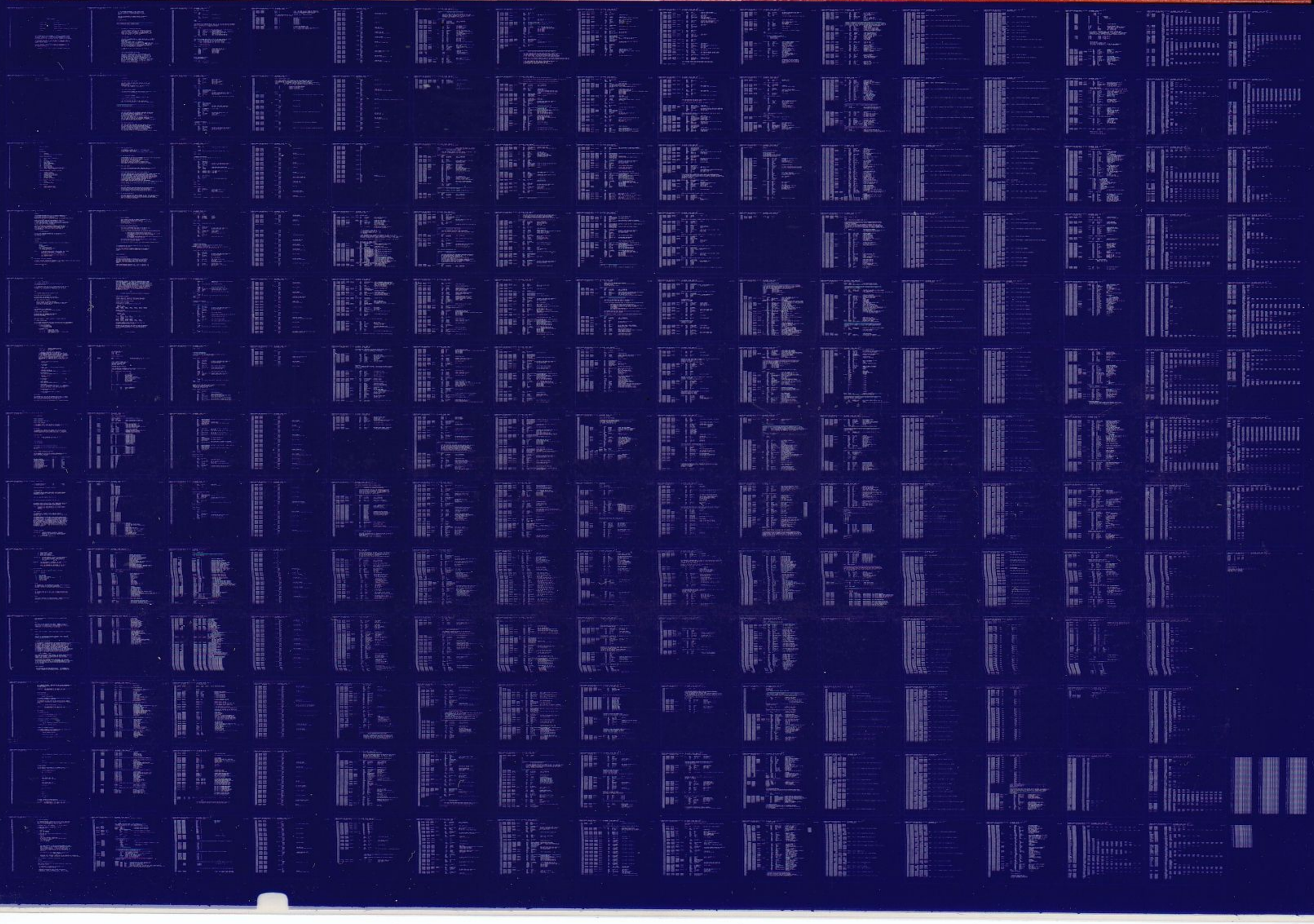
RK611 UNIBUS RK6 DR-3 AH-9126F-MC
RK06,RK07 CZR6JF0 FICHE 1 OF 1



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IDENTIFICATION

PRODUCT CODE:	AC-9125F-MC
PRODUCT NAME:	CZR6JF0 UNIBUS RK6 DR-3
DATE:	JANUARY 1982
MAINTAINER:	STORAGE SYSTEMS SOFTWARE TEST APPLICATION
AUTHOR:	B. T. LEBLANC

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42
43                                  REVISION        CHANGES                                 DATE
44                                  CZR6JF0         IMPLEMENTED XXDP LOAD MEDIA OPTION      JAN 82
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                        1.0     ABSTRACT

                                THIS PROGRAM PERFORMS PART 3 OF THE DRIVE DIAGNOSTICS TO
                                INSURE THAT THE DISK IS CAPABLE OF PROPERLY PERFORMING
                                ALL OPERATOR INTERVENTION FUNCTIONS.
                                ERROR DETECTION LOGIC IS CHECKED BY MANUAL & SOFTWARE ERROR FORCING.

                                AFTER A SUCCESSFUL RUN (WITH NO ERRORS) OF THIS PART,
                                PRECEEDED BY THE SUCCESSFUL RUN OF PARTS 1 & 2,
                                IT CAN BE ASSERTED THAT THE RK06 DRIVE WILL WORK SUCCESSFULLY
                                IN THE STAND-ALONE MODE.  SYSTEMS INTERACTION, & ERROR RATE
                                ANALYSIS ARE LEFT TO OTHER PROGRAMS.

                                TESTING IS BASED ON A HIERARCHY APPROACH STARTING WITH
                                BASIC LOGIC TESTS AND PROCEEDING THRU DYNAMIC TESTING.  THE
                                TESTS WILL BE KEPT SMALL TO FACILITATE SCOPING LOOPS.
                                THIS PROGRAM WILL TEST RK06 & RK07 WITHOUT NEED OF
                                OPERATOR INPUTS.

                                        *****CAUTION*****

                                HALTING THIS PROGRAM ANYWHERE BUT AT THE END OF A PASS,
                                MAY LEAVE THE HEADERS IN THE DISK CARTRIDGE IN AN
                                UNDETERMINED STATE.


                        2.0     REQUIREMENTS

                        2.1     HARDWARE

                                THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE DISK DIAGNOSTIC:

                                        PDP-11
                                        CONSOLE TELETYPE
                                        16K MEMORY
                                        KW11-L OR KW11-P CLOCK
                                        RK06 UNIBUS CONTROLLER (RK611)
                                        1 TO 8 RK06/RK07 DRIVES

                                NOTES:  1.  IF NEITHER KW11-L OR P CLOCK IS USED, ALL TIMING
                                            TESTS WILL BE BYPASSED.  A MESSAGE AT THE
                                            BEGINNING OF THE TESTS WILL CONFIRM THIS.

                                        2.  THE PROGRAM CAN WORK OFF EITHER FORMATTED OR
                                            NON-FORMATTED PACKS.


                        2.2     PRELIMINARY TESTING & PROGRAMS

                                THE RK611 DISKLESS CONTROLLER DIAGNOSTICS (ALL PARTS) SHOULD FIRST RUN SUCCESSFU
                                FOLLOWED BY THE RK06 DRIVE DIAGNOSTICS - PARTS 1 & 2.


                        3.0     PROGRAM CONSIDERATIONS
```

3.1 PDP-11 FAMILY COMPATIBILITY

THIS PROGRAM CAN BE USED BY THE PDP-11/04,05,10,20,
34,35,40,45,50, & 70.

IT IS COMPATABLE WITH THE LSI-11 INSTRUCTION SET AND CAN TEST
THE RK06 ONLY IF THE DRIVE CONTROLLER FOR THE LSI-11 IS
DESIGNED TO BE DIAGNOSTICALLY COMPATABLE WITH THE RK611.

3.2 XXDP

THIS PROGRAM SHOULD NOT BE CHAINED BY XXDP.

CHAIN MODE OPERATION (MONITOR)

BY DEFINITION, ANY PROGRAM THAT REQUIRES
OPERATOR INTERVENTION SHOULD NOT BE CHAINED.

DUMP MODE OPERATION (MANUAL)

1. INPUT DIALOGUE IF STARTED FROM 220.
2. DRIVE 0 CAN BE TESTED, BUT THE OPERATOR IS FIRST GIVEN
   A MESSAGE TO REPLACE THE PACK IN DR0 WITH A SCRATCH
   PACK & TYPE <CR> WHEN DONE.

3.3 ACT/APT

THIS PROGRAM IS ACT COMPATIBLE.
HOWEVER, IT SHOULD NOT BE RUN IN THE AUTO MODE.

AUTOMATIC MODE (MONITOR)

BY DEFINITION, ANY PROGRAM THAT REQUIRES
OPERATOR INTERVENTION SHOULD NOT BE
RUN IN THE AUTO MODE.

DUMP MODE (MANUAL): INPUT DIALOGUE IF STARTED FROM 220.

3.3.1 APT ETABLE DEFINITIONS

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

1. SOFTWARE ENVIRONMENT:
   =1 IF APT SCRIPT MODE
   =0 IF STANDALONE MODE

2. ENVIRONMENT MODE:
   BIT 7 = 1 ETABLE DOES SIZING
         = 0 PROGRAM DOES SIZING
   BIT 6 = 1 SPOOL MESSAGES TO APT IF SCRIPT MODE
         = 0 DON'T SPOOL TO APT

```
                        BIT 5 = 1     SUPPRESS CONSOLE OUTPUT
                              = 0     ALLOW CONSOLE OUTPUT
                        BITS 4-0      NOT USED

                    3.  SWITCH 1 (SOFTWARE SWITCH REGISTER)
                    IF ENVIRONMENT MODE BIT 7 (SIZING BIT) IS SET TO 1,
                    THE SOFTWARE SWITCH REGISTER WILL BE USED, INSTEAD
                    OF THE HARDWARE CONSOLE SWITCH REGISTER.  REGARDLESS
                    OF WHICH ONE IS USED, ALL BITS DEFINED IN SECTIONS
                    4.3 & 4.4 (SWITCH REGISTER OPTIONS) MAY USED
                    WHEN RUNNING IN STANDALONE MODE.  IN APT SCRIPT MODE,
                    HOWEVER, BIT 14 (LOOP ON TEST) MUST ALWAYS BE SET
                    TO 0.

                    4.  SWITCH 2 (USER SWITCH REGISTER)
                          NOT USED

                    5.  CPU OPTIONS:
                          NOT USED

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

                    7.  INTERRUPT VECTOR 1:
                        USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 210

                    8.  BUS PRIORITY 1:
                        USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 5

                    9.  INTERRUPT VECTOR 2:
                          NOT USED

                    10. BUS PRIORITY 2:
                          NOT USED

                    11. BASE ADDRESS:
                        USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 177440

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

                    13.CONTROLLER DESCRIPTOR WORDS:
                           NOT USED

                    14. DEVICE DESCRIPTOR CODES (IN WORDS):
                           NOT USED

          3.4       DUAL ACCESS

                    THIS PROGRAM WILL NOT TEST OR SUPPORT DUAL-ACCESS.  A DRIVE
                    EQUIPED WITH DUAL ACCESS MUST BE SWITCHED TO THE PORT UNDER
                    TEST TO PREVENT CONTENTION WITH THE OTHER PORT.

                    DUAL ACCESS TESTS WILL BE INCORPORATED IN A SEPARATE PROGRAM
```

AT A LATER DATE.

3.5 MEMORY MANAGEMENT

MEMORY MANAGEMENT NOT USED

3.6 PARITY CHECK ENABLED

IF THE MEMORY PARITY CHECK OPTION IS AVAILABLE ON THE SYSTEM, THE PROGRAM WILL RUN WITH MEMORY CHECK ENABLED.

3.7 BAD SECTOR

THE PROGRAM WILL COMPARE DATA ERRORS WITH THE BAD SECTOR INFORMATION CONTAINED ON CYLINDER 410, HEAD 2. PRINTOUTS OF DATA ERRORS DUE TO BAD SECTORS/TRACKS WILL BE MASKED OUT.

3.8 EXECUTION TIME

TOTAL TIME: APPROX 5 MINUTES TO DO ALL THE TESTS
(BASED ON THE PDP 11/50)

3.9 FAULT ISOLATION

TO BE DETERMINED.

3.10 ERROR CORRECTION AND FAILURE RATE ANALYSIS

THIS PROGRAM WILL NOT DO ERROR CORRECTION OR FAILURE RATE ANALYSIS.

3.11 DEFAULT UNIBUS ADDRESSES & VECTORS

THE FOLLOWING IS A LIST OF ALL DEFAULT ADDRESSES & VECTORS OF ALL HARDWARE TO BE USED & THEIR MEMORY ADDRESSES WHERE THEY CAN BE CHANGED.

	LOCATION	DEFAULT CONTENTS
RK06 BUS ADDRESS	1264	177440
CONTROLLER INTERRUPT VECTOR	1334	210
CONTROLLER PRIORITY	1336	240
P-CLOCK STATUS REG	1340	172540
P-CLOCK SET BUFFER	1342	172542
P-CLOCK READ BUFFER	1344	172544
L-CLOCK STATUS REG	1346	177546
L-CLOCK INTERRUPT VECTOR	1350	100
P-CLOCK INTERRUPT VECTOR	1352	104
TTY KB STATUS REG	1144	177560
TTY KB BUFFER	1146	177562

```
                        TTY PRINTER STATUS REG          1150            177564
                        TTY PRINTER BUFFER              1152            177566



4.0     OPERATING PROCEDURE & CONTROL FUNCTIONS


4.1     PROGRAM LOADING

        THE PROGRAM CAN BE LOADED FROM PAPER TAPE USING STANDARD
        PROCEDURE FOR ABSOLUTE LOADER TAPES; OR FROM ANY MEDIA
        SUPPORTED BY XXDP.


4.1.1   LOAD THE STARTING ADDRESS (SEE SEC 4.2).


4.1.2   SET SWITCH REGISTERS AS DESIRED (SEE SEC 4.3).


4.1.3   SET DRIVES TO BE TESTED IN THE 'LOAD' CONDITION & WITH THE
        APPROPRIATE PORT SELECTED & WRITE LOCK DISABLED.  DRIVES
        NOT TO BE TESTED MUST HAVE BOTH PORTS DESELECTED.

        NOTE:  THE DRIVE WILL NOT RESPOND TO THE 'START SPINDLE'
               COMMAND IF THE RUN/STOP SWITCH IS IN THE 'STOP'
               POSITION.


4.1.4   PRESS 'START'

        THE PROGRAM WILL IDENTIFY ITSELF AND WILL BEGIN A
        DIALOGUE WITH THE OPERATOR TO DETERMINE DRIVES TO BE TESTED
        (SEE SEC 4.5).

        THE PROGRAM BEGINS TESTING ONLY THOSE DRIVES SPECIFIED BY
        THE INPUT DIALOGUE.  IF A SPECIFIED DRIVE CANNOT BE FOUND BY
        THE PROGRAM IT WILL BE FLAGGED AS AN ERROR THAT THE DRIVE
        WAS NOT AVAILABLE.  THEN BEGINNING WITH THE LOWEST NUMERICAL
        DRIVE AND PROCEEDING IN SEQUENTIAL ORDER, ALL VALID DRIVES
        WILL BE TESTED.  ONE PASS THROUGH THE TEST SEQUENCE WILL BE
        PERFORMED ON EACH DRIVE BEFORE MOVING TO THE NEXT DRIVE
        IN SEQUENCE.  THE DRIVE TO BE TESTED WILL BE TYPED AT THE
        BEGINNING OF EACH PASS.  "END OF PASS" WILL BE TYPED AFTER
        TESTING ALL DRIVES.



4.2     STARTING LOCATIONS

        LOCATION 200 - STARTING ADDRESS TO DEFAULT THE BUSS
                       ADDRESS & THE CONTROLLER INTERRUPT VECTOR
                       & TEST ALL DRIVES IN THE 'DRIVE PRESENT'
                       CONDITION.
        NOTE:   THE DRIVE PRESENT CONDITION IS:
```

A. HEADS MANUALLY LOADED
B. CORRECT PORT SELECTED
C. WRITE LOCK DISABLED
D. DRIVE READY INDICATOR ON

LOCATION 220 - STARTING ADDRESS TO INPUT TESTING PARAMETERS VIA THE INPUT DIALOGUE. BUSS ADDRESS & CONT. INTERRUPT VECTOR INPUTTED ONLY ON 1ST PASS.

IMPORTANT: FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.3.

ALSO, THE PROGRAM WILL DETERMINE IF THE DRIVE IS AN RK06 OR RK07 WITHOUT OPERATOR INPUT.

4.3 SWITCH REGISTER

THE SWITCHES ARE USED TO PROVIDE CONTROL FUNCTIONS.

SWITCH	FUNCTION
15	HALT ON ERROR
14	LOOP ON TEST
13	INHIBIT ERROR TYPEOUT
12	BYPASS DRIVE AFTER 20 ERRORS
11	INHIBIT ITERATION
10	BELL ON ERROR
9	LOOP ON ERROR

4.3.1 SW<15>

THE PROGRAM HALTS ON ENCOUNTERING AN ERROR, AFTER TYPING OUT THE ERROR MESSAGE AND PERTINENT INFORMATION.
PRESSING "CONTINUE" CONTINUES NORMAL OPERATION OF THE PROGRAM.

4.3.2 SW<14>

THE PROGRAM LOOPS ON THE TEST THAT IS BEING EXECUTED WHEN THE SWITCH IS PUT ON. THIS SWITCH IS NORMALLY USED ALONG WITH SW15.

4.3.3 SW<13>

THIS SWITCH INHIBITS ALL ERROR MESSAGES. NORMALLY USED WHEN LOOPING ON TEST (SW14) OR LOOPING ON ERROR (SW9).

4.3.4 SW<12>

THIS SWITCH BYPASSES A GIVEN DRIVE AFTER 20 ERRORS HAVE
BEEN DETECTED.

4.3.5 SW<11>

EACH TEST WILL BE EXECUTED ONLY ONCE. NORMALLY AFTER THE
FIRST PASS, EACH SUBTEST IS ITERATED A NUMBER OF TIMES
(USUALLY 50, 5 IN SOME CASES). SETTING THIS SWITCH INHIBITS
ITERATIONS, SO THAT QUICK PASSES CAN BE MADE.

4.3.6 SW<10>

RINGS A BELL ON ERROR. USEFUL WHEN ERROR TYPEOUT IS INHIBITED.

4.3.7 SW<09>

THIS SWITCH PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP FOR
ERRORS. IF THE PROGRAM DETECTS AN ERROR, IT WILL LOOP BACK
TO THE BEGINNING OF TEST.

4.4 'SOFTWARE' SWITCH REGISTER

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/04 OR 11/34)
THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS
NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE
'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE
SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH
A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'.
THE PROGRAM WILL RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN
THE PROGRAM IS AT A HIGHER PRIORITY PROCESSING AN RK06 INTERRUPT.
THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER
IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

        SWR = NNNNNN   NEW =

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

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

4.5 INPUT DIALOGUE

THE DIALOGUE WILL BE DONE INTERACTIVELY. THE PROGRAM WILL
REQUEST A PARAMETER BY CONSOLE TYPEOUT. THE PARAMETER MAY
THEN BE ENTERED AS SPECIFIED BELOW OR ALLOWED TO DEFAULT

BY A CARRIAGE RETURN. UNRECOGNIZED OR ILLEGAL RESPONSES WILL BE ECHOED BACK FOLLOWED BY "?". THE PROPER RESPONSE MAY THEN BE ENTERED.

IMPORTANT: FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.4.

4.5.1 DRIVE SELECTION

THE REQUEST WILL BE:

DRIVES TO BE TESTED:

THE DEFAULT RESPONSE IS CARRIAGE RETURN TO TEST ALL DRIVES IN THE 'DRIVE PRESENT' CONDITION.

THE OPERATOR CAN ALSO TYPE IN THE SPECIFIC DRIVE NUMBERS TO BE TESTED, SEPARATED BY COMMAS & TERMINATED BY A CARRIAGE RETURN.

E.G. DRIVES TO BE TESTED: 1,2,4,6

IMPORTANT: FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.3.

4.5.2 BUS ADDRESS

THE REQUEST WILL BE:

TYPE IN BUSS ADDRESS IF NOT 177440

THE DEFAULT IS A CARRIAGE RETURN

4.5.3 CONTROLLER INTERRUPT VECTOR

THE REQUEST WILL BE:

TYPE IN CONTROLLER INTERRUPT VECTOR IF NOT 210

THE DEFAULT IS A CARRIAGE RETURN.

4.5.4 EXAMPLE OF PROGRAM DIALOGUE

THE EXAMPLE SHOWN IS FOR A PROGRAM STARTED AT ADDRESS 220.
ALL OPERATOR RESPONSES ARE UNDERLINED.

```
CZR6JF0 UNIBUSS RK6 DR-3
DRIVES TO BE TESTED: 1,3<CR>
TYPE IN BUSS ADDRESS IF NOT 177440 <CR>
```

```
                                                    ----
                        TYPE IN CONTROLLER INTERRUPT VECTOR IF NOT 210 <CR>
                                                    ----

                        WILL TEST DRIVES:
                        1
                        3

                        DRIVE 1

                        (THE REST IS IDENTICAL TO THE EXAMPLE SHOWN IN 4.6 BELOW)


4.6     PROGRAM EXAMPLE

        THE FOLLOWING IS AN EXAMPLE OF A PROGRAM STARTED AT THE
        DEFAULT ADDRESS (200) & WITH 2 DRIVES ON THE LINE.

                CZR6JF0 UNIBUSS RK6 DR-3

                WILL TEST DRIVES:
                0
                1

                DRIVE 0

                DRIVE SERIAL NO. AAA
                CARTRIDGE SERIAL NO. BBB

                DRIVE 1

                DRIVE SERIAL NO. CCC
                CARTRIDGE SERIAL NO. DDD

                END PASS #1


                WILL TEST DRIVES:
                0
                1

                DRIVE 0

                DRIVE 1

                END PASS # 2

                   (ETC)

THE ABOVE ASSUMES NO ERRORS DETECTED.
THE NUMBER OF PASSES IS DETERMINED BY ACT/APT/XXDP

IMPORTANT:  FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT
            CONSIDERATIONS IN SECTIONS 3.2 & 3.3.
```

4.7 HALTING THE PROGRAM

THE PROGRAM PROVIDES A METHOD OF HALTING ITSELF SUCH THAT THE CARTRIDGE AND/OR DRIVE IS NOT LEFT IN ON UNDETERMINED STATE; IE: HEADS UNLOADED OR INVALID FORMAT.

TO PROPERLY HALT, TYPE CONTROL-C (^C) ON THE CONSOLE.

IF HEADS ARE LOADED & FORMATTING IS VALID,
THE PROGRAM WILL:

1. ECHO ^C
2. TYPE ''CPU HALTED''
3. HALT THE PROGRAM

IF HEADS ARE NOT LOADED AND/OR FORMATTING IS INVALID,
THE PROGRAM WILL:

1. ECHO ^C
2. TYPE 'HALT PENDING, PLEASE WAIT'
3. DO THE TEST(S) THAT LOADS HEADS AND/OR FORMATS THE INVALID CYLINDERS
4. TYPE 'CPU HALTED'
5. HALT THE PROGRAM

NOTES:

1. THE ABOVE EXAMPLE IS FOR THE PROGRAM RUNNING IN DUMP MODE (MANUAL). IF THE PROGRAM IS RUNNING IN CHAIN/AUTO MODE VIA XXDP,ACT,APT; IT WILL FIRST LOAD HEADS AND/OR FORMAT CORRECTLY, IF REQ'D, THEN IT WILL JUMP ON TO THE MONITOR WHERE THE NEXT PROGRAM CAN BE CALLED IN.

   THE TYPEOUTS WILL BE ''ABORT PENDING - PLEASE WAIT''
   & 'PROGRAM ABORTING''

2. OPERATING THE 'CONTINUE' SWITCH ON THE CPU CONSOLE WILL RETURN THE PROGRAM TO TEST 1 WHERE TESTING WILL BEGIN WITH THE 1'ST DRIVE AGAIN.

5.0 DRIVE DIAGNOSTIC FUNCTIONAL DESCRIPTION

5.1 GENERAL

OPERATOR INTERVENTION TESTS

THESE TESTS CHECK OUT ALL THE DRIVE INTERLOCKS, FRONT PANEL SWITCHES AND LIGHTS.

THE OPERATOR IS INSTRUCTED TO PERFORM A TEST AND TYPE A SPACE WHEN FINISHED.

OPERATOR INTERVENTION TESTS CAN BE INDIVIDUALLY BYPASSED BY TYPING A CONTROL-E <^E>. ONLY AT THE BEGINNING OF EACH TEST, AS INSTRUCTED BY THE TYPEOUT.

```
                                IF THE PROGRAM DETERMINES IT WAS LOADED UNDER
                                ACT, APT, OPERATOR INTERVENTION TESTS WILL BE
                                BYPASSED UNLESS THE 'LOAD & DUMP MODE' IS BEING
                                USED.

                                THEY WILL BE BYPASSED IN 'MONITOR MODE' AS OPERATOR
                                INTERVENTION MAY NOT BE FEASIBLE IN OVER-NITE
                                TESTING.

                        5.2     TEST DESCRIPTIONS


                                ********************************************************************************
                                BASIC CONTROLLER TESTS, SIZING & SETUP
                                ********************************************************************************



                                TEST 1  REFERENCE ALL CONTROLLER REGISTERS

                                        THIS TEST VERIFIES THAT ALL THE CONTROLLER REGISTERS
                                        CAN BE ACCESSED.  THE INABILITY  TO BE ACCESSED WILL
                                        RESULT IN A TIMEOUT TRAP WITH  AN ERROR MESSAGE.  ANY
                                        ERROR IN THIS TEST WILL RESULT IN ABORTING ALL OTHER
                                        TESTS AND JUMPING TO  'END OF PASS'


                                TEST 2  SIZE THE BUSS

                                        THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
                                        EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
                                        MANUAL MODE.
                                        EVERY DRIVE FROM 0 THRU 7 IS ADDRESSED.
                                        CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
                                        DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
                                        TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
                                        MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
                                        DICATING THE OTHER PORT IS ACCESSED.

                                        IF CERR DUE TO DTYE, THE DRIVE WILL BE TESTED AS
                                        AN RK07.


                                TEST 3  VERIFY OPERATOR DRIVE SELECTIONS

                                        THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
                                        DEFAULTED.  EVERY DRIVE FROM 0 TO 7 IS ADDRESSED &
                                        CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
                                        PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06.
                                        IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
                                        ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
                                        NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
                                        NED ONLY, IT IS CHECKED AGAINT THE INPUTTED INFOR TO
                                        VERIFY IT WAS NOT SPECIFIED.
                                        IF CERR DUE TO DTYE, THE DRIVE WILL BE TESTED
```

```
                        AS AN RK07.


                TEST 4  FIND NEXT DRIVE TO BE TESTED

                        THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
                        ADDRESS IN 'DRVAD' & $TMP4 IS SET TO CDT IF DRIVE
                        DRIVE IS RK07.
                        THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
                        THE DRIVE WHOSE ADDRESS IS IN 'DRVAD'.


                TEST 5  PRINT DRIVE SERIAL NUMBER

                        THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A, WORD 11
                        IN DECIMAL & IS PERFORMED ON THE 1ST PASS ONLY


                TEST 6  SET VV WITH PACK COMMAND

                        IF VV IS RESET, THE PACK COMMAND IS USED TO SET IT.

                TEST 7  UNLOAD DRIVE TO BE TESTED

                        THIS TEST UNLOADS THE DRIVE TO BE TESTED NEXT,
                        WAITS FOR ATTN & VERIFIES IT CAME FROM THE CORRECT DRIVE.


                ;*******************************************************************
                OPERATOR INTERVENTION TESTS
                ;*******************************************************************


                TEST 10 INTERLOCKS TESTS

                        THIS TEST VERIFIES THAT THE DOOR & CARTRIDGE STATUS BITS
                        ARE OPERATING PROPERLY IN MESSAGE A0 & THAT THE REMOVAL
                        OF THE CARTRIDGE CLEARS VOLUME VALID.
                        IT FURTHUR VERIFIES ALL REMAINING STATUS BITS OF
                        MESSAGE A & B, WORDS 0 & 1.
                        THIS TEST ALSO CHECKS THAT THE SPINDLE CANNOT BE STARTED
                        WHEN THE DOOR IS OPEN OR THE CARTRIDGE IS REMOVED.
                        IT ALSO VERIFIES THAT LOSS OF VOLUME VALID RESETS SACK WHICH
                        ASSERTS NON EXISTENT DRIVE IN RKCS2


                TEST 11 UNIT SELECT PLUG TEST

                        THIS TEST VERIFIES THAT WHEN THE UNIT SELECT PLUG IS PULLED
                        OUT, THE QUAL LOGIC RESETS ATTN & VOLUME VALID, THAT
                        THE DRIVE DE-SELECTS & NON EXISTENT DRIVE ASSERTS.
                        FURTHUR, THE OPERATOR IS ASKED TO INSERT ANY NUMBER OF
                        UNIT SELECT PLUGS. THE PROGRAM WILL RESPOND BY TYPING
                        THE PLUG CODE NUMBER AS SOON AS IT IS INSERTED.
                        THIS PORTION OF THE TEST IS TERMINATED AT ANY TIME BY A CONTROL-C
```

```
763
764
765                                     TEST 12 PORT SELECTION TESTS
766
767                                             THE OPERATOR IS ASKED TO SWITCH TO THE WRONG PORT
768                                             & THEN DESELECT BOTH PORTS.
769                                             IN BOTH CASES, NON EXISTENT DRIVE SHOULD ASSERT IN RKCS2
770
771
772
773                                     TEST 13 AC LOW DETECTION  PART 1
774
775                                             A PRELIMINARY AC LOW TEST IS PERFORMED HERE WHILE HEADS ARE UNLOADED.
776                                             BATTERY RETRACT WILL BE TESTED LATER.
777                                             ACLO CANNOT BE TESTED DIRECTLY SINCE IT REQUIRES
778                                             SECTOR PULSES, I.E. HEADS LOADED.
779                                             THEREFORE THE INDICATOR CHECKED IS NON-EXISTENT
780                                             DRIVE (NED) ASSERTING IN RKCS2 AS A RESULT OF DCLO.
781                                             AFTER POWER UP, VOLUME VALID IS CHECKED TO BE CLEARED.
782
783
784                                     TEST 14 CHECK NXF LOGIC
785
786                                             THIS TEST VERIFIES NON-EXECUTABLE FUNCTION (NXF) IS DETECTED
787                                             AS A RESULT OF DOING A SEEK WITH VOLUME VALID RESET.
788
789
790                                     TEST 15 READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
791
792                                             THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
793                                             THIS AREA CONTAINS BAD SECTOR INFOR WHICH IS WRITTEN BY THE
794                                             FACTORY DURING MANF.  ALL BAD SECTOR INFOR (BSE) WILL BE STORED
795                                             AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
796                                             IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
797                                             IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
798                                             A MESSAGE WILL BE TYPED INDICATING THAT ALL
799                                             FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
800                                             THIS IS DONE SO AS NOT TO DESTROY BSE INFOR OR AN ALIGNMENT PACK BY WRIT
801
802                                             THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
803
804
805                                     TEST 16 WRITE LOCK TEST
806
807                                             THIS TEST VERIFIES THAT DATA WRITTEN ON A SECTOR CANNOT BE
808                                             ALTERED ONCE THE WRITE LOCK SWITCH HAS BEEN ENABLED.
809                                             IT ALSO CHECKS THAT WRITE PROTECT TAKES EFFECT ONLY AT
810                                             SECTOR BOUNDRIES WHEN DOING CONTINUOUS WRITING ON CYL 0, HEAD 0
811
812
813                                     TEST 17 AC LOW DETECTION PART 2
814
815                                             THIS TEST VERIFIES THAT WHEN AC POWER IS LOST, THAT WRITING CEASES
816                                             AT SECTOR BOUNDRIES & THAT THE BATTERY RETRACT IS FUNCTIONAL.
817                                             THERE IS APPROX 4 MS BETWEEN AC LOW ASSERTING AND NED ASSERTING
818                                             WHEN THE INTERFACE SHUTS DOWN.
```

```
819
820
821
822
823                                    TEST 20 END OF PROGRAM
824
825                                            THIS IS NOT A TEST BUT A LINKAGE TO PERFORM ALL THE
826                                            ABOVE TESTS FOR THE NEXT DRIVE PRESENT.
827                                            THE NEXT TEST IS ENTERED ONLY AFTER ALL DRIVES PRESENT
828                                            HAVE BEEN TESTED.
829                                            DO NOT LOOP ON THIS 'TEST'.
830
831
832                                    TEST 21 MULTIPLE DRIVE DETECTION TEST
833
834                                            THIS TEST IS PERFORMED ONLY ONCE AT THE END OF PASS 1
835                                            AND IS BYPASSED IF ONLY ONE DRIVE IS PRESENT.
836
837                                            THE MULTIPLE DRIVE DETECTION LOGIC IS TESTED BY THE FOLLOWING METHOD:
838
839                                                  A. HEADS MUST BE LOADED (SECTOR PULSES REQ'D)
840                                                  B. THE OPERATOR IS INSTRUCTED TO INSERT THE SAME UNIT SELECT
841                                                     PLUG NUMBER (1 PAIR AT A TIME) ON ANY 2 DRIVES
842                                                     TO BE TESTED
843                                                  C. THE OPERATOR THEN DEPRESSES THE SPACE BAR TO CONTINUE THE TES
844                                                     OR A CONTROL-C TO EXIT THE TEST
845
846                                            THE PROGRAM VERIFIES THAT MULTIPLE DRIVE SELECT & DRIVE UNSAFE
847                                            BOTH SET & THAT THE DRIVE UNLOADS
848
849                                            THE OPERATOR IS ASKED TO VERIFY THAT HEADS UNLOAD FROM BOTH DRIVES
850
851
852
853                                            THE PROGRAM DOES NOT REQUIRE FORMATTED PACKS AS FORMATTING
854                                            IS PERFORMED IN ANY CASE.
855
856                                            ANY TEST THAT MODIFIES STANDARD FORMATTING IS FOLLOWED BY A
857                                            'CLEAN UP' TEST TO PUT THOSE CYLINDERS BACK TO STANDARD
858                                            FORMAT.
859
860
861
862                                    6.0     ERROR REPORTING
863
864
865                                    6.1     ERROR INTERPRETATION
866
867                                            WHENEVER AN ERROR MESSAGE IS PRINTED OUT, ALL REGISTERS
868                                            AND OTHER DATA PERTAINING TO THE ERROR ARE ALSO GIVEN.
869                                            MSG A(00), MSG B(01), RKER, RKBA...ETC, INDICATE THE
870                                            CONTENTS OF THE CORRESPONDING REGISTERS AT THE TIME OF
871                                            ERROR.
872
873                                            EVERY ERROR MESSAGE CONTAINS A PC.  THIS PC INDICATES THE
874                                            POSITION IN PROGRAM WHERE THE ERROR CALL IS LOCATED.  THE
```

ERROR MESSAGE, BECAUSE OF PRACTICAL CONSIDERATIONS IS MADE
SHORT AND MEANINGFUL. THE USER IS ADVISED TO LOOK UP THE
PC IN THE PROGRAM LISTING, WHERE HE WILL FIND MORE INFORMATION
ABOUT THE ERROR. IN MANY INSTANCES, A SINGLE FAULT WILL
GIVE RISE TO MORE THAN ONE ERROR REPORT. A LITTLE DELIBERATION
AND CAREFUL EXAMINATION OF THE DATA GIVEN WILL BE CERTAINLY
VERY HELPFUL IN PINPOINTING THE FAULT. A BRIEF EXPLANATION
OF WHAT IS BEING CHECKED IN THE TEST IS GIVEN AT THE
BEGINNING OF EVERY TEST. ALL THE NUMBERS GIVEN WITH ERROR
MESSAGES ARE IN OCTAL.

NOTE

NO ERROR LOGGING OR OPERATION HISTORY IS PROVIDED.

6.2 ERROR PRINTOUT EXAMPLE:

```
DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE DOOR OPEN
VERIFY SPINDLE DOES NOT START & HEADS DO NOT LOAD

DEPRESS SPACE BAR WHEN FINISHED

SPINDLE ON SET IN RKMR2
AFTER MANUALLY LOADING HEADS WITH DOOR OPEN

  TEST NO.  PC
  000010  015700
RKMR2   RKMR3   RKER    RKDS    RKCS1   RKCS2   RKASOF
050343  100000  000000  140301  040200  000103  004000

MESSAGE A0 ERROR
AFTER MANUALLY LOADING HEADS WITH DOOR OPEN

  TEST NO.  PC
  000010  015736
        EXPECT
A0      B0      A1      B1      A2      B2      B3
100143  100000  000543  000001
        ACTUAL
050343  100000  001723  000001
RKCS1   RKCS2   RKASOF  RKER    RKDS    RKDC
040200  000103  004000  000000  140301  000000

THE ABOVE EXAMPLE SHOWS EXPECTED & ACTUAL DATA FOR
MESSAGE REGISTERS A0, B0, A1 & B1.

MESSAGES A2, B2 & B3 WILL BE TYPED OUT ONLY AS REQUIRED
IF THE CYLINDER DIFFERENCE/OFFSET, CYLINDER ADDRESS &
HEAD & SECTOR INFORMATION IS A VARIABLE PARAMETER OF
THE TEST.
```

[END OF DOCUMENT]

%

```
                                ;*** PGM REV 036 ***
                                .NLIST  CND,MC,MD
                                .LIST   ME
                                .ENABL  ABS,AMA

                                ;DEFINE SYSMAC MACROS

167400                          $SWR=   167400                  ;DEFINE SWITCHES 15,14,13,11,10,9,8
000001                          $TN=    1                       ;SET FIRST TEST NO. TO 1


                                .TITLE  CZR6JF0 UNIBUS RK6 DR-3
                                ;*COPYRIGHT (C) 1976,1982
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY GARY PAPAZIAN
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C5), JAN, 1981.
                                ;*
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            ABORT DRIVE AFTER 20 ERRORS
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>


                                .SBTTL  SUMMARY OF STARTING LOCATIONS
                                ;*
                                ;*
                                ;*              200     DEFAULT PARAMETERS
                                ;*              220     INPUT PARAMETERS
                                ;*              240     ODT11
                                ;*
```

```
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

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

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
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
```

```
  1032            000002                  SW01=   2
  1033            000001                  SW00=   1
  1034                                    .EQUIV  SW09,SW9
  1035                                    .EQUIV  SW08,SW8
  1036                                    .EQUIV  SW07,SW7
  1037                                    .EQUIV  SW06,SW6
  1038                                    .EQUIV  SW05,SW5
  1039                                    .EQUIV  SW04,SW4
  1040                                    .EQUIV  SW03,SW3
  1041                                    .EQUIV  SW02,SW2
  1042                                    .EQUIV  SW01,SW1
  1043                                    .EQUIV  SW00,SW0
  1044
  1045                                    ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
  1046            100000                  BIT15=  100000
  1047            040000                  BIT14=  40000
  1048            020000                  BIT13=  20000
  1049            010000                  BIT12=  10000
  1050            004000                  BIT11=  4000
  1051            002000                  BIT10=  2000
  1052            001000                  BIT09=  1000
  1053            000400                  BIT08=  400
  1054            000200                  BIT07=  200
  1055            000100                  BIT06=  100
  1056            000040                  BIT05=  40
  1057            000020                  BIT04=  20
  1058            000010                  BIT03=  10
  1059            000004                  BIT02=  4
  1060            000002                  BIT01=  2
  1061            000001                  BIT00=  1
  1062                                    .EQUIV  BIT09,BIT9
  1063                                    .EQUIV  BIT08,BIT8
  1064                                    .EQUIV  BIT07,BIT7
  1065                                    .EQUIV  BIT06,BIT6
  1066                                    .EQUIV  BIT05,BIT5
  1067                                    .EQUIV  BIT04,BIT4
  1068                                    .EQUIV  BIT03,BIT3
  1069                                    .EQUIV  BIT02,BIT2
  1070                                    .EQUIV  BIT01,BIT1
  1071                                    .EQUIV  BIT00,BIT0
  1072
  1073                                    ;*BASIC "CPU" TRAP VECTOR ADDRESSES
  1074            000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
  1075            000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
  1076            000014                  TBITVEC=14              ;;"T" BIT
  1077            000014                  TRTVEC= 14              ;;TRACE TRAP
  1078            000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
  1079            000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
  1080            000024                  PWRVEC= 24              ;;POWER FAIL
  1081            000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
  1082            000034                  TRAPVEC=34              ;;"TRAP" TRAP
  1083            000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
  1084            000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
  1085            000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
  1086
  1087                                    .SBTTL  RK06 CONTROLLER REGISTER DEFINITION
```

```
                                ;       $BASE=177440

000000                          RKCS1=  0               ;CONTROL AND STATUS REGISTER 1
000002                          RKWC=   2               ;WORD COUNT REGISTER
000004                          RKBA=   4               ;BUS ADDRESS REGISTER
000006                          RKDA=   6               ;DESIRED TRACK SECTOR REGISTER
000010                          RKCS2=  10              ;CONTROL AND STATUS REGISTER 2
000012                          RKDS=   12              ;DRIVE STATUS REGISTER
000014                          RKER=   14              ;ERROR REGISTER
000016                          RKASOF= 16              ;ATTENTION SUMMARY AND OFFSET REGISTER
000020                          RKDC=   20              ;DESIRED CYLINDER REGISTER
000024                          RKDB=   24              ;DATA BUFFER
000026                          RKMR1=  26              ;MAINTENANCE REGISTER 1
000034                          RKMR2=  34              ;MAINTENANCE REGISTER 2 (MESSAGE LINE A)
000036                          RKMR3=  36              ;MAINTENANCE REGISTER 3 (MESSAGE LINE B)
000030                          RKECPS= 30              ;ECC POSITION INFORMATION
000032                          RKECPT= 32              ;ECC PATTERN INFORMATION

                                .SBTTL  CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)

                                ;       DRIVE COMMANDS

000001                          SELDRV= 1               ;SELECT DRIVE (GET STATUS)
000003                          PACK=   3               ;PACK ACKNOWLEDGE
000005                          CLEAR=  5               ;DRIVE CLEAR
000007                          UNLOAD= 7               ;UNLOAD
000011                          SRTSPL= 11              ;START SPINDLE
000013                          RECAL=  13              ;RECALIBRATE
000015                          OFFSET= 15              ;OFFSET
000017                          SEEK=   17              ;SEEK
000021                          RDDATA= 21              ;READ DATA
000023                          WRDATA= 23              ;WRITE DATA
000025                          RDHEAD= 25              ;READ HEADER
000027                          WRHEAD= 27              ;WRITE HEADER AND DATA
000031                          WRTCHK= 31              ;WRITE CHECK

000001                          GO=     BIT0            ;GO BIT
000100                          IE=     BIT6            ;INTERRUPT ENABLE
000200                          RDY=    BIT7            ;CONTROLLER READY
000400                          BA16=   BIT8            ;BUS ADDRESS BIT 16
001000                          BA17=   BIT9            ;BUS ADDRESS BIT 17
002000                          CDT=    BIT10           ;CONTROLLER DRIVE TYPE (0=RK06,1=RK07)
004000                          CTO=    BIT11           ;CONTROLLER TIMEOUT
010000                          CFMT=   BIT12           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
020000                          DCPAR=  BIT13           ;SERCON PARITY ERROR DETECTED BY CONTROLLER
040000                          DI=     BIT14           ;DRIVE INTERRUPT
100000                          CERR=   BIT15           ;CONTROLLER ERROR
100000                          CCLR=   BIT15           ;CONTROLLER CLEAR

                                .SBTTL  CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)

000007                          DRVMSK= 7               ;MASK FOR DRIVE SELECTION CODE
000010                          RLS=    BIT3            ;DESELECT OR RELEASE DRIVE IN BITS 0-2
000020                          BAI=    BIT4            ;BUS ADDRESS INCREMENT INHIBIT
000040                          SCLR=   BIT5            ;SUBSYSTEM CLEAR CONTROLLER AND ALL DRIVES
```

```
1144            000100                  IR=     BIT6                    ;INPUT READY
1145            000200                  OR=     BIT7                    ;OUTPUT READY
1146            000400                  UFE=    BIT8                    ;UNIT FIELD ERROR
1147            001000                  MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
1148            002000                  PGE=    BIT10                   ;PROGRAMMING ERROR
1149            004000                  NEM=    BIT11                   ;NON-EXISTENT MEMORY
1150            010000                  NED=    BIT12                   ;NON-EXISTENT DRIVE
1151            020000                  UPE=    BIT13                   ;UNIBUS PARITY ERROR
1152            040000                  WCE=    BIT14                   ;WRITE CHECK ERROR
1153            100000                  DLT=    BIT15                   ;DATA LATE ERROR
1154
1155                                    .SBTTL  ERROR REGISTER BIT DEFINITION (RKER:14)
1156
1157            000001                  ILF=    BIT0                    ;ILLEGAL FUNCTION CODE
1158            000002                  SKI=    BIT1                    ;SEEK INCOMPLETE
1159            000004                  NXF=    BIT2                    ;NON-EXECUTABLE FUNCTION
1160            000010                  DRPAR=  BIT3                    ;DRIVE DETECTED SERCON PARITY ERROR
1161            000020                  FMTE=   BIT4                    ;FORMAT ERROR
1162            000040                  DTYE=   BIT5                    ;DRIVE TYPE ERROR
1163            000100                  ECH=    BIT6                    ;ECC HARD
1164            000200                  BSE=    BIT7                    ;BAD SECTOR ERROR
1165            000400                  HVRC=   BIT8                    ;HEADER VRC ERROR
1166            001000                  COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
1167            002000                  IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR: HEAD/CYL
1168            004000                  WLE=    BIT11                   ;WRITE LOCK ERROR
1169            010000                  DTE=    BIT12                   ;DRIVE TIMING ERROR
1170            020000                  OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
1171            040000                  UNS=    BIT14                   ;DRIVE UNSAFE
```

ERROR REGISTER BIT DEFINITION (RKER:14) SEQ 0024

```
1172            100000          DCK=    BIT15                   ;DATA CHECK
1173
1174                            .SBTTL  STATUS REGISTER BIT DEFINITION (RKDS:12)
1175
1176            000001          DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
1177                                                            ;   THIS BIT IS RESET)
1178            000004          OFST=   BIT2                    ;DRIVE OFFSET
1179            000010          ACLO=   BIT3                    ;AC LOW
1180            000020          DCLO=   BIT4                    ;DC LOW
1181            000040          DROT=   BIT5                    ;DRIVE OFF TRACK
1182            000100          VV=     BIT6                    ;VOLUME VALID
1183            000200          DRDY=   BIT7                    ;DRIVE READY
1184            000400          DDT=    BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1185            004000          WRL=    BIT11                   ;WRITE LOCK
1186            020000          PIP=    BIT13                   ;POSITIONING IN PROGRESS
1187            040000          DSC=    BIT14                   ;DRIVE STATUS CHANGE
1188            100000          SVAL=   BIT15                   ;STATUS VALID
1189
1190                            .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)
1191
1192            000017          MESMSK= 17                      ;MESSAGE MASK
1193            000020          PAT=    BIT4                    ;FORCE EVEN PARITY ON SERCON MESSAGE LINES
1194            000040          DMD=    BIT5                    ;DIAGNOSTIC MODE
1195            000100          MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
1196            000200          MIND=   BIT7                    ;MAINTENANCE INDEX
1197            000400          MCLK=   BIT8                    ;MAINTENANCE CLOCK
1198            001000          MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
1199            002000          MEWD=   BIT10                   ;MAINTENANCE ENCODED WRITE DATA
1200            004000          PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
1201            010000          PCD=    BIT12                   ;PRECOMPENSATION DELAY
1202            020000          ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
1203            040000          WRTGAT= BIT14                   ;WRITE GATE
1204            100000          RDGATE= BIT15                   ;READ GATE
1205
1206                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A (RKMR2:34)
1207
1208            000040          D.DRA=  BIT5                    ;DRIVE AVAILABLE
1209            000100          D.VV=   BIT6                    ;VOLUME VALID
1210            000200          D.DRDY= BIT7                    ;DRIVE READY
1211            000400          D.DDT=  BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1212            001000          D.FORM= BIT9                    ;DRIVE FORMAT
1213            002000          D.OFF=  BIT10                   ;OFFSET ON
1214            004000          D.WRL=  BIT11                   ;WRITE LOCK
1215            010000          D.SPIN= BIT12                   ;SPINDLE ON
1216            020000          D.PIP=  BIT13                   ;POSITIONING IN PROGRESS
1217            040000          D.DSC=  BIT14                   ;DRIVE STATUS CHANGE
1218
1219                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34)
1220
1221            000020          D.SSP=  BIT4                    ;SERVO SIG PRESENT
1222            000040          D.HDHM= BIT5                    ;HEADS HOME
1223            000100          D.BRHM= BIT6                    ;BRUSHES HOME
1224            000200          D.DOOR= BIT7                    ;DOOR INTERLOCKED
1225            000400          D.CART= BIT8                    ;CARTRAGE INTERLOCK
1226            001000          D.SPOK= BIT9                    ;SPEED OK
1227            002000          D.FWD=  BIT10                   ;FORWARD
```

DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34) SEQ 0025

```
                        D.REV=  BIT11                   ;REVERSE
                        D.LOAD= BIT12                   ;HEADS LOADING
                        D.RTZ=  BIT13                   ;RETURN TO ZERO
                        D.UNLD= BIT14                   ;HEADS UNLOADING

                        .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B (RKMR3:36)

                        D.IDAE= BIT5                    ;INVALID DISK ADDRESS ERROR:HEAD/CYL
                        D.ACLO= BIT6                    ;AC LOW
                        D.FLT=  BIT7                    ;DRIVE FAULT
                        D.NXF=  BIT8                    ;NON-EXECUTABLE FUNCTION CODE
                        D.PAR=  BIT9                    ;DRIVE DETECTED SERCON PARITY ERROR
                        D.SKI=  BIT10                   ;SEEK INCOMPLETE
                        D.WLE=  BIT11                   ;WRITE LOCK ERROR
                        D.SPLS= BIT12                   ;SPEED LOSS
                        D.DROT= BIT13                   ;DRIVE OFF TRACK
                        D.UNS=  BIT14                   ;R/W UNSAFE

                        .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B (RKMR3:36)

                        D.SECT= BIT4                    ;SECTOR ERROR
                        D.WCUR= BIT5                    ;WRITE CURRENT AND NO WRITE GATE
                        D.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
                        D.HDFL= BIT7                    ;HEAD FAULT
                        D.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
                        D.XERR= BIT9                    ;INDEX ERROR
                        D.TIB=  BIT10                   ;TRIBIT ERROR
                        D.PLO=  BIT11                   ;PLO ERROR
                        D.NMOV= BIT12                   ;SEEK AND NO MOTION
                        D.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
                        D.SUNS= BIT14                   ;SERVO UNSAFE

                        .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE A (RKMR2:34)

                        M.DRV=  7                       ;DRIVE CODE, ALL BYTES
                        M.SER=  77770                   ;DRIVE SERIAL #, BYTE 11

                        .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE B (RKMR3:36)

                        M.ID=   3                       ;BYTE ID, ALL BYTES
                        M.ALGN= BIT14                   ;ALIGN SIGN, BYTE 10
                        M.SECT= 760                     ;SECTOR COUNT, BYTE 11
                        M.HEAD= 7000                    ;HEAD DECODE, BYTE 11
                        M.PAR=  BIT15                   ;PARITY, MESS A/B, ALL BYTES
```

```
                                .SBTTL  TRAP CATCHER

                        000000          .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                        000174          .=174
000174  000000        DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000        SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  010012          JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
                        000220          .=220
000220  000137  010002          JMP     PARSRT          ;INPUT ALL PARAMETERS & START TESTING

                        000240          .=240
000240  000137  055504          JMP     0.ODT           ;ENTER ODT11

                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************************
                                ;HOOKS REQUIRED BY ACT11
                        000244          $SVPC=.                 ;SAVE PC
                        000046          .=46
000046  024022                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052          .=52
000052  120000                  .WORD   120000          ;;2)SET LOC.52 TO 120000
                        000244          .=$SVPC                 ;; RESTORE PC
                        001000          .=1000
                                .SBTTL  APT PARAMETER BLOCK

                                ;;**************************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**************************************************************************
                        001000          .$X=.   ;;SAVE CURRENT LOCATION
                        000024          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                  200     ;;FOR APT START UP
                        000044          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001000                  $APTHDR ;;POINT TO APT HEADER BLOCK
                        001000          .=.$X   ;;RESET LOCATION COUNTER
                                ;;**************************************************************************
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

001000                  $APTHD:
001000  000000          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001210          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  000454          $TSTM:  .WORD   300.    ;;RUN TIM OF LONGEST TEST
001006  001130          $PASTM: .WORD   600.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  001130          $UNITM: .WORD   600.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001012  000052                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)


                                .LIST   MD

                                ;
```

```
1328                            ;USE LOOP  X TO OMIT SUBCLR
1329                            ;
1330                            .MACRO  LOOP    A
1331                                    SCOP1
1332                                    MOV     #STACK,SP       ;RESTORE STK PTR
1333
1334                            .IF     B       A
1335                                    JSR     PC,SUBCLR
1336                                    ERROR   24              ;CERR AFTER SCLR
1337
1338                            .ENDC
1339                            .ENDM   LOOP
1340
1341                            ;
1342                            ;THIS MACRO FILLS EXPECTED MSG A0, B0, A1, B1, A2, B2 & B3 WITH STANDARD
1343                            ;BITS SEE A=D.DSC AFTER ATTN OR 0 AFTER DRIVE CLEAR OR ANY IMPLIED SEEKS
1344                            ;NOTE: A CAN BE ANY BIT COMBINATION DESIRED.
1345                            ;
1346                            .MACRO  F.EAB   A
1347
1348                                    MOV     #<A!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
1349                                    CLR     E.B0            ;EXPECTED MSG B0
1350                                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
1351                                    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
1352                                    CLR     E.A2            ;EXPECTED MSG A2
1353                                    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
1354                                    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
1355                            .ENDM   F.EAB
1356
1357                            ;
1358                            ;THIS MACRO ASSUMES DRIVE MSG A0, B0, A1, B1 WILL ALWAYS BE TESTED
1359                            ;USE    A,C,D,E FOR MSG A0, B0, A1, B1 ERROR NUMBERS RESP.
1360                            ;USE    G=T.A2  TO READ MSG A2 & PUT INFO INTO 'CYLDIF'
1361                            ;       H=T.B2  TO READ MSG B2 & PUT INFO INTO 'CYLADD'
1362                            ;       I=T.B3  TO READ MSG B3 & PUT INFO INTO 'SECTOR' & 'HEADA'
1363                            ;
1364                            ;USE    F=<ERROR DESCRIPTION>
1365                            ;
1366                            .MACRO  CHECK   A,C,D,E,F,G,H,I
1367
1368                                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
1369                                    .WORD   G!H!I           ;& MSGS SPECIFIED HERE
1370                                    ERROR   A               ;MSG A0 ERROR F
1371                                    ERROR   C               ;MSH B0 ERROR
1372                                    ERROR   D               ;MSG A1 ERROR
1373                                    ERROR   E               ;MSG B1 ERROR
1374                            .ENDM   CHECK
1375
1376                            ;
1377                            ;A=CYL DIFF/OFFSET ERROR #
1378                            ;B=CYL ADDR ERROR #
1379                            ;C=<ERROR DESCRIPTION>
1380                            ;
1381                            .MACRO  CWD2    A,B,C,?D,?E
1382
1383                                    MOV     #2,RKMR1(R5)    ;SELECT WD 2
```

```
1384                                            JSR     PC,GSTAT
1385                                            TST     CYLDIF          ;SEE IF MSG A2=0
1386                                            BEQ     D               ;BR IF YES
1387                                            ERROR   A               ;MSG A2 NOT CLEARED C
1388                                    D:      TST     CYLADD          ;SEE IF MSG B2=0
1389                                            BEQ     E               ;BR IF YES
1390                                            ERROR   B               ;MSG B2 NOT CLEARED C
1391                                    E:
1392                                    .ENDM   CWD2
1393
1394                                    .MACRO  DRCLR   ?A
1395
1396                                            MOV     #CCLR,RKCS1(R5)
1397                                            MOV     $UNIT,RKCS2(R5) ;DRIVE#
1398                                            MOV     #CLEAR,HCS1
1399                                            JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
1400                                            ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
1401                                            JSR     PC,TSTATN       ;TEST FOR ATTN
1402                                            BR      A
1403                                            ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
1404                                    A:
1405
1406                                    .ENDM   DRCLR
1407
1408
1409                                    .MACRO  CALIB   ?A
1410                                            MOV     #CCLR,RKCS1(R5)
1411                                            MOV     $UNIT,RKCS2(R5)
1412                                            MOV     #RECAL,HCS1
1413                                            JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
1414                                            ERROR   124             ;RDY NOT SET AFTER RECAL CMD
1415
1416                                            MOV     #1,RKMR1(R5)    ;SELECT WORD 1
1417                                            JSR     PC,GSTAT
1418                                            BIT     #D.RTZ,HMR2
1419                                            BNE     A
1420                                            ERROR   214             ;RTZ NOT SET DURING RECAL CMD
1421                                    A:      MOV     T10,TEMP2       ;SETUP TIMEOUT
1422                                            JSR     PC,FATT1        ;FIND ATTN
1423                                            ERROR   55              ;NO ATTN AFTER RECAL CMD
1424                                            DRCLR
1425
1426                                    .ENDM   CALIB
1427
1428
1429                                    ;
1430                                    ; A=WRHEAD/<CFMT!WRHEAD>
1431                                    ; USE WRHDR     <A>,X   TO OMIT CHECKING A0, B0, A1, B1
1432                                    ;
1433                                    .MACRO  WRHDR   A,C,?D
1434
1435                                            MOV     #<A>,HCS1
1436                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1437                                            ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
1438                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1439                                            BIT     #CERR,HCS1
```

```
1440                                    BEQ     D
1441                                    ERROR   201             ;CERR AFTER WRITE HEADER CMD
1442                            D:
1443                            .IF B   C
1444                                    F.EAB   0
1445                                    CHECK   215,216,217,220,<AFTER WRITE HEADER CMD>,0,0,0
1446                            .ENDC
1447
1448                            .ENDM   WRHDR
1449
1450                            ;
1451                            ; A=RDHEAD/<CFMT!RDHEAD>
1452                            ;USE RDHDR <A>,X TO OMIT CHECKING A0, B0, A1, B1
1453                            ;
1454                            .MACRO  RDHDR   A,C,?D,?E
1455
1456                                    MOV     #RHTAB,R0
1457                                    MOV     #<A>,HCS1
1458                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1459                                    ERROR   171             ;NO RDY AFTER READ HEADER CMD
1460                                    BIT     #CERR,HCS1
1461                                    BEQ     D
1462                                    ERROR   174             ;CERR AFTER READ HEADER CMD
1463                                    TYPE    ,MSG26          ;ABORTING DATA TESTS TO DO TIMING TESTS
1464                                    JMP     TIMING
1465
1466                            D:      MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
1467                                    MOV     RKDB(R5),(R0)+  ;2'ND WORD
1468                                    MOV     RKDB(R5),(R0)+  ;3'RD WORD
1469
1470
1471                                    BIT     #DLT,RKCS2(R5)
1472                                    BEQ     E
1473                                    JSR     PC,GSTAT
1474                                    ERROR   173             ;DLT AFTER READ HEADER CMD
1475                            E:
1476                            .IF     B       C
1477                                    NOP
1478                            .ENDC
1479
1480                            .ENDM   RDHDR
1481
1482
1483                            .MACRO  HDCHK3  ?A
1484
1485                                    RDHDR   RDHEAD,X
1486                                    CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
1487                                    BEQ     A               ;BR IF SAME
1488                                    ERROR   51              ;WRONG CYL# ON HEADER
1489                            A:
1490
1491                            .ENDM   HDCHK3
1492
1493                            ;
1494                            ; A=TOCYL/FRCYL , B=HEAD#, C = 0 FOR 22 SECTOR, 1 FOR 20 SECTOR
1495                            ;
```

```
1496                            .MACRO  HDTBL   A,B,C
1497
1498                                    MOV     A,CALADD        ;SETUP
1499                                    MOV     #B,HEAD         ;TO FILL
1500                                    MOV     #C,FORMAT       ;HEADER
1501                                    JSR     PC,FHDTAB       ;TABLE
1502
1503                            .ENDM   HDTBL
1504
1505                            ;
1506                            ;QUICK SEEK.    ENTER WITH CYL# IN RKDC
1507                            ;
1508                            .MACRO  QKSEEK  ?A
1509
1510                                    MOV     #SEEK,HCS1
1511                                    JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
1512                                    ERROR   131             ;NO RDY AFTER SEEK CMD
1513
1514                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1515                                    JSR     PC,FATT2        ;FIND ATTN
1516                                    ERROR   132             ;NO ATTN AFTER SEEK CMD
1517
1518                                    BIT     #CERR,HCS1
1519                                    BEQ     A
1520                                    ERROR   210             ;CERR AFTER SEEK CMD
1521
1522                            A:
1523
1524                            .ENDM   QKSEEK
1525
1526
1527                            ;
1528                            ;A=WRDATA/<CFMT!WRDATA>
1529                            ;C=ADDR TO JMP TO ATTEMPT TO WRITE ON ANOTHER SECTOR
1530                            ;D=ADDR TO JMP TO BYPASS TEST
1531                            ;E: IF BLANK WILL CHECK A0, B0, A1 & B1 AT THE END OF WRITING
1532                            ;E: IF NON BLANK WILL OMIT CHECKING A0 THRU B1
1533                            ;
1534
1535                            .MACRO  WDATA   A,C,D,E,?F,?G,?H,?I
1536
1537                                    MOV     #<A>,HCS1
1538                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1539                                    ERROR   11              ;NO RDY AFTER WRITE DATA CMD
1540                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1541                                    BIT     #CERR,HCS1
1542                                    BEQ     I               ;BR IF NO ERRORS
1543
1544                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
1545                                    BEQ     G               ;BR IF NO
1546                                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
1547                                    BR      H               ;RETURN HERE IF NO
1548
1549                                    INC     SECTOR          ;RETURN HERE IF YES
1550                                    CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
1551                                    BNE     F               ;BR IF NO
```

