026300  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
026302  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
026304  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
026306  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
026310  000002                          RTI
2558
2559                            .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

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


026314  104412                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
026316  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
026322  012700  026474                  MOV     #$DECVL,R0      ;;GET ADDRESS OF '$DECVL'' STRING
026326  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
026332  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
026334  012202                          MOV     (R2)+,R2
026336  012737  000012  026412          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
026344  012704  026424                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
026350  012705  026426                  MOV     #$TNPWR+2,R5
026354  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
026356  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
026360  005602                          SBC     R2
026362  161502                          SUB     (R5),R2
026364  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
026366  005203                          INC     R3              ;;ADD 1 TO PARTIAL
026370  000772                          BR      2$              ;;LOOP
026372  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
026374  005502                          ADC     R2
026376  062402                          ADD     (R4)+,R2
026400  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
026402  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
026406  110320                          MOVB    R3,(R0)+        ;;SAVE IT
026410  005327                          DEC     (PC)+           ;;DONE?
026412  000000                  4$:     .WORD   0
026414  001357                          BNE     1$              ;;BR IF NO
026416  105020                          CLRB    (R0)+           ;;TERMINATOR
026420  104413                          RESREG                  ;;RESTORE REGISTERS
026422  000207                          RTS     PC              ;;RETURN
026424  145000                  $TNPWR: 145000                  ;;1.0E09
026426  035632                          35632
```

```
026430  160400                          160400                  ;;1.0E08
026432  002765                          2765
026434  113200                          113200                  ;;1.0E07
026436  000230                          230
026440  041100                          041100                  ;;1.0E06
026442  000017                          17
026444  103240                          103240                  ;;1.0E05
026446  000001                          1
026450  023420                          23420                   ;;1.0E04
026452  000000                          0
026454  001750                          1750                    ;;1.0E03
026456  000000                          0
026460  000144                          144                     ;;1.0E02
026462  000000                          0
026464  000012                          12                      ;;1.0E01
026466  000000                          0
026470  000001                          1                       ;;1.0E00
026472  000000                          0
026474                          $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
 2560
 2561                           .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE

                                ;;******************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
                                ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK


026510  104412                  $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
026512  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
026516  012705  026627                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
026522  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
026526  012703  177770                  MOV     #^C7,R3         ;;MASK
026532  012100                          MOV     (R1)+,R0        ;;LOWER WORD
026534  012101                          MOV     (R1)+,R1        ;;HIGH WORD
026536  005002                          CLR     R2              ;;TERMINATOR
026540  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
026542  010002                          MOV     R0,R2           ;;GET THIS DIGIT
026544  005304                          DEC     R4              ;;COUNT THIS CHARACTER
026546  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
026550  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
026552  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
026554  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
026560  104413                          RESREG                  ;;RESTORE ALL REGISTERS
026562  000207                          RTS     PC              ;;RETURN TO USER
026564  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
026566  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
026570  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
026572  006001                          ROR     R1
026574  006000                          ROR     R0
026576  006001                          ROR     R1
026600  006000                          ROR     R0
026602  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
026604  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
```

```
026610  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
026612                          $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
2562
2563                            .SBTTL  SCOPE HANDLER ROUTINE

                                ;;**********************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                ;*CALL
                                ;*      SCOPE           ;;SCOPE=IOT

026630                          $SCOPE:
026630  104407                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
026632  032777  040000  152314  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
026640  001114                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
026642  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
026644  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
026650  012737  026670  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
026656  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
026662  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
026666  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
026670  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
026672  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
026676  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
026700                          6$:;#####END OF CODE FOR THE XOR TESTER#####
026700  032777  000400  152246          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
026706  001404                          BEQ     2$              ;;BR IF NO
026710  127737  152240  001116          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
026716  001465                          BEQ     $OVER           ;;BR IF YES
026720  105737  001117          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
026724  001421                          BEQ     3$              ;;BR IF NO
026726  123737  001131  001117          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
026734  101015                          BHI     3$              ;;BR IF NO
026736  032777  001000  152210          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
026744  001404                          BEQ     4$              ;;BR IF NO
026746  013737  001124  001122  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
026754  000446                          BR      $OVER
026756  105037  001117          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
026762  005037  001176                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
026766  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
026770  032777  004000  152156  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
026776  001011                          BNE     1$              ;;BR IF YES
027000  005737  001220                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
027004  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
027006  005237  001120                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
027012  023737  001176  001120          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
027020  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
027022  012737  000001  001120  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
027030  013737  027106  001176          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
```

```
027036  105237  001116          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
027042  113737  001116  001216          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
027050  011637  001122                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
027054  011637  001124                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
027060  005037  001200                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
027064  112737  000001  001131          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
027072  013777  001116  152056  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
027100  013716  001122                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
027104  000002                          RTI                     ;;FIXES PS
027106  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
2564
2565                                    .SBTTL  ROUTINE TO SIZE MEMORY

                                        ;;**********************************************************************
                                        ;*CALL:
                                        ;*      JSR     PC,$SIZE
                                        ;*      RETURN
                                        ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION

027110  010046                  $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
027112  010146                          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
027114  013746  000114                  MOV     @#114,-(SP)     ;;SAVE MEMORY ERROR VECTOR PS & PC
027120  013746  000116                  MOV     @#116,-(SP)
027124  012737  000116  000114          MOV     #116,@#114      ;;IGNORE PARITY ERRORS WHILE SIZING
027132  012737  000002  000116          MOV     #RTI,@#116
027140  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
027144  013746  000006                  MOV     @#ERRVEC+2,-(SP)
027150  010600                          MOV     SP,R0           ;;SAVE THE STACK POINTER
                                        ;;SET THE ERRVEC PS TO THE PRESENT PS
027152  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
027154  012637  000006                  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
027160  012737  027200  000004          MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
027166  012701  020000                  MOV     #20000,R1       ;;FIRST ADDRESS
027172  005711                  1$:     TST     (R1)            ;;TEST THIS ADDRESS
027174  005721                          TST     (R1)+           ;;STEP TO NEXT ADDRESS
027176  000775                          BR      1$              ;;TRY ANOTHER
027200  162701  000002          2$:     SUB     #2,R1           ;;DROP BACK
027204  010006                          MOV     R0,SP           ;;RESTORE THE STACK
027206  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
027212  012637  000004                  MOV     (SP)+,@#ERRVEC
027216  012637  000116                  MOV     (SP)+,@#116     ;;RESTORE MEMORY ERROR VECTOR
027222  012637  000114                  MOV     (SP)+,@#114
027226  010137  027240                  MOV     R1,$LSTAD       ;;LAST ADDRESS
027232  012601                          MOV     (SP)+,R1        ;;RESTORE R1
027234  012600                          MOV     (SP)+,R0        ;;RESTORE R0
027236  000207                          RTS     PC
027240  000000                  $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
2566
2567                                    .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.

027242  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
```

```
027244  016000  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
027250  005740                  TST     -(R0)           ;;BACKUP BY 2
027252  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
027254  006300                  ASL     R0              ;;POSITION FOR INDEXING
027256  016000  027276          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
027262  000200                  RTS     R0              ;;GO TO ROUTINE


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

027264  011646          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
027266  016666  000004  000002  MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
027274  000002                  RTI                     ;;RESTORE THE PSW

                        .SBTTL  TRAP TABLE

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

                        ;       ROUTINE
                        ;       -------
027276  027264  $TRPAD: .WORD   $TRAP2
027300  024116          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
027302  025134          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
027304  025110          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
027306  025150          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
027310  025336          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

027312  025632          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

027314  025562          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
027316  026044          $RDCHR  ;;CALL=RDCHR    TPAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
027320  023050          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
027322  026220          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
027324  026256          $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
2568 027326  022266      $DSPLY  ;;CALL=DISPLY   TRAP+14(104414) ROUTINE TO TYPE ERROR MESSAGES
2569         000032  $TERM=.-$TRPAD
2570
2577
```

```
                                .SBTTL  SINGLE/DUAL PORT RH/RM DRIVER (REV 6.2) FEBRUARY 1980

                                ;NEW DRIVE TYPE ID FOR RM02 **********
                                ;10-AUG-77 ***********
                                ;10-MAR-78 THE SC, SC5 CHANGES
                                ;NEW DRIVE TYPE ID FOR RM05 **********
                                ;FEBRUARY 1980 ***********

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

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

                                ;STORAGE FOR RMDS, RMER1, RMER2, AND RMMR2 ON AN ERROR '2''
                                        ;RMERRS   = RMDS
                                        ;RMERRS+2 = RMER1
                                        ;RMERRS+4 = RMER2
                                        ;RMERRS+6 = RMMR2

027330  000000  000000  000000  RMERRS: .WORD   0,0,0,0

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

027340      000                 DRVACT: .BYTE   0               ;DRIVE 0
027341      000                         .BYTE   0               ;DRIVE 1
027342      000                         .BYTE   0               ;DRIVE 2
027343      000                         .BYTE   0               ;DRIVE 3
027344      000                         .BYTE   0               ;DRIVE 4
027345      000                         .BYTE   0               ;DRIVE 5
027346      000                         .BYTE   0               ;DRIVE 6
027347      000                         .BYTE   0               ;DRIVE 7

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

027350      000                 DRVSTA: .BYTE   0               ;DRIVE 0
027351      000                         .BYTE   0               ;DRIVE 1
027352      000                         .BYTE   0               ;DRIVE 2
027353      000                         .BYTE   0               ;DRIVE 3
027354      000                         .BYTE   0               ;DRIVE 4
027355      000                         .BYTE   0               ;DRIVE 5
027356      000                         .BYTE   0               ;DRIVE 6
027357      000                         .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                        ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                        ;DRVTYP=7 IF DRIVE IS RM05 ******
                                        ;DRVTYP=5 IF DRIVE IS RM02 ******
                                        ;DRVTYP=4 IF DRIVE IS RM03
                                        ;DRVTYP=-1 IF NOT RM05/3/2
```

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

027370  000             DPINT:  .BYTE   0               ;DRIVE 0
027371  000                     .BYTE   0               ;DRIVE 1
027372  000                     .BYTE   0               ;DRIVE 2
027373  000                     .BYTE   0               ;DRIVE 3
027374  000                     .BYTE   0               ;DRIVE 4
027375  000                     .BYTE   0               ;DRIVE 5
027376  000                     .BYTE   0               ;DRIVE 6
027377  000                     .BYTE   0               ;DRIVE 7

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

027400  000             DPRQS:  .BYTE   0               ;DRIVE 0
027401  000                     .BYTE   0               ;DRIVE 1
027402  000                     .BYTE   0               ;DRIVE 2
027403  000                     .BYTE   0               ;DRIVE 3
027404  000                     .BYTE   0               ;DRIVE 4
027405  000                     .BYTE   0               ;DRIVE 5
027406  000                     .BYTE   0               ;DRIVE 6
027407  000                     .BYTE   0               ;DRIVE 7

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

027410  000000          TRNSWT: .WORD   0

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

027412  000000          SRCHWT: .WORD   0

                        ;RM DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
                                ;ACTDRV=0 IF DRIVER IS INACTIVE
                                ;ACTDRV>0 IF DRIVER IS ACTIVE

027414  000             ACTDRV: .BYTE   0

                        ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
```

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                                        ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
                                        ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE

027415  000                     ACTSTR: .BYTE   0

                                ;UNLOAD FLAG (ULDFLG=8 BYTES)
                                        ;ULDFLG=0 IF NO UNLOAD COMMAND
                                        ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
                                        ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE

027416  000                     ULDFLG: .BYTE   0               ;DRIVE 0
027417  000                             .BYTE   0               ;DRIVE 1
027420  000                             .BYTE   0               ;DRIVE 2
027421  000                             .BYTE   0               ;DRIVE 3
027422  000                             .BYTE   0               ;DRIVE 4
027423  000                             .BYTE   0               ;DRIVE 5
027424  000                             .BYTE   0               ;DRIVE 6
027425  000                             .BYTE   0               ;DRIVE 7

                                ;LOOK AHEAD COUNT (LACNT=8 BYTES)
                                        ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED

027426  000                     LACNT:  .BYTE   0               ;DRIVE 0
027427  000                             .BYTE   0               ;DRIVE 1
027430  000                             .BYTE   0               ;DRIVE 2
027431  000                             .BYTE   0               ;DRIVE 3
027432  000                             .BYTE   0               ;DRIVE 4
027433  000                             .BYTE   0               ;DRIVE 5
027434  000                             .BYTE   0               ;DRIVE 6
027435  000                             .BYTE   0               ;DRIVE 7

                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
                                        ;SAVEFG <0 IF SAVE THE RH/RM REGISTERS WHEN THE
                                        ;OPERATION IS COMPLETED AS PER (DPB+14).
                                        ;SAVEFG=0 IF SAVE THE RH/RM REGISTERS, AS PER
                                        ;(DPB+14), AFTER AN ERROR.

027436  000000                  SAVEFG: .WORD   0

                                ;SEEK FLAG (SEEKFG=1 WORD)
                                        ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
                                        ;FOR A DATA TRANSFER START A SEARCH COMMAND
                                        ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
                                        ;DISREGARD THE WINDOW

027440  177777                  SEEKFG: .WORD   -1

                                ;TIMEOUT TABLE (TIMER=8 WORDS)
                                        ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION

027442  177777                  TIMER:  .WORD   -1               ;DRIVE 0
027444  177777                          .WORD   -1              ;DRIVE 1
027446  177777                          .WORD   -1              ;DRIVE 2
027450  177777                          .WORD   -1              ;DRIVE 3
027452  177777                          .WORD   -1              ;DRIVE 4
027454  177777                          .WORD   -1              ;DRIVE 5
027456  177777                          .WORD   -1              ;DRIVE 6
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027460  177777                  .WORD   -1              ;DRIVE 7
                
                ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
                        ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
                        ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
                
027462  177777  DTUW:   .WORD   -1
                
                ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
                        ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
                        ;ATTENTION BIT
                
027464  001     ATABIT: .BYTE   1       ;DRIVE 0
027465  002             .BYTE   2       ;DRIVE 1
027466  004             .BYTE   4       ;DRIVE 2
027467  010             .BYTE   10      ;DRIVE 3
027470  020             .BYTE   20      ;DRIVE 4
027471  040             .BYTE   40      ;DRIVE 5
027472  100             .BYTE   100     ;DRIVE 6
027473  200             .BYTE   200     ;DRIVE 7
                
                ;FSRM TO RH11/RH70 'MASSBUS CONTROL BUS PARITY ERRORS'' (MCPE) ALLOWED BEFORE
                ;CALLING IT FATAL (MCPEMX=1 WORD)
                
027474  000003  MCPEMX: .WORD   3
                
                ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH/RM),
                ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).
                
027476  176700  RMADR:  .WORD   176700
027500  000254  000240  RMVEC:  .WORD   254,5*32.
                
                ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
027504  000004  MXLACT: .WORD   4
                
                ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
027506  001000  MXDLTA: .WORD   8.*64.
                
                ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
027510  000200  MNDLTA: .WORD   2*64.
                
                ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
027512  000005  MXWNDW: .WORD   5
                
                ;DEFINITIONS OF THE RH/RM ADDRESS INDEXES

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

                                        .SBTTL  RH/RM DRIVER INITIALIZATION CODE

                                        ;THIS ROUTINE WILL DETERMINE WHICH RM DRIVES ARE
                                        ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
                                        ;TO THE PROPER STATE FOR EACH DRIVE.
                                        ;NOTE: THIS ROUTINE CALLS DRVINT
                                        ;
                                        ;CALL
                                        ;
                                        ;       JSR     PC,RMINIT
                                        ;       RETURN
                                        ;
                                        ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                        ;
027514  104412                  RMINIT: SAVREG                  ;SAVE R0 - R5
027516  013746  177776                  MOV     PS,-(SP)        ;SAVE THE PRESENT PROCESSOR STATUS
027522  012737  000240  177776          MOV     #<5*32.>,PS     ;CHANGE THE PRIORITY TO 5
027530  004737  035402                  JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
027534  012701  027330                  MOV     #RMERRS,R1      ;FIRST ADDRESS TO BE CLEARED
027540  012702  027440                  MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
027544  005021                  1$:     CLR     (R1)+           ;CLEAR
027546  020102                          CMP     R1,R2           ;ARE WE DONE?
027550  103775                          BLO     1$              ;BR IF NO
027552  012702  027462                  MOV     #DTUW,R2        ;LAST ADDRESS
027556  012721  177777          2$:     MOV     #-1,(R1)+       ;INITIALIZE
027562  020102                          CMP     R1,R2           ;DONE?
027564  101774                          BLOS    2$              ;LOOP IF NO
027566  005037  027350                  CLR     DRVSTA          ;SET ALL DRIVES TO OFFLINE
027572  005037  027352                  CLR     DRVSTA+2
027576  005037  027354                  CLR     DRVSTA+4
027602  005037  027356                  CLR     DRVSTA+6
027606  013703  027500                  MOV     RMVEC,R3        ;SETUP THE RH/RM VECTOR
027612  012723  032350                  MOV     #ISR,(R3)+
027616  013713  027502                  MOV     RMVEC+2,(R3)
027622  013704  027476                  MOV     RMADR,R4        ;FIRST ADDRESS OF RH/RM
027626  012764  005000  000010          MOV     #CLR,RMCS2(R4)  ;MASSBUS INIT
027634  005001                          CLR     R1              ;START WITH DRIVE 0
027636  004037  027726          3$:     JSR     R0,DRVINT       ;INIT THE DRIVE
027642  000401                          BR      4$              ;'DVA' NOT SET OR PARITY ERROR
027644  000402                          BR      5$              ;NORMAL RETURN
027646  105061  027350          4$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
027652  005201                  5$:     INC     R1              ;GO TO NEXT DRIVE
027654  042701  177770                  BIC     #^C7,R1         ;MASK OUT UNUSED BITS
027660  001366                          BNE     3$              ;BR IF MORE DRIVES TO GO
027662  012701  000007                  MOV     #7,R1           ;START WITH DRIVE 7
027666  005037  177776                  CLR     PS              ;CLEAR THE PROCESSOR STATUS
027672  105761  027370          6$:     TSTB    DPINT(R1)       ;WAITING FOR DRIVE TO SWITCH PORTS ?
```

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                        BEQ     8$              ;BR NOT WAITING
                        JSR     PC,SET.IE       ;SET INTERRUPT
                7$:     TSTB    DPINT(R1)       ;DRIVE SWITCHED PORTS ?
                        BNE     7$              ;BR IF NOT
                8$:     DEC     R1              ;GO TO THE NEXT DRIVE
                        BPL     6$              ;CHECK NEXT DRIVE
                        MOV     (SP)+,PS        ;RESTORE THE PROCESSOR STATUS
                        RESREG                  ;RESTORE R0 - R5
                        RTS     PC              ;BYE-BYE

                ;DRIVE INITILIZATION ROUTINE
                ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
                ;AN RM05/3/2. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT16
                ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
                ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
                ;DRVSTA IS SET TO THE PROPER CONDITION.
                ;CALL
                ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                ;       MOV     RMADR,R4        ;UNIBUS ADDRESS OF RH/RM (RMCS1)
                ;       JSR     R0,DRVINT       ;CALLED BY A JSR
                ;       RETURN1                 ;ERROR OCCURRED (PARITY)
                ;       RETURN2                 ;NORMAL RETURN
                ;

                DRVINT: MOV     R5,-(SP)        ;SAVE R5
                DULP:   CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
                        CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
                        CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
                        MOV     R1,RMCS2(R4)    ;SELECT A DRIVE
                        MOVB    #111,RMCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
                        BIT     #BIT12,RMCS2(R4)        ;NONEXISTENT DRIVE?
                        BEQ     1$              ;NO
                        JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
                        BR      6$              ;LEAVE THIS ROUTINE

                1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
                        BIT     #BIT11,RMCS1(R4)        ;SEE IF DRIVE AVAILABLE
                        BEQ     DULP            ;BR IF DRIVE NOT AVAILABLE
                        JSR     R0,RD.RM        ;READ THE DRIVE TYPE REG.
                        RMDT
                        8$                      ;ERROR RETURN ADDRESS
                        MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
                        MOVB    #4,DRVTYP(R1)   ;SET RM03 INDICATOR
                        CMP     #20024,R5       ;SINGLE PORT RM03 ?
                        BEQ     2$              ;BR IF YES
                        CMP     #24024,R5       ;DUAL PORT RM03 ?
                        BEQ     2$              ;BR IF YES
                        MOVB    #5,DRVTYP(R1)   ;SET RM02 INDICATOR
                        CMP     #20025,R5       ;SINGLE PORT RM02 ?
                        BEQ     2$              ;BR IF SO
                        CMP     #24025,R5       ;DUAL PORT RM02 ?
                        BEQ     2$              ;BR IF SO
                        MOVB    #7,DRVTYP(R1)   ;SET RM05 INDICATOR
                        CMP     #20027,R5       ;SINGLE PORT RM05 ?
                        BEQ     2$              ;BR IF YES
                        CMP     #24027,R5       ;DUAL PORT RM05 ?
                        BEQ     2$              ;BR IF YES
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                311 030110  112761  177777  027360          MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
                312 030116  000446                          BR      6$              ;EXIT
                313
                314 030120  012746  000121          2$:     MOV     #121,-(SP)      ;DO A 'READ-IN PRESET'
                315 030124  004037  034526                  JSR     R0,WRT.RM
                316 030130  000000                          RMCS1
                317 030132  030260                          8$
                318 030134  012746  010000                  MOV     #BIT12,-(SP)    ;SET FMT16=1
                319 030140  004037  034526                  JSR     R0,WRT.RM
                320 030144  000032                          RMOF
                321 030146  030260                          8$
                322 030150  004037  034346                  JSR     R0,RD.RM        ;READ RMDS
                323 030154  000012                          RMDS
                324 030156  030260                          8$
                325 030160  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
                326 030162  100015                          BPL     4$              ;BR IF ATA=0
                327 030164  116164  027464  000016          MOVB    ATABIT(R1),RMAS(R4)     ;CLEAR ATTENTION BIT
                328 030172  004037  034346                  JSR     R0,RD.RM        ;FIND OUT WHY ATA=1
                329 030176  000014                          RMER1
                330 030200  030260                          8$
                331 030202  006126                          ROL     (SP)+           ;IS IT UNSAFE?
                332 030204  100004                          BPL     4$              ;BR IF NOT
                333 030206  112761  177777  027350          MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
                334 030214  000407                          BR      6$              ;EXIT
                335
                336 030216  005105                  4$:     COM     R5              ;CHECK MOL, DPR, DRY, AND VV
                337 030220  042705  167077                  BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
                338 030224  001003                          BNE     6$              ;BR IF MOL, DPR, DRY, OR VV IS CLEAR
                339 030226  112761  000001  027350          MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
                340 030234  005720                  6$:     TST     (R0)+           ;STEP OVER THE ERROR RETURN
                341 030236  000410                          BR      8$              ;EXIT
                342 030240  006301                  7$:     ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
                343 030242  012761  060000  027442          MOV     #60000,TIMER(R1)        ;START 2 SEC TIMER
                344 030250  006201                          ASR     R1              ;RESTORE R1
                345 030252  112761  177777  027370          MOVB    #-1,DPINT(R1)   ;SET PORT INITIALIZE INIDICATOR
                346 030260  012605                  8$:     MOV     (SP)+,R5        ;RESTORE R5
                347 030262  000200                          RTS     R0              ;EXIT
                348
                349                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
                350                                  ;
                351                                  ;CALL
                352                                  ;
                353                                  ;       JSR     R0,RM05         ;CALL THE RM05 DRIVER
                354                                  ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
                355                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
                356                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
                357                                                                  ;IS AN ERROR CONDITION
                358
                359 030264  013746  177776          RM05:   MOV     PS,-(SP)        ;SAVE THE CALLING STATUS
                360 030270  013737  027502  177776          MOV     RMVEC+2,PS      ;DON'T ALLOW ANY RM INTERRUPTS
                361 030276  112737  000001  027414          MOVB    #1,ACTDRV       ;SET ''ACTIVE DRIVER'' FLAG
                362 030304  104412                          SAVREG                  ;SAVE R0 - R5
                363 030306  011002                          MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
                364 030310  005062  000016                  CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
                365 030314  111201                          MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
                366 030316  013704  027476                  MOV     RMADR,R4        ;UNIBUS ADDRESS OF RMCS1
                367 030322  105761  027350                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
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030326  003014                          BGT     1$              ;BR IF ONLINE
030330  105761  027416                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
030334  001036                          BNE     3$              ;BR IF YES
030336  105761  027370                  TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
030342  001042                          BNE     5$              ;BR IF YES
030344  004037  027726                  JSR     R0,DRVINT       ;GO INIT. THE DRIVE
030350  000434                          BR      4$              ;ERROR RETURN
030352  105761  027350                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
030356  003445                          BLE     6$              ;BR IF NOT
030360  105761  027400          1$:     TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
030364  001031                          BNE     5$              ;BR IF YES
030366  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
030372  004037  035500                  JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
030376  000460                          BR      9$              ;QUEUE IS FULL
030400  122762  000103  000002          CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
030406  001003                          BNE     2$              ;BR IF NO
030410  112761  177777  027416          MOVB    #-1,ULDFLG(R1)  ;SET THE 'UNLOAD IN QUEUE'' FLAG
030416  105761  027340          2$:     TSTB    DRVACT(R1)      ;IS THIS DRIVE ACTIVE?
030422  001043                          BNE     8$              ;BR IF YES
030424  004737  030556                  JSR     PC,OPT          ;CALL THE OPTIMIZER
030430  000440                          BR      8$
030432  012762  120000  000016  3$:     MOV     #BIT15!BIT13,16(R2)     ;SET THE 'UNLOAD IN QUEUE'' ERROR FLAG
030440  000434                          BR      8$              ;EXIT
030442  004737  031636          4$:     JSR     PC,CI7          ;GO HANDLE THE PARITY ERROR
030446  000431                          BR      8$
030450  004037  035500          5$:     JSR     R0,DRVQUE       ;PUT REQUEST IN QUEUE
030454  000431                          BR      9$              ;QUEUE IS FULL
030456  032714  000100                  BIT     #BIT06,(R4)     ;IE BIT SET ?
030462  001023                          BNE     8$              ;YES
030464  004737  035036                  JSR     PC,SET.IE       ;SET THE INTERRUPT
030470  000420                          BR      8$              ;RETURN
030472  105761  027350          6$:     TSTB    DRVSTA(R1)      ;SEE IF DRIVE OFFLINE OR UNSAFE
030476  002412                          BLT     7$              ;BR IF UNSAFE
030500  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)     ;SET OFFLINE ERROR INDICATOR
030506  105761  027360                  TSTB    DRVTYP(R1)      ;SEE IF OFFLINE OR NONEXISTENT
030512  001007                          BNE     8$              ;BR IF OFFLINE
030514  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)     ;REPORT DRIVE NONEXISTENT
030522  000403                          BR      8$              ;GO TO EXIT
030524  012762  110000  000016  7$:     MOV     #BIT15!BIT12,16(R2)     ;DRIVE IS UNSAFE
030532  104413                  8$:     RESREG                  ;RESTORE R0 - R5
030534  005720                          TST     (R0)+           ;SETUP FOR NORMAL RETURN
030536  000401                          BR      10$             ;FINISH UP, THEN EXIT
030540  104413                  9$:     RESREG                  ;RESTORE R0 - R5
030542  005720                  10$:    TST     (R0)+           ;CORRECT THE RETURN ADDRESS
030544  105037  027414                  CLRB    ACTDRV          ;CLEAR ''ACTIVE DRIVER'' FLAG
030550  012637  177776                  MOV     (SP)+,PS        ;RETURN 'PS'' TO USER LEVEL
030554  000200                          RTS     R0              ;RETURN TO CALLER

                        ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
                        ;
                        ;CALL
                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                        ;       JSR     PC,OPT          ;SETUP A COMMAND
                        ;
030556  104412          OPT:    SAVREG                  ;SAVE R0 - R5
030560  013746  177776          MOV     PS,-(SP)        ;SAVE PROC. STATUS
030564  146137  027464  027412          BICB    ATABIT(R1),SRCHWT       ;CLEAR LA SEACH FLAG
```

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                                                ;RESET THE PORT REQ FLAG ****
                                                ;GET "DPB" POINTER OF REQUEST
                                                ;IS THERE A REQUEST IN QUEUE?
                                                ;NO--BR TO EXIT
                                                ;LOAD THE DRIVE ADDRESS *******
                                                ;CLEAR THE DRIVE
                                                ;DVA SET ?
                                                ;TO PROT REQUEST ,IF NOT
                                                ;IS DRIVE ONLINE?
                                                ;YES
                                                ;NO--REMOVE REQUEST FROM QUEUE
                                                ;SET OFFLINE STATUS/ERROR INDICATOR
                                                ;IS DRIVE UNSAFE ?
                                                ;BR TO EXIT IF NOT
                                                ;SET UNSAFE STATUS/ERROR INDICATOR
                                                ;BR TO EXIT
                                                ;LOAD COMMAND ONTO THE STACK
                                                ;LOAD THE REGISTER
                                                ;REGISTER INCREMENT
                                                ;ERROR RETURN ADDRESS
                                                ;DRIVE AVAILABLE ?
                                                ;BR IF NOT
                                                ;IS THE REQUEST FOR I/O?
                                                ;YES
                                                ;CALL THE COMMAND INITIATOR
                                                ;BR TO EXIT
                                                ;DATA TRANSFER UNDERWAY?
                                                ;YES--GO START A SEARCH
                                                ;DO IMPLIED SEEKS?
                                                ;YES
                                                ;NO--DO LOOK AHEAD
                                                ;RETURN HERE ON A PARITY ERROR
                                                ;GO START A SEARCH
                                                ;START A DATA TRANSFER
                                                ;START A SEARCH
                                                ;GO TO THE EXIT
                                                ;SET PORT REQUEST INDICATOR
                                                ;SET UP TO ADDRESS WORDS
                                                ;CONVERT TO WORD INDEX
                                                ;START 10 SEC TIMER
                                                ;EXIT
                                                ;PROCESS THE PARITY ERROR
                                                ;SEE IF 'IE' ALREADY SET
                                                ;BR IF SET
                                                ;SET "IE" WITHOUT A "TRE"
                                                ;RESTORE PROC. STATUS
                                                ;RESTORE R0 - R5
                                                ;COMMAND INITIATOR
                                                ;CALL
                                                ;DRIVE NUMBER
                                                ;ADDRESS OF DPB
                                                ;CI?= CI1,CI3, OR CI4
```

```
                                        ;                                       ;WHERE:
                                        ;                                       ;CI1=DATA TRANSFER
                                        ;                                       ;CI2=SEARCH REQUESTED BY DATA XFER
                                        ;                                       ;CI4=NOT DATA TRANSFER
                                        ;
031014  004737  035576          CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM 'DRIVES WAIT' QUEUE
031020  010237  027410                  MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
031024  010203                          MOV     R2,R3           ;DPB ADDRESS TO R3
031026  013704  027476                  MOV     RMADR,R4        ;RMCS1 ADDRESS
031032  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
031036  062703  000004                  ADD     #4,R3           ;DESIRED WORD COUNT
031042  062704  000002                  ADD     #2,R4           ;RMWC ADDRESS
031046  012324                          MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
031050  012324                          MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
031052  012346                          MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
031054  004037  034526                  JSR     R0,WRT.RM       ;CALL THE LOAD(WRITE) ROUTINE
031060  000006                          RMDA                    ;INDEX OF REGISTER TO LOAD
031062  031636                          CI7                     ;ERROR RETURN ADDRESS
031064  012346                          MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
031066  004037  034526                  JSR     R0,WRT.RM
031072  000034                          RMDC
031074  031636                          CI7
031076  016246  000002                  MOV     2(R2),-(SP)     ;LOAD ''COMMAND+GO'', ''A17&A16'', AND 'PSEL''
031102  004037  034526                  JSR     R0,WRT.RM
031106  000000                          RMCS1
031110  031636                          CI7
031112  010137  027462                  MOV     R1,DTUW         ;SET 'DATA TRANSFER UNDERWAY''
031116  000137  031600                  JMP     CI5
031122  013704  027476          CI3:    MOV     RMADR,R4        ;RMCS1 ADDRESS
031126  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
031132  016246  000012                  MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
031136  004037  034526                  JSR     R0,WRT.RM
031142  000034                          RMDC
031144  031636                          CI7
031146  116203  000010                  MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
                                        ;       SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
                                        ;       BGE     1$
                                        ;       ADD     #32.,R3
031152  010346                  1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
031154  042716  177740                  BIC     #177740,(SP)    ;CHOP OF ALL EXENTED BITS ,IF ANY
031160  116266  000011  000001          MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
031166  004037  034526                  JSR     R0,WRT.RM       ;LOAD DESIRED TRACK & SECTOR
031172  000006                          RMDA
031174  031636                          CI7
031176  012746  000131                  MOV     #131,-(SP)      ;START A SEARCH
031202  004037  034526                  JSR     R0,WRT.RM
031206  000000                          RMCS1
031210  031636                          CI7
031212  156137  027464  027412          BISB    ATABIT(R1),SRCHWT       ;SET ''SEARCH WAIT'' KEY
031220  000567                          BR      CI5
031222  013704  027476          CI4:    MOV     RMADR,R4        ;RMCS1 ADDRESS
031226  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
031232  116203  000002                  MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
031236  122703  000131                  CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
031242  001007                          BNE     1$              ;BR IF NO
031244  016246  000010                  MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
031250  004037  034526                  JSR     R0,WRT.RM
```