```
1552                                            ERROR   40              ;ABORTING TEST DETECTED 10 BAD SECTORS
1553                                            JMP     D               ;BYPASS TEST
1554
1555                                    F:      MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
1556                                            JMP     C
1557
1558                                    G:      ERROR   12              ;CERR WITH WRITE DATA CMD
1559                                            F.EAB   0
1560                                            CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1561                                            TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1562                                            JMP     $EOP
1563                                    H:      ERROR   47              ;BAD SECTOR NOT LISTED IN TABLE
1564                                    I:
1565                                    .IF     B       E
1566                                            F.EAB   0
1567                                            CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1568                                    .ENDC
1569                                    .ENDM   WDATA
1570
1571
1572                                    ;
1573                                    ;A=RDDATA/<CFMT!RDDATA>
1574                                    ;USE RDATA      <A>,X TO OMIT CKWD12
1575                                    ;
1576
1577                                    .MACRO  RDATA   A,C,?D,?E,?F,?G,?H
1578
1579                                            MOV     #<A>,HCS1
1580                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1581                                            ERROR   13              ;NO RDY AFTER READ DATA CMD
1582                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1583                                            BIT     #CERR,HCS1
1584                                            BEQ     G
1585                                            BIT     #BSE,HER        ;SEE IF BAD SECTOR
1586                                            BEQ     E
1587                                            ERROR   50              ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
1588                                            BR      H
1589                                    D:      TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1590                                            JMP     $EOP
1591
1592                                    E:      BIT     #DCK,HER        ;SEE IF DATA CHECK ERROR
1593                                            BEQ     F
1594                                            ERROR   21              ;DATA CHECK ERROR AFTER READ CMD (ECC)
1595                                            BR      H
1596
1597                                    F:      ERROR   14              ;CERR AFTER READ DATA CMD.
1598
1599                                    H:      F.EAB   0
1600                                            CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1601                                            BR      D
1602
1603                                    G:
1604                                    .IF     B       C
1605                                            F.EAB   0
1606                                            CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1607                                    .ENDC
```

```
1608                            .ENDM   RDATA
1609
1610
1611                            ;
1612                            ;A=WRTCHK/<CFMT!WRTCHK>
1613                            ;C=16 FOR STD ERROR MSG
1614                            ;C=134/135/136/137 FOR ERROR MSG USED IN 'SBOUND' ROUTINE
1615                            ;USE WRCHK      <A>,C,X TO OMIT CKWD12
1616                            ;
1617
1618                            .MACRO  WRCHK   A,C,D,?E,?F
1619
1620                                    MOV     #<A>,HCS1
1621                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1622                                    ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
1623                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1624                                    BIT     #CERR,HCS1
1625                                    BEQ     F
1626                                    BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
1627                                    BEQ     E
1628                                    MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
1629                                    ERROR   C               ;WCE AFTER WRITE CMD
1630                                    BR      F
1631
1632                            E:      ERROR   22              ;CERR AFTER WRITE CHECK CMD
1633                                    F.EAB   0
1634                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1635                                    TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1636                                    JMP     ENDRV
1637
1638                            F:
1639                            .IF     B       D
1640                                    F.EAB   0
1641                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1642                            .ENDC
1643                            .ENDM   WRCHK
1644
1645                            ;
1646                            ;MACRO TO TEST THAT WRITE CHECK OCCURRED AT SECTOR BOUNDRY
1647                            ;A&B=134,135 FOR WRITE PROTECT SW TEST
1648                            ;A&B=136,137 FOR AC LOW TEST PART 2
1649                            ;C=JUMP ADDR TO REPEAT TEST
1650                            ;
1651                            .MACRO  SBOUND  A,B,C,?D,?E,?F,?G,?H,?I,?J,?K
1652
1653                                    JSR     PC,SUBCLR
1654                                    ERROR   24              ;CERR AFTER SCLR
1655
1656                                    TST     $TMP2           ;SEE IF TRK/SECTOR 0
1657                                    BEQ     K               ;REPEAT,NO NEW DATA XFER TOOK PLACE
1658                                    CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
1659                                    BEQ     K               ;REPEAT,NO OLD DATA TO CHECK AGAINST
1660                                    BIT     #BIT0,$TMP1
1661                                    BNE     D               ;BR IF WRITING 1'S WHEN WLE OCCURRED
1662                                    MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
1663                                    BR      E
```

```
1664
1665                            K:      JMP     C
1666
1667                            D:      MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
1668                            E:      BIS     #BAI,RKCS2(R5)
1669                                    MOV     #-256.,RKWC(R5)
1670                                    MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
1671                                    MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
1672                                    MOV     TOCYL,RKDC(R5)
1673                                    WRCHK   WRTCHK,A,X
1674                                    NOP
1675                                    NOP
1676
1677                                    CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SECTOR 0
1678                                    BNE     F               ;BR IF NO
1679                                    MOV     #21.,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
1680                                    BR      H
1681                            F:      CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2,SECTOR 0
1682                                    BNE     G               ;BR IF NO
1683                                    MOV     #425,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
1684                                    BR      H
1685
1686                            G:      DEC     $TMP2           ;GET SECTOR BEFORE WRL
1687                                    MOV     $TMP2,RKDA(R5)
1688                            H:      MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
1689                                    BIT     #BIT0,$TMP1
1690                                    BNE     I               ;BR IF WRITING 1'S WHEN WLE OCCURRED
1691                                    MOV     #DATA0,RKBA(R5) ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
1692                                    BR      J
1693
1694                            I:      MOV     #DATA1,RKBA(R5) ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
1695                            J:      BIS     #BAI,RKCS2(R5)
1696                                    MOV     #-256.,RKWC(R5)
1697                                    MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
1698                                    MOV     TOCYL,RKDC(R5)
1699                                    WRCHK   WRTCHK,B,X
1700
1701                            .ENDM   SBOUND
1702
1703                            ;
1704                            ;QUICK START SPINDLE
1705                            ;
1706                            .MACRO  QKSRT   ?A
1707
1708                                    JSR     PC,SUBCLR
1709                                    ERROR   24              ;CERR AFTER SCLR
1710
1711                                    BIT     #D.SPIN,HMR2    ;SEE IF SPINDLE ALREADY ON
1712                                    BNE     A               ;BR IF YES
1713                                    TYPE    ,MSG29          ;PLEASE WAIT, HEADS BEING LOADED
1714
1715                                    MOV     #SRTSPL,HCS1
1716                                    JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
1717                                    ERROR   143             ;CONTR RDY NOT SET AFTER CMD
1718
1719                                    MOV     T100,TEMP2
```

```
1720                                            JSR     PC,FATT1        ;FIND ATTN
1721                                            ERROR   144             ;NO ATTN AFTER CMD
1722
1723                                            CLR     UNLD
1724                                    A:
1725                                    .ENDM   QKSRT
1726
1727                                    ;
1728                                    ;ROUTINE TO ISSUE PACK COMMAND
1729                                    ;
1730                                    .MACRO  QKPACK  ?A
1731                                            MOV     #CCLR,RKCS1(R5)
1732                                            MOV     $UNIT,RKCS2(R5) ;DRIVE #
1733                                            MOV     #PACK,HCS1
1734                                            JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
1735                                            ERROR   116             ;CONTR NOT RDY
1736
1737                                            BIT     #D.VV,HMR2
1738                                            BNE     A
1739                                            ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
1740                                    A:
1741                                    .ENDM   QKPACK
1742
1743                                    ;
1744                                    ;QUICK UNLOAD
1745                                    ;
1746                                    .MACRO  QKUNLD
1747
1748                                            JSR     PC,SUBCLR
1749                                            ERROR   24              ;CERR AFTER SCLR
1750
1751                                            MOV     #UNLOAD,HCS1
1752                                            JSR     PC,DOCMD        ;DO UNLOAD CMD & GET CONTR READY
1753                                            ERROR   17              ;NO RDY AFTER UNLD CMD
1754                                            JSR     PC,TSTATN
1755                                            ERROR   20              ;NO ATTN AFTER UNLOAD CMD
1756                                    .ENDM   QKUNLD
1757
1758
1759
1760                                            .NLIST  MD
1761
1762
```

```
                                .SBTTL  COMMON TAGS

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

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000     $TSTNM: .BYTE   0                       ;;CONTAINS THE TEST NUMBER
001103  000     $ERFLG: .BYTE   0                       ;;CONTAINS ERROR FLAG
001104  000000  $ICNT:   .WORD   0                       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000  $LPADR:  .WORD   0                       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000  $LPERR:  .WORD   0                       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000  $ERTTL:  .WORD   0                       ;;CONTAINS TOTAL ERRORS DETECTED
001114  000     $ITEMB: .BYTE   0                       ;;CONTAINS ITEM CONTROL BYTE
001115  001     $ERMAX: .BYTE   1                       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000  $ERRPC:  .WORD   0                       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000  $GDADR:  .WORD   0                       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000  $BDADR:  .WORD   0                       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000  $GDDAT:  .WORD   0                       ;;CONTAINS 'GOOD' DATA
001126  000000  $BDDAT:  .WORD   0                       ;;CONTAINS 'BAD' DATA
001130  000000           .WORD   0                      ;;RESERVED--NOT TO BE USED
001132  000000           .WORD   0
001134  000     $AUTOB: .BYTE   0                       ;;AUTOMATIC MODE INDICATOR
001135  000     $INTAG: .BYTE   0                       ;;INTERRUPT MODE INDICATOR
001136  000000           .WORD   0
001140  177570  SWR:     .WORD   DSWR                   ;;ADDRESS OF SWITCH REGISTER
001142  177570  DISPLAY: .WORD   DDISP                  ;;ADDRESS OF DISPLAY REGISTER
001144  177560  $TKS:    177560                         ;;TTY KBD STATUS
001146  177562  $TKB:    177562                         ;;TTY KBD BUFFER
001150  177564  $TPS:    177564                         ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566  $TPB:    177566                         ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000     $NULL:   .BYTE   0                      ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002     $FILLS:  .BYTE   2                      ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012     $FILLC:  .BYTE   12                     ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
001157  000     $TPFLG:  .BYTE   0                      ;;''TERMINAL AVAILABLE'' FLAG (BIT<07>=0=YES)
001160  000000  $TMP0:   .WORD   0                       ;;USER DEFINED
001162  000000  $TMP1:   .WORD   0                       ;;USER DEFINED
001164  000000  $TMP2:   .WORD   0                       ;;USER DEFINED
001166  000000  $TMP3:   .WORD   0                       ;;USER DEFINED
001170  000000  $TMP4:   .WORD   0                       ;;USER DEFINED
001172  000000  $TMP5:   .WORD   0                       ;;USER DEFINED
001174  000000  $TIMES:  0                               ;;MAX. NUMBER OF ITERATIONS
001176  000000  $ESCAPE:0                               ;;ESCAPE ON ERROR ADDRESS
001200  177607  000377  $BELL:   .ASCIZ  <207><377><377> ;;CODE FOR BELL
001204  077     $QUES:   .ASCII  /?/                    ;;QUESTION MARK
001205  015     $CRLF:   .ASCII  <15>                   ;;CARRIAGE RETURN
001206  000012  $LF:     .ASCIZ  <12>                    ;;LINE FEED
                                ;;**********************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;**********************************************************************
                                .EVEN
001210                  $MAIL:                          ;;APT MAILBOX
001210  000000  $MSGTY: .WORD   AMSGTY                   ;;MESSAGE TYPE CODE
```

```
1819  001212  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
1820  001214  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
1821  001216  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
1822  001220  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
1823  001222  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
1824  001224  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
1825  001226  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
1826  001230                        $ETABLE:                ;;APT ENVIRONMENT TABLE
1827  001230     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
1828  001231     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
1829  001232  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
1830  001234  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
1831  001236  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
1832                                ;*                      BITS 15-11=CPU TYPE
1833                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
1834                                ;*                              11/70=06,PDQ=07,Q=10
1835                                ;*                      BIT 10=REAL TIME CLOCK
1836                                ;*                      BIT  9=FLOATING POINT PROCESSOR
1837                                ;*                      BIT  8=MEMORY MANAGEMENT
1838  001240     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
1839  001241     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
1840                                ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
1841                                ;*                              900 NSEC CORE=001
1842                                ;*                              300 NSEC BIPOLAR=002
1843                                ;*                              500 NSEC MOS=003
1844  001242  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
1845                                ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
1846  001244     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
1847  001245     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
1848  001246  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
1849  001250     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
1850  001251     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
1851  001252  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
1852  001254     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
1853  001255     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
1854  001256  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
1855  001260  000000                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
1856  001262  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
1857  001264  177440                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
1858  001266  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
1859  001270  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
1860  001272  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
1861  001274  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
1862  001276  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
1863  001300  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
1864  001302  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
1865  001304  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
1866  001306  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
1867  001310  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
1868  001312  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
1869  001314  000000                $DDW8:  .WORD   ADDW8   ;;DEVICE DESCRIPTOR WORD#8
1870  001316  000000                $DDW9:  .WORD   ADDW9   ;;DEVICE DESCRIPTOR WORD#9
1871  001320  000000                $DDW10: .WORD   ADDW10  ;;DEVICE DESCRIPTOR WORD#10
1872  001322  000000                $DDW11: .WORD   ADDW11  ;;DEVICE DESCRIPTOR WORD#11
1873  001324  000000                $DDW12: .WORD   ADDW12  ;;DEVICE DESCRIPTOR WORD#12
1874  001326  000000                $DDW13: .WORD   ADDW13  ;;DEVICE DESCRIPTOR WORD#13
```

```
1875  001330  000000                  $DDW14: .WORD   ADDW14  ;;DEVICE DESCRIPTOR WORD#14
1876  001332  000000                  $DDW15: .WORD   ADDW15  ;;DEVICE DESCRIPTOR WORD#15
1877
1878
1879  001334                          $ETEND:
1880
1881          177440                  ABASE=  177440                  ;DEFAULT BUSS ADDRESS
1882  001334  000210                  RKVEC:  210                     ;DEFAULT CONTROLLER INTERRUPT VECTOR
1883  001336  000240                  RKPRI:  PR5                     ;PRIORITY
1884  001340  172540                  PKS:    172540                  ;P-CLOCK STATUS REG
1885  001342  172542                  PKSB:   172542                  ;P-CLOCK SET BUFFER
1886  001344  172544                  PKRB:   172544                  ;P-CLOCK READ BUFFER
1887  001346  177546                  LKS:    177546                  ;L-CLOCK STATUS REG.
1888
1889  001350  000100                  LCVEC:  100                     ;L-CLOCK INTERRUPT VECTOR
1890  001352  000104                  PCVEC:  104                     ;P-CLOCK INTERRUPT VECTOR.
1891
1892          000114                  MEMVEC= 114                     ;MEMORY PARITY VECTOR
1893          172100                  MEMBAS= 172100                  ;MEMORY PARITY OPTION CSR START ADDR
1894
1895  001354  000000                  TRAPPC: 0                       ;PC FOR MEMORY PARITY ERROR TRAP
1896
1897  001356  000000                  PARAM:  0                       ;1 FOR 220 START, NO DEFAULT
1898  001360  000000                  FTITLE: 0                       ;FLAG FOR PRINTING OUT 1ST PROGRAM TITLE
1899
1900  001362  000000                  DRVPTR: 0                       ;CONTAINS THE POINTER TO THE DRIVE FLAG
1901                                                                  ;(DRIV0-DRIV7) OF THE DRIVE TO BE CHECKED NEXT.
1902
1903          000040                  SPBAR=  40                      ;SPACE BAR
1904  001364  000000                  FRCYL:  0                       ;FROM CYLINDER
1905  001366  000000                  TOCYL:  0                       ;TO CYLINDER
1906  001370  000000                  CCYL:   0                       ;CURRENT CYL, USED IN N SQUARE TEST
1907  001372  000000                  PCYL:   0                       ;PREV CYL., USED IN N SQUARE TEST
1908  001374  000000                  CALDIF: 0                       ;CALC CYL DIFF USED IN N SQUARE TEST
1909  001376  000000                  CYLDIF: 0                       ;CYL DIFF, RIGHT JUSTIFIED FROM RKMR3
1910  001400  000000                  CYLADD: 0                       ;CYL ADDR, RIGHT JUSTIFIED FROM RKMR3
1911  001402  000000                  CALADD: 0                       ;CYL ADDR USED IN FHDTAB ROUTINE
1912
1913  001404  000074                  HZ:     60.                     ;60 FOR 60 CPS
1914                                                                  ;50 FOR 50 CPS
1915  001406  000000                  COUNT:  0                       ;LOADED TO 50 OR 60 TO COUNT TO 1 SEC
1916                                                                  ;OR ANY OTHER NUMBER TO COUNT OFF FRACTIONAL SECOND
1917  001410  000000                  SEC:    0                       ;SECOND COUNTER
1918  001412  000000                  TIMUP:  0                       ;FLAG TO INDICATE TIME IS UP
1919  001414  000000                  SECNT:  0                       ;SECTOR COUNT
1920  001416  000000                  PSEC:   0                       ;PREVIOUS SECTOR
1921  001420  000000                  ESEC:   0                       ;EXPECTED SECTOR
1922  001422  000000                  SECTOR: 0                       ;SECTOR COUNT, RIGHT JUSTIFIED FROM RKMR3
1923
1924  001424  000012                  T10:    10.                     ;TIMEOUT CONSTANTS
1925  001426  000144                  T100:   100.
1926  001430  011610                  T5000:  5000.
1927  001432  141520                  T50000: 50000.
1928
1929
1930  001434  000000                  WD1:    0                       ;ACTUAL HEADER/DATA WORD
```

```
1931  001436  000000                  WD2:    0                       ;EXPECTED DATA WORD
1932
1933  001440  000000                  OFFERR: 0                       ;SET WHEN WRITE CHECK ERROR ON OFFSET
1934
1935
1936  001442  000000                  HEAD:   0                       ;HEAD NUMBER
1937  001444  000000                  HEADA:  0                       ;HEAD # FROM H.B3, RT. JUSTIFIED
1938  001446  000000                  HD1:    0                       ;SHIFTED HEAD# FOR FORMATTER ROUTINE
1939  001450  000000                  FORMAT: 0                       ;FORMAT TYPE
1940  001452  000000                  FMT1:   0                       ;SHIFTED FORMAT FOR FORMATTER ROUTINE
1941  001454  000000                  WDCNT:  0                       ;WORD COUNT
1942
1943  001456  000000                  DATA0:  0                       ;ALL 0'S
1944  001460  052525                  DATA01: 52525                   ;0101 PATT
1945  001462  177777                  DATA1:  177777                  ;ALL 1'S
1946  001464  133467                  DPAT1:  133467
1947  001466  070627                  DPAT2:  70627
1948
1949  001470  000000                  WORD:   0                       ;HEADER/DATA WORD
1950  001472  000000                  HDWD:   0                       ;HEADER WORD FROM RKDB
1951
1952  001474  000000                  BSERR:  0                       ;CANNOT READ BSE INFO WHEN SET
1953  001476  000000                  LIMERR: 0                       ;LIMIT DETECT ERROR FLAG
1954  001500  000000                  MDSERR: 0                       ;MULT DRIVE SEL ERROR FLAG
1955  001502  000000                  BYPCERR:0                       ;SET TO 1 TO BYPASS CKCERR IN 'GSTAT1'
1956  001504  000000                  CHKFLG: 0                       ;WORDS TO BE TESTED
1957
1958  001506  000102                  HDTAB:  .BLKW 66.               ;CALCULATED HEADER WORD TABLE
1959  001712  000102                  RHTAB:  .BLKW 66.               ;FILLED AFTER READ HEADER CMD
1960  002116  000102                  SRTTAB: .BLKW 66.               ;ABOVE RHTAB SORTED STARTING FORM
1961                                                                  ;SECTOR 0 BY SORT ROUTINE
1962  002322  000400                  BSE22H: .BLKW 256.              ;22 SECTOR HARDWARE BSE INFO.
1963  003322  000400                  BSE22S: .BLKW 256.              ;22 SECTOR SOFTWARE BSE INFO.
1964  004322  000400                  RDTAB:  .BLKW 256.              ;FILLED AFTER READ DATA CMD
1965
1966  005322  000000                  UNLD:   0                       ;SET TO 0 IF HEADS ARE LOADED
1967                                                                  ;SET TO 1 IF HEADS UNLOADED
1968  005324  000000                  BADHDR: 0                       ;SET TO 0 IF FORMATTING OK
1969                                                                  ;SET TO 1 IF FORMATTING ALTERED
1970  005326  000000                  HPEND:  0                       ;SET TO 0 IF HALT NOT PENDING
1971                                                                  ;SET TO 1 IF HALT PENDING
1972
1973                                                                  ;THE ABOVE 3 FLAGS ARE USED
1974                                                                  ;BY 'STOP' ROUTINE TO BRING
1975                                                                  ;THE CPU TO A VALID HALT.
1976
1977
1978  005330    001     002     004   ATTN:   .BYTE 1,2,4,10,20,40,100,200    ;ATN 0-7 RESP.
1979  005333    010     020     040
1980  005336    100     200
1981                                          .EVEN
1982                                  ;
1983                                  ;THE FOLLOWING ARE HOLDING REGISTERS FOR THE RK611 REGISTERS
1984                                  ;THEY ARE LOADED AFTER RDY IS REC'D FROM WRDY ROUTINE.
1985                                  ;
1986
```

```
 1987  005340  000000          HCS1:   0                       ;HOLD RKCS1
 1988  005342  000000          HCS2:   0                       ;HOLD RKCS2
 1989  005344  000000          HWC:    0                       ;HOLD RKWC
 1990  005346  000000          HBA:    0                       ;ETC.
 1991  005350  000000          HDA:    0
 1992  005352  000000          HDS:    0
 1993  005354  000000          HER:    0
 1994  005356  000000          HASOF:  0
 1995  005360  000000          HDC:    0
 1996  005362  000000          HDB:    0
 1997  005364  000000          HMR1:   0
 1998  005366  000000          HMR2:   0
 1999  005370  000000          HMR3:   0
 2000  005372  000000          HPOS:   0
 2001  005374  000000          HPAT:   0
 2002
 2003  005376  000000          TEMP1:  0                       ;TEMPORARY STORAGE.
 2004  005400  000000          TEMP2:  0
 2005  005402  000000          TEMP3:  0
 2006  005404  000000          TEMP4:  0
 2007  005406  000000          TEMP5:  0
 2008                          ;
 2009                          ;THE FOLLOWING ARE HOLDING REGISTERS FOR MSGA(0-3) & MSGB(0-3).
 2010                          ;
 2011  005410  000000          H.A0:   0
 2012  005412  000000          H.B0:   0
 2013  005414  000000          H.A1:   0
 2014  005416  000000          H.B1:   0
 2015  005420  000000          H.A2:   0
 2016  005422  000000          H.B2:   0
 2017  005424  000000          H.A3:   0
 2018  005426  000000          H.B3:   0
 2019                          ;
 2020                          ;THE FOLLOWING ARE 'EXPECTED' REGISTER FOR THE ABOVE.
 2021                          ;
 2022  005430  000000          E.A0:   0
 2023  005432  000000          E.B0:   0
 2024  005434  000000          E.A1:   0
 2025  005436  000000          E.B1:   0
 2026  005440  000000          E.A2:   0
 2027  005442  000000          E.B2:   0
 2028  005444  000000          E.A3:   0
 2029  005446  000000          E.B3:   0
 2030                          ;
 2031                          ;THE FOLLOWING ARE IDENTIFIERS FOR DRIVE MSG WORDS TO BE TESTED.
 2032                          ;
 2033          000001          T.A2=BIT0                       ;TEST MSG A2 IF SET
 2034          000002          T.B2=BIT1
 2035          000004          T.B3=BIT2
 2036
 2037                          ;
 2038                          ;ALL THE FLAGS BELOW ARE CLEARED INITIALLY BY THE CLRFLG ROUTINE.
 2039                          ;
 2040
 2041  005450  000000          DDUMP:  0                       ;FLAG - SET WHEN IN DDP DUMP MODE
 2042  005452  000000          DDPCH:  0                       ;FLAG - SET WHEN IN DDP CHAIN MODE
```

```
2043  005454  000000                  ACT11:  0                       ;FLAG - SET WHEN IN ACT11 MODE OF OPERATION
2044  005456  000000                  PPTP:   0                       ;FLAG - SET WHEN PROGRAM LOADED BY PAPER TAPE
2045  005460  000000                  DRIVS:  0                       ;CONTAINS THE NUMBER OF DRIVES PRESENT
2046
2047                                  ;THE FLAGS BELOW ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
2048                                  ;IS PRESENT AND IS TO BE TESTED.
2049
2050  005462  000000                  DRIV0:  0                       ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
2051  005464  000000                  DRIV1:  0                       ;FOR DRIVE 1
2052  005466  000000                  DRIV2:  0                       ;FOR DRIVE 2
2053  005470  000000                  DRIV3:  0                       ;FOR DRIVE 3
2054  005472  000000                  DRIV4:  0                       ;FOR DRIVE 4
2055  005474  000000                  DRIV5:  0                       ;FOR DRIVE 5
2056  005476  000000                  DRIV6:  0                       ;FOR DRIVE 6
2057  005500  000000                  DRIV7:  0                       ;FOR DRIVE 7
2058
2059  005502  000000                  LCLKF:  0                       ;L-CLOCK FLAG PRESENT FLAG
2060  005504  000000                  PCLKF:  0                       ;P-CLOCK FLAG PRESENT FLAG
2061  005506  000000                  DOTIM:  0                       ;SET IF EITHER CLOCK PRESENT FOR TIMING TESTS.
2062  005510  000000                  SIZFLG: 0                       ;SET IF DEFAULT DO SIZING IN TEST 1
```

```
                                .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


005512                          $ERRTB:

                                ;ERROR 1
005512  044456                          EM2                     ;DR # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2
005514  051007                          DH1
005516  054126                          DT1
005520  054550                          DF1

                                ;ERROR 2
005522  044675                          EM5                     ;DETECTED MDS
005524  051007                          DH1
005526  054126                          DT1
005530  054550                          DF1

                                ;ERROR 3
005532  044716                          EM6                     ;DETECTED UFE
005534  051007                          DH1
005536  054126                          DT1
005540  054550                          DF1

                                ;ERROR 4
005542  044737                          EM7                     ;DETECTED DRA & NED RESET (WRONG PORT SELECTED?)
005544  051007                          DH1
005546  054126                          DT1
005550  054550                          DF1
                                ;ERROR 5
005552  000000                          0
005554  000000                          0
005556  000000                          0
005560  000000                          0

                                ;ERROR 6
005562  045102                          EM9                     ;DR NOT PRESENT BUT SPECIFIED BY OPERATOR
005564  051007                          DH1
005566  054126                          DT1
005570  054550                          DF1

                                ;ERROR 7
005572  045156                          EM10                    ;ABORT TEST, COULD NOT REFERENCE CONTROLLER REGISTER
005574  051007                          DH1
005576  054126                          DT1
005600  054550                          DF1
```

```
2119
2120                                    ;ERROR 10
2121  005602  045241                        EM11        ;DRA & NED BOTH SET
2122  005604  051007                        DH1
2123  005606  054126                        DT1
2124  005610  054550                        DF1
2125                                    ;ERR 11
2126  005612  045305                        EM12        ;NO RDY
2127  005614  052074                        DH27        ;AFTER WRITE DATA CMD
2128  005616  054126                        DT1
2129  005620  054654                        DF10
2130                                    ;ERR 12
2131  005622  045575                        EM21        ;CERR SET
2132  005624  052074                        DH27
2133  005626  054126                        DT1
2134  005630  054654                        DF10
2135                                    ;ERR 13
2136  005632  045305                        EM12        ;NO RDY
2137  005634  052044                        DH26        ;AFTER READ DATA CMD
2138  005636  054126                        DT1
2139  005640  054654                        DF10
2140                                    ;ERR 14
2141  005642  045575                        EM21        ;CERR SET
2142  005644  052044                        DH26
2143  005646  054126                        DT1
2144  005650  054654                        DF10
2145                                    ;ERR 15
2146  005652  045305                        EM12        ;NO RDY
2147  005654  052303                        DH32        ;AFTER WRITE CHECK CMD
2148  005656  054126                        DT1
2149  005660  054654                        DF10
2150                                    ;ERR 16
2151  005662  050650                        EM80        ;WRITE CHECK ERROR SET
2152  005664  052303                        DH32        ;AFTER WRITE CHECK CMD
2153  005666  054126                        DT1
2154  005670  054654                        DF10
2155                                    ;ERR 17
2156  005672  045305                        EM12        ;CONTR NOT RDY
2157  005674  051604                        DH18        ;AFTER UNLD CMD
2158  005676  054126                        DT1
2159  005700  054654                        DF10
2160                                    ;ERR 20
2161  005702  045343                        EM13        ;NO ATTN
2162  005704  051604                        DH18
2163  005706  054126                        DT1
2164  005710  054654                        DF10
2165                                    ;ERR 21
2166  005712  050707                        EM83        ;DATA CHECK ERROR
2167  005714  052044                        DH26        ;AFTER READ DATA CMD
2168  005716  054126                        DT1
2169  005720  054654                        DF10
2170                                    ;ERR 22
2171  005722  045575                        EM21        ;CERR SET
2172  005724  052303                        DH32        ;AFTER WRITE CHECK CMD
2173  005726  054126                        DT1
2174  005730  054654                        DF10
```

```
2175                                    ;ERR 23
2176  005732  045512                            EM18            ;MSG B0 ERROR
2177  005734  052074                            DH27            ;AFTER WRITE DATA CMD
2178  005736  054304                            DT13
2179  005740  055010                            DF21
2180                                    ;ERROR 24
2181  005742  045575                            EM21            ;CERR SET
2182  005744  051707                            DH21            ;AFTER SCLR
2183  005746  054126                            DT1
2184  005750  054654                            DF10
2185                                    ;ERR 25
2186  005752  045554                            EM20            ;MSG B1 ERROR
2187
2188
2189
2190
2191
2192  005754  052074                            DH27
2193  005756  054304                            DT13
2194  005760  055010                            DF21
2195                                    ;ERR 26
2196  005762  045512                            EM18
2197  005764  052044                            DH26            ;AFTER READ DATA CMD
2198  005766  054304                            DT13
2199  005770  055010                            DF21
2200
2201                                    ;ERROR 27
2202  005772  045710                            EM24            ;VOL VALID NOT SET
2203  005774  051631                            DH19            ;AFTER PACK CMD
2204  005776  054126                            DT1
2205  006000  054654                            DF10
2206                                    ;ERR 30
2207  006002  045554                            EM20            ;MSG B1 ERROR
2208  006004  052044                            DH26            ;AFTER READ DATA CMD.
2209  006006  054304                            DT13
2210  006010  055010                            DF21
2211                                    ;ERR 31
2212  006012  045512                            EM18            ;MSG B0 ERROR
2213  006014  052303                            DH32            ;AFTER WRITE CHECK CMD
2214  006016  054304                            DT13
2215  006020  055010                            DF21
2216                                    ;ERR 32
2217  006022  045554                            EM20            ;MSG B1 ERROR
2218  006024  052303                            DH32
2219  006026  054304                            DT13
2220  006030  055010                            DF21
2221                                    ;ERR 33
2222  006032  046535                            EM44            ;VV NOT CLEARED
2223  006034  051145                            DH4             ;AFTER PACK RE-INSERTED
2224  006036  054126                            DT1
2225  006040  054654                            DF10
2226                                    ;ERR 34
2227  006042  050545                            EM76            ;NO DRIVES FOUND IN DEVICE MAP
2228  006044  051007                            DH1
2229  006046  054126                            DT1
2230  006050  054550                            DF1
```

```
2231                                    ;ERR 35
2232  006052  045471                        EM17                    ;MSG A0 ERROR
2233  006054  051213                        DH5                     ;AFTER AC SW OFF
2234  006056  054304                        DT13
2235  006060  055010                        DF21
2236                                    ;ERR 36
2237  006062  045533                        EM19                    ;MSG A1 ERROR
2238  006064  051213                        DH5
2239  006066  054304                        DT13
2240  006070  055010                        DF21
2241                                    ;ERR 37
2242  006072  045554                        EM20                    ;MSG A1 ERROR
2243  006074  051213                        DH5                     ;AFTER OFFSET CMD
2244  006076  054304                        DT13
2245  006100  055010                        DF21
2246                                    ;ERR 40
2247  006102  050176                        EM71                    ;DETECTED 10 BAD SECTORS
2248  006104  052074                        DH27                    ;AFTER WRITE DATA CMD
2249  006106  054126                        DT1
2250  006110  054654                        DF10
2251                                    ;ERR 41
2252  006112  045365                        EM14                    ;WRONG ATTN
2253  006114  051604                        DH18                    ;AFTER UNLOAD CMD
2254
2255  006116  054126                        DT1
2256  006120  054654                        DF10
2257                                    ;ERR 42
2258  006122  045412                        EM15                    ;DRDY NOT CLEARED
2259  006124  051604                        DH18
2260
2261  006126  054126                        DT1
2262  006130  054654                        DF10
2263                                    ;ERR 43
2264  006132  045444                        EM16                    ;DSC NOT SET
2265  006134  051604                        DH18
2266  006136  054126                        DT1
2267  006140  054654                        DF10
2268                                    ;ERR 44
2269  006142  045617                        EM22                    ;DOOR NOT CLEARED
2270  006144  051241                        DH8                     ;AFTER DRIVE UNLOADED & DOOR OPENED
2271  006146  054126                        DT1
2272  006150  054654                        DF10
2273                                    ;ERR 45
2274  006152  045471                        EM17                    ;MSG A0 ERROR
2275  006154  051241                        DH8
2276  006156  054304                        DT13
2277  006160  055010                        DF21
2278                                    ;ERR 46
2279  006162  045512                        EM18                    ;MSG B0 ERROR
2280  006164  051241                        DH8
2281  006166  054304                        DT13
2282  006170  055010                        DF21
2283                                    ;ERR 47
2284  006172  050246                        EM72                    ;BSE ERROR IN WRITE CMD NOT ON BSE TABLE
2285  006174  052074                        DH27                    ;AFTER WRITE DATA CMD
2286  006176  054126                        DT1
```

```
 2287  006200  054654                        DF10
 2288
 2289                                ;ERR 50
 2290  006202  050325                        EM73            ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
 2291  006204  051007                        DH1
 2292  006206  054126                        DT1
 2293  006210  054550                        DF1
 2294                                ;ERR 51
 2295  006212  050744                        EM93            ;WRONG CYL# IN HEADER WORD
 2296  006214  052021                        DH25            ;AFTER SEEK CMD
 2297  006216  054240                        DT9
 2298  006220  054764                        DF20
 2299                                ;ERR 52
 2300  006222  045471                        EM17            ;MSG A0 ERROR
 2301  006224  052074                        DH27            ;AFTER WRITE DATA CMD
 2302  006226  054304                        DT13
 2303  006230  055010                        DF21
 2304                                ;ERR 53
 2305  006232  045533                        EM19            ;MSG A1 ERROR
```

```
 2306  006234  052074                    DH27
 2307  006236  054304                    DT13
 2308  006240  055010                    DF21
 2309                          ;ERR 54
 2310  006242  045471                    EM17          ;MSG A0 ERROR
 2311  006244  052044                    DH26          ;AFTER READ DATA CMD
 2312  006246  054304                    DT13
 2313  006250  055010                    DF21
 2314                          ;ERROR 55
 2315  006252  045343                    EM13          ;NO ATTN
 2316  006254  051560                    DH17          ;AFTER RECAL CMD
 2317  006256  054126                    DT1
 2318  006260  054654                    DF10
 2319                          ;ERR 56
 2320  006262  045533                    EM19          ;MSG A1 ERROR
 2321  006264  052044                    DH26
 2322  006266  054304                    DT13
 2323  006270  055010                    DF21
 2324                          ;ERR 57
 2325  006272  045471                    EM17          ;MSG A0 ERROR
 2326  006274  052303                    DH32          ;AFTER WRITE CHECK CMD
 2327  006276  054304                    DT13
 2328  006300  055010                    DF21
 2329                          ;ERR 60
 2330  006302  045533                    EM19          ;MSG A1 ERROR
 2331  006304  052303                    DH32
 2332  006306  054304                    DT13
 2333  006310  055010                    DF21
 2334                          ;ERR 61
 2335  006312  050007                    EM69          ;NO DRIVES PRESENT
 2336  006314  051007                    DH1
 2337  006316  054126                    DT1
 2338  006320  054550                    DF1
 2339                          ;ERR 62
 2340  006322  050471                    EM75          ;FOUND 10 BAD CYL
 2341  006324  052074                    DH27          ;AFTER WRITE DATA CMD
 2342  006326  054126                    DT1
 2343  006330  054654                    DF10
 2344                          ;ERR 63
 2345  006332  045533                    EM19          ;MSG A1 ERROR
 2346  006334  051241                    DH8           ;AFTER DRIVE UNLOADED & DOOR OPENED
 2347  006336  054304                    DT13
 2348  006340  055010                    DF21
 2349                          ;ERR 64
 2350  006342  045554                    EM20          ;MSG B1 ERROR
 2351  006344  051241                    DH8
 2352  006346  054304                    DT13
 2353  006350  055010                    DF21
 2354                          ;ERR 65
 2355  006352  045660                    EM23          ;SPIN SET
 2356  006354  051304                    DH11          ;AFTER LOADING HEADS WITH DOOR OPEN
 2357  006356  054126                    DT1
 2358  006360  054654                    DF10
 2359                          ;ERR 66
 2360  006362  045471                    EM17          ;MSG A0 ERROR
 2361  006364  051304                    DH11
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2362  006366  054304                    DT13
2363  006370  055010                    DF21
2364                            ;ERR 67
2365  006372  045512                    EM18                    ;MSG B0 ERROR
2366  006374  051304                    DH11
2367  006376  054304                    DT13
2368  006400  055010                    DF21
2369                            ;ERR 70
2370  006402  045533                    EM19                    ;MSG A1 ERROR
2371  006404  051304                    DH11
2372  006406  054304                    DT13
2373  006410  055010                    DF21
2374                            ;ERR 71
2375  006412  045554                    EM20                    ;MSG B1 ERROR
2376  006414  051304                    DH11
2377  006416  054304                    DT13
2378  006420  055010                    DF21
2379                            ;ERR 72
2380  006422  045746                    EM25                    ;CARTRIDGE NOT CLEARED
2381  006424  051360                    DH12                    ;AFTER DISK PACK REMOVED
2382  006426  054126                    DT1
2383  006430  054654                    DF10
2384                            ;ERR 73
2385  006432  000000                    0
2386  006434  000000                    0
2387  006436  000000                    0
2388  006440  000000                    0
2389                            ;ERR 74
2390  006442  045471                    EM17                    ;MSG A0 ERROR
2391  006444  051145                    DH4                     ;AFTER PACK RE-INSERTED & HDS LOADED
2392  006446  054304                    DT13
2393  006450  055010                    DF21
2394                            ;ERR 75
2395  006452  045512                    EM18                    ;MSG B0 ERROR
2396  006454  051145                    DH4
2397  006456  054304                    DT13
2398  006460  055010                    DF21
2399                            ;ERR 76
2400  006462  045533                    EM19                    ;MSG A1 ERROR
2401  006464  051145                    DH4
2402  006466  054304                    DT13
2403  006470  055010                    DF21
2404                            ;ERR 77
2405  006472  045554                    EM20                    ;MSG B1 ERROR
2406  006474  051145                    DH4
2407  006476  054304                    DT13
2408  006500  055010                    DF21
2409                            ;ERR 100
2410  006502  045660                    EM23                    ;SPIN SET
2411  006504  051410                    DH13                    ;AFTER LOADING HEADS WITH CART. OUT
2412  006506  054126                    DT1
2413  006510  054654                    DF10
2414                            ;ERR 101
2415  006512  000000                    0
2416  006514  000000                    0
2417  006516  000000                    0
```

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2418  006520  000000                        0
2419                                ;ERR 102
2420  006522  000000                        0
2421  006524  000000                        0
2422  006526  000000                        0
2423  006530  000000                        0
2424                                ;ERR 103
2425  006532  000000                        0
2426  006534  000000                        0
2427  006536  000000                        0
2428  006540  000000                        0
2429                                ;ERR 104
2430  006542  000000                        0
2431  006544  000000                        0
2432  006546  000000                        0
2433  006550  000000                        0
2434                                ;ERR 105
2435  006552  047204                        EM52            ;UNS NOT SET
2436  006554  053535                        DH64            ;AFTER MDS FOUND
2437  006556  054126                        DT1
2438  006560  054654                        DF10
2439                                ;ERR 106
2440  006562  046103                        EM28            ;VV SET
2441  006564  051474                        DH15            ;WITHOUT PACK CMD
2442  006566  054126                        DT1
2443  006570  054654                        DF10
2444                                ;ERR 107
2445  006572  046135                        EM29            ;DSC NOT SET
2446  006574  053211                        DH59            ;AFTER EVEN PARITY ISSUED
2447  006576  054126                        DT1
2448  006600  054654                        DF10
2449                                ;ERR 110
2450  006602  046773                        EM48            ;WRL NOT CLEARED
2451  006604  053016                        DH48            ;AFTER WRITE LOCK SWITCH DISABLED
2452  006606  054126                        DT1
2453  006610  054654                        DF10
2454                                ;ERR 111
2455  006612  046162                        EM30            ;ATTN NOT CLEARED
2456  006614  051521                        DH16            ;AFTER UNIT SELECT PLUG REMOVED
2457  006616  054126                        DT1
2458  006620  054654                        DF10
2459                                ;ERR 112
2460  006622  046056                        EM27            ;NED NOT SET
2461  006624  051521                        DH16
2462  006626  054126                        DT1
2463  006630  054654                        DF10
2464                                ;ERR 113
2465  006632  045343                        EM13            ;ATTN NOT SET
2466  006634  053211                        DH59            ;AFTER EVEN PARITY ISSUED
2467  006636  054126                        DT1
2468  006640  054654                        DF10
2469                                ;ERROR 114
2470  006642  047456                        EM58            ;PARITY NOT SET
2471  006644  053211                        DH59
2472  006646  054126                        DT1
2473  006650  054654                        DF10
```

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2474
2475  006652  047033                ;ERR 115
2476  006654  053057                        EM49            ;WRL NOT SET
2477  006656  054126                        DH49            ;AFTER WRITE LOCK SW ENABLED
2478  006660  054654                        DT1
2479                                        DF10
2480  006662  045305                ;ERROR 116
2481  006664  051637                        EM12            ;CONT NOT RDY
2482  006666  054126                        DH19            ;AFTER PACK CMD
2483  006670  054654                        DT1
2484                                        DF10
2485  006672  045305                ;ERROR 117
2486  006674  051654                        EM12            ;CONT NOT RDY
2487  006676  054126                        DH20            ;AFTER SEL DR CMD
2488  006700  054654                        DT1
2489                                        DF10
2490  006702  045305                ;ERROR 120
2491  006704  051707                        EM12
2492  006706  054126                        DH21            ;AFTER SUBSYS CLEAR
2493  006710  054654                        DT1
2494                                        DF10
2495  006712  047067                ;ERR 121
2496  006714  053117                        EM50            ;WLE NOT SET
2497  006716  054126                        DH50            ;AFTER WRITING WITH WRITE LOCK SET
2498  006720  054654                        DT1
2499                                        DF10
2500  006722  046056                ;ERR 122
2501  006724  051767                        EM27            ;NED NOT SET
2502  006726  054126                        DH23            ;AFTER WRONG PORT SELECTED
2503  006730  054654                        DT1
2504                                        DF10
2505  006732  045471                ;ERR 123
2506  006734  053117                        EM17            ;MSG A0 ERROR
2507  006736  054304                        DH50            ;AFTER WRITING WITH WRITE LOCK ENABLED
2508  006740  055010                        DT13
2509                                        DF21
2510  006742  045305                ;ERROR 124
2511  006744  051560                        EM12
2512  006746  054126                        DH17            ;AFTER RECAL CMD
2513  006750  054654                        DT1
2514                                        DF10
2515  006752  045512                ;ERR 125
2516  006754  053117                        EM18            ;MSG B0 ERROR
2517  006756  054304                        DH50            ;AFTER WITING WITH WRL ENABLED
2518  006760  055010                        DT13
2519                                        DF21
2520  006762  045533                ;ERR 126
2521  006764  053117                        EM19            ;MSG A1 ERROR
2522  006766  054304                        DH50
2523  006770  055010                        DT13
2524                                        DF21
2525  006772  045554                ;ERR 127
2526  006774  053117                        EM20            ;MSG B1 ERROR
2527  006776  054304                        DH50
2528  007000  055010                        DT13
2529                                        DF21
                                    ;ERR 130
```

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2530  007002  046213                EM31            ;NED NOT CLEARED
2531  007004  052161                DH29            ;AFTER CORRECT PORT SELECTED
2532  007006  054126                DT1
2533  007010  054654                DF10
2534                          ;ERROR 131
2535  007012  045305                EM12            ;NO RDY
2536  007014  052021                DH25            ;AFTER SEEK CMD
2537  007016  054126                DT1
2538  007020  054654                DF10
2539                          ;ERROR 132
2540  007022  045343                EM13            ;NO ATTN
2541  007024  052021                DH25
2542  007026  054126                DT1
2543  007030  054654                DF10
2544                          ;ERR 133
2545  007032  046056                EM27            ;NED NOT SET
2546  007034  052125                DH28            ;AFTER BOTH PORTS DESELECTED
2547  007036  054126                DT1
2548  007040  054654                DF10
2549                          ;ERR 134
2550  007042  047131                EM51            ;WRITE LOCK NOT SET SECTOR BOUNDRY
2551  007044  053117                DH50            ;AFTER WRITING WITH WRL ENABLED
2552  007046  054166                DT3
2553  007050  054564                DF3
2554                          ;ERR 135
2555  007052  047131                EM51
2556  007054  053265                DH60            ;AFTER WRITE LOCK ENABLED WHILE WRITING
2557  007056  054166                DT3
2558  007060  054610                DF4
2559                          ;ERR 136
2560  007062  047131                EM51
2561  007064  053464                DH63            ;AFTER WRITE LOCK ENABLED FROM AC OFF
2562  007066  054166                DT3
2563  007070  054564                DF3
2564                          ;ERR 137
2565  007072  047131                EM51
2566  007074  053464                DH63
2567  007076  054166                DT3
2568  007100  054610                DF4
2569                          ;ERR 140
2570  007102  046244                EM32            ;SPINDLE ON NOT SET
2571  007104  052247                DH31            ;AFTER DRIVE MANUALLY LOADED
2572  007106  054126                DT1
2573  007110  054654                DF10
2574                          ;ERR 141
2575  007112  046300                EM33            ;DRIVE NOT READY
2576  007114  052456                DH38            ;AFTER AC POWERED UP
2577  007116  054126                DT1
2578  007120  054654                DF10
2579                          ;ERR 142
2580  007122  046331                EM34
2581  007124  052247                DH31
2582  007126  054126                DT1
2583  007130  054654                DF10
2584                          ;ERR 143
2585  007132  045305                EM12            ;CONT NOT READY
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 2586  007134  052335                DH34                ;AFTER ST SPIN. CMD
 2587  007136  054126                DT1
 2588  007140  054654                DF10
 2589                          ;ERR 144
 2590  007142  045343                EM13                ;NO ATTN
 2591  007144  052335                DH34
 2592  007146  054126                DT1
 2593  007150  054654                DF10
 2594                          ;ERR 145
 2595  007152  046372                EM35                ;HEADS NOT HOME
 2596  007154  052371                DH35                ;AFTER MANUAL UNLOAD
 2597  007156  054126                DT1
 2598  007160  054654                DF10
 2599                          ;ERR 146
 2600  007162  047430                EM57                ;CERR NOT SET
 2601  007164  052422                DH37                ;AFTER TIMEOUT TO POWER DOWN
 2602  007166  054126                DT1
 2603  007170  054654                DF10
 2604                          ;ERR 147
 2605  007172  046426                EM37                ;AC LOW NOT SET
 2606  007174  052422                DH37
 2607  007176  054126                DT1
 2608  007200  054654                DF10
 2609                          ;ERR 150
 2610  007202  046456                EM42                ;NED NOT SET
 2611  007204  052422                DH37
 2612  007206  054126                DT1
 2613  007210  054654                DF10
 2614                          ;ERROR 151
 2615  007212  045305                EM12                ;NO RDY
 2616  007214  051735                DH22                ;AFTER CLEAR CMD
 2617  007216  054126                DT1
 2618  007220  054654                DF10
 2619                          ;ERR 152
 2620  007222  046503                EM43                ;AC LO NOT CLEARED
 2621  007224  052456                DH38                ;AFTER AC POWERED UP
 2622  007226  054126                DT1
 2623  007230  054654                DF10
 2624                          ;ERR 153
 2625  007232  046535                EM44                ;VV NOT CLEARED
 2626  007234  052456                DH38
 2627  007236  054126                DT1
 2628  007240  054654                DF10
 2629                          ;ERROR 154
 2630  007242  047331                EM55                ;ATTN NOT CLEARED
 2631  007244  051735                DH22
 2632  007246  054126                DT1
 2633  007250  054654                DF10
 2634                          ;ERR 155
 2635  007252  046577                EM45                ;VV SET AFTER HDS LOADED
 2636  007254  051474                DH15                ;WITHOUT 'PACK' CMD
 2637  007256  054126                DT1
 2638  007260  054654                DF10
 2639                          ;ERR 156
 2640  007262  046654                EM46                ;NXF=0
 2641  007264  052712                DH45                ;AFTER SEEK WITH VV=0
```

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2642  007266  054126                    DT1
2643  007270  054654                    DF10
2644                            ;ERR 157
2645  007272  046733                    EM47          ;CYL ADDR CHANGED FROM 0
2646  007274  052712                    DH45
2647  007276  054364                    DT14
2648  007300  055044                    DF22
2649                            ;ERR 160
2650  007302  045471                    EM17          ;MSG A0 ERROR
2651  007304  052712                    DH45
2652  007306  054304                    DT13
2653  007310  055010                    DF21
2654                            ;ERR 161
2655  007312  045512                    EM18          ;MSG B0 ERROR
2656  007314  052712                    DH45
2657  007316  054304                    DT13
2658  007320  055010                    DF21
2659                            ;ERR 162
2660  007322  045533                    EM19          ;MSG A1 ERROR
2661  007324  052712                    DH45
2662  007326  054304                    DT13
2663  007330  055010                    DF21
2664                            ;ERR 163
2665  007332  045554                    EM20          ;MSG B1 ERROR
2666  007334  052712                    DH45
2667  007336  054304                    DT13
2668  007340  055010                    DF21
2669                            ;ERR 164
2670  007342  046654                    EM46          ;NXF NOT SET
2671  007344  052751                    DH46          ;AFTER WRITE DATA WITH VV=0
2672  007346  054126                    DT1
2673  007350  054654                    DF10
2674                            ;ERR 165
2675  007352  047744                    EM68          ;CANNOT READ BSE INFO
2676  007354  052562                    DH42          ;ON SECTORS 0, 2, 4, 6, 8
2677  007356  054126                    DT1
2678  007360  054740                    DF17
2679                            ;ERR 166
2680  007362  000000                    0
2681  007364  000000                    0
2682  007366  000000                    0
2683  007370  000000                    0
2684                            ;ERR 167
2685  007372  047744                    EM68
2686  007374  054041                    DH74          ;ON SEC 10, 12....20
2687  007376  054126                    DT1
2688  007400  054740                    DF17
2689                            ;ERR 170
2690  007402  000000                    0
2691  007404  000000                    0
2692  007406  000000                    0
2693  007410  000000                    0
2694                            ;ERROR 171
2695  007412  045305                    EM12          ;NO RDY
2696  007414  052215                    DH30          ;AFTER READ HEADER CMD
2697  007416  054126                    DT1
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 2698  007420  054654                        DF10
 2699                              ;ERROR 172
 2700  007422  047527                        EM61          ;NXF DID NOT SET FAULT
 2701  007424  052712                        DH45          ;AFTER SEEK WITH VV=0
 2702  007426  054126                        DT1
 2703  007430  054654                        DF10
 2704                              ;ERROR 173
 2705  007432  047555                        EM63          ;DLT SET
 2706  007434  052215                        DH30
 2707  007436  054126                        DT1
 2708  007440  054720                        DF15
 2709                              ;ERROR 174
 2710  007442  045575                        EM21          ;CERR SET
 2711  007444  052215                        DH30
 2712  007446  054126                        DT1
 2713  007450  054720                        DF15
 2714                              ;ERR 175
 2715  007452  047231                        EM53          ;UNLD NOT SET
 2716  007454  053535                        DH64          ;AFTER MDS FOUND
 2717  007456  054126                        DT1
 2718  007460  054654                        DF10
 2719                              ;ERR 176
 2720  007462  047261                        EM54          ;CANNOT FIND MDS
 2721  007464  053571                        DH65          ;AFTER SEARCHING ALL DRIVES
 2722  007466  054126                        DT1
 2723  007470  054654                        DF10
 2724                              ;ERROR 177
 2725  007472  046014                        EM26          ;VV NOT CLEARED
 2726  007474  051521                        DH16          ;AFTER UNIT SEL PLUG REMOVED
 2727  007476  054126                        DT1
 2728  007500  054654                        DF10
 2729                              ;ERROR 200
 2730  007502  045305                        EM12          ;NO RDY
 2731  007504  052502                        DH39          ;AFTER WRITE HEADER CMD
 2732  007506  054126                        DT1
 2733  007510  054720                        DF15
 2734                              ;ERROR 201
 2735  007512  045575                        EM21          ;CERR SET
 2736  007514  052502                        DH39
 2737  007516  054126                        DT1
 2738  007520  054720                        DF15
 2739                              ;ERROR 202
 2740  007522  047364                        EM56          ;UNEXP MEMORY PARITY ERROR
 2741  007524  053634                        DH66          ;TEST #,PRAP PC
 2742  007526  054234                        DT6
 2743  007530  054634                        DF5
 2744                              ;ERROR 203
 2745  007532  045512                        EM18          ;MSG B0 ERROR
 2746  007534  051213                        DH5           ;AFTER AC SWITCHED OFF
 2747  007536  054304                        DT13
 2748  007540  055010                        DF21
 2749                              ;ERR 204
 2750  007542  047430                        EM57          ;CERR NOT SET
 2751  007544  053655                        DH67          ;AFTER TIMEOUT TO ENABLE WRL
 2752  007546  054126                        DT1
 2753  007550  054654                        DF10
```

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2754
2755  007552  047067                ;ERR 205
                                          EM50          ;WRL NOT SET
2756  007554  053655                       DH67
2757  007556  054126                       DT1
2758  007560  054654                       DF10
2759                                ;ERROR 206
2760  007562  047576                       EM64          ;WCE AT CYL 411,TRK 2, SEC 21
2761  007564  051007                       DH1
2762  007566  054126                       DT1
2763  007570  054640                       DF7
2764                                ;ERROR 207
2765  007572  047430                       EM57          ;CERR NOT SET
2766  007574  053117                       DH50          ;AFTER WRITING WITH WRL ENABLED
2767  007576  054126                       DT1
2768  007600  054654                       DF10
2769                                ;ERROR 210
2770  007602  045575                       EM21          ;CERR SET
2771  007604  052021                       DH25
2772  007606  054126                       DT1
2773  007610  054654                       DF10
2774                                ;ERR 211
2775  007612  047506                       EM59          ;CTO SET
2776  007614  050105                       EM70          ;WHILE WAITING FOR OR REC'D CONTR RDY MSG A & B BAD
2777  007616  054126                       DT1
2778  007620  054674                       DF12
2779                                ;ERR 212
2780  007622  047723                       EM67          ;NED SET
2781  007624  050105                       EM70
2782  007626  054126                       DT1
2783  007630  054674                       DF12
2784                                ;ERR 213
2785  007632  044675                       EM5           ;MDS SET
2786  007634  050105                       EM70
2787  007636  054126                       DT1
2788  007640  054674                       DF12
2789                                ;ERR 214
2790  007642  050444                       EM74          ;RTZ NOT SET
2791  007644  052535                       DH41          ;DURING RECD CMD
2792  007646  054126                       DT1
2793  007650  054654                       DF10
2794                                ;ERR 215
2795  007652  045471                       EM17          ;MSG A0 ERROR
2796  007654  052502                       DH39          ;AFTER WRITE HEADER CMD.
2797  007656  054304                       DT13
2798  007660  055010                       DF21
2799                                ;ERR 216
2800  007662  045512                       EM18          ;B0 ERROR
2801  007664  052502                       DH39
2802  007666  054304                       DT13
2803  007670  055010                       DF21
2804                                ;ERR 217
2805  007672  045533                       EM19          ;A1 ERROR
2806  007674  052502                       DH39
2807  007676  054304                       DT13
2808  007700  055010                       DF21
2809                                ;ERR 220
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2810  007702  045554                    EM20                    ;B1 ERROR
2811  007704  052502                    DH39
2812  007706  054304                    DT13
2813  007710  055010                    DF21
2814                              ;ERROR 221
2815  007712  000000                    0
2816  007714  000000                    0
2817  007716  000000                    0
2818  007720  000000                    0
2819                              ;ERROR 222
2820  007722  000000                    0
2821  007724  000000                    0
2822  007726  000000                    0
2823  007730  000000                    0
2824                              ;ERROR 223
2825  007732  000000                    0
2826  007734  000000                    0
2827  007736  000000                    0
2828  007740  000000                    0
2829                              ;ERROR 224
2830  007742  000000                    0
2831  007744  000000                    0
2832  007746  000000                    0
2833  007750  000000                    0
2834                              ;ERROR 225
2835  007752  000000                    0
2836  007754  000000                    0
2837  007756  000000                    0
2838  007760  000000                    0
2839                              ;ERROR 226
2840  007762  045305                    EM12                    ;NO RDY
2841  007764  052044                    DH26                    ;AFTER READ DATA CMD
2842  007766  054126                    DT1
2843  007770  054654                    DF10
2844                              ;ERROR 227
2845  007772  045575                    EM21                    ;CERR SET
2846  007774  052044                    DH26
2847  007776  054126                    DT1
2848  010000  054720                    DF15
```

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2849
2850                                        .SBTTL  PROGRAM SETUP
2851
2852  010002  012737  000001  001356  PARSRT: MOV     #1,PARAM        ;SET FLAG FOR 220 START
2853  010010  000402                          BR      PRGSRT          ;START PROGRAM
2854
2855  010012  005037  001356          START:  CLR     PARAM           ;CLEAR FOR 200 START
2856  010016  000005                  PRGSRT: RESET                   ;CLEAR ALL INT ENABLE & INIT
2857  010020  012706  001100                  MOV     #STACK,SP       ;SETUP STACK POINTER
2858  010024  012746  000000                  MOV     #PR0,-(SP)      ;PSW LOADED TO BE
2859  010030  012746  010036                  MOV     #1$,-(SP)       ;LSI-11 COMPATABLE
2860  010034  000002                          RTI                     ;ENABLE ALL INTERRUPTS
2861
2862  010036  004737  033416          1$:     JSR     PC,$TKINT       ;SETUP KB VECTOR ADDR, PRIORITY 4
2863                                                                   ;& TURN ON KB INTERRUPT
2864
2865
2866                                          ;*** CPU PRIORITY LEVEL NOW AT 0 ***
2867                                          ;*** ANY DEVICE WHICH SETS ITS   ***
2868                                          ;*** INTERRUPT ENABLE BIT WILL   ***
2869                                          ;*** SERVICED.                   ***
2870
2871                                          ;CLOCK INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 6 (IN 'ST5')
2872                                          ;RK06 CONTROLLER INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 5 IN 'SETINT')
2873                                          ;KEYBOARD INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 4 (SEE ABOVE)
2874
2875                                          ;ALL 'SYSMAC' TRAPS WILL CHANGE CPU PRIORITY TO LEVEL 7 (SEE BELOW)
2876
2877                                                                   ;SYSMAC 'SETUP'
2878                                        .SBTTL  INITIALIZE THE COMMON TAGS
2879                                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
2880  010042  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
2881  010046  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
2882  010050  022706  001140                  CMP     #SWR,R6 ;;DONE?
2883  010054  001374                          BNE     .-6             ;;LOOP BACK IF NO
2884  010056  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
2885                                        ;;INITIALIZE A FEW VECTORS
2886  010062  012737  031452  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
2887  010070  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
2888  010076  012737  031732  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
2889  010104  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
2890  010112  012737  035646  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
2891  010120  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
2892  010126  012737  031206  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
2893  010134  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
2894  010142  013737  023770  023762          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
2895  010150  005037  001174                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
2896  010154  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
2897  010160  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
2898  010166  012737  010166  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
2899  010174  012737  010174  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
2900                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
2901                                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
2902  010202  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
2903  010206  012737  010242  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
2904  010214  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
```

```
2905  010222  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
2906  010230  022777  177777  170702          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
2907  010236  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
2908                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
2909  010240  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
2910  010242  012716  010250          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
2911  010246  000002                          RTI
2912  010250  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
2913  010256  012737  000174  001142          MOV     #DISPREG,DISPLAY
2914  010264  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
2915
2916  010270  005037  001216                  CLR     $PASS           ;;CLEAR PASS COUNT
2917  010274  132737  000200  001231          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
2918  010302  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
2919  010304  012737  001232  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
2920  010312                          67$:
2921
2922  010312  012737  010356  000004  MEMPAR: MOV     #1$,ERRVEC      ;TIMEOUT VECTOR
2923  010320  012737  000340  000006          MOV     #PR7,ERRVEC+2
2924
2925  010326  012701  172100                  MOV     #MEMBAS,R1      ;ADDR OF MEM CSR
2926  010332  005011                  3$:     CLR     (R1)            ;SEE IF CAN REFERENCE
2927  010334  012711  000001                  MOV     #1,(R1)         ;SET ENABLE BIT IF YES
2928  010340  012737  031110  000114          MOV     #MEMERR,MEMVEC  ;LD MEMORY CHK VECTOR IF DONT TIMEOUT
2929  010346  012737  000340  000116          MOV     #PR7,MEMVEC+2
2930  010354  000401                          BR      2$
2931
2932  010356  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJ STACK
2933  010360  062701  000002          2$:     ADD     #2,R1           ;TRY NEXT CSR
2934  010364  020127  172140                  CMP     R1,#MEMBAS+40   ;ALL TRIED?
2935  010370  001360                          BNE     3$              ;BR IN NO
2936  010372  012737  000006  000004          MOV     #ERRVEC+2,ERRVEC        ;RESTORE TRAP CATCHER
2937  010400  005037  000006                  CLR     ERRVEC+2
2938
2939  010404  004737  024110                  JSR     PC,CLRFLG       ;CLEAR DDUMP THRU SIZFLG
2940  010410  005037  001220                  CLR     $DEVCT
2941  010414  005037  001222                  CLR     $UNIT
2942
2943                                  ;
2944                                  ;FIND OUT IF XXDP, ACT, APT; CHAIN OR DUMP MODE
2945                                  ;
2946
2947  010420  005737  000042          START1: TST     42
2948  010424  001015                          BNE     1$              ;BR IF AUTO
2949  010426  004737  024130                  JSR     PC,TITLE        ;MANUAL, TYPE PROG ID
2950  010432  123727  000041  000013          CMPB    41,#13          ;13=LOADED BY XXDP
2951  010440  001011                          BNE     2$
2952  010442  005237  005450                  INC     DDUMP           ;SET RK06 DUMP MODE FLAG
2953  010446  104401  036575                  TYPE    ,MSG2           ;REPLACE DR0 PACK W/SCRATCH & DO<CR>
2954  010452  000000                          HALT                    ;HALT
2955  010454  000137  010470                  JMP     ST2
2956  010460  000137  010534          1$:     JMP     ST3
2957  010464  005237  005456          2$:     INC     PPTP            ;SET ACT/APT/PTP DUMP MODE FLAG
2958
2959                                  ;
2960                                  ;CHECK IF ALL PARAMETERS DEFAULTED.  IF NOT, BEGIN INPUT DIALOGUE
```

```
                                        ;WITH OPERATOR.  THE REPLY TO 'DRIVES TO BE TESTED' SHOULD BE
                                        ;DRIVE NOS.  SEPERATED BY COMMAS & TERMINATED BY <CR>
                                        ;       EX:     DRIVES TO BE TESTED:  1,2,4<CR>
                                        ;
010470  005737  001356          ST2:    TST     PARAM
010474  001002                          BNE     1$              ;BR IF 220 START
010476  000137  010566                  JMP     ST4             ;200 START, DEFAULT & SIZE THE BUSS
010502  104401  036656          1$:     TYPE    ,MSG3           ;DRIVES TO BE TESTED
010506  004737  024210                  JSR     PC,GDRVS        ;GET DR NOS.
010512  104401  036710                  TYPE    ,MSG4           ;BUSS ADDR
010516  004737  024350                  JSR     PC,GBA          ;GET BA
010522  104401  036755                  TYPE    ,MSG5           ;CONT INT VECTOR
010526  004737  024376                  JSR     PC,GINT         ;GET INT VECTOR
010532  000427                          BR      ST5

                                        ;
                                        ;AUTO MODE
                                        ;CHECK IF LOADED BY XXDP OR OTHER.  SET FLAGS & NO INPUT DIALOGUE.
                                        ;DEFAULT ALL PARAMETERS.  TEST ONLY THOSE DRIVES THAT ARE READY
                                        ;ON THE BUSS
                                        ;
010534  123727  000041  000013  ST3:    CMPB    41,#13          ;13=LOADED BY XXDP
010542  001007                          BNE     1$
010544  005237  005452                  INC     DDPCH           ;SET RK06 CHAIN MODE FLAG
010550  004737  024130                  JSR     PC,TITLE
010554  104401  037072                  TYPE    ,MSG7           ;DRO NOT TSTD
010560  000402                          BR      ST4
010562  005237  005454          1$:     INC     ACT11           ;SET ACT AUTO FLAG.

010566  012737  177440  001264  ST4:    MOV     #177440,$BASE   ;DEFAULT VALUE
010574  012737  000210  001334          MOV     #210,RKVEC      ;DEFAULT VALUE
010602  004737  024430                  JSR     PC,SETINT
010606  005237  005510                  INC     SIZFLG          ;DO "SIZE THE BUSS" TEST

010612  005037  005322          ST5:    CLR     UNLD            ;INITIALIZE FLAGS
010616  005037  005324                  CLR     BADHDR          ;USED IN 'STOP' ROUTINE
010622  005037  005326                  CLR     HPEND           ;FOR VALID PROGRAM HALTS
010626  005037  001176                  CLR     $ESCAPE
010632  005037  001172                  CLR     $TMP5           ;CLEAR RK07 FLAG
010636  012737  005462  001362          MOV     #DRIV0,DRVPTR   ;SETUP
010644  005037  001220                  CLR     $DEVCT          ;NO. OF DRVS DONE
010650  005037  001222                  CLR     $UNIT           ;CURRENT DRV UNDER TEST
010654  012737  010722  000004          MOV     #1$,ERRVEC              ;SETUP TIMEOUT ERROR VECTOR
010662  005777  170460                  TST     @LKS            ;SEE IF L-CLOCK THERE
010666  005237  005502                  INC     LCLKF           ;PRESENT, SET FLAG.
010672  013700  001350                  MOV     LCVEC,R0        ;VECTOR ADDR
010676  012737  010764  000004          MOV     #2$,ERRVEC
010704  005777  170430                  TST     @PKS            ;SEE IF P-CLOCK THERE
010710  005237  005504                  INC     PCLKF           ;PRESENT, SET FLAG
010714  013700  001352                  MOV     PCVEC,R0        ;VECTOR ADDR
010720  000412                          BR      3$

010722  022626                  1$:     CMP     (SP)+,(SP)+     ;L-CLOCK NOT THERE, CLEAR STACK
010724  012737  010770  000004          MOV     #4$,ERRVEC
```

```
3017  010732  005777  170402            TST     @PKS            ;SEE IF P-CLOCK THERE
3018  010736  005237  005504            INC     PCLKF           ;PRESENT, SET FLAG
3019  010742  013700  001352            MOV     PCVEC,R0        ;VECTOR ADDR
3020  010746  005237  005506    3$:     INC     DOTIM           ;INDICATES TIMING TESTS CAN BE DONE
3021  010752  012720  030230            MOV     #CLOCK,(R0)+    ;SERVICE ROUTINE FOR CLOCKS
3022  010756  012710  000300            MOV     #PR6,(R0)
3023  010762  000407                    BR      TST1            ;;GO TO NEXT TEST
3024
3025  010764  022626            2$:     CMP     (SP)+,(SP)+     ;P-CLOCK NOT THERE, CLEAR STACK
3026  010766  000767                    BR      3$
3027
3028  010770  022626            4$:     CMP     (SP)+,(SP)+     ;NEITHER CLOCK THERE, CLEAR STACK
3029  010772  005037  005506            CLR     DOTIM           ;TIMING TESTS CANNOT BE DONE.
3030  010776  104401  037301            TYPE    ,MSG13          ;ALL TIMING TESTS BYPASSED
3031
3032
```

```
                        .SBTTL BASIC CONTROLLER TESTS, SIZING & SETUP

                        ;;*********************************************************************
                        ;*TEST 1        REFERENCE ALL CONTROLLER REGISTERS
                        ;*
                        ;*      THIS TEST VERIFIES THAT ALL THE CONTROLLER REGISTERS
                        ;*      CAN BE ACCESSED.  THE INABILITY  TO BE ACCESSED WILL
                        ;*      RESULT IN A TIMEOUT TRAP WITH  AN ERROR MESSAGE.  ANY
                        ;*      ERROR IN THIS TEST WILL RESULT IN ABORTING ALL OTHER
                        ;*      TESTS AND JUMPING TO  'END OF PASS'
                        ;*
                        ;;*********************************************************************
011002  000004          TST1:   SCOPE
011004  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
011012  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
                        
011016  012746  000000                  MOV     #PR0,-(SP)      ;RESET PSW TO PRIORITY 0
011022  012746  011030                  MOV     #5$,-(SP)       ;& MAKE IT LSI COMPATABLE
011026  000002                          RTI
011030                  5$:
                        
011030  012737  011154  000004          MOV     #1$,ERRVEC              ;SETUP TIMOUT ERROR VECTOR
011036  013705  001264                  MOV     $BASE,R5        ;SETUP INDEX REG.
011042  005765  000000                  TST     RKCS1(R5)       ;REFERENCE ALL THE
011046  005765  000010                  TST     RKCS2(R5)       ;CONTROLLER REGISTERS
011052  005765  000002                  TST     RKWC(R5)
011056  005765  000004                  TST     RKBA(R5)
011062  005765  000006                  TST     RKDA(R5)
011066  005765  000012                  TST     RKDS(R5)        ;TIMEOUTS IN THIS SECTION
011072  005765  000014                  TST     RKER(R5)        ;INDICATE THAT THE CONTROLLER
011076  005765  000016                  TST     RKASOF(R5)      ;REGISTERS CANNOT BE READ.
011102  005765  000020                  TST     RKDC(R5)        ;TESTING SHOULD NOT PROCEED
011106  005765  000024                  TST     RKDB(R5)        ;UNTIL THIS IS REMEDIED.
011112  005765  000026                  TST     RKMR1(R5)
011116  005765  000034                  TST     RKMR2(R5)
011122  005765  000036                  TST     RKMR3(R5)
011126  005765  000030                  TST     RKECPS(R5)
011132  005765  000032                  TST     RKECPT(R5)
                        
011136  012737  031022  000004          MOV     #BADTMO,ERRVEC  ;SETUP TIMEOUT HANDLER
011144  012737  000340  000006          MOV     #PR7,ERRVEC+2
011152  000404                          BR      TST2            ;;GO TO NEXT TEST
                        
011154  022626          1$:     CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
011156  104007                  ERROR   7               ;ABORT-COULD NOT REFERENCE CONTROLLER REGISTER
011160  000137  023734          JMP     $EOP
                        
                        
                        ;;*********************************************************************
                        ;*TEST 2        SIZE THE BUSS
                        ;*
                        ;*      THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
                        ;*      EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
                        ;*      MANUAL MODE.
                        ;*      EVERY DRIVE FROM 0 THRU 7 IS ADDRESSED.
                        ;*      CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
```

```
                                        ;*      DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
                                        ;*      TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
                                        ;*      MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
                                        ;*      DICATING THE OTHER PORT IS ACCESSED.
                                        ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS AN RK07.
                                        ;*
                                        ;*****************************************************************************
011164  000004                TST2:   SCOPE
011166  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
011174  012706  001100                MOV     #STACK,SP       ;RESTORE STK PTR

011200  005237  001502                INC     BYPCERR         ;DO NOT TEST CERR IN FRDY

011204  132737  000200  001231        BITB    #BIT7,$ENVM     ;SEE IF USE APT SELECTED DRIVES
011212  001002                        BNE     14$             ;BR IF YES
011214  000137  011334                JMP     12$             ;ELSE DO NORM SIZING OR VERIFY

011220  104401  037205        14$:    TYPE    ,MSG10          ;WILL TEST DRIVES
011224  005037  005460                CLR     DRIVS           ;# OF DRIVES PRESENT
011230  005000                        CLR     R0              ;DRV ADDR
011232  012701  005462                MOV     #DRIV0,R1       ;DRV FLAG
011236  013702  001266                MOV     $DEVM,R2        ;APT DEVICE MAP

011242  032702  000001        15$:    BIT     #BIT0,R2        ;SEE IF DRV IN DEVICE MAP
011246  001410                        BEQ     16$             ;BR IF NO
011250  005237  005460                INC     DRIVS           ;ELSE INCR DRIVE COUNT
011254  005211                        INC     (R1)            ;& SET DRIVE PRESENT FLAG
011256  104401  001205                TYPE    ,$CRLF
011262  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TYPE DRIVE #
011264  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
011266     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
011267     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS

011270  005721                16$:    TST     (R1)+           ;ADV POINTER TO NEXT FLAG
011272  005200                        INC     R0              ;INC DRIVE #
011274  022700  000010                CMP     #8.,R0          ;ALL 8 TESTED?
011300  001402                        BEQ     17$             ;BR IF YES

011302  006002                        ROR     R2              ;ELSE GET NEXT BIT OFF DEVICE MAP
011304  000756                        BR      15$             ;& TRY AGAIN

011306  005737  005460        17$:    TST     DRIVS           ;SEE IF MORE DRIVES PRESENT
011312  001402                        BEQ     18$             ;BR IF NO
011314  000137  012010                JMP     VERIFY          ;ELSE EXIT TEST & SETUP FOR RK07'S.

011320  104034                18$:    ERROR   34              ;NO DRIVES FOUND IN $DEVM
011322  000000                        HALT                    ;SETUP CORRECTLY & PRESS 'CONTINUE'
011324  000137  010612                JMP     ST5             ;TO TRY AGAIN
011330  000137  012010        20$:    JMP     VERIFY          ;DO NOT SIZE, GO THE NEXT TEST.

011334  012765  000040  000010  12$:  MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
```

```
3145
3146  011342  013737  001424  005376          MOV     T10,TEMP1       ;SET TIMEOUT
3147  011350  004737  024542                  JSR     PC,FRDY         ;FIND RDY
3148  011354  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3149
3150  011356  005737  005510                  TST     SIZFLG          ;SIZE BUS?
3151  011362  001762                          BEQ     20$             ;BR IF NO
3152  011364  104401  037205                  TYPE    ,MSG10          ;WILL TEST DRIVES
3153  011370  005037  005460                  CLR     DRIVS           ;# OF DRIVES PRESENT
3154  011374  005000                          CLR     R0              ;DRV ADDR
3155  011376  012701  005462                  MOV     #DRIV0,R1       ;DRV FLAG
3156  011402                          1$:
3157  011402  104415                          SCOP1
3158  011404  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3159
3160  011410  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3161  011416  013737  001424  005376          MOV     T10,TEMP1       ;SET TIMEOUT
3162  011424  004737  024542                  JSR     PC,FRDY         ;FIND RDY
3163  011430  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3164  011432  010065  000010                  MOV     R0,RKCS2(R5)    ;SELECT THE DRIVE ADDR
3165  011436  012737  000001  005340          MOV     #SELDRV,HCS1
3166  011444  053737  001170  005340          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
3167  011452  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
3168  011460  013737  001432  005376          MOV     T50000,TEMP1
3169  011466  004737  025232                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
3170  011472  013737  001424  005376          MOV     T10,TEMP1
3171  011500  004737  024542                  JSR     PC,FRDY         ;FIND RDY
3172  011504  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
3173  011506  032737  100000  005340          BIT     #CERR,HCS1
3174  011514  001052                          BNE     2$
3175  011516  013737  005366  005376          MOV     HMR2,TEMP1
3176  011524  042737  177770  005376          BIC     #^C<DRVMSK>,TEMP1
3177  011532  020037  005376                  CMP     R0,TEMP1        ;S/B SAME
3178  011536  001020                          BNE     3$
3179  011540  005700                          TST     R0
3180  011542  001003                          BNE     4$
3181  011544  005737  005452                  TST     DDPCH           ;SEE IF XXDP CHAIN MODE
3182  011550  001016                          BNE     5$
3183  011552  005237  005460          4$:     INC     DRIVS           ;INC DRIVE COUNT.
3184  011556  005211                          INC     (R1)            ;SET DRIVE PRESENT FLAG
3185  011560  053711  001170                  BIS     $TMP4,(R1)      ;ADD CDT IF RK07
3186  011564  104401  001205                  TYPE    ,$CRLF
3187  011570  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3188                                                                  ;;TYPE DR #
3189  011572  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3190  011574     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3191  011575     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3192  011576  000403                          BR      5$
3193
3194  011600  004737  025250          3$:     JSR     PC,BYP          ;TYPE BYPASS DR #
3195  011604  104001                          ERROR   1               ;WRITTEN DR # DOES NOT MATCH RKMR2 DR #
3196
3197  011606  005721                  5$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR. FLAG
3198  011610  005200                          INC     R0              ;INC DR #
3199  011612  005037  001170                  CLR     $TMP4           ;CLEAR RK07 FLAG FOR NEXT DRIVE
3200  011616  022700  000010                  CMP     #8.,R0
```

```
3201  011622  001267                          BNE     1$              ;MORE LEFT.
3202  011624  005737  005460                  TST     DRIVS
3203  011630  001065                          BNE     10$
3204  011632  104061                          ERROR   61              ;NO DRIVES SEEN
3205  011634  000000                          HALT                    ;SETUP & PRESS 'CONTINUE'
3206  011636  000137  010612                  JMP     ST5
3207
3208  011642  032737  000040  005354  2$:     BIT     #DTYE,HER
3209  011650  001405                          BEQ     13$
3210  011652  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
3211  011660  000137  011402                  JMP     1$              ;TRY AGAIN
3212  011664  032737  001000  005342  13$:    BIT     #MDS,HCS2
3213  011672  001015                          BNE     6$
3214  011674  032737  000400  005342          BIT     #UFE,HCS2
3215  011702  001015                          BNE     7$
3216  011704  032737  000001  005352          BIT     #DRA,HDS
3217  011712  001015                          BNE     8$
3218  011714  032737  010000  005342          BIT     #NED,HCS2
3219  011722  001424                          BEQ     9$
3220  011724  000730                          BR      5$
3221
3222  011726  004737  025250          6$:     JSR     PC,BYP          ;TYPE BYP DR #
3223  011732  104002                          ERROR   2               ;MDS DETECTED
3224  011734  000724                          BR      5$
3225
3226  011736  004737  025250          7$:     JSR     PC,BYP
3227  011742  104003                          ERROR   3               ;UFE DETECTED
3228  011744  000720                          BR      5$
3229
3230  011746  032737  010000  005342  8$:     BIT     #NED,HCS2
3231  011754  001676                          BEQ     4$
3232  011756  104401  037412                  TYPE    ,MSG15          ;DRV#
3233  011762  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3234                                                                  ;;TYPE DR#
3235  011764  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3236  011766     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3237  011767     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3238  011770  104010                          ERROR   10              ;DRA & NED BOTH SET
3239  011772  000705                          BR      5$
3240
3241  011774  004737  025250          9$:     JSR     PC,BYP
3242  012000  104004                          ERROR   4               ;NO DRA & NO NED = OTHER PORT SELECTED
3243  012002  000701                          BR      5$
3244  012004  000137  012402          10$:    JMP     NUDRV
3245
3246  012010                          VERIFY:
3247
3248
3249                                  ;;*************************************************************************
3250                                  ;*TEST 3        VERIFY OPERATOR DRIVE SELECTIONS
3251                                  ;*
3252                                  ;*      THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
3253                                  ;*      DEFAULTED.  EVERY DRIVE FROM 0 TO 7 IS ADDRESSED &
3254                                  ;*      CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
3255                                  ;*      PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06.
3256                                  ;*      IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
```

```
                                        ;*      ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
                                        ;*      NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
                                        ;*      NED ONLY, IT IS CHECKED AGAINT THE INPUTTED INFOR TO
                                        ;*      VERIFY IT WAS NOT SPECIFIED.
                                        ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS RK07.
                                        ;*
                                        ;;*****************************************************************************
012010  000004                  TST3:   SCOPE
012012  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
012020  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
012024  005000                          CLR     R0              ;DRIVE ADDR
012026  012701  005462                  MOV     #DRIV0,R1       ;DRIVE FLAG
012032                          1$:
012032  104415                          SCOP1
012034  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
012040  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
012046  013737  001424  005376          MOV     T10,TEMP1       ;SET TIME OUT
012054  004737  024542                  JSR     PC,FRDY         ;FIND RDY
012060  104120                          ERROR   120             ;NO RDY AFTER SCLR
012062  010065  000010                  MOV     R0,RKCS2(R5)    ;DRV ADDR
012066  012737  000001  005340          MOV     #SELDRV,HCS1
012074  053737  001170  005340          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
012102  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
012110  013737  001432  005376          MOV     T50000,TEMP1
012116  004737  025232                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
012122  013737  001424  005376          MOV     T10,TEMP1
012130  004737  024542                  JSR     PC,FRDY         ;FIND RDY
012134  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
012136  032737  100000  005340          BIT     #CERR,HCS1
012144  001036                          BNE     2$
012146  013737  005366  005376          MOV     HMR2,TEMP1
012154  042737  177770  005376          BIC     #^C<DRVMSK>,TEMP1
012162  020037  005376                  CMP     R0,TEMP1        ;S/B SAME
012166  001014                          BNE     3$
012170  005711                  11$:    TST     (R1)
012172  001402                          BEQ     4$
012174  053711  001170                  BIS     $TMP4,(R1)      ;ADD CDT IF RK07
012200  005721                  4$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR FLAG
012202  005200                          INC     R0              ;INC DR#
012204  005037  001170                  CLR     $TMP4           ;CLEAR RK07 FLAG FOR NEXT DRIVE
012210  022700  000010                  CMP     #8.,R0
012214  001306                          BNE     1$              ;MORE LEFT
012216  000475                          BR      TST4            ;;GO TO NEXT TEST
012220  004737  025250          3$:     JSR     PC,BYP          ;TRY BYPASS DRIVE#
012224  104001                          ERROR   1               ;WRITTEN DR# DOES NOT MATCH RKMR2 DR#
012226  005711                          TST     (R1)
012230  001763                          BEQ     4$              ;BRANCH IF NOT SPEC BY INPUT
012232  005337  005460          12$:    DEC     DRIVS           ;DECREMENT TOTAL DRIVS
012236  005011                          CLR     (R1)            ;CLEAR DRIVE FLAG
012240  000757                          BR      4$
012242  032737  000040  005354  2$:     BIT     #DTYE,HER
012250  001405                          BEQ     13$
012252  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
012260  000137  012032                  JMP     1$              ;TRY AGAIN
```

```
3313
3314
3315  012264  032737  001000  005342  13$:    BIT     #MDS,HCS2
3316  012272  001027                          BNE     6$
3317  012274  032737  000400  005342          BIT     #UFE,HCS2
3318  012302  001027                          BNE     7$
3319  012304  032737  000001  005352          BIT     #DRA,HDS
3320  012312  001005                          BNE     8$
3321  012314  032737  010000  005342          BIT     #NED,HCS2
3322  012322  001423                          BEQ     9$
3323  012324  000404                          BR      10$
3324  012326  032737  010000  005342  8$:     BIT     #NED,HCS2
3325  012334  001715                          BEQ     11$
3326  012336  005711                  10$:    TST     (R1)
3327  012340  001717                          BEQ     4$
3328
3329  012342  004737  025250                  JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3330  012346  104006                          ERROR   6
3331  012350  000730                          BR      12$
3332
3333  012352  004737  025250          6$:     JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3334  012356  104002                          ERROR   2               ;MDS DETECTED
3335  012360  000724                          BR      12$
3336
3337  012362  004737  025250          7$:     JSR     PC,BYP
3338  012366  104003                          ERROR   3               ;UFE DETECTED
3339  012370  000720                          BR      12$
3340
3341  012372  004737  025250          9$:     JSR     PC,BYP
3342  012376  104004                          ERROR   4               ;DRA & NED RESET - OTHER PORT SELECTED
3343  012400  000714                          BR      12$
3344
3345
3346
3347                                          ;
3348                                          ;THIS PART OF THE PROGRAM WILL BE REPEATED FOR EACH
3349                                          ;DRIVE PRESENT
3350                                          ;
3351                                          ;'$UNIT' CONTAINS THE ADDRESS OF THE DRIVE CURRENTLY
3352                                          ;UNDER TEST
3353
3354  012402  005037  001502          NUDRV:  CLR     BYPCERR         ;ENTER HERE FROM LAST TEST
3355                                                                  ;TEST CERR IN 'FRDY'
3356  012406  005037  001170                  CLR     $TMP4           ;RK07 FLAG
3357
```

```
                                ;;*****************************************************************
                                ;*TEST 4        FIND NEXT DRIVE TO BE TESTED
                                ;*
                                ;*      THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
                                ;*      ADDRESS IN '$UNIT' & $TMP4 IS SET TO CDT IF DRIVE IS RK07.
                                ;*      THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
                                ;*      THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.
                                ;*
                                ;;*****************************************************************
012412  000004                TST4:   SCOPE
012414  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
012422  012706  001100                MOV     #STACK,SP       ;RESTORE STK PTR
012426  012737  000004  001214        MOV     #$TN-1,$TESTN
012434  012737  000004  001102        MOV     #$TN-1,$TSTNM

012442  005737  005460                TST     DRIVS           ;ANY DRIVES PRESENT?
012446  001004                        BNE     4$              ;YES BRANCH
012450  104401  037772                TYPE    ,MSG27          ;ALL DRIVES TESTED
012454  000137  023734                JMP     $EOP            ;NO, GO TO END

012460  013701  001362        4$:     MOV     DRVPTR,R1       ;ADDR OF NEXT DRIVE FLAG
012464  005737  001220                TST     $DEVCT          ;IS FIRST DRIVE BEING CHECKED
012470  001402                        BEQ     2$              ;YES, BRANCH
012472  005237  001222        1$:     INC     $UNIT           ;INCR DRIVE ADDR TO NEXT DRIVE
012476  005711                2$:     TST     (R1)            ;IS DRIVE PRESENT?
012500  001002                        BNE     5$              ;BR IF YES
012502  005721                        TST     (R1)+           ;ELSE FIND NEXT DRIVE
012504  000772                        BR      1$
012506  005737  005452        5$:     TST     DDPCH           ;DDP CHAIN MODE?
012512  001405                        BEQ     3$              ;BR IF NO
012514  005737  001222                TST     $UNIT           ;ELSE SEE IF DRV 0
012520  001002                        BNE     3$              ;BR IF NO
012522  005721                        TST     (R1)+           ;ELSE FIND NEXT DRIVE PRESENT
012524  000762                        BR      1$

012526  032721  002000        3$:     BIT     #CDT,(R1)+      ;SEE IF DRIVE UNDER TEST IS RK07
012532  001403                        BEQ     6$              ;BR IF NO
012534  012737  002000  001170        MOV     #CDT,$TMP4      ;ELSE SET RK07 FLAG
012542  010137  001362        6$:     MOV     R1,DRVPTR       ;STORE POINTER TO NEXT DR FLAG
012546  104401  037412                TYPE    ,MSG15          ;"DRIVE"
012552  013700  001222                MOV     $UNIT,R0
012556  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;DRIVE #
012560  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
012562     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
012563     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS

                                ;       TYPE    ,$CRLF

012564  005737  001170                TST     $TMP4           ;SEE IF RK07 UNDER TEST
012570  001014                        BNE     7$              ;BR IF YES
012572  012737  000632  012654        MOV     #632,LC         ;ELSE LOAD RK06 PARAMETERS
012600  005037  012662                CLR     E.DDT
012604  012737  000777  012656        MOV     #777,MASK
012612  012737  160017  012660        MOV     #160017,MASK1
012620  000421                        BR      TST5            ;;GOTO NEXT TEST
```

```
 3414
 3415  012622  012737  001456  012654  7$:     MOV     #1456,LC        ;LOAD RK07 PARAMETERS
 3416  012630  012737  000400  012662          MOV     #D.DDT,E.DDT
 3417  012636  012737  001777  012656          MOV     #1777,MASK
 3418  012644  012737  140017  012660          MOV     #140017,MASK1
 3419  012652  000404                          BR      TST5            ;;GOTO NEXT TEST
 3420
 3421  012654  000000                  LC:     0                       ;LAST CYL
 3422  012656  000000                  MASK:   0
 3423  012660  000000                  MASK1:  0
 3424  012662  000000                  E.DDT:  0                       ;EXPECTED DRIVE TYPE TO E.A0
```

```
                                ;ENTER HERE FOR POWER FAIL RESTART
                                ;;*****************************************************************
                                ;*TEST 5        PRINT DRIVE SERIAL NUMBER
                                ;*
                                ;*      THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A, WORD 11
                                ;*      IN BCD & IS PERFORMED ON THE 1ST PASS ONLY
                                ;*
                                ;;*****************************************************************
                        TST5:   SCOPE
001174                          MOV     #1,$TIMES       ;;DO 1 ITERATION
                                MOV     #STACK,SP       ;RESTORE STK PTR

                                TST     $PASS
                                BNE     TST6            ;;GO TO NEXT IF NOT FIRST PASS
                                JSR     PC,SUBCLR       ;DO SUBSYS CLEAR
                                ERROR   24              ;CERR AFTER SCLR

                                TYPE    ,MSG16          ;DRIVE SERIAL NO.
000026                          MOV     #3,RKMR1(R5)    ;SELECT BYTE 3
                                JSR     PC,GSTAT        ;GET STATUS
                                MOV     HMR2,R1         ;GET SERIAL #
                                MOV     #$OCTVL,R4      ;GET ADDR CHAR BUFF
                                MOV     R4,-(SP)        ;STORE ON STACK FOR $SUPRS
                                MOV     #3,R3           ;SETUP CHAR COOUNT
                                ROL     R1              ;INITIALIZE BIT POSITIONS
                                ROL     R1
                        1$:     ROL     R1              ;GET NEXT 4 BITS
                                ROL     R1
                                ROL     R1
                                MOV     R1,R0           ;GET WORKING COPY
                                BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
                                BIS     #60,R0          ;CONVERT TO ASCII DIGIT
                                MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFF
                                DEC     R3
                                BNE     1$              ;BR IF ALL 3 CHARS NOT DONE
                                CLRB    (R4)            ;ELSE INSERT NULL TERMINATOR

                                JSR     PC,$SUPRS       ;TYPE
                        ;       TYPE    ,$CRLF
                        ;       TYPE    ,$CRLF

                                ;;*****************************************************************
                                ;*TEST 6        SET VV WITH PACK COMMAND
                                ;*
                                ;*      IF VV IS RESET, THE PACK COMMAND IS USED TO SET IT.
                                ;*
                                ;;*****************************************************************
                        TST6:   SCOPE
001174                          MOV     #1,$TIMES       ;;DO 1 ITERATION
                                MOV     #STACK,SP       ;RESTORE STK PTR

                                JSR     PC,SUBCLR
                                ERROR   24              ;CERR AFTER SCLR
```

```
                                        BIT     #D.VV,HMR2
                                        BNE     TST7            ;;GO TO NEXT TEST IF VV SET
                                        MOV     #CCLR,RKCS1(R5)
                                        MOV     $UNIT,RKCS2(R5) ;DRIVE #
                                        MOV     #PACK,HCS1
                                        JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
                                        ERROR   116             ;CONTR NOT RDY

                                        BIT     #D.VV,HMR2
                                        BNE     64$
                                        ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
                                64$:


                                ;;**********************************************************************
                                ;*TEST 7         UNLOAD DRIVE TO BE TESTED
                                ;*
                                ;*      THIS TEST UNLOADS THE DRIVE TO BE TESTED NEXT,
                                ;*      WAITS FOR ATTN & VERIFIES IT CAME FROM THE CORRECT DRIVE.
                                ;*
                                ;;**********************************************************************
                                TST7:   SCOPE
                                        MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        MOV     #STACK,SP

                                        INC     UNLD            ;USED TO CHECK FOR VALID HALT

                                        JSR     PC,SUBCLR
                                        ERROR   24              ;CERR AFTER SCLR

                                        MOV     #UNLOAD,HCS1
                                        JSR     PC,DOCMD        ;DO UNLOAD CMD & GET CONTR READY
                                        ERROR   17              ;NO RDY AFTER UNLD CMD
                                        JSR     PC,TSTATN
                                        ERROR   20              ;NO ATTN AFTER UNLOAD CMD


                                .SBTTL OPERATOR INTERVENTION TESTS

                                ;;**********************************************************************
                                ;*TEST 10        INTERLOCKS TESTS
                                ;*
                                ;*      THIS TEST VERIFIES THAT THE DOOR & CARTRIDGE STATUS BITS
                                ;*      ARE OPERATING PROPERLY IN MESSAGE A0 & THAT THE REMOVAL
                                ;*      OF THE CARTRIDGE CLEARS VOLUME VALID.
                                ;*      IT FURTHUR VERIFIES ALL REMAINING STATUS BITS OF
                                ;*      MESSAGE A & B, WORDS 0 & 1.
                                ;*      THIS TEST ALSO CHECKS THAT THE SPINDLE CANNOT BE STARTED
                                ;*      WHEN THE DOOR IS OPEN OR THE CARTRIDGE IS REMOVED.
                                ;*      IT ALSO VERIFIES THAT LOSS OF VOLUME VALID RESETS SACK WHICH
                                ;*      ASSERTS NON EXISTENT DRIVE IN RKCS2
                                ;*
                                ;;**********************************************************************
                                TST10:  SCOPE
                                        MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        MOV     #STACK,SP       ;RESET STACK PTR
```

```
3537
3538  013172  004737  026436                  JSR     PC,SUBCLR
3539  013176  104024                          ERROR   24              ;CERR AFTER SCLR
3540
3541  013200  005237  001502                  INC     BYPCERR         ;DONT DO CKCERR ROUTINE
3542
3543  013204  104401  037127                  TYPE    ,MSG8           ;INTERLOCKS TEST
3544  013210  104401  042017                  TYPE    ,MSG52          ;CONT-E TO EXIT OR SPACE TO CONTINUE
3545  013214  004737  030412                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3546  013220  000137  014020                  JMP     8$              ;RET HERE FOR CONT-E
3547
3548  013224  104401  041473                  TYPE    ,MSG47          ;VERIFY DOOR CANNOT BE OPENED
3549  013230  104401  040625                  TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
3550  013234  004737  030452                  JSR     PC,GETSP        ;GET SPACE
3551
3552  013240  104401  043464                  TYPE    ,MSG65          ;DEPRESS RUN/STOP SW TO 'STOP'
3553  013244  104401  040130                  TYPE    ,MSG30          ;OPEN DOOR & LEAVE IT OPEN
3554  013250  104401  040625                  TYPE    ,MSG37          ;DEPRESS SPACE BAR  WHEN DONE
3555  013254  004737  030452                  JSR     PC,GETSP        ;INPUT  SPACE
3556  013260  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
3557  013266  004737  026106                  JSR     PC,GSTAT
3558  013272  032737  000200  005366          BIT     #D.DOOR,HMR2
3559  013300  001401                          BEQ     1$
3560  013302  104044                          ERROR   44              ;DOOR STATUS BIT NOT CLEARED
3561
3562  013304  012737  000140  005430  1$:     MOV     #<D.DRA!D.VV>,E.A0  ;EXPECTED A0
3563  013312  005037  005432                  CLR     E.B0
3564  013316  012737  000540  005434          MOV     #<D.HDHM!D.BRHM!D.CART>,E.A1
3565  013324  012737  000001  005436          MOV     #1,E.B1
3566
3567  013332  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
3568  013336  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
3569  013340  104045                          ERROR   45              ;MSG A0 ERROR AFTER DRIVE UNLOADED & DOOR OPENED
3570  013342  104046                          ERROR   46              ;MSH B0 ERROR
3571  013344  104063                          ERROR   63              ;MSG A1 ERROR
3572  013346  104064                          ERROR   64              ;MSG B1 ERROR
3573
3574  013350  004737  026436                  JSR     PC,SUBCLR
3575  013354  104024                          ERROR   24              ;CERR AFTER SCLR
3576
3577  013356  104401  040260                  TYPE    ,MSG33          ;PRESS 'RUN-STOP' TO 'RUN'
3578  013362  104401  040345                  TYPE    ,MSG34          ;VERIFY DOES NOT START
3579  013366  104401  040625                  TYPE    ,MSG37
3580  013372  004737  030452                  JSR     PC,GETSP        ;GET SPACE FROM TTY
3581
3582  013376  004737  026106                  JSR     PC,GSTAT
3583  013402  032737  010000  005366          BIT     #D.SPIN,HMR2
3584  013410  001401                          BEQ     2$
3585  013412  104065                          ERROR   65              ;SPIN SET IN MSGA0
3586
3587  013414  012737  000140  005430  2$:     MOV     #<D.DRA!D.VV>,E.A0  ;EXPECTED MSG A0
3588  013422  005037  005432                  CLR     E.B0
3589  013426  012737  000540  005434          MOV     #<D.HDHM!D.BRHM!D.CART>,E.A1
3590  013434  012737  000001  005436          MOV     #1,E.B1
3591
3592  013442  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
```

```
3593  013446  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
3594  013450  104066                        ERROR   66              ;MSG A0 ERROR AFTER ATTEMPT TO START SPIN & DOOR OPEN
3595  013452  104067                        ERROR   67              ;MSH B0 ERROR
3596  013454  104070                        ERROR   70              ;MSG A1 ERROR
3597  013456  104071                        ERROR   71              ;MSG B1 ERROR
3598
3599  013460  004737  026436               JSR     PC,SUBCLR
3600  013464  104024                        ERROR   24              ;CERR AFTER SCLR
3601
3602  013466  104401  043464               TYPE    ,MSG65          ;DEPRESS 'RUN-STOP' SW TO STOP
3603  013472  104401  040220               TYPE    ,MSG32          ;REMOVE PACK & CLOSE DOOR
3604  013476  104401  040625               TYPE    ,MSG37
3605  013502  004737  030452               JSR     PC,GETSP        ;GET SPACE FROM TTY
3606
3607  013506  012765  000001  000026       MOV     #1,RKMR1(R5)    ;SELECT WORD 1
3608  013514  004737  026106               JSR     PC,GSTAT
3609  013520  032737  000400  005366       BIT     #D.CART,HMR2
3610  013526  001401                        BEQ     3$
3611  013530  104072                        ERROR   72              ;CARTRIDGE STATUS BIT NOT RESET
3612
3613
3614  013532  004737  026436        3$:    JSR     PC,SUBCLR
3615  013536  104024                        ERROR   24              ;CERR AFTER SCLR
3616
3617  013540  104401  040433               TYPE    ,MSG35          ;PRESS 'RUN-STOP' TO 'RUN'
3618  013544  104401  040345               TYPE    ,MSG34          ;VERIFY DOES NOT START
3619  013550  104401  040625               TYPE    ,MSG37
3620  013554  004737  030452               JSR     PC,GETSP        ;GET SPACE FROM TTY
3621
3622  013560  004737  026106               JSR     PC,GSTAT
3623  013564  032737  010000  005366       BIT     #D.SPIN,HMR2
3624  013572  001401                        BEQ     5$
3625  013574  104100                        ERROR   100             ;SPIN SET IN MSG A0
3626
3627  013576  104401  043464        5$:    TYPE    ,MSG65          ;PRESS 'RUN-STOP' TO 'STOP'
3628  013602  104401  040530               TYPE    ,MSG36          ;INSERT CARTRIDGE, SET 'RUN' SW. & CLOSE DOOR
3629  013606  104401  043724               TYPE    ,MSG70          ;VERIFY HEADS LOAD
3630  013612  104401  043647               TYPE    ,MSG69          ;DEPRESS SPACE WHEN READY GOES ON
3631  013616  004737  030452               JSR     PC,GETSP        ;GET SPACE FROM TTY
3632  013622  005037  005322               CLR     UNLD            ;FOR VALID HALT
3633
3634  013626  012765  100000  000000       MOV     #CCLR,RKCS1(R5)
3635  013634  005065  000026               CLR     RKMR1(R5)       ;SELECT WORD 0
3636  013640  004737  026106               JSR     PC,GSTAT
3637  013644  032737  000100  005366       BIT     #D.VV,HMR2
3638  013652  001401                        BEQ     7$
3639  013654  104033                        ERROR   33              ;VV NOT CLEARED AFTER PACK RE-INSERTED
3640
3641  013656  012737  050240  005430  7$:  MOV     #<D.DSC!D.SPIN!D.DRDY!D.DRA>,E.A0       ;EXPECTED A0
3642  013664  005037  005432               CLR     E.B0
3643  013670  012737  001720  005434       MOV     #<D.SPOK!D.CART!D.SSP!D.BRHM!D.DOOR>,E.A1
3644  013676  012737  000001  005436       MOV     #1,E.B1
3645
3646  013704  004737  025264               JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
3647  013710  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
3648  013712  104074                        ERROR   74              ;MSG A0 ERROR AFTER PACK REINSERTED & HEADS LOADED
```

```
3649  013714  104075                          ERROR   75              ;MSH B0 ERROR
3650  013716  104076                          ERROR   76              ;MSG A1 ERROR
3651  013720  104077                          ERROR   77              ;MSG B1 ERROR
3652
3653  013722  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3654  013730  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE #
3655  013736  012737  000003  005340          MOV     #PACK,HCS1
3656  013744  004737  024446                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
3657  013750  104116                          ERROR   116             ;CONTR NOT RDY
3658
3659  013752  032737  000100  005366          BIT     #D.VV,HMR2
3660  013760  001001                          BNE     64$
3661  013762  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
3662  013764                          64$:
3663  013764  005237  005322                  INC     UNLD            ;FOR VALID HALT
3664
3665  013770  004737  026436                  JSR     PC,SUBCLR
3666  013774  104024                          ERROR   24              ;CERR AFTER SCLR
3667
3668  013776  012737  000007  005340          MOV     #UNLOAD,HCS1
3669  014004  004737  024446                  JSR     PC,DOCMD        ;DO UNLOAD CMD & GET CONTR READY
3670  014010  104017                          ERROR   17              ;NO RDY AFTER UNLD CMD
3671  014012  004737  025024                  JSR     PC,TSTATN
3672  014016  104020                          ERROR   20              ;NO ATTN AFTER UNLOAD CMD
3673  014020                          8$:
3674
3675                                  ;;**********************************************************************
3676                                  ;*TEST 11        UNIT SELECT PLUG TEST
3677                                  ;*
3678                                  ;*      THIS TEST VERIFIES THAT WHEN THE UNIT SELECT PLUG IS PULLED
3679                                  ;*      OUT, THE QUAL LOGIC RESETS ATTN & VOLUME VALID, THAT
3680                                  ;*      THE DRIVE DE-SELECTS & NON EXISTENT DRIVE ASSERTS.
3681                                  ;*      FURTHUR, THE OPERATOR IS ASKED TO INSERT ANY NUMBER OF
3682                                  ;*      UNIT SELECT PLUGS. THE PROGRAM WILL RESPOND BY TYPING
3683                                  ;*      THE PLUG CODE NUMBER AS SOON AS IT IS INSERTED.
3684                                  ;*      THIS PORTION OF THE TEST IS TERMINATED AT ANY TIME BY A CONT-E
3685                                  ;*
3686                                  ;;**********************************************************************
3687  014020  000004                  TST11:  SCOPE
3688  014022  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3689  014030  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR
3690
3691  014034  004737  026436                  JSR     PC,SUBCLR
3692  014040  104024                          ERROR   24              ;CERR AFTER SCLR
3693
3694  014042  104401  037500                  TYPE    ,MSG18          ;UNIT SELECT PLUG TEST
3695  014046  104401  042017                  TYPE    ,MSG52          ;CONT-E TO EXIT OR SPACE TO CONTINUE
3696  014052  004737  030412                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3697  014056  000137  014652                  JMP     12$             ;RETURN HERE FOR CONT-E
3698
3699  014062  012765  000020  000026          MOV     #PAT,RKMR1(R5)  ;EVEN PARITY TO GET DSC & ATTN
3700  014070  004737  026106                  JSR     PC,GSTAT
3701  014074  032737  001000  005370          BIT     #D.PAR,HMR3     ;SEE IF PARITY SET
3702  014102  001001                          BNE     2$              ;BR IF YES
3703  014104  104114                          ERROR   114             ;PARITY BIT NOT SET AFTER SEL DRIVE CMD
3704                                                                  ;WITH EVEN PARITY ISSUED.
```

```
3705  014106  032737  040000  005366  2$:     BIT     #D.DSC,HMR2     ;SEE IF DSC SET
3706  014114  001001                          BNE     1$
3707  014116  104107                          ERROR   107             ;DSC NOT SET AFTER SEL DRV WITH EVEN PARITY
3708
3709  014120  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
3710  014126  004737  026106                  JSR     PC,GSTAT
3711  014132  004737  025024                  JSR     PC,TSTATN
3712  014136  104113                          ERROR   113             ;NO ATTN AFTER SEL DRV WITH EVEN PARITY
3713
3714  014140  104401  037153                  TYPE    ,MSG9           ;REMOVE UNIT SELECT PLUG
3715  014144  104401  040625                  TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
3716  014150  004737  030452                  JSR     PC,GETSP        ;GET SPACE
3717
3718  014154  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3719  014162  004737  026106                  JSR     PC,GSTAT
3720  014166  004737  025024                  JSR     PC,TSTATN       ;RETURN HERE FOR SPACE
3721  014172  000401                          BR      3$              ;NO ATTN
3722  014174  104111                          ERROR   111             ;REMOVING UNIT SEL PLUG, DID NOT
                                                                      ;DISABLE ATTN.
3723
3724  014176  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
3725  014204  004737  026106                  JSR     PC,GSTAT
3726  014210  032765  010000  000010          BIT     #NED,RKCS2(R5)
3727  014216  001001                          BNE     4$
3728  014220  104112                          ERROR   112             ;REMOVING UNIT SEL PLUG DID NOT
                                                                      ;ASSERT NON-EXISTENT DRIVE
3729
3730
3731  014222  104401  043532          4$:     TYPE    ,MSG67          ;DESELECT ALL OTHER PORTS
3732  014226  104401  040625                  TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
3733  014232  004737  030452                  JSR     PC,GETSP        ;GET SPACE
3734
3735  014236  104401  040671                  TYPE    ,MSG38          ;INSERT UNIT SELECT PLUGS
3736  014242  104401  041027                  TYPE    ,MSG39          ;DEPRESS CONTROL-E WHEN FINISHED
3737  014246  104401  042300                  TYPE    ,MSG55          ;EXIT WITH CORRECT UNIT SELECT PLUG #
3738  014252  013746  001222                  MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
                                                                      ;;TYPE CORRECT#
3739
3740  014256  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3741  014260     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3742  014261     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3743  014262  104401  001205                  TYPE    ,$CRLF
3744
3745  014266  105037  033414                  CLRB    $TKQSRT         ;CLEAR PREVIOUS INFO
3746  014272  005037  001160                  CLR     $TMP0
3747
3748  014276  004737  033416          5$:     JSR     PC,$TKINT
3749  014302  113737  033414  001160          MOVB    $TKQSRT,$TMP0   ;GET CHAR IF THERE
3750  014310  042737  177600  001160          BIC     #^C<177>,$TMP0  ;GET RID OF JUNK, IF ANY
3751  014316  005737  001160                  TST     $TMP0
3752  014322  001422                          BEQ     6$              ;BR IF NOTHING TYPED YET
3753  014324  023727  001160  000005          CMP     $TMP0,#5        ;SEE IF CONT-E
3754  014332  001470                          BEQ     9$              ;BR IF YES
3755  014334  023727  001160  000003          CMP     $TMP0,#3        ;SEE IF CONT-C
3756  014342  001004                          BNE     13$             ;BR IF NO
3757  014344  004737  033416                  JSR     PC,$TKINT       ;ENABLE KB INT
3758  014350  000137  030502                  JMP     STOP1           ;ELSE DO VALID HALT
3759  014354  104401  040212          13$:    TYPE    ,MSG31          ;?
3760  014360  105037  033414                  CLRB    $TKQSRT
```

```
3761  014364  004737  033416              JSR     PC,$TKINT
3762
3763  014370  005000              6$:     CLR     R0
3764  014372  012765  100000  000000  7$: MOV     #CCLR,RKCS1(R5)
3765  014400  010065  000010              MOV     R0,RKCS2(R5)    ;DRIVE NO.
3766  014404  012737  000001  005340      MOV     #SELDRV,HCS1
3767  014412  004737  024446              JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
3768  014416  104117                      ERROR   117             ;CONTR RDY NOT SET
3769
3770  014420  032765  010000  000010      BIT     #NED,RKCS2(R5)  ;SEE IF UNIT SELECT PLUG INSERTED
3771  014426  001405                      BEQ     8$              ;& IF MATCH DRIVE NO IN CS2. BR IF YES
3772  014430  005200                      INC     R0
3773  014432  020027  000010              CMP     R0,#8.          ;ALL 8 DRIVE NOS TRIED?
3774  014436  001355                      BNE     7$              ;BR IF NO
3775  014440  000716                      BR      5$              ;ELSE RETURN
3776
3777  014442  032737  000100  005366  8$: BIT     #D.VV,HMR2
3778  014450  001312                      BNE     5$              ;TYPE SAME UNIT SELECT PLUG RDY ONCE
3779  014452  012765  100000  000000      MOV     #CCLR,RKCS1(R5)
3780  014460  010065  000010              MOV     R0,RKCS2(R5)    ;DRIVE ADDR
3781  014464  012737  000003  005340      MOV     #PACK,HCS1
3782  014472  004737  024446              JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
3783  014476  104116                      ERROR   116             ;CONTR NOT RDY
3784  014500  010046                      MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3785                                                              ;;TYPE UNIT SEL PLUG NO.
3786  014502  104403                      TYPOS                   ;;GO TYPE--OCTAL ASCII
3787  014504     001                      .BYTE   1               ;;TYPE 1 DIGIT(S)
3788  014505     000                      .BYTE   0               ;;SUPPRESS LEADING ZEROS
3789  014506  104401  001205              TYPE    ,$CRLF
3790  014512  000671                      BR      5$
3791
3792  014514  004737  033416          9$: JSR     PC,$TKINT       ;ENABLE KB INT
3793  014520  012765  100000  000000      MOV     #CCLR,RKCS1(R5)
3794  014526  013765  001222  000010      MOV     $UNIT,RKCS2(R5)
3795  014534  012737  000001  005340      MOV     #SELDRV,HCS1
3796  014542  004737  024446              JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
3797  014546  104117                      ERROR   117             ;CONT NOT RDY AFTER SEL DRV CMD
3798
3799  014550  032765  010000  000010      BIT     #NED,RKCS2(R5)  ;SEE IF CORRECT PLUG FOR EXIT
3800  014556  001411                      BEQ     10$             ;BR IF YES
3801  014560  104401  042300              TYPE    ,MSG55          ;EXIT WITH CORRECT UNIT SELECT PLUG NO.
3802  014564  013746  001222              MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
3803                                                              ;;TYPE CORRECT UNIT SEL PLUG #
3804  014570  104403                      TYPOS                   ;;GO TYPE--OCTAL ASCII
3805  014572     001                      .BYTE   1               ;;TYPE 1 DIGIT(S)
3806  014573     000                      .BYTE   0               ;;SUPPRESS LEADING ZEROS
3807  014574  104401  041027              TYPE    ,MSG39          ;DEPRESS CONT-E WHEN DONE
3808  014600  000636                      BR      5$
3809
3810  014602  004737  026436         10$: JSR     PC,SUBCLR
3811  014606  104024                      ERROR   24              ;CERR AFTER SCLR
3812
3813  014610  004737  026106              JSR     PC,GSTAT
3814  014614  032737  000100  005366      BIT     #D.VV,HMR2
3815  014622  001005                      BNE     11$
3816  014624  104401  041072              TYPE    ,MSG40          ;VV NOT SET, INSERT UNIT SELECT PLUG
```

```
3817  014630  104401  041027          TYPE    ,MSG39          ;DEPRESS CONT-E TO EXIT TEST
3818  014634  000620                  BR      5$
3819
3820  014636  104401  043752  11$:    TYPE    ,MSG71          ;SELECT CORRECT PORT ON OTHER DRIVES
3821  014642  104401  040625          TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
3822  014646  004737  030452          JSR     PC,GETSP        ;GET SPACE
3823  014652                  12$:
3824
3825
3826                                  ;;*******************************************************************
3827                                  ;*TEST 12       PORT SELECTION TESTS
3828                                  ;*
3829                                  ;*      THE OPERATOR IS ASKED TO SWITCH TO THE WRONG PORT
3830                                  ;*      & THEN DESELECT BOTH PORTS.
3831                                  ;*      IN BOTH CASES, NON EXISTENT DRIVE SHOULD ASSERT IN RKCS2
3832                                  ;*
3833                                  ;;*******************************************************************
3834  014652  000004          TST12:  SCOPE
3835  014654  012737  000001  001174  MOV     #1,$TIMES       ;;DO 1 ITERATION
3836  014662  012706  001100          MOV     #STACK,SP       ;RESTORE STACK PTR
3837
3838  014666  004737  026436          JSR     PC,SUBCLR
3839  014672  104024                  ERROR   24              ;CERR AFTER SCLR
3840
3841  014674  104401  037532          TYPE    ,MSG19          ;PORT SELECTION TESTS
3842  014700  104401  042017          TYPE    ,MSG52          ;DEPRESS CONT-E TO EXIT OR SPACE BAR TO CONTINUE
3843  014704  004737  030412          JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3844  014710  000137  015070          JMP     4$              ;RETURN HERE FOR CONT-E
3845
3846  014714  104401  041204          TYPE    ,MSG41          ;SWITCH TO OTHER PORT
3847  014720  104401  040625          TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
3848  014724  004737  030452          JSR     PC,GETSP        ;GET SPACE
3849
3850  014730  004737  026106          JSR     PC,GSTAT
3851  014734  032765  010000  000010  BIT     #NED,RKCS2(R5)
3852  014742  001001                  BNE     1$
3853  014744  104122                  ERROR   122             ;NED NOT SET AFTER WRONG PORT SELECTED
3854
3855
3856  014746  104401  041264  1$:     TYPE    ,MSG42          ;SELECT CORRECT PORT
3857  014752  104401  040625          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3858  014756  004737  030452          JSR     PC,GETSP        ;GET SPACE
3859
3860  014762  004737  026436          JSR     PC,SUBCLR
3861  014766  104024                  ERROR   24              ;CERR AFTER SCLR
3862
3863  014770  032765  010000  000010  BIT     #NED,RKCS2(R5)
3864  014776  001401                  BEQ     2$
3865  015000  104130                  ERROR   130             ;NED NOT CLEARED AFTER CORRECT PORT SELECTED
3866
3867  015002  104401  041342  2$:     TYPE    ,MSG43          ;DESELECT BOTH PORTS
3868  015006  104401  040625          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3869  015012  004737  030452          JSR     PC,GETSP
3870  015016  004737  026106          JSR     PC,GSTAT
3871  015022  032765  010000  000010  BIT     #NED,RKCS2(R5)
3872  015030  001001                  BNE     3$
```

```
3873  015032  104133                          ERROR   133             ;NED NOT SET AFTER BOTH PORTS DESELECTED
3874
3875
3876  015034  104401  041372          3$:     TYPE    ,MSG44          ;SELECT CORRECT PORT
3877  015040  104401  040625                  TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3878  015044  004737  030452                  JSR     PC,GETSP
3879
3880  015050  004737  026436                  JSR     PC,SUBCLR
3881  015054  104024                          ERROR   24              ;CERR AFTER SCLR
3882
3883  015056  032765  010000  000010          BIT     #NED,RKCS2(R5)
3884  015064  001421                          BEQ     TST13           ;;GOTO NEXT TEST
3885  015066  104130                          ERROR   130             ;NED NOT CLEARED AFTER CORRECT PORT SELECTED
3886
3887  015070  012765  100000  000000  4$:     MOV     #CCLR,RKCS1(R5)
3888  015076  004737  026106                  JSR     PC,GSTAT
3889  015102  032765  010000  000010          BIT     #NED,RKCS2(R5)
3890  015110  001407                          BEQ     TST13           ;;GOTO NEXT TEST
3891  015112  104401  041422                  TYPE    ,MSG45          ;CORRECT PORT NOT SELECTED, TRY AGAIN
3892  015116  104401  040625                  TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3893  015122  004737  030452                  JSR     PC,GETSP
3894  015126  000760                          BR      4$
3895
3896
3897                                  ;;**********************************************************************
3898                                  ;*TEST 13       AC LOW DETECTION  PART 1
3899                                  ;*
3900                                  ;*      A PRELIMINARY AC LOW TEST IS PERFORMED HERE WHILE HEADS ARE UNLOADED.
3901                                  ;*      BATTERY RETRACT WILL BE TESTED LATER.
3902                                  ;*      ACLO CANNOT BE TESTED DIRECTLY SINCE IT REQUIRES SECTOR PULSES
3903                                  ;*      I.E. HEADS LOADED.
3904                                  ;*      THEREFORE THE INDICATOR CHECKED IS NON-EXISTENT DRIVE (NED)
3905                                  ;*      ASSERTING IN RKCS2 AS A RESULT OF DCLO.
3906                                  ;*      AFTER POWER UP, VOLUME VALID IS CHECKED TO BE CLEARED.
3907                                  ;*
3908                                  ;;**********************************************************************
3909  015130  000004                  TST13:  SCOPE
3910  015132  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3911  015140  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3912
3913  015144  004737  026436                  JSR     PC,SUBCLR
3914  015150  104024                          ERROR   24              ;CERR AFTER SCLR
3915
3916  015152  104401  037563                  TYPE    ,MSG21          ;AC LOW TEST
3917  015156  104401  042017                  TYPE    ,MSG52          ;CONT-E TO BYPASS TEST
3918                                                                  ;OR SPACE TO CONTINUE
3919  015162  004737  030412                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3920  015166  000137  015442                  JMP     10$             ;RETURN HERE IF CONT-E
3921  015172  104401  041553                  TYPE    ,MSG49          ;TURN OFF AC(RET HERE IF SPACE)
3922
3923  015176  005037  005400                  CLR     TEMP2
3924  015202  012737  177777  005376  12$:     MOV     #-1,TEMP1       ;SETUP TIMEOUT
3925  015210  004737  026106          1$:     JSR     PC,GSTAT
3926  015214  032737  100000  005340          BIT     #CERR,HCS1
3927  015222  001012                          BNE     3$
3928  015224  005337  005376                  DEC     TEMP1
```

```
3929  015230  001367                          BNE     1$
3930  015232  005237  005400                  INC     TEMP2
3931  015236  023727  005400  000002          CMP     TEMP2,#2        ;SEE IF GONE THRU 2 TIMES
3932  015244  001356                          BNE     12$             ;BR IF NO
3933  015246  104146                          ERROR   146             ;CERR NOT DETECTED BEFORE TIMEOUT
3934  015250  013737  001432  005376  3$:     MOV     T50000,TEMP1
3935  015256  012765  100000  000000  4$:     MOV     #CCLR,RKCS1(R5)
3936  015264  004737  026106                  JSR     PC,GSTAT
3937  015270  032765  010000  000010          BIT     #NED,RKCS2(R5)
3938  015276  001004                          BNE     5$
3939  015300  005337  005376                  DEC     TEMP1
3940  015304  001364                          BNE     4$
3941  015306  104150                          ERROR   150             ;NED NOT SET BEFORE TIMEOUT
3942
3943  015310  104401  041626          5$:     TYPE    ,MSG50          ;SWITCH AC BACK ON
3944  015314  104401  043724                  TYPE    ,MSG70          ;VERIFY HEADS LOAD
3945  015320  104401  043647                  TYPE    ,MSG69          ;PRESS SPACE AFTER READY ON
3946  015324  004737  030452                  JSR     PC,GETSP        ;GET SPACE
3947
3948  015330  004737  026436                  JSR     PC,SUBCLR
3949  015334  104024                          ERROR   24              ;CERR AFTER SCLR
3950
3951  015336  032737  000200  005366          BIT     #D.DRDY,HMR2    ;SEE IF LOADED
3952  015344  001001                          BNE     6$              ;BR IN YES
3953  015346  104141                          ERROR   141             ;DRV NOT RDY AFTER AC UP
3954
3955  015350  005037  005322          6$:     CLR     UNLD            ;FOR VALID HALT
3956  015354  032737  000100  005370          BIT     #D.ACLO,HMR3
3957  015362  001401                          BEQ     7$
3958  015364  104152                          ERROR   152             ;ACLO NOT RESET AFTER POWER UP
3959
3960  015366  032737  000100  005366  7$:     BIT     #D.VV,HMR2
3961  015374  001401                          BEQ     8$
3962  015376  104153                          ERROR   153             ;VV NOT RESET AFTER POWER UP
3963
3964  015400                          8$:
3965  015400  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3966  015406  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE #
3967  015414  012737  000003  005340          MOV     #PACK,HCS1
3968  015422  004737  024446                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
3969  015426  104116                          ERROR   116             ;CONTR NOT RDY
3970
3971  015430  032737  000100  005366          BIT     #D.VV,HMR2
3972  015436  001001                          BNE     64$
3973  015440  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
3974  015442                          64$:
3975  015442                          10$:
3976
3977                                  ;;*******************************************************************
3978                                  ;*TEST 14       CHECK NXF LOGIC
3979                                  ;*
3980                                  ;*      THIS TEST VERIFIES NON-EXECUTABLE FUNCTION (NXF) IS DETECTED
3981                                  ;*      AS A RESULT OF DOING A SEEK WITH VOLUME VALID RESET.
3982                                  ;*
3983                                  ;;*******************************************************************
3984  015442  000004                  TST14:  SCOPE
```