```
 539 031254  000006                          RMDA
 540 031256  031636                          CI7
 541 031260  000403                          BR      2$                  ;GO LOAD CYLINDER
 542 031262  122703  000105          1$:     CMPB    #105,R3             ;IS IT A SEEK COMMAND
 543 031266  001007                          BNE     3$                  ;BR IF NO
 544 031270  016246  000012          2$:     MOV     12(R2),-(SP)        ;LOAD DESIRED CYLINDER
 545 031274  004037  034526                  JSR     R0,WRT.RM
 546 031300  000034                          RMDC
 547 031302  031636                          CI7
 548 031304  000546                          BR      CI6
 549 031306  122703  000115          3$:     CMPB    #115,R3             ;IS IT AN ''OFFSET'' COMMAND?
 550 031312  001013                          BNE     4$                  ;BR IF NO
 551 031314  004037  034346                  JSR     R0,RD.RM            ;MERGE THE OFFSET VALUE INTO RMOF
 552 031320  000032                          RMOF                        ;BUT DON'T CHANGE THE UPPER
 553 031322  031636                          CI7
 554 031324  116216  000001                  MOVB    1(R2),(SP)          ;BYTE WHEN LOADING THE
 555 031330  004037  034526                  JSR     R0,WRT.RM           ;REGISTER (RMOF)
 556 031334  000032                          RMOF
 557 031336  031636                          CI7
 558 031340  000530                          BR      CI6                 ;GO START THE COMMAND
 559 031342  122703  000107          4$:     CMPB    #107,R3             ;IS IT A ''RECALIBRATE'' COMMAND?
 560 031346  001525                          BEQ     CI6                 ;BR IF YES
 561 031350  122703  000117                  CMPB    #117,R3             ;IS IT A RETURN TO CENTER?
 562 031354  001522                          BEQ     CI6                 ;BR IF YES
 563 031356  122703  000103                  CMPB    #103,R3             ;IS IT AN ''UNLOAD'' COMMAND?
 564 031362  001016                          BNE     5$                  ;BR IF NO
 565 031364  112761  000001  027340          MOVB    #1,DRVACT(R1)       ;SET THE DRIVE ACTIVE INDICATOR
 566 031372  105061  027350                  CLRB    DRVSTA(R1)          ;PUT DRIVE STATUS TO OFFLINE
 567 031376  112761  000001  027416          MOVB    #1,ULDFLG(R1)       ;SET ''UNLOAD IN PROGRESS'' FLAG
 568 031404  010346                          MOV     R3,-(SP)            ;START THE ''UNLOAD'' COMMAND
 569 031406  004037  034526                  JSR     R0,WRT.RM
 570 031412  000000                          RMCS1
 571 031414  031636                          CI7
 572 031416  000207                          RTS     PC                  ;RETURN TO USER
 573 031420  122703  000143          5$:     CMPB    #143,R3             ;IS IT A ''SET FORMAT'' COMMAND?
 574 031424  001014                          BNE     6$                  ;BR IF NO
 575 031426  004037  034346                  JSR     R0,RD.RM            ;READ THE OFFSET REGISTER
 576 031432  000032                          RMOF
 577 031434  031636                          CI7
 578 031436  116266  000001  000001          MOVB    1(R2),1(SP)         ;COMBINE ''FMT16'',''ECI'', AND ''HCI''
 579 031444  004037  034526                  JSR     R0,WRT.RM           ;LOAD ''FMT16'', ''ECI'', AND/OR ''HCI''.
 580 031450  000032                          RMOF
 581 031452  031636                          CI7
 582 031454  000436                          BR      12$
 583 031456  122703  000141          6$:     CMPB    #141,R3             ;IS IT A ''GET REGISTER'' COMMAND?
 584 031462  001023                          BNE     10$                 ;BR IF NO
 585 031464  016203  000006          7$:     MOV     6(R2),R3            ;POINTS TO 1ST ADDRESS OF WHERE
 586                                                                     ;TO PUT THE REGISTER(S)
 587 031470  116237  000010  031506          MOVB    10(R2),9$           ;INIT. THE INDEX FOR THE FIRST REG.
 588 031476  116205  000011                  MOVB    11(R2),R5           ;INDEX OF LAST REG. TO MOVE
 589 031502  004037  034346          8$:     JSR     R0,RD.RM            ;READ RH/RM REGISTER
 590 031506  000000                  9$:     RMCS1                       ;INDEX OF REG. TO READ
 591 031510  031636                          CI7
 592 031512  012623                          MOV     (SP)+,(R3)+         ;GET THE CONTENTS OF RH/RM REG.
 593 031514  023705  031506                  CMP     9$,R5               ;LAST REG. BEEN READ?
 594 031520  001414                          BEQ     12$                 ;GET OUT IF YES
 595 031522  062737  000002  031506          ADD     #2,9$               ;INCREASE THE INDEX BY 2
```

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 596 031530  000764                          BR      8$                ;LOOP--MORE TO READ
 597 031532  122703  000145          10$:    CMPB    #145,R3           ;IS IT A ''SELECT DRIVE'' COMMAND?
 598 031536  001405                          BEQ     12$               ;BR IF YES
 599 031540  010346                  11$:    MOV     R3,-(SP)          ;LOAD THE COMMAND
 600 031542  004037  034526                  JSR     R0,WRT.RM
 601 031546  000000                          RMCS1
 602 031550  031636                          CI7
 603 031552  004737  035576          12$:    JSR     PC,POPQU          ;REMOVE REQ. FROM QUEUE
 604 031556  052762  000200  000016          BIS     #BIT07,16(R2)     ;SET THE ''DONE'' BIT
 605 031564  005737  027436                  TST     SAVEFG            ;SAVE THE RH/RM REGISTERS?
 606 031570  100002                          BPL     13$               ;BR IF NO
 607 031572  004737  034720                  JSR     PC,SVRH70         ;YES--GO SAVE THE REGISTERS
 608 031576  000207                  13$:    RTS     PC                ;RETURN TO USER
 609 031600  006301                  CI5:    ASL     R1
 610 031602  012761  060000  027442          MOV     #60000,TIMER(R1)          ;SET A ONE SECOND TIMER
 611 031610  006201                          ASR     R1
 612 031612  112761  000001  027340          MOVB    #1,DRVACT(R1)     ;SET THE DRIVE ACTIVE
 613 031620  000207                          RTS     PC                ;RETURN TO THE USER
 614 031622  010346                  CI6:    MOV     R3,-(SP)          ;LOAD THE COMMAND
 615 031624  004037  034526                  JSR     R0,WRT.RM
 616 031630  000000                          RMCS1
 617 031632  031636                          CI7
 618 031634  000761                          BR      CI5
 619 031636  032764  010000  000010  CI7:    BIT     #BIT12,RMCS2(R4)          ;DRIVE NON-EXISTENT ?
 620                                  ;       BNE     CI8               ;BR IF YES
 621 031644  005702                  1$:     TST     R2                ;ANYTHING IN QUEUE ?
 622                                  ;       BEQ     CI7B              ;BR IF NOT
 623 031646  001001                          BNE     2$                ;BR IF QUEUE IS THERE
 624 031650  000207                          RTS     PC                ;OTHERWISE EXIT
 625 031652  012762  104000  000016  2$:     MOV     #BIT15!BIT11,16(R2)       ;SET ''PARITY'' ERROR INDICATOR
 626                                  ;       JSR     PC,SVRH70         ;GO SAVE THE RH/RM REGISTERS
 627 031660  012746  000111          CI7B:   MOV     #111,-(SP)        ;DO A ''DRIVE CLEAR''
 628 031664  004037  034526                  JSR     R0,WRT.RM
 629 031670  000000                          RMCS1
 630 031672  031736                          CI8
 631 031674  004737  035460          2$:     JSR     PC,EMPTYQ         ;EMPTY THE QUEUE
 632 031700  105061  027400                  CLRB    DPRQS(R1)         ;CLEAR THE PORT REQUEST FLAG
 633 031704  105061  027416                  CLRB    ULDFLG(R1)        ;CLEAR THE UNLOAD IN QUEUE FLAG
 634 031710  105061  027340                  CLRB    DRVACT(R1)        ;DRIVE IS IDLE
 635 031714  020237  027410                  CMP     R2,TRNSWT         ;IF THIS DRIVE HAD AN I/O REQUEST
 636                                  ;       CMP     R1,DTUW           ;IF THIS DRIVE HAD AN I/O REQUEST
 637 031720  001005                          BNE     1$                ;IN PROGRESS CLEAR ALL OF THE FLAGS
 638 031722  005037  027410                  CLR     TRNSWT
 639 031726  012737  177777  027462          MOV     #-1,DTUW
 640 031734  000207                  1$:     RTS     PC
 641 031736  104412                  CI8:    SAVREG                    ;SAVE R0 - R5
 642 031740  032764  010000  000010          BIT     #BIT12,RMCS2(R4)          ;IS 'NED' SET ?
 643                                  ;       BNE     1$                ;BR IF YES
 644 031746  005001                          CLR     R1
 645 031750  005003                          CLR     R3
 646 031752  105761  027340          1$:     TSTB    DRVACT(R1)        ;DRIVE ACTIVE?
 647                                  ;       BEQ     5$                ;BR IF NO
 648 031756  001003                          BNE     22$               ;BR IF IN ACTIVE
 649 031760  105761  027400                  TSTB    DPRQS(R1)         ;PORT REQUEST
 650 031764  001443                          BEQ     5$                ;BR IF NOT
 651 031766  013702  027410          22$:    MOV     TRNSWT,R2         ;GET THE ''TRANSFER WAIT'' QUEUE
 652 031772  020137  027462                  CMP     R1,DTUW           ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
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                                                BEQ     2$              ;BR IF YES
                                                JSR     PC,GETREQ       ;GET THE DPB POINTER
                                        2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
                                                BEQ     4$              ;BR IF NOT
                                                BIT     #BIT12,RMCS2(R4)        ;'NED' SET ?
                                                BEQ     3$              ;BR IF NOT
                                                MOV     #BIT15!BIT01,16(R2)     ;SET 'DRIVE NON-EXISTENT' INDICATOR
                                                BR      4$              ;CONTINUE
                                        3$:     MOV     #BIT15!BIT10,16(R2)     ;SET 'NON-CLEARABLE PARITY'' ERROR INDICATOR
                                                JSR     PC,SVRH70       ;SAVE RH/RM REGISTERS
                                        4$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
                                                CLRB    DRVACT(R1)      ;SET 'DRIVE ACTIVE'' TO IDLE
                                                CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST FLAG
                                                CMP     R1,DTUW         ;IS THIS DRIVE SETUP FOR A TRANSFER
                                                BNE     5$              ;BR IF NOT
                                                MOV     #-1,DTUW        ;RESET THE INDICATOR
                                                CLR     TRNSWT          ;CLEAR THE TRANSFER QUEUE
                                        5$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
                                                BIT     #BIT12,RMCS2(R4)        ;'NED' SET ?
                                                BNE     6$              ;BR IF YES
                                                INC     R1              ;MOVE TO THE NEXT DRIVE
                                                ADD     #2,R3
                                                BIC     #^C7,R1
                                                BNE     1$              ;BR IF MORE DRIVES
                                                MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
                                                CLR     TRNSWT          ;CLEAR THE 'TRANSFER WAIT' QUEUE
                                                JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
                                                MOV     #CLR,RMCS2(R4)  ;DO A MASSBUS INIT.
                                                BR      7$              ;CONTINUE
                                        6$:     JSR     PC,EMPTYQ       ;CLEAR THE DRIVE'S QUEUE
                                                CLRB    DRVSTA(R1)      ;SET DRIVE TO OFFLINE
                                                CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
                                        7$:     JSR     PC,SET.IE       ;SET ''IE'' WITHOUT ''TRE''
                                                RESREG                  ;RESTORE R0 - R5
                                                RTS     PC              ;RETURN

                                        ;LOOK AHEAD ROUTINE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;       MOV     #DPB,R2         ;POINT TO DPB
                                        ;       JSR     R0,LA           ;GO CHECK THE WINDOW
                                        ;       RETURN1                 ;ERROR RETURN
                                        ;       RETURN2                 ;START A SEARCH
                                        ;       RETURN3                 ;START A DATA TRANSFER

                                        LA:     MOV     RMADR,R4        ;GET RMCS1'S ADDRESS
                                                MOV     R1,RMCS2(R4)    ;SELECT DRIVE
                                                JSR     R0,RD.RM        ;READ DRIVE STATUS
                                                RMDS
                                                4$                      ;ERROR RETURN ADDRESS
                                                BIC     #^C020200,(SP)  ;ON CYLINDER ?
                                                CMP     #200,(SP)+      ;PIP=0,DRY=1?
                                                BNE     3$              ;NO
                                                INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
                                                CMPB    LACNT(R1),MXLACT        ;EXCEED MAX?
                                                BGT     2$              ;BR IF YES
```

```
                                                MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
                                                SWAB    R3              ;MULT. BY 64--ALIGN WITH
                                                ASR     R3              ;LOOK AHEAD REGISTER
                                                ASR     R3
                                                MOV     #340,PS         ;PRIORITY LEVEL '7'
                                        6$:     JSR     R0,RD.RM        ;READ LOOK AHEAD REGISTER
                                                RMLA
                                                4$
                                                CMP     (SP),RMLA(R4)   ;CORRECT LA NUMBER ?
                                                BEQ     7$              ;YES
                                                TST     (SP)+           ;NO,CLEAR STACK
                                                BR      3$
                                        7$:     SUB     (SP)+,R3        ;CALCULATE THE DELTA
                                                BGE     1$
                                                ADD     #<32.*64.>,R3   ;MAKE THE DELTA POSITIVE
                                        1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
                                                BLT     3$              ;IF IT IS WITHIN THE
                                                CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
                                                BGE     3$              ;THE LOOK AHEAD COUNT
                                        2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
                                                TST     (R0)+
                                        3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
                                                BR      5$              ;EXIT
                                        4$:     JSR     PC,CI7          ;PROCESS THE ERROR
                                        5$:     RTS     R0              ;RETURN

                                        ;INTERRUPT SERVICE ROUTINE

                                ISR:    MOVB    #1,ACTDRV       ;SET ''ACTIVE DRIVER'' FLAG
                                        SAVREG                  ;SAVE R0 - R5
                                        MOV     RMADR,R4        ;ADDRESS OF RHSCS1
                                        MOV     DTUW,R1         ;GET 'DATA TRANSFER UNDERWAY'' INDICATOR
                                        BLT     1$              ;BR IF NO DATA TRANSFER UNDERWAY
                                        JSR     PC,TD           ;CALL TRANSFER DONE
                                        BR      2$              ;EXIT
                                1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
                                2$:     RESREG                  ;RESTORE R0 - R5
                                        CLRB    ACTDRV          ;CLEAR ''ACTIVE DRIVER'' FLAG
                                        RTI                     ;RETURN

                                ;TRANSFER DONE ROUTINE

                                TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
                                        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
                                        ASL     R1
                                        MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
                                        ASR     R1
                                        MOV     TRNSWT,R2       ;GET ''DPB'' ADDRESS FROM THE
                                        CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
                                        BIS     #BIT07,16(R2)   ;SET DONE
                                        MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
                                        JSR     R0,RD.RM        ;TRANSFER ERROR(TRE=1)?
                                        RMCS1
                                        CI7
                                        ROL     (SP)+
                                        BMI     3$              ;BR IF YES
                                        TST     SAVEFG          ;SAVE THE RH/RM REGISTERS?
```

```
032502  100002                          BPL     1$              ;BR IF NO
032504  004737  034720                  JSR     PC,SVRH70       ;YES--SAVE THE REGISTERS
032510                          1$:
032510  004737  035554                  JSR     PC,GETREQ       ;GET DPB POINTER
032514  005702                          TST     R2              ;ENTRY FOR DRIVE ?
032516  001403                          BEQ     2$              ;BR IF NOT
032520  004737  030556                  JSR     PC,OPT          ;CALL OPTIMIZER
032524  000417                          BR      SC              ;CHECK OTHER DRIVES
                                ;THE RELEASE DRIVE COMMAND IS FORECD TO ENTER FOR DUAL PORT OPERATION
032526  012714  000113          2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
032532  000414                          BR      SC              ;CHECK FOR OTHER DRIVES
032534  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2)     ;SET DATA ERROR FLAG
032542  004737  035460                  JSR     PC,EMPTYQ       ;EMPTY THE 'DRIVE'S WAIT'' QUEUE
032546  004737  034720                  JSR     PC,SVRH70       ;SAVE THE RH/RM REGISTERS
032552  012714  040111                  MOV     #40111,(R4)     ;ISSUE A 'DRIVE CLEAR''
032556  012714  000113                  MOV     #113,(R4)       ;ISSUE A RELEASE TO THE DRIVE
032562  000400                          BR      SC              ;CHECK FOR OTHER DRIVES


                                ;SPECIAL CONDITION ROUTINE

032564  116403  000016          SC:     MOVB    RMAS(R4),R3     ;READ 'RMAS''
032570  001014                          BNE     2$              ;BR IF ANY 'ATA' BITS SET
032572  004037  034346                  JSR     R0,RD.RM        ;READ CONTROL AND STATUS REGISTER
032576  000000                          RMCS1
032600  031736                          CI8
                                ;       1$                      ;EXIT IF FAIL TO READ
032602  106126                          ROLB    (SP)+           ;IS ''IE''=1?
032604  100405                          BMI     1$              ;YES, NO DRIVES TO CHECK
032606  004037  035644                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
032612  104001                          EMT     1               ;REPORT AN ILLEGAL INTERRUPT
032614  004737  035036                  JSR     PC,SET.IE       ;SET INTERRUPT ENABLE
032620  000207                  1$:     RTS     PC              ;RETURN
032622  005046                  2$:     CLR     -(SP)           ;PROCESS ALL DRIVES THAT HAVE
032624  110316                          MOVB    R3,(SP)         ;AN ''ATA''=1
032626  012703  000001                  MOV     #1,R3
032632  005001                          CLR     R1
032634  030316                  SC3:    BIT     R3,(SP)         ;ATA=1?
032636  001005                          BNE     SC5             ;YES
032640  005201                  SC4:    INC     R1              ;MOVE TO THE NEXT DRIVE
032642  106303                          ASLB    R3
032644  001373                          BNE     SC3             ;BR IF MORE TO CHECK?
032646  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
032650  000207                          RTS     PC              ;RETURN TO USER
032652  105761  027370          SC5:    TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
032656  001402                          BEQ     1$              ;BR IF NOT
032660  000137  033576                  JMP     SC13            ;PROCESS THE DRIVE
032664  105761  027400          1$:     TSTB    DPRQS(R1)       ;PORT REQUEST OUTSTANDING ?
032670  001402                          BEQ     2$              ;BR IF NOT
032672  000137  033576                  JMP     SC13            ;START THE OUTSTANDING COMMAND
032676  105761  027350          2$:     TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
032702  003023                          BGT     5$              ;BR IF ONLINE
032704  105761  027416                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
032710  003420                          BLE     5$              ;BR IF NOT
032712  004737  035554                  JSR     PC,GETREQ       ;GET DPB POINTER
032716  004737  034720                  JSR     PC,SVRH70       ;SAVE THE RH/RM REGISTERS
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                                                JSR     PC,SC12         ;SAVE RMDS, RMER1, RMER2, AND RMMR2
                                                                        ;ALSO DO A DRIVE INIT (DRVINT)
                                                TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
                                                BLE     6$              ;NO
                                                BIT     #BIT14,RMERRS   ;WAS THERE AN ERROR?
                                                BNE     3$              ;BR IF ERROR
                                                JMP     SC11            ;NO ERROR
                                        3$:     MOV     RMERRS+2,R5     ;YES -- PICKUP RMER1 AND
                                                BR      SC6A            ;GO PROCESS THE ERROR
                                        5$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
                                                BNE     SC6             ;BR IF EITHER
                                                JSR     PC,SC12         ;SAVE RMDS, RMER1, RMER2, AND RMMR2
                                                                        ;ALSO DO A DRVINT
                                        6$:     TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE ?
                                                BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
                                                TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
                                                BMI     7$              ;BR IF UNSAFE
                                                BIT     #BIT13,RMERRS+4 ;ADDRESS PLUG CHANGED ?
                                                BNE     8$              ;BR IF YES
                                        ;       MOV     #113,-(SP)      ;RELEASE COMMAND
                                                MOV     #111,-(SP)      ;DRIVE CLEAR
                                                JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RMCS1
                                                RMCS1                   ;REGISTER INDEX
                                                SC8                     ;PARITY EXIT ADDRESS
                                        7$:     MOV     (SP),R5         ;PICKUP (RMAS) BEFORE THE ERROR CALL
                                                JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
                                                EMT     2               ;REPORT THE UNEXPECTED ATTENTION
                                                BR      SC4             ;GO CHECK FOR MORE ATA'S
                                        8$:
                                                JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
                                                EMT     5               ;REPORT THE ADDRESS PLUG CHANGE
                                                BR      SC4             ;CHECK FOR MORE DRIVES
                                        SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
                                                MOV     #-1,TIMER(R1)   ;STOP THE TIMER
                                                ASR     R1              ;RESTORE THE DRIVE ADDRESS
                                                JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
                                                MOV     R1,RMCS2(R4)    ;SELECT DRIVE
                                                JMP     SC11            ;PROCESS THE SEARCH
                                                JSR     R0,RD.RM        ;READ THE RM'S STATUS REG.
                                                RMDS
                                                SC8
                                                MOV     (SP),R5         ;AND PUT IT IN R5
                                                ROL     (SP)+           ;WAS THERE AN ERROR?
                                                BMI     1$              ;BR IF ERROR
                                                TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
                                                BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
                                                BIS     #BIT15!BIT07!BIT03,16(R2)       ;INFORM USER OF ERROR RECOVER COMPLETION
                                                BR      SC7
                                        1$:     JSR     R0,RD.RM        ;READ ERROR REGISTER #1
                                                RMER1
                                                SC8
                                                MOV     (SP)+,R5        ;AND SAVE IT IN R5
                                                JSR     PC,SVRH70       ;SAVE RH/RM REGISTERS
                                                MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
                                                JSR     R0,WRT.RM
                                                RMCS1
                                                SC8
```