```
3985  015444  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3986  015452  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR
3987
3988  015456  004737  026436                  JSR     PC,SUBCLR
3989  015462  104024                          ERROR   24              ;CERR AFTER SCLR
3990
3991  015464  032737  010000  005366          BIT     #D.SPIN,HMR2    ;SEE IF SPINDLE ALREADY ON
3992  015472  001020                          BNE     64$             ;BR IF YES
3993  015474  104401  040064                  TYPE    ,MSG29          ;PLEASE WAIT, HEADS BEING LOADED
3994
3995  015500  012737  000011  005340          MOV     #SRTSPL,HCS1
3996  015506  004737  024446                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
3997  015512  104143                          ERROR   143             ;CONTR RDY NOT SET AFTER CMD
3998
3999  015514  013737  001426  005400          MOV     T100,TEMP2
4000  015522  004737  025056                  JSR     PC,FATT1        ;FIND ATTN
4001  015526  104144                          ERROR   144             ;NO ATTN AFTER CMD
4002
4003  015530  005037  005322                  CLR     UNLD
4004  015534                          64$:
4005  015534  005037  005322                  CLR     UNLD            ;FOR VALID HALT
4006
4007  015540  004737  026436                  JSR     PC,SUBCLR
4008  015544  104024                          ERROR   24              ;CERR AFTER SCLR
4009
4010  015546  104401  037624                  TYPE    ,MSG22          ;NXF TEST
4011  015552  104401  042017                  TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
4012  015556  004737  030412                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
4013  015562  000137  016070                  JMP     7$              ;RETURN HERE FOR CONT-E
4014
4015  015566  104401  041676                  TYPE    ,MSG51          ;REMOVE UNIT SELECT PLUG TO CLEAR VV
4016  015572  104401  040625                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4017  015576  004737  030452                  JSR     PC,GETSP        ;GET SPACE
4018
4019  015602  004737  026106                  JSR     PC,GSTAT
4020  015606  032737  000100  005366          BIT     #D.VV,HMR2
4021  015614  001403                          BEQ     1$
4022  015616  104177                          ERROR   177             ;VV NOT CLEARED AFTER UNIT SEL PLUG
4023  015620  000137  016070                  JMP     7$              ;EXIT TEST
4024
4025  015624  032737  000100  005366  1$:     BIT     #D.VV,HMR2
4026  015632  001406                          BEQ     2$
4027  015634  104155                          ERROR   155             ;VV SET AFTER HEADS LOADED
4028  015636  000137  016070                  JMP     7$              ;EXIT TEST
4029
4030  015642  004737  026436                  JSR     PC,SUBCLR
4031  015646  104024                          ERROR   24              ;CERR AFTER SCLR
4032
4033  015650  012765  000001  000020  2$:     MOV     #1,RKDC(R5)
4034  015656  012737  000017  005340          MOV     #SEEK,HCS1
4035  015664  004737  024446                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
4036  015670  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
4037
4038  015672  013737  001432  005376          MOV     T50000,TEMP1
4039  015700  004737  025152                  JSR     PC,FATT2        ;FIND ATTN
4040  015704  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
```

```
 4041
 4042  015706  032737  000400  005370          BIT     #D.NXF,HMR3
 4043  015714  001003                          BNE     3$
 4044  015716  104156                          ERROR   156             ;NXF NOT SET AFTER SEEK WITH VV=0
 4045  015720  000137  016070                  JMP     7$              ;EXIT TEST
 4046
 4047  015724  032737  000200  005370  3$:     BIT     #D.FLT,HMR3
 4048  015732  001003                          BNE     4$
 4049  015734  104172                          ERROR   172             ;NXF DID NOT SET FAULT
 4050  015736  000137  016070                  JMP     7$              ;EXIT TEST
 4051
 4052  015742  012737  050240  005430  4$:     MOV     #<D.DSC!D.SPIN!D.DRDY!D.DRA>,E.A0  ;EXPECTED A0
 4053  015750  012737  000600  005432          MOV     #<D.NXF!D.FLT>,E.B0
 4054  015756  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
 4055  015764  012737  000001  005436          MOV     #1,E.B1
 4056
 4057  015772  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4058  015776  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4059  016000  104160                          ERROR   160             ;MSG A0 ERROR AFTER SEEK WITH VV=0
 4060  016002  104161                          ERROR   161             ;MSH B0 ERROR
 4061  016004  104162                          ERROR   162             ;MSG A1 ERROR
 4062  016006  104163                          ERROR   163             ;MSG B1 ERROR
 4063  016010  005737  001400                  TST     CYLADD
 4064  016014  001401                          BEQ     5$
 4065  016016  104157                          ERROR   157             ;HEADS MOVED WITH SEEK & DXF
 4066
 4067  016020  004737  026436          5$:     JSR     PC,SUBCLR
 4068  016024  104024                          ERROR   24              ;CERR AFTER SCLR
 4069
 4070  016026  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 4071  016034  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE #
 4072  016042  012737  000003  005340          MOV     #PACK,HCS1
 4073  016050  004737  024446                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
 4074  016054  104116                          ERROR   116             ;CONTR NOT RDY
 4075
 4076  016056  032737  000100  005366          BIT     #D.VV,HMR2
 4077  016064  001001                          BNE     65$
 4078  016066  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
 4079  016070                          65$:
 4080  016070                          7$:
 4081
 4082                                  ;;*******************************************************************
 4083                                  ;*TEST 15       READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
 4084                                  ;*
 4085                                  ;*      THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
 4086                                  ;*      THIS AREA CONTAINS BAD SECTOR INFOR WHICH IS WRITTEN BY THE
 4087                                  ;*      FACTORY DURING MANF.  ALL BAD SECTOR INFOR (BSE) WILL BE STORED
 4088                                  ;*      AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
 4089                                  ;*
 4090                                  ;*      SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED BAD SEC
 4091                                  ;*      SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE DETECTED
 4092                                  ;*
 4093                                  ;*      IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
 4094                                  ;*      IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
 4095                                  ;*      A MESSAGE WILL BE TYPED INDICATING THAT ALL
 4096                                  ;*      FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
```

```
                                        ;*      THIS IS DONE SO AS NOT TO DESTROY BSE INFOR OR AN ALIGNMENT PACK BY WRITING
                                        ;*
                                        ;*      THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
                                        ;*
                                        ;;*****************************************************************************
016070  000004                        TST15:  SCOPE
016072  012737  000001  001174                MOV     #1,$TIMES       ;;DO 1 ITERATION
016100  012706  001100                        MOV     #STACK,SP       ;RESTORE STK PTR
016104  004737  026436                        JSR     PC,SUBCLR
016110  104024                        ;       ERROR   24              ;CERR AFTER SCLR
016112  005037  005400                        CLR     TEMP2           ;SECTOR CTR
016116  005037  005402                        CLR     TEMP3           ;0=22 SECTOR HARDWARE DETECTED TABLE
                                                                      ;1=22 SECTOR SOFTWARE DETECTED TABLE
                                                                      ;2=DONE
016122  012737  002322  005404                MOV     #BSE22H,TEMP4   ;STORE 22 SECTOR HARDWARE BSE ADDR.
016130  013765  005404  000004                MOV     TEMP4,RKBA(R5)
016136  012737  001000  005406                MOV     #1000,TEMP5     ;TRACK 2, SECTOR 0
016144  013765  005406  000006                MOV     TEMP5,RKDA(R5)
016152  013765  012654  000020  1$:           MOV     LC,RKDC(R5)     ;LAST CYL
016160  012765  177400  000002                MOV     #-256.,RKWC(R5) ;LOAD WORD CT
016166  012737  000021  005340                MOV     #RDDATA,HCS1
016174  004737  024504                        JSR     PC,DATCMD       ;DO READ DATA CMD & GET CONTR RDY
016200  104226                        ;       ERROR   226             ;NO RDY AFTER READ DATA CMD
016202  004737  026106                        JSR     PC,GSTAT        ;GET FRESH DATA
016206  032737  100000  005340                BIT     #CERR,HCS1
016214  001470                                BEQ     8$
016216  104227                        ;       ERROR   227             ;CERR AFTER READ DATA CMD
016220  012737  010340  005430                MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
016226  005037  005432                        CLR     E.B0            ;EXPECTED MSG B0
016232  012737  001720  005434                MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
016240  012737  000001  005436                MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
016246  005037  005440                        CLR     E.A2            ;EXPECTED MSG A2
016252  012737  000002  005442                MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
016260  012737  000003  005446                MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
016266  004737  025264                        JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
016272  000000                        ;       .WORD   0!0!0           ;& MSGS SPECIFIED HERE
016274  104054                        ;       ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
016276  104026                        ;       ERROR   26              ;MSH B0 ERROR
016300  104056                        ;       ERROR   56              ;MSG A1 ERROR
016302  104030                        ;       ERROR   30              ;MSG B1 ERROR
016304  004737  026436                        JSR     PC,SUBCLR
016310  104024                        ;       ERROR   24              ;CERR AFTER SUBCLR
016312  005237  005400                        INC     TEMP2
016316  023727  005400  000005                CMP     TEMP2,#5        ;READ ALL 5 SECTORS?
016324  001007                                BNE     5$
016326  005737  005402                        TST     TEMP3
016332  001002                                BNE     2$
016334  104165                        ;       ERROR   165             ;CANT READ SECTORS 0,2,4,6,8
016336  000414                                BR      3$
016340  104167                        2$:     ERROR   167             ;CANT READ SECTORS 10,12,14,16,18,20
016342  000412                                BR      3$
```

```
4153  016344  013765  005404  000004  5$:     MOV     TEMP4,RKBA(R5)  ;RESTORE TABLE ADDR
4154  016352  062737  000002  005406          ADD     #2,TEMP5        ;SETUP TO READ 2 SECTORS FROM LAST
4155  016360  013765  005406  000006          MOV     TEMP5,RKDA(R5)
4156  016366  000671                          BR      1$
4157
4158  016370  005237  001474          3$:     INC     BSERR           ;SET BSE FLAG
4159  016374  000501                          BR      TST16           ;;GO TO NEXT TEST
4160  016376  005737  002330          8$:     TST     BSE22H+6        ;TEST CARTRIDGE TYPE
4161  016402  001405                          BEQ     9$              ;BRANCH IF DATA CARTRIDGE
4162  016404  104401  042360                  TYPE    ,MSG56          ;ALIGNMENT CARTRIDGE USED
4163  016410  005237  001474                  INC     BSERR           ;SET BSE ERROR FLAG
4164  016414  000426                          BR      10$
4165
4166  016416  005237  005402          9$:     INC     TEMP3
4167  016422  023727  005402  000001          CMP     TEMP3,#1
4168  016430  001020                          BNE     10$
4169  016432  005037  005400                  CLR     TEMP2
4170  016436  012737  003322  005404          MOV     #BSE22S,TEMP4   ;STORE 22 SECTOR SOFTWARE BSE ADDR
4171  016444  013765  005404  000004          MOV     TEMP4,RKBA(R5)
4172  016452  012737  001012  005406          MOV     #1012,TEMP5     ;TRACK 2, SECTOR 12
4173  016460  013765  005406  000006          MOV     TEMP5,RKDA(R5)
4174  016466  000137  016152                  JMP     1$              ;REPEAT
4175
4176  016472  005737  001216          10$:    TST     $PASS
4177
4178
4179  016476  001014                          BNE     13$             ;TYPE CART # ONLY ON 1'ST PASS
4180  016500  104401  037450                  TYPE    ,MSG17          ;CART SERIAL #
4181  016504  012746  002322                  MOV     #BSE22H,-(SP)
4182  016510  004737  035030                  JSR     PC,$DB2O        ;CONVERT DBL BINARY WORD TO OCTAL
4183  016514  004737  035400                  JSR     PC,$SUPRS       ;TYPE SERIAL #
4184  016520  104401  001205                  TYPE    ,$CRLF
4185  016524  104401  001205                  TYPE    ,$CRLF
4186
4187  016530  004737  026436          13$:    JSR     PC,SUBCLR
4188  016534  104024                          ERROR   24              ;CERR AFTER SCLR
4189                                                                  ;RETURN TO CYL 0
4190
4191  016536  012737  000017  005340          MOV     #SEEK,HCS1
4192  016544  004737  024446                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
4193  016550  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
4194
4195  016552  013737  001432  005376          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4196  016560  004737  025152                  JSR     PC,FATT2        ;FIND ATTN
4197  016564  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
4198
4199  016566  032737  100000  005340          BIT     #CERR,HCS1
4200  016574  001401                          BEQ     64$
4201  016576  104210                          ERROR   210             ;CERR AFTER SEEK CMD
4202
4203  016600                          64$:
4204
4205
4206                                  ;;*****************************************************************
4207                                  ;*TEST 16       WRITE LOCK TEST
4208                                  ;*
```

```
                                        ;*      THIS TEST VERIFIES THAT DATA WRITTEN ON A SECTOR CANNOT BE
                                        ;*      ALTERED ONCE THE WRITE LOCK SWITCH HAS BEEN ENABLED.
                                        ;*      IT ALSO CHECKS THAT WRITE PROTECT TAKES EFFECT ONLY AT
                                        ;*      SECTOR BOUNDRIES WHEN DOING CONTINUOUS WRITING ON CYL 0, HEAD 0
                                        ;*
                                        ;;*****************************************************************************
016600  000004                TST16:  SCOPE
016602  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
016610  012706  001100                MOV     #STACK,SP       ;RESTORE STACK PTR
016614  005737  001474                TST     BSERR           ;SEE IF ALIGN CART
016620  001402                        BEQ     15$             ;BR IF NO
016622  000137  021450                JMP     12$             ;ELSE EXIT TEST

016626  004737  026436        15$:    JSR     PC,SUBCLR
016632  104024                        ERROR   24              ;CERR AFTER SCLR

016634  104401  037705                TYPE    ,MSG24          ;WRITE LOCK TEST
016640  104401  042017                TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
016644  004737  030412                JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
016650  000137  021450                JMP     12$             ;RETURN HERE IF CONT-E

016654  004737  026106                JSR     PC,GSTAT
016660  032737  004000  005366        BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS ON
016666  001416                        BEQ     2$              ;BR IF NO
016670  104401  042120        1$:     TYPE    ,MSG53          ;DISABLE WRITE LOCK
016674  104401  040625                TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
016700  004737  030452                JSR     PC,GETSP        ;GET SPACE

016704  004737  026106                JSR     PC,GSTAT
016710  032737  004000  005366        BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS OFF
016716  001402                        BEQ     2$
016720  104110                        ERROR   110             ;WRITE LOCK NOT DISABLED
016722  000762                        BR      1$

016724  005037  001366        2$:     CLR     TOCYL           ;SETUP
016730  005037  001402                CLR     CALADD          ;FOR
016734  005037  001442                CLR     HEAD            ;FILL HEADER TABLE
016740  005037  001450                CLR     FORMAT          ;ROUTINE

016744  004737  027420        16$:    JSR     PC,FHDTAB       ;BUILD STD 22 SECTOR HEADER TABLE

016750  012765  001506  000004        MOV     #HDTAB,RKBA(R5)
016756  012765  177676  000002        MOV     #-66.,RKWC(R5)
016764  000337  001442                SWAB    HEAD
016770  013765  001442  000006        MOV     HEAD,RKDA(R5)   ;HEAD ADDR
016776  000337  001442                SWAB    HEAD


017002  012737  000027  005340        MOV     #<WRHEAD>,HCS1
017010  004737  024504                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
017014  104200                        ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
017016  004737  026106                JSR     PC,GSTAT        ;GET FRESH STATUS
017022  032737  100000  005340        BIT     #CERR,HCS1
017030  001401                        BEQ     64$
017032  104201                        ERROR   201             ;CERR AFTER WRITE HEADER CMD
017034                          64$:
```

```
                                                INC     HEAD
                                                CMP     HEAD,#3         ;SEE IF ALL HEADS DONE
                                                BNE     16$             ;BR IF NO

                                                JSR     PC,SUBCLR
                                                ERROR   24              ;CERR AFTER SCLR

                                                CLR     SECTOR
                                        14$:    MOV     SECTOR,RKDA(R5)

                                                MOV     #DATA0,RKBA(R5) ;WRITE ALL 0'S
                                                BIS     #BAI,RKCS2(R5)
                                                MOV     #-256.,RKWC(R5) ;CYL 0, TRK 0, SECTOR 0

                                                MOV     #<WRDATA>,HCS1
                                                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
                                                ERROR   11              ;NO RDY AFTER WRITE DATA CMD
                                                JSR     PC,GSTAT        ;GET FRESH STATUS
                                                BIT     #CERR,HCS1
                                                BEQ     68$             ;BR IF NO ERRORS

                                                BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
                                                BEQ     66$             ;BR IF NO
                                                JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
                                                BR      67$             ;RETURN HERE IF NO

                                                INC     SECTOR          ;RETURN HERE IF YES
                                                CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
                                                BNE     65$             ;BR IF NO
                                                ERROR   40              ;ABORTING TEST DETECTED 10 BAD SECTORS
                                                JMP     12$             ;BYPASS TEST

                                        65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
                                                JMP     14$

                                        66$:    ERROR   12              ;CERR WITH WRITE DATA CMD

                                                MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
                                                CLR     E.B0            ;EXPECTED MSG B0
                                                MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
                                                MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
                                                CLR     E.A2            ;EXPECTED MSG A2
                                                MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
                                                MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3

                                                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
                                                .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
                                                ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
                                                ERROR   23              ;MSH B0 ERROR
                                                ERROR   53              ;MSG A1 ERROR
                                                ERROR   25              ;MSG B1 ERROR
                                                TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
                                                JMP     $EOP

                                        67$:    ERROR   47              ;BAD SECTOR NOT LISTED IN TABLE
```

```
4321  017314                          68$:
4322
4323  017314  004737  026436                JSR     PC,SUBCLR
4324  017320  104024                        ERROR   24              ;CERR AFTER SCLR
4325
4326  017322  012765  001456  000004        MOV     #DATA0,RKBA(R5)
4327  017330  052765  000020  000010        BIS     #BAI,RKCS2(R5)
4328  017336  012765  177400  000002        MOV     #-256.,RKWC(R5)
4329  017344  013737  001456  001436        MOV     DATA0,WD2       ;EXPECTED WORD FOR TRUERR TYPEOUT
4330  017352  013765  001422  000006        MOV     SECTOR,RKDA(R5)
4331
4332  017360  012737  000031  005340        MOV     #<WRTCHK>,HCS1
4333  017366  004737  024504                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4334  017372  104015                        ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4335  017374  004737  026106                JSR     PC,GSTAT        ;GET FRESH STATUS
4336  017400  032737  100000  005340        BIT     #CERR,HCS1
4337  017406  001450                        BEQ     70$
4338  017410  032737  040000  005342        BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4339  017416  001405                        BEQ     69$
4340  017420  016537  000024  001434        MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4341  017426  104016                        ERROR   16              ;WCE AFTER WRITE CMD
4342  017430  000437                        BR      70$
4343
4344  017432  104022                69$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4345
4346  017434  012737  010340  005430        MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4347  017442  005037  005432                CLR     E.B0            ;EXPECTED MSG B0
4348  017446  012737  001720  005434        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4349  017454  012737  000001  005436        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4350  017462  005037  005440                CLR     E.A2            ;EXPECTED MSG A2
4351  017466  012737  000002  005442        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4352  017474  012737  000003  005446        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4353
4354  017502  004737  025264                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4355  017506  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4356  017510  104057                        ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4357  017512  104031                        ERROR   31              ;MSH B0 ERROR
4358  017514  104060                        ERROR   60              ;MSG A1 ERROR
4359  017516  104032                        ERROR   32              ;MSG B1 ERROR
4360  017520  104401  044035                TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4361  017524  000137  023374                JMP     ENDRV
4362
4363  017530                          70$:
4364
4365  017530  004737  026436        3$:     JSR     PC,SUBCLR
4366  017534  104024                        ERROR   24              ;CERR AFTER SCLR
4367
4368  017536  104401  042211                TYPE    ,MSG54          ;ENABLE WRITE LOCK
4369  017542  104401  040625                TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4370  017546  004737  030452                JSR     PC,GETSP        ;GET SPACE
4371
4372  017552  012765  100000  000000        MOV     #CCLR,RKCS1(R5)
4373  017560  004737  026106                JSR     PC,GSTAT
4374  017564  032737  004000  005366        BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS ON
4375  017572  001002                        BNE     4$
4376  017574  104115                        ERROR   115             ;WRITE LOCK NOT ENABLED
```

```
4377  017576  000754                          BR      3$
4378
4379  017600  012765  001462  000004  4$:     MOV     #DATA1,RKBA(R5) ;ATTEMPT TO WRITE ALL 1'S WITH WRITE LOCK SET
4380  017606  052765  000020  000010          BIS     #BAI,RKCS2(R5)
4381  017614  012765  177400  000002          MOV     #-256.,RKWC(R5)  ; CYLINDER 0, HEAD 0
4382  017622  013765  001422  000006          MOV     SECTOR,RKDA(R5)
4383  017630  012737  000023  005340          MOV     #WRDATA,HCS1
4384  017636  004737  024504                  JSR     PC,DATCMD       ;DO WRITE DATA CMD & GET CONTR RDY
4385  017642  104116                          ERROR   116             ;CONTR NOT RDY
4386
4387  017644  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
4388  017650  032737  100000  005340          BIT     #CERR,HCS1
4389  017656  001001                          BNE     17$
4390  017660  104207                          ERROR   207             ;CERR NOT SET AFTER WRITE WITH WRL SET
4391  017662  032737  004000  005370  17$:    BIT     #D.WLE,HMR3     ;CHECK WRITE LOCK ERROR SET
4392  017670  001001                          BNE     5$              ;BR IF SET
4393  017672  104121                          ERROR   121             ;WRITE LOCK ERROR NOT SET
4394                                                                  ;AFTER WRITE DATA WITH WRITE LOCK SET
4395  017674  012737  054340  005430  5$:     MOV     #<D.DSC!D.SPIN!D.WRL!D.DRDY!D.VV!D.DRA>,E.A0  ;EXP A0
4396  017702  012737  004200  005432          MOV     #<D.WLE!D.FLT>,E.B0
4397  017710  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4398  017716  012737  000001  005436          MOV     #1,E.B1
4399
4400  017724  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4401  017730  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4402  017732  104123                          ERROR   123             ;MSG A0 ERROR AFTER WRITE WITH WRITE LOCK SET
4403  017734  104125                          ERROR   125             ;MSH B0 ERROR
4404  017736  104126                          ERROR   126             ;MSG A1 ERROR
4405  017740  104127                          ERROR   127             ;MSG B1 ERROR
4406
4407  017742  004737  026436                  JSR     PC,SUBCLR
4408  017746  104024                          ERROR   24              ;CERR AFTER SCLR
4409
4410  017750  012765  001456  000004          MOV     #DATA0,RKBA(R5) ;CHECK THAT NONE OF ORIG DATA
4411  017756  052765  000020  000010          BIS     #BAI,RKCS2(R5)  ;HAS CHANGED
4412  017764  012765  177400  000002          MOV     #-256.,RKWC(R5)  ;AS RESULT OF WRITE WITH WRITE LOCK SET
4413  017772  013737  001456  001436          MOV     DATA0,WD2       ;EXPECTED WORD FOR TRUERR TYPEOUT
4414  020000  013765  001422  000006          MOV     SECTOR,RKDA(R5)
4415
4416  020006  012737  000031  005340          MOV     #<WRTCHK>,HCS1
4417  020014  004737  024504                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4418  020020  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4419  020022  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
4420  020026  032737  100000  005340          BIT     #CERR,HCS1
4421  020034  001450                          BEQ     72$
4422  020036  032737  040000  005342          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4423  020044  001405                          BEQ     71$
4424  020046  016537  000024  001434          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4425  020054  104016                          ERROR   16              ;WCE AFTER WRITE CMD
4426  020056  000437                          BR      72$
4427
4428  020060  104022                  71$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4429
4430  020062  012737  010340  005430          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4431  020070  005037  005432                  CLR     E.B0            ;EXPECTED MSG B0
4432  020074  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
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4433  020102  012737  000001  005436          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4434  020110  005037  005440                  CLR     E.A2            ;EXPECTED MSG A2
4435  020114  012737  000002  005442          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4436  020122  012737  000003  005446          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4437
4438  020130  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4439  020134  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4440  020136  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4441  020140  104031                          ERROR   31              ;MSH B0 ERROR
4442  020142  104060                          ERROR   60              ;MSG A1 ERROR
4443  020144  104032                          ERROR   32              ;MSG B1 ERROR
4444  020146  104401  044035                  TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4445  020152  000137  023374                  JMP     ENDRV
4446
4447  020156                          72$:
4448
4449  020156  004737  026436          6$:     JSR     PC,SUBCLR
4450  020162  104024                          ERROR   24              ;CERR AFTER SCLR
4451
4452  020164  104401  042120                  TYPE    ,MSG53          ;DISABLE WRITE LOCK
4453  020170  104401  040625                  TYPE    ,MSG37          ;SPACE BAR WHEN DONE
4454  020174  004737  030452                  JSR     PC,GETSP        ;GET SPACE
4455  020200  004737  026106                  JSR     PC,GSTAT
4456  020204  032737  004000  005366          BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK OFF
4457  020212  001361                          BNE     6$
4458                                          ;TEST FOR WRITE LOCK AT SECTOR BOUNDRIES
4459                                          ;FOR CONTINUOUS WRITING ON CYL 0, TRACK 0,1,2
4460  020214  104401  042211                  TYPE    ,MSG54          ;SET WRITE LOCK
4461  020220  013737  001430  001160          MOV     T5000,$TMP0
4462  020226  005037  001162                  CLR     $TMP1           ;BIT0=0:WRITE 0'S; BIT0=1;WRITE 1'S
4463  020232  005037  001366                  CLR     TOCYL
4464
4465  020236  004737  026436          7$:     JSR     PC,SUBCLR
4466  020242  104024                          ERROR   24              ;CERR AFTER SCLR
4467
4468  020244  032737  000001  001162          BIT     #BIT0,$TMP1
4469  020252  001004                          BNE     8$              ;BR IF WRITING 1'S
4470  020254  012765  001456  000004          MOV     #DATA0,RKBA(R5) ;SETUP ALL 0'S
4471  020262  000403                          BR      9$
4472
4473  020264  012765  001462  000004  8$:     MOV     #DATA1,RKBA(R5) ;SETUP ALL 1'S
4474  020272  052765  000020  000010  9$:     BIS     #BAI,RKCS2(R5)
4475  020300  012765  140400  000002          MOV     #-63.*256.,RKWC(R5)     ;WRITE TRACK 0,1,2  63 SECTORS
4476  020306  005065  000006                  CLR     RKDA(R5)        ;BEGIN AT TRACK AND SEC 0
4477  020312  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4478  020320  012737  000023  005340          MOV     #WRDATA,HCS1
4479  020326  004737  024504                  JSR     PC,DATCMD       ;DO WRITE DATA CMD & GET CONTR RDY
4480  020332  104011                          ERROR   11              ;CONTR NOT RDY
4481
4482  020334  032737  100000  005340          BIT     #CERR,HCS1
4483  020342  001017                          BNE     13$
4484  020344  005337  001160                  DEC     $TMP0
4485  020350  001011                          BNE     10$
4486  020352  104204                          ERROR   204             ;CERR NOT SET BY TIMEOUT
4487  020354  104401  042120                  TYPE    ,MSG53          ;DISABLE WRITE LOCK
4488  020360  104401  040625                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
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4489  020364  004737  030452                JSR     PC,GETSP        ;INPUT SPACE
4490  020370  000137  021450                JMP     12$             ;EXIT TEST
4491
4492  020374  005237  001162        10$:    INC     $TMP1
4493  020400  000716                        BR      7$              ;GO WRITE OPPOSITE DATA
4494  020402  032737  000200  005354  13$:  BIT     #BSE,HER        ;SEE IF BAD SECTOR
4495  020410  001411                        BEQ     21$             ;BR IF NO
4496  020412  005237  001366                INC     TOCYL           ;ELSE TRY ANOTHER CYL
4497  020416  023727  001366  000012        CMP     TOCYL,#10.      ;SEE IF 10 CONSEC CYL BAD
4498  020424  001304                        BNE     7$              ;BR IF NO & DO AGAIN
4499  020426  104062                        ERROR   62              ;10 BAD CONSEC CYLINDERS
4500  020430  000137  021450                JMP     12$             ;EXIT TEST
4501
4502  020434  032737  004000  005370  21$:  BIT     #D.WLE,HMR3
4503  020442  001001                        BNE     11$
4504  020444  104205                        ERROR   205             ;NO WRL BY TIMEOUT
4505
4506  020446  104401  042120        11$:    TYPE    ,MSG53          ;DISABLE WRITE LOCK
4507  020452  104401  040625                TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
4508  020456  004737  030452                JSR     PC,GETSP
4509
4510  020462  013737  005350  001164        MOV     HDA,$TMP2       ;STORE RKDA OF ERROR
4511  020470  013737  005350  001166        MOV     HDA,$TMP3       ;STORE FOR ERROR TYPEOUT
4512
4513  020476  023727  001164  000001        CMP     $TMP2,#1        ;SEE IF WRL ON TRK 0, SEC 1
4514  020504  001003                        BNE     22$             ;BR IF NO
4515  020506  104401  044233                TYPE    ,MSG100         ;ELSE WRL OCCURRED ON TRK 2,  SEC 21
4516  020512  000621                        BR      6$              ;& NO NEW DATA XFER TOOK PLACE
4517
4518  020514  005737  001164        22$:    TST     $TMP2           ;SEE IF WRL ON TRK 0, SEC 0
4519  020520  001004                        BNE     23$             ;BR IN NO
4520  020522  104401  044233                TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 20
4521  020526  000137  020156                JMP     6$              ;& NO NEW DATA XFER TOOK PLACE
4522
4523  020532  023727  001164  001025  23$:  CMP     $TMP2,#1025     ;SEE IF WRL ON TRK 2, SEC 21
4524  020540  001004                        BNE     24$             ;BE IF NO
4525  020542  104401  044233                TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 19
4526  020546  000137  020156                JMP     6$              ;& NO NEW DATA XFER TOOK PLACE
4527
4528  020552  023727  001164  001024  24$:  CMP     $TMP2,#1024     ;SEE IF WRL ON TRK 2, SEC 20
4529  020560  001004                        BNE     25$             ;BR IF NO
4530  020562  104401  044233                TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 18
4531  020566  000137  020156                JMP     6$              ;& NO OLD DATA TO CHECK AGAINST
4532
4533  020572  023727  001164  000400  25$:  CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SEC 0
4534  020600  001004                        BNE     18$             ;BR IF NO
4535  020602  012765  000025  000006        MOV     #21.,RKDA(R5)   ;ELSE SECTOR AT WRL IS TRK 0, SEC 21
4536  020610  000415                        BR      20$
4537
4538  020612  023727  001164  001000  18$:  CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2, SEC 0
4539  020620  001004                        BNE     19$             ;BR IF NO
4540  020622  012765  000425  000006        MOV     #425,RKDA(R5)   ;ELSE SECTOR AT WRL IS TRK 1, SEC 21
4541  020630  000405                        BR      20$
4542
4543  020632  005337  001164        19$:    DEC     $TMP2           ;GET SECTOR AT WRL
4544  020636  013765  001164  000006        MOV     $TMP2,RKDA(R5)
```

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 4545
 4546  020644  016537  000006  001166  20$:    MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
 4547
 4548
 4549
 4550  020652  004737  026436                  JSR     PC,SUBCLR
 4551  020656  104024                          ERROR   24              ;CERR AFTER SCLR
 4552
 4553  020660  005737  001164                  TST     $TMP2           ;SEE IF TRK/SECTOR 0
 4554  020664  001414                          BEQ     80$             ;REPEAT,NO NEW DATA XFER TOOK PLACE
 4555  020666  023727  001164  001023          CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
 4556  020674  001410                          BEQ     80$             ;REPEAT,NO OLD DATA TO CHECK AGAINST
 4557  020676  032737  000001  001162          BIT     #BIT0,$TMP1
 4558  020704  001006                          BNE     73$             ;BR IF WRITING 1'S WHEN WLE OCCURRED
 4559  020706  012765  001462  000004          MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
 4560  020714  000405                          BR      74$
 4561
 4562  020716  000137  020156          80$:    JMP     6$
 4563
 4564  020722  012765  001456  000004  73$:    MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
 4565  020730  052765  000020  000010  74$:    BIS     #BAI,RKCS2(R5)
 4566  020736  012765  177400  000002          MOV     #-256.,RKWC(R5)
 4567  020744  013765  001166  000006          MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
 4568  020752  017537  000004  001436          MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
 4569  020760  013765  001366  000020          MOV     TOCYL,RKDC(R5)
 4570
 4571  020766  012737  000031  005340          MOV     #<WRTCHK>,HCS1
 4572  020774  004737  024504                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
 4573  021000  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
 4574  021002  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
 4575  021006  032737  100000  005340          BIT     #CERR,HCS1
 4576  021014  001450                          BEQ     82$
 4577  021016  032737  040000  005342          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
 4578  021024  001405                          BEQ     81$
 4579  021026  016537  000024  001434          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
 4580  021034  104134                          ERROR   134             ;WCE AFTER WRITE CMD
 4581  021036  000437                          BR      82$
 4582
 4583  021040  104022                  81$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
 4584
 4585  021042  012737  010340  005430          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4586  021050  005037  005432                  CLR     E.B0            ;EXPECTED MSG B0
 4587  021054  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4588  021062  012737  000001  005436          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4589  021070  005037  005440                  CLR     E.A2            ;EXPECTED MSG A2
 4590  021074  012737  000002  005442          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4591  021102  012737  000003  005446          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4592
 4593  021110  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4594  021114  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4595  021116  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
 4596  021120  104031                          ERROR   31              ;MSH B0 ERROR
 4597  021122  104060                          ERROR   60              ;MSG A1 ERROR
 4598  021124  104032                          ERROR   32              ;MSG B1 ERROR
 4599  021126  104401  044035                  TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
 4600  021132  000137  023374                  JMP     ENDRV
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 4601
 4602  021136                          82$:
 4603  021136  000240                          NOP
 4604  021140  000240                          NOP
 4605
 4606  021142  023727  001164  000400          CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SECTOR 0
 4607  021150  001004                          BNE     75$             ;BR IF NO
 4608  021152  012765  000025  000006          MOV     #21.,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
 4609  021160  000415                          BR      77$
 4610  021162  023727  001164  001000  75$:    CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2,SECTOR 0
 4611  021170  001004                          BNE     76$             ;BR IF NO
 4612  021172  012765  000425  000006          MOV     #425,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
 4613  021200  000405                          BR      77$
 4614
 4615  021202  005337  001164          76$:    DEC     $TMP2           ;GET SECTOR BEFORE WRL
 4616  021206  013765  001164  000006          MOV     $TMP2,RKDA(R5)
 4617  021214  016537  000006  001166  77$:    MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
 4618  021222  032737  000001  001162          BIT     #BIT0,$TMP1
 4619  021230  001004                          BNE     78$             ;BR IF WRITING 1'S WHEN WLE OCCURRED
 4620  021232  012765  001456  000004          MOV     #DATA0,RKBA(R5) ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
 4621  021240  000403                          BR      79$
 4622
 4623  021242  012765  001462  000004  78$:    MOV     #DATA1,RKBA(R5) ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
 4624  021250  052765  000020  000010  79$:    BIS     #BA1,RKCS2(R5)
 4625  021256  012765  177400  000002          MOV     #-256.,RKWC(R5)
 4626  021264  017537  000004  001436          MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
 4627  021272  013765  001366  000020          MOV     TOCYL,RKDC(R5)
 4628
 4629  021300  012737  000031  005340          MOV     #<WRTCHK>,HCS1
 4630  021306  004737  024504                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
 4631  021312  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
 4632  021314  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
 4633  021320  032737  100000  005340          BIT     #CERR,HCS1
 4634  021326  001450                          BEQ     84$
 4635  021330  032737  040000  005342          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
 4636  021336  001405                          BEQ     83$
 4637  021340  016537  000024  001434          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
 4638  021346  104135                          ERROR   135             ;WCE AFTER WRITE CMD
 4639  021350  000437                          BR      84$
 4640
 4641  021352  104022                  83$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
 4642
 4643  021354  012737  010340  005430          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4644  021362  005037  005432                  CLR     E.B0            ;EXPECTED MSG B0
 4645  021366  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4646  021374  012737  000001  005436          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4647  021402  005037  005440                  CLR     E.A2            ;EXPECTED MSG A2
 4648  021406  012737  000002  005442          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4649  021414  012737  000003  005446          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4650
 4651  021422  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4652  021426  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4653  021430  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
 4654  021432  104031                          ERROR   31              ;MSH B0 ERROR
 4655  021434  104060                          ERROR   60              ;MSG A1 ERROR
 4656  021436  104032                          ERROR   32              ;MSG B1 ERROR
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 4657  021440  104401  044035                TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
 4658  021444  000137  023374                JMP     ENDRV
 4659
 4660  021450                            84$:
 4661
 4662  021450                            12$:
 4663
 4664                                    ;;*************************************************************************
 4665                                    ;*TEST 17       AC LOW DETECTION PART 2
 4666                                    ;*
 4667                                    ;*      THIS TEST VERIFIES THAT WHEN AC POWER IS LOST, THAT WRITING CEASES
 4668                                    ;*      AT SECTOR BOUNDRIES & THAT THE BATTERY RETRACT IS FUNCTIONAL.
 4669                                    ;*      THERE IS APPROX 4 MS BETWEEN AC LOW ASSERTING AND NED ASSERTING
 4670                                    ;*      WHEN THE INTERFACE SHUTS DOWN.
 4671                                    ;*
 4672                                    ;*************************************************************************
 4673  021450  000004                   TST17:  SCOPE
 4674  021452  012737  000001  001174            MOV     #1,$TIMES       ;;DO 1 ITERATION
 4675  021460  012706  001100                    MOV     #STACK,SP       ;RESTORE STK PTR
 4676
 4677  021464  004737  026436                    JSR     PC,SUBCLR
 4678  021470  104024                            ERROR   24              ;CERR AFTER SCLR
 4679
 4680  021472  104401  037731                    TYPE    ,MSG26          ;AC LOW-PART 2
 4681  021476  104401  042017                    TYPE    ,MSG52          ;CONT-E TO BYPASS TEST
 4682                                                                    ;OR SPACE TO CONINUE
 4683  021502  004737  030412                    JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
 4684  021506  000137  023374                    JMP     12$             ;RETURN HERE FOR CONT-E
 4685                                                                    ;RETURN HERE FOR SPACE
 4686  021512  005737  001474                    TST     BSERR           ;TEST FOR ALIGN CARTRIDGE
 4687  021516  001402                            BEQ     1$              ;BR IF NOT ALIGN CART.
 4688  021520  000137  022142                    JMP     2$
 4689
 4690  021524  004737  026106            1$:     JSR     PC,GSTAT
 4691  021530  032737  004000  005366            BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK
 4692  021536  001417                            BEQ     11$             ;BR IF NO
 4693
 4694  021540  104401  042120                    TYPE    ,MSG53          ;DISABLE WRITE LOCK
 4695  021544  104401  040625                    TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
 4696  021550  004737  030452                    JSR     PC,GETSP        ;GET SPACE
 4697
 4698  021554  004737  026106                    JSR     PC,GSTAT
 4699  021560  032737  004000  005366            BIT     #D.WRL,HMR2     ;SEE IF STILL WRITE LOCK
 4700  021566  001403                            BEQ     11$             ;BR IF NO
 4701  021570  104110                            ERROR   110             ;WRITE LOCK NOT DISABLED
 4702  021572  000137  023374                    JMP     12$             ;EXIT TEST
 4703
 4704  021576  005037  001366            11$:    CLR     TOCYL           ;SETUP
 4705  021602  005037  001402                    CLR     CALADD          ;FOR
 4706  021606  005037  001442                    CLR     HEAD            ;FILL HEADER TABLE
 4707  021612  005037  001450                    CLR     FORMAT          ;ROUTINE
 4708
 4709  021616  004737  027420            13$:    JSR     PC,FHDTAB       ;BUILD STD 22 SECTOR HEADER TABLE
 4710
 4711  021622  012765  001506  000004            MOV     #HDTAB,RKBA(R5)
 4712  021630  012765  177676  000002            MOV     #-66.,RKWC(R5)
```

```
4713  021636  000337  001442                  SWAB    HEAD
4714  021642  013765  001442  000006          MOV     HEAD,RKDA(R5)   ;HEAD ADDR
4715  021650  000337  001442                  SWAB    HEAD
4716
4717  021654  012737  000027  005340          MOV     #<WRHEAD>,HCS1
4718  021662  004737  024504                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4719  021666  104200                          ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4720  021670  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
4721  021674  032737  100000  005340          BIT     #CERR,HCS1
4722  021702  001401                          BEQ     64$
4723  021704  104201                          ERROR   201             ;CERR AFTER WRITE HEADER CMD
4724  021706                          64$:
4725
4726  021706  005237  001442                  INC     HEAD
4727  021712  023727  001442  000003          CMP     HEAD,#3         ;SEE IF ALL HEADS DONE
4728  021720  001336                          BNE     13$             ;BR IF NO
4729  021722  005037  001366                  CLR     TOCYL
4730
4731  021726  004737  026436          16$:    JSR     PC,SUBCLR
4732  021732  104024                          ERROR   24              ;CERR AFTER SCLR
4733
4734  021734  012765  001462  000004          MOV     #DATA1,RKBA(R5) ;RETURN HERE FOR SPACE
4735  021742  052765  000020  000010          BIS     #BAI,RKCS2(R5)  ;WRITE INITIAL BACKGROUND OF 1'S
4736  021750  012765  137000  000002          MOV     #-66.*256.,RKWC(R5)     ;TRACK 0,1,2  ALL SECTORS
4737  021756  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4738  021764  012737  000023  005340          MOV     #WRDATA,HCS1
4739  021772  004737  024504                  JSR     PC,DATCMD       ;DO WRITE DATA CMD & GET CONTR RDY
4740  021776  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
4741  022000  004737  026106                  JSR     PC,GSTAT        ;GET FRESH STATUS
4742  022004  032737  100000  005340          BIT     #CERR,HCS1
4743  022012  001453                          BEQ     2$
4744  022014  032737  000200  005354          BIT     #BSE,HER        ;SEE IF BAD SECTOR
4745  022022  001034                          BNE     17$
4746
4747  022024  012737  010340  005430          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4748  022032  005037  005432                  CLR     E.B0            ;EXPECTED MSG B0
4749  022036  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4750  022044  012737  000001  005436          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4751  022052  005037  005440                  CLR     E.A2            ;EXPECTED MSG A2
4752  022056  012737  000002  005442          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4753  022064  012737  000003  005446          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4754
4755  022072  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4756  022076  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4757  022100  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4758  022102  104023                          ERROR   23              ;MSH B0 ERROR
4759  022104  104053                          ERROR   53              ;MSG A1 ERROR
4760  022106  104025                          ERROR   25              ;MSG B1 ERROR
4761  022110  000137  023374                  JMP     12$
4762
4763  022114  005237  001366          17$:    INC     TOCYL
4764  022120  023727  001366  000012          CMP     TOCYL,#10.      ;TRIED 10 CYLINDERS?
4765  022126  001003                          BNE     18$             ;BR IF NO
4766  022130  104062                          ERROR   62              ;CANNOT WRITE ON 10 CONSEC CYL
4767  022132  000137  023374                  JMP     12$
4768
```

```
4769  022136  000137  021726          18$:    JMP     16$
4770
4771  022142  004737  026436          2$:     JSR     PC,SUBCLR
4772  022146  104024                          ERROR   24              ;CERR AFTER SCLR
4773
4774  022150  104401  041553                  TYPE    ,MSG49          ;TURN OFF AC
4775  022154  104401  042564                  TYPE    ,MSG57          ;VERIFY BATTERY RETRACT FUNCTIONAL
4776
4777  022160  005737  001474                  TST     BSERR           ;SEE IF ALIGN CART USED
4778  022164  001405                          BEQ     15$             ;BR IF NO
4779  022166  104401  040625                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4780  022172  004737  030452                  JSR     PC,GETSP        ;GET SPACE
4781  022176  000523                          BR      8$              ;SKIP ALL WRITING
4782
4783  022200  013737  001432  001160  15$:    MOV     T50000,$TMP0
4784  022206  005037  001162                  CLR     $TMP1           ;BIT0=0;WRITE 0'S; BIT0=1:WRITE 1'S
4785
4786  022212  004737  026436          4$:     JSR     PC,SUBCLR
4787  022216  104024                          ERROR   24              ;CERR AFTER SCLR
4788
4789  022220  032737  000001  001162          BIT     #BIT0,$TMP1
4790  022226  001004                          BNE     5$              ;BR IF WRITING 1'S
4791  022230  012765  001456  000004          MOV     #DATA0,RKBA(R5) ;SETUP ALL 0'S
4792  022236  000403                          BR      6$
4793
4794  022240  012765  001462  000004  5$:     MOV     #DATA1,RKBA(R5) ;SETUP ALL 1'S
4795  022246  052765  000020  000010  6$:     BIS     #BAI,RKCS2(R5)
4796  022254  012765  140400  000002          MOV     #-63.*256.,RKWC(R5)     ;TRACK 0,1,2  63 SECTORS
4797  022262  005065  000006                  CLR     RKDA(R5)        ;BEGIN AT TRK AND SECTOR 0
4798  022266  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4799  022274  012737  000023  005340          MOV     #WRDATA,HCS1
4800  022302  004737  024504                  JSR     PC,DATCMD       ;DO WRITE DATA CMD & GET CONTR RDY
4801  022306  104011                          ERROR   11              ;CONTR NOT RDY
4802
4803  022310  004737  026106                  JSR     PC,GSTAT
4804  022314  032737  100000  005340          BIT     #CERR,HCS1
4805  022322  001017                          BNE     3$
4806  022324  005337  001160                  DEC     $TMP0
4807  022330  001011                          BNE     7$
4808  022332  104146                          ERROR   146             ;CERR NOT SET BY TIMEOUT
4809  022334  104401  041626                  TYPE    ,MSG50          ;TURN AC BACK ON
4810  022340  104401  043647                  TYPE    ,MSG69          ;DEPRESS SPACE AFTER 'READY' LIGHT ON
4811  022344  004737  030452                  JSR     PC,GETSP        ;GET SPACE
4812  022350  000137  023374                  JMP     12$             ;EXIT TEST
4813
4814  022354  005237  001162          7$:     INC     $TMP1
4815  022360  000714                          BR      4$              ;GO WRITE OPPOSITE DATA
4816
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4817  022362  032737  000100  005370  3$:     BIT     #D.ACLO,HMR3
4818  022370  001001                          BNE     10$
4819  022372  104147                          ERROR   147             ;AC LOW NOT SET
4820
4821  022374  005237  005322          10$:    INC     UNLD            ;FOR VALID HALT
4822  022400  012737  070140  005430          MOV     #<D.DSC!D.PIP!D.SPIN!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4823  022406  012737  010300  005432          MOV     #<D.SPLS!D.ACLO!D.FLT>,E.B0
4824  022414  012737  044720  005434          MOV     #<D.UNLD!D.REV!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4825  022422  012737  000001  005436          MOV     #1,E.B1
4826
4827  022430  004737  025264                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4828  022434  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4829  022436  104035                          ERROR   35              ;MSG A0 ERROR AFTER AC SWITCH OFF FROM HEADS LOADED
4830  022440  104203                          ERROR   203             ;MSH B0 ERROR
4831  022442  104036                          ERROR   36              ;MSG A1 ERROR
4832  022444  104037                          ERROR   37              ;MSG B1 ERROR
4833
4834  022446  013737  005350  001164  8$:     MOV     HDA,$TMP2       ;SAVE RKDA
4835  022454  013737  005350  001166          MOV     HDA,$TMP3       ;SAVE FOR TYPEOUT
4836
4837  022462  104401  041626                  TYPE    ,MSG50          ;TURN AC BACK ON
4838  022466  104401  043647                  TYPE    ,MSG69          ;DEPRESS SPACE AFTER 'READY' LIGHT ON
4839  022472  004737  030452                  JSR     PC,GETSP        ;GET SPACE
4840
4841  022476  004737  026436                  JSR     PC,SUBCLR
4842  022502  104024                          ERROR   24              ;CERR AFTER SCLR
4843
4844  022504  032737  000100  005370          BIT     #D.ACLO,HMR3
4845  022512  001401                          BEQ     9$
4846  022514  104152                          ERROR   152             ;ACLO NOT RESET AFTER POWER UP
4847
4848  022516  005037  005322          9$:     CLR     UNLD            ;FOR VALID HALT
4849  022522  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4850  022530  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE #
4851  022536  012737  000003  005340          MOV     #PACK,HCS1
4852  022544  004737  024446                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
4853  022550  104116                          ERROR   116             ;CONTR NOT RDY
4854
4855  022552  032737  000100  005366          BIT     #D.VV,HMR2
4856  022560  001001                          BNE     65$
4857  022562  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
4858  022564                          65$:
4859  022564  005737  001474                  TST     BSERR           ;SEE IF ALIGN CART USED
4860  022570  001402                          BEQ     14$             ;BR IF NO
4861  022572  000137  023374                  JMP     12$             ;ELSE EXIT TEST
4862
4863  022576                          14$:
4864
4865  022576  004737  026436                  JSR     PC,SUBCLR
4866  022602  104024                          ERROR   24              ;CERR AFTER SCLR
4867
4868  022604  005737  001164                  TST     $TMP2           ;SEE IF TRK/SECTOR 0
4869  022610  001414                          BEQ     73$             ;REPEAT,NO NEW DATA XFER TOOK PLACE
4870  022612  023727  001164  001023          CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
4871  022620  001410                          BEQ     73$             ;REPEAT,NO OLD DATA TO CHECK AGAINST
4872  022622  032737  000001  001162          BIT     #BIT0,$TMP1
```

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 4873  022630  001006                        BNE     66$                     ;BR IF WRITING 1'S WHEN WLE OCCURRED
 4874  022632  012765  001462  000004        MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
 4875  022640  000405                        BR      67$
 4876
 4877  022642  000137  022142        73$:    JMP     2$
 4878
 4879  022646  012765  001456  000004 66$:    MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
 4880  022654  052765  000020  000010 67$:    BIS     #BAI,RKCS2(R5)
 4881  022662  012765  177400  000002        MOV     #-256.,RKWC(R5)
 4882  022670  013765  001166  000006        MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
 4883  022676  017537  000004  001436        MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
 4884  022704  013765  001366  000020        MOV     TOCYL,RKDC(R5)
 4885
 4886  022712  012737  000031  005340        MOV     #<WRTCHK>,HCS1
 4887  022720  004737  024504                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
 4888  022724  104015                        ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
 4889  022726  004737  026106                JSR     PC,GSTAT        ;GET FRESH STATUS
 4890  022732  032737  100000  005340        BIT     #CERR,HCS1
 4891  022740  001450                        BEQ     75$
 4892  022742  032737  040000  005342        BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
 4893  022750  001405                        BEQ     74$
 4894  022752  016537  000024  001434        MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
 4895  022760  104136                        ERROR   136             ;WCE AFTER WRITE CMD
 4896  022762  000437                        BR      75$
 4897
 4898  022764  104022                74$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
 4899
 4900  022766  012737  010340  005430        MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4901  022774  005037  005432                CLR     E.B0            ;EXPECTED MSG B0
 4902  023000  012737  001720  005434        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4903  023006  012737  000001  005436        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4904  023014  005037  005440                CLR     E.A2            ;EXPECTED MSG A2
 4905  023020  012737  000002  005442        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4906  023026  012737  000003  005446        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4907
 4908  023034  004737  025264                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4909  023040  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4910  023042  104057                        ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
 4911  023044  104031                        ERROR   31              ;MSH B0 ERROR
 4912  023046  104060                        ERROR   60              ;MSG A1 ERROR
 4913  023050  104032                        ERROR   32              ;MSG B1 ERROR
 4914  023052  104401  044035                TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
 4915  023056  000137  023374                JMP     ENDRV
 4916
 4917  023062                        75$:
 4918  023062  000240                        NOP
 4919  023064  000240                        NOP
 4920
 4921  023066  023727  001164  000400        CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SECTOR 0
 4922  023074  001004                        BNE     68$             ;BR IF NO
 4923  023076  012765  000025  000006        MOV     #21.,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
 4924  023104  000415                        BR      70$
 4925  023106  023727  001164  001000 68$:    CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2,SECTOR 0
 4926  023114  001004                        BNE     69$             ;BR IF NO
 4927  023116  012765  000425  000006        MOV     #425,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
 4928  023124  000405                        BR      70$
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 4929
 4930  023126  005337  001164          69$:    DEC     $TMP2                   ;GET SECTOR BEFORE WRL
 4931  023132  013765  001164  000006          MOV     $TMP2,RKDA(R5)
 4932  023140  016537  000006  001166  70$:    MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
 4933  023146  032737  000001  001162          BIT     #BIT0,$TMP1
 4934  023154  001004                          BNE     71$                     ;BR IF WRITING 1'S WHEN WLE OCCURRED
 4935  023156  012765  001456  000004          MOV     #DATA0,RKBA(R5) ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
 4936  023164  000403                          BR      72$
 4937
 4938  023166  012765  001462  000004  71$:    MOV     #DATA1,RKBA(R5) ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
 4939  023174  052765  000020  000010  72$:    BIS     #BAI,RKCS2(R5)
 4940  023202  012765  177400  000002          MOV     #-256.,RKWC(R5)
 4941  023210  017537  000004  001436          MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
 4942  023216  013765  001366  000020          MOV     TOCYL,RKDC(R5)
 4943
 4944  023224  012737  000031  005340          MOV     #<WRTCHK>,HCS1
 4945  023232  004737  024504                  JSR     PC,DATCMD               ;DO DATA X FOR CMD & GET CONTR RDY
 4946  023236  104015                          ERROR   15                      ;NO RDY AFTER WRITE CHECK CMD
 4947  023240  004737  026106                  JSR     PC,GSTAT                ;GET FRESH STATUS
 4948  023244  032737  100000  005340          BIT     #CERR,HCS1
 4949  023252  001450                          BEQ     77$
 4950  023254  032737  040000  005342          BIT     #WCE,HCS2               ;SEE IF WRITE CHECK ERROR
 4951  023262  001405                          BEQ     76$
 4952  023264  016537  000024  001434          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
 4953  023272  104137                          ERROR   137                     ;WCE AFTER WRITE CMD
 4954  023274  000437                          BR      77$
 4955
 4956  023276  104022                  76$:    ERROR   22                      ;CERR AFTER WRITE CHECK CMD
 4957
 4958  023300  012737  010340  005430          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4959  023306  005037  005432                  CLR     E.B0                    ;EXPECTED MSG B0
 4960  023312  012737  001720  005434          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4961  023320  012737  000001  005436          MOV     #1,E.B1                 ;MSG ID FOR EXPECTED MSG B1
 4962  023326  005037  005440                  CLR     E.A2                    ;EXPECTED MSG A2
 4963  023332  012737  000002  005442          MOV     #2,E.B2                 ;MSG ID FOR EXPECTED MSG B2
 4964  023340  012737  000003  005446          MOV     #3,E.B3                 ;MSG ID FOR EXPECTED MSG B3
 4965
 4966  023346  004737  025264                  JSR     PC,CHKMSG               ;CHECK MSGS A0, B0, A1, B1
 4967  023352  000003                          .WORD   T.A2!T.B2!0                     ;& MSGS SPECIFIED HERE
 4968  023354  104057                          ERROR   57                      ;MSG A0 ERROR AFTER WRITE CHECK CMD
 4969  023356  104031                          ERROR   31                      ;MSH B0 ERROR
 4970  023360  104060                          ERROR   60                      ;MSG A1 ERROR
 4971  023362  104032                          ERROR   32                      ;MSG B1 ERROR
 4972  023364  104401  044035                  TYPE    ,MSG72                  ;ABORTING BALANCE OF TESTS
 4973  023370  000137  023374                  JMP     ENDRV
 4974
 4975  023374                          77$:
 4976
 4977  023374                          12$:
 4978
 4979  023374                          ENDRV:
 4980
 4981                                  ;;*****************************************************************************
 4982                                  ;*TEST 20        END OF PROGRAM
 4983                                  ;*
 4984                                  ;*      THIS IS NOT A TEST BUT A LINKAGE TO PERFORM ALL THE
```

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                                        ;*      ABOVE TESTS FOR THE NEXT DRIVE PRESENT.
                                        ;*      THE NEXT TEST IS ENTERED ONLY AFTER ALL DRIVES PRESENT
                                        ;*      HAVE BEEN TESTED.
                                        ;*      DO NOT LOOP ON THIS 'TEST'.
                                        ;*
                                        ;;*****************************************************************
023374  000004                  TST20:  SCOPE
023376  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
023404  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
                                        INC     $DEVCT          ;INCR COUNT FOR # OF DRIVES THAT ARE CHECKED
023414  023737  005460  001220          CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
023422  001402                          BEQ     TST21           ;;GO TO NEXT TEST IF YES
023424  000137  012402                  JMP     NUDRV           ;IF NOT, GO BACK & TEST NEXT DRIVE PRESENT.

                                        ;;*****************************************************************
                                        ;*TEST 21       MULTIPLE DRIVE DETECTION TEST
                                        ;*
                                        ;*      THIS TEST IS PERFORMED ONLY ONCE AT THE END OF PASS 1
                                        ;*      AND IS BYPASSED IF ONLY ONE DRIVE IS PRESENT.
                                        ;*
                                        ;*      THE MULTIPLE DRIVE DETECTION LOGIC IS TESTED BY THE FOLLOWING METHOD:
                                        ;*
                                        ;*              A. HEADS MUST BE LOADED (SECTOR PULSES REQ'D)
                                        ;*              B. THE OPERATOR IS INSTRUCTED TO INSERT THE SAME UNIT SELECT
                                        ;*                 PLUG NUMBER (1 PAIR AT A TIME) ON ANY 2 DRIVES
                                        ;*                 TO BE TESTED
                                        ;*              C. THE OPERATOR THEN DEPRESSES THE SPACE BAR TO CONTINUE THE TEST
                                        ;*                 OR A CONT-E TO EXIT THE TEST
                                        ;*
                                        ;*      THE PROGRAM VERIFIES THAT MULTIPLE DRIVE SELECT & DRIVE UNSAFE
                                        ;*      BOTH SET & THAT THE DRIVE UNLOADS
                                        ;*
                                        ;*      THE OPERATOR IS ASKED TO VERIFY THAT HEADS UNLOAD FROM BOTH DRIVES
                                        ;*
                                        ;;*****************************************************************
023430  000004                  TST21:  SCOPE
023432  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
023440  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR

023444  005737  001216                  TST     $PASS
023450  001402                          BEQ     1$              ;DO TEST ONLY IN 1ST PASS
023452  000137  023722                  JMP     11$             ;ELSE EXIT TEST

023456  023727  005460  000001  1$:     CMP     DRIVS,#1
023464  001004                          BNE     2$              ;BR IF MORE THAN 1 DRIVE PRESENT
023466  104401  043175                  TYPE    ,MSG62          ;BYPASS TEST, ONLY 1 DRIVE PRESENT
023472  000137  023722                  JMP     11$             ;ELSE EXIT TEST

023476  104401  040022          2$:     TYPE    ,MSG28          ;MULT DRV DETECTION TEST
023502  104401  042017                  TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
023506  004737  030412                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
023512  000137  023722                  JMP     11$             ;RETURN HERE FOR CONT-E

023516  104401  042632                  TYPE    ,MSG58          ;LOAD HEADS ON ALL DRIVES
023522  104401  040625                  TYPE    ,MSG37          ;PRESS SPACE WHEN SONE
```

```
5041  023526  004737  030452          JSR     PC,GETSP        ;GET SPACE
5042
5043  023532  004737  026436  3$:     JSR     PC,SUBCLR
5044  023536  104024                  ERROR   24              ;CERR AFTER SCLR
5045
5046  023540  104401  042714          TYPE    ,MSG59          ;INSERT SAME UNIT SEL PLUG # IN 2 DRIVES
5047  023544  104401  040625          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
5048  023550  004737  030452          JSR     PC,GETSP        ;GET SPACE
5049
5050  023554  005000                  CLR     R0              ;DRIVE # COUNTER
5051
5052  023556  012765  100000  000000  6$:     MOV     #CCLR,RKCS1(R5)
5053  023564  010065  000010          MOV     R0,RKCS2(R5)    ;DRIVE #
5054  023570  012737  000001  005340          MOV     #SELDRV,HCS1
5055  023576  053737  001170  005340          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
5056  023604  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
5057  023612  013737  001432  005376          MOV     T50000,TEMP1
5058  023620  004737  025232                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
5059
5060  023624  032765  001000  000010          BIT     #MDS,RKCS2(R5)  ;SEE IF THAT DRIVE HAS MDS
5061  023632  001006                          BNE     7$              ;BR IF YES
5062  023634  005200                          INC     R0              ;ELSE TRY ANOTHER DRIVE
5063  023636  020027  000010                  CMP     R0,#8.          ;SEE IF ALL DRIVES TESTED
5064  023642  001345                          BNE     6$              ;BR IF NO
5065  023644  104176                          ERROR   176             ;CANNOT FIND MDS
5066  023646  000411                          BR      10$             ;TRY AGAIN
5067
5068  023650  104401  043127  7$:     TYPE    ,MSG61          ;MULT DRIVES FOUND ON DRIVE #
5069  023654  010046                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
5070                                                          ;;TYPE UNIT NO
5071  023656  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
5072  023660     001                  .BYTE   1               ;;TYPE 1 DIGIT(S)
5073  023661     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
5074  023662  104401  043607          TYPE    ,MSG68          ;VERIFY BOTH DRIVES UNLOADED
5075  023666  005237  005322          INC     UNLD            ;FOR VALID HALT
5076  023672  104401  043017  10$:     TYPE    ,MSG60          ;INSERT CORRECT UNIT SEL PLUG & LOAD HEADS
5077  023676  104401  043271          TYPE    ,MSG63          ;DEPRESS CONT-E OR SPACE BAR WHEN DONE
5078  023702  004737  030412          JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
5079  023706  000137  023722          JMP     11$             ;RETURN HERE FOR CONTROL-E (EXIT)
5080  023712  005037  005322          CLR     UNLD            ;RETURN HERE FOR SPACE (DO AGAIN)
5081  023716  000137  023532          JMP     3$
5082  023722  005037  005322  11$:     CLR     UNLD
5083
5084  023726  004737  026436          JSR     PC,SUBCLR
5085  023732  104024                  ERROR   24              ;CERR AFTER SCLR
```

```
                                .SBTTL  END OF PASS ROUTINE

                                ;;*********************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO ST5XY

023734                          $EOP:
023734  000004                          SCOPE
023736  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
023742  005037  001174                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
023746  005237  001216                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
023752  042737  100000  001216          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
023760  005327                          DEC     (PC)+           ;;LOOP?
023762  000001                  $EOPCT: .WORD   1
023764  003022                          BGT     $DOAGN          ;;YES
023766  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
023770  000001                  $ENDCT: .WORD   1
023772  023762                          $EOPCT
023774  104401  024041                  TYPE    ,$ENDMG         ;;TYPE 'END PASS #''
024000  013746  001216                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
024004  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
024006  104401  024036                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
024012  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
024016  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
024020  000005                          RESET                   ;;CLEAR THE WORLD
024022  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
024024  000240                          NOP                     ;;SAVE ROOM
024026  000240                          NOP                     ;;FOR
024030  000240                          NOP                     ;;ACT11
024032                          $DOAGN:
024032  000137                          JMP     @(PC)+          ;;RETURN
024034  024056                  $RTNAD: .WORD   ST5XY
024036     377     377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
024041     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
024046  050040  051501  020123
024054  000043
024056  122737  000001  001230  ST5XY:  CMPB    #APTENV,$ENV            ;RUN UNDER APT ?
024064  001007                          BNE     2$              ;BRANCH IF NOT
024066  022737  000002  001216          CMP     #2,$PASS        ;TWO PASSES DONE ?
024074  101003                          BHI     2$              ;BRANCH IF NOT
024076  005237  001102          1$:     INC     $TSTNM          ;CHANGE THE TEST NUMBER
024102  000775                          BR      1$              ;LOOPING
024104  000137  010612          2$:     JMP     ST5             ;EXIT
```

```
                                .SBTTL  SUBROUTINES

                                ;SUBROUTINE TO CLEAR ALL FLAGS FROM DDUMP THRU DOTIM
                                ;
024110  012700  005450          CLRFLG: MOV     #DDUMP,R0
024114  012701  177757                  MOV     #-17.,R1
024120  005020                  1$:     CLR     (R0)+
024122  005201                          INC     R1
024124  001375                          BNE     1$
024126  000207                          RTS     PC

                                ;
                                ;TYPE PROGRAM ID IF FTITLE=0
                                ;
024130  005737  001360          TITLE:  TST     FTITLE
024134  001024                          BNE     1$
024136  005237  001360                  INC     FTITLE
024142  104401  035736                  TYPE    ,MSG1                   ;PROGRAM ID
                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
024146  005737  000042                  TST     @#42                    ;;ARE WE RUNNING UNDER XXDP/ACT?
024152  001012                          BNE     64$                     ;;BRANCH IF YES
024154  123727  001230  000001          CMPB    $ENV,#1                 ;;ARE WE RUNNING UNDER APT?
024162  001406                          BEQ     64$                     ;;BRANCH IF YES
024164  023727  001140  000176          CMP     SWR,#SWREG              ;;SOFTWARE SWITCH REG SELECTED?
024172  001005                          BNE     65$                     ;;BRANCH IF NO
024174  104406                          GTSWR                           ;;GET SOFT-SWR SETTINGS
024176  000403                          BR      65$
024200  112737  000001  001134  64$:    MOVB    #1,$AUTOB               ;;SET AUTO-MODE INDICATOR
024206                          65$:
024206  000207                  1$:     RTS     PC

                                ;
                                ;ROUTINE TO INPUT DRIVE NOS. TYPED IN & SET
                                ;DRIVS, DRIV0-DRIV7 REGISTERS APPROPRIATELY
                                ;

024210  104411                  GDRVS:  RDLIN
024212  012600                          MOV     (SP)+,R0                ;GET STARTING ADDR OF ASCII STRING
024214  012701  177770                  MOV     #-8.,R1                 ;SET UP COUNT
024220  112002                  1$:     MOVB    (R0)+,R2                ;GET ASCII CHAR
024222  042702  177400                  BIC     #177400,R2              ;MASK HI BYTE
024226  012703  005462                  MOV     #DRIV0,R3               ;DRIVE FLAG ADDR
024232  012704  000060                  MOV     #60,R4

024236  020402                  2$:     CMP     R4,R2                   ;WAS TYPED CHAR 0 THRU 7?
024240  001415                          BEQ     3$                      ;BRANCH IF YES
024242  005723                          TST     (R3)+                   ;NO, INCREMENT DR FLAG ADDR
024244  005204                          INC     R4
024246  020427  000070                  CMP     R4,#70
024252  001371                          BNE     2$                      ;S/B 0-7 OR TERMINATOR
024254  005702                          TST     R2
024256  001022                          BNE     4$
024260  020127  177770                  CMP     R1,#-8.
024264  001426                          BEQ     6$                      ;DEFAULT ALL DRIVES
```

```
5187  024266  005037  005510          7$:     CLR     SIZFLG          ;BYPASS TEST 1 (SIZING)
5188  024272  000207                          RTS     PC              ;FOUND TERMINATOR, EXIT
5189
5190  024274  005213                  3$:     INC     @R3             ;SET UP FLAG FOR THE DRIVE
5191  024276  005237  005460                  INC     DRIVS           ;INCREMENT TOTAL # DRIVES TO BE TESTED
5192  024302  112002                          MOVB    (R0)+,R2        ;GET NEXT ASCII CHAR.
5193  024304  042702  177400                  BIC     #177400,R2      ;MASK
5194  024310  022702  000054                  CMP     #54,R2          ;IS IT A COMMA?
5195  024314  001407                          BEQ     5$              ;YES, GO TO NEXT WORD.
5196  024316  005702                          TST     R2              ;NO, IS IT A TERMINATOR?
5197  024320  001001                          BNE     4$              ;IF NOT, SOMETHING WRONG.
5198  024322  000761                          BR      7$              ;FOUND TERMINATOR, EXIT
5199
5200  024324  104401  044402          4$:     TYPE    ,EM1            ;ONLY 0-7 ALLOWED.
5201  024330  000137  010016                  JMP     PRGSRT          ;START ALL OVER
5202
5203  024334  005201                  5$:     INC     R1              ;S/B NO MORE THAN 8 DIFF
5204  024336  001330                          BNE     1$              ;DRIVES TYPED IN.
5205  024340  000771                          BR      4$              ;IF NORE, HAVE ERROR.
5206
5207  024342  005237  005510          6$:     INC     SIZFLG          ;DO TEST 1 (SIZING)
5208  024346  000207                          RTS     PC              ;EXIT.
5209
5210                                  ;
5211                                  ;ROUTINE TO INPUT RKBAS OR DEFAULT.
5212                                  ;
5213
5214  024350  104412                  GBA:    RDOCT
5215  024352  012600                          MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
5216  024354  005700                          TST     R0
5217  024356  001403                          BEQ     1$              ;BRANCH IF DEFAULT.
5218  024360  010037  001264                  MOV     R0,$BASE
5219  024364  000207                          RTS     PC
5220  024366  012737  177440  001264  1$:     MOV     #177440,$BASE   ;DEFAULT VALUE
5221  024374  000207                          RTS     PC
5222
5223                                  ;
5224                                  ;ROUTINE TO INPUT RKVEC OR DEFAULT
5225                                  ;
5226
5227  024376  104412                  GINT:   RDOCT
5228  024400  012600                          MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
5229  024402  005700                          TST     R0
5230  024404  001405                          BEQ     1$              ;BRANCH IF DEFAULT
5231  024406  010037  001334                  MOV     R0,RKVEC
5232  024412  004737  024430          2$:     JSR     PC,SETINT
5233  024416  000207                          RTS     PC
5234  024420  012737  000210  001334  1$:     MOV     #210,RKVEC      ;DEFAULT VALUE
5235  024426  000771                          BR      2$
5236
5237                                  ;
5238                                  ;ROUTINE TO SETUP INTERRUPT VECTOR & PRIORITY
5239                                  ;
5240
5241  024430  013700  001334          SETINT: MOV     RKVEC,R0
5242  024434  012720  031152                  MOV     #INTER,(R0)+    ;INTER ADDR TO RKVEC
```

```
5243  024440  013710  001336                  MOV     RKPRI,(R0)      ;PR5 TO RKVEC+2
5244  024444  000207                          RTS     PC
5245
5246
5247                                          ;
5248                                          ;THIS ROUTINE SETS CDT IN RKCS1 IF DRIVE UNDER TEST IS AN RK07.
5249                                          ;ENTER WITH COMMAND IN HCS1
5250                                          ;
5251  024446  053737  001170  005340  DOCMD:  BIS     $TMP4,HCS1      ;ADD CDT IF RK07
5252  024454  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;DO COMMAND
5253  024462  013737  001424  005376          MOV     T10,TEMP1
5254  024470  004737  024542                  JSR     PC,FRDY         ;FIND CONTR READY
5255  024474  000207                          RTS     PC              ;SET HERE IF NOT RDY
5256  024476  062716  000002                  ADD     #2,(SP)         ;ELSE SKIP OVER ERROR
5257  024502  000207                          RTS     PC
5258                                          ;
5259                                          ;THIS ROUTINE IS SIMILAR TO THE ABOVE BUT IS USED FOR DATA TRANSFERS
5260                                          ;& REQUIRES A LONGER TIMEOUT
5261                                          ;
5262  024504  053737  001170  005340  DATCMD: BIS     $TMP4,HCS1      ;ADD CDT IF RK07
5263  024512  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;DO CMD
5264  024520  013737  001432  005376          MOV     T50000,TEMP1
5265  024526  004737  024542                  JSR     PC,FRDY         ;FIND CONTR RDY
5266  024532  000207                          RTS     PC
5267  024534  062716  000002                  ADD     #2,(SP)
5268  024540  000207                          RTS     PC
5269                                          ;
5270
5271                                          ;ROUTINE TO FIND CONTROLLER READY (RDY) DURING A DELAY
5272                                          ;ENTER WITH A COUNT IN TEMP1
5273                                          ;RETURN IF RDY NOT PRESENT (ERROR CONDITION)
5274                                          ;RETURN +2 IF RDY PRESENT (SKIP OVER ERROR)
5275                                          ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
5276                                          ;
5277  024542  032765  000200  000000  FRDY:   BIT     #RDY,RKCS1(R5)
5278  024550  001010                          BNE     1$
5279  024552  005337  005376                  DEC     TEMP1
5280  024556  001371                          BNE     FRDY
5281  024560  004737  024676                  JSR     PC,HOLD         ;STORE ALL RK611 REGS IN HOLDING REGS.
5282  024564  004737  026024                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
5283  024570  000207                          RTS     PC              ;NO RDY, EXIT
5284  024572  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5285  024576  004737  024676                  JSR     PC,HOLD
5286  024602  004737  026024                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
5287  024606  000207                          RTS     PC
5288                                          ;
5289                                          ;ROUTINE TO FIND CONTROLLER READY AND STORE DRIVE REGS ONLY
5290                                          ;
5291  024610  032765  000200  000000  FRDY1:  BIT     #RDY,RKCS1(R5)
5292  024616  001014                          BNE     1$
5293  024620  005337  005376                  DEC     TEMP1
5294  024624  001371                          BNE     FRDY1
5295  024626  016537  000034  005366          MOV     RKMR2(R5),HMR2
5296  024634  016537  000036  005370          MOV     RKMR3(R5),HMR3
5297  024642  004737  026024                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
5298  024646  000207                          RTS     PC              ;NO RDY, EXIT
```

```
                                        1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
005366                                          MOV     RKMR2(R5),HMR2
005370                                          MOV     RKMR3(R5),HMR3
026024                                          JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
                                                RTS     PC

                                        ;
                                        ;STORE ALL RK611 REGISTERS IN HOLDING REGS
                                        ;
005340                                  HOLD:   MOV     RKCS1(R5),HCS1
005342                                          MOV     RKCS2(R5),HCS2
005344                                          MOV     RKWC(R5),HWC
005346                                          MOV     RKBA(R5),HBA
005350                                          MOV     RKDA(R5),HDA
005352                                          MOV     RKDS(R5),HDS
005354                                          MOV     RKER(R5),HER
005356                                          MOV     RKASOF(R5),HASOF
005360                                          MOV     RKDC(R5),HDC
005364                                          MOV     RKMR1(R5),HMR1
005366                                          MOV     RKMR2(R5),HMR2
005370                                          MOV     RKMR3(R5),HMR3
005372                                          MOV     RKECPS(R5),HPOS
005374                                          MOV     RKECPT(R5),HPAT
                                                RTS     PC

                                        ;
                                        ;ROUTINE TO CHECK FOR CORRECT ATTN
                                        ;RETURN IF ATTN NOT PRESENT (ERROR CONDITION)
                                        ;RETURN +2 IF ATTN PRESENT (SKIP OVER ERROR)
                                        ;
                                        TSTATN: MOV     R4,-(SP)        ;SAV R4
001222                                          MOV     $UNIT,R4
005357                                          BITB    ATTN(R4),HASOF+1
                                                BEQ     1$              ;BRANCH IF ATTN NOT PRESENT
                                                MOV     (SP)+,R4        ;RESTOR R4
000002                                          ADD     #2,(SP)         ;INCR RET ADDR TO JUMP OVER ERROR.
                                                RTS     PC
                                        1$:     MOV     (SP)+,R4        ;RESTOR R4
                                                RTS     PC

                                        ;
                                        ;ROUTINE TO FIND ATTN WITHIN TIMES GREATER THAN 1 SEC
                                        ;ENTER WITH TIME IN SECONDS IN TEMP2
                                        ;RETURN IF NO ATTN (ERROR CONDITION)
                                        ;RETURN +2 IF ATTN FOUND
                                        ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
                                        ;
                                        FATT1:  MOV     R4,-(SP)        ;SAV R4
177777  005376                          3$:     MOV     #-1,TEMP1
001222                                          MOV     $UNIT,R4
000017                                  1$:     BITB    ATTN(R4),RKASOF+1(R5) ;FIND CORRECT ATTN
                                                BNE     2$
005376                                          DEC     TEMP1
```

```
5355  025106  001371                        BNE     1$
5356  025110  005337  005400                DEC     TEMP2
5357  025114  001361                        BNE     3$
5358  025116  005065  000026                CLR     RKMR1(R5)       ;SELECT WORD 0
5359  025122  004737  026106                JSR     PC,GSTAT        ;GET LATEST STATUS
5360  025126  012604                        MOV     (SP)+,R4        ;RESTOR R4
5361  025130  000207                        RTS     PC
5362
5363  025132  005065  000026        2$:     CLR     RKMR1(R5)
5364  025136  004737  026106                JSR     PC,GSTAT        ;GET STATUS AFTER ATTN SEEN
5365  025142  012604                        MOV     (SP)+,R4        ;RESTOR R4
5366  025144  062716  000002                ADD     #2,(SP)         ;SKIP OVER ERROR
5367  025150  000207                        RTS     PC
5368
5369                                ;
5370                                ;ROUTINE TO FIND ATTN WITHIN 1 SEC
5371                                ;ENTER WITH COUNT IN TEMP1
5372                                ;RETURN IF NO ATTN (ERROR)
5373                                ;RETURN +2 IF ATTN FOUND
5374                                ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
5375                                ;
5376
5377  025152  010446                FATT2:  MOV     R4,-(SP)        ;SAV R4
5378  025154  013704  001222        2$:     MOV     $UNIT,R4
5379  025160  136465  005330  000017        BITB    ATTN(R4),RKASOF+1(R5)  ;FIND CORRECT ATTN
5380  025166  001011                        BNE     1$
5381  025170  005337  005376                DEC     TEMP1
5382  025174  001367                        BNE     2$
5383  025176  005065  000026                CLR     RKMR1(R5)       ;SELECT WORD 0
5384  025202  004737  026106                JSR     PC,GSTAT        ;GET LATEST STATUS.
5385  025206  012604                        MOV     (SP)+,R4        ;RESTOR R4
5386  025210  000207                        RTS     PC
5387  025212  005065  000026        1$:     CLR     RKMR1(R5)
5388  025216  004737  026106                JSR     PC,GSTAT
5389  025222  012604                        MOV     (SP)+,R4        ;RESTOR R4
5390  025224  062716  000002                ADD     #2,(SP)         ;SKIP OVER ERROR
5391  025230  000207                        RTS     PC
5392                                ;
5393                                ;ENTER WITH A COUNT IN TEMP1
5394                                ;THE DELAY IS APPROX 17 US/ITERATION + 12 US TO EXIT
5395                                ;WHEN COUNT IS 0. BASED ON AN 11/05
5396                                ;
5397  025232  005737  005376        DLY:    TST     TEMP1           ;5.6 US
5398  025236  001403                        BEQ     1$              ;2.5 US
5399  025240  005337  005376                DEC     TEMP1           ;6.8 US
5400  025244  000772                        BR      DLY             ;2.5 US
5401  025246  000207                1$:     RTS     PC              ;3.8 US
5402                                ;
5403                                ;THIS ROUTINE TYPES BYPASSED DRIVE#.  ENTER WITH DRIVE# IN R0
5404                                ;
5405
5406  025250  104401  037367        BYP:    TYPE    ,MSG14          ;BYPASS DRIVE
5407  025254  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
5408                                                                ;;TYPE DR#
5409  025256  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
5410  025260     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
```

```
                                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                        RTS     PC
                                ;
                                ;THIS ROUTINE READS ALL MSG A & B WORDS & CHECKS THEM AS REQ'D.
                                ;
                        CHKMSG: MOV     @(SP),CHKFLG    ;PASS MSGS TO BE TESTED
                                ADD     #2,(SP)         ;BUMP RETURN ADDR TO 1ST ERROR
                                JSR     PC,GSTAT1       ;GET ALL ACTUAL DRIVE & CONTR STATUS

                                BIS     $UNIT,E.A0      ;SET UNIT #
                                BIS     $UNIT,E.A1
                                BIS     $UNIT,E.A2
                                BIS     $UNIT,E.A3

                                BIS     E.DDT,E.A0      ;ADD DRIVE TYPE

                                MOV     TEMP1,-(SP)     ;SAVE TEMP1

                                MOV     E.A0,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG A0
                                MOV     TEMP1,E.A0

                                MOV     E.A1,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG A1
                                MOV     TEMP1,E.A1

                                MOV     E.A2,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG A2
                                MOV     TEMP1,E.A2

                                MOV     E.B0,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG B0
                                MOV     TEMP1,E.B0

                                MOV     E.B1,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG B1
                                MOV     TEMP1,E.B1

                                MOV     E.B2,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG B2
                                MOV     TEMP1,E.B2

                                MOV     E.B3,TEMP1
                                JSR     PC,SBPAR        ;GET PARITY FOR MSG B3
                                MOV     TEMP1,E.B3

                                MOV     (SP)+,TEMP1     ;RESTORE TEMP1
                                MOV     $ESCAPE,$TMP5   ;SAVE ESCAPE

                                CMP     H.A0,E.A0       ;TEST MSG A0
                                BEQ     2$              ;BR IF OK
                                MOV     #1$,$ESCAPE     ;ELSE SETUP ESCAPE
                                MOV     (SP),-(SP)      ;COPY RET ADDR.
                                RTS     PC              ;& RETURN TO MAINLINE ERROR

                        1$:     BIT     #SW9,@SWR       ;RET HERE FROM MAINLINE ERROR
```

```
5467  025566  001107                        BNE     20$             ;& BR IF LOOP ON ERROR
5468  025570  062716  000002        2$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
5469
5470  025574  023737  005412  005432        CMP     H.B0,E.B0       ;TEST MSG B0
5471  025602  001411                        BEQ     5$              ;BR IF OK
5472  025604  012737  025616  001176        MOV     #4$,$ESCAPE     ;ELSE SETUP ESCAPE
5473  025612  011646                        MOV     (SP),-(SP)      ;COPY RET ADDR
5474  025614  000207                        RTS     PC              ;& RETURN TO MAINLINE ERROR
5475
5476  025616  032777  001000  153314  4$:   BIT     #SW9,@SWR       ;RETURN HERE FROM MAINLINE ERROR
5477  025624  001070                        BNE     20$             ;& BR IF LOOP ON ERROR
5478  025626  062716  000002        5$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
5479
5480  025632  023737  005414  005434        CMP     H.A1,E.A1       ;TEST MSG A1
5481  025640  001411                        BEQ     8$              ;BR IF OK
5482  025642  012737  025654  001176        MOV     #7$,$ESCAPE
5483  025650  011646                        MOV     (SP),-(SP)
5484  025652  000207                        RTS     PC
5485
5486  025654  032777  001000  153256  7$:   BIT     #SW9,@SWR
5487  025662  001051                        BNE     20$
5488  025664  062716  000002        8$:     ADD     #2,(SP)
5489
5490  025670  023737  005416  005436        CMP     H.B1,E.B1       ;TEST MSG B1
5491  025676  001411                        BEQ     11$             ;BR IF OK
5492  025700  012737  025712  001176        MOV     #10$,$ESCAPE
5493  025706  011646                        MOV     (SP),-(SP)
5494  025710  000207                        RTS     PC
5495
5496  025712  032777  001000  153220  10$:  BIT     #SW9,@SWR
5497  025720  001032                        BNE     20$
5498  025722  062716  000002        11$:    ADD     #2,(SP)
5499
5500  025726  032737  000001  001504  12$:  BIT     #T.A2,CHKFLG    ;TEST MSG A2?
5501  025734  001402                        BEQ     13$             ;BR IF NO
5502  025736  004737  026722                JSR     PC,RCYLD        ;PUT INFO CYLDIF, DO NOT CHECK
5503  025742  032737  000002  001504  13$:  BIT     #T.B2,CHKFLG    ;TEST MSG B2?
5504  025750  001402                        BEQ     14$             ;BR IF NO
5505  025752  004737  026774                JSR     PC,RCYLA        ;PUT INFO IN CYLADD, DO NOT CHECK
5506
5507  025756  032737  000004  001504  14$:  BIT     #T.B3,CHKFLG    ;TEST MSG B3?
5508  025764  001404                        BEQ     15$
5509  025766  004737  027032                JSR     PC,RSEC         ;PUT INFO IN SECTOR, DO NOT CHECK
5510  025772  004737  027070                JSR     PC,RHEAD        ;PUT INFO IN HEADA, DO NOT CHECK
5511
5512  025776  013737  001172  001176  15$:  MOV     $TMP5,$ESCAPE   ;RESTORE ESCAPE
5513  026004  000207                        RTS     PC
5514
5515  026006  012706  001100        20$:    MOV     #STACK,SP       ;RESET STACK PTR
5516  026012  013737  001172  001176        MOV     $TMP5,$ESCAPE   ;RESTORE ESCAPE
5517  026020  000177  153064                JMP     @$LPERR
5518                                ;
5519                                ;THIS ROUTINE CHECKS FOR CERTAIN ERROR CONDITIONS ONLY
5520                                ;I.E.: IF NED, CTO OR MDS SET MESSAGE A & B ARE INVALID
5521                                ;
5522  026024  005737  001502        CKCERR: TST     BYPCERR
```

```
5523  026030  001025                        BNE     4$
5524  026032  032737  100000  005340        BIT     #CERR,HCS1
5525  026040  001001                        BNE     1$              ;BR IF CERR
5526  026042  000207                        RTS     PC
5527
5528  026044  032737  004000  005340  1$:   BIT     #CTO,HCS1
5529  026052  001402                        BEQ     2$              ;BR IF NOT CTO
5530  026054  104211                        ERROR   211             ;CTO ERROR, MSG A & B INVALID
5531  026056  000207                        RTS     PC
5532
5533  026060  032737  010000  005342  2$:   BIT     #NED,HCS2
5534  026066  001401                        BEQ     3$              ;BR IF NOT NED
5535  026070  104212                        ERROR   212             ;NED ERROR, MSG A & B INVALID
5536
5537  026072  032737  001000  005342  3$:   BIT     #MDS,HCS2
5538  026100  001401                        BEQ     4$
5539  026102  104213                        ERROR   213             ;MDS ERROR, MSG A & B INVALID
5540
5541  026104  000207                  4$:   RTS     PC
5542
5543                                  ;
5544                                  ;THIS ROUTINE DOES THE SELECT DRIVE COMMAND TO GET STATUS
5545                                  ;IT THEN WAITS FOR CONTROLLER READY
5546
5547                                  ;IF RDY NOT RECEIVED BY THE TIMEOUT, AN ERROR IS FLAGGED
5548                                  ;
5549
5550  026106  013746  005376          GSTAT:  MOV     TEMP1,-(SP)     ;SAVE TEMP1
5551  026112  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
5552  026120  012737  000001  005340          MOV     #SELDRV,HCS1
5553  026126  004737  024446                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5554  026132  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRIVE CMD
5555  026134  012637  005376                  MOV     (SP)+,TEMP1     ;RESTOR TEMP1.
5556  026140  000207                          RTS     PC
5557                                  ;
5558                                  ;THIS ROUTINE GETS STATUS OF ALL DRIVE REGISTERS (MSG A0-A3, B0-B3)
5559                                  ;& ALL CONTROLLER REGISTERS.
5560                                  ;
5561  026142  013746  005376          GSTAT1: MOV     TEMP1,-(SP)     ;SAVE TEMP1
5562  026146  004737  024676                  JSR     PC,HOLD         ;GET ALL CONTR REG
5563  026152  012765  100000  000000          MOV     #CCLR,RKCS1(R5) ;CLEAR CONTR
5564  026160  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
5565  026166  012765  000003  000026          MOV     #3,RKMR1(R5)    ;SELECT WORD 3
5566  026174  004737  026372                  JSR     PC,GSTAT2
5567  026200  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
5568  026202  013737  005366  005424          MOV     HMR2,H.A3       ;STORE MSG A3
5569  026210  013737  005370  005426          MOV     HMR3,H.B3       ;STORE MSG B3
5570
5571  026216  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5572  026224  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5573  026232  012765  000002  000026          MOV     #2,RKMR1(R5)    ;SELECT WORD 2
5574  026240  004737  026372                  JSR     PC,GSTAT2
5575  026244  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
5576  026246  013737  005366  005420          MOV     HMR2,H.A2       ;STORE MSG A2
5577  026254  013737  005370  005422          MOV     HMR3,H.B2       ;STORE MSG B2
5578
```

```
5579  026262  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5580  026270  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5581  026276  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
5582  026304  004737  026372                  JSR     PC,GSTAT2
5583  026310  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
5584  026312  013737  005366  005414          MOV     HMR2,H.A1       ;STORE MSG A1
5585  026320  013737  005370  005416          MOV     HMR3,H.B1       ;STORE MSG B1
5586
5587  026326  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5588  026334  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5589  026342  004737  026372                  JSR     PC,GSTAT2
5590  026346  104117                          ERROR   117             ;RDY NOT SET BY END OF SEL DRV CMD
5591  026350  013737  005366  005410          MOV     HMR2,H.A0       ;STORE MSG A0
5592  026356  013737  005370  005412          MOV     HMR3,H.B0       ;STORE MSG B0
5593
5594  026364  012637  005376                  MOV     (SP)+,TEMP1     ;RESTORE TEMP1
5595  026370  000207                          RTS     PC
5596
5597
5598  026372  012737  000001  005340  GSTAT2: MOV     #SELDRV,HCS1
5599  026400  053737  001170  005340          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
5600  026406  013765  005340  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
5601  026414  013737  001424  005376          MOV     T10,TEMP1
5602  026422  004737  024610                  JSR     PC,FRDY1        ;FIND CONTR RDY & STORE DRIVE REGS ONLY
5603  026426  000207                          RTS     PC              ;RET HERE IF NOT RDY
5604  026430  062716  000002                  ADD     #2,(SP)         ;RET HERE IF OK
5605  026434  000207                          RTS     PC
5606                                  ;
5607                                  ;THIS ROUTINE DOES A SUBSYSTEM CLEAR & WAITS FOR CONTROLLER READY
5608                                  ;IF RDY IS NOT RECEIVED BY THE END OF THE TIMEOUT, AN ERROR IS FLAGGED.
5609                                  ;THE ROUTINE THEN GETS CURRENT STATUS & CHECKS FOR CONTROLLER ERROR (CERR)
5610                                  ;RETURN IF CERR SET
5611                                  ;RETURN +2 IF CERR CLEAR
5612                                  ;
5613  026436  012765  000040  000010  SUBCLR: MOV     #SCLR,RKCS2(R5) ;SUBSYS CLEAR
5614  026444  013737  001424  005376          MOV     T10,TEMP1
5615  026452  004737  024542                  JSR     PC,FRDY         ;FIND RDY
5616  026456  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
5617  026460  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
5618  026466  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
5619  026472  004737  026106                  JSR     PC,GSTAT        ;GET STATUS
5620  026476  032737  100000  005340          BIT     #CERR,HCS1      ;CHECK FOR CONT ERROR
5621  026504  001401                          BEQ     1$
5622  026506  000207                          RTS     PC
5623  026510  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5624  026514  000207                          RTS     PC
5625
5626                                  ;
5627                                  ;READ THE SECTOR COUNT IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
5628                                  ;
5629  026516  012765  000003  000026  RDSEC:  MOV     #3,RKMR1(R5)    ;WORD 3
5630  026524  004737  026106                  JSR     PC,GSTAT
5631  026530  013737  005370  001422          MOV     HMR3,SECTOR
5632  026536  042737  177017  001422          BIC     #^C<M.SECT>,SECTOR
5633  026544  006237  001422                  ASR     SECTOR          ;RIGHT JUSTIFY
5634  026550  006237  001422                  ASR     SECTOR          ;SECTOR
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5635  026554  006237  001422            ASR     SECTOR          ;INFO
5636  026560  006237  001422            ASR     SECTOR
5637  026564  000207                    RTS     PC
5638                                ;
5639                                ;READ THE CYL DIFF/OFFSET IN RKMR2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
5640                                ;
5641  026566  012765  000002  000026  RDCYLD: MOV     #2,RKMR1(R5)    ;WORD 2
5642  026574  004737  026106          JSR     PC,GSTAT
5643  026600  013737  005366  001376  MOV     HMR2,CYLDIF
5644
5645  026606  043737  012660  001376  BIC     MASK1,CYLDIF
5646  026614  006237  001376          ASR     CYLDIF          ;RIGHT JUSTIFY
5647  026620  006237  001376          ASR     CYLDIF          ;CYL DIFF/OFFSET
5648  026624  006237  001376          ASR     CYLDIF          ;INFO
5649  026630  006237  001376          ASR     CYLDIF
5650  026634  023737  001376  012656  CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
5651  026642  001002                  BNE     1$              ;BR IF NOT
5652  026644  005037  001376          CLR     CYLDIF          ;CLR IF YES
5653  026650  000207                1$:     RTS     PC
5654                                ;
5655                                ;READ THE CYL ADDR IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN  'CYLADD'
5656                                ;
5657  026652  012765  000002  000026  RDCYLA: MOV     #2,RKMR1(R5)    ;WORD 2
5658  026660  004737  026106          JSR     PC,GSTAT
5659  026664  013737  005370  001400  MOV     HMR3,CYLADD
5660  026672  043737  012660  001400  BIC     MASK1,CYLADD
5661  026700  006237  001400          ASR     CYLADD          ;RIGHT JUSTIFY
5662  026704  006237  001400          ASR     CYLADD          ;CYL ADDR
5663  026710  006237  001400          ASR     CYLADD          ;INFO
5664  026714  006237  001400          ASR     CYLADD
5665  026720  000207                  RTS     PC
5666                                ;
5667                                ;READ THE CYL DIFF/OFFSET IN H.A2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
5668                                ;
5669  026722  013737  005420  001376  RCYLD:  MOV     H.A2,CYLDIF
5670  026730  043737  012660  001376          BIC     MASK1,CYLDIF  ;CLEAR UNWANTED INFO
5671  026736  006237  001376          ASR     CYLDIF  ;RIGHT JUSTIFY
5672  026742  006237  001376          ASR     CYLDIF
5673  026746  006237  001376          ASR     CYLDIF
5674  026752  006237  001376          ASR     CYLDIF
5675  026756  023737  001376  012656  CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
5676  026764  001002                  BNE     1$              ;BR IF NO
5677  026766  005037  001376          CLR     CYLDIF          ;ELSE CLEAR
5678  026772  000207                1$:     RTS     PC
5679                                ;
5680                                ;READ THE CYL ADDR IN H.B2, RIGHT JUSTIFY IT & STORE IT IN 'CYLADD'
5681                                ;
5682  026774  013737  005422  001400  RCYLA:  MOV     H.B2,CYLADD
5683  027002  043737  012660  001400          BIC     MASK1,CYLADD  ;CLEAR UNWANTED INFO
5684  027010  006237  001400          ASR     CYLADD          ;RIGHT JUSTIFY
5685  027014  006237  001400          ASR     CYLADD
5686  027020  006237  001400          ASR     CYLADD
5687  027024  006237  001400          ASR     CYLADD
5688  027030  000207                  RTS     PC
5689                                ;
5690                                ;READ THE SECTOR COUNT IN H.B3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
```

GET VALUE FOR SOFTWARE SWITCH REGISTER SEQ 0109

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                                        ;
027032  013737  005426  001422  RSEC:   MOV     H.B3,SECTOR
027040  042737  177017  001422          BIC     #^C<M.SECT>,SECTOR  ;CLEAR UNWANTED INFO
027046  006237  001422                  ASR     SECTOR              ;RIGHT JUSTIFY
027052  006237  001422                  ASR     SECTOR
027056  006237  001422                  ASR     SECTOR
027062  006237  001422                  ASR     SECTOR
027066  000207                          RTS     PC
                                        ;
                                        ;READ THE HEAD ADDR IN H.B3, RIGHT IT & STORE IT IN 'HEADA'
                                        ;
027070  013737  005426  001444  RHEAD:  MOV     H.B3,HEADA
027076  042737  170777  001444          BIC     #^C<M.HEAD>,HEADA  ;CLEAR UNWANTED INFO
027104  006237  001444                  ASR     HEADA              ;RIGHT JUSTIFY IT
027110  000337  001444                  SWAB    HEADA
027114  000207                          RTS     PC
                                        ;
                                        ;FIND SECTOR 17
                                        ;RETURN IF NOT FOUND
                                        ;RETURN +4 IF FOUND
                                        ;
027116  013737  001430  005376  FSEC17: MOV     T5000,TEMP1        ;SETUP TIMEOUT
027124  004737  026516          1$:     JSR     PC,RDSEC           ;READ SECTOR
027130  023727  001422  000021          CMP     SECTOR,#17.        ;TEST FOR SECTOR 17
027136  001014                          BNE     2$                 ;BR IF NOT 17
                                        
027140  004737  026516                  JSR     PC,RDSEC
027144  023727  001422  000021          CMP     SECTOR,#17.
027152  001412                          BEQ     3$                 ;BR IF READ SAME TWICE
027154  004737  026516                  JSR     PC,RDSEC           ;ELSE TRY 1 MORE TIME
027160  023727  001422  000021          CMP     SECTOR,#17.
027166  001404                          BEQ     3$                 ;BR IF 17
                                        
027170  005337  005376          2$:     DEC     TEMP1
027174  001353                          BNE     1$                 ;TRY AGAIN
027176  000207                          RTS     PC
                                        
027200  062716  000004          3$:     ADD     #4,(SP)            ;SKIP OVER ERROR
027204  000207                          RTS     PC
                                        ;
                                        ;FIND DESIRED CYL DIFF
                                        ;RETURN IF NOT FOUND
                                        ;RETURN+6 IF FOUND
                                        ;
                                        
027206  013737  001430  005376  FCYL:   MOV     T5000,TEMP1        ;SETUP TIMEOUT
027214  004737  026566          1$:     JSR     PC,RDCYLD
027220  023737  001376  005400          CMP     CYLDIF,TEMP2       ;TEST FOR CYL DIFF
027226  001014                          BNE     2$                 ;BR IF NOT FOUND
                                        
027230  004737  026566                  JSR     PC,RDCYLD
027234  023737  001376  005400          CMP     CYLDIF,TEMP2
027242  001412                          BEQ     3$                 ;BR IF READ SAME TWICE
027244  004737  026566                  JSR     PC,RDCYLD          ;ELSE TRY 1 MORE TIME
027250  023737  001376  005400          CMP     CYLDIF,TEMP2
027256  001404                          BEQ     3$
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5747
5748  027260  005337  005376          2$:     DEC     TEMP1
5749  027264  001353                          BNE     1$                      ;TRY AGAIN
5750  027266  000207                          RTS     PC
5751
5752  027270  062716  000006          3$:     ADD     #6,(SP)                 ;SKIP OVER ERROR
5753  027274  000207                          RTS     PC
5754
5755                                  ;
5756                                  ;ROUTINE TO FIND HEADS HOME IN RKMR2 WORD 1 BEFORE SPECIFIED DELAY
5757                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
5758                                  ;RETURN IF NOT FOUND
5759                                  ;RETURN+2 IF FOUND - SKIP OVER ERROR
5760                                  ;
5761  027276  012737  177777  005376  FHDHM:  MOV     #-1,TEMP1               ;ALL 1'S
5762  027304  012765  000001  000026          MOV     #1,RKMR1(R5)            ;WORD 1
5763  027312  004737  026106          1$:     JSR     PC,GSTAT
5764  027316  032737  000040  005366          BIT     #D.HDHM,HMR2
5765  027324  001007                          BNE     2$
5766  027326  005337  005376                  DEC     TEMP1
5767  027332  001367                          BNE     1$
5768
5769  027334  005337  005400                  DEC     TEMP2
5770  027340  001356                          BNE     FHDHM
5771  027342  000207                          RTS     PC
5772  027344  062716  000002          2$:     ADD     #2,(SP)                 ;SKIP OVER ERROR
5773  027350  000207                          RTS     PC
5774                                  ;
5775                                  ;ROUTINE TO FIND LOAD HEADS IN RKMR2 WORD 1 BEFORE 5MS
5776                                  ;RETURN IF NOT FOUND
5777                                  ;RETURN+2 IF FOUND: SKIP OVER ERROR
5778                                  ;
5779  027352  012737  000372  005376  FLOAD:  MOV     #250.,TEMP1
5780  027360  012765  000001  000026          MOV     #1,RKMR1(R5)            ;WORD 1
5781  027366  004737  026106          1$:     JSR     PC,GSTAT
5782  027372  032737  010000  005366          BIT     #D.LOAD,HMR2
5783  027400  001004                          BNE     2$
5784  027402  005337  005376                  DEC     TEMP1
5785  027406  001367                          BNE     1$
5786  027410  000207                          RTS     PC
5787  027412  062716  000002          2$:     ADD     #2,(SP)                 ;SKIP OVER ERROR
5788  027416  000207                          RTS     PC
5789                                  ;
5790                                  ;FILL HEADER TABLE WITH 66 WORDS OF VALID HEADERS
5791                                  ;ENTER WITH CYL # IN 'CALADD'
5792                                  ;ENTER WITH HEAD # IN 'HEAD'
5793                                  ;ENTER WITH FORMAT IN 'FORMAT'
5794                                  ;
5795  027420  010046                  FHDTAB: MOV     R0,-(SP)                ;SAV R0
5796  027422  010146                          MOV     R1,-(SP)                ;SAV R1
5797  027424  012700  001506                  MOV     #HDTAB,R0               ;HEADER WORD TABLE ADDR
5798  027430  005001                          CLR     R1                      ;SECTOR COUNTER
5799  027432  013737  001442  001446          MOV     HEAD,HD1
5800  027440  006337  001446                  ASL     HD1
5801  027444  006337  001446                  ASL     HD1
5802  027450  006337  001446                  ASL     HD1
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5803  027454  006337  001446          ASL     HD1
5804  027460  006337  001446          ASL     HD1             ;SETUP HEAD # FOR WORD 2 OF HEADER
5805  027464  013737  001450  001452  MOV     FORMAT,FMT1
5806  027472  000337  001452          SWAB    FMT1
5807  027476  006337  001452          ASL     FMT1            ;SETUP FORMAT FOR WORD 2 OF HEADER
5808
5809  027502  013720  001402  1$:     MOV     CALADD,(R0)+    ;HEADER WORD 1-CYL ADDR
5810  027506  010110                  MOV     R1,(R0)         ;HEADER WORD 2-SECTOR NO
5811  027510  053710  001446          BIS     HD1,(R0)        ;               -HEAD NO
5812  027514  053710  001452          BIS     FMT1,(R0)       ;               -FORMAT
5813  027520  004737  027600          JSR     PC,SECFLG       ;GET SECTOR FLAGS
5814
5815  027524  013737  001402  005376  MOV     CALADD,TEMP1
5816  027532  011037  005400          MOV     (R0),TEMP2
5817  027536  043737  001402  005400  BIC     CALADD,TEMP2
5818  027544  042037  005376          BIC     (R0)+,TEMP1
5819  027550  053737  005376  005400  BIS     TEMP1,TEMP2
5820  027556  013720  005400          MOV     TEMP2,(R0)+     ;HEADER WORD 3-HEADER CHECK
5821
5822  027562  005201                  INC     R1              ;SECTOR CTR
5823  027564  020127  000026          CMP     R1,#22.         ;ALL 22 SECTORS DONE? (66 WORDS)
5824  027570  001344                  BNE     1$              ;BR IF NO
5825
5826  027572  012601                  MOV     (SP)+,R1        ;RESTOR R1
5827  027574  012600                  MOV     (SP)+,R0        ;RESTOR R0
5828  027576  00C207                  RTS     PC
5829                          ;
5830                          ;THIS ROUTINE GETS INFORMATION FROM THE BAD SECTOR TABLE FILLED BY A PREVIOUS
5831                          ;TEST & SETS BITS 14 & 15 APPROPRIATLY.
5832                          ;
5833  027600  010246          SECFLG: MOV     R2,-(SP)        ;SAVE R2
5834  027602  005737  001450          TST     FORMAT
5835  027606  001016                  BNE     1$              ;BR IF 20 SECTOR FORMAT
5836  027610  012702  002332          MOV     #BSE22H+8.,R2
5837  027614  004737  027650          JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
5838  027620  052710  100000          BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
5839
5840  027624  012702  003332          MOV     #BSE22S+8.,R2   ;ELSE RETURN HERE
5841  027630  004737  027650          JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
5842  027634  052710  040000          BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
5843
5844  027640  012602                  MOV     (SP)+,R2        ;ELSE RETURN HERE
5845  027642  000207                  RTS     PC
5846
5847  027644  012602          1$:     MOV     (SP)+,R2        ;RESTORE R2
5848  027646  000207                  RTS     PC
5849
5850                          ;
5851                          ; THIS ROUTINE DOES THE ACTUAL SCANNING OF THE BAD SECTOR TABLES.
5852                          ;ENTER WITH THE ADDRESS OF TABLE (BSE22H, BSE22S, ETC.) IN TEMP1
5853                          ;RETURN IF NO COMPARE
5854                          ;RETURN+4 IF COMPARE
5855                          ;
5856  027650  010346          FLGTST: MOV     R3,-(SP)        ;SAVE R3
5857
5858  027652  021227  177777  1$:     CMP     (R2),#-1        ;SEE IF ALL 1'S
```

```
5859  027656  001002                  BNE     2$              ;BR IF NO
5860  027660  012603                  MOV     (SP)+,R3        ;RESTORE R3
5861  027662  000207                  RTS     PC
5862
5863  027664  022237  001402  2$:     CMP     (R2)+,CALADD    ;SEE IF=CYL # & ADR PTR TO TRK/SECTOR WORD
5864  027670  001403                  BEQ     3$
5865  027672  062702  000002          ADD     #2,R2           ;GO TO NEXT CYL WORD IN TABLE
5866  027676  000765                  BR      1$
5867
5868  027700  013703  001442  3$:     MOV     HEAD,R3         ;GET HEAD # FROM FHDTAB ROUTINE
5869  027704  000303                  SWAB    R3
5870  027706  050103                  BIS     R1,R3           ;ADD SECTOR # FROM FHDTAB ROUTINE
5871  027710  022203                  CMP     (R2)+,R3        ;SEE IF SECTOR/HEAD COMPARE
5872                                                          ;& INCR PTR TO NEXT CYL WORD
5873  027712  001401                  BEQ     4$              ;BR IF COMPARE
5874  027714  000756                  BR      1$              ;ELSE TRY NEXT CYL
5875
5876  027716  012603  4$:     MOV     (SP)+,R3        ;RESTORE R3
5877  027720  062716  000004          ADD     #4,(SP)         ;INCREMENT RET ADDR
5878  027724  000207                  RTS     PC
5879
5880                          ;
5881                          ;THIS ROUTINE SORTS THE RHTAB TABLE FROM WHATEVER SECTOR IT BEGINS
5882                          ;WITH AND RE-WRITES THE INFO IN SRTTAB TABLE TO BEGIN WITH SECTOR 0
5883                          ;
5884  027726  010046  SORT:   MOV     R0,-(SP)        ;SAVE R0
5885  027730  010146          MOV     R1,-(SP)        ;SAVE R1
5886  027732  004737  026516  JSR     PC,RDSEC
5887  027736  062737  000001  001422  ADD     #1,SECTOR
5888  027744  004737  030034  JSR     PC,MULT6        ;MULT SECTOR BY 6
5889
5890  027750  012700  000204          MOV     #132.,R0
5891  027754  163700  001422          SUB     SECTOR,R0       ;R0-SECTOR TO R0 = INDEX
5892  027760  010037  001422          MOV     R0,SECTOR
5893  027764  062737  001712  001422  ADD     #RHTAB,SECTOR   ;SAVE INDEX
5894
5895  027772  062700  001712          ADD     #RHTAB,R0       ;INDEX TO BOT HALF OF RHTAB
5896  027776  012701  002116          MOV     #SRTTAB,R1      ;INDEX TO TOP HALF OF SRTTAB
5897
5898
5899  030002  012021  1$:     MOV     (R0)+,(R1)+     ;PUT BOTTOM OF RHTAB TO TOP OF SRTTAB
5900  030004  020027  002116          CMP     R0,#RHTAB+132.
5901  030010  001374                  BNE     1$
5902
5903  030012  012700  001712          MOV     #RHTAB,R0       ;PUT TOP OF RHTAB TO BOT OF SRTTAB
5904  030016  012021  2$:     MOV     (R0)+,(R1)+
5905  030020  020037  001422          CMP     R0,SECTOR
5906  030024  001374                  BNE     2$
5907
5908  030026  012601                  MOV     (SP)+,R1        ;RESTOR R1
5909  030030  012600                  MOV     (SP)+,R0        ;RESTOR R0
5910  030032  000207                  RTS     PC
5911
5912                          ;
5913                          ;MULT BY 6. ENTER WITH DESIRED # IN 'SECTOR'
5914                          ;
```

```
 5915  030034  006337  001422          MULT6:  ASL     SECTOR          ;2 X SECTOR
 5916  030040  013746  001422                  MOV     SECTOR,-(SP)
 5917  030044  006337  001422                  ASL     SECTOR          ;4 X SECTOR
 5918  030050  062637  001422                  ADD     (SP)+,SECTOR    ;(4 X S)+(2 X S) = 6 X SECTOR
 5919  030054  000207                          RTS     PC
 5920
 5921                                  ;
 5922                                  ;THIS ROUTINE IS ENTERED ONLY IF THERE IS A BSE ERROR AFTER A WRITE DATA
 5923                                  ;CMD.  IT VERIFIES THAT THE BAD SECTOR IS LISTED IN THE BSE INFORMATION
 5924                                  ;CYLINDER AT CYL 410, TRACK 2.
 5925                                  ;
 5926                                  ;RETURN IF SECTOR NOT LISTED IN BSE TABLE, ERROR CONDITION.
 5927                                  ;RETURN+2 IF LISTED, SKIP OVER ERROR
 5928                                  ;
 5929  030056  010446                  TRUERR: MOV     R4,-(SP)                ;SAVE R4
 5930
 5931  030060  032737  010000  005340          BIT     #CFMT,HCS1      ;CHECK FORMAT
 5932  030066  001014                          BNE     3$              ;BR FOR 20 SECTOR FORMAT
 5933                                                                  ;NOTE, 20 SECTOR FORMAT NOT
 5934                                                                  ;DONE IN THIS PROGRAM
 5935
 5936  030070  012704  002332                  MOV     #BSE22H+8.,R4
 5937  030074  004737  030130                  JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
 5938  030100  000407                          BR      3$              ;RETURN HERE IF YES
 5939
 5940  030102  012704  003332                  MOV     #BSE22S+8.,R4   ;ELSE RETURN HERE
 5941  030106  004737  030130                  JSR     PC,TERR1        ;& SEE IF ON SOFTWARE DETECTED TABLE
 5942  030112  000402                          BR      3$              ;RETURN HERE IF YES
 5943
 5944  030114  012604                  1$:     MOV     (SP)+,R4        ;RESTORE R4
 5945  030116  000207                          RTS     PC              ;RETURN WITHOUT JUMPING OVER ERROR
 5946
 5947
 5948  030120  012604                  3$:     MOV     (SP)+,R4        ;RESTORE R4
 5949  030122  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR ON RETURN
 5950  030126  000207                          RTS     PC
 5951
 5952                                  ;
 5953                                  ;THIS ROUTINE DOES THE ACTUAL COMPARING OF CYLINDER, HEAD & TRACK AGAINST
 5954                                  ;THE BSE TABLE FOR THE ABOVE SUBROUTINE.
 5955                                  ;RETURN IF FOUND ON TABLE
 5956                                  ;RETURN+2 IF NOT FOUND
 5957                                  ;
 5958  030130  021427  177777  TERR1:  CMP     (R4),#-1        ;SEE IF ALL 1'S
 5959  030134  001405                  BEQ     1$              ;BR IF YES, NOT ON TABLE
 5960  030136  022437  005360          CMP     (R4)+,HDC       ;SEE IF CYL MATCH
 5961  030142  001405                  BEQ     2$              ;BR IF YES
 5962  030144  005724                  TST     (R4)+           ;ELSE ADV TO NEXT CYL WORD
 5963  030146  000770                  BR      TERR1           ;& TRY AGAIN.
 5964
 5965  030150  062716  000002  1$:     ADD     #2,(SP)
 5966  030154  000207                  RTS     PC
 5967
 5968  030156  022437  005350  2$:     CMP     (R4)+,HDA       ;SEE IF SECTOR & TRACK MATCH
 5969  030162  001401                  BEQ     3$              ;BR IF YES
 5970  030164  000761                  BR      TERR1           ;OR TRY AGAIN
```

GET VALUE FOR SOFTWARE SWITCH REGISTER SEQ 0114

```
                                3$:     RTS     PC
                                ;
                                ;
                                ;ROUTINE TO TURN L OR P CLOCK INTERRUPT ON
                                ;
030170  005037  001412          CLKON:  CLR     TIMUP
030174  005737  005504                  TST     PCLKF
030200  001004                          BNE     1$              ;BRANCH IF P-CLOCK PRESENT
030202  012777  000100  151136          MOV     #100,@LKS       ;L-CLOCK, ENABLE INT
030210  000207                          RTS     PC
030212  012777  177777  151122  1$:     MOV     #-1,@PKSB       ;P-CLOCK, ALL 1'S
030220  012777  000135  151112          MOV     #135,@PKS       ;ENABLE INT, CT UP, REP INT
030226  000207                          RTS     PC              ;LINE FREQ & RUN
                                ;
                                ;KW11-L & KW11-P INTERRUPT HANDLER
                                ;
030230  005037  001412          CLOCK:  CLR     TIMUP
030234  005337  001406                  DEC     COUNT
030240  001010                          BNE     1$
030242  013737  001404  001406          MOV     HZ,COUNT
030250  005337  001410                  DEC     SEC
030254  001002                          BNE     1$
030256  005237  001412                  INC     TIMUP           ;SORRY, TIME IS UP
030262  000002                  1$:     RTI
                                ;
                                ;ROUTINE TO TURN L OR P CLOCK INTERRUPT OFF
                                ;
030264  005737  005504          CLKOF:  TST     PCLKF
030270  001003                          BNE     1$              ;BRACH IF P-CLOCK PRESENT
030272  005077  151050                  CLR     @LKS            ;L-CLOCK, CLEAR INTERRUPT
030276  000207                          RTS     PC
030300  005077  151034          1$:     CLR     @PKS            ;P-CLOCK, CLEAR INTERRUPT
```

```
 6008  030304  000207                    RTS     PC
 6009
 6010                                    ;
 6011                                    ;THIS ROUTINE GENERATES PARITY FOR THE EXPECTED MESSAGES
 6012                                    ;ENTER WITH THE EXPECTED WORD IN TEMP1
 6013                                    ; TEMP1 IS ROTATED LEFT 17 TIMES. EACH TIME THE CARRY BIT IS SET,
 6014                                    ;R1 IS INCREMENTED. AT THE END OF 17 ROTATES ( TEMP1 BACK TO ORIG),
 6015                                    ;R1 BIT 0 IS EXAMINED. IF IT IS SET, INDICATING AN ODD # OF 1'S,
 6016                                    ; THE PARITY BIT IS NOT SET IN B .
 6017                                    ;IF IT IS NOT SET, INDICATING AN EVEN # OF 1'S ,THE PARITY BIT IS
 6018                                    ;SET IN TEMP1
 6019                                    ;
 6020  030306  010046                    SBPAR:  MOV     R0,-(SP)        ;SAVE R0
 6021  030310  010146                            MOV     R1,-(SP)        ;SAVE R1
 6022  030312  012700  000021                    MOV     #17.,R0         ;SHIFT COUNTER
 6023  030316  005001                            CLR     R1              ;COUNT # OF 1'S IN TEMP1
 6024  030320  000241                            CLC                     ;CLEAR CARRY
 6025
 6026  030322  006137  005376            1$:     ROL     TEMP1
 6027  030326  103001                            BCC     2$              ;BR IF CARRY CLEAR
 6028  030330  005201                            INC     R1              ;COUNT # OF 1'S
 6029  030332  005300                    2$:     DEC     R0              ;SHIFT COUNTER
 6030  030334  001372                            BNE     1$
 6031
 6032  030336  032701  000001                    BIT     #BIT0,R1
 6033  030342  001003                            BNE     3$              ;BR IF ODD # IN R0
```

GET VALUE FOR SOFTWARE SWITCH REGISTER SEQ 0116

```
030344  052737  100000  005376          BIS     #M.PAR,TEMP1    ;SET PARITY BIT
030352  012601                  3$:     MOV     (SP)+,R1        ;RESTORE R1
030354  012600                          MOV     (SP)+,R0        ;RESTORE R0
030356  000207                          RTS     PC

                        ;
                        ;ROUTINE TO ENABLE LOOPING ON INTERMITTANT ERRORS
                        ;WHEN $LPERR SET BY OTHER THAN SCOPE ROUTINE
                        ; IE: MY LOOP MACRO
                        ;
030360  032777  001000  150552  $SCOP1$: BIT     #SW9,@SWR       ;LOOP ON ERROR?
030366  001406                  BEQ     1$              ;BR IF NO
030370  105737  001103          TSTB    $ERFLG          ;HAD ERROR?
030374  001403                  BEQ     1$              ;BR IF NO
030376  013716  001110          MOV     $LPERR,(SP)
030402  000002                  RTI

030404  011637  001110          1$:     MOV     (SP),$LPERR     ;SET LOOP ADDR FOR TIGHT SCOPE LOOP
030410  000002                  RTI

                        ;
                        ;ROUTINE TO INPUT A 'SPACE' OR 'CONTROL-E' FROM TTY
                        ;RETURN IF CONTROL-E
                        ;RETURN +4 IF SPACE
                        ;
030412  005777  150530  CCSP:   TST     @$TKB           ;CLEAR DONE FLAG
030416  104410                  RDCHR                   ;READ CHAR FROM TTY
030420  012600                  MOV     (SP)+,R0        ;GET CHAR OFF STACK
030422  020027  000040          CMP     R0,#SPBAR       ;SEE IF SPACE
030426  001406                  BEQ     1$              ;BR IF YES.