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897 033162  006105                  SC6A:   ROL     R5              ;WAS 'UNSAFE' CONDITION -1?
898 033164  100406                          BMI     1$              ;BR IF YES
899 033166  005702                          TST     R2              ;ANYTHING IN QUEUE ?
900 033170  001447                          BEQ     SC7             ;BR IF NOT
901 033172  052762  100240  000016          BIS     #BIT15!BIT07.BIT05,16(R2)       ;INFORM USER OF ERROR
902 033200  000443                          BR      SC7
903 033202  004037  034346          1$:     JSR     R0,RD.RM        ;READ DRIVE STATUS REG. #1
904 033206  000012                          RMDS
905 033210  033366                          SC8
906 033212  011605                          MOV     (SP),R5         ;SAVE RMDS IN R5
907 033214  006126                          ROL     (SP)+           ;'ERR'=1?
908 033216  100011                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
909 033220  112761  177777  027350          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
910 033226  004737  034720                  JSR     PC,SVRH70       ;SAVE RH/RM REGISTERS
911 033232  052761  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
912 033240  000423                          BR      SC7
913 033242  032705  010000          2$:     BIT     #BIT12,R5       ;'MOL' = 1 ?
914 033246  001015                          BNE     3$              ;BR IF YES
915 033250  112761  177777  027340          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
916 033256  112761  000001  027350          MOVB    #1,DRVSTA(R1)   ;ONLINE
917 033264  006301                          ASL     R1
918 033266  012761  072460  027442          MOV     #30000.,TIMER(R1)       ;START 30 SECOND TIMER
919 033274  006201                          ASR     R1
920 033276  000137  032640                  JMP     SC4
921 033302  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
922 033310  105061  027340          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
923                                 ;       JSR     PC,EMPTYQ       ;DUMP THE QUEUE
924 033314  004737  035576                  JSR     PC,POPQUE       ;REMOVE THE QUEUE
925 033320  105761  027416                  TSTB    ULDFLG(R1)      ;UNLOAD IN RMOGRESS OR QUEUE?
926 033324  003002                          BGT     1$              ;BR IF NOT
927 033326  105061  027416                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
928 033332  116164  027464  000016  1$:     MOVB    ATABIT(R1),RMAS(R4)     ;CLEAR ATTENTION BIT
929 033340  105761  027350                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
930 033344  100406                          BMI     2$              ;BR IF IT IS
931                                 ;       MOV     #113,-(SP)      ;RELEASE COMMAND
932 033346  012746  000111                  MOV     #111,-(SP)      ;DRIVE CLEAR COMMAND
933 033352  004037  034526                  JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RPCS1
934 033356  000000                          RMCS1                   ;REGISTER INDEX
935 033360  033366                          SC8                     ;PARITY EXIT ADDRESS
936 033362  000137  032640          2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
937 033366  105761  027340          SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
938 033372  001405                          BEQ     1$              ;YES
939 033374  004737  035554                  JSR     PC,GETREQ       ;GET DPB POINTER
940 033400  004737  031636                  JSR     PC,CI7          ;PROCESS THE PARITY ERROR
941 033404  000402                          BR      2$              ;CONTINUE
942 033406                          1$:
943                                 ;       JSR     PC,CI7          ;PROCESS THE PARITY ERROR
944 033406  004737  031660                  JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
945 033412  000137  032640          2$:     JMP     SC4             ;CHECK MORE DRIVES
946 033416  105761  027416          SC11:   TSTB    ULDFLG(R1)      ;'UNLOAD IN PROGRESS'?
947 033422  003402                          BLE     1$              ;BR IF NO
948 033424  105061  027416                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
949 033430  105061  027340          1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
950 033434  136167  027464  027412          BITB    ATABIT(R1),SRCHWT       ;DOING A SEARCH OPERATION FOR
951                                                                 ;AN I/O COMMAND?
952 033442  001012                          BNE     2$              ;BR IF YES
953 033444  004737  035576                  JSR     PC,POPQUE       ;REMOVE REQUEST FROM QUEUE
```