030430  020027  000005          CMP     R0,#5           ;SEE IF CONTROL-E
030434  001405                  BEQ     2$              ;BR IF YES
030436  104401  040212          TYPE    ,MSG31          ;"?"
030442  000763                  BR      CCSP            ;TRY AGAIN

030444  062716  000004  1$:     ADD     #4,(SP)
030450  000207          2$:     RTS     PC

                        ;
                        ;ROUTINE TO INPUT A 'SPACE' FROM TTY
                        ;
030452  005777  150470  GETSP:  TST     @$TKB           ;CLEAR DONE FLAG
030456  104410                  RDCHR                   ;READ CHAR OFF TTY
030460  012600                  MOV     (SP)+,R0        ;GET CHAR OFF STACK
030462  020027  000040          CMP     R0,#SPBAR       ;SEE IF SPACE
030466  001403                  BEQ     1$              ;EXIT IF YES
030470  104401  040212          TYPE    ,MSG31          ;?
030474  000766                  BR      GETSP           ;TRY AGAIN
030476  000207          1$:     RTS     PC

                        ;
                        ;THIS ROUTINE IS ENTERED BY TYPING A CONTROL-C.
                        ;IT IS USED TO ALLOW THE OPERATOR TO HALT THE CPU WHILE INSURING
```

```
                                        ;THAT HEADS ARE LOADED & FORMATTING IS VALID BEFORE ACTUALLY HALTING
                                        ;THE CPU.
                                        ;
030500  022626                  STOP:   CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INTERRUPT

030502  004737  026436          STOP1:  JSR     PC,SUBCLR
030506  104024                          ERROR   24              ;CERR AFTER

030510  005737  005322                  TST     UNLD            ;SEE IF HEADS UNLOADED
030514  001437                          BEQ     3$              ;BR IF NO
030516  005737  000042                  TST     42              ;SEE IF MANUAL OR AUTO MODE
030522  001403                          BEQ     1$              ;BR IF MANUAL MODE
030524  104401  044071                  TYPE    ,MSG74          ;PGM ABORT PENDING
030530  000402                          BR      2$
030532  104401  044137          1$:     TYPE    ,MSG75          ;HALT PENDING
030536                          2$:

030536  004737  026436                  JSR     PC,SUBCLR
030542  104024                          ERROR   24              ;CERR AFTER SCLR

030544  032737  010000  005366          BIT     #D.SPIN,HMR2    ;SEE IF SPINDLE ALREADY ON
030552  001020                          BNE     64$             ;BR IF YES
030554  104401  040064                  TYPE    ,MSG29          ;PLEASE WAIT, HEADS BEING LOADED

030560  012737  000011  005340          MOV     #SRTSPL,HCS1
030566  004737  024446                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
030572  104143                          ERROR   143             ;CONTR RDY NOT SET AFTER CMD

030574  013737  001426  005400          MOV     T100,TEMP2
030602  004737  025056                  JSR     PC,FATT1        ;FIND ATTN
030606  104144                          ERROR   144             ;NO ATTN AFTER CMD

030610  005037  005322                  CLR     UNLD
030614                          64$:

030614  005737  005324          3$:     TST     BADHDR          ;SEE IF HEADERS VALID
030620  001460                          BEQ     4$              ;BR IF YES
030622  005237  005326                  INC     HPEND
030626  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
030634  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
030642  012737  000013  005340          MOV     #RECAL,HCS1
030650  004737  024446                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
030654  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD

030656  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
030664  004737  026106                  JSR     PC,GSTAT
030670  032737  020000  005366          BIT     #D.RTZ,HMR2
030676  001001                          BNE     65$
030700  104214                          ERROR   214             ;RTZ NOT SET DURING RECAL CMD
030702  013737  001424  005400  65$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
030710  004737  025056                  JSR     PC,FATT1        ;FIND ATTN
030714  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD

030716  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
030724  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
030732  012737  000005  005340          MOV     #CLEAR,HCS1
```

```
                                        JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
                                        ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
                                        JSR     PC,TSTATN       ;TEST FOR ATTN
                                        BR      66$
                                        ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
                                66$:

                                        JMP     FORM            ;WRITE VALID FORMATS

                                4$:     TST     42              ;SEE IF MANUAL OR AUTO MODE
                                        BEQ     5$              ;BR IF MANUAL MODE
                                        TYPE    ,MSG76          ;PGM ABORTED
                                        CLR     $EOPCT          ;SET UP EOP TO EXIT TO MONITOR
                                        CLR     $ESCAPE
                                        JMP     $EOP            ;ABORT PROGRAM

                                5$:     TYPE    ,MSG77          ;CPU HALTED
                                        HALT
                                        JMP     ST5             ;START OVER IF CONTINUE PRESSED

                                FORM:
                                .SBTTL  UNEXPECTED TIMEOUT HANDLER

                                ;
                                ;THIS ROUTINE IS ENTERED IF THERE IS
                                ;       A.  NON EXISTANT MEMORY (NO SSYN)
                                ;       B.  BOUNDRY ERROR
                                ;       C.  STACK OVERFLOW
                                ;

031022  011600                  BADTMO: MOV     (SP),R0         ;SAVE PC WHERE TIMEOUT OCCURRED.
031024  005740                          TST     -(R0)           ;GET PC BEFORE UPDATE
031026  032777  020000  150104          BIT     #SW13,@SWR      ;INHIBIT ERR TYPOUT?
031034  001005                          BNE     1$              ;YES, DON'T TYPE
031036  104401  044546                  TYPE    ,EM3            ;ABORT TESTS,UNEXP T.O. @ PC=
031042  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TYPE PC
031044  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
031046     006                          .BYTE   6               ;;TYPE 6 DIGIT(S)
031047     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
031050  032777  001000  150062  1$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
031056  001403                          BEQ     2$              ;NO, BRANCH
031060  022626                          CMP     (SP)+,(SP)+     ;YES, RESTORE STACK
031062  000177  150020                  JMP     @$LPADR         ;GO TO STARTING ADDR OF TEST
                                                                ;THAT GAVE BAD TIMEOUT
031066  032777  040000  150044  2$:     BIT     #SW14,@SWR      ;LOOP ON TEST?
031074  001401                          BEQ     3$              ;NO BRANCH
031076  000002                          RTI                     ;YES

031100  000000                  3$:     HALT                    ;UNEXPECTED TIME OUT OCCURRED
                                                                ;AS INDICATED. YOU CAN LOOP ON
                                                                ;ERROR, LOOP ON TEST OR INHIBIT
                                                                ;ERROR TYPEOUT BY SETTING THOSE
                                                                ;SWITCHES.
                                                                ;
```

```
                                                C 10
CZR6JF0 UNIBUS RK6 DR-3 MACY11 30(1046)  04-JAN-82  13:06  PAGE 120
CZR6JF.P11    04-JAN-82 12:48           UNEXPECTED TIMEOUT HANDLER                                SEQ 0119

  6202  031102  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK
  6203  031104  000137  023734                  JMP     $EOP            ;ABORT TESTS
  6204
  6205                                  .SBTTL  MEMORY CHECK ENABLE TRAP
  6206
  6207  031110  012737  031124  001176  MEMERR: MOV     #1$,$ESCAPE
  6208  031116  011637  001354                  MOV     (SP),TRAPPC     ;STORE PC
  6209  031122  104202                          ERROR   202             ;UNEXP MEM PARITY ERROR
  6210
  6211  031124  005037  001176          1$:     CLR     $ESCAPE
  6212  031130  032777  001000  150002          BIT     #SW9,@SWR       ;CHECK IF LOOP ON ERROR
  6213  031136  001001                          BNE     2$              ;YES, FORCE STACK AND TRY AGAIN
  6214  031140  000002                          RTI                     ;ELSE RETURN
  6215
  6216  031142  012706  001100          2$:     MOV     #STACK,SP       ;INIT STACK
  6217  031146  000177  147736                  JMP     @$LPERR
  6218
  6219                                  .SBTTL  RK06 INTERRUPT HANDLER
  6220
  6221  031152  000240                  INTER:  NOP
  6222  031154  000240                          NOP
  6223  031156  000240                          NOP
  6224  031160  011600                          MOV     (SP),R0         ;SAVE PC WHERE INT OCCURRED.
  6225  031162  005740                          TST     -(R0)           ;GET PC BEFORE UPDATE.
  6226  031164  104401  037036                  TYPE    ,MSG6           ;INT AT PC=
  6227  031170  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
  6228                                                                  ;;TYPE PC
  6229  031172  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
  6230  031174     006                          .BYTE   6               ;;TYPE 6 DIGIT(S)
  6231  031175     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
  6232  031176  000000                          HALT
  6233  031200  000240                          NOP
  6234  031202  000240                          NOP
  6235  031204  000002                          RTI
  6236
  6237                                  .SBTTL  POWER DOWN AND UP ROUTINES
  6238
  6239                                  ;POWER DOWN ROUTINE
  6240
  6241  031206  012737  031220  000024  $PWRDN: MOV     #$PWRUP,PWRVEC  ;SET UP VECTOR
  6242  031214  000000                          HALT
  6243  031216  000776                          BR      .-2             ;HANG UP.
  6244
  6245                                  ;POWER UP ROUTINE
  6246
  6247  031220  005037  031272          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY
  6248  031224  005237  031272          1$:     INC     $PWRCT          ;WAIT FOR THE INCR
  6249  031230  001375                          BNE     1$              ;OF WORD
  6250  031232  012737  031206  000024          MOV     #$PWRDN,PWRVEC  ;SET POWER DOWN VECTOR
  6251  031240  012737  000340  000026          MOV     #PR7,PWRVEC+2   ;PRIORITY 7
  6252  031246  012737  000340  000036          MOV     #PR7,TRAPVEC+2  ;LOCKOUT ALL INTERRUPTS FOR TRAPS
  6253  031254  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK
  6254  031260  104401  037232                  TYPE    ,MSG11          ;REPORT POWER FAIL
  6255  031264  000005                          RESET
  6256  031266  000137  012664                  JMP     PFSRT
  6257
```

```
 6258  031272  000000                  $PWRCT: 0                       ;WAIT COUNT FOR TTY
 6259
 6260                                  ;
 6261                                  ;DIVISION UTILITY ROUTINE
 6262                                  ;
 6263                                  ;R0-R1-R2-R3=DIVIDEND
 6264                                  ;R4-R5=DIVISOR
 6265                                  ;R0-R1=REMAINDER AFTER DIVISION
 6266                                  ;R2-R3=QUOTIENT AFTER DIVISION
 6267                                  ;ENTER WITH JSR PC,M.DPID
 6268                                  ;
 6269  031274  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 6270  031300  010446                          MOV     R4,-(SP)        ;HI ORDER
 6271  031302  010546                          MOV     R5,-(SP)        ;LO ORDER TO THE STACK
 6272  031304  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
 6273  031310  005416                          NEG     @SP             ;VERSION OF DIVISOR
 6274  031312  005666  000002                  SBC     2(SP)
 6275  031316  061601                          ADD     @SP,R1
 6276  031320  005500                          ADC     R0              ;PERFORM INIT SUBT.
 6277  031322  066600  000002                  ADD     2(SP),R0
 6278  031326  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
 6279  031330  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
 6280  031332  006103          M.DP40: ROL     R3
 6281  031334  006102                  ROL     R2
 6282  031336  006101                  ROL     R1
 6283  031340  006100                  ROL     R0
 6284  031342  005716                  TST     @SP             ;TEST CARRY INDICATOR
 6285  031344  001410                  BEQ     M.DP41          ;IF TO CARRY THEN ADD, ELSE SUBT.
 6286  031346  005016                  CLR     @SP             ;CLEAR UP FOR NEXT TIME
 6287  031350  066601  000002                  ADD     2(SP),R1
 6288  031354  005500                          ADC     R0              ;ADD -(DIVISOR)
 6289  031356  005516                          ADC     @SP             ;SET CARRY
 6290  031360  066600  000004                  ADD     4(SP),R0
 6291  031364  000404                          BR      M.DP42
 6292
 6293  031366  060501          M.DP41: ADD     R5,R1
 6294  031370  005500                  ADC     R0              ;ADD +(DIVISOR)
 6295  031372  005516                  ADC     @SP             ;SET CARRY
 6296  031374  060400                  ADD     R4,R0
 6297  031376  005516          M.DP42: ADC     @SP             ;SET CARRY
 6298  031400  005716                  TST     @SP             ;TEST THE UPDATE INDICATOR
 6299  031402  001401                  BEQ     .+4             ;IF 0,FORGET IT
 6300  031404  005203                  INC     R3              ;NO CARRY POSSIBLE HERE
 6301  031406  005366  000006                  DEC     6(SP)           ;DECREMENT CTR
 6302  031412  003347                          BGT     M.DP40          ;BR IF MORE TO DO
 6303  031414  006003                  ROR     R3
 6304  031416  103404                  BCS     M.DP44
 6305  031420  060501                  ADD     R5,R1
 6306  031422  005500                  ADC     R0
 6307  031424  060400                  ADD     R4,R0
 6308  031426  000241                  CLC
 6309
 6310  031430  006103          M.DP44: ROL     R3
 6311  031432  062706  000010                  ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
 6312  031436  000242                  CLV
 6313  031440  000207                  RTS     PC
```

```
 6314
 6315  031442  062706  000006          M.DP50: ADD     #6,SP
 6316  031446  000262                          SEV
 6317  031450  000207                          RTS     PC
 6318
```

```
                        .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

031452                  $SCOPE:
031452  104407                  CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
031454  032777  040000  147456  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
031462  001114                  BNE     $OVER           ;;YES IF SW14=1
                        ;#####START OF CODE FOR THE XOR TESTER#####
031464  000416          $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
031466  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
031472  012737  031512  000004  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
031500  005737  177060          TST     @#177060        ;;TIME OUT ON XOR?
031504  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
031510  000463                  BR      $SVLAD          ;;GO TO THE NEXT TEST
031512  022626          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
031514  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
031520  000423                  BR      7$              ;;LOOP ON THE PRESENT TEST
031522                  6$:;#####END OF CODE FOR THE XOR TESTER#####
031522  032777  000400  147410  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
031530  001404                  BEQ     2$              ;;BR IF NO
031532  127737  147402  001102  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
031540  001465                  BEQ     $OVER           ;;BR IF YES
031542  105737  001103  2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
031546  001421                  BEQ     3$              ;;BR IF NO
031550  123737  001115  001103  CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
031556  101015                  BHI     3$              ;;BR IF NO
031560  032777  001000  147352  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
031566  001404                  BEQ     4$              ;;BR IF NO
031570  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
031576  000446                  BR      $OVER
031600  105037  001103  4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
031604  005037  001174          CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
031610  000415                  BR      1$              ;;ESCAPE TO THE NEXT TEST
031612  032777  004000  147320  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
031620  001011                  BNE     1$              ;;BR IF YES
031622  005737  001216          TST     $PASS           ;;IF FIRST PASS OF PROGRAM
031626  001406                  BEQ     1$              ;;      INHIBIT ITERATIONS
031630  005237  001104          INC     $ICNT           ;;INCREMENT ITERATION COUNT
031634  023737  001174  001104  CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
031642  002024                  BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
031644  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
031652  013737  031730  001174          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
031660  105237  001102  $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
031664  113737  001102  001214          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
```

```
 6375  031672  011637  001106                 MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 6376  031676  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 6377  031702  005037  001176                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 6378  031706  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 6379  031714  013777  001102  147220 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 6380  031722  013716  001106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 6381  031726  000002                         RTI                     ;;FIXES PS
 6382  031730  003720                 $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 6383                                  .SBTTL  ERROR HANDLER ROUTINE
 6384
 6385                                  ;;**************************************************************************
 6386                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 6387                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 6388                                  ;*AND GO TO TYPERR ON ERROR
 6389                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 6390                                  ;*SW15=1         HALT ON ERROR
 6391                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 6392                                  ;*SW10=1         BELL ON ERROR
 6393                                  ;*SW09=1         LOOP ON ERROR
 6394                                  ;*CALL
 6395                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 6396
 6397  031732                          $ERROR:
 6398  031732  104407                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 6399  031734  105237  001103         7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 6400  031740  001775                         BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 6401  031742  013777  001102  147172         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 6402  031750  032777  002000  147162         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 6403  031756  001402                         BEQ     1$              ;;NO - SKIP
 6404  031760  104401  001200                 TYPE    ,$BELL          ;;RING BELL
 6405  031764  005237  001112         1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 6406  031770  011637  001116                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 6407  031774  162737  000002  001116         SUB     #2,$ERRPC
 6408  032002  117737  147110  001114         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 6409  032010  032777  020000  147122         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 6410  032016  001004                         BNE     20$             ;;SKIP TYPEOUTS
 6411  032020  004737  055134                 JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
 6412  032024  104401  001205                 TYPE    ,$CRLF
 6413  032030                          20$:
 6414  032030  122737  000001  001230         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 6415  032036  001007                         BNE     2$              ;;NO,SKIP APT ERROR REPORT
 6416  032040  113737  001114  032052         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 6417  032046  004737  032730                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 6418  032052     000                  21$:    .BYTE   0
 6419  032053     000                          .BYTE   0
 6420  032054  000777                  22$:    BR      22$             ;;APT ERROR LOOP
 6421  032056  005777  147056         2$:     TST     @SWR            ;;HALT ON ERROR
 6422  032062  100002                         BPL     3$              ;;SKIP IF CONTINUE
 6423  032064  000000                         HALT                    ;;HALT ON ERROR!
 6424  032066  104407                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 6425  032070  032777  001000  147042 3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 6426  032076  001402                         BEQ     4$              ;;BR IF NO
 6427  032100  013716  001110                 MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 6428  032104  005737  001176         4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 6429  032110  001402                         BEQ     5$              ;;BR IF NONE
 6430  032112  013716  001176                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
```

```
 6431  032116                                5$:
 6432  032116  022737  024022  000042              CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
 6433  032124  001001                              BNE     6$              ;;BRANCH IF NO
 6434  032126  000000                              HALT                    ;;YES
 6435  032130                                6$:
 6436  032130  000002                              RTI                     ;;RETURN
 6437                                  .SBTTL  TYPE ROUTINE
 6438
 6439                                  ;;**********************************************************************
 6440                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 6441                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 6442                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 6443                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 6444                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 6445                                  ;*
 6446                                  ;*CALL:
 6447                                  ;*1) USING A TRAP INSTRUCTION
 6448                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 6449                                  ;*OR
 6450                                  ;*      TYPE
 6451                                  ;*      MESADR
 6452                                  ;*
 6453
 6454  032132  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 6455  032136  100002                          BPL     1$              ;;BR IF YES
 6456  032140  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 6457  032142  000430                          BR      3$              ;;LEAVE
 6458  032144  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 6459  032146  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 6460  032152  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 6461  032160  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 6462  032162  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 6463  032170  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 6464  032172  010037  032202                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 6465  032176  004737  032720                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 6466  032202  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
 6467  032204  132737  000040  001231  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 6468  032212  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
 6469  032214  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 6470  032216  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 6471  032220  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 6472  032222  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 6473  032224  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 6474  032230  000002                          RTI                     ;;RETURN
 6475  032232  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 6476  032236  001430                          BEQ     8$
 6477  032240  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 6478  032244  001006                          BNE     5$
 6479  032246  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 6480  032250  104401                          TYPE                    ;;TYPE A CR AND LF
 6481  032252  001205                          $CRLF
 6482  032254  105037  032462                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 6483  032260  000755                          BR      2$              ;;GET NEXT CHARACTER
 6484  032262  004737  032344          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 6485  032266  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 6486  032272  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
```

```
                                ;HORIZONTAL TAB PROCESSOR

032320  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
032324  004737  032344          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
032330  132737  000007  032462          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
032336  001372                          BNE     9$              ;;TAB STOP
032340  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
032342  000724                          BR      2$              ;;GET NEXT CHARACTER
032344                          $TYPEC:
032344  105777  146574                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          :MJD001
032350  100022                          BPL     10$             ;;BR IF NOT                     :MJD001
032352  017746  146570                  MOV     @$TKB,-(SP)     ;;GET CHAR                      :MJD001
032356  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         :MJD001
032362  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 :MJD001
032366  001012                          BNE     102$            ;;BR IF NOT                     :MJD001
032370                          101$:                                                           :MJD001
032370  105777  146550                  TSTB    @$TKS           ;;WAIT FOR CHAR                 :MJD001
032374  100375                          BPL     101$                                            :MJD001
032376  117716  146544                  MOVB    @$TKB,(SP)      ;;GET CHAR                      :MJD001
032402  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT                      :MJD001
032406  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?                   :MJD001
032412  001366                          BNE     101$            ;;BR IF NOT                     :MJD001
032414                          102$:                                                           :MJD001
032414  005726                          TST     (SP)+           ;;FIX STACK                     :MJD001
032416                          10$:                                                            :MJD001
032416  105777  146526                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
032422  100375                          BPL     10$                                             :MJD001
032424  116677  000002  146520          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
032432  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
032440  001003                          BNE     1$              ;;BRANCH IF NO
032442  105037  032462                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
032446  000406                          BR      $TYPEX          ;;EXIT
032450  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
032456  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
032460  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
032462  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
032464  000207                  $TYPEX: RTS     PC

                                .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
                                        $TYPDS:
032466                                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
032466  010046                                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
032470  010146                                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
032472  010246                                 MOV     R3,-(SP)        ;;PUSH R3 ON STACK
032474  010346                                 MOV     R5,-(SP)        ;;PUSH R5 ON STACK
032476  010546                                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
032500  012746  020200                         MOV     20(SP),R5       ;;GET THE INPUT NUMBER
032504  016605  000020                         BPL     1$              ;;BR IF INPUT IS POS.
032510  100004                                 NEG     R5              ;;MAKE THE BINARY NUMBER POS.
032512  005405                                 MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
032514  112766  000055  000001          1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
032522  005000                                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
032524  012703  032702                         MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
032530  112723  000040                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
032534  005002                                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
032536  016001  032672                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
032542  160105                                 BLT     4$              ;;BR IF DONE
032544  002402                                 INC     R2              ;;INCREASE THE BCD DIGIT BY 1
032546  005202                                 BR      3$
032550  000774                         4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
032552  060105                                 TST     R2              ;;CHECK IF BCD DIGIT=0
032554  005702                                 BNE     5$              ;;FALL THROUGH IF 0
032556  001002                                 TSTB    (SP)            ;;STILL DOING LEADING 0'S?
032560  105716                                 BMI     7$              ;;BR IF YES
032562  100407                         5$:     ASLB    (SP)            ;;MSD?
032564  106316                                 BCC     6$              ;;BR IF NO
032566  103003                                 MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
032570  116663  000001  177777          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
032576  052702  000060                 7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
032602  052702  000040                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
032606  110223                                 TST     (R0)+           ;;JUST INCREMENTING
032610  005720                                 CMP     R0,#10          ;;CHECK THE TABLE INDEX
032612  020027  000010                         BLT     2$              ;;GO DO THE NEXT DIGIT
032616  002746                                 BGT     8$              ;;GO TO EXIT
032620  003002                                 MOV     R5,R2           ;;GET THE LSD
032622  010502                                 BR      6$              ;;GO CHANGE TO ASCII
032624  000764                         8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
032626  105726                                 BPL     9$              ;;BR IF NO
032630  100003                                 MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
032632  116663  177777  177776          9$:     CLRB    (R3)            ;;SET THE TERMINATOR
032640  105013                                 MOV     (SP)+,R5        ;;POP STACK INTO R5
032642  012605                                 MOV     (SP)+,R3        ;;POP STACK INTO R3
032644  012603                                 MOV     (SP)+,R2        ;;POP STACK INTO R2
032646  012602                                 MOV     (SP)+,R1        ;;POP STACK INTO R1
032650  012601                                 MOV     (SP)+,R0        ;;POP STACK INTO R0
032652  012600                                 TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
032654  104401  032702                         MOV     2(SP),4(SP)     ;;ADJUST THE STACK
032660  016666  000002  000004                 MOV     (SP)+,(SP)
032666  012616                                 RTI                     ;;RETURN TO USER
032670  000002                         $DTBL:  10000.
032672  023420                                 1000.
032674  001750                                 100.
032676  000144                                 10.
032700  000012
```

```
                                $DBLK:  .BLKW   4
                                .SBTTL  APT COMMUNICATIONS ROUTINE
                                ;;*****************************************************************
033712  112737  000001  033156  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
033720  112737  000001  033154  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
033726  000403                  BR      $ATYC
033730  112737  000001  033156  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
033736                          $ATYC:
033736  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
033740  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
033742  105737  033154          TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
033746  001450                  BEQ     5$              ;;IF NOT:  BR
033750  122737  000001  001230  CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
033756  001031                  BNE     3$              ;;IF NOT:  BR
033760  132737  000100  001231  BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
033766  001425                  BEQ     3$              ;;IF NOT:  BR
033770  017600  000004          MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
033774  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
033002  005737  001210  1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
033006  001375                  BNE     1$              ;;IF NUT:  WAIT
033010  010037  001224          MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
033014  105720          2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
033016  001376                  BNE     2$
033020  163700  001224          SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
033024  006200                  ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
033026  010037  001226          MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
033032  012737  000004  001210  MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
033040  000413                  BR      5$
033042  017637  000004  033066  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
033050  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
033056  013746  177776          MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
033062  004737  032132          JSR     PC,$TYPE        ;;CALL TYPE MACRO
033066  000000          4$:     .WORD   0
033070                  5$:
033070  105737  033156  10$:     TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
033074  001416                  BEQ     12$             ;;IF NOT:  BR
033076  005737  001230          TST     $ENV            ;;RUNNING UNDER APT?
033102  001413                  BEQ     12$             ;;IF NOT:  BR
033104  005737  001210  11$:     TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
033110  001375                  BNE     11$             ;;IF NOT:  WAIT
033112  017637  000004  001212  MOV     @4(SP),$FATAL   ;;GET ERROR #
033120  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
033126  005237  001210          INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
033132  105037  033156  12$:     CLRB    $FFLG           ;;CLEAR FATAL FLAG
033136  105037  033155          CLRB    $LFLG           ;;CLEAR LOG FLAG
033142  105037  033154          CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
033146  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
033150  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
033152  000207                  RTS     PC              ;;RETURN
033154     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
033155     000          $LFLG:  .BYTE   0               ;;LOG FLAG
033156     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
033160                          .EVEN
000200                  APTSIZE=200
000001                  APTENV=001
```

```
  6655           000100                  APTSPOOL=100
  6656           000040                  APTCSUP=040
  6657                                   .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
  6658
  6659                                   ;;**********************************************************************
  6660                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
  6661                                   ;*OCTAL (ASCII) NUMBER AND TYPE IT.
  6662                                   ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
  6663                                   ;*CALL:
  6664                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  6665                                   ;*      TYPOS                   ;;CALL FOR TYPEOUT
  6666                                   ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
  6667                                   ;*      .BYTE   M               ;;M=1 OR 0
  6668                                   ;*                                      ;;1=TYPE LEADING ZEROS
  6669                                   ;*                                      ;;0=SUPPRESS LEADING ZEROS
  6670                                   ;*
  6671                                   ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
  6672                                   ;*$TYPOS OR $TYPOC
  6673                                   ;*CALL:
  6674                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  6675                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
  6676                                   ;*
  6677                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
  6678                                   ;*CALL:
  6679                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  6680                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
  6681
  6682  033160  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
  6683  033164  116637  000001  033403          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
  6684  033172  112637  033405                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
  6685  033176  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
  6686  033202  000406                          BR      $TYPON
  6687  033204  112737  000001  033403  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
  6688  033212  112737  000006  033405          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
  6689  033220  112737  000005  033402  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
  6690  033226  010346                          MOV     R3,-(SP)        ;;SAVE R3
  6691  033230  010446                          MOV     R4,-(SP)        ;;SAVE R4
  6692  033232  010546                          MOV     R5,-(SP)        ;;SAVE R5
  6693  033234  113704  033405                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
  6694  033240  005404                          NEG     R4
  6695  033242  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
  6696  033246  110437  033404                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
  6697  033252  113704  033403                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
  6698  033256  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
  6699  033262  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
  6700  033264  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
  6701  033266  000404                          BR      3$              ;;GO DO MSB
  6702  033270  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
  6703  033272  006105                          ROL     R5
  6704  033274  006105                          ROL     R5
  6705  033276  010503                          MOV     R5,R3
  6706  033300  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
  6707  033302  105337  033404                  DECB    $OMODE          ;;TYPE THIS DIGIT?
  6708  033306  100016                          BPL     7$              ;;BR IF NO
  6709  033310  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
  6710  033314  001002                          BNE     4$              ;;TEST FOR 0
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 6711  033316  005704                        TST     R4              ;;SUPPRESS THIS 0?
 6712  033320  001403                        BEQ     5$              ;;BR IF YES
 6713  033322  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 6714  033324  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 6715  033330  052703  000040        5$:   BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 6716  033334  110337  033400              MOVB    R3,8$           ;;SAVE FOR TYPING
 6717  033340  104401  033400              TYPE    ,8$             ;;GO TYPE THIS DIGIT
 6718  033344  105337  033402        7$:   DECB    $OCNT           ;;COUNT BY 1
 6719  033350  003347                        BGT     2$              ;;BR IF MORE TO DO
 6720  033352  002402                        BLT     6$              ;;BR IF DONE
 6721  033354  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 6722  033356  000744                        BR      2$              ;;GO DO THE LAST DIGIT
 6723  033360  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
 6724  033362  012604                        MOV     (SP)+,R4        ;;RESTORE R4
 6725  033364  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 6726  033366  016666  000002  000004       MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 6727  033374  012616                        MOV     (SP)+,(SP)
 6728  033376  000002                        RTI                     ;;RETURN
 6729  033400     000                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 6730  033401     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 6731  033402     000                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 6732  033403     000                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 6733  033404  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 6734                                .SBTTL  TTY INPUT ROUTINE
 6735
 6736                                ;;******************************************************************************
 6737                                .ENABL  LSB
 6738  033406  000000                $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
 6739  033410  000000                $TKQIN: .WORD   0               ;;INPUT POINTER
 6740  033412  000000                $TKQOUT: .WORD  0               ;;OUTPUT POINTER
 6741  033414  000001                $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
 6742          033415                $TKQEND=.
 6743          033416                .EVEN
 6744
 6745                                ;*TK INITIALIZE ROUTINE
 6746                                ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
 6747                                ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
 6748                                ;
 6749                                ;*CALL:
 6750                                ;*      JSR     PC,$TKINT
 6751                                ;*      RETURN
 6752                                ;
 6753  033416  005037  033406        $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
 6754  033422  012737  033414  033410        MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
 6755  033430  013737  033410  033412        MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
 6756  033436  012737  033466  000060        MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
 6757  033444  012737  000200  000062        MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
 6758  033452  005777  145470                TST     @$TKB           ;;CLEAR DONE FLAG
 6759  033456  012777  000100  145460        MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
 6760  033464  000207                        RTS     PC              ;;RETURN TO CALLER
 6761
 6762                                ;*TK SERVICE ROUTINE
 6763                                ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
 6764                                ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
 6765                                ;*IT IN THE QUEUE.
 6766                                ;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
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                                ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (STOP)
                                ;
033466  117746  145454      $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
033472  042716  177600              BIC     #^C177,(SP)     ;;STRIP THE JUNK
033476  021627  000021              CMP     (SP),#$XON      ;;IS IT A RANDOM XON?                   ;RAN001
033502  001002                      BNE     30$             ;;BRANCH IF NO                          ;RAN001
033504  005726                      TST     (SP)+           ;;CLEAN RANDOM XON OFF STACK            ;RAN001
033506  000002                      RTI                     ;;RETURN                                ;RAN001
033510                          30$:                                                                ;RAN001
033510  021627  000003              CMP     (SP),#3         ;;IS IT A CONTROL C?
033514  001007                      BNE     1$              ;;BRANCH IF NO
033516  104401  034626              TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
033522  004737  033414              JSR     PC,$TKINT       ;;INIT THE KEYBOARD
033526  005726                      TST     (SP)+           ;;CLEAN UP STACK
033530  000137  030500              JMP     STOP            ;;CONTROL C RESTART
033534  021627  000007          1$: CMP     (SP),#7         ;;IS IT A CONTROL G?
033540  001004                      BNE     2$              ;;BRANCH IF NO
033542  022737  000176  001140      CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
033550  001500                      BEQ     6$              ;;GO TO SWR CHANGE
                                ;
033552                          2$:
033552  022737  000001  033406      CMP     #1,$TKCNT       ;;IS THE QUEUE FULL?
033560  001004                      BNE     3$              ;;BRANCH IF NO
033562  104401  001200              TYPE    ,$BELL          ;;RING THE TTY BELL
033566  005726                      TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
033570  000451                      BR      5$              ;;EXIT
033572  021627  000023          3$: CMP     (SP),#23        ;;IS IT A CONTROL-S?
033576  001021                      BNE     32$             ;;BRANCH IF NO
033600  005077  145340              CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
033604  005726                      TST     (SP)+           ;;CLEAN CHAR OFF STACK
033606  105777  145332          31$: TSTB    @$TKS           ;;WAIT FOR A CHAR
033612  100375                      BPL     31$             ;;LOOP UNTIL ITS THERE
033614  117746  145326              MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
033620  042716  177600              BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
033624  022627  000021              CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
033630  001366                      BNE     31$             ;;BRANCH IF NO
033632  012777  000100  145304      MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
033640  000002                      RTI                     ;;RETURN
033642  005237  033406          32$: INC     $TKCNT          ;;COUNT THIS CHARACTER
033646  021627  000140              CMP     (SP),#140       ;;IS IT UPPER CASE?
033652  002405                      BLT     4$              ;;BRANCH IF YES
033654  021627  000175              CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
033660  003002                      BGT     4$              ;;BRANCH IF YES
033662  042716  000040              BIC     #40,(SP)        ;;MAKE IT UPPER CASE
033666  112677  177516          4$: MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
033672  005237  033410              INC     $TKQIN          ;;UPDATE THE POINTER
033676  023727  033410  033415      CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
033704  001003                      BNE     5$              ;;BRANCH IF NO
033706  012737  033414  033410      MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
033714  000002                  5$: RTI                     ;;RETURN
                                ;;*******************************************************************
                                ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
                                ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
                                ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
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 6823  033716  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
 6824  033724  001124                          BNE     15$             ;;EXIT IF NOT
 6825  033726  105777  145212                  TSTB    @$TKS           ;;IS A CHAR WAITING?
 6826  033732  100121                          BPL     15$             ;;IF NOT, EXIT
 6827  033734  117746  145206                  MOVB    @$TKB,-(SP)     ;;YES
 6828  033740  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
 6829  033744  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
 6830  033750  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
 6831                                                                  ;;AND EXIT
 6832
 6833                                  ;;**************************************************************************
 6834                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
 6835                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
 6836                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
 6837  033752  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 6838  033760  001674                          BEQ     2$              ;;BRANCH IF YES
 6839  033762  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
 6840  033764  004737  033416                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
 6841  033770  005077  145150                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 6842  033774  112737  000001  001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
 6843
 6844  034002  104401  034640                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
 6845  034006  104401  034645  $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 6846  034012  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
 6847  034016  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6848  034020  104401  034656                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 6849  034024  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 6850  034026  005046                          CLR     -(SP)           ;;THE NEW SWR
 6851  034030  105777  145110          7$:     TSTB    @$TKS           ;;CHAR THERE?
 6852  034034  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 6853
 6854  034036  117746  145104                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 6855  034042  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 6856
 6857  034046  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
 6858  034052  001015                          BNE     9$              ;;BRANCH IF NOT
 6859  034054  104401  034626                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
 6860  034060  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
 6861  034064  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 6862  034072  001003                          BNE     8$              ;;BRANCH IF NO
 6863  034074  012777  000100  145042          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 6864  034102  000137  030500          8$:     JMP     STOP            ;;CONTROL-C RESTART
 6865
 6866
 6867  034106  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 6868  034112  001005                          BNE     10$             ;;BRANCH IF NOT
 6869  034114  104401  034633                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 6870  034120  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 6871  034124  000737                          BR      19$             ;;LET'S TRY IT AGAIN
 6872
 6873
 6874  034126  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 6875  034132  001022                          BNE     16$             ;;BRANCH IF NO
 6876  034134  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 6877  034140  001403                          BEQ     11$             ;;BRANCH IF YES
 6878  034142  016677  000002  144770          MOV     2(SP),@SWR      ;;SAVE NEW SWR
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6879  034150  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
6880  034154  104401  001205          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
6881  034160  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
6882  034166  001003                          BNE     15$             ;;BRANCH IF NOT
6883  034170  012777  000100  144746          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
6884  034176  000002                  15$:    RTI                     ;;RETURN
6885  034200  004737  032344          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
6886  034204  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
6887  034210  002420                          BLT     18$             ;;BRANCH IF YES
6888  034212  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
6889  034216  003015                          BGT     18$             ;;BRANCH IF YES
6890  034220  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
6891  034224  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
6892  034230  001403                          BEQ     17$             ;;BRANCH IF YES
6893  034232  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
6894  034234  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
6895  034236  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
6896  034240  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
6897  034244  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
6898  034250  000667                          BR      7$              ;;GET THE NEXT ONE
6899  034252  104401  001204          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
6900  034256  000720                          BR      20$             ;;SIMULATE CONTROL-U
6901                                  .DSABL  LSB
6902
6903
6904                                  ;;**********************************************************************
6905                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
6906                                  ;*CALL:
6907                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
6908                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
6909                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
6910                                  ;
6911
6912  034260  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
6913  034262  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
6914  034270  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
6915  034274  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
6916  034276  012746  034304                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
6917  034302  000002                          RTI                     ;;POP NEW PC AND PS
6918  034304                          64$:
6919  034304  005737  033406          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
6920  034310  001775                          BEQ     1$
6921  034312  005337  033406                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
6922  034316  117766  177070  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
6923  034324  005237  033412                  INC     $TKQOUT         ;;UPDATE THE POINTER
6924  034330  023727  033412  033415          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
6925  034336  001003                          BNE     2$              ;;BRANCH IF NO
6926  034340  012737  033414  033412          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
6927  034346  000002                  2$:     RTI                     ;;RETURN
6928                                  ;;**********************************************************************
6929                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
6930                                  ;*CALL:
6931                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
6932                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
6933                                  ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
6934
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```
 6935  034350  010346                $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
 6936  034352  005046                        CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
 6937  034354  012703  034604        1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
 6938  034360  022703  034626        2$:     CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
 6939  034364  101456                        BLOS    4$              ;;BR IF YES
 6940  034366  104410                        RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 6941  034370  112613                        MOVB    (SP)+,(R3)      ;;GET CHARACTER
 6942  034372  122713  000177        10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
 6943  034376  001022                        BNE     5$              ;;BR IF NO
 6944  034400  005716                        TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
 6945  034402  001007                        BNE     6$              ;;BR IF NO
 6946  034404  112737  000134  034602        MOVB    #'\,9$          ;;TYPE A BACK SLASH
 6947  034412  104401  034602                TYPE    ,9$
 6948  034416  012716  177777                MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
 6949  034422  005303                6$:     DEC     R3              ;;BACKUP BY ONE
 6950  034424  020327  034604                CMP     R3,#$TTYIN      ;;STACK EMPTY?
 6951  034430  103434                        BLO     4$              ;;BR IF YES
 6952  034432  111337  034602                MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
 6953  034436  104401  034602                TYPE    ,9$             ;;GO TYPE
 6954  034442  000746                        BR      2$              ;;GO READ ANOTHER CHAR.
 6955  034444  005716                5$:     TST     (SP)            ;;RUBOUT KEY SET?
 6956  034446  001406                        BEQ     7$              ;;BR IF NO
 6957  034450  112737  000134  034602        MOVB    #'\,9$          ;;TYPE A BACK SLASH
 6958  034456  104401  034602                TYPE    ,9$
 6959  034462  005016                        CLR     (SP)            ;;CLEAR THE RUBOUT KEY
 6960  034464  122713  000025        7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
 6961  034470  001003                        BNE     8$              ;;BR IF NO
 6962  034472  104401  034633                TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
 6963  034476  000726                        BR      1$              ;;GO START OVER
 6964  034500  122713  000022        8$:     CMPB    #22,(R3)        ;;IS CHARACTER A '^R'?
 6965  034504  001011                        BNE     3$              ;;BRANCH IF NO
 6966  034506  105013                        CLRB    (R3)            ;;CLEAR THE CHARACTER
 6967  034510  104401  001205                TYPE    ,$CRLF          ;;TYPE A 'CR' & 'LF'
 6968  034514  104401  034604                TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 6969  034520  000717                        BR      2$              ;;GO PICKUP ANOTHER CHACTER
 6970  034522  104401  001204        4$:     TYPE    ,$QUES          ;;TYPE A '?'
 6971  034526  000712                        BR      1$              ;;CLEAR THE BUFFER AND LOOP
 6972  034530  111337  034602        3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
 6973  034534  104401  034602                TYPE    ,9$
 6974  034540  122723  000015                CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 6975  034544  001305                        BNE     2$              ;;LOOP IF NOT RETURN
 6976  034546  105063  177777                CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 6977  034552  104401  001206                TYPE    ,$LF            ;;TYPE A LINE FEED
 6978  034556  005726                        TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 6979  034560  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 6980  034562  011646                        MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 6981  034564  016666  000004  000002        MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 6982  034572  012766  034604  000004        MOV     #$TTYIN,4(SP)
 6983  034600  000002                        RTI                     ;;RETURN
 6984  034602     000                9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 6985  034603     000                        .BYTE   0               ;;TERMINATOR
 6986  034604  000022                $TTYIN: .BLKB   22              ;;RESERVE 22 BYTES FOR TTY INPUT
 6987  034626  041536  005015   000  $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL 'C'
 6988  034633     136  006525  000012 $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
 6989  034640  043536  005015   000  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
 6990  034645     015  051412  051127 $MSWR:  .ASCIZ  <15><12>/SWR = /
```

```
                                .EVEN
                                .SBTTL  READ AN OCTAL NUMBER FROM THE TTY

                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                ;*CHANGE IT TO BINARY.
                                ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
                                ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
                                ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
                                ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
                                ;*CALL:
                                ;*      RDOCT                   ;;READ AN OCTAL NUMBER
                                ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT

034670  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
034672  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
034700  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
034702  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
034704  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
034706  104411                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
034710  012600                          MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
034712  010037  035016                  MOV     R0,5$           ;;AND SAVE IT
034716  005001                          CLR     R1              ;;CLEAR DATA WORD
034720  005002                          CLR     R2
034722  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
034724  001420                          BEQ     3$              ;;IF ZERO GET OUT
034726  122716  000060                  CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
034732  003026                          BGT     4$              ;;IS AN OCTAL DIGIT
034734  122716  000067                  CMPB    #'7,(SP)
034740  002423                          BLT     4$
034742  006301                          ASL     R1              ;;*2
034744  006102                          ROL     R2
034746  006301                          ASL     R1              ;;*4
034750  006102                          ROL     R2
034752  006301                          ASL     R1              ;;*8
034754  006102                          ROL     R2
034756  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
034762  062601                          ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
034764  000756                          BR      2$              ;;LOOP
034766  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
034770  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
034774  010237  035026                  MOV     R2,$HIOCT
035000  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
035002  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
035004  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
035006  000002                          RTI                     ;;RETURN
035010  005726                  4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
035012  105010                          CLRB    (R0)            ;;SET A TERMINATOR
035014  104401                          TYPE                    ;;TYPE UP THRU THE BAD CHAR.
035016  000000                  5$:     .WORD   0
035020  104401  001204                  TYPE    ,$QUES          ;;"?" "CR" & "LF"
035024  000730                          BR      1$              ;;TRY AGAIN
```

```
                                $HIOCT: .WORD   0                       ;;HIGH ORDER BITS GO HERE
                                .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,@#$DB2O      ;;CALL THE ROUTINE
                                ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK

035030  104413                  $DB2O:  SAVREG                  ;;SAVE ALL REGISTERS
035032  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
035036  012705  035147                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
035042  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
035046  012703  177770                  MOV     #^C7,R3         ;;MASK
035052  012100                          MOV     (R1)+,R0        ;;LOWER WORD
035054  012101                          MOV     (R1)+,R1        ;;HIGH WORD
035056  005002                          CLR     R2              ;;TERMINATOR
035060  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
035062  010002                          MOV     R0,R2           ;;GET THIS DIGIT
035064  005304                          DEC     R4              ;;COUNT THIS CHARACTER
035066  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
035070  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
035072  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
035074  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
035100  104414                          RESREG                  ;;RESTORE ALL REGISTERS
035102  000207                          RTS     PC              ;;RETURN TO USER
035104  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
035106  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
035110  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
035112  006001                          ROR     R1
035114  006000                          ROR     R0
035116  006001                          ROR     R1
035120  006000                          ROR     R0
035122  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
035124  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
035130  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
035132  000016                  $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
                                .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

035150  104413                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
035152  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
035156  012700  035330                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
```

```
 7103  035162  010066  000002                    MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
 7104  035166  012201                            MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
 7105  035170  012202                            MOV     (R2)+,R2
 7106  035172  012737  000012  035246            MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
 7107  035200  012704  035260                    MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
 7108  035204  012705  035262                    MOV     #$TNPWR+2,R5
 7109  035210  005003                    1$:     CLR     R3              ;;CLEAR PARTIAL
 7110  035212  161401                    2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
 7111  035214  005602                            SBC     R2
 7112  035216  161502                            SUB     (R5),R2
 7113  035220  002402                            BLT     3$              ;;BR IF TEN POWER TO LARGE
 7114  035222  005203                            INC     R3              ;;ADD 1 TO PARTIAL
 7115  035224  000772                            BR      2$              ;;LOOP
 7116  035226  062401                    3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
 7117  035230  005502                            ADC     R2
 7118  035232  062402                            ADD     (R4)+,R2
 7119  035234  022525                            CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
 7120  035236  052703  000060                    BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
 7121  035242  110320                            MOVB    R3,(R0)+        ;;SAVE IT
 7122  035244  005327                            DEC     (PC)+           ;;DONE?
 7123  035246  000000                    4$:     .WORD   0
 7124  035250  001357                            BNE     1$              ;;BR IF NO
 7125  035252  105020                            CLRB    (R0)+           ;;TERMINATOR
 7126  035254  104414                            RESREG                  ;;RESTORE REGISTERS
 7127  035256  000207                            RTS     PC              ;;RETURN
 7128  035260  145000                    $TNPWR: 145000                  ;;1.0E09
 7129  035262  035632                            35632
 7130  035264  160400                            160400                  ;;1.0E08
 7131  035266  002765                            2765
 7132  035270  113200                            113200                  ;;1.0E07
 7133  035272  000230                            230
 7134  035274  041100                            041100                  ;;1.0E06
 7135  035276  000017                            17
 7136  035300  103240                            103240                  ;;1.0E05
 7137  035302  000001                            1
 7138  035304  023420                            23420                   ;;1.0E04
 7139  035306  000000                            0
 7140  035310  001750                            1750                    ;;1.0E03
 7141  035312  000000                            0
 7142  035314  000144                            144                     ;;1.0E02
 7143  035316  000000                            0
 7144  035320  000012                            12                      ;;1.0E01
 7145  035322  000000                            0
 7146  035324  000001                            1                       ;;1.0E00
 7147  035326  000000                            0
 7148  035330  000014                    $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
 7149                                    .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
 7150
 7151                                    ;;**************************************************************************
 7152                                    ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
 7153                                    ;*UNSIGNED DECIMAL ASCIZ NUMBER.
 7154                                    ;*CALL
 7155                                    ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
 7156                                    ;*      JSR     PC,@#$B2D       ;;CALL
 7157                                    ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
 7158
```

```
 7159
 7160  035344  016637  000002  035374 $SB2D:  MOV     2(SP),1$          ;;SAVE BINARY NUMBER
 7161  035352  012746  035374                 MOV     #1$,-(SP)         ;;SET POINTER
 7162  035356  004737  035150                 JSR     PC,@#$DB2D        ;;CALL DOUBLE LENGTH CONVERT
 7163  035362  062716  000005                 ADD     #5,(SP)           ;;ONLY ALLOW FIVE CHARACTERS
 7164  035366  012666  000002                 MOV     (SP)+,2(SP)       ;;PICKUP POINTER
 7165  035372  000207                         RTS     PC                ;;RETURN
 7166  035374  000000  000000          1$:    .WORD   0,0
 7167                                .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
 7168
 7169                                ;;**********************************************************************
 7170                                ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
 7171                                ;*LEADING NUMBERS.
 7172                                ;*CALL
 7173                                ;*      MOV     #NUMADR,-(SP)     ;;FIRST ADDRESS OF ASCIZ STRING
 7174                                ;*      JSR     PC,@#$SUPRS
 7175
 7176
 7177  035400  010046                $SUPRS: MOV     R0,-(SP)          ;;SAVE R0
 7178  035402  016600  000004                 MOV     4(SP),R0          ;;PICKUP THE POINTER
 7179  035406  105710                 1$:     TSTB    (R0)              ;;TERMINATEOR?
 7180  035410  001403                         BEQ     2$                ;;BR IF YES
 7181  035412  122720  000060                 CMPB    #'0,(R0)+         ;;IS THIS AN ASCII "0" ?
 7182  035416  001773                         BEQ     1$                ;;BR IF YES
 7183  035420  005300                 2$:     DEC     R0                ;;BACKUP BY "1"
 7184  035422  010037  035430                 MOV     R0,3$             ;;SAVE FOR TYPING
 7185  035426  104401                         TYPE                      ;;GO TYPE
 7186  035430  000000                 3$:     .WORD   0                 ;;ASCIZ POINTER GOES HERE
 7187  035432  012600                         MOV     (SP)+,R0          ;;RESTORE R0
 7188  035434  012616                         MOV     (SP)+,(SP)        ;;RESTORE THE STACK
 7189  035436  000207                         RTS     PC                ;;RETURN
 7190                                .SBTTL  INTEGER MULTIPLY ROUTINE
 7191
 7192                                ;;**********************************************************************
 7193                                ;*CALL
 7194                                ;*      MOV     MULTIPLER,-(SP)
 7195                                ;*      MOV     MULTIPLICAND,-(SP)
 7196                                ;*      JSR     PC,@#$MULT
 7197                                ;*      RETURN  ;;PRODUCT IS ON THE STACK
 7198                                ;*
 7199                                ;*      STACK   PRODUCT
 7200                                ;*      -----   -------
 7201                                ;*      TOP     LSB'S
 7202                                ;*      +2      MSB'S
 7203
 7204  035440                        $MULT:
 7205  035440  010046                         MOV     R0,-(SP)          ;;PUSH R0 ON STACK
 7206  035442  010146                         MOV     R1,-(SP)          ;;PUSH R1 ON STACK
 7207  035444  010246                         MOV     R2,-(SP)          ;;PUSH R2 ON STACK
 7208  035446  005046                         CLR     -(SP)             ;;CLEAR THE SIGN KEY
 7209  035450  016601  000012                 MOV     12(SP),R1         ;;GET THE MULTIPLICAND
 7210  035454  100002                         BPL     1$                ;;BR IF PLUS
 7211  035456  005216                         INC     (SP)              ;;SET THE SIGN KEY
 7212  035460  005401                         NEG     R1                ;;MAKE THE MULTIPLICAND POSTIVE
 7213  035462  016602  000014          1$:    MOV     14(SP),R2         ;;GET THE MULTIPLIER
 7214  035466  100002                         BPL     2$                ;;BR IF PLUS
```

```
 7215  035470  005316                        DEC     (SP)            ;;UPDATE THE SIGN KEY
 7216  035472  005402                        NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
 7217  035474  012746  000021          2$:   MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
 7218  035500  005000                        CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
 7219  035502  103001                  3$:   BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
 7220  035504  060200                        ADD     R2,R0
 7221  035506  006000                  4$:   ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
 7222  035510  006001                        ROR     R1              ;;THE MULTIPLICAND
 7223  035512  005316                        DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
 7224  035514  001372                        BNE     3$              ;;BR IF NO
 7225  035516  022616                        CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
 7226  035520  001403                        BEQ     5$              ;;GO TO EXIT IF NO
 7227  035522  005400                        NEG     R0              ;;YES--SO MAKE IT SO
 7228  035524  005401                        NEG     R1
 7229  035526  005600                        SBC     R0
 7230  035530  005726                  5$:   TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
 7231  035532  010066  000012              MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
 7232  035536  010166  000010              MOV     R1,10(SP)       ;;LSB'S
 7233  035542  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
 7234  035544  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 7235  035546  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 7236  035550  000207                        RTS     PC
 7237                          .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
 7238
 7239                          ;;*******************************************************************
 7240                          ;*SAVE R0-R5
 7241                          ;*CALL:
 7242                          ;*      SAVREG
 7243                          ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
 7244                          ;*
 7245                          ;*TOP---(+16)
 7246                          ;* +2---(+18)
 7247                          ;* +4---R5
 7248                          ;* +6---R4
 7249                          ;* +8---R3
 7250                          ;*+10---R2
 7251                          ;*+12---R1
 7252                          ;*+14---R0
 7253
 7254  035552                  $SAVREG:
 7255  035552  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 7256  035554  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 7257  035556  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 7258  035560  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 7259  035562  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 7260  035564  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 7261  035566  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
 7262  035572  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
 7263  035576  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
 7264  035602  016646  000022          MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
 7265  035606  000002                  RTI
 7266
 7267                          ;*RESTORE R0-R5
 7268                          ;*CALL:
 7269                          ;*      RESREG
 7270  035610                  $RESREG:
```

```
                        MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
                        MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
                        MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
                        MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
                        MOV     (SP)+,R5        ;;POP STACK INTO R5
                        MOV     (SP)+,R4        ;;POP STACK INTO R4
                        MOV     (SP)+,R3        ;;POP STACK INTO R3
                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                        RTI
                .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.

                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
                        MOV     2(SP),R0        ;;GET TRAP ADDRESS
                        TST     -(R0)           ;;BACKUP BY 2
                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
                        ASL     R0              ;;POSITION FOR INDEXING
                        MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
                        RTS     R0              ;;GO TO ROUTINE


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

                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
                        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
                        RTI                     ;;RESTORE THE PSW

                .SBTTL  TRAP TABLE

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

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

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

                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
                        $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
                        $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
                        $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
```

```
 7327  035734  030360                          SCOP1$  ;;CALL=SCOP1    TRAP+15(104415) INTERNAL LOOP ON ERROR
 7328
```

```
                                                .SBTTL  SERVICE MESSAGES

035736  005015  047125  041111          MSG1:   .ASCII  <CR><LF>/UNIBUS RK6 DR-3/
035744  051525  051040  033113
035752  042040  026522     063
035757     015  041412  051132                  .ASCII  <CR><LF>/CZR6JF0/<CR><LF>
035764  045066  030106  005015
035772  005015  025011  025052                  .ASCII  <CR><LF>/        ***** CAUTION *****/<CR><LF>
036000  025052  041440  052501
036006  044524  047117  025040
036014  025052  025052  005015
036022  005015  044124  051511                  .ASCII  <CR><LF>/THIS PROGRAM SHOULD  BE HALTED ONLY BY TYPING CONTROL-C/
036030  050040  047522  051107
036036  046501  051440  047510
036044  046125  020104  041040
036052  020105  040510  052114
036060  042105  047440  046116
036066  020131  054502  052040
036074  050131  047111  020107
036102  047503  052116  047522
036110  026514     103
036113     015  047412  044124                  .ASCII  <CR><LF>/OTHERWISE CARTRIDGE FORMATTING AND, OR THE DEVICE/
036120  051105  044527  042523
036126  041440  051101  051124
036134  042111  042507  043040
036142  051117  040515  052124
036150  047111  020107  047101
036156  026104  047440  020122
036164  044124  020105  042504
036172  044526  042503
036176  005015  040515  020131                  .ASCII  <CR><LF>/MAY BE LEFT IN AN UNDETERMINED STATE/<CR><LF>
036204  042502  046040  043105
036212  020124  047111  040440
036220  020116  047125  042504
036226  042524  046522  047111
036234  042105  051440  040524
036242  042524  005015
036246  005015  047111  052111                  .ASCII  <CR><LF>/INITIALLY, DRIVES TO BE TESTED SHOULD HAVE:/<CR><LF>
036254  040511  046114  026131
036262  042040  044522  042526
036270  020123  047524  041040
036276  020105  042524  052123
036304  042105  051440  047510
036312  046125  020104  040510
036320  042526  006472     012
036325     015  040412  020056                  .ASCII  <CR><LF>/A. HEADS MANUALLY LOADED/
036332  042510  042101  020123
036340  040515  052516  046101
036346  054514  046040  040517
036354  042504     104
036357     015  041012  020056                  .ASCII  <CR><LF>/B. CORRECT PORT SELECTED/
036364  047503  051122  041505
036372  020124  047520  052122
036400  051440  046105  041505
```

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 7385  036406  042524     104
 7386  036411     015  041412  020056          .ASCII  <CR><LF>/C. WRITE LOCK DISABLED/
 7387  036416  051127  052111  020105
 7388  036424  047514  045503  042040
 7389  036432  051511  041101  042514
 7390  036440     104
 7391  036441     015  042012  020056          .ASCII  <CR><LF>/D. DRIVE READY INDICATOR ON/<CR><LF>
 7392  036446  051104  053111  020105
 7393  036454  042522  042101  020131
 7394  036462  047111  044504  040503
 7395  036470  047524  020122  047117
 7396  036476  005015
 7397  036500  005015  051104  053111          .ASCII  <CR><LF>/DRIVES NOT TO BE TESTED MUST HAVE/
 7398  036506  051505  047040  052117
 7399  036514  052040  020117  042502
 7400  036522  052040  051505  042524
 7401  036530  020104  052515  052123
 7402  036536  044040  053101     105
 7403  036543     015  041012  052117          .ASCIZ  <CR><LF>/BOTH PORTS DESELECTED/<CR><LF>
 7404  036550  020110  047520  052122
 7405  036556  020123  042504  042523
 7406  036564  042514  052103  042105
 7407  036572  005015     000
 7408
 7409  036575     015  041412  040510  MSG2:   .ASCII  <CR><LF>/CHANGE XXDP PACK/
 7410  036602  043516  020105  054130
 7411  036610  050104  050040  041501
 7412  036616     113
 7413  036617     015  041412  042514          .ASCIZ  <CR><LF>/CLEAR LOC 40,RESTART PROGRAM/
 7414  036624  051101  046040  041517
 7415  036632  032040  026060  042522
 7416  036640  052123  051101  020124
 7417  036646  051120  043517  040522
 7418  036654  000115
 7419  036656  005015  051104  053111  MSG3:   .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED: /
 7420  036664  024105  024523  052040
 7421  036672  020117  042502  052040
 7422  036700  051505  042524  035104
 7423  036706  000040
 7424  036710  005015  054524  042520  MSG4:   .ASCIZ  <CR><LF>/TYPE BUSS ADDRESS IF NOT 177440:  /
 7425  036716  041040  051525  020123
 7426  036724  042101  051104  051505
 7427  036732  020123  043111  047040
 7428  036740  052117  030440  033467
 7429  036746  032064  035060  020040
 7430  036754     000
 7431  036755     015  052012  050131  MSG5:   .ASCIZ  <CR><LF>/TYPE CONTROLLER INTERRUPT VECTOR IF NOT 210:  /
 7432  036762  020105  047503  052116
 7433  036770  047522  046114  051105
 7434  036776  044440  052116  051105
 7435  037004  052522  052120  053040
 7436  037012  041505  047524  020122
 7437  037020  043111  047040  052117
 7438  037026  031040  030061  020072
 7439  037034  000040
 7440  037036  005015  047111  042524  MSG6:   .ASCIZ  <CR><LF>/INTERRUPT OCCURRED AT PC=/
```

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 7441  037044  051122  050125  020124
 7442  037052  041517  052503  051122
 7443  037060  042105  040440  020124
 7444  037066  041520  000075
 7445  037072  005015  051104  053111  MSG7:   .ASCIZ  <CR><LF>/DRIVE 0 WILL NOT BE TESTED/
 7446  037100  020105  020060  044527
 7447  037106  046114  047040  052117
 7448  037114  041040  020105  042524
 7449  037122  052123  042105     000
 7450  037127     015  044412  052116  MSG8:   .ASCIZ  <CR><LF>/INTERLOCKS TEST/<CR><LF>
 7451  037134  051105  047514  045503
 7452  037142  020123  042524  052123
 7453  037150  005015     000
 7454  037153     015  051012  046505  MSG9:   .ASCIZ  <CR><LF>/REMOVE UNIT SELECT PLUG/
 7455  037160  053117  020105  047125
 7456  037166  052111  051440  046105
 7457  037174  041505  020124  046120
 7458  037202  043525     000
 7459  037205     015  005012  044527  MSG10:  .ASCIZ  <CR><LF><LF>/WILL TEST DRIVES:/
 7460  037212  046114  052040  051505
 7461  037220  020124  051104  053111
 7462  037226  051505  000072
 7463  037232  005015  050012  053517  MSG11:  .ASCIZ  <CR><LF><LF>/POWER UP RESTART TO TEST 1/<CR><LF>
 7464  037240  051105  052440  020120
 7465  037246  042522  052123  051101
 7466  037254  020124  047524  052040
 7467  037262  051505  020124  006461
 7468  037270  000012
 7469  037272  047516  042516  005015  MSG12:  .ASCIZ  /NONE/<CR><LF>
 7470  037300     000
 7471  037301     015  047012  020117  MSG13:  .ASCII  <CR><LF>/NO L OR P CLOCKS PRESENT/
 7472  037306  020114  051117  050040
 7473  037314  041440  047514  045503
 7474  037322  020123  051120  051505
 7475  037330  047105     124
 7476  037333     015  040412  046114          .ASCIZ  <CR><LF>/ALL TIMING TESTS BYPASSED/
 7477  037340  052040  046511  047111
 7478  037346  020107  042524  052123
 7479  037354  020123  054502  040520
 7480  037362  051523  042105     000
 7481  037367     015  041012  050131  MSG14:  .ASCIZ  <CR><LF>/BYPASSING DRIVE /
 7482  037374  051501  044523  043516
 7483  037402  042040  044522  042526
 7484  037410  000040
 7485  037412  005015  042012  044522  MSG15:  .ASCIZ  <CR><LF><LF>/DRIVE /
 7486  037420  042526  000040
 7487  037424  005015  051104  053111  MSG16:  .ASCIZ  <CR><LF>/DRIVE SERIAL NO. /
 7488  037432  020105  042523  044522
 7489  037440  046101  047040  027117
 7490  037446  000040
 7491  037450  005015  040503  052122  MSG17:  .ASCIZ  <CR><LF>/CARTRIDGE SERIAL NO. /
 7492  037456  044522  043504  020105
 7493  037464  042523  044522  046101
 7494  037472  047040  027117  000040
 7495  037500  005015  047125  052111  MSG18:  .ASCIZ  <CR><LF>/UNIT SELECT PLUG TEST/<CR><LF>
 7496  037506  051440  046105  041505
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 7497  037514  020124  046120  043525
 7498  037522  052040  051505  006524
 7499  037530  000012
 7500  037532  005015  047520  052122  MSG19:  .ASCIZ  <CR><LF>/PORT SELECTION TESTS/<CR><LF>
 7501  037540  051440  046105  041505
 7502  037546  044524  047117  052040
 7503  037554  051505  051524  005015
 7504  037562     000
 7505  037563     015  040412  020103  MSG21:  .ASCIZ  <CR><LF>/AC LOW DETECTION TEST-PART 1/<CR><LF>
 7506  037570  047514  020127  042504
 7507  037576  042524  052103  047511
 7508  037604  020116  042524  052123
 7509  037612  050055  051101  020124
 7510  037620  006461  000012
 7511  037624  005015  047516  026516  MSG22:  .ASCIZ  <CR><LF>/NON-EXECUTABLE FUNCTION (NXF) DETECTION TEST/<CR><LF>
 7512  037632  054105  041505  052125
 7513  037640  041101  042514  043040
 7514  037646  047125  052103  047511
 7515  037654  020116  047050  043130
 7516  037662  020051  042504  042524
 7517  037670  052103  047511  020116
 7518  037676  042524  052123  005015
 7519  037704     000
 7520  037705     015  053412  044522  MSG24:  .ASCIZ  <CR><LF>/WRITE LOCK TEST/<CR><LF>
 7521  037712  042524  046040  041517
 7522  037720  020113  042524  052123
 7523  037726  005015     000
 7524  037731     015  040412  020103  MSG26:  .ASCIZ  <CR><LF>/AC LOW DETECTION TEST-PART 2/<CR><LF>
 7525  037736  047514  020127  042504
 7526  037744  042524  052103  047511
 7527  037752  020116  042524  052123
 7528  037760  050055  051101  020124
 7529  037766  006462  000012
 7530  037772  005015  040412  046114  MSG27:  .ASCIZ  <CR><LF><LF>/ALL DRIVES TESTED/<CR><LF><LF>
 7531  040000  042040  044522  042526
 7532  040006  020123  042524  052123
 7533  040014  042105  005015  000012
 7534  040022  005015  052515  052114  MSG28:  .ASCIZ  <CR><LF>/MULTIPLE DRIVE DETECTION TEST/<CR><LF>
 7535  040030  050111  042514  042040
 7536  040036  044522  042526  042040
 7537  040044  052105  041505  044524
 7538  040052  047117  052040  051505
 7539  040060  006524  000012
 7540  040064  005015  046120  040505  MSG29:  .ASCIZ  <CR><LF>/PLEASE WAIT, HEADS BEING LOADED/<CR><LF>
 7541  040072  042523  053440  044501
 7542  040100  026124  044040  040505
 7543  040106  051504  041040  044505
 7544  040114  043516  046040  040517
 7545  040122  042504  006504  000012
 7546  040130  005015  042526  044522  MSG30:  .ASCIZ  <CR><LF>/VERIFY DOOR CAN NOW BE OPENED & LEAVE IT OPEN/<CR><LF>
 7547  040136  054506  042040  047517
 7548  040144  020122  040503  020116
 7549  040152  047516  020127  042502
 7550  040160  047440  042520  042516
 7551  040166  020104  020046  042514
 7552  040174  053101  020105  052111
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 7553  040202  047440  042520  006516
 7554  040210  000012
 7555  040212  005015  006477  000012  MSG31:  .ASCIZ  <CR><LF>/?/<CR><LF>
 7556  040220  005015  042522  047515  MSG32:  .ASCIZ  <CR><LF>/REMOVE DISK PACK & CLOSE DOOR/
 7557  040226  042526  042040  051511
 7558  040234  020113  040520  045503
 7559  040242  023040  041440  047514
 7560  040250  042523  042040  047517
 7561  040256  000122
 7562  040260  005015  042504  051120  MSG33:  .ASCIZ <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE DOOR OPEN/
 7563  040266  051505  020123  051047
 7564  040274  047125  051455  047524
 7565  040302  023520  051440  044527
 7566  040310  041524  020110  047524
 7567  040316  023440  052522  023516
 7568  040324  053440  044510  042514
 7569  040332  042040  047517  020122
 7570  040340  050117  047105     000
 7571  040345     015  053012  051105  MSG34:  .ASCIZ  <CR><LF>/VERIFY SPINDLE DOES NOT START & HEADS DO NOT LOAD/<CR><LF>
 7572  040352  043111  020131  050123
 7573  040360  047111  046104  020105
 7574  040366  047504  051505  047040
 7575  040374  052117  051440  040524
 7576  040402  052122  023040  044040
 7577  040410  040505  051504  042040
 7578  040416  020117  047516  020124
 7579  040424  047514  042101  005015
 7580  040432     000
 7581  040433     015  042012  050105  MSG35:  .ASCIZ <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE CARTRIDGE REMOVED/
 7582  040440  042522  051523  023440
 7583  040446  052522  026516  052123
 7584  040454  050117  020047  053523
 7585  040462  052111  044103  052040
 7586  040470  020117  051047  047125
 7587  040476  020047  044127  046111
 7588  040504  020105  040503  052122
 7589  040512  044522  043504  020105
 7590  040520  042522  047515  042526
 7591  040526  000104
 7592  040530  005015  047111  042523  MSG36:  .ASCIZ  <CR><LF>/INSERT DISK PACK, DEPRESS 'RUN-STOP' TO 'RUN' & CLOSE DOOR/
 7593  040536  052122  042040  051511
 7594  040544  020113  040520  045503
 7595  040552  020054  042504  051120
 7596  040560  051505  020123  051047
 7597  040566  047125  051455  047524
 7598  040574  023520  052040  020117
 7599  040602  051047  047125  020047
 7600  040610  020046  046103  051517
 7601  040616  020105  047504  051117
 7602  040624     000
 7603  040625     015  042012  050105  MSG37:  .ASCIZ  <CR><LF>/DEPRESS SPACE BAR WHEN FINISHED/<CR><LF>
 7604  040632  042522  051523  051440
 7605  040640  040520  042503  041040
 7606  040646  051101  053440  042510
 7607  040654  020116  044506  044516
 7608  040662  044123  042105  005015
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 7609  040670      000
 7610  040671      015  044412  051516  MSG38:  .ASCII  <CR><LF>/INSERT UNIT SELECT PLUGS, IN ANY ORDER/
 7611  040676  051105  020124  047125
 7612  040704  052111  051440  046105
 7613  040712  041505  020124  046120
 7614  040720  043525  026123  044440
 7615  040726  020116  047101  020131
 7616  040734  051117  042504      122
 7617  040741      015  052012  042510          .ASCIZ  <CR><LF>/THE PROGRAM WILL ECHO THE UNIT SELECT PLUG NUMBER/<CR><LF>
 7618  040746  050040  047522  051107
 7619  040754  046501  053440  046111
 7620  040762  020114  041505  047510
 7621  040770  052040  042510  052440
 7622  040776  044516  020124  042523
 7623  041004  042514  052103  050040
 7624  041012  052514  020107  052516
 7625  041020  041115  051105  005015
 7626  041026      000
 7627  041027      015  042012  050105  MSG39:  .ASCIZ  <CR><LF>/DEPRESS CONTROL-E TO EXIT TEST/<CR><LF>
 7628  041034  042522  051523  041440
 7629  041042  047117  051124  046117
 7630  041050  042455  052040  020117
 7631  041056  054105  052111  052040
 7632  041064  051505  006524  000012
 7633  041072  005015  047526  052514  MSG40:  .ASCII  <CR><LF>/VOLUME VALID NOT SET/
 7634  041100  042515  053040  046101
 7635  041106  042111  047040  052117
 7636  041114  051440  052105
 7637  041120  005015  040515  042513          .ASCIZ  <CR><LF>/MAKE SURE ORIGINAL UNIT SELECT PLUG IS INSERTED/<CR><LF>
 7638  041126  051440  051125  020105
 7639  041134  051117  043511  047111
 7640  041142  046101  052440  044516
 7641  041150  020124  042523  042514
 7642  041156  052103  050040  052514
 7643  041164  020107  051511  044440
 7644  041172  051516  051105  042524
 7645  041200  006504  000012
 7646  041204  005015  042504  042523  MSG41:  .ASCIZ  <CR><LF>/DESELECT PORT IN USE & SELECT OPPOSITE PORT/<CR><LF>
 7647  041212  042514  052103  050040
 7648  041220  051117  020124  047111
 7649  041226  052440  042523  023040
 7650  041234  051440  046105  041505
 7651  041242  020124  050117  047520
 7652  041250  044523  042524  050040
 7653  041256  051117  006524  000012
 7654  041264  005015  042504  042523  MSG42:  .ASCIZ  <CR><LF>/DESELECT WRONG PORT & SELECT CORRECT PORT/<CR><LF>
 7655  041272  042514  052103  053440
 7656  041300  047522  043516  050040
 7657  041306  051117  020124  020046
 7658  041314  042523  042514  052103
 7659  041322  041440  051117  042522
 7660  041330  052103  050040  051117
 7661  041336  006524  000012
 7662  041342  005015  042504  042523  MSG43:  .ASCIZ  <CR><LF>/DESELECT BOTH PORTS/<CR><LF>
 7663  041350  042514  052103  041040
 7664  041356  052117  020110  047520
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 7665  041364  052122  006523  000012
 7666  041372  005015  042523  042514  MSG44:  .ASCIZ  <CR><LF>/SELECT CORRECT PORT/<CR><LF>
 7667  041400  052103  041440  051117
 7668  041406  042522  052103  050040
 7669  041414  051117  006524  000012
 7670  041422  005015  047503  051122  MSG45:  .ASCIZ  <CR><LF>/CORRECT PORT NOT SELECTED, TRY AGAIN/<CR><LF>
 7671  041430  041505  020124  047520
 7672  041436  052122  047040  052117
 7673  041444  051440  046105  041505
 7674  041452  042524  026104  052040
 7675  041460  054522  040440  040507
 7676  041466  047111  005015     000
 7677  041473     015  053012  051105  MSG47:  .ASCIZ  <CR><LF>/VERIFY DOOR CANNOT BE OPENED (DO NOT FORCE)/<CR><LF>
 7678  041500  043111  020131  047504
 7679  041506  051117  041440  047101
 7680  041514  047516  020124  042502
 7681  041522  047440  042520  042516
 7682  041530  020104  042050  020117
 7683  041536  047516  020124  047506
 7684  041544  041522  024505  005015
 7685  041552     000
 7686  041553     015  052012  051125  MSG49:  .ASCIZ  <CR><LF>/TURN OFF AC POWER FROM BEHIND THE RK06/<CR><LF>
 7687  041560  020116  043117  020106
 7688  041566  041501  050040  053517
 7689  041574  051105  043040  047522
 7690  041602  020115  042502  044510
 7691  041610  042116  052040  042510
 7692  041616  051040  030113  006466
 7693  041624  000012
 7694  041626  005015  040527  052111  MSG50:  .ASCIZ  <CR><LF>/WAIT 30 SEC & SWITCH AC POWER BACK ON/
 7695  041634  031440  020060  042523
 7696  041642  020103  020046  053523
 7697  041650  052111  044103  040440
 7698  041656  020103  047520  042527
 7699  041664  020122  040502  045503
 7700  041672  047440  000116
 7701  041676  005015  047515  042515  MSG51:  .ASCII  <CR><LF>/MOMENTARILY REMOVE & INSERT THE SAME UNIT SELECT PLUG/
 7702  041704  052116  051101  046111
 7703  041712  020131  042522  047515
 7704  041720  042526  023040  044440
 7705  041726  051516  051105  020124
 7706  041734  044124  020105  040523
 7707  041742  042515  052440  044516
 7708  041750  020124  042523  042514
 7709  041756  052103  050040  052514
 7710  041764     107
 7711  041765     015  052012  020117          .ASCIZ  <CR><LF>/TO RESET VOLUME VALID/<CR><LF>
 7712  041772  042522  042523  020124
 7713  042000  047526  052514  042515
 7714  042006  053040  046101  042111
 7715  042014  005015     000
 7716  042017     015  042012  050105  MSG52:  .ASCII  <CR><LF>/DEPRESS SPACE TO DO TEST/
 7717  042024  042522  051523  051440
 7718  042032  040520  042503  052040
 7719  042040  020117  047504  052040
 7720  042046  051505     124
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 7721  042051     015  047412  020122          .ASCIZ  <CR><LF>/OR CONTROL-E TO BYPASS ENTIRE TEST/<CR><LF>
 7722  042056  047503  052116  047522
 7723  042064  026514  020105  047524
 7724  042072  041040  050131  051501
 7725  042100  020123  047105  044524
 7726  042106  042522  052040  051505
 7727  042114  006524  000012
 7728  042120  005015  044504  040523  MSG53:  .ASCIZ  <CR><LF>/DISABLE THE WRITE LOCK SWITCH, VERIFY LIGHT GOES OFF/<CR><LF>
 7729  042126  046102  020105  044124
 7730  042134  020105  051127  052111
 7731  042142  020105  047514  045503
 7732  042150  051440  044527  041524
 7733  042156  026110  053040  051105
 7734  042164  043111  020131  044514
 7735  042172  044107  020124  047507
 7736  042200  051505  047440  043106
 7737  042206  005015     000
 7738  042211     015  042412  040516  MSG54:  .ASCIZ  <CR><LF>/ENABLE THE WRITE LOCK SWITCH, VERIFY LIGHT GOES ON/<CR><LF>
 7739  042216  046102  020105  044124
 7740  042224  020105  051127  052111
 7741  042232  020105  047514  045503
 7742  042240  051440  044527  041524
 7743  042246  026110  053040  051105
 7744  042254  043111  020131  044514
 7745  042262  044107  020124  047507
 7746  042270  051505  047440  006516
 7747  042276  000012
 7748  042300  005015  054105  052111  MSG55:  .ASCIZ  <CR><LF>/EXIT TEST WITH ORIGINAL UNIT SELECT PLUG NO. /
 7749  042306  052040  051505  020124
 7750  042314  044527  044124  047440
 7751  042322  044522  044507  040516
 7752  042330  020114  047125  052111
 7753  042336  051440  046105  041505
 7754  042344  020124  046120  043525
 7755  042352  047040  027117  000040
 7756  042360  005015  046101  043511  MSG56:  .ASCII  <CR><LF>/ALIGNMENT CARTRIDGE USED/
 7757  042366  046516  047105  020124
 7758  042374  040503  052122  044522
 7759  042402  043504  020105  051525
 7760  042410  042105
 7761  042412  005015  051120  043517          .ASCII  <CR><LF>/PROGRAM WILL BYPASS THE WRITE LOCK TEST/
 7762  042420  040522  020115  044527
 7763  042426  046114  041040  050131
 7764  042434  051501  020123  044124
 7765  042442  020105  051127  052111
 7766  042450  020105  047514  045503
 7767  042456  052040  051505     124
 7768  042463     015  040412  042116          .ASCIZ  <CR><LF>/AND READ-WRITE DATA PORTION OF AC LOW DETECTION TEST-PART 2/<CR
 7769  042470  051040  040505  026504
 7770  042476  051127  052111  020105
 7771  042504  040504  040524  050040
 7772  042512  051117  044524  047117
 7773  042520  047440  020106  041501
 7774  042526  046040  053517  042040
 7775  042534  052105  041505  044524
 7776  042542  047117  052040  051505
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 7777  042550  026524  040520  052122
 7778  042556  031040  005015  000012
 7779  042564  005015  042526  044522  MSG57:  .ASCIZ  <CR><LF>/VERIFY BATTERY RETRACT FUNCTIONAL/<CR><LF>
 7780  042572  054506  041040  052101
 7781  042600  042524  054522  051040
 7782  042606  052105  040522  052103
 7783  042614  043040  047125  052103
 7784  042622  047511  040516  006514
 7785  042630  000012
 7786  042632  005015  047514  042101  MSG58:  .ASCIZ  <CR><LF>/LOAD HEADS ON ALL DRIVES TO BE TESTED FOR MDS/<CR><LF>
 7787  042640  044040  040505  051504
 7788  042646  047440  020116  046101
 7789  042654  020114  051104  053111
 7790  042662  051505  052040  020117
 7791  042670  042502  052040  051505
 7792  042676  042524  020104  047506
 7793  042704  020122  042115  006523
 7794  042712  000012
 7795  042714  005015  047111  042523  MSG59:  .ASCIZ  <CR><LF>/INSERT SAME UNIT SELECT PLUG NUMBER IN ANY 2 DRIVES TO BE TESTE
 7796  042722  052122  051440  046501
 7797  042730  020105  047125  052111
 7798  042736  051440  046105  041505
 7799  042744  020124  046120  043525
 7800  042752  047040  046525  042502
 7801  042760  020122  047111  040440
 7802  042766  054516  031040  042040
 7803  042774  044522  042526  020123
 7804  043002  047524  041040  020105
 7805  043010  042524  052123  042105
 7806  043016     000
 7807  043017     015  044412  051516  MSG60:  .ASCII  <CR><LF>/INSERT CORRECT UNIT SELECT PLUGS & LOAD HEADS/
 7808  043024  051105  020124  047503
 7809  043032  051122  041505  020124
 7810  043040  047125  052111  051440
 7811  043046  046105  041505  020124
 7812  043054  046120  043525  020123
 7813  043062  020046  047514  042101
 7814  043070  044040  040505  051504
 7815  043076  005015  047117  050040          .ASCIZ  <CR><LF>/ON PREVIOUS 2 DRIVES/<CR><LF>
 7816  043104  042522  044526  052517
 7817  043112  020123  020062  051104
 7818  043120  053111  051505  005015
 7819  043126     000
 7820  043127     015  046412  046125  MSG61:  .ASCIZ  <CR><LF>/MULTIPLE DRIVES FOUND ON DRIVE NO. /
 7821  043134  044524  046120  020105
 7822  043142  051104  053111  051505
 7823  043150  043040  052517  042116
 7824  043156  047440  020116  051104
 7825  043164  053111  020105  047516
 7826  043172  020056     000
 7827  043175     015  041012  050131  MSG62:  .ASCII  <CR><LF>/BYPASSING MULT. DRIVE SELECT TEST/
 7828  043202  051501  044523  043516
 7829  043210  046440  046125  027124
 7830  043216  042040  044522  042526
 7831  043224  051440  046105  041505
 7832  043232  020124  042524  052123
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 7833  043240  005015  047117  054514          .ASCIZ  <CR><LF>/ONLY 1 DRIVE PRESENT/<CR><LF>
 7834  043246  030440  042040  044522
 7835  043254  042526  050040  042522
 7836  043262  042523  052116  005015
 7837  043270     000
 7838  043271     015  042012  050105  MSG63:  .ASCII  <CR><LF>/DEPRESS SPACE BAR TO DO ANOTHER 2 DRIVES/
 7839  043276  042522  051523  051440
 7840  043304  040520  042503  041040
 7841  043312  051101  052040  020117
 7842  043320  047504  040440  047516
 7843  043326  044124  051105  031040
 7844  043334  042040  044522  042526
 7845  043342     123
 7846  043343     015  047412  020122          .ASCII  <CR><LF>/OR CONTROL-E TO EXIT TEST/
 7847  043350  047503  052116  047522
 7848  043356  026514  020105  047524
 7849  043364  042440  044530  020124
 7850  043372  042524  052123
 7851  043376  005015  044450  051516          .ASCIZ  <CR><LF>/(INSERT CORRECT UNIT SELECT PLUGS BEFORE EXITING)/<CR><LF>
 7852  043404  051105  020124  047503
 7853  043412  051122  041505  020124
 7854  043420  047125  052111  051440
 7855  043426  046105  041505  020124
 7856  043434  046120  043525  020123
 7857  043442  042502  047506  042522
 7858  043450  042440  044530  044524
 7859  043456  043516  006451  000012
 7860  043464  005015  042504  051120  MSG65:  .ASCIZ  <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'STOP'/
 7861  043472  051505  020123  051047
 7862  043500  047125  051455  047524
 7863  043506  023520  051440  044527
 7864  043514  041524  020110  047524
 7865  043522  023440  052123  050117
 7866  043530  000047
 7867  043532  005015  042504  042523  MSG67:  .ASCIZ  <CR><LF>/DESELECT PORT SWITCH ON ALL OTHER DRIVES/<CR><LF>
 7868  043540  042514  052103  050040
 7869  043546  051117  020124  053523
 7870  043554  052111  044103  047440
 7871  043562  020116  046101  020114
 7872  043570  052117  042510  020122
 7873  043576  051104  053111  051505
 7874  043604  005015     000
 7875  043607     015  053012  051105  MSG68:  .ASCIZ  <CR><LF>/VERIFY BOTH DRIVES UNLOADED/<CR><LF>
 7876  043614  043111  020131  047502
 7877  043622  044124  042040  044522
 7878  043630  042526  020123  047125
 7879  043636  047514  042101  042105
 7880  043644  005015     000
 7881  043647     015  042012  050105  MSG69:  .ASCIZ  <CR><LF>/DEPRESS SPACE WHEN 'READY' LIGHT GOES ON/<CR><LF>
 7882  043654  042522  051523  051440
 7883  043662  040520  042503  053440
 7884  043670  042510  020116  051047
 7885  043676  040505  054504  020047
 7886  043704  044514  044107  020124
 7887  043712  047507  051505  047440
 7888  043720  006516  000012
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 7889  043724  005015  042526  044522  MSG70:  .ASCIZ <CR><LF>/VERIFY HEADS LOAD/<CR><LF>
 7890  043732  054506  044040  040505
 7891  043740  051504  046040  040517
 7892  043746  006504  000012
 7893  043752  005015  042523  042514  MSG71:  .ASCIZ  <CR><LF>/SELECT CORRECT PORT SWITCH ON ALL OTHER DRIVES/<CR><LF>
 7894  043760  052103  041440  051117
 7895  043766  042522  052103  050040
 7896  043774  051117  020124  053523
 7897  044002  052111  044103  047440
 7898  044010  020116  046101  020114
 7899  044016  052117  042510  020122
 7900  044024  051104  053111  051505
 7901  044032  005015     000
 7902  044035     015  040412  047502  MSG72:  .ASCIZ  <CR><LF>/ABORTING BALANCE OF TESTS/
 7903  044042  052122  047111  020107
 7904  044050  040502  040514  041516
 7905  044056  020105  043117  052040
 7906  044064  051505  051524     000
 7907
 7908  044071     015  050012  047522  MSG74:  .ASCIZ  <CR><LF>/PROGRAM ABORT PENDING...PLEASE WAIT/
 7909  044076  051107  046501  040440
 7910  044104  047502  052122  050040
 7911  044112  047105  044504  043516
 7912  044120  027056  050056  042514
 7913  044126  051501  020105  040527
 7914  044134  052111     000
 7915  044137     015  044012  046101  MSG75:  .ASCIZ  <CR><LF>/HALT PENDING...PLEASE WAIT/
 7916  044144  020124  042520  042116
 7917  044152  047111  027107  027056
 7918  044160  046120  040505  042523
 7919  044166  053440  044501  000124
 7920  044174  005015  051120  043517  MSG76:  .ASCIZ  <CR><LF>/PROGRAM ABORTED/
 7921  044202  040522  020115  041101
 7922  044210  051117  042524  000104
 7923  044216  005015  050103  020125  MSG77:  .ASCIZ  <CR><LF>/CPU HALTED/
 7924  044224  040510  052114  042105
 7925  044232     000
 7926  044233     015  051412  051117  MSG100: .ASCII  <CR><LF>/SORRY, WRITE LOCK SHOULD NOT BE DEPRESSED/
 7927  044240  054522  020054  051127
 7928  044246  052111  020105  047514
 7929  044254  045503  051440  047510
 7930  044262  046125  020104  047516
 7931  044270  020124  042502  042040
 7932  044276  050105  042522  051523
 7933  044304  042105
 7934  044306  005015  044127  046111          .ASCII  <CR><LF>/WHILE ON TRACK 2 SECTORS 19, 20 OR 21/
 7935  044314  020105  047117  052040
 7936  044322  040522  045503  031040
 7937  044330  051440  041505  047524
 7938  044336  051522  030440  026071
 7939  044344  031040  020060  051117
 7940  044352  031040     061
 7941  044355     015  050012  042514          .ASCIZ  <CR><LF>/PLEASE TRY AGAIN/<CR><LF>
 7942  044362  051501  020105  051124
 7943  044370  020131  043501  044501
 7944  044376  006516  000012
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                                        .SBTTL  ERROR MESSAGES

044402  005015  051105  047522  EM1:    .ASCIZ  <CR><LF>/ERROR, ONLY 0 THRU 7 ALLOWED, TRY AGAIN/<CR><LF>
044410  026122  047440  046116
044416  020131  020060  044124
044424  052522  033440  040440
044432  046114  053517  042105
044440  020054  051124  020131
044446  043501  044501  006516
044454  000012
044456  051104  053111  020105  EM2:    .ASCIZ  /DRIVE # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2/
044464  020043  047111  051040
044472  041513  031123  041440
044500  047101  047516  020124
044506  042502  051040  040505
044514  020104  040502  045503
044522  041440  051117  042522
044530  052103  054514  044440
044536  020116  045522  051115
044544  000062
044546  005015  041101  051117  EM3:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED TIME OUT AT PC=/
044554  020124  042524  052123
044562  027123  027056  047125
044570  054105  042520  052103
044576  042105  052040  046511
044604  020105  052517  020124
044612  052101  050040  036503
044620     000
044621     015  040412  047502  EM4:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED INTERRUPT AT PC=/
044626  052122  052040  051505
044634  051524  027056  052456
044642  042516  050130  041505
044650  042524  020104  047111
044656  042524  051122  050125
044664  020124  052101  050040
044672  036503     000
044675     115  051504  051440  EM5:    .ASCIZ  /MDS SET IN RKCS2/
044702  052105  044440  020116
044710  045522  051503  000062
044716  043125  020105  042523  EM6:    .ASCIZ  /UFE SET IN RKCS2/
044724  020124  047111  051040
044732  041513  031123     000
044737     104  040522  044440  EM7:    .ASCIZ  /DRA IN RKDS & NED IN RKCS2 RESET; WRONG PORT SELECTED?/
044744  020116  045522  051504
044752  023040  047040  042105
044760  044440  020116  045522
044766  051503  020062  042522
044774  042523  035524  053440
045002  047522  043516  050040
045010  051117  020124  042523
045016  042514  052103  042105
045024  000077
045026  051104  053111  020105  EM8:    .ASCIZ  /DRIVE PRESENT BUT NOT SPECIFIED BY OPERATOR/
045034  051120  051505  047105
045042  020124  052502  020124
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 8001  045050  047516  020124  050123
 8002  045056  041505  043111  042511
 8003  045064  020104  054502  047440
 8004  045072  042520  040522  047524
 8005  045100  000122
 8006  045102  051104  053111  020105  EM9:    .ASCIZ  /DRIVE NOT PRESENT BUT SPECIFIED BY OPERATOR/
 8007  045110  047516  020124  051120
 8008  045116  051505  047105  020124
 8009  045124  052502  020124  050123
 8010  045132  041505  043111  042511
 8011  045140  020104  054502  047440
 8012  045146  042520  040522  047524
 8013  045154  000122
 8014  045156  041101  051117  020124  EM10:   .ASCIZ  /ABORT TESTS...CANNOT REFERENCE CONTROLLER REGISTER/
 8015  045164  042524  052123  027123
 8016  045172  027056  040503  047116
 8017  045200  052117  051040  043105
 8018  045206  051105  047105  042503
 8019  045214  041440  047117  051124
 8020  045222  046117  042514  020122
 8021  045230  042522  044507  052123
 8022  045236  051105     000
 8023  045241     104  040522  044440  EM11:   .ASCIZ  /DRA IN RKDS & NED IN RKCS2 BOTH SET/
 8024  045246  020116  045522  051504
 8025  045254  023040  047040  042105
 8026  045262  044440  020116  045522
 8027  045270  051503  020062  047502
 8028  045276  044124  051440  052105
 8029  045304     000
 8030  045305     103  047117  051124  EM12:   .ASCIZ  /CONTROLLER NOT READY IN RKCS1/
 8031  045312  046117  042514  020122
 8032  045320  047516  020124  042522
 8033  045326  042101  020131  047111
 8034  045334  051040  041513  030523
 8035  045342     000
 8036  045343     116  020117  052101  EM13:   .ASCIZ  /NO ATTN IN RKASOF/
 8037  045350  047124  044440  020116
 8038  045356  045522  051501  043117
 8039  045364     000
 8040  045365     127  047522  043516  EM14:   .ASCIZ  /WRONG ATTN IN RKASOF/
 8041  045372  040440  052124  020116
 8042  045400  047111  051040  040513
 8043  045406  047523  000106
 8044  045412  051104  054504  047040  EM15:   .ASCIZ  /DRDY NOT CLEARED IN RKMR2/
 8045  045420  052117  041440  042514
 8046  045426  051101  042105  044440
 8047  045434  020116  045522  051115
 8048  045442  000062
 8049  045444  051504  020103  047516  EM16:   .ASCIZ  /DSC NOT SET IN RKMR2/
 8050  045452  020124  042523  020124
 8051  045460  047111  051040  046513
 8052  045466  031122     000
 8053  045471     115  051505  040523  EM17:   .ASCIZ  /MESSAGE A0 ERROR/
 8054  045476  042507  040440  020060
 8055  045504  051105  047522  000122
 8056  045512  042515  051523  043501  EM18:   .ASCIZ  /MESSAGE B0 ERROR/
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8057  045520  020105  030102  042440
8058  045526  051122  051117     000
8059  045533     115  051505  040523  EM19:   .ASCIZ  /MESSAGE A1 ERROR/
8060  045540  042507  040440  020061
8061  045546  051105  047522  000122
8062  045554  042515  051523  043501  EM20:   .ASCIZ  /MESSAGE B1 ERROR/
8063  045562  020105  030502  042440
8064  045570  051122  051117     000
8065  045575     103  051105  020122  EM21:   .ASCIZ  /CERR SET IN RKCS1/
8066  045602  042523  020124  047111
8067  045610  051040  041513  030523
8068  045616     000
8069  045617     104  047517  020122  EM22:   .ASCIZ  /DOOR STATUS IN RKMR2 NOT CLEARED/
8070  045624  052123  052101  051525
8071  045632  044440  020116  045522
8072  045640  051115  020062  047516
8073  045646  020124  046103  040505
8074  045654  042522  000104
8075  045660  050123  047111  046104  EM23:   .ASCIZ  /SPINDLE ON SET IN RKMR2/
8076  045666  020105  047117  051440
8077  045674  052105  044440  020116
8078  045702  045522  051115  000062
8079  045710  047526  052514  042515  EM24:   .ASCIZ  /VOLUME VALID NOT SET IN RKMR2/
8080  045716  053040  046101  042111
8081  045724  047040  052117  051440
8082  045732  052105  044440  020116
8083  045740  045522  051115  000062
8084  045746  040503  052122  044522  EM25:   .ASCIZ  /CARTRIDGE STATUS IN RKMR2 NOT CLEARED/
8085  045754  043504  020105  052123
8086  045762  052101  051525  044440
8087  045770  020116  045522  051115
8088  045776  020062  047516  020124
8089  046004  046103  040505  042522
8090  046012  000104
8091  046014  047526  052514  042515  EM26:   .ASCIZ  /VOLUME VALID NOT CLEARED IN RKMR2/
8092  046022  053040  046101  042111
8093  046030  047040  052117  041440
8094  046036  042514  051101  042105
8095  046044  044440  020116  045522
8096  046052  051115  000062
8097  046056  042516  020104  047516  EM27:   .ASCIZ  /NED NOT SET IN RKCS2/
8098  046064  020124  042523  020124
8099  046072  047111  051040  041513
8100  046100  031123     000
8101  046103     126  046117  046525  EM28:   .ASCIZ  /VOLUME VALID SET IN RKMR2/
8102  046110  020105  040526  044514
8103  046116  020104  042523  020124
8104  046124  047111  051040  046513
8105  046132  031122     000
8106  046135     104  041523  047040  EM29:   .ASCIZ  /DSC NOT SET IN RKMR2/
8107  046142  052117  051440  052105
8108  046150  044440  020116  045522
8109  046156  051115  000062
8110  046162  052101  047124  047040  EM30:   .ASCIZ  /ATTN NOT RESET IN RKASOF/
8111  046170  052117  051040  051505
8112  046176  052105  044440  020116
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 8113  046204  045522  051501  043117
 8114  046212     000
 8115  046213     116  042105  047040  EM31:   .ASCIZ  /NED NOT CLEARED IN RKCS2/
 8116  046220  052117  041440  042514
 8117  046226  051101  042105  044440
 8118  046234  020116  045522  051503
 8119  046242  000062
 8120  046244  050123  047111  046104  EM32:   .ASCIZ  /SPINDLE ON NOT SET IN RKMR2/
 8121  046252  020105  047117  047040
 8122  046260  052117  051440  052105
 8123  046266  044440  020116  045522
 8124  046274  051115  000062
 8125  046300  051104  053111  020105  EM33:   .ASCIZ  /DRIVE NOT READY IN RKMR2/
 8126  046306  047516  020124  042522
 8127  046314  042101  020131  047111
 8128  046322  051040  046513  031122
 8129  046330     000
 8130  046331     104  047517  020122  EM34:   .ASCIZ  /DOOR STATUS BIT NOT SET IN RKMR2/
 8131  046336  052123  052101  051525
 8132  046344  041040  052111  047040
 8133  046352  052117  051440  052105
 8134  046360  044440  020116  045522
 8135  046366  051115  000062
 8136  046372  042510  042101  020123  EM35:   .ASCIZ  /HEADS HOME NOT SET IN RKMR2/
 8137  046400  047510  042515  047040
 8138  046406  052117  051440  052105
 8139  046414  044440  020116  045522
 8140  046422  051115  000062
 8141  046426  041501  046040  053517  EM37:   .ASCIZ  /AC LOW NOT SET IN RKMR3/
 8142  046434  047040  052117  051440
 8143  046442  052105  044440  020116
 8144  046450  045522  051115  000063
 8145  046456  042516  020104  047516  EM42:   .ASCIZ  /NED NOT SET IN RKCS2/
 8146  046464  020124  042523  020124
 8147  046472  047111  051040  041513
 8148  046500  031123     000
 8149  046503     101  046103  020117  EM43:   .ASCIZ  /ACLO NOT CLEARED IN RKMR3/
 8150  046510  047516  020124  046103
 8151  046516  040505  042522  020104
 8152  046524  047111  051040  046513
 8153  046532  031522     000
 8154  046535     126  046117  046525  EM44:   .ASCIZ  /VOLUME VALID NOT CLEARED IN RKMR2/
 8155  046542  020105  040526  044514
 8156  046550  020104  047516  020124
 8157  046556  046103  040505  042522
 8158  046564  020104  047111  051040
 8159  046572  046513  031122     000
 8160  046577     126  046117  046525  EM45:   .ASCIZ  /VOLUME VALID SET IN RKMR2 AFTER HEADS LOADED/
 8161  046604  020105  040526  044514
 8162  046612  020104  042523  020124
 8163  046620  047111  051040  046513
 8164  046626  031122  040440  052106
 8165  046634  051105  044040  040505
 8166  046642  051504  046040  040517
 8167  046650  042504  000104
 8168  046654  047516  026516  054105  EM46:   .ASCIZ  /NON-EXECUTABLE FUNCTION (NXF) NOT SET IN RKMR3/
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8169  046662  041505  052125  041101
8170  046670  042514  043040  047125
8171  046676  052103  047511  020116
8172  046704  047050  043130  020051
8173  046712  047516  020124  042523
8174  046720  020124  047111  051040
8175  046726  046513  031522     000
8176  046733     103  046131  047111  EM47:   .ASCIZ  /CYLINDER ADDRESS CHANGED FROM 0/
8177  046740  042504  020122  042101
8178  046746  051104  051505  020123
8179  046754  044103  047101  042507
8180  046762  020104  051106  046517
8181  046770  030040     000
8182  046773     127  044522  042524  EM48:   .ASCIZ  /WRITE LOCK IN RKMR2 NOT CLEARED/
8183  047000  046040  041517  020113
8184  047006  047111  051040  046513
8185  047014  031122  047040  052117
8186  047022  041440  042514  051101
8187  047030  042105     000
8188  047033     127  044522  042524  EM49:   .ASCIZ  /WRITE LOCK IN RKMR2 NOT SET/
8189  047040  046040  041517  020113
8190  047046  047111  051040  046513
8191  047054  031122  047040  052117
8192  047062  051440  052105     000
8193  047067     127  044522  042524  EM50:   .ASCIZ  /WRITE LOCK ERROR IN RKMR3 NOT SET/
8194  047074  046040  041517  020113
8195  047102  051105  047522  020122
8196  047110  047111  051040  046513
8197  047116  031522  047040  052117
8198  047124  051440  052105     000
8199  047131     127  044522  042524  EM51:   .ASCIZ  /WRITE LOCK DID NOT OCCUR AT SECTOR BOUNDRY/
8200  047136  046040  041517  020113
8201  047144  044504  020104  047516
8202  047152  020124  041517  052503
8203  047160  020122  052101  051440
8204  047166  041505  047524  020122
8205  047174  047502  047125  051104
8206  047202  000131
8207  047204  047125  020123  047516  EM52:   .ASCIZ  /UNS NOT SET IN RKMR3/
8208  047212  020124  042523  020124
8209  047220  047111  051040  046513
8210  047226  031522     000
8211
8212  047231     125  046116  040517  EM53:   .ASCIZ  /UNLOAD NOT SET IN RKMR2/
8213  047236  020104  047516  020124
8214  047244  042523  020124  047111
8215  047252  051040  046513  031122
8216  047260     000
8217  047261     103  047101  047516  EM54:   .ASCIZ  /CANNOT FIND MULT. DRIVE SELECT IN RKCS2/
8218  047266  020124  044506  042116
8219  047274  046440  046125  027124
8220  047302  042040  044522  042526
8221  047310  051440  046105  041505
8222  047316  020124  047111  051040
8223  047324  041513  031123     000
8224  047331     101  052124  020116  EM55:   .ASCIZ  /ATTN NOT CLEARED IN RKASOF/
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 8225  047336  047516  020124  046103
 8226  047344  040505  042522  020104
 8227  047352  047111  051040  040513
 8228  047360  047523  000106
 8229  047364  047125  054105  042520  EM56:   .ASCIZ  /UNEXPECTED MEMORY PARITY ERROR TRAP/
 8230  047372  052103  042105  046440
 8231  047400  046505  051117  020131
 8232  047406  040520  044522  054524
 8233  047414  042440  051122  051117
 8234  047422  052040  040522  000120
 8235  047430  042503  051122  044440  EM57:   .ASCIZ  /CERR IN RKCS1 NOT SET/
 8236  047436  020116  045522  051503
 8237  047444  020061  047516  020124
 8238  047452  042523  000124
 8239  047456  040520  044522  054524  EM58:   .ASCIZ  /PARITY NOT SET IN RKMR3/
 8240  047464  047040  052117  051440
 8241  047472  052105  044440  020116
 8242  047500  045522  051115  000063
 8243  047506  052103  020117  042523  EM59:   .ASCIZ  /CTO SET IN RKCS1/
 8244  047514  020124  047111  051040
 8245  047522  041513  030523     000
 8246  047527     116  043130  042040  EM61:   .ASCIZ  /NXF DID NOT SET FAULT/
 8247  047534  042111  047040  052117
 8248  047542  051440  052105  043040
 8249  047550  052501  052114     000
 8250  047555     104  052114  051440  EM63:   .ASCIZ  /DLT SET IN RKCS2/
 8251  047562  052105  044440  020116
 8252  047570  045522  051503  000062
 8253  047576  045522  041504  023040  EM64:   .ASCII  /RKDC & RKDA INDICATE THAT WRITE CHECK ERROR/
 8254  047604  051040  042113  020101
 8255  047612  047111  044504  040503
 8256  047620  042524  052040  040510
 8257  047626  020124  051127  052111
 8258  047634  020105  044103  041505
 8259  047642  020113  051105  047522
 8260  047650     122
 8261  047651     015  047412  041503          .ASCIZ  <CR><LF>/OCCURRED AT CYL 411, TRACK 2, SECTOR 21/
 8262  047656  051125  042522  020104
 8263  047664  052101  041440  046131
 8264  047672  032040  030461  020054
 8265  047700  051124  041501  020113
 8266  047706  026062  051440  041505
 8267  047714  047524  020122  030462
 8268  047722     000
 8269  047723     116  042105  051440  EM67:   .ASCIZ  /NED SET IN RKCS2/
 8270  047730  052105  044440  020116
 8271  047736  045522  051503  000062
 8272  047744  040503  047116  052117  EM68:   .ASCIZ  /CANNOT READ BAD SECTOR INFORMATION/
 8273  047752  051040  040505  020104
 8274  047760  040502  020104  042523
 8275  047766  052103  051117  044440
 8276  047774  043116  051117  040515
 8277  050002  044524  047117     000
 8278  050007     116  020117  051104  EM69:   .ASCII  /NO DRIVES FOUND ON BUSS/
 8279  050014  053111  051505  043040
 8280  050022  052517  042116  047440
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 8281  050030  020116  052502  051523
 8282  050036  005015  042523  052524          .ASCIZ  <CR><LF>/SETUP CORRECTLY & PRESS 'CONTINUE'/<CR><LF>
 8283  050044  020120  047503  051122
 8284  050052  041505  046124  020131
 8285  050060  020046  051120  051505
 8286  050066  020123  041447  047117
 8287  050074  044524  052516  023505
 8288  050102  005015     000
 8289  050105     127  044510  042514  EM70:   .ASCIZ  /WHILE WAITING FOR CONTR READY OR AFTER CONTR READY REC'D/
 8290  050112  053440  044501  044524
 8291  050120  043516  043040  051117
 8292  050126  041440  047117  051124
 8293  050134  051040  040505  054504
 8294  050142  047440  020122  043101
 8295  050150  042524  020122  047503
 8296  050156  052116  020122  042522
 8297  050164  042101  020131  042522
 8298  050172  023503  000104
 8299  050176  042504  042524  052103  EM71:   .ASCIZ  /DETECTED 10 BAD SECTORS...ABORTING TEST/
 8300  050204  042105  030440  020060
 8301  050212  040502  020104  042523
 8302  050220  052103  051117  027123
 8303  050226  027056  041101  051117
 8304  050234  044524  043516  052040
 8305  050242  051505  000124
 8306  050246  042504  042524  052103  EM72:   .ASCIZ  /DETECTED BSE BUT NOT LISTED IN BAD SECTOR FILE/
 8307  050254  042105  041040  042523
 8308  050262  041040  052125  047040
 8309  050270  052117  046040  051511
 8310  050276  042524  020104  047111
 8311  050304  041040  042101  051440
 8312  050312  041505  047524  020122
 8313  050320  044506  042514     000
 8314  050325     104  052105  041505  EM73:   .ASCII  /DETECTED BSE IN READ COMMAND/
 8315  050332  042524  020104  051502
 8316  050340  020105  047111  051040
 8317  050346  040505  020104  047503
 8318  050354  046515  047101     104
 8319  050361     015  041012  052125          .ASCIZ  <CR><LF>/BUT NOT IN PREVIOUS WRITE COMMAND TO SAME SECTOR/
 8320  050366  047040  052117  044440
 8321  050374  020116  051120  053105
 8322  050402  047511  051525  053440
 8323  050410  044522  042524  041440
 8324  050416  046517  040515  042116
 8325  050424  052040  020117  040523
 8326  050432  042515  051440  041505
 8327  050440  047524  000122
 8328  050444  052122  020132  047516  EM74:   .ASCIZ  /RTZ NOT SET IN RKMR2/
 8329  050452  020124  042523  020124
 8330  050460  047111  051040  046513
 8331  050466  031122     000
 8332  050471     015  042012  052105  EM75:   .ASCIZ  <CR><LF>/DETECTED 10 BAD CYLINDERS...ABORTING TEST/
 8333  050476  041505  042524  020104
 8334  050504  030061  041040  042101
 8335  050512  041440  046131  047111
 8336  050520  042504  051522  027056
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 8337  050526  040456  047502  052122
 8338  050534  047111  020107  042524
 8339  050542  052123     000
 8340  050545     116  020117  051104  EM76:   .ASCII  /NO DRIVES FOUND IN DEVICE MAP ($DEVM)/
 8341  050552  053111  051505  043040
 8342  050560  052517  042116  044440
 8343  050566  020116  042504  044526
 8344  050574  042503  046440  050101
 8345  050602  024040  042044  053105
 8346  050610  024515
 8347  050612  005015  042523  052524          .ASCIZ  <CR><LF>/SETUP CORRECTLY & RESTART/<CR><LF>
 8348  050620  020120  047503  051122
 8349  050626  041505  046124  020131
 8350  050634  020046  042522  052123
 8351  050642  051101  006524  000012
 8352  050650  051127  052111  020105  EM80:   .ASCIZ  /WRITE CHECK ERROR SET IN RKCS2/
 8353  050656  044103  041505  020113
 8354  050664  051105  047522  020122
 8355  050672  042523  020124  047111
 8356  050700  051040  041513  031123
 8357  050706     000
 8358  050707     104  052101  020101  EM83:   .ASCIZ  /DATA CHECK ERROR SET IN RKER/
 8359  050714  044103  041505  020113
 8360  050722  051105  047522  020122
 8361  050730  042523  020124  047111
 8362  050736  051040  042513  000122
 8363  050744  042522  042101  047111  EM93:   .ASCIZ  /READING WRONG CYLINDER # IN HEADER/
 8364  050752  020107  051127  047117
 8365  050760  020107  054503  044514
 8366  050766  042116  051105  021440
 8367  050774  044440  020116  042510
 8368  051002  042101  051105     000
 8369
 8370                                  .SBTTL  DATA HEADERS
 8371
 8372  051007     124  051505  020124  DH1:    .ASCIZ  /TEST NO.  PC/
 8373  051014  047516  020056  050040
 8374  051022  000103
 8375  051024  045522  051115  004461  DH2:    .ASCIZ  /RKMR1  RKMR2   RKMR3   RKER    RKDS    RKCS1   RKCS2/
 8376  051032  045522  051115  004462
 8377  051040  045522  051115  004463
 8378  051046  045522  051105  051011
 8379  051054  042113  004523  045522
 8380  051062  051503  004461  045522
 8381  051070  051503  000062
 8382  051074  045522  041527  051011  DH3:    .ASCIZ  /RKWC   RKBA    RKDA    RKASOF  RKDC    RKECPS  RKECPT/
 8383  051102  041113  004501  045522
 8384  051110  040504  051011  040513
 8385  051116  047523  004506  045522
 8386  051124  041504  051011  042513
 8387  051132  050103  004523  045522
 8388  051140  041505  052120     000
 8389  051145     101  052106  051105  DH4:    .ASCIZ  /AFTER PACK RE-INSERTED & HEADS LOADED/
 8390  051152  050040  041501  020113
 8391  051160  042522  044455  051516
 8392  051166  051105  042524  020104
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 8393  051174  020046  042510  042101
 8394  051202  020123  047514  042101
 8395  051210  042105     000
 8396  051213     101  052106  051105  DH5:    .ASCIZ  /AFTER AC SWITCHED OFF/
 8397  051220  040440  020103  053523
 8398  051226  052111  044103  042105
 8399  051234  047440  043106     000
 8400  051241     101  052106  051105  DH8:    .ASCIZ  /AFTER DRIVE UNLOADED & DOOR OPENED/
 8401  051246  042040  044522  042526
 8402  051254  052440  046116  040517
 8403  051262  042504  020104  020046
 8404  051270  047504  051117  047440
 8405  051276  042520  042516  000104
 8406  051304  043101  042524  020122  DH11:   .ASCIZ  /AFTER MANUALLY LOADING HEADS WITH DOOR OPEN/
 8407  051312  040515  052516  046101
 8408  051320  054514  046040  040517
 8409  051326  044504  043516  044040
 8410  051334  040505  051504  053440
 8411  051342  052111  020110  047504
 8412  051350  051117  047440  042520
 8413  051356  000116
 8414  051360  043101  042524  020122  DH12:   .ASCIZ  /AFTER DISK PACK REMOVED/
 8415  051366  044504  045523  050040
 8416  051374  041501  020113  042522
 8417  051402  047515  042526  000104
 8418  051410  043101  042524  020122  DH13:   .ASCIZ  /AFTER MANUALLY LOADING HEADS WITH DISK PACK REMOVED/
 8419  051416  040515  052516  046101
 8420  051424  054514  046040  040517
 8421  051432  044504  043516  044040
 8422  051440  040505  051504  053440
 8423  051446  052111  020110  044504
 8424  051454  045523  050040  041501
 8425  051462  020113  042522  047515
 8426  051470  042526  000104
 8427  051474  044527  044124  052517  DH15:   .ASCIZ  /WITHOUT PACK COMMAND/
 8428  051502  020124  040520  045503
 8429  051510  041440  046517  040515
 8430  051516  042116     000
 8431  051521     101  052106  051105  DH16:   .ASCIZ  /AFTER UNIT SELECT PLUG REMOVED/
 8432  051526  052440  044516  020124
 8433  051534  042523  042514  052103
 8434  051542  050040  052514  020107
 8435  051550  042522  047515  042526
 8436  051556  000104
 8437  051560  043101  042524  020122  DH17:   .ASCIZ  /AFTER RECAL COMMAND/
 8438  051566  042522  040503  020114
 8439  051574  047503  046515  047101
 8440  051602  000104
 8441  051604  043101  042524  020122  DH18:   .ASCIZ  /AFTER UNLOAD COMMAND/
 8442  051612  047125  047514  042101
 8443  051620  041440  046517  040515
 8444  051626  042116     000
 8445  051631     101  052106  051105  DH19:   .ASCIZ  /AFTER PACK COMMAND/
 8446  051636  050040  041501  020113
 8447  051644  047503  046515  047101
 8448  051652  000104
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 8449  051654  043101  042524  020122  DH20:   .ASCIZ  /AFTER SELECT DRIVE COMMAND/
 8450  051662  042523  042514  052103
 8451  051670  042040  044522  042526
 8452  051676  041440  046517  040515
 8453  051704  042116     000
 8454  051707     101  052106  051105  DH21:   .ASCIZ  /AFTER SUBSYSTEM CLEAR/
 8455  051714  051440  041125  054523
 8456  051722  052123  046505  041440
 8457  051730  042514  051101     000
 8458  051735     101  052106  051105  DH22:   .ASCIZ  /AFTER DRIVE CLEAR COMMAND/
 8459  051742  042040  044522  042526
 8460  051750  041440  042514  051101
 8461  051756  041440  046517  040515
 8462  051764  042116     000
 8463  051767     101  052106  051105  DH23:   .ASCIZ  /AFTER WRONG PORT SELECTED/
 8464  051774  053440  047522  043516
 8465  052002  050040  051117  020124
 8466  052010  042523  042514  052103
 8467  052016  042105     000
 8468  052021     101  052106  051105  DH25:   .ASCIZ  /AFTER SEEK COMMAND/
 8469  052026  051440  042505  020113
 8470  052034  047503  046515  047101
 8471  052042  000104
 8472  052044  043101  042524  020122  DH26:   .ASCIZ  /AFTER READ DATA COMMAND/
 8473  052052  042522  042101  042040
 8474  052060  052101  020101  047503
 8475  052066  046515  047101  000104
 8476  052074  043101  042524  020122  DH27:   .ASCIZ  /AFTER WRITE DATA COMMAND/
 8477  052102  051127  052111  020105
 8478  052110  040504  040524  041440
 8479  052116  046517  040515  042116
 8480  052124     000
 8481  052125     101  052106  051105  DH28:   .ASCIZ  /AFTER BOTH PORTS DESELECTED/
 8482  052132  041040  052117  020110
 8483  052140  047520  052122  020123
 8484  052146  042504  042523  042514
 8485  052154  052103  042105     000
 8486  052161     101  052106  051105  DH29:   .ASCIZ  /AFTER CORRECT PORT SELECTED/
 8487  052166  041440  051117  042522
 8488  052174  052103  050040  051117
 8489  052202  020124  042523  042514
 8490  052210  052103  042105     000
 8491  052215     101  052106  051105  DH30:   .ASCIZ  /AFTER READ HEADER COMMAND/
 8492  052222  051040  040505  020104
 8493  052230  042510  042101  051105
 8494  052236  041440  046517  040515
 8495  052244  042116     000
 8496  052247     101  052106  051105  DH31:   .ASCIZ  /AFTER DRIVE MANUALLY LOADED/
 8497  052254  042040  044522  042526
 8498  052262  046440  047101  040525
 8499  052270  046114  020131  047514
 8500  052276  042101  042105     000
 8501  052303     101  052106  051105  DH32:   .ASCIZ  /AFTER WRITE CHECK COMMAND/
 8502  052310  053440  044522  042524
 8503  052316  041440  042510  045503
 8504  052324  041440  046517  040515
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 8505  052332  042116     000
 8506  052335     101  052106  051105  DH34:   .ASCIZ  /AFTER START SPINDLE COMMAND/
 8507  052342  051440  040524  052122
 8508  052350  051440  044520  042116
 8509  052356  042514  041440  046517
 8510  052364  040515  042116     000
 8511  052371     101  052106  051105  DH35:   .ASCIZ  /AFTER MANUALLY UNLOADING/
 8512  052376  046440  047101  040525
 8513  052404  046114  020131  047125
 8514  052412  047514  042101  047111
 8515  052420  000107
 8516  052422  043101  042524  020122  DH37:   .ASCIZ  /AFTER TIMEOUT TO POWER DOWN/
 8517  052430  044524  042515  052517
 8518  052436  020124  047524  050040
 8519  052444  053517  051105  042040
 8520  052452  053517  000116
 8521  052456  043101  042524  020122  DH38:   .ASCIZ  /AFTER AC POWERED UP/
 8522  052464  041501  050040  053517
 8523  052472  051105  042105  052440
 8524  052500  000120
 8525  052502  043101  042524  020122  DH39:   .ASCIZ  /AFTER WRITE HEADER COMMAND/
 8526  052510  051127  052111  020105
 8527  052516  042510  042101  051105
 8528  052524  041440  046517  040515
 8529  052532  042116     000
 8530  052535     104  051125  047111  DH41:   .ASCIZ  /DURING RECAL COMMAND/
 8531  052542  020107  042522  040503
 8532  052550  020114  047503  046515
 8533  052556  047101  000104
 8534  052562  047117  051440  041505  DH42:   .ASCIZ  /ON SECTORS 0,2,4,6 OR 8  CYL 410 TRACK 2/
 8535  052570  047524  051522  030040
 8536  052576  031054  032054  033054
 8537  052604  047440  020122  020070
 8538  052612  041440  046131  032040
 8539  052620  030061  052040  040522
 8540  052626  045503  031040     000
 8541  052633     106  051117  040515  DH44:   .ASCIZ  /FORMAT & ALL READ-WRITE TESTS WILL BE BYPASSED/
 8542  052640  020124  020046  046101
 8543  052646  020114  042522  042101
 8544  052654  053455  044522  042524
 8545  052662  052040  051505  051524
 8546  052670  053440  046111  020114
 8547  052676  042502  041040  050131
 8548  052704  051501  042523  000104
 8549  052712  043101  042524  020122  DH45:   .ASCIZ  /AFTER SEEK WITH VOLUME VALID=0/
 8550  052720  042523  045505  053440
 8551  052726  052111  020110  047526
 8552  052734  052514  042515  053040
 8553  052742  046101  042111  030075
 8554  052750     000
 8555  052751     101  052106  051105  DH46:   .ASCIZ  /AFTER WRITE DATA WITH VOLUME VALID=0/
 8556  052756  053440  044522  042524
 8557  052764  042040  052101  020101
 8558  052772  044527  044124  053040
 8559  053000  046117  046525  020105
 8560  053006  040526  044514  036504
```

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053014  000060
053016  043101  042524  020122  DH48:   .ASCIZ  /AFTER WRITE LOCK SWITCH DISABLED/
053024  051127  052111  020105
053032  047514  045503  051440
053040  044527  041524  020110
053046  044504  040523  046102
053054  042105     000
053057     101  052106  051105  DH49:   .ASCIZ  /AFTER WRITE LOCK SWITCH ENABLED/
053064  053440  044522  042524
053072  046040  041517  020113
053100  053523  052111  044103
053106  042440  040516  046102
053114  042105     000
053117     101  052106  051105  DH50:   .ASCIZ  /AFTER WRITING WITH WRITE LOCK ENABLED/
053124  053440  044522  044524
053132  043516  053440  052111
053140  020110  051127  052111
053146  020105  047514  045503
053154  042440  040516  046102
053162  042105     000
053165     103  046131  021440  DH56:   .ASCIZ  /CYL #  HEADER WORD 0/
053172  044011  040505  042504
053200  020122  047527  042122
053206  030040     000
053211     101  052106  051105  DH59:   .ASCIZ  /AFTER DRIVE SELECT COMMAND WITH EVEN PARITY/
053216  042040  044522  042526
053224  051440  046105  041505
053232  020124  047503  046515
053240  047101  020104  044527
053246  044124  042440  042526
053254  020116  040520  044522
053262  054524     000
053265     101  052106  051105  DH60:   .ASCIZ  /AFTER WRITE LOCK ENABLED DURING CONTINUOUS WRITING/
053272  053440  044522  042524
053300  046040  041517  020113
053306  047105  041101  042514
053314  020104  052504  044522
053322  043516  041440  047117
053330  044524  052516  052517
053336  020123  051127  052111
053344  047111  000107
053350  045522  040504  053411  DH61:   .ASCII  /RKDA   WORD    EXPECTED/
053356  051117  004504  054105
053364  042520  052103  042105
053372  005015  020100  051127          .ASCIZ  <CR><LF>/@ WRL  WAS     WORD/
053400  004514  040527  004523
053406  047527  042122     000
053413     122  042113  004501  DH62:   .ASCII  /RKDA   WORD    EXPECTED/
053420  047527  042122  042411
053426  050130  041505  042524
053434     104
053435     015  041012  043105          .ASCII  <CR><LF>/BEFORE WAS     WORD/
053442  051117  004505  040527
053450  004523  047527  042122
053456  005015  051127  000114          .ASCIZ  <CR><LF>/WRL/
053464  043101  042524  020122  DH63:   .ASCIZ  /AFTER WRITE LOCK ENABLED FROM AC FAILURE/
```

```
 8617  053472  051127  052111  020105
 8618  053500  047514  045503  042440
 8619  053506  040516  046102  042105
 8620  053514  043040  047522  020115
 8621  053522  041501  043040  044501
 8622  053530  052514  042522     000
 8623  053535     101  052106  051105  DH64:   .ASCIZ  /AFTER MDS DETECTED IN RKCS2/
 8624  053542  046440  051504  042040
 8625  053550  052105  041505  042524
 8626  053556  020104  047111  051040
 8627  053564  041513  031123     000
 8628  053571     101  052106  051105  DH65:   .ASCIZ  /AFTER SEARCHING ALL DRIVES PRESENT/
 8629  053576  051440  040505  041522
 8630  053604  044510  043516  040440
 8631  053612  046114  042040  044522
 8632  053620  042526  020123  051120
 8633  053626  051505  047105  000124
 8634  053634  042524  052123  047040  DH66:   .ASCIZ  /TEST NO.       TRAP PC/
 8635  053642  027117  052011  040522
 8636  053650  020120  041520     000
 8637  053655     101  052106  051105  DH67:   .ASCIZ  /AFTER TIMEOUT TO ENABLE WRITE LOCK/
 8638  053662  052040  046511  047505
 8639  053670  052125  052040  020117
 8640  053676  047105  041101  042514
 8641  053704  053440  044522  042524
 8642  053712  046040  041517  000113
 8643  053720  042411  050130  041505  DH69:   .ASCIZ  /       EXPECT/
 8644  053726  000124
 8645  053730  040411  052103  040525  DH70:   .ASCIZ  /       ACTUAL/
 8646  053736  000114
 8647  053740  030101  041011  004460  DH71:   .ASCIZ  /A0     B0      A1      B1      A2      B2      B3/
 8648  053746  030501  041011  004461
 8649  053754  031101  041011  004462
 8650  053762  031502     000
 8651  053765     115  043523  040440  DH73:   .ASCIZ  /MSG A & B IN RKMR2 & RKMR3 RESP ARE INVALID/
 8652  053772  023040  041040  044440
 8653  054000  020116  045522  051115
 8654  054006  020062  020046  045522
 8655  054014  051115  020063  042522
 8656  054022  050123  040440  042522
 8657  054030  044440  053116  046101
 8658  054036  042111     000
 8659  054041     117  020116  042523  DH74:   .ASCIZ  /ON SECTORS 10, 12, 14, 16, 18 OR 20 CYL 410 TRACK 2/
 8660  054046  052103  051117  020123
 8661  054054  030061  020054  031061
 8662  054062  020054  032061  020054
 8663  054070  033061  020054  034061
 8664  054076  047440  020122  030062
 8665  054104  041440  046131  032040
 8666  054112  030061  052040  040522
 8667  054120  045503  031040     000
 8668
 8669                                  .SBTTL  ERROR OUTPUT DATA
 8670
 8671          054126                  .EVEN
 8672  054126  001214  001116  DT1:    $TESTN,$ERRPC
```

```
 8673  054132  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8674  054140  005354  005352  005340
 8675  054146  005342
 8676  054150  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8677  054156  005356  005360  005372
 8678  054164  005374
 8679  054166  001214  001116  001166  DT3:    $TESTN,$ERRPC,$TMP3,WD1,WD2
 8680  054174  001434  001436
 8681  054200  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8682  054206  005354  005352  005340
 8683  054214  005342
 8684  054216  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8685  054224  005356  005360  005372
 8686  054232  005374
 8687  054234  001214  001354          DT6:    $TESTN,TRAPPC
 8688  054240  001214  001116  001366  DT9:    $TESTN,$ERRPC,TOCYL,RHTAB
 8689  054246  001712
 8690  054250  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8691  054256  005354  005352  005340
 8692  054264  005342
 8693  054266  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8694  054274  005356  005360  005372
 8695  054302  005374
 8696  054304  001214  001116  005430  DT13:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,H.A0,H.B0,H.A1,H.B1
 8697  054312  005432  005434  005436
 8698  054320  005410  005412  005414
 8699  054326  005416
 8700  054330  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8701  054336  005354  005352  005340
 8702  054344  005342
 8703  054346  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8704  054354  005356  005360  005372
 8705  054362  005374
 8706
 8707  054364  001214  001116  005430  DT14:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2
 8708  054372  005432  005434  005436
 8709  054400  005440  005442
 8710  054404  005410  005412  005414          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2
 8711  054412  005416  005420  005422
 8712  054420  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8713  054426  005354  005352  005340
 8714  054434  005342
 8715  054436  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8716  054444  005356  005360  005372
 8717  054452  005374
 8718
 8719  054454  001214  001116  005430  DT15:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2,E.B3
 8720  054462  005432  005434  005436
 8721  054470  005440  005442  005446
 8722  054476  005410  005412  005414          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2,H.B3
 8723  054504  005416  005420  005422
 8724  054512  005426
 8725  054514  005364  005366  005370          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8726  054522  005354  005352  005340
 8727  054530  005342
 8728  054532  005344  005346  005350          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
```

```
 8729  054540  005356  005360  005372
 8730  054546  005374
 8731
 8732                                  .SBTTL  ERROR DATA FORMATS
 8733
 8734  054550  000003                  DF1:    3
 8735  054552     002      000                 .BYTE 2,0
 8736  054554  051024                          DH2
 8737  054556     007      000                 .BYTE 7,0
 8738  054560  051074                          DH3
 8739  054562     007      000                 .BYTE   7,0
 8740
 8741
 8742  054564  000005                  DF3:    5
 8743  054566     000      000                 .BYTE 0,0
 8744  054570  051007                          DH1
 8745  054572     002      000                 .BYTE 2,0
 8746  054574  053350                          DH61
 8747  054576     003      000                 .BYTE 3,0
 8748  054600  051024                          DH2
 8749  054602     007      000                 .BYTE   7,0
 8750  054604  051074                          DH3
 8751  054606     007      000                 .BYTE   7,0
 8752
 8753  054610  000005                  DF4:    5
 8754  054612     000      000                 .BYTE 0,0
 8755  054614  051007                          DH1
 8756  054616     002      000                 .BYTE 2,0
 8757  054620  053413                          DH62
 8758  054622     003      000                 .BYTE 3,0
 8759  054624  051024                          DH2
 8760  054626     007      000                 .BYTE   7,0
 8761  054630  051074                          DH3
 8762  054632     007      000                 .BYTE   7,0
 8763
 8764  054634  000001                  DF5:    1
 8765  054636     002      000                 .BYTE   2,0
 8766
 8767  054640  000003                  DF7:    3
 8768  054642     002      000                 .BYTE   2,0
 8769  054644  051024                          DH2
 8770  054646     007      000                 .BYTE   7,0
 8771  054650  051074                          DH3
 8772  054652     007      000                 .BYTE   7,0
 8773  054654  000004                  DF10:   4
 8774  054656     000      000                 .BYTE 0,0
 8775  054660  051007                          DH1
 8776  054662     002      000                 .BYTE 2,0
 8777  054664  051024                          DH2
 8778  054666     007      000                 .BYTE 7,0
 8779  054670  051074                          DH3
 8780  054672     007      000                 .BYTE   7,0
 8781
 8782  054674  000005                  DF12:   5
 8783  054676     000      000                 .BYTE   0,0
 8784  054700  053765                          DH73
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 8785  054702     000      000                    .BYTE   0,0
 8786  054704  051007                            DH1
 8787  054706     002      000                    .BYTE   2,0
 8788  054710  051024                            DH2
 8789  054712     007      000                    .BYTE   7,0
 8790  054714  051074                            DH3
 8791  054716     007      000                    .BYTE   7,0
 8792
 8793
 8794  054720  000004                    DF15:   4
 8795  054722     000      000                    .BYTE   0,0
 8796  054724  051007                            DH1
 8797  054726     002      000                    .BYTE   2,0
 8798  054730  051024                            DH2
 8799  054732     007      000                    .BYTE   7,0
 8800  054734  051074                            DH3
 8801  054736     007      000                    .BYTE   7,0
 8802
 8803
 8804  054740  000005                    DF17:   5
 8805  054742     000      000                    .BYTE   0,0
 8806  054744  052633                            DH44
 8807  054746     000      000                    .BYTE   0,0
 8808  054750  051007                            DH1
 8809  054752     002      000                    .BYTE   2,0
 8810  054754  051024                            DH2
 8811  054756     007      000                    .BYTE   7,0
 8812  054760  051074                            DH3
 8813  054762     007      000                    .BYTE   7,0
 8814  054764  000005                    DF20:   5
 8815  054766     000      000                    .BYTE   0,0
 8816  054770  051007                            DH1
 8817  054772     002      000                    .BYTE   2,0
 8818  054774  053165                            DH56
 8819  054776     002      000                    .BYTE   2,0
 8820  055000  051024                            DH2
 8821  055002     007      000                    .BYTE   7,0
 8822  055004  051074                            DH3
 8823  055006     007      000                    .BYTE   7,0
 8824
 8825  055010  000007                    DF21:   7
 8826  055012     000      000                    .BYTE   0,0
 8827  055014  051007                            DH1
 8828  055016     002      000                    .BYTE   2,0
 8829  055020  053720                            DH69
 8830  055022     000      000                    .BYTE   0,0
 8831  055024  053740                            DH71
 8832  055026     004      000                    .BYTE   4,0
 8833  055030  053730                            DH70
 8834  055032     004      000                    .BYTE   4,0
 8835  055034  051024                            DH2
 8836  055036     007      000                    .BYTE   7,0
 8837  055040  051074                            DH3
 8838  055042     007      000                    .BYTE   7,0
 8839
 8840  055044  000007                    DF22:   7
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 8841  055046      000      000                .BYTE   0,0
 8842  055050  051007                         DH1
 8843  055052      002      000                .BYTE   2,0
 8844  055054  053720                         DH69
 8845  055056      000      000                .BYTE   0,0
 8846  055060  053740                         DH71
 8847  055062      006      000                .BYTE   6,0
 8848  055064  053730                         DH70
 8849  055066      006      000                .BYTE   6,0
 8850  055070  051024                         DH2
 8851  055072      007      000                .BYTE   7,0
 8852  055074  051074                         DH3
 8853  055076      007      000                .BYTE   7,0
 8854
 8855  055100  000007                DF23:    7
 8856  055102      000      000                .BYTE   0,0
 8857  055104  051007                         DH1
 8858  055106      002      000                .BYTE   2,0
 8859  055110  053720                         DH69
 8860  055112      000      000                .BYTE   0,0
 8861  055114  053740                         DH71
 8862  055116      007      000                .BYTE   7,0
 8863  055120  053730                         DH70
 8864  055122      007      000                .BYTE   7,0
 8865  055124  051024                         DH2
 8866  055126      007      000                .BYTE   7,0
 8867  055130  051074                         DH3
 8868  055132      007      000                .BYTE   7,0
 8869                                ;;*****************************************************************
 8870                                .SBTTL  TYPE ERROR ROUTINE
 8871                                ;*ENTRY JSR PC,TYP ERR
 8872                                ;*RETURN RTS PC
 8873                                ;*
 8874                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
 8875                                ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
 8876                                ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
 8877                                ;*THE ERROR.
 8878                                ;;*****************************************************************
 8879  055134  104413                TYPERR: SAVREG
 8880  055136  032777  020000  123774         BIT     #SW13,@SWR      ;INHIBIT ERROR TYPEOUTS?
 8881  055144  001107                         BNE     20$             ;YES-BRANCH
 8882  055146  113700  001114               MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
 8883  055152  042700  177400               BIC     #177400,R0      ;CLEAR SIGN EXTENSION
 8884  055156  005300                         DEC     R0              ;FORM INDEX FOR ERROR TABLE
 8885  055160  006300                         ASL     R0
 8886  055162  006300                         ASL     R0
 8887  055164  006300                         ASL     R0
 8888  055166  062700  005512         1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
 8889  055172  012037  055206               MOV     (R0)+,2$        ;GET EM POINTER
 8890  055176  001404                         BEQ     3$              ;BRANCH IF THERE ISN'T ONE
 8891  055200  104401  001205               TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
 8892  055204  104401                         TYPE                    ;TYPE ERROR MESSAGE (EM)
 8893  055206  000000                 2$:     .WORD   0               ;EM POINTER GOES HERE
 8894  055210  012037  055224         3$:     MOV     (R0)+,4$        ;GET DH POINTER
 8895  055214  001404                         BEQ     5$              ;BRANCH IF THERE ISN'T ONE
 8896  055216  104401  001205               TYPE    ,$CRLF          ;TYPE CR-LF
```