```
 954 033450  052762  000200  000016          BIS     #BIT07,16(R2)    ;SET 'DONE'' BIT
 955 033456  005737  027436                  TST     SAVEFG           ;SAVE THE REGISTERS?
 956 033462  100002                          BPL     2$               ;BR IF NO
 957 033464  004737  034720                  JSR     PC,SVRH70        ;YES--SAVE ALL OF THE RH/RM REG'S
 958 033470  116164  027464  000016  2$:     MOVB    ATABIT(R1),RMAS(R4)      ;CLEAR ATTENTION BIT
 959 033476  146137  027464  027412          BICB    ATABIT(R1),SRCHWT        ;CLEAR IMPLIED SEEK SET
 960 033504  006301                          ASL     R1               ;WORD INDEX
 961 033506  012761  177777  027442          MOV     #-1,TIMER(R1)    ;STOP CLOCK
 962 033514  006201                          ASR     R1               ;RESTORE R1
 963 033516  004737  030556                  JSR     PC,OPT           ;START A REQUEST
 964 033522  000137  032640                  JMP     SC4              ;CHECK FOR MORE DRIVES
 965 033526  010164  000010          SC12:   MOV     R1,RMCS2(R4)     ;SELECT DRIVE
 966 033532  016437  000012  027330          MOV     RMDS(R4),RMERRS  ;SAVE THE FOUR REGISTERS THAT
 967 033540  016437  000014  027332          MOV     RMER1(R4),RMERRS+2       ;WILL TELL US SOMETHING
 968 033546  016437  000042  027334          MOV     RMER2(R4),RMERRS+4
 969 033554  016437  000040  027336          MOV     RMMR2(R4),RMERRS+6
 970 033562  004037  027726                  JSR     R0,DRVINT        ;INIT. THE STATE OF THE DRIVE
 971 033566  000401                          BR      1$               ;TAKE ERROR EXIT
 972 033570  000207                          RTS     PC               ;RETURN
 973 033572  005726                  1$:     TST     (SP)+            ;POP PC OFF OF THE STACK
 974 033574  000674                          BR      SC8              ;PROCESS THE PARITY ERROR
 975 033576  006301                  SC13:   ASL     R1               ;SETUP TO ADDRESS WORDS
 976 033600  012761  177777  027442          MOV     #-1,TIMER(R1)    ;STOP THE TIMER
 977 033606  006201                          ASR     R1               ;
 978 033610  010164  000010                  MOV     R1,RMCS2(R4)     ;SELECT THE DRIVE
 979 033614  116164  027464  000016          MOVB    ATABIT(R1),RMAS(R4)      ;CLEAR THE ATTENTION BIT
 980 033622  105761  027370          1$:     TSTB    DPINT(R1)        ;INITIALIZING THE DRIVE ?
 981 033626  001424                          BEQ     2$               ;BR IF NOT
 982 033630  105061  027370                  CLRB    DPINT(R1)        ;CLEAR THE INIT INDICATOR
 983 033634  004037  027726                  JSR     R0,DRVINT        ;GO INIT THE DRIVE
 984 033640  000240                          NOP                      ;DUMMY PARITY ERROR RETURN
 985 033642  105761  027350                  TSTB    DRVSTA(R1)       ;DRIVE ONLINE ?
 986 033646  003014                          BGT     2$               ;BR IF YES -- START ORDER
 987 033650  005702                          TST     R2               ;QUEUE ENTRY FOR THE DRIVE
 988 033652  001426                          BEQ     3$               ;BR IF NOT
 989 033654  004737  035554                  JSR     PC,GETREQ        ;GET DPB ADDRESS
 990 033660  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)      ;INFORM USER THAT DRIVE OFFLINE
 991 033666  004737  034720                  JSR     PC,SVRH70        ;SAVE THE REGISTERS
 992                             ;           JSR     PC,EMPTYQ        ;EMPTY THE REQUEST QUEUE
 993 033672  004737  035576                  JSR     PC,POPQUE        ;REMOVE THE QUEUE
 994 033676  000414                          BR      3$
 995 033700  032764  004000  000000  2$:     BIT     #BIT11,RMCS1(R4)         ;DVA SET ?
 996 033706  001006                          BNE     4$               ;SET THEN CALL OPT
 997 033710  006301                          ASL     R1
 998 033712  012761  060000  027442          MOV     #60000,TIMER(R1)
 999 033720  006201                          ASR     R1
1000 033722  000402                          BR      3$
1001 033724  004737  030556          4$:     JSR     PC,OPT           ;START THE PENDING REQUEST
1002 033730  000137  032640          3$:     JMP     SC4              ;PROCESS OTHER DRIVES
1003
1004                             ;RM TIMER ROUTINE
1005                             ;CALL
1006                             ;       MOV     #TIME,-(SP)      ;ELASPED TIME IN MILLISECONDS ON THE STACK
1007                             ;       JSR     PC,RMTMR         ;CALL RM05 TIME ROUTINE
1008
1009 033734  005737  027414          RMTMR:  TST     ACTDRV           ;CHECK ''ACTDRV & ACTSTR''
1010 033740  001027                          BNE     4$               ;IF NON ZERO EXIT
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1011 033742  112737  000001  027415          MOVB    #1,ACTSTR       ;SET ''ACTSTR''
1012 033750  104412                          SAVREG                  ;SAVE R0 - R5
1013 033752  005001                          CLR     R1              ;START WITH DRIVE 0
1014 033754  005003                          CLR     R3
1015 033756  005763  027442          1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
1016 033762  002406                          BLT     2$              ;BR IF NO
1017 033764  166663  000002  027442          SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
1018 033772  003002                          BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
1019 033774  004737  034024                  JSR     PC,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
1020 034000  005201                  2$      INC     R1              ;MOVE TO NEXT DRIVE
1021 034002  005723                          TST     (R3)+
1022 034004  022701  000010                  CMP     #8.,R1          ;OUT OF DRIVES?
1023 034010  003362                          BGT     1$              ;BR IF NO
1024 034012  104413                  3$:     RESREG                  ;RESTORE R0 - R5
1025 034014  105037  027415                  CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
1026 034020  012616                  4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
1027 034022  000207                          RTS     PC              ;RETURN
1028
1029                                 ;SOFTWARE TIMEOUT ROUTINE
1030                                 ;
1031                                 ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
1032                                 ;       OR GREATER
1033                                 ;
1034                                 ;CALL:  STO
1035                                 ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
1036                                 ;       JSR     PC,STO          ;CALL
1037                                 ;       RETURN
1038
1039 034024  010146                  STO:    MOV     R1,-(SP)        ;SAVE R1
1040 034026  010246                          MOV     R2,-(SP)        ;SAVE R2
1041 034030  010346                          MOV     R3,-(SP)        ;SAVE R3
1042 034032  010446                          MOV     R4,-(SP)        ;SAVE R4
1043 034034  013704  027476                  MOV     RMADR,R4        ;GET ADDRESS OF ''RMCS1''
1044 034040  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
1045 034044  004037  034346                  JSR     R0,RD.RM        ;READ ''DRIVE STATUS REG''
1046 034050  000012                          RMDS
1047                                 ;       STO5
1048 034052  034334                          STO9
1049 034054  105726                          TSTB    (SP)+           ;IS ''DRY''=1?
1050 034056  100436                          BMI     STO2            ;BR IF YES
1051 034060  105761  027370          STO1:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
1052 034064  001033                          BNE     STO2            ;BR IF YES
1053 034066  105761  027400                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
1054 034072  001030                          BNE     STO2            ;BR IF YES
1055 034074  013702  027410                  MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
1056 034100  020137  027462                  CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
1057 034104  001404                          BEQ     1$              ;BR IF YES
1058 034106  000137  034334                  JMP     STO9            ;IF NOT DON'T BOTHER DRIVES
1059 034112  004737  035554                  JSR     PC,GETREQ       ;GET DPB ADDRESS
1060 034116  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2)     ;SET THE ERROR FLAGS
1061 034124  004737  034720                  JSR     PC,SVRH70       ;SAVE RH/RM REGISTERS
1062                                 ;       MOV     #CLR,RMCS2(R4)  ;''INIT'' THE MASS BUS
1063 034130  105061  027340                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
1064 034134  105061  027416                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
1065 034140  005037  027410                  CLR     TRNSWT          ;CLEAR DPB ADDRESS
1066 034144  012737  177777  027462          MOV     #-1,DTUW        ;CLEAR THE TRANSFER DRIVE #
1067 034152  000470                          BR      STO9            ;DON'T BOTHER OTHER DRIVES
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1068 034154  116405  000016          ST02:   MOVB    RMAS(R4),R5     ;READ ATTENTION REG
1069 034160  136105  027464                  BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
1070 034164  001007                          BNE     ST03            ;YES
1071 034166  105761  027370                  TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
1072 034172  001021                          BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
1073 034174  105761  027400                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
1074 034200  001035                          BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
1075 034202  000454                          BR      ST09            ;OTHER WISE EXIT
1076 034204  105761  027370          ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
1077 034210  001003                          BNE     1$              ;BR IF INIT PENDING
1078 034212  105761  027400                  TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
1079 034216  001446                          BEQ     ST09            ;BR IF NOT
1080 034220  012763  177777  027442  1$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
1081 034226  000442                          BR      ST09            ;EXIT
1082 034230  004737  031736          ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
1083 034234  000437                          BR      ST09
1084 034236  105061  027370          ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
1085 034242  105061  027350                  CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
1086 034246  012763  177777  027442          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
1087 034254  004737  035554                  JSR     PC,GETREQ       ;GET THE DPB ADDRESS
1088 034260  005702                          TST     R2              ;REQUEST IN QUEUE ?
1089 034262  001424                          BEQ     ST09            ;BR IF NOT
1090 034264  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)     ;INFORM THE USER DRIVE NOT AVAILABLE
1091 034272  000414                          BR      ST08            ;FINISH
1092 034274  012763  177777  027442  ST07:   MOV     #-1,TIMER(R3)   ;STOP THE TIMER
1093 034302  105061  027400                  CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
1094 034306  004737  035554                  JSR     PC,GETREQ       ;GET DPB ADDRESS
1095 034312  005702                          TST     R2              ;QUEUE ENTRY FOR DRIVE ?
1096 034314  001407                          BEQ     ST09            ;BR IF NONE
1097 034316  012762  100004  000016          MOV     #BIT15!BIT2,16(R2)      ;INFORM USER OF PORT REQUEST ERROR
1098 034324  004737  035460          ST08:   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
1099 034330  004737  034720                  JSR     PC,SVRH70       ;SAVE THE REGISTERS
1100 034334  012604                  ST09:   MOV     (SP)+,R4        ;RESTORE R4
1101 034336  012603                          MOV     (SP)+,R3        ;RESTORE R3
1102 034340  012602                          MOV     (SP)+,R2        ;RESTORE R2
1103 034342  012601                          MOV     (SP)+,R1        ;RESTORE R1
1104 034344  000207                          RTS     PC              ;RETURN
1105
1106                                 ;ROUTINE TO READ A RH/RM REGISTER
1107                                 ;
1108                                 ;CALL
1109                                 ;       JSR     R0,RD.RM        ;GO READ A REGISTER
1110                                 ;       INDEX                   ;REG. INDEX FROM BASE
1111                                 ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
1112                                 ;                               ;AT THIS ADDRESS
1113                                 ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
1114                                 ;
1115 034346  013737  027474  034514  RD.RM:   MOV     MCPEMX,RD.RM2   ;MAX. RETRYS ALLOWED
1116 034354  011646                          MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
1117 034356  013737  027476  034372          MOV     RMADR,RD.ADR    ;FORM THE DESIRED ADDRESS
1118 034364  062037  034372                  ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
1119 034370  013727                  RD.RM1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RM DRIVE
1120 034372  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
1121 034374  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
1122 034376  013766  034374  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
1123 034404  013746  027476                  MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
1124 034410  062716  000010                  ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
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1125 034414  032736  010000                 BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
1126 034420  001037                         BNE     RD.RM3          ;BR IF DRIVE NON-EXISTENT
1127 034422  017746  173050                 MOV     @RMADR,-(SP)    ;READ RMCS1
1128 034426  032716  020000                 BIT     #BIT13,(SP)     ;DID MCPE SET?
1129 034432  001002                         BNE     1$              ;BR IF YES
1130 034434  022620                         CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
1131 034436  000432                         BR      RD.RM4          ;EXIT
1132 034440                         1$:
     034440  004037  035644                 JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
     034444  104003                         EMT     3               ;REPORT 'MCPE' ERROR
1133 034446  005737  027462                 TST     DTUW            ;DATA TRANSFER UNDERWAY?
1134 034452  100405                         BMI     2$              ;NO
1135 034454  032716  040000                 BIT     #BIT14,(SP)     ;'TRE' = 1 ?
1136 034460  001402                         BEQ     2$              ;NO
1137 034462  005726                         TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
1138 034464  000415                         BR      RD.RM3          ;TAKE THE FATAL ERROR EXIT
1139 034466  052716  040000         2$:     BIS     #BIT14,(SP)     ;CLEAR 'MCPE' BY SENDING A '1' TO 'TRE'
1140 034472  000316                         SWAB    (SP)            ;POSITION BEFORE WRITING
1141 034474  013737  027476  034510         MOV     RMADR,3$        ;FORM ADDRESS OF HIGH BYTE
1142 034502  005237  034510                 INC     3$
1143 034506  112637                         MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RMCS1
1144 034510  000000                 3$:     .WORD   0               ;ADDRESS STORAGE
1145 034512  005327                         DEC     (PC)+           ;EXCEEDED MAX. RETRYS
1146 034514  000003                 RD.RM2: .WORD   3
1147 034516  002324                         BGE     RD.RM1          ;BR IF NO
1148 034520  011000                 RD.RM3: MOV     (R0),R0         ;FATAL ERROR EXIT
1149 034522  012616                         MOV     (SP)+,(SP)
1150 034524  000200                 RD.RM4: RTS     R0
1151
1152                                 ;ROUTINE TO WRITE A REGISTER
1153                                 ;
1154                                 ;CALL
1155                                 ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
1156                                 ;       JSR     R0,WRT.RM       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
1157                                 ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
1158                                 ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
1159                                 ;       RETURN                  ;ERROR FREE RETURN
1160
1161 034526  013737  027474  034704 WRT.RM: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
1162 034534  016637  000002  034614         MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
1163 034542  012616                         MOV     (SP)+,(SP)      ;ADJUST THE STACK
1164 034544  012037  034616                 MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
1165 034550  001015                         BNE     1$              ;BR IF NOT RMCS1
1166 034552  122737  000150  034614         CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
1167 034560  002411                         BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
1168 034562  004037  034346                 JSR     R0,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
1169 034566  000000                         RMCS1                   ;THE COMMAND BEFORE SENDING IT TO
1170 034570  034710                         WRT.R3                  ;THE RH/RM
1171 034572  000316                         SWAB    (SP)
1172 034574  042716  177770                 BIC     #^C7,(SP)
1173 034600  112637  034615                 MOVB    (SP)+,WRT.WD+1
1174 034604  063737  027476  034616 1$:     ADD     RMADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
1175 034612  012737                 WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
1176 034614  000000                 WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
1177 034616  000000                 WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
1178 034620  013746  027476                 MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
1179 034624  062716  000010                 ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
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1180 034630  032736  010000                BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
1181 034634  001025                        BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
1182 034636  004037  034346                JSR     R0,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
1183 034642  000014                        RMER1
1184 034644  034710                        WRT.R3
1185 034646  032726  000010                BIT     #BIT03,(SP)+
1186 034652  001420                        BEQ     WRT.R4          ;BR IF 'PAR=0''
1187 034654  016037  177776  034666        MOV     -2(R0),1$       ;PICKUP THE INDEX
1188 034662  004037  034346                JSR     R0,RD.RM        ;READ THE REG.
1189 034666  000000              1$:       .WORD   0               ;REG. INDEX
1190 034670  034710                        WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
1191 034672  004037  035644                JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
     034676  104004                        EMT     4               ;REPORT THE PARITY ON WRITE ERROR
1192 034700  005726                        TST     (SP)+           ;CLEAR OFF THE STACK
1193 034702  005327                        DEC     (PC)+           ;DECREMENT THE ERROR COUNT
1194 034704  000003              WRT.R2:   .WORD   3               ;RETRY COUNTER
1195 034706  002341                        BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
1196 034710  011000              WRT.R3:   MOV     (R0),R0         ;TAKE THE 'PARITY ON WRITE'' ERROR EXIT
1197 034712  000401                        BR      WRT.R5          ;EXIT
1198 034714  005720              WRT.R4:   TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
1199 034716  000200              WRT.R5:   RTS     R0
1200
1201                             ;ROUTINE TO SAVE THE RH/RM REGISTERS AS PER DPB+14
1202                             ;
1203                             ;CALL
1204                             ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
1205                             ;       JSR     PC,SVRH70       ;SAVE THE DRIVES REG'S
1206
1207 034720  104412              SVRH70:  SAVREG                 ;SAVE R0 - R5
1208 034722  005702                       TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
1209 034724  001442                       BEQ     6$              ;BR IF NONE
1210 034726  013704  027476               MOV     RMADR,R4
1211 034732  111264  000010               MOVB    (R2),RMCS2(R4)  ;SELECT DRIVE
1212 034736  016203  000014               MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
1213 034742  001433                       BEQ     6$              ;EXIT IF NO ADDRESS
1214 034744  005037  035000               CLR     3$              ;COUNTER & POINTER
1215 034750  023727  035000  000022 1$:   CMP     3$,#RMDB        ;REACHED THE BUFFER REGISTER ?
1216 034756  001006                       BNE     2$              ;BR IF NOT
1217 034760  032764  000200  000010       BIT     #BIT07,RMCS2(R4)        ;'OR' SET ?
1218 034766  001002                       BNE     2$              ;BR IF SET
1219 034770  005023                       CLR     (R3)+           ;STORE RMDB AS ZEROES
1220 034772  000405                       BR      4$              ;CONTINUE
1221 034774  004037  034346         2$:   JSR     R0,RD.RM        ;READ THE SELECTED REGISTER
1222 035000  000000              3$:      .WORD   0               ;REGISTER INDEX
1223 035002  035026                       5$                      ;ERROR RETURN ADDRESS
1224 035004  012623                       MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
1225 035006  023727  035000  000046 4$:   CMP     3$,#RMEC2       ;REACHED THE END ?
1226 035014  001406                       BEQ     6$              ;BR IF YES
1227 035016  062737  000002  035000       ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
1228 035024  000751                       BR      1$              ;CONTINUE READING THE REGISTERS
1229 035026  004737  031636         5$:   JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
1230 035032  104413              6$:      RESREG                  ;RESTORE R0 - R5
1231 035034  000207                       RTS     PC              ;RETURN
1232
1233                             ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A ''TRE''
1234                             ;CALL
1235                             ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER T'
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1236                                    ;       JSR     PC,SET.IE       ;SET ''IE''
1237                                    ;       RETURN
1238
1239 035036  010446                     SET.IE: MOV     R4,-(SP)        ;SAVE R4
1240 035040  013704  027476                     MOV     RMADR,R4        ;PICKUP ADDRESS OF RMCS1
1241 035044  010164  000010                     MOV     R1,RMCS2(R4)    ;SELECT DRIVE
1242 035050  011446                             MOV     (R4),-(SP)      ;READ RMCS1
1243 035052  052716  040000                     BIS     #BIT14,(SP)     ;SET THE ''TRE'' BIT OF THE WORD READ
1244 035056  000316                             SWAB    (SP)            ;ADJUST FOR DATO
1245 035060  112714  000100                     MOVB    #BIT06,(R4)     ;SET ''IE''
1246 035064  032764  010000  000010             BIT     #BIT12,RMCS2(R4)        ;IS 'NED'=1?
1247 035072  001002                             BNE     1$              ;YES--CLEAR ''TRE''
1248 035074  005726                             TST     (SP)+           ;CLEAN OFF THE STACK
1249 035076  000402                             BR      2$
1250 035100  112664  000001             1$:     MOVB    (SP)+,1(R4)     ;CLEAR ''TRE''
1251 035104  012604                     2$:     MOV     (SP)+,R4        ;RESTORE R4
1252 035106  000207                             RTS     PC              ;RETURN TO CALLER
1253
1254                                    ;QUEUE COUNT
1255 035110      000                    QCNT:   .BYTE   0               ;DRIVE 0
1256 035111      000                            .BYTE   0               ;DRIVE 1
1257 035112      000                            .BYTE   0               ;DRIVE 2
1258 035113      000                            .BYTE   0               ;DRIVE 3
1259 035114      000                            .BYTE   0               ;DRIVE 4
1260 035115      000                            .BYTE   0               ;DRIVE 5
1261 035116      000                            .BYTE   0               ;DRIVE 6
1262 035117      000                            .BYTE   0               ;DRIVE 7
1263
1264                                    ;QUEUE INPUT POINTERS
1265
1266 035120  035202                     QINPT:  .WORD   QDRV0            ;DRIVE 0
1267 035122  035222                             .WORD   QDRV1            ;DRIVE 1
1268 035124  035242                             .WORD   QDRV2            ;DRIVE 2
1269 035126  035262                             .WORD   QDRV3            ;DRIVE 3
1270 035130  035302                             .WORD   QDRV4            ;DRIVE 4
1271 035132  035322                             .WORD   QDRV5            ;DRIVE 5
1272 035134  035342                             .WORD   QDRV6            ;DRIVE 6
1273 035136  035362                             .WORD   QDRV7            ;DRIVE 7
1274
1275                                    ;QUEUE OUTPUT POINTERS
1276
1277 035140  035202                     QOUTPT: .WORD   QDRV0            ;DRIVE 0
1278 035142  035222                             .WORD   QDRV1            ;DRIVE 1
1279 035144  035242                             .WORD   QDRV2            ;DRIVE 2
1280 035146  035262                             .WORD   QDRV3            ;DRIVE 3
1281 035150  035302                             .WORD   QDRV4            ;DRIVE 4
1282 035152  035322                             .WORD   QDRV5            ;DRIVE 5
1283 035154  035342                             .WORD   QDRV6            ;DRIVE 6
1284 035156  035362                             .WORD   QDRV7            ;DRIVE 7
1285
1286 035160  035202                     QSTART: .WORD   QDRV0            ;DRIVE 0 START ADDRESS
1287 035162  035222                     QSTOP:  .WORD   QDRV1            ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
1288 035164  035242                             .WORD   QDRV2            ;STOP DRIVE 1--START DRIVE 2
1289 035166  035262                             .WORD   QDRV3            ;STOP DRIVE 2--START DRIVE 3
1290 035170  035302                             .WORD   QDRV4            ;STOP DRIVE 3--START DRIVE 4
1291 035172  035322                             .WORD   QDRV5            ;STOP DRIVE 4--START DRIVE 5
1292 035174  035342                             .WORD   QDRV6            ;STOP DRIVE 5--START DRIVE 6
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1293 035176  035362                        .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
1294 035200  035402                        .WORD   QTERM           ;STOP DRIVE 7
1295
1296                                ;DRIVE REQUEST QUEUES
1297
1298 035202                         QDRV0:  .BLKW   10
1299 035222                         QDRV1:  .BLKW   10
1300 035242                         QDRV2:  .BLKW   10
1301 035262                         QDRV3:  .BLKW   10
1302 035302                         QDRV4:  .BLKW   10
1303 035322                         QDRV5:  .BLKW   10
1304 035342                         QDRV6:  .BLKW   10
1305 035362                         QDRV7:  .BLKW   10
1306         035402                 QTERM=.
1307
1308                                ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
1309                                ;
1310                                ;CALL
1311                                ;       JSR     PC,CLRQUE
1312
1313 035402  104412                 CLRQUE: SAVREG                  ;SAVE R0 - R5
1314 035404  012702  035110                 MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
1315 035410  005022                         CLR     (R2)+           ;DRIVES 0 & 1
1316 035412  005022                         CLR     (R2)+           ;DRIVES 2 & 3
1317 035414  005022                         CLR     (R2)+           ;DRIVES 4 & 5
1318 035416  005022                         CLR     (R2)+           ;DRIVES 6 & 7
1319 035420  012703  000010                 MOV     #8.,R3          ;MOVE THE STARTING
1320 035424  012701  035160                 MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
1321 035430  012122                 1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
1322 035432  005303                         DEC     R3
1323 035434  001375                         BNE     1$
1324 035436  012703  000010                 MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
1325 035442  012701  035160                 MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
1326 035446  012122                 2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
1327 035450  005303                         DEC     R3
1328 035452  001375                         BNE     2$
1329 035454  104413                         RESREG                  ;RESTORE R0 - R5
1330 035456  000207                         RTS     PC
1331
1332                                ;EMPTY THE QUEUE SPECIFIED BY R1
1333                                ;
1334                                ;CALL
1335                                ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
1336                                ;       JSR     PC,EMPTYQ
1337
1338 035460  105061  035110         EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
1339 035464  006301                         ASL     R1
1340 035466  016161  035120  035140         MOV     QINPT(R1),QOUTPT(R1)    ;SET OUTPUT QUEUE POINTER=INPUT POINTER
1341 035474  006201                         ASR     R1
1342 035476  000207                         RTS     PC
1343
1344                                ;ROUTINE TO PUT A REQUEST IN QUEUE
1345                                ;
1346                                ;CALL
1347                                ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
1348                                ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
1349                                ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
```

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1350                                    ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
1351                                    ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
1352
1353 035500  122761  000010  035110    DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
1354 035506  001421                            BEQ     2$              ;BR IF YES-TAKE RETURN1
1355 035510  105261  035110                    INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
1356 035514  006301                            ASL     R1
1357 035516  010271  035120                    MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
1358 035522  062761  000002  035120            ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
1359 035530  026161  035120  035162            CMP     QINPT(R1),QSTOP(R1)     ;TIME TO RESET THE POINTER
1360 035536  001003                            BNE     1$              ;BR IF NO
1361 035540  016161  035160  035120            MOV     QSTART(R1),QINPT(R1)    ;YES--RESET POINTER
1362 035546  006201                    1$:     ASR     R1
1363 035550  005720                            TST     (R0)+           ;TAKE RETURN 2
1364 035552  000200                    2$:     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 035554  005002                    GETREQ: CLR     R2
1375 035556  105761  035110                    TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
1376 035562  001404                            BEQ     2$              ;NO
1377 035564  006301                    1$:     ASL     R1
1378 035566  017102  035140                    MOV     @QOUTPT(R1),R2  ;PICKUP ''DPB'' POINTER FOR THIS DRIVE
1379 035572  006201                            ASR     R1
1380 035574  000207                    2$:     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 035576  105361  035110            POPQUE: DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
1390 035602  006301                            ASL     R1
1391 035604  017102  035140                    MOV     @QOUTPT(R1),R2  ;GET THE ''DPB'' POINTER
1392 035610  005071  035140                    CLR     @QOUTPT(R1)     ;REMOVE DPB ADDRESS FROM THE QUEUE
1393 035614  062761  000002  035140            ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
1394 035622  026161  035140  035162            CMP     QOUTPT(R1),QSTOP(R1)    ;TIME TO RESET THE POINTER?
1395 035630  001003                            BNE     1$              ;NO--BR TO EXIT
1396 035632  016161  035160  035140            MOV     QSTART(R1),QOUTPT(R1)   ;YES--RESET THE POINTER
1397 035640  006201                    1$:     ASR     R1
1398 035642  000207                            RTS     PC              ;RETURN TO USER
1399
1401                                    ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
1402                                    ;REPORTS AN ERROR DIRECTLY.
1403                                    ;
1404                                    ;CALL
1405                                    ;       JSR     R0,ES.SAV
1406                                    ;       ERROR   N               ;;THE ERROR CALL
1407                                    ;       RETURN                  ;THE RETURN IS PAST THE ERROR CALL
```

```
1408
1409 035644  012037  035660          ES.SAV: MOV     (R0)+,1$        ;GET THE ERROR CALL
1410 035650  013746  001200                  MOV     $ESCAPE,-(SP)   ;SAVE THE ADDRESS IN '$ESCAPE'
1411 035654  005037  001200                  CLR     $ESCAPE         ;CLEAR THE ESCAPE RETURN
1412 035660  000000                  1$:     .WORD   0               ;THE ERROR CALL IS MOVED HERE
1413 035662  012637  001200                  MOV     (SP)+,$ESCAPE   ;RESTORE THE ESCAPE ADDRESS
1414 035666  000200                          RTS     R0              ;RETURN
1416
1417                                  .SBTTL  BUSADR - GET BUS ADDRESS AND VECTOR ADDRESS
1418
1419                                  ;THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
1420                                  ;OF THE RH/RM IS SETUP FOR THE PROPER ADDRESS.
1421                                  ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
1422                                  ;REQUIRED.
1423                                  ;NOTE: THIS ROUTINE DESTROYS R0-R4
1424                                  ;CALL
1425                                  ;
1426                                  ;       JSR     PC,BUSADR
1427                                  ;       RETURN
1428
1429 035670  104412                  BUSADR: SAVREC          ;SAVE ALL REG
1430 035672  012700  001276          1$:     MOV     #$RMADR,R0      ;FIRST ADDRESS
1431 035676  104401  036040                  TYPE    ,MRMCS1         ;'RMCS1='
1432 035702  011046                          MOV     (R0),-(SP)      ;PRESENT RMCS1 ADDRESS
1433 035704  104402                          TYPOC                   ;TYPE IT
1434 035706  104401  042330                  TYPE    ,BLNKS1         ;TYPE 1 BLANK
1435 035712  104411                          RDLIN                   ;GET THE ENTRY
1436 035714  012601                          MOV     (SP)+,R1        ;ADDRESS OF ASCII TEXT
1437 035716  004537  036056                  JSR     R5,CK.NUM       ;ENTER AND STORE THE NEW ADDRESS
1438 035722  000763                          BR      1$              ;ERROR EXIT
1439 035724  012700  001300          2$:     MOV     #$RMVEC,R0      ;VECTOR ADDRESS
1440 035730  104401  036047                  TYPE    ,MRMVEC         ;'RMVEC='
1441 035734  011046                          MOV     (R0),-(SP)      ;PRESENT RH/RM VECTOR ADDRESS ON THE STACK
1442 035736  104402                          TYPOC                   ;TYPE IT
1443 035740  104401  042330                  TYPE    ,BLNKS1         ;TYPE 1 BLANK
1444 035744  104411                          RDLIN                   ;READ THE ENTRY
1445 035746  012601                          MOV     (SP)+,R1        ;ASCII TEXT ADDRESS
1446 035750  004537  036056                  JSR     R5,CK.NUM       ;ENTER AND STORE NEW ADDRESS
1447 035754  000763                          BR      2$              ;ERROR EXIT
1448 035756  012700  001276          3$:     MOV     #$RMADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
1449 035762  012701  027476                  MOV     #RMADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
1450 035766  013705  000004                  MOV     @#ERRVEC,R5     ;SAVE ERROR VECTOR
1451 035772  012737  036016  000004          MOV     #4$,@#ERRVEC    ;LOAD NEW VECTOR ADDRESS
1452 036000  005777  143272                  TST     @$RMADR         ;LEGAL I/O ADDRESS ?
1453 036004  010537  000004                  MOV     R5,@#ERRVEC     ;YES,IF NOT TRAP TO TIMEOUT
1454 036010  012021                          MOV     (R0)+,(R1)+     ;LOAD THE BUS ADDRESS
1455 036012  012021                          MOV     (R0)+,(R1)+     ;LOAD VECTOR ADDRESS
1456 036014  000407                          BR      6$              ;COMMON EXIT
1457 036016  012716  036024          4$:     MOV     #5$,(SP)        ;SET RETURN ADDRESS
1458 036022  000002                          RTI                     ;RETRUN FROM TIME OUT TRAP
1459 036024                          5$:
     036024  104006                          EMT     6
1460 036026  010537  000004                  MOV     R5,@#ERRVEC     ;RESTORE THE TIME OUT TRAP
1461 036032  000717                          BR      1$              ;TRY AGAIN
1462 036034  104413                  6$:     RESREG                  ;RESTORE ALL REG
1463 036036  000207                          RTS     PC
1464
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```
1465 036040      122     115     103  MRMCS1: .ASCIZ  @RMCS1=@
1466 036047      122     115     126  MRMVEC: .ASCIZ  @RMVEC=@
1467
1468                                  .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
1469                                  ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
1470                                  ;AND FORMS AN OCTAL NUMBER IN R2
1471                                  ;CALL:
1472                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
1473                                  ;       JSR     R5,CK.NUM       ;R5 CHANGED
1474                                  ;       RET                     ;ERROR EXIT
1475                                  ;       RET                     ;NORMAL EXIT
1476 036056  010246                  CK.NUM: MOV     R2,-(SP)        ;SAVE R2
1477 036060  010346                          MOV     R3,-(SP)        ;SAVE R3
1478 036062  010446                          MOV     R4,-(SP)        ;SAVE R4
1479 036064  012703  000006                  MOV     #6,R3           ;MAX OCTAL DIGITS IN THE NUMBER
1480 036070  005002                          CLR     R2              ;FINAL OCTAL VALUE
1481 036072  112104                  1$:     MOVB    (R1)+,R4        ;GET CURRENT POINTED BYTE
1482 036074  001424                          BEQ     3$              ;BRANCH,IF TERMINATOR DETECTED
1483 036076  120427  000060                  CMPB    R4,#'0          ;SMALLER THAN ASCII-0 ?
1484 036102  103425                          BLO     5$              ;YES,ERROR EXIT
1485 036104  120427  000067                  CMPB    R4,#'7          ;LARGER THAN ASCII-7 ?
1486 036110  101022                          BHI     5$              ;YES,ERROR EXIT
1487 036112  006302                          ASL     R2              ;SHIFT LEFT
1488 036114  103420                          BCS     5$              ;
1489 036116  006302                          ASL     R2              ;ONE
1490 036120  103416                          BCS     5$              ;
1491 036122  006302                          ASL     R2              ;OCTAL DIGIT
1492 036124  103414                          BCS     5$              ;ERROR IF CARRY BIT SET
1493 036126  042704  177770                  BIC     #177770,R4      ;CHOP OFF HIGHER BITS
1494 036132  060402                          ADD     R4,R2           ;APPENDING CURRENT DIGIT TO NUMBER
1495 036134  005303                          DEC     R3              ;DECREMENT BYTE COUNT
1496 036136  001401                          BEQ     2$              ;BRANCH,IF LAST BYTE
1497 036140  000754                          BR      1$              ;LOOPING BACK
1498 036142  112104                  2$:     MOVB    (R1)+,R4        ;CHECK TERMINATOR
1499 036144  001004                          BNE     5$              ;ERROR EXIT
1500 036146  005702                  3$:     TST     R2              ;FINAL VALUE = 0
1501 036150  001402                          BEQ     5$              ;YES, TAKE ERROR EXIT
1502 036152  010210                          MOV     R2,(R0)         ;REPLACE THE ORIGINAL VALUE
1503 036154  005725                  4$:     TST     (R5)+           ;ADJUST FOR NORMAL RETURN
1504 036156  012604                  5$:     MOV     (SP)+,R4        ;RESTORE R4
1505 036160  012603                          MOV     (SP)+,R3        ;RESTORE R3
1506 036162  012602                          MOV     (SP)+,R2        ;RESTORE R2
1507 036164  000205                          RTS     R5              ;EXIT
1508
```

```
                                .SBTTL  ERROR MESSAGES

036166  122  110  040  EM1:    .ASCIZ  /RH INTERRUPT OCCURRED (RMAS = 0)/
036227  125  116  105  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
036265  115  101  123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR (MCPE=1)/
036323  115  101  123  EM4:    .ASCIZ  /MASSBUS PARITY ERROR (PAR=1)
036360  101  104  104  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
036414  122  110  040  EM6:    .ASCIZ  /RH DIDN'T RESPOND TO ADDRESSING/
036454  125  116  103  EM10:   .ASCIZ  /UNCORRECTABLE MASSBUS PARITY ERROR/
036517  106  101  124  EM11:   .ASCIZ  /FATAL MASSBUS PARITY ERROR/
036552  120  105  122  EM12:   .ASCIZ  /PERSISTENT DEVICE UNSAFE/
036603  117  120  105  EM13:   .ASCIZ  /OPERATION NOT COMPLETED WITHIN TIME LIMIT/
036655  104  122  111  EM14:   .ASCIZ  /DRIVE WENT OFFLINE/
036700  116  117  040  EM15:   .ASCIZ  /NO RESPONSE TO PORT REQUEST/
036734  110  105  101  EM20:   .ASCIZ  /HEADER CRC ERROR/
036755  104  101  124  EM21:   .ASCIZ  /DATA CHECK ('DCK') ERROR/
037006  127  122  111  EM22:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') SET/
037061  127  122  111  EM23:   .ASCIZ  /WRITE CHECK ERROR - DATA CHECK ('DCK') NOT SET/
037140  110  105  101  EM24:   .ASCIZ  /HEADER READ ERROR - 'FMT' BIT DROPPED/
037206  110  105  101  EM25:   .ASCIZ  /HEADER READ ERROR - HEADER COMPARE ('HCE') ERROR/
037267  106  117  122  EM26:   .ASCIZ  /FORMAT ERROR ('FER')/
037314  110  105  101  EM27:   .ASCIZ  /HEADER COMPARE ('HCE') ERROR/
037351  115  111  123  EM30:   .ASCIZ  /MISCELLANEOUS DRIVE ERROR/
037403  117  120  105  EM31:   .ASCIZ  /OPERATION INCOMPLETE ('OPI') ERROR/
037446  104  122  111  EM32:   .ASCIZ  /DRIVE TIMING ('DTE') ERROR/
037501  120  101  122  EM33:   .ASCIZ  /PARITY ('PAR') ERROR AFTER OPERATION STARTED/
037556  127  122  111  EM34:   .ASCIZ  /WRITE CLOCK FAILURE ('WCF') ERROR/
037620  111  116  126  EM35:   .ASCIZ  /INVALID ADDRESS ('IAE') ERROR/
037656  127  122  111  EM36:   .ASCIZ  /WRITE LOCK ('WLE') ERROR/
037707  104  101  124  EM37:   .ASCIZ  /DATA CHECK ('DCK') SET DURING WRITE CHECK COMMAND/
037771  122  110  040  EM40:   .ASCIZ  /RH OR UNIBUS TRANSFER ERROR/
040025  102  125  123  EM41:   .ASCIZ  /BUS ADDRESS OR WORD COUNT INCORRECT/
040071  104  101  124  EM42:   .ASCIZ  /DATA COMPARE ERRORS - NO OTHER ERROR(S) DETECTED/
040152  103  101  116  EM43:   .ASCIZ  /CAN'T MATCH DATA READ WITH A PATTERN/
040217  105  122  122  EM44:   .ASCIZ  /ERROR BIT(S) SET, BUT NO ERROR SIGNALED BY THE RH/
040301  105  103  103  EM45:   .ASCIZ  /ECC LOGIC FAILURE - POSITION REGISTER VALUE NOT VALID/
040367  102  125  123  EM46:   .ASCIZ  /BUS ADDRESS AND WORD COUNT NOT CONSISTENT/
040441  123  105  105  EM50:   .ASCIZ  /SEEK INCOMPLETE ('SKI') ERROR/
040477  120  122  117  EM51:   .ASCIZ  /PROGRAM DETECTED POSITIONING ERROR/
040542  104  122  111  EM60:   .ASCIZ  /DRIVE UNSAFE ERROR/
040565  040  040  000  EM61:   .ASCIZ  /  /

                                .EVEN
040570  122  115  101  DH1:    .ASCIZ  /RMAS  /
040577  104  122  111  DH2:    .ASCIZ  /DRIVE   RMDS    RMER1   RMER2   RMMR2    RMAS    /
040661  104  122  111  DH3:    .ASCIZ  /DRIVE   REG ADR   DATA  /
040712  104  122  111  DH4:    .ASCIZ  /DRIVE   REG ADR   GOOD    BAD    /
040754  122  115  101  DH6:    .ASCIZ  /RMADR   /
040765  104  122  111  DH7:    .ASCIZ  /DRIVE   RMCS1   RMWC    RMBA    RMDA    /
041036  122  115  103  DH10:   .ASCIZ  /RMCS2   RMDS    RMER1   RMAS    RMDB    /
041107  122  115  115  DH11:   .ASCIZ  /RMMR1   RMDT    RMOF    RMDC    RMMR2   /
041160  122  115  105  DH12:   .ASCIZ  /RMER2   RMEC1   RMEC2   /
                                .EVEN

041212  001326  000000       DT1:    .WORD   ATTN,0
041216  001224  027330  027332  DT2:    .WORD   DRIVE,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6,ATTN,0
041234  001224  034372  034374  DT3:    .WORD   DRIVE,RD.ADR,RD.WRD,0
```

```
                                                    .WORD   DRIVE,WRT.AD,WRT.WD,RD.WRD,0
                                                    .WORD   RMADR,0
                                                    .WORD   DRIVE,RM.REG,RM.REG+2,RM.REG+4,RM.REG+6,0
                                                    .WORD   RM.REG+10,RM.REG+12,RM.REG+14,RM.REG+16,RM.REG+22,0
                                                    .WORD   RM.REG+24,RM.REG+26,RM.REG+32,RM.REG+34,RM.REG+40,0
                                                    .WORD   RM.REG+42,RM.REG+44,RM.REG+46,0

                                                    .BYTE   0
                                                    .BYTE   0,0,0,0,0,0
                                                    .BYTE   0,0,0
                                                    .BYTE   0,0,0,0
                                                    .EVEN

                                                    .ASCIZ  /SUBSYS /
                                                    .ASCIZ  /DRIVE(S): /
                                                    .ASCIZ  /** STARTING PASS 1 /
                                                    .ASCIZ  <CRLF>/MOUNT PACK ON DRIVE /
                                                    .ASCIZ  /AND LOAD. /
                                                    .ASCIZ  /TYPE <CR> WHEN DRIVE READY./
                                                    .ASCIZ  <CRLF>/DRIVE IS NOT READY, TEST IS ABORTED/
                                                    .ASCIZ  <CRLF>/PACK IS NOT ACCEPTABLE, CHANGE PACK AND TRY AGAIN/
                                                    .ASCIZ  /UNLOAD DRIVE /
                                                    .ASCII  / AND REMOVE PACK/<CRLF>
                                                    .ASCIZ  /TYPE <CR> WHEN DONE./
                                                    .ASCIZ  /** STARTING PASS 2 /
                                                    .ASCIZ  /** ALL DRIVES ARE COMPATIBLE **/<CRLF>
                                                    .ASCIZ  /SCORES FOR DRIVE /
                                                    .ASCIZ  /   TRACK   DRIVE    OVRWRT  OVRWRT  READ    READ/
                                                    .ASCIZ  /   NUMBR   READ     OFST-   OFST+   OFST-   OFST+/
                                                    .ASCIZ  /SELF/
                                                    .ASCIZ  <HT>
                                                    .ASCIZ  /* 0/<HT>
                                                    .ASCIZ  /'/
                                                    .ASCIZ  /, /
                                                    .ASCIZ  /WILL TEST /
                                                    .ASCIZ  /ON /
                                                    .ASCIZ  <CRLF>/IS THERE ANOTHER SUB-SYSTEM (Y OR N) ? /
                                                    .ASCIZ  /Y/<CRLF>
                                                    .ASCIZ  /N/<CRLF>
                                                    .ASCII  / /
                                                    .ASCII  / /
                                                    .ASCII  / /
                                                    .ASCIZ  / /
                                                    .ASCIZ  /:/
                                                    .ASCIZ  @ / @
                                                    .ASCIZ  /?/
                                                    .ASCIZ  / BAD SPOT FILE /
                                                    .ASCIZ  /TEST COMPLETE/
                                                    .ASCIZ  <CRLF>/**************/<CRLF>
                                                    .ASCII  /DRIVE NOT ON-LINE OR NOT ASSIGNED/<CRLF>
                                                    .ASCIZ  <07>/PROGRAM HALT/<CRLF>
                                                    .ASCIZ  /DRIVE FAILED ON BASIC READ & WRITE TEST/<CRLF>
                                                    .ASCIZ  /DRIVE FAILED ON WRITE TEST (TEST 4)/<CRLF>
                                                    .ASCIZ  /FATAL ERROR/
                                                    .ASCIZ  <CRLF>/ 'L' OR 'P' CLOCK REQUIRED ON SYSTEM/<CRLF>
                                                    .ASCIZ  / ?DRIVE/
                                                    .ASCIZ  / IS LOAD DEVICE/
```

```
    118 042734      040     077     103  NOTST:  .ASCIZ  @ ?CANNOT SELECT RM03/2'S AND RM05'S TOGETHER(NOT COMPATIBLE)@<CRLF>
    119
    120                                  .EVEN
    121
    122 043032                           BUFFER:
    123
    124         000200                   .END    200
```

```
ABASE = 176700        AUSWR = 000000        CK.CHR  022364        DRIV6   004776        EM44    040217
ACDW1 = 000000        AVECT1= 000254        CK.DEC  022336        DRIV7   005020        EM45    040301
ACDW2 = 000000        AVECT2= 000000        CK.DIG  022436        DRVACT  027340        EM46    040367
ACK   = 000123        BADSEC  001342        CK.NUM  036056        DRVCLR= 000111        EM5     036360
ACPUOP= 000000        BIT0  = 000001        CK.OCT  022310        DRVER   020250        EM50    040441
ACTDRV  027414        BIT00 = 000001        CLKFLG  001316        DRVINT  027726        EM51    040477
ACTSTR  027415        BIT01 = 000002        CLOCK   021426        DRVQUE  035500        EM6     036414
ADDW0 = 000000        BIT02 = 000004        CLRDPB  021620        DRVSTA  027350        EM60    040542
ADDW1 = 000000        BIT03 = 000010        CLRQUE  035402        DRVTYP  027360        EM61    040565
ADDW10= 000000        BIT04 = 000020        CMCNT   001354        DSWR  = 177570        ENDX1   010704
ADDW11= 000000        BIT05 = 000040        CMCYL   001356        DTEER   020320        ERPRC1  017462
ADDW12= 000000        BIT06 = 000100        CMSEC   001362        DTUW    027462        ERPROC  017446
ADDW13= 000000        BIT07 = 000200        CMTRK   001364        DTYP    001402        ERROR = 104000
ADDW14= 000000        BIT08 = 000400        COLON   042332        DT1     041212        ERRVEC= 000004
ADDW15= 000000        BIT09 = 001000        COMMA   042224        DT10    041276        ES.SAV  035644
ADDW2 = 000000        BIT1  = 000002        CR    = 000015        DT11    041312        FALPAR  017564
ADDW3 = 000000        BIT10 = 002000        CRLF  = 000200        DT12    041326        FAULT   001376
ADDW4 = 000000        BIT11 = 004000        CYLIMT  001374        DT2     041216        FILBUF  020742
ADDW5 = 000000        BIT12 = 010000        CYLNDR  004616        DT3     041234        FINISH  023356
ADDW6 = 000000        BIT13 = 020000        DCKER   020200        DT4     041244        FMTDPB  004506
ADDW7 = 000000        BIT14 = 040000        DDISP = 177570        DT6     041256        FMTER   020360
ADDW8 = 000000        BIT15 = 100000        DEASG   016770        DT7     041262        GENDPB  004576
ADDW9 = 000000        BIT2  = 000004        DF1     041336        DULP    027730        GETREG= 000141
ADEVCT= 000000        BIT3  = 000010        DF2     041337        DUMP    020440        GETREQ  035554
ADEVM = 000000        BIT4  = 000020        DF3     041345        DUMP2   017620        GTSWR = 104406
AENV  = 000000        BIT5  = 000040        DF4     041350        EMPTYQ  035460        HALTX   042464
AENVM = 000000        BIT6  = 000100        DH1     040570        EMTVEC= 000030        HALT1   042503
AFATAL= 000000        BIT7  = 000200        DH10    041036        EM1     036166        HALT2   042554
AMADR1= 000000        BIT8  = 000400        DH11    041107        EM10    036454        HCEER   020370
AMADR2= 000000        BIT9  = 001000        DH12    041160        EM11    036517        HCRCER  020240
AMADR3= 000000        BLKADR  004444        DH2     040577        EM12    036552        HOUR    001344
AMADR4= 000000        BLNKS1  042330        DH3     040661        EM13    036603        HT    = 000011
AMAMS1= 000000        BLNKS2  042327        DH4     040712        EM14    036655        HZ      001320
AMAMS2= 000000        BLNKS3  042326        DH6     040754        EM15    036700        IAEER   020340
AMAMS3= 000000        BLNKS4  042325        DH7     040765        EM2     036227        IDLEX   017344
AMAMS4= 000000        BPTVEC= 000014        DISMNT  016716        EM20    036734        INDST   004424
AMSGAD= 000000        BUFFER  043032        DISPLA  001156        EM21    036755        IOTVEC= 000020
AMSGLG= 000000        BUSADR  035670        DISPLY= 104414        EM22    037006        ISR     032350
AMSGTY= 000000        CFLAG   001336        DISPRE  000174        EM23    037061        KPATH   016430
AMTYP1= 000000        CHGADR  001334        DONE    017644        EM24    037140        KSR     021534
AMTYP2= 000000        CI1     031014        DPINT   027370        EM25    037206        LA      032174
AMTYP3= 000000        CI3     031122        DPRQS   027400        EM26    037267        LABAD   014734
AMTYP4= 000000        CI4     031222        DRIVE = 001224        EM27    037314        LACNT   027426
APASS = 000000        CI5     031600        DRIV0   004622        EM3     036265        LF    = 000012
APRIOR= 000000        CI6     031622        DRIV1   004644        EM30    037351        LINDEC  021114
APTCSU= 000040        CI7     031636        DRIV10  005042        EM31    037403        LINE1   021016
APTENV= 000001        CI7B    031660        DRIV11  005064        EM32    037446        LINKDV  021664
APTSIZ= 000200        CI8     031736        DRIV12  005106        EM33    037501        LINOCT  021062
APTSPD= 000100        CKBUS   020540        DRIV13  005130        EM34    037556        LODEV   042714
ASNLST  002006        CKCLK   021134        DRIV14  005152        FM35    037620        LOG0    001406
ASSGN1  002010        CKCLK1  021230        DRIV15  005174        EM36    037656        LOG1    001426
ASSGN2  002012        CKCLK2  021276        DRIV16  005216        EM37    037707        LOG10   001646
ASWREG= 000000        CKCLK3  021320        DRIV17  005240        EM4     036323        LOG11   001666
ATABIT  027464        CKERR   020472        DRIV2   004666        EM40    037771        LOG12   001706
ATESTN= 000000        CKFMT   020260        DRIV3   004710        EM41    040025        LOG13   001726
ATTN    001326        CKHCE   020270        DRIV4   004732        EM42    040071        LOG14   001746
AUNIT = 000000        CKSWR = 104407        DRIV5   004754        EM43    040152        LOG15   001766
```

```
LOG2    001446  M.DP42  022034  POSER   020300  RDN9    003436  RMWC  = 000002
LOG3    001466  M.DP44  022066  PRINT   017052  RDP0    003676  RM.REG  004526
LOG4    001506  M.DP50  022100  PROCES  017352  RDP1    003716  RM05    030264
LOG5    001526  N       042322  PRTBAD  020602  RDP10   004136  RNOP  = 000101
LOG6    001546  NEDCLK  042635  PRTIM   017614  RDP11   004156  RSTART  001400
LOG7    001566  NOTST   042734  PR0   = 000000  RDP12   004176  RTC   = 000117
LOG8    001606  NULINE  001366  PR1   = 000040  RDP13   004216  R6    =%000006
LOG9    001626  OFFCOD  004504  PR2   = 000100  RDP14   004236  R7    =%000007
LOOP1   013530  OFFSET= 000115  PR3   = 000140  RDP15   004256  SAVEFG  027436
LOOP2   013546  OFFST   014144  PR4   = 000200  RDP16   004276  SAVREG= 104412
LOOP3   015616  OFLIN   017604  PR5   = 000240  RDP17   004316  SC      032564
LOOP4   016410  OPIER   020310  PR6   = 000300  RDP18   004336  SCOPE = 000004
LOOP5   016622  OPT     030556  PR7   = 000340  RDP2    003736  SCORE   014514
LOOP6   016640  OVWN0   002056  PS    = 177776  RDP3    003756  SC11    033416
LSTAD   001332  OVWN1   002076  PSEUDO  005322  RDP4    003776  SC12    033526
MAKEUP  014376  OVWN10  002316  PSW   = 177776  RDP5    004016  SC13    033576
MARKX   042215  OVWN11  002336  PUNSAF  017544  RDP6    004036  SC3     032634
MCPEMX  027477  OVWN12  002356  PWRVEC= 000024  RDP7    004056  SC4     032640
MESG1   041354  OVWN13  002376  QCNT    035110  RDP8    004076  SC5     032652
MESG10  041520  OVWN14  002416  QDRIV   042704  RDP9    004116  SC6     033046
MESG11  041565  OVWN15  002436  QDRV0   035202  RD.ADR  034372  SC6A    033162
MESG12  041650  OVWN16  002456  QDRV1   035222  RD.RM   034346  SC7     033310
MESG13  041666  OVWN17  002476  QDRV2   035242  RD.RM1  034370  SC8     033366
MESG14  041734  OVWN18  002516  QDRV3   035262  RD.RM2  034514  SEARCH= 000131
MESG15  041760  OVWN2   002116  QDRV4   035302  RD.RM3  034520  SELLMT  001370
MESG16  042021  OVWN3   002136  QDRV5   035322  RD.RM4  034524  SECOND  001350
MESG17  042043  OVWN4   002156  QDRV6   035342  RD.WRD  034374  SEEK  = 000105
MESG18  042124  OVWN5   002176  QDRV7   035362  READIN= 000121  SEEKFG  027440
MESG19  042342  OVWN6   002216  QINPT   035120  RECAL = 000107  SELDRV= 000145
MESG2   041364  OVWN7   002236  QOUTPT  035140  RELSE = 000113  SELEX    042206
MESG20  042362  OVWN8   002256  QSTART  035160  REPLZ   022110  SELF0   004356
MESG21  042422  OVWN9   002276  QSTOP   035162  RESREG= 104413  SELF1   004360
MESG3   041377  OVWP0   002536  QTERM = 035402  RESVEC= 000010  SELF10  004402
MESG4   041423  OVWP1   002556  QUES    042340  RMADR   027476  SELF11  004404
MESG5   042227  OVWP10  002776  QUOTM   042222  RMAS  = 000016  SELF12  004406
MESG6   042242  OVWP11  003016  RDCHR = 104410  RMBA  = 000004  SELF13  004410
MESG7   042246  OVWP12  003036  RDDAT = 000171  RMCS1 = 000000  SELF14  004412
MESG8   041451  OVWP13  003056  RDHD  = 000173  RMCS2 = 000010  SELF15  004414
MESG9   041464  OVWP14  003076  RDLIN = 104411  RMDA  = 000006  SELF16  004416
MINUTE  001346  OVWP15  003116  RDN0    003216  RMDB  = 000022  SELF17  004420
MNDLTA  027510  OVWP16  003136  RDN1    003236  RMDC  = 000034  SELF18  004422
MOD00   007036  OVWP17  003156  RDN10   003456  RMDS  = 000012  SELF2   004362
MOD11   007344  OVWP18  003176  RDN11   003476  RMDT  = 000026  SELF3   004364
MOD12   007524  OVWP2   002576  RDN12   003516  RMEC1 = 000044  SELF4   004366
MOD21   007062  OVWP3   002616  RDN13   003536  RMEC2 = 000046  SELF5   004370
MOD22   007330  OVWP4   002636  RDN14   003556  RMERRS  027330  SELF6   004372
MOD23   007264  OVWP5   002656  RDN15   003576  RMER1 = 000014  SELF7   004374
MOD30   007356  OVWP6   002676  RDN16   003616  RMER2 = 000042  SELF8   004376
MONTR   007006  OVWP7   002716  RDN17   003636  RMHR  = 000036  SELF9   004400
MRMCS1  036040  OVWP8   002736  RDN18   003656  RMINIT  027514  SETFMT= 000143
MRMVEC  036047  OVWP9   002756  RDN2    003256  RMLA  = 000020  SETVEC  006774
MXDLTA  027506  PACK    001324  RDN3    003276  RMMR1 = 000024  SET.IE  035036
MXLACT  027504  PARER   020330  RDN4    003316  RMMR2 = 000040  SIXTEE  001352
MXWNDW  027512  PCLOCK  001314  RDN5    003336  RMOF  = 000032  SIZMEM  006730
M.DPID  021732  PIRQ  = 177772  RDN6    003356  RMSN  = 000030  SKIER   020410
M.DP40  021770  PIRQVE= 000240  RDN7    003376  RMTMR   033734  SLASH   042334
M.DP41  022024  POPQUE  035576  RDN8    003416  RMVEC   027500  SPATH   016520
```

```
SPOTX   010536          TIMER   027442          $BDDAT  001142          $ILLUP  025072          $RMCS1= 000020
SRCHWT  027412          TKVEC = 000060          $BELL   001202          $INTAG  001151          $RMCS2= 000030
STACK = 001100          TPVEC = 000064          $BUF  = 000006          $ITEMB  001130          $RMDA = 000026
STARS   042400          TRAPVE= 000034          $CDW1   001272          $LF     001210          $RMDB = 000042
STARSC  001360          TRFER   020400          $CDW2   001274          $LFLG   024715          $RMDC = 000054
START   005502          TRKLMT  001372          $CHARC  024446          $LKCSB  001304          $RMDS = 000032
START1  005520          TRNSWT  027410          $CKSWR  025562          $LKCSR  001302          $RMDT = 000046
START2  005536          TRTVEC= 000014          $CLR.T  023476          $LKS    001310          $RMEC1= 000064
START3  005550          TSTNM   001340          $CMTAG  001114          $LLVEC  001312          $RMEC2= 000066
STATIN  001322          TST1    010720          $CM3  = 000000          $LOOP   023554          $RMER1= 000034
STKLMT= 177774          TST10   015554          $CM4  = 000001          $LPADR  001122          $RMER2= 000062
STNDAT  005262          TST11   016242          $CNTLC  023352          $LPERR  001124          $RMHR = 000056
STO     034024          TST2    011274          $CNTLG  026171          $LPVEC  001306          $RMLA = 000040
STO1    034060          TST3    011550          $CNTLU  026164          $LSTAD  027240          $RMMR1= 000044
STO2    034154          TST4    012174          $COMND= 000002          $MADR1  001244          $RMMR2= 000060
STO3    034204          TST5    012672          $CPUOP  001240          $MADR2  001250          $RMOF = 000052
STO5    034230          TST6    013244          $CRLF   001207          $MADR3  001254          $RMSN = 000050
STO6    034236          TST7    015040          $CYL  = 000012          $MADR4  001260          $RMVEC  001300
STO7    034274          TYPDS = 104405          $DBLK   025552          $MAIL   001212          $RMWC = 000022
STO8    034324          TYPE  = 104401          $DB2D   026314          $MAMS1  001242          $RTNAD  023556
STO9    034334          TYPOC = 104402          $DB2O   026510          $MAMS2  001246          $RTRN   023552
SVRH70  034720          TYPON = 104404          $DECVL  026474          $MAMS3  001252          $SAVRE  026220
SWR     001154          TYPOS = 104403          $DEVCT  001222          $MAMS4  001256          $SAVR6  025076
SWREG   000176          TYPRI4  022240          $DEVM   001270          $MBADR  001102          $SB2D   022574
SWTIM   017574          UCPAR   017554          $DOAGN  023516          $MFLG   024714          $SB2O   022624
SW0   = 000001          ULDFLG  027416          $DSPLY  022266          $MNEW   026207          $SCOPE  026630
SW00  = 000001          UNIT    001330          $DTBL   025542          $MSGAD  001226          $SEC  = 000010
SW01  = 000002          UNSAF   020430          $EMTAB= 000022          $MSGLG  001230          $SETUP= 000137
SW02  = 000004          WCFER   020420          $ENDAD  023506          $MSGTY  001212          $SIZE   027110
SW03  = 000010          WCKD  = 000151          $ENDCT  023454          $MSWR   026176          $STUP = 177777
SW04  = 000020          WCKER   020210          $ENV    001232          $MTYP1  001243          $SUPRS  022200
SW05  = 000040          WCKHD = 000153          $ENVM   001233          $MTYP2  001247          $SVLAD  027036
SW06  = 000100          WLEER   020350          $EOP    023420          $MTYP3  001253          $SVPC = 000214
SW07  = 000200          WRTDAT= 000161          $EOPCT  023446          $MTYP4  001257          $SWR  = 177600
SW08  = 000400          WRTHD = 000163          $ERFLG  001117          $MXCNT  027106          $SWREG  001234
SW09  = 001000          WRT.AD  034616          $ERMAX  001131          $NULL   001170          $SWRMK= 000000
SW1   = 000002          WRT.RM  034526          $ERROR  023562          $NWTST= 000000          $SYSNM= 000014
SW10  = 002000          WRT.R1  034612          $ERRPC  001132          $OCNT   025332          $TATUS= 000016
SW11  = 004000          WRT.R2  034704          $ERRTB  005362          $OCTVL  026612          $TBIT   023560
SW12  = 010000          WRT.R3  034710          $ERRTY  023722          $OMODE  025334          $TERM = 000032
SW13  = 020000          WRT.R4  034714          $ERTTL  001126          $OVER   027072          $TESTN  001216
SW14  = 040000          WRT.R5  034716          $ESCAP  001200          $PASS   001220          $TIME   021330
SW15  = 100000          WRT.WD  034614          $ETABL  001232          $PASTM  001106          $TIMES  001176
SW2   = 000004          XEND2   017046          $ETEND  001276          $PHYDR= 000015          $TKB    001162
SW3   = 000010          XFATL   042621          $FATAL  001214          $POWER  025100          $TKINT  022654
SW4   = 000020          XPASS1  007754          $FFLG   024716          $PSEL = 000003          $TKS    001160
SW5   = 000040          XPASS2  012360          $FILLC  001172          $PWRDN  024720          $TKSRV  022704
SW6   = 000100          XXDP    001404          $FILLS  001171          $PWRMG  025054          $TMPO   001174
SW7   = 000200          Y       042317          $FMT  = 000001          $PWRUP  024772          $TN   = 000012
SW8   = 000400          $APTHD  001100          $GAP  = 000016          $QUES   001206          $TNPWR  026424
SW9   = 001000          $ATYC   024476          $GDADR  001134          $RDCHR  026044          $TPB    001166
SYSADR  002014          $ATY1   024452          $GDDAT  001140          $RDLIN  023050          $TPFLG  001173
TAB     042213          $ATY3   024460          $GET42  023460          $RDSZ = 000001          $TPS    001164
TABLEX  002054          $ATY4   024470          $GTSWR  025632          $RESRE  026256          $TRAP   027242
TAB.XY= 001114          $AUTOB  001150          $HD   = 000000          $RMADR  001276          $TRAP2  027264
TBITVE= 000014          $BASE   001266          $HIBTS  001100          $RMAS = 000036          $TRK  = 000011
TD      032414          $BDADR  001136          $ICNT   001120          $RMBA = 000024          $TRP  = 000015
```

```
$TRPAD  027276          $TYPE   024116          $TYPOS  025110          $VECT2  001264          $XTSTR  026642
$TSTM   001104          $TYPEC  024330          $UNIT   001224          $WRDM = 000004          $$GET4= 000001
$TSTNM  001116          $TYPEX  024450          $UNITM  001110          $XOFF = 000023          $OFILL  025333
$TTYIN  023326          $TYPOC  025134          $USWR   001236          $XON  = 000021          .$X   = 001100
$TYPDS  025336          $TYPON  025150          $VECT1  001262

. ABS.  043032      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  51016 WORDS  ( 200 PAGES)
DYNAMIC MEMORY AVAILABLE FOR  69 PAGES
CZRMTA.BIN,CZRMTA/C=CZRMTA.DOC,CZRMTA,SYSMAC/M
```

8-:46 8-;87 8-;97 8-<23* 8-<46* 8-<91* 8-=18* 8-=48* 8-=53* 8-=76*

SEQ 0144

$SETUP	4-120	4-120	4-120	4-120	4-120	4-120	4-120#	4-120#	4-120#	4-120#	4-120#	4-120#	4-120#	8-19
	8-19	8-19	8-19	8-19	8-19	8-19	8-19	8-19	8-19	8-19	8-19	8-20	8-20	8-20
	8-139	8-139	8-141	8-141	8-141	8-141	8-149	8-155	8-155	8-163				
$SIZE	8-75	8-165#												
$STUP	4-120	4-120	4-120	4-120	4-120	4-120	4-120#	4-120#	4-120#	4-120#	4-120#	4-120#	4-120#	4-120#
	4-120#	4-120#	4-120#	4-120#										
$SUPRS	8-D10	8-F36#												
$SVLAD	8-163	8-163#												
$SVPC	4-129	4-129#												
$SWR	4-52#	4-63	4-64	4-64	4-64	4-64	4-64	4-64	4-64	4-64	5-0	5-0	5-0	8-19
	8-19	8-19	8-19	8-19	8-465	8-538	8-594	8-677	8-791	8-880	8-<10	8-=08	8->10	8-139
	8-139	8-139	8-139	8-139	8-141	8-141	8-141	8-141	8-141	8-141	8-141	8-141	8-141	8-141
	8-141	8-149	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163
	8-163	8-163	8-163	8-163	8-163	8-163	8-163	8-163						
$SWREG	5-0#	8-19												
$SWRMK	4-64	4-64	4-64	4-64	4-64	4-64	4-64	4-64	4-64	8-163	8-163	8-163	8-163	8-163
	8-163	8-163	8-163	8-163	8-163									
$SYSNM	6-0#	8-207*	8-237	8-471	8-473	8-797	8-799	8-a06						
$TATUS	4-73#	4-74	8-a33	8-a50	8-a56	8-a58	8-a60	8-a62	8-a64	8-a66	8-A11			
$TBIT	8-19*	8-139	8-139	8-139#	8-139*	8-149*								
$TERM	8-169#													
$TESTN	5-0#	8-163*												
$TIME	8-C82	8-D54#	8-E05											
$TIMES	5-0#	8-19*	8-465*	8-538*	8-594*	8-677*	8-791*	8-880*	8-<10*	8-=08*	8->10*	8-139*	8-163	8-163
	8-163	8-163*	8-163*											
$TKB	5-0#	8-E06	8-E13	8-H25	8-145	8-145	8-155	8-155	8-155	8-155	8-155	8-155		
$TKANT	8-56	8-H23#												
$TKS	5-0#	8-E14*	8-H26*	8-H40*	8-H53*	8-H55*	8-145	8-145	8-155	8-155	8-155	8-155	8-155	8-155
	8-155*													
$TKSRV	8-H23	8-H33#												
$TMP0	5-0#	8-261*	8-262											
$TN	4-53#	4-63	8-465	8-465	8-465#	8-538	8-538	8-538#	8-594	8-594	8-594#	8-677	8-677	8-677#
	8-791	8-791	8-791#	8-880	8-880	8-880#	8-<10	8-<10	8-<10#	8-=08	8-=08	8-=08#	8->10	8->10
	8->10#													
$TNPWR	8-159	8-159	8-159#											
$TPB	5-0#	8-145	8-145	8-145*										
$TPFLG	5-0#	8-145	8-145	8-145										
$TPS	5-0#	8-145	8-145	8-145										
$TRAP	8-19	8-167#												
$TRAP2	8-167	8-167#												
$TRK	6-0#	8-339*	8-549*	8-572*	8-573	8-631*	8-646*	8-647	8-649*	8-922*	8-923	8-925*	8-:02*	8-:03
	8-:40	8-<43*	8-<44	8-<85*	8-<87	8-=87*	8-=88							
$TRP	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167
	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167
	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167	8-167
	8-167	8-167	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#	8-167#
	8-168	8-168	8-168	8-168	8-168#									
$TRPAD	8-167	8-167#	8-169											
$TSTM	4-132#													
$TSTNM	5-0#	8-139*	8-141	8-141	8-141	8-163	8-163	8-163	8-163	8-163	8-163	8-163*		
$TTYIN	8-H70	8-H71	8-H83	8-106	8-120	8-124#								
$TYPBN	8-167													
$TYPDS	8-153#	8-167	8-167											
$TYPE	8-F55	8-F67	8-145#	8-147	8-167	8-167								
$TYPEC	8-145	8-145	8-145	8-145#	8-155									
$TYPEX	8-145	8-145	8-145#											

$TYPOC 8-15'# 8-167 8-167

SEQ 0146

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$TYPON   8-151    8-151#   8-167
$TYPOS   8-151#   8-167
$UNIT    5-0#     6-0
$UNITM   4-132#
$USWR    5-0#
$VECT1   5-0#
$VECT2   5-0#
$WRDM    6-0#     8-337*   8-546*   8-610*   8-892*   8-960*   8-967*   8-995*   8-:47    8-;95    8-<21*   8-=17*   8-=49*   8-=52*
         8-=77*   8-C07    8-C22    8-C54
$XOFF    8-145    8-145
$XON     8-145    8-145
$XTSTR   8-163#
.$ASTA   8-147    8-147
.$X      4-132    4-132#
ABASE    4-  /#   5-0      5-0
ACDW1    5-0      5-0
ACDW2    5-0      5-0
ACK      4-105#
ACPUOP   5-0      5-0
ACTDRV   9-92#    9-361*   9-412*   9-738*   9-747*   9-:09
ACTSTR   9-98#    9-:11*   9-:25*
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
ADEVM    5-0      5-0
AENV     5-0      5-0
AENVM    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
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AMTYP/ 5-0 5-0

SEO 0148

```
APASS    5-0       5-0
APRIOR   5-0
APTCSU   8-145     8-147#
APTENV   8-141     8-145     8-147     8-147#
APTSIZ   8-19      8-147#
APTSPO   8-145     8-147     8-147#
ASNLST   6-0#      8-59      8-119     8-194     8-196     8-208*    8-228     8-234     8->44
ASSGN1   6-0#      8-209*    8-270*    8-282     8-698*    8-710
ASSGN2   6-0#      8-210*    8-725     8-?42*
ASWREG   5-0       5-0
ATABIT   8-142     8-212     8-222     9-152#    9-327     9-424     9-530     9-928     9-950     9-958     9-959     9-979     9-:69
ATESTN   5-0       5-0
ATTN     6-0#      10-55     10-56
AUNIT    5-0       5-0
AUSWR    5-0       5-0
AVECT1   4-118#    5-0       5-0
AVECT2   5-0       5-0
BADSEC   6-0#      8->39*    8-?12     8-?74     8-?90*
BIT0     4-67#     8->43     8-?03     8-?35
BIT00    4-67      4-67#
BIT01    4-67      4-67#     8-@64     9-404     9-659
BIT02    4-67      4-67#
BIT03    4-67      4-67#     8-A11     9-886     9-;85
BIT04    4-67      4-67#     8-A11     8-A23     9-921
BIT05    4-67      4-67#     9-901
BIT06    4-67      4-67#     8-E14     8-H26     9-337     9-395     9-469     9-782     9-<45
BIT07    4-67      4-67#     8-@50     8-A26     9-337     9-604     9-759     9-886     9-901     9-921     9-954     9-<17
BIT08    4-67      4-67#     8-A20     8-163     9-337
BIT09    4-67      4-67#     8-@62     8-141     8-163     9-:60
BIT1     4-67#     8-421     8-438
BIT10    4-67#     8-@60     8-A38     8-A46     8-141     9-661
BIT11    4-67#     8-@58     8-A41     8-163     9-290     9-431     9-625     9-995
BIT12    4-67#     8-@56     8-A49     8-139     9-284     9-318     9-337     9-406     9-439     9-619     9-642     9-657     9-671     9-911
         9-913     9-;25     9-;80     9-<46
BIT13    4-67#     8-A29     8-A55     8-F65     8-141     9-389     9-860     9-;28
BIT14    4-67#     8-@37     8-@39     8-@64     8-A14     8-A17     8-A55     8-163     9-401     9-436     9-847     9-990     9-:90     9-;35
         9-;39     9-<43
BIT15    4-67#     8-@35     8-A57     8-A79     9-389     9-401     9-404     9-406     9-436     9-439     9-625     9-659     9-661     9-782
         9-886     9-901     9-911     9-921     9-990     9-:60     9-:90     9-:97
BIT2     4-67#     8-@66     9-:97
BIT3     4-67#     8-A32
BIT4     4-67#
BIT5     4-67#     8-A35
BIT6     4-67#
BIT7     4-67#     8-371     8-382     8-:50
BIT8     4-67#
BIT9     4-67#     8-A44
BLKADR   6-0#      8-92      8-206     8-236     8-287     8-468     8-702     8-730     8-794     8-?47     8-@04
BLNKS1   8-133     8-243     8-309     8-313     8-491     8-753     8-824     8-C38     8-C83     9->34     9->43     10-100#
BLNKS2   10-99#
BLNKS3   8-?99     8-@07     10-98#
BLNKS4   8-@20     10-97#
BPTVEC   4-67#
BUFFER   6-0       8-335     8-361     8-364     8-547     8-608     8-896     8-940     8-969     8-<28     8-=20     10-122#
BUSADR   8-175     9->29#
CFLAG    6-0#      8-69*     8-E04*    8-E07     8-H39*    8-H99*
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CHGADP 6-0# 8-4* 8-8* 8-12* 8-160 8-226 8-267 H 12

SEQ 0150

DISPL▾	8-a73	8-a79	8-a85	8-a91	8-a97	8-A02	8-A73 J 12	8-A81	8-A83	8-A89	8-A95	8-B01	8-B07	8-B11 SEQ 0152

EM11 8-@85 10-10#

L 12

SEQ 0154

```
M.DP50   8-E64    8-E98#
M.DPID   8-E41    8-E55#
MAKEUP   8-973    8-:89#   8-<72    8-=56
MARKX    8-@21   10-89#
MCPEMX   9-164#   9-;15    9-;61
MESG1    8-129    8-250    8-297    8-479    8-741    8-812   10-71#
MESG10   8-354    8-527    8-778    8-853   10-77#
MESG11   8-380    8-A62   10-78#
MESG12   8-683    8-?22   10-79#
MESG13   8-689    8-?28   10-80#
MESG14   8-739    8-810   10-82#
MESG15   8-I32   10-83#
MESG16   8-?78   10-84#
MESG17   8-?86   10-85#
MESG18   8-?88   10-86#
MESG19   8-C19   10-104#
MESG2    8-134    8-231   10-72#
MESG20   8-I34   10-105#
MESG21   8-448   10-107#
MESG3    8-295    8-477   10-73#
MESG4    8-303    8-485    8-747    8-818   10-74#
MESG5    8-230   10-92#
MESG6    8-249    8-296    8-478    8-740    8-811   10-93#
MESG7    8-259   10-94#
MESG8    8-310    8-492    8-754    8-825   10-75#
MESG9    8-312    8-494    8-756    8-827   10-76#
MINUTE   6-0#     8-67*    8-D62    8-D82*   8-D83    8-D85*
MNDLTA   9-179#   9-727
MOD00    8-119#
MOD11    8-178    8-190#
MOD12    8-192    8-226#
MOD21    8-127#   8-141    8-152    8-157    8-265
MOD22    8-161    8-180#
MOD23    8-170#
MOD30    8-191    8-194#   8-223
MONTR    8-89#
MRMCS1   9->31    9->65#
MRMVEC   9->40    9->66#
MXDLTA   9-176#   9-725
MXLACT   9-173#   9-708
MXWNDW   9-182#
N        8-266   10-96#
NEDCLK   8-D43   10-115#
NOTST    8-523    8-849   10-118#
NULINE   6-0#     8->46*   8-?92    8-@11*   8-@14    8-@18*   8-@22*
OFFCOD   6-0#     8-934*   8-:06    8-:08*   8-:51    8-;29    8-;35    8-<59*   8-<80    8-<83*   8-<89*   8-<96*   8-=15*   8-=92
         8-=94*
OFFSET   4-102#
OFFST    8-971    8-:25#   8-<70    8-=54
OFLIN    8-@65    8-@96#
OPIER    8-A31    8-B15#
OPT      9-387    9-422#   9-777    9-963    9-:01
OVWN0    6-0#     8-883    8-;39    8->42    8->53    8->57    8->61    8-..1    8->96
OVWN1    6-0#
OVWN10   6-0#
OVWN11   6-0#
```

PUNSAF 8-a57 8-a72#

SEQ 0162

9-124# 9-605 9-766 9-955

K 13

SEQ 0166

START¹ 4-124 8-7#

M 13

SEQ 0168

TRFER 8-A19 8-B56#

SEQ 0170

```
$$CMRE   4-372#
$$CMTM   4-372#  5-0
$$ESCA   4-67#
$$NEWT   4-67#   8-465   8-538   8-594   8-677   8-791   8-880   8-<10   8-=08   8->10
$$SET    8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167#  8-168
$$SETM   8-19    8-19#
$$SETU   8-19    8-19#
$$SKIP   4-67#
.$ACT1   4-55#   4-129
.$APTB   4-59#   5-0     5-0#
.$APTH   4-59#   4-132
.$APTY   4-59#   8-147
.$CATC   4-56#   4-122
.$CMTA   4-56#   4-372
.$DB2D   4-57#   8-159
.$DB2O   4-57#   8-161
.$EOP    4-59#   8-139
.$ERRO   4-56#   8-141
.$ERRT   4-56#   8-143
.$POWE   4-59#   8-149
.$READ   4-55#   8-155
.$SAVE   4-57#   8-157
.$SCOP   4-58#   8-163
.$SIZE   4-57#   8-165
.$TRAP   4-57#   8-167
.$TYPD   4-56#   8-153
.$TYPE   4-55#   8-145
.$TYPO   4-56#   8-151
.EQUAT   4-55#   4-67
.HEADE   4-55#   4-63
.SETUP   4-55#   4-120
.SWRHI   4-55#   4-64
.SWRLO   4-55#   4-64#   4-65
CKCHR    4-16#   8-G57   8-G65
CKDIG    4-26#
CKNUM    4-39#
COMMEN   4-67#
ENDCOM   4-67#
ERRCAL   8-171#  9-817   9-868   9-870   9-;32   9-;91
ERROR    4-8#    8-A63   8-A64   8-A65   8-A66   8-B78   8-B79   8-B80   8-B81   9->59
ESCAPE   4-67#
GETPRI   4-67#   8-139   8-165
GETSWR   4-58#   4-67#   8-20    8-20#
MORETA   4-135#  5-0
MULT     4-67#
NEWTST   4-67#   8-465   8-538   8-594   8-677   8-791   8-880   8-<10   8-=08   8->10
POP      4-67#   8-;67   8-<00   8-@23   8-E31   8-147   8-147   8-149   8-149   8-153   8-157
PUSH     4-67#   8-;24   8-;83   8-?73   8-E24   8-147   8-147   8-147   8-149   8-149   8-153   8-157
REPORT   4-67#
SETPRI   4-67#
SETTRA   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167   8-167#  8-168
SETUP    4-67#   8-19
SKIP     4-67#
SLASH    4-67#
STARS    4-67#   4-129   4-132   4-132   4-132   5-0     5-0     5-0     8-465   8-538   8-594   8-677   8-791   8-880
         8-<10   8-=08   8->10   8-139   8-141   8-143   8-145   8-147   8-149   8-149   8-151   8-153   8-155   8-155
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