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 8897  055222  104401                     TYPE                    ;TYPE DATA HEADER
 8898  055224  000000               4$:   .WORD   0               ;DH POINTER GOES HERE
 8899  055226  012001               5$:   MOV     (R0)+,R1        ;GET DT POINTER
 8900  055230  001455                     BEQ     20$             ;BRANCH IF THERE ARE NONE
 8901  055232  005004                     CLR     R4              ;SET INDENT SWITCH
 8902  055234  012000                     MOV     (R0)+,R0        ;GET DF POINTER
 8903  055236  012002                     MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
 8904  055240  001446                     BEQ     17$             ;DH NUM IS 0-BRANCH
 8905  055242  005104                     COM     R4              ;NO INDENT
 8906  055244  104401  001205            TYPE    ,$CRLF
 8907  055250  112003               10$:  MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
 8908  055252  105720                     TSTB    (R0)+           ;BUMP PAST FORMAT WORD
 8909  055254  005703                     TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
 8910  055256  001407                     BEQ     14$             ;NO - SKIP DATA PRINT
 8911  055260  013146               11$:  MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
 8912  055262  104402                     TYPOC                   ;TYPE IT
 8913  055264  005303                     DEC     R3              ;MORE DATA WORDS
 8914  055266  001403                     BEQ     14$             ;NO-BRANCH
 8915  055270  104401  055420            TYPE    ,SPACE2         ;TYPE SEPARATORS
 8916  055274  000771                     BR      11$             ;LOOP
 8917  055276  005302               14$:  DEC     R2              ;MORE DH'S?
 8918  055300  003431                     BLE     20$             ;NO-BRANCH
 8919  055302  104401  001205            TYPE    ,$CRLF
 8920  055306  005760  000002            TST     2(R0)           ;ONLY A DH IN THIS REQUEST?
 8921  055312  001404                     BEQ     15$             ;YES-BRANCH BYPASS INDENT
 8922  055314  005104                     COM     R4              ;INDENT?
 8923  055316  001002                     BNE     15$             ;NO-BRANCH
 8924  055320  104401  055420            TYPE    ,SPACE2         ;YES-TYPE SPACES
 8925  055324  012037  055332      15$:  MOV     (R0)+,16$       ;GET NEXT DH POINTER
 8926  055330  104401                     TYPE                    ;TYPE DH
 8927  055332  000000               16$:  .WORD   0               ;DH POINTER GOES HERE
 8928  055334  105710                     TSTB    (R0)            ;TYPE A DT?
 8929  055336  001003                     BNE     21$             ;YES-BRANCH
 8930  055340  062700  000002            ADD     #2,R0           ;INCREMENT DF POINTER
 8931  055344  000754                     BR      14$             ;SEE IF END OF DF BLOCK
 8932  055346  104401  001205      21$:  TYPE    ,$CRLF
 8933  055352  005704                     TST     R4              ;INDENT?
 8934  055354  001335                     BNE     10$             ;NO-BRANCH
 8935  055356  104401  055420      17$:  TYPE    ,SPACE2         ;YES-TYPE SPACES
 8936  055362  000732                     BR      10$             ;LOOP
 8937  055364  104414               20$:  RESREG
 8938  055366  032777  010000  123544    BIT     #SW12,@SWR      ;SEE IF EXIT AFTER 20 ERRORS
 8939  055374  001410                     BEQ     25$             ;BR IF NO
 8940  055376  023727  001103  000024    CMP     $ERFLG,#20.     ;ELSE SEE IF HAVE 20 ERRORS
 8941  055404  001004                     BNE     25$             ;BR IF NO
 8942  055406  012706  001100            MOV     #STACK,SP       ;ELSE RESTORE STACK
 8943  055412  000137  023374            JMP     ENDRV           ;AND BYPASS DRIVE
 8944  055416  000207               25$:  RTS     PC
 8945  055420  020040     000     SPACE2: .ASCIZ/  /            ;2 SPACES
 8946                               ;  ODT-11 -- V005A
 8947
 8948                               ; DEC-11-UODPA-A-LA
 8949
 8950                               ; COPYRIGHT 1969,1970,1972
 8951                               ; DIGITAL EQUIPMENT CORPORATION
 8952                               ; MAYNARD, MASSACHUSETTS 01754
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 8953                                           .ENABL  ABS,AMA
 8954          055424                           .EVEN
 8955          055504                           .=.+60
 8956          000000                 R0      =       %0      ; REGISTER
 8957          000001                 R1      =       %1      ;  NAMING
 8958          000002                 R2      =       %2      ;   CONVENTIONS
 8959          000003                 R3      =       %3
 8960          000004                 R4      =       %4
 8961          000005                 R5      =       %5
 8962          000006                 SP      =       %6
 8963          000007                 PC      =       %7
 8964          177776                 ST      =       177776          ;STATUS REGISTER
 8965                                 ;
 8966          000014                 O.TVEC  =       14              ;TRT VECTOR LOCATION
 8967          000340                 O.STM   =       340             ;PRIORITY MASK - STATUS REGISTER
 8968          000020                 O.TBT   =       20              ;T-BIT MASK - STATUS REGISTER
 8969          000003                 TRT     =       000003          ;TRT INSTRUCTION
 8970          000006                 RTT     =       000006          ;RTT INSTRUCTION
 8971                                 ;
 8972                                 ; R5 IS USUALLY CONSIDERED SAFE, THE CURRENT ADDRESS WORD
 8973                                 ; RESIDES IN IT.  AFTER A BREAKPOINT, IT IS SET TO ZERO, AND SEARCH
 8974                                 ; OPERATIONS LEAVE IT RANDOMLY FILLED.  OTHERWISE, IT SHOULD NOT
 8975                                 ; BE USED EXCEPT FOR JSR'S AND THE CURRENT ADDRESS POINTER (CAD).
 8976                                 ;
 8977          177562                 O.RDB   =       177562  ;R DATA BUFFER
 8978          177560                 O.RCSR  =       177560  ;R C/SR
 8979          177566                 O.TDB   =       177566  ;T DATA BUFFER
 8980          177564                 O.TCSR  =       177564  ;T C/SR
 8981                                 ;
 8982                                 ;
 8983                                 ; INITIALIZE ODT
 8984                                 ;  USE O.ODT FOR A NORMAL ENTRY
 8985                                 ;  USE O.ODT+2 TO RESTART ODT - WIPING OUT ALL BREAKPOINTS
 8986                                 ;  USE O.ODT+4 TO RE-ENTER (I.E. - FAKE A BREAKPOINT)
 8987
 8988
 8989
 8990                                 ;
 8991  055504  000413                 O.ODT:  BR      O.STRT          ;NORMAL ENTRY
 8992  055506  000417                         BR      O.RST           :RESTART
 8993  055510  013737  177776  055464 O.ENTR: MOV     ST,O.UST        ;RE-ENTER  --  SAVE STATUS
 8994  055516  013737  000016  177776         MOV     O.TVEC+2,ST     ;SET UP LOCAL STATUS
 8995  055524  010737  055462                 MOV     PC,O.UPC        ;FAKE THE PC
 8996  055530  000137  056662                 JMP     O.BK1
 8997                                 ;
 8998  055534  012706  055444         O.STRT: MOV     #O.UR0,SP       ;SET UP STACK
 8999  055540  010637  055460                 MOV     SP,O.USP        ;FAKE THE SAVED STACK
 9000  055544  000414                         BR      O.RST1          ;CLEAR BREAKPOINT TABLES
 9001  055546  004037  057070         O.RST:  JSR     0,O.SVR         ;SAVE REGISTERS
 9002  055552  013777  055502  177716         MOV     O.UIN,@O.ADR1   ;REMOVE THE BREAKPOINT
 9003  055560  113704  055466                 MOVB    O.PRI,R4        ;GET ODT PRIORITY
 9004  055564  106004                         RORB    R4              ;SHIFT
 9005  055566  106004                         RORB    R4              ; INTO
 9006  055570  106004                         RORB    R4              ;  POSITION
 9007  055572  110437  177776                 MOVB    R4,ST           ;STORE IN STATUS
 9008  055576  000127                 O.RST1: JMP     (PC)+
```

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 9009  055600  000403                          BR      0.45
 9010  055602  012737  000002  056572          MOV     #RTI,0.RTIT     ;SET TO RTI IF 11/20 OR /05
 9011  055610  105037  057511          0.45:   CLRB    0.P             ;DISALLOW PROCEED
 9012  055614  012737  000340  000016          MOV     #0.STM,0.TVEC+2 ;STATUS WORD TO TRT VECTOR + 2
 9013  055622  012737  056652  000014          MOV     #0.BRK,0.TVEC   ;PC TO TRT VECTOR
 9014  055630  000447                          BR      0.RALL          ;CLEAR BREAKPOINT TABLES
 9015                                  ;
 9016                                  ; SPECIAL NAME HANDLER
 9017                                  ;  DEPENDS UPON THE EXPLICIT ORDER OF THE TWO TABLES 0.TL AND 0.UR0
 9018                                  ;
 9019  055632  004537  057312          0.REGT: JSR     5,0.GET         ;SPECIAL NAME, GET ONE MORE CHARACTER
 9020  055636  012704  057535                  MOV     #0.TL,R4        ;TABLE START ADDRESS
 9021  055642  120024                  0.RSP:  CMPB    R0,(R4)+        ;IS THIS THE CORRECT CHARACTER?
 9022  055644  001413                          BEQ     0.SP            ;JUMP IF YES
 9023  055646  022704  057543                  CMP     #0.TL+0.LG,R4   ;IS THE SEARCH DONE?
 9024  055652  101373                          BHI     0.RSP           ;BRANCH IF NOT
 9025  055654  042700  177770                  BIC     #177770,R0      ;MASK OFF OCTAL
 9026  055660  010004                          MOV     R0,R4
 9027  055662  006304                  0.SP1:  ASL     R4
 9028  055664  062704  055444                  ADD     #0.UR0,R4       ;GENERATE ADDRESS
 9029  055670  005202                          INC     R2              ;SET FOUND FLAG
 9030  055672  000444                          BR      0.SCAN          ;GO FIND NEXT CHARACTER
 9031  055674  162704  057526          0.SP:   SUB     #0.TL-7,R4      ;CORRECT CONSTANT
 9032  055700  000770                          BR      0.SP1
 9033                                  ;
 9034                                  ; _ HANDLER - OPEN INDEXED ON THE PC
 9035                                  ;
 9036  055702  004737  057436          0.ORPC: JSR     PC,0.TCLS
 9037  055706  010502                          MOV     R5,R2           ;CURRENT ADDRESS IN R2
 9038  055710  061202                          ADD     @R2,R2          ;COMPUTE
 9039  055712  006202                          ASR     R2              ;MOVE ONE BIT TO CARRY
 9040  055714  103421                          BCS     0.ERR           ;ERROR IF ODD NUMBER
 9041  055716  006302                          ASL     R2              ;RESTORE WORD
 9042  055720  005722                          TST     (R2)+           ; AND INCREMENT BY TWO
 9043  055722  010205                          MOV     R2,R5           ;UPDATE CAD
 9044  055724  000137  056176                  JMP     0.OP2           ;GO FINISH UP
 9045                                  ;
 9046                                  ; B HANDLER - SET AND REMOVE BREAKPOINTS
 9047                                  ;
 9048  055730  005702                  0.BKPT: TST     R2              ;IF NO NUMBER TYPED
 9049  055732  001406                          BEQ     0.RALL          ;  REMOVE BREAKPOINT
 9050  055734  006204                          ASR     R4              ;CHECK IF ODD
 9051  055736  103410                          BCS     0.ERR           ;JUMP IF ODD
 9052  055740  006304                          ASL     R4              ;RESTORE ONE BIT
 9053  055742  010437  055476                  MOV     R4,0.ADR1       ;SET A BREAKPOINT
 9054
 9055  055746  000412                          BR      0.DCD
 9056
 9057
 9058
 9059  055750  012737  057552  055476  0.RALL: MOV     #0.TRTC,0.ADR1  ;CLEAR BREAKPOINT
 9060  055756  000406                          BR      0.DCD
 9061                                  ;
 9062                                  ; COMMAND DECODER - ODT11
 9063                                  ;
 9064                                  ;   REGISTERS R0-R4 MAY BE USED,
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                        ;    REGISTER R5 WILL BE CONSIDERED SAFE
                        ;
056000 005004           O.ERR:  BIS     #1,R5           ;CLOSE EVERYTHING
056004 012700 000077            MOV     #'?,R0          ;  ? TO BE TYPED
056010 004537 057370            JSR     5,O.FTYP        ; OUTPUT ?
056014 004537 057470    O.DCD:  JSR     5,O.CRLS        ;TYPE  <CR><LF>*
056020 005004           O.DCD1: CLR     R4              ; R4 CONTAINS THE CONVERTED OCTAL
056022 005002                   CLR     R2              ; R2 IS THE NUMBER FOUND FLAG
056024 004537 057312    O.SCAN: JSR     5,O.GET         ;GET A CHAR, RETURN IN R0
056030 022700 000060            CMP     #'0,R0          ;COMPARE WITH ASCII 0
056034 101013                   BHI     O.CLGL          ;CHECK LEGALITY IF NON-NUMERIC
056036 022700 000067            CMP     #'7,R0          ;COMPARE WITH ASCII 7
056042 103410                   BLO     O.CLGL          ;CHECK LEGALITY IF NOT OCTAL
056044 042700 177770            BIC     #177770,R0      ;CONVERT TO BCD
056050 006304                   ASL     R4              ; MAKE ROOM
056052 006304                   ASL     R4              ;  IN
056054 006304                   ASL     R4              ;    R4
056056 060004                   ADD     R0,R4           ;PACK THREE BITS IN R4
056062 005202                   INC     R2              ;R2 HAS NUMERIC FLAG
056064 000760                   BR      O.SCAN          ;   AND TRY AGAIN
056066 005001           O.CLGL: CLR     R1              ;CLEAR INDEX
056070 120061 057521    O.LGL1: CMPB    R0,O.LGCH(R1)   ;DO THE CODES MATCH?
056076 001405                   BEQ     O.LGL2          ;JUMP IF YES
056100 005201                   INC     R1              ; SET INDEX FOR NEXT SEARCH
056102 020127 000014            CMP     R1,#O.CLGT      ;IS THE SEARCH DONE?
056106 103336                   BHIS    O.ERR           ;    OOPS!
056110 000770                   BR      O.LGL1          ;RE-LOOP
056112 006301           O.LGL2: ASL     R1              ;MULTIPLY BY TWO
056114 000171 056074            JMP     @O.LGDR(R1)     ;GO TO PROPER ROUTINE
                        ;
056074 056124           O.LGDR: O.WRD   ;  /    OPEN WORD
056076 056156                   O.CRET  ;  CARRIAGE RETURN    CLOSE
056100 055632                   O.REGT  ;  $  REGISTER OPS
056102 056466                   O.GO    ;  G  GO TO ADDRESS K
056104 056170                   O.OP1   ;  <LF>  MODIFY, CLOSE, OPEN NEXT
056106 055702                   O.ORPC  ;     OPEN RELATED, INDEX - PC
056110 056222                   O.BACK  ;  ^  OPEN PREVIOUS
056112 056232                   O.OFST  ;  O  OFFSET
056114 056310                   O.WSCH  ;  W  SEARCH WORD
056116 056304                   O.EFF   ;  E  SEARCH EFFECTIVE ADDRESS
056120 055730                   O.BKPT  ;  B  BREAKPOINTS
056122 056574                   O.PROC  ;  P  PROCEED
000030                  O.LGL   =       .-O.LGDR        ;LGL MUST EQUAL 2X CHLGT ALWAYS
                        ;
                        ; PROCESS / - OPEN WORD
                        ;
056124 005702           O.WRD:  TST     R2              ;GET VALUE IF R2 IS NON-ZERO
056126 001410                   BEQ     O.WRDA          ;SKIP OTHERWISE
056130 010405                   MOV     R4,R5           ;   PUT VALUE IN CAD
056132 006205           O.WRD1: ASR     R5              ;MOVE ONE BIT TO CARRY
056134 103711           O.ERR2: BCS     O.ERR           ;JUMP IF ODD ADDRESS
056136 006305                   ASL     R5              ;RESTORE THE CARRY BIT
056140 011500                   MOV     @R5,R0          ;GET CONTENTS OF WORD
056142 004537 057226            JSR     5,O.CADV        ;GO GET AND TYPE OUT @CAD
056146 000714                   BR      O.DCD1          ;GO BACK TO DECODER
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 9121  056150  042705  000001          O.WRDA: BIC     #1,R5           ;CLEAR CLOSED BIT
 9122  056154  000766                          BR      O.WRD1          ;GO BACK TO MAIN-LINE
 9123                                  ;
 9124                                  ; PROCESS CARRIAGE RETURN
 9125                                  ;
 9126  056156  004737  057436          O.CRET: JSR     PC,O.TCLS       ;CLOSE LOCATION
 9127  056162  052705  000001                  BIS     #1,R5           ;CLOSE EVERYTHING
 9128  056166  000702                          BR      O.DCD           ;RETURN TO DECODER
 9129                                  ;
 9130                                  ; PROCESS <LF>, OPEN NEXT WORD
 9131                                  ;
 9132  056170  004737  057436          O.OP1:  JSR     PC,O.TCLS       ;CLOSE PRESENT CELL
 9133  056174  005725                          TST     (R5)+           ;GENERATE NEW ADDRESS
 9134  056176  004537  057462          O.OP2:  JSR     5,O.CRLF        ;<CR><LF>
 9135  056202  010500                          MOV     R5,R0           ;NUMBER TO TYPE
 9136  056204  004537  057226                  JSR     5,O.CADV        ; TYPE OUT ADDRESS
 9137  056210  012700  000057                  MOV     #'/,R0          ;TYPE A /
 9138  056214  004537  057370                  JSR     5,O.FTYP
 9139  056220  000744                          BR      O.WRD1          ;GO PROCESS IT
 9140                                  ;
 9141                                  ; PROCESS ^, OPEN PREVIOUS WORD
 9142                                  ;
 9143  056222  004737  057436          O.BACK: JSR     PC,O.TCLS
 9144  056226  005745                          TST     -(R5)           ;GENERATE NEW ADDRESS
 9145  056230  000762                          BR      O.OP2           ;GO DO THE REST
 9146                                  ;
 9147                                  ; PROCESS 0, COMPUTE OFFSET
 9148                                  ;
 9149  056232  006205                  O.OFST: ASR     R5              ;GET LOW ORDER BIT
 9150  056234  103737                          BCS     O.ERR2          ;ERROR IF CLOSED
 9151  056236  006305                          ASL     R5              ;RESTORE WORD
 9152  056240  012700  000040                  MOV     #' ,R0          ;TYPE ONE BLANK
 9153  056244  004537  057370                  JSR     5,O.FTYP        ; AS A SEPARATOR
 9154  056250  160504                          SUB     R5,R4           ;COMPUTE
 9155  056252  005304                          DEC     R4
 9156  056254  005304                          DEC     R4              ;     16 BIT OFFSET
 9157  056256  010400                          MOV     R4,R0           ;TYPE A
 9158  056260  010402                          MOV     R4,R2           ;SAVE R4
 9159  056262  004537  057226                  JSR     5,O.CADV        ;NUMBER IN R0 - WORD MODE
 9160  056266  010200                          MOV     R2,R0
 9161  056270  006200                          ASR     R0              ;DIVIDE BY TWO
 9162  056272  103402                          BCS     O.OF1           ;BRANCH IF ODD
 9163  056274  004537  057226                  JSR     5,O.CADV        ;NUMBER IN R0 - BYTE MODE
 9164  056300  000137  056000          O.OF1:  JMP     O.DCD1          ;ALL DONE
 9165                                  ;
 9166                                  ; SEARCHES - $MSK   HAS THE MASK
 9167                                  ;            $MSK+2 HAS THE FWA
 9168                                  ;            $MSK+4 HAS THE LWA
 9169
 9170
 9171
 9172
 9173                                  ;
 9174  056304  005201                  O.EFF:  INC     R1              ;SET EFFECTIVE SEARCH
 9175  056306  000401                          BR      O.WDS
 9176  056310  005001                  O.WSCH: CLR     R1              ;SET WORD SEARCH
```

```
 9177  056312  005702                 O.WDS:  TST     R2              ;CHECK FOR OBJECT FOUND
 9178  056314  001621                 O.ERR1: BEQ     O.ERR           ;ERROR IF NO OBJECT
 9179  056316  013702  055472                 MOV     O.MSK+2,R2      ;SET ORIGIN
 9180  056322  013705  055470                 MOV     O.MSK,R5        ;SET MASK
 9181  056326  005105                         COM     R5              ;AND COMPLEMENT IT
 9182  056330  020237  055474         O.WDS2: CMP     R2,O.MSK+4      ; IS THE SEARCH ALL DONE?
 9183  056334  101217                         BHI     O.DCD           ;  YES
 9184  056336  011200                         MOV     @R2,R0          ; GET OBJECT
 9185  056340  005701                         TST     R1              ;NO
 9186  056342  001027                         BNE     O.EFF1          ;BRANCH IF EFFECTIVE SEARCH
 9187  056344  010046                         MOV     R0,-(SP)
 9188  056346  010403                         MOV     R4,R3           ;EXCLUSIVE OR
 9189  056350  040400                         BIC     R4,R0           ; IS DONE
 9190  056352  042603                         BIC     (SP)+,R3                ;  IN A VERY
 9191  056354  050003                         BIS     R0,R3           ;     FANCY MANNER HERE
 9192  056356  040503                         BIC     R5,R3           ;AND RESULT WITH MASK
 9193  056360  001016         O.WDS3: BNE     O.WDS4          ;RE-LOOP IF NO MATCH
 9194  056362  010446                 MOV     R4,-(SP)        ;REGISTERS R2,R4, AND R5 ARE SAFE
 9195  056364  004537  057462         JSR     5,O.CRLF        ;TYPE <CR,LF>
 9196  056370  010200                 MOV     R2,R0           ;GET READY TO TYPE
 9197  056372  004537  057226         JSR     5,O.CADV        ;  TYPE ADDRESS
 9198  056376  012700  000057         MOV     #'/,R0          ;SLASH TO R0
 9199  056402  004537  057370         JSR     5,O.FTYP        ;TYPE IT
 9200  056406  011200                 MOV     @R2,R0          ;GET CONTENTS
 9201  056410  004537  057226         JSR     5,O.CADV        ;TYPE CONTENTS
 9202  056414  012604                 MOV     (SP)+,R4        ; RESTORE R4
 9203  056416  005722         O.WDS4: TST     (R2)+           ;INCREMENT TO NEXT CELL AND
 9204  056420  000743                 BR      O.WDS2          ;     RETURN
 9205  056422  020004         O.EFF1: CMP     R0,R4           ; IS (X)=K?
 9206  056424  001755                 BEQ     O.WDS3          ;TYPE IF EQUAL
 9207  056426  010003                 MOV     R0,R3           ;(X) TO R3
 9208  056430  060203                 ADD     R2,R3           ;(X)+X
 9209  056432  005203                 INC     R3
 9210  056434  005203                 INC     R3              ;(X)+X+2
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                                        CMP     R3,R4           ;IS (X)+X+2=K?
                                        BEQ     0.WDS3          ;BRANCH IF EQUAL
                                        BIC     #177400,R0      ;WIPE OUT EXTRANEOUS BITS
                                        MOVB    R0,R0           ;EXTEND SIGN
                                        CCC
                                        ASL     R0              ;MULTIPLY BY TWO
                                        INC     R0              ;ADD TWO
                                        INC     R0
                                        ADD     R2,R0           ;ADD PC
                                        CMP     R0,R4           ;IS THE RESULT A PROPER REL. BRANCH?
                                        BR      0.WDS3
                                ;
                                ; PROCESS G - GO
                                ;
056466  105037  057511          0.GO:   CLRB    0.P             ;DISALLOW PROCEED
056472  006204                          ASR     R4              ;CHECK LOW ORDER BIT
056474  103617                          BCS     0.ERR2          ;ERROR IF ODD NUMBER
056476  006304                          ASL     R4              ;RESTORE WORD
056500  010437  055462                  MOV     R4,0.UPC        ;SET UP NEW PC
056504  112737  000340  177776          MOVB    #0.STM,ST       ;SET HIGH PRIORITY
056512  004537  057160                  JSR     5,0.RSTT        ;RESTORE TELETYPE
056516  105037  057510          0.TBIT: CLRB    0.T             ;CLEAR BOTH
056522  042737  000020  055464          BIC     #0.TBT,0.UST    ;  T-BIT FLAGS
056530  017737  176742  055502          MOV     @0.ADR1,0.UIN   ;SAVE INSTRUCTION
056536  013777  057552  176732          MOV     0.TRTC,@0.ADR1  ;REPLACE WITH TRAP
056544  012600                  0.GO2:  MOV     (SP)+,R0        ;RESTORE
056546  012601                          MOV     (SP)+,R1        ; R0
056550  012602                          MOV     (SP)+,R2        ;   THRU
056552  012603                          MOV     (SP)+,R3
056554  012604                          MOV     (SP)+,R4        ;
056556  012605                          MOV     (SP)+,R5        ;    R5
056560  012606                          MOV     (SP)+,SP        ; AND SP
056562  013746  055464                  MOV     0.UST,-(SP)     ;    AND STATUS
056566  013746  055462                  MOV     0.UPC,-(SP)     ;    AND PC
056572  000006                  0.RTIT: RTT                     ;CHANGED TO RTI FOR 11/20 AND /05
                                ;
                                ; PROCESS P - PROCEED
                                ;   ONLY ALLOWED AFTER A BREAKPOINT
                                ;
056574  105737  057511          0.PROC: TSTB    0.P             ;CHECK LEGALITY OF PROCEED
056600  001645                          BEQ     0.ERR1          ;NOT LEGAL
056602  105037  057511                  CLRB    0.P             ;CLEAR PROCEED FLAG
056606  005702                          TST     R2              ;WAS COUNT SPECIFIED?
056610  001402                          BEQ     0.PR1           ;NO
056612  010437  055500                  MOV     R4,0.CT         ;YES, PUT AWAY COUNT
056616  112737  000340  177776  0.PR1:  MOVB    #0.STM,ST       ;FORCE HIGH PRIORITY
056624  004537  057160                  JSR     5,0.RSTT        ;RESTORE TTY
056630  112737  000340  177776  0.C1:   MOVB    #0.STM,ST       ;SET HIGH PRIORITY
056636  105237  057510                  INCB    0.T             ;SET T-BIT FLAG
056642  052737  000020  055464          BIS     #0.TBT,0.UST    ;SET T-BIT
056650  000735                          BR      0.GO2
                                ;
                                ; BREAKPOINT HANDLER
                                ;  A TRT BREAKPOINT CAUSES 0.BRK TO BE ENTERED, WHICH SAVES
                                ;  VARIOUS ODDS AND ENDS, FINDS OUT IF THE BREAKPOINT WAS LEGAL,
                                ;  AND GIVES CONTROL TO THE COMMAND DECODER
```

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 9267                                   ;
 9268  056652  012637  055462          0.BRK:  MOV     (SP)+,0.UPC     ;PRIORITY IS 7 UPON ENTRY
 9269  056656  012637  055464                  MOV     (SP)+,0.UST     ;SAVE STATUS AND PC
 9270  056662  004037  057070          0.BK1:  JSR     0,0.SVR         ;SAVE VARIOUS REGISTERS
 9271  056666  105737  057510                  TSTB    0.T             ;CHECK FOR T-BIT SET
 9272  056672  001311                          BNE     0.TBIT          ;JUMP IF SET
 9273  056674  013777  055502  176574          MOV     0.UIN,@0.ADR1   ;REMOVE BREAKPOINTS
 9274  056702  105737  055466                  TSTB    0.PRI           ;CHECK IF PRIORITY
 9275  056706  100003                          BPL     0.BK2           ; IS AS SAME AS USER PGM
 9276  056710  113705  055464                  MOVB    0.UST,R5        ;PICK UP USER UST IF SO
 9277  056714  000407                          BR      0.BK3           ;AND DON'T COMPUTE THE PRIORITY
 9278  056716  113705  055466          0.BK2:  MOVB    0.PRI,R5        ;OTHERWISE PICK UP ACTUAL PRIORITY
 9279  056722  000257                          CCC                     ;CLEAR CARRY
 9280  056724  106005                          RORB    R5              ;SHIFT LOW ORDER BITS
 9281  056726  106005                          RORB    R5              ;   INTO
 9282  056730  106005                          RORB    R5              ;     HIGH ORDER
 9283  056732  106005                          RORB    R5              ;       POSITION
 9284  056734  110537  177776          0.BK3:  MOVB    R5,ST           ;PUT THE STATUS AWAY WHERE IT BELONGS
 9285  056740  013705  055462                  MOV     0.UPC,R5        ;GET PC, IT POINTS TO THE TRT
 9286  056744  005745                          TST     -(R5)           ;SUBTRACT TWO
 9287  056746  010537  055462                  MOV     R5,0.UPC        ;FROM THE USER'S PC
 9288  056752  020537  055476                  CMP     R5,0.ADR1       ;COMPARE WITH LIST
 9289  056756  001417                          BEQ     0.B2            ;JUMP IF FOUND
 9290  056760  004537  057126                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS
 9291  056764  004537  057462                  JSR     5,0.CRLF
 9292  056770  012704  057514                  MOV     #0.BD,R4        ;ERROR, NOTHING FOUND
 9293  056774  012703  057515                  MOV     #0.BD+1,R3
 9294  057000  004537  057354                  JSR     5,0.TYPE        ;OUTPUT 'BE" FOR BAD ENTRY
 9295  057004  010500                          MOV     R5,R0
 9296  057006  042737  000020  055464          BIC     #0.TBT,0.UST    ;CLEAR OUT ANY POSSIBLE FAKE T-BIT
 9297  057014  000420                          BR      0.B3            ; AND CONTINUE
 9298  057016  005337  055500          0.B2:   DEC     0.CT
 9299  057022  003302                          BGT     0.C1            ;JUMP IF REPEAT
 9300  057024  012737  000001  055500          MOV     #1,0.CT         ;RESET COUNT TO 1
 9301  057032  105237  057511                  INCB    0.P             ;ALLOW PROCEED
 9302  057036  004537  057126                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS, R4 IS SAFE
 9303  057042  012700  000102                  MOV     #'B,R0
 9304  057046  004537  057370                  JSR     5,0.FTYP        ;TYPE 'B"
 9305  057052  013700  055476                  MOV     0.ADR1,R0       ;GET ADDRESS OF BREAK
 9306  057056  004537  057226          0.B3:   JSR     5,0.CADV        ;TYPE ADDRESS
 9307  057062  005005                          CLR     R5              ;CLEAR CAD
 9308  057064  000137  055774                  JMP     0.DCD           ;GO TO DECODER
 9309                                   ;
 9310                                   ; SAVE REGISTERS R0-R6 IN INTERNAL STACK
 9311                                   ;
 9312  057070  012637  057506          0.SVR:  MOV     (SP)+,0.XXX     ;PICK REGISTER FROM STACK AND SAVE
 9313  057074  010637  055460                  MOV     SP,0.USP        ;SAVE USER STACK ADDRESS
 9314  057100  012706  055460                  MOV     #0.USP,SP       ;SET TO INTERNAL STACK
 9315  057104  010546                          MOV     R5,-(SP)        ;SAVE
 9316  057106  010446                          MOV     R4,-(SP)        ; REGISTERS
 9317  057110  010346                          MOV     R3,-(SP)        ;1
 9318  057112  010246                          MOV     R2,-(SP)        ; THRU
 9319  057114  010146                          MOV     R1,-(SP)        ;     5
 9320  057116  013746  057506                  MOV     0.XXX,-(SP)     ;PUT SAVED REGISTER ON STACK
 9321  057122  005746                          TST     -(SP)
 9322  057124  000200                          RTS     R0
```

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                                ;
                                ; SAVE TELETYPE STATUS
                                ;
057126  113737  177560  057512  O.SVTT: MOVB    O.RCSR,O.CSR1   ;SAVE R C/SR
057134  113737  177564  057513          MOVB    O.TCSR,O.CSR2   ;SAVE T C/SR
057142  105037  177560                  CLRB    O.RCSR          ;CLEAR ENABLE AND MAINTENANCE
057146  105037  177564                  CLRB    O.TCSR          ;  BITS IN BOTH C/SR
057152  004537  057462                  JSR     5,O.CRLF        ;TYPE <CR,LF>
057156  000205                          RTS     R5
                                ;
                                ; RESTORE TELETYPE STATUS
                                ;
057160  004537  057462          O.RSTT: JSR     5,O.CRLF                ;<CR,LF> BEFORE RESTORING
057164  105737  177564                  TSTB    O.TCSR          ;WAIT READY ON PRINTER
057170  100375                          BPL     .-4
057172  032737  004000  177560          BIT     #4000,O.RCSR    ;CHECK BUSY FLAG ON READER
057200  001403                          BEQ     O.RSE1          ;SKIP READY LOOP IF NOT BUSY
057202  105737  177560                  TSTB    O.RCSR          ;WAIT READY
057206  100375                          BPL     .-4             ;    ON READER
057210  113737  057512  177560  O.RSE1: MOVB    O.CSR1,O.RCSR   ;RESTORE
057216  113737  057513  177564          MOVB    O.CSR2,O.TCSR   ;  THE STATUS REGISTERS
057224  000205                          RTS     R5
                                ;
                                ; TYPE OUT CONTENTS OF WORD OR BYTE WITH ONE TRAILING SPACE
                                ; WORD IS IN R0
                                ;
057226  010246                  O.CADV: MOV     R2,-(SP)        ;SAVE R2
057230  012704  057551                  MOV     #O.BUF+6,R4     ;BUFFER START ADDRESS
057234  012746  000060                  MOV     #'0,-(SP)               ;CONSTANT ASCII 0
057240  010002          O.SPC:  MOV     R0,R2           ; GET
057242  042702  177770                  BIC     #177770,R2      ;    OCTAL CHARACTER
057246  061602                          ADD     @SP,R2          ;CONVERT TO ASCII
057250  110244                          MOVB    R2,-(R4)        ;STORE IN BUFFER
057252  006200                          ASR     R0              ;SHIFT THIS MESS
057254  006200                          ASR     R0              ; RIGHT
057256  006200                          ASR     R0              ;   THREE WHOLE PLACES
057260  020427  057544                  CMP     R4,#O.BUF+1     ;DONE?
057264  101365                          BHI     O.SPC           ;    NO
057266  042700  177776                  BIC     #177776,R0      ;GET LAST BIT
057272  062600                          ADD     (SP)+,R0                ;CONVERT TO ASCII
057274  110044                          MOVB    R0,-(R4)        ;AND PUT IT AWAY
057276  012703  057551                  MOV     #O.BUF+6,R3     ;LWA
057302  004537  057354                  JSR     5,O.TYPE        ;TYPE WHOLE STRING OF CHARACTERS
057306  012602                          MOV     (SP)+,R2        ;RESTORE R2
057310  000205                          RTS     R5
                                ;
                                ; GENERAL CHARACTER INPUT ROUTINE
                                ; CHARACTER INPUT GOES TO R0
                                ;
057312  105737  177560          O.GET:  TSTB    O.RCSR          ;WAIT FOR
057316  100375                          BPL     .-4             ;    INPUT FROM KEYBOARD
057320  113700  177562                  MOVB    O.RDB,R0        ;GET A CHARACTER
057324  004537  057370                  JSR     5,O.FTYP        ;ECHO CHARACTER
057330  042700  177600                  BIC     #177600,R0      ;STRIP OFF PARITY FROM CHARACTER
057334  001766                          BEQ     O.GET           ;IGNORE NULLS
057336  122700  000040                  CMPB    #40,R0          ;CHECK FOR SPACES
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 9379  057342  001763                    BEQ     0.GET           ;IGNORE NULLS
 9380  057344  122700  000073            CMPB    #';,R0          ;CHECK FOR SEMI-COLON
 9381  057350  001760                    BEQ     0.GET           ;IGNORE THEM IF FOUND
 9382  057352  000205                    RTS     R5
 9383                                ;
 9384                                ; GENERAL CHARACTER OUTPUT ROUTINE
 9385                                ;  ADDRESS OF FIRST BYTE IN R4,
 9386                                ;  ADDRESS OF LAST BYTE IN R3, (R3)>(R4)
 9387                                ;
 9388  057354  020304                0.TYPE: CMP     R3,R4           ;CHECK FOR COMPLETION
 9389  057356  103426                        BLO     0.TYP1          ; EXIT WHEN DONE
 9390  057360  112400                        MOVB    (R4)+,R0        ;GET A CHARACTER
 9391  057362  004537  057370                JSR     5,0.FTYP        ;TYPE ONE CHARACTER
 9392  057366  000772                        BR      0.TYPE          ;LOOP UNTIL DONE
 9393                                ;
 9394                                ; TYPE ONLY ONE CHARACTER (CONTAINED IN R0)
 9395                                ;
 9396  057370  105737  177564        0.FTYP: TSTB    0.TCSR          ;CHECK STATUS
 9397  057374  100375                        BPL     .-4             ;WAIT UNTIL READY
 9398  057376  110037  177566                MOVB    R0,0.TDB        ;TYPE ONE CHARACTER
 9399  057402  120037  000045                CMPB    R0,@#45         ;IS CHAR TO BE FILLED?
 9400  057406  001012                        BNE     0.TYP1          ;NO
 9401  057410  113746  000044                MOVB    @#44,-(SP)      ;YES, INIT THE COUNT
 9402  057414  105737  177564        0.TYP2: TSTB    0.TCSR
 9403  057420  100375                        BPL     0.TYP2
 9404  057422  105037  177566                CLRB    0.TDB           ;GENERATE NULL FILLER
 9405  057426  105316                        DECB    @SP
 9406  057430  003371                        BGT     0.TYP2
 9407  057432  005726                        TST     (SP)+           ;POP STACK
 9408  057434  000205                0.TYP1: RTS     R5
 9409                                ;
 9410                                ; CLOSE WORD OR BYTE AND EXIT,
 9411                                ; UPON ENTERING, R2 HAS NUMERIC FLAG, R4 HAS CONTENTS
 9412                                ;
 9413  057436  006205                0.TCLS: ASR     R5              ;GET LOW ORDER BIT
 9414  057440  103405                        BCS     0.TC            ;JUMP IF ALREADY CLOSED
 9415  057442  006305                        ASL     R5
 9416  057444  005702                        TST     R2              ;IF NO NUMBER WAS TYPED THERE IS
 9417  057446  001401                        BEQ     0.CLS1          ;NO CHANGE TO THE OPEN CELL
 9418  057450  010415                        MOV     R4,@R5          ;STORE WORD
 9419  057452  000207                0.CLS1: RTS     PC
 9420  057454  005746                0.TC:   TST     -(SP)           ;POP EXTRA CELL FROM STACK
 9421  057456  000137  055760                JMP     0.ERR           ;AND SCREAM BLOODY MURDER
 9422                                ;
 9423                                ; 0.CRLF - TYPE <CR,LF>
 9424                                ; 0.CRLS - TYPE <CR,LF>*
 9425                                ;
 9426  057462  012703  057517        0.CRLF: MOV     #0.CR+1,R3      ;LWA <CR,LF>
 9427  057466  000402                        BR      0.CRS
 9428  057470  012703  057520        0.CRLS: MOV     #0.CR+2,R3      ;LWA <CR,LF>*
 9429  057474  012704  057516        0.CRS:  MOV     #0.CR,R4        ;FWA
 9430  057500  004537  057354                JSR     5,0.TYPE        ;TYPE SOMETHING
 9431  057504  000205                        RTS     R5
 9432                                ;
 9433  057506  000000                0.XXX:  .WORD   0               ;TEMPORARY STORAGE
 9434  057510     000                0.T:    .BYTE   0               ;  T-BIT FLAG
```

```
 9435  057511      000                O.P:    .BYTE   0               ;PROCEED FLAG = 0 IF PROCEED NOT ALLOWED
 9436                                                                  ;             = 1 IF PROCEED ALLOWED
 9437  057512      000                O.CSR1: .BYTE   0               ;SAVE CELL - R C/SR
 9438  057513      000                O.CSR2: .BYTE   0               ;SAVE CELL - T C/SR
 9439                                 ;
 9440                                         .EVEN
 9441  057514   042502                O.BD:   .WORD   'BE
 9442                                 ;
 9443  057516      015                O.CR:   .BYTE   015     ;  <CR>
 9444  057517      012                        .BYTE   012     ;  <LF>
 9445  057520      052                        .BYTE   '*      ;  *
 9446                                 ;
 9447  057521      057                O.LGCH: .BYTE   '/      ;  /
 9448  057522      015                        .BYTE   015     ;  CARRIAGE RETURN
 9449  057523      044                        .BYTE   '$      ;  $
 9450  057524      107                        .BYTE   'G      ;  G
 9451  057525      012                        .BYTE   012     ;  <LF>
 9452  057526      137                        .BYTE   '       ;
 9453  057527      136                        .BYTE   '^      ;  ^
 9454  057530      117                        .BYTE   'O      ;  O
 9455  057531      127                        .BYTE   'W      ;  W
 9456  057532      105                        .BYTE   'E      ;  E
 9457  057533      102                        .BYTE   'B      ;  B
 9458  057534      120                        .BYTE   'P      ;  P
 9459            000014                O.CLGT  =       .-O.LGCH                ;TABLE LENGTH
 9460                                 ;
 9461  057535      123                O.TL:   .BYTE   'S      ;DO        1
 9462  057536      120                        .BYTE   'P      ;NOT       2
 9463  057537      115                        .BYTE   'M      ;CHANGE    3
 9464  057540      000                        .BYTE   0       ;THE       4
 9465  057541      000                        .BYTE   0       ;ORDER     5
 9466  057542      102                        .BYTE   'B      ;HERE      6
 9467            000006                O.LG    =       .-O.TL
 9468                                 ;
 9469  057543                         O.BUF:                          ;6 CHAR. BUFFER WITH
 9470            057551                .       =       .+6
 9471  057551      040                        .BYTE                   ;TRAILING BLANK
 9472                                         .EVEN
 9473                                 ;
 9474  057552   000003                O.TRTC: TRT                     ;TRACE TRAP PROTOTYPE
 9475                                 ;
 9476                                 ;THE ORDER OF THE FOLLOWING ENTRIES IS CRITICAL
 9477                                 ;
 9478            055444                .       =       O.ODT-40
 9479  055444   000000                O.UR0:  0       ;USER R0
 9480  055446   000000                        0       ;      R1
 9481  055450   000000                        0       ;      R2
 9482  055452   000000                        0       ;      R3
 9483  055454   000000                        0       ;      R4
 9484  055456   000000                        0       ;      R5
 9485  055460   000000                O.USP:  0       ;USER SP
 9486  055462   000000                O.UPC:  0       ;USER PC
 9487  055464   000000                O.UST:  0       ;USER ST
 9488  055466   000007                O.PRI:  7       ;ODT PRIORITY
 9489  055470   000000                O.MSK:  0       ;MASK
 9490  055472   000000                        0       ;LOW LIMIT
```

```
 9491  055474  000000                          0       ;HIGH LIMIT
 9492                                  ;
 9493                                  ; BREAK POINT LISTS, ADR1 = ADDRESS OF BREAKPOINT,CT = COUNT,
 9494                                  ;   UIN = CONTENTS
 9495                                  ;
 9496  055476  000000                  0.ADR1: 0
 9497  055500  000000                  0.CT:   0
 9498  055502  000000                  0.UIN:  0
 9499          000001                          .END
```

```
ABASE = 177440            1816    1857    1881#
ACDW1 = 000000            1816    1859
ACDW2 = 000000            1816    1860
ACLO  = 000010            1179#
ACPUOP= 000000            1816    1831
ACT11   005454            2043#   2990*
ADDW0 = 000000            1816    1861
ADDW1 = 000000            1816    1862
ADDW10= 000000            1816    1871
ADDW11= 000000            1816    1872
ADDW12= 000000            1816    1873
ADDW13= 000000            1816    1874
ADDW14= 000000            1816    1875
ADDW15= 000000            1816    1876
ADDW2 = 000000            1816    1863
ADDW3 = 000000            1816    1864
ADDW4 = 000000            1816    1865
ADDW5 = 000000            1816    1866
ADDW6 = 000000            1816    1867
ADDW7 = 000000            1816    1868
ADDW8 = 000000            1816    1869
ADDW9 = 000000            1816    1870
ADEVCT= 000000            1816    1822
ADEVM = 000000            1816    1858
AENV  = 000000            1816    1827
AENVM = 000000            1816    1828
AFATAL= 000000            1816    1819
AMADR1= 000000            1816    1844
AMADR2= 000000            1816    1848
AMADR3= 000000            1816    1851
AMADR4= 000000            1816    1854
AMAMS1= 000000            1816    1838
AMAMS2= 000000            1816    1846
AMAMS3= 000000            1816    1849
AMAMS4= 000000            1816    1852
AMSGAD= 000000            1816    1824
AMSGLG= 000000            1816    1825
AMSGTY= 000000            1816    1818
AMTYP1= 000000            1816    1839
AMTYP2= 000000            1816    1847
AMTYP3= 000000            1816    1850
AMTYP4= 000000            1816    1853
APASS = 000000            1816    1821
APRIOR= 000000            1816
APTCSU= 000040            6467    6656#
APTENV= 000001            5124    6414    6460    6612    6654#
APTSIZ= 000200            2917    6653#
APTSPO= 000100            6462    6614    6655#
ASWREG= 000000            1816    1829
ATESTN= 000000            1816    1820
ATTN    005330            1978#   5332    5352    5379
AUNIT = 000000            1816    1823
AUSWR = 000000            1816    1830
AVECT1= 000000            1816    1855
AVECT2= 000000            1816    1856
BADHDR  005324            1968#   2998*   6125
```

```
BADTMO  031022          3072    6177#
BAI     = 000020        1142#   4278    4327    4380    4411    4474    4565    4624    4735    4795    4880    4939
BA16    = 000400        1128#
BA17    = 001000        1129#
BIT0    = 000001        1071#   1125    1157    1176    2033    3112    4468    4557    4618    4789    4872    4933    6032
BIT00   = 000001        1061#   1071
BIT01   = 000002        1060#   1070
BIT02   = 000004        1059#   1069
BIT03   = 000010        1058#   1068
BIT04   = 000020        1057#   1067
BIT05   = 000040        1056#   1066
BIT06   = 000100        1055#   1065
BIT07   = 000200        1054#   1064
BIT08   = 000400        1053#   1063    6349
BIT09   = 001000        1052#   1062    6357    6425
BIT1    = 000002        1070#   1158    2034
BIT10   = 002000        1051#   1130    1148    1167    1199    1213    1227    1240    1254    6402
BIT11   = 004000        1050#   1131    1149    1168    1185    1200    1214    1228    1241    1255    6364
BIT12   = 010000        1049#   1132    1150    1169    1201    1215    1229    1242    1256
BIT13   = 020000        1048#   1133    1151    1170    1186    1202    1216    1230    1243    1257    6409
BIT14   = 040000        1047#   1134    1152    1171    1187    1203    1217    1231    1244    1258    1268    5842    6335
BIT15   = 100000        1046#   1135    1136    1153    1172    1188    1204    1271    5838
BIT2    = 000004        1069#   1159    1178    2035
BIT3    = 000010        1068#   1141    1160    1179
BIT4    = 000020        1067#   1142    1161    1180    1193    1221    1248
BIT5    = 000040        1066#   1143    1162    1181    1194    1208    1222    1235    1249
BIT6    = 000100        1065#   1126    1144    1163    1182    1195    1209    1223    1236    1250
BIT7    = 000200        1064#   1127    1145    1164    1183    1196    1210    1224    1237    1251    3102
BIT8    = 000400        1063#   1128    1146    1165    1184    1197    1211    1225    1238    1252
BIT9    = 001000        1062#   1129    1147    1166    1198    1212    1226    1239    1253
BPTVEC= 000014          1078#
BSE     = 000200        1164#   4288    4494    4744
BSERR   001474          1952#   4158*   4163*   4218    4686    4777    4859
BSE22H  002322          1962#   4112    4160    4181    5836    5936
BSE22S  003322          1963#   4170    5840    5940
BYP     025250          3194    3222    3226    3241    3302    3329    3333    3337    3341    5406#
BYPCER  001502          1955#   3100*   3354*   3541*   5522
CALADD  001402          1911#   4244*   4705*   5809    5815    5817    5863
CALDIF  001374          1908#
CCLR    = 100000        1136#   3483    3634    3653    3709    3718    3724    3764    3779    3793    3887    3935    3965
                        4070    4299    4372    4849    5052    5563    5571    5579    5587    6128    6143
CCSP    030412          3545    3696    3843    3919    4012    4227    4683    5036    5078    6061#   6070
CCYL    001370          1906#
CDT     = 002000        1130#   3210    3311    3393    3395
CERR    = 100000        1135#   3173    3286    3926    4123    4199    4261    4285    4336    4388    4420    4482    4575
                        4633    4721    4742    4804    4890    4948    5524    5620
CFMT    = 010000        1132#   5931
CHKFLG  001504          1956#   5416*   5500    5503    5507
CHKMSG  025264          3567    3592    3646    4057    4135    4312    4354    4400    4438    4593    4651    4755    4827
                        4908    4966    5416#
CKCERR  026024          5282    5286    5297    5302    5522#
CKSWR   = 104407        6334    6398    6424    7321#
CLEAR   = 000005        1113#   6145
CLKOF   030264          6003#
CLKON   030170          5981#
CLOCK   030230          3021    5992#
```

```
CLRFLG  024110          2939    5136#
COE     = 001000        1166#
COUNT   001406          1915#   5993*   5995*
CR      = 000015         986#   6523    6533    7333    7336    7338    7342    7352    7361    7368    7376    7381    7386
                        7391    7397    7403    7409    7413    7419    7424    7431    7440    7445    7450    7454    7459
                        7463    7469    7471    7476    7481    7485    7487    7491    7495    7500    7505    7511    7520
                        7524    7530    7534    7540    7546    7555    7556    7562    7571    7581    7592    7603    7610
                        7617    7627    7633    7637    7646    7654    7662    7666    7670    7677    7686    7694    7701
                        7711    7716    7721    7728    7738    7748    7756    7761    7768    7779    7786    7795    7807
                        7815    7820    7827    7833    7838    7846    7851    7860    7867    7875    7881    7889    7893
                        7902    7908    7915    7920    7923    7926    7934    7941    7948    7966    7974    8261    8282
                        8319    8332    8347    8605    8612    8615
CRLF    = 000200         987#   6477    6533
CTO     = 004000        1131#   5528
CYLADD  001400          1910#   4063    5659*   5660*   5661*   5662*   5663*   5664*   5682*   5683*   5684*   5685*   5686*
                        5687*
CYLDIF  001376          1909#   5643*   5645*   5646*   5647*   5648*   5649*   5650    5652*   5669*   5670*   5671*   5672*
                        5673*   5674*   5675    5677*   5738    5742    5745
DATA0   001456          1943#   4277    4326    4329    4410    4413    4470    4564    4620    4791    4879    4935
DATA01  001460          1944#
DATA1   001462          1945#   4379    4473    4559    4623    4734    4794    4874    4938
DATCMD  024504          4120    4258    4282    4333    4384    4417    4479    4572    4630    4718    4739    4800    4887
                        4945    5262#
DCK     = 100000        1172#
DCLO    = 000020        1180#
DCPAR   = 020000        1133#
DDISP   = 177570         993#   1791    2905
DDPCH   005452          2042#   2986*   3181    3386
DDT     = 000400        1184#
DDUMP   005450          2041#   2952*   5136
DF1     054550          2083    2089    2095    2101    2112    2118    2124    2230    2293    2338    8734#
DF10    054654          2129    2134    2139    2144    2149    2154    2159    2164    2169    2174    2184    2205    2225
                        2250    2256    2262    2267    2272    2287    2318    2343    2358    2383    2413    2438    2443
                        2448    2453    2458    2463    2468    2473    2478    2483    2488    2493    2498    2503    2513
                        2533    2538    2543    2548    2573    2578    2583    2588    2593    2598    2603    2608    2613
                        2618    2623    2628    2633    2638    2643    2673    2698    2703    2718    2723    2728    2753
                        2758    2768    2773    2793    2843    8773#
DF12    054674          2778    2783    2788    8782#
DF15    054720          2708    2713    2733    2738    2848    8794#
DF17    054740          2678    2688    8804#
DF20    054764          2298    8814#
DF21    055010          2179    2194    2199    2210    2215    2220    2235    2240    2245    2277    2282    2303    2308
                        2313    2323    2328    2333    2348    2353    2363    2368    2373    2378    2393    2398    2403
                        2408    2508    2518    2523    2528    2653    2658    2663    2668    2748    2798    2803    2808
                        2813    8825#
DF22    055044          2648    8840#
DF23    055100          8855#
DF3     054564          2553    2563    8742#
DF4     054610          2558    2568    8753#
DF5     054634          2743    8764#
DF7     054640          2763    8767#
DH1     051007          2081    2087    2093    2099    2110    2116    2122    2228    2291    2336    2761    8372#   8744
                        8755    8775    8786    8796    8808    8816    8827    8842    8857
DH11    051304          2356    2361    2366    2371    2376    8406#
DH12    051360          2381    8414#
DH13    051410          2411    8418#
```

```
DH15    051474            2441    2636    8427#
DH16    051521            2456    2461    2726    8431#
DH17    051560            2316    2511    8437#
DH18    051604            2157    2162    2253    2259    2265    8441#
DH19    051631            2203    2481    8445#
DH2     051024            8375#   8736    8748    8759    8769    8777    8788    8798    8810    8820    8835    8850    8865
DH20    051654            2486    8449#
DH21    051707            2182    2491    8454#
DH22    051735            2616    2631    8458#
DH23    051767            2501    8463#
DH25    052021            2296    2536    2541    2771    8468#
DH26    052044            2137    2142    2167    2197    2208    2311    2321    2841    2846    8472#
DH27    052074            2127    2132    2177    2192    2248    2285    2301    2306    2341    8476#
DH28    052125            2546    8481#
DH29    052161            2531    8486#
DH3     051074            8382#   8738    8750    8761    8771    8779    8790    8800    8812    8822    8837    8852    8867
DH30    052215            2696    2706    2711    8491#
DH31    052247            2571    2581    8496#
DH32    052303            2147    2152    2172    2213    2218    2326    2331    8501#
DH34    052335            2586    2591    8506#
DH35    052371            2596    8511#
DH37    052422            2601    2606    2611    8516#
DH38    052456            2576    2621    2626    8521#
DH39    052502            2731    2736    2796    2801    2806    2811    8525#
DH4     051145            2223    2391    2396    2401    2406    8389#
DH41    052535            2791    8530#
DH42    052562            2676    8534#
DH44    052633            8541#   8806
DH45    052712            2641    2646    2651    2656    2661    2666    2701    8549#
DH46    052751            2671    8555#
DH48    053016            2451    8562#
DH49    053057            2476    8568#
DH5     051213            2233    2238    2243    2746    8396#
DH50    053117            2496    2506    2516    2521    2526    2551    2766    8574#
DH56    053165            8581#   8818
DH59    053211            2446    2466    2471    8585#
DH60    053265            2556    8593#
DH61    053350            8602#   8746
DH62    053413            8608#   8757
DH63    053464            2561    2566    8616#
DH64    053535            2436    2716    8623#
DH65    053571            2721    8628#
DH66    053634            2741    8634#
DH67    053655            2751    2756    8637#
DH69    053720            8643#   8829    8844    8859
DH70    053730            8645#   8833    8848    8863
DH71    053740            8647#   8831    8846    8861
DH73    053765            8651#   8784
DH74    054041            2686    8659#
DH8     051241            2270    2275    2280    2346    2351    8400#
DI      =  040000         1134#
DISPLA  001142            1791#   2905*   2913*   6379*   6401*
DISPRE  000174            1280#   2913
DLT     =  100000         1153#
DLY     025232            3169    3282    5058    5397#   5400
DMD     =  000040         1194#
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DOCMD    024446          3486    3512    3656    3669    3767    3782    3796    3968    3996    4035    4073    4192    4852
                         5251#   5553    6115    6131    6146
DOTIM    005506          2061#   3020*   3029*
DPAT1    001464          1946#
DPAT2    001466          1947#
DRA    = 000001          1176#   3216    3319
DRDY   = 000200          1183#
DRIVS    005460          2045#   3107*   3114*   3131    3153*   3183*   3202    3306*   3373    4996    5029    5191*
DRIV0    005462          2050#   3002    3109    3155    3268    5174
DRIV1    005464          2051#
DRIV2    005466          2052#
DRIV3    005470          2053#
DRIV4    005472          2054#
DRIV5    005474          2055#
DRIV6    005476          2056#
DRIV7    005500          2057#
DROT   = 000040          1181#
DRPAR  = 000010          1160#
DRVMSK= 000007           1140#   3176    3289
DRVPTR   001362          1900#   3002*   3378    3396*
DSC    = 040000          1187#
DSWR   = 177570           992#   1790    2904
DTE    = 010000          1169#
DTYE   = 000040          1162#   3208    3309
DT1      054126          2082    2088    2094    2100    2111    2117    2123    2128    2133    2138    2143    2148    2153
                         2158    2163    2168    2173    2183    2204    2224    2229    2249    2255    2261    2266    2271
                         2286    2292    2317    2337    2342    2357    2382    2412    2437    2442    2447    2452    2457
                         2462    2467    2472    2477    2482    2487    2492    2497    2502    2512    2532    2537    2542
                         2547    2572    2577    2582    2587    2592    2597    2602    2607    2612    2617    2622    2627
                         2632    2637    2642    2672    2677    2687    2697    2702    2707    2712    2717    2722    2727
                         2732    2737    2752    2757    2762    2767    2772    2777    2782    2787    2792    2842    2847
                         8672#
DT13     054304          2178    2193    2198    2209    2214    2219    2234    2239    2244    2276    2281    2302    2307
                         2312    2322    2327    2332    2347    2352    2362    2367    2372    2377    2392    2397    2'02
                         2407    2507    2517    2522    2527    2652    2657    2662    2667    2747    2797    2802    2807
                         2812    8696#
DT14     054364          2647    8707#
DT15     054454          8719#
DT3      054166          2552    2557    2562    2567    8679#
DT6      054234          2742    8687#
DT9      054240          2297    8688#
D.ACLO= 000100           1236#   3956    4817    4823    4844
D.BRHM= 000100           1223#   3564    3589    3643    4054    4129    4306    4348    4397    4432    4587    4645    4749
                         4824    4902    4960
D.CART= 000400           1225#   3564    3589    3609    3643    4054    4129    4306    4348    4397    4432    4587    4645
                         4749    4824    4902    4960
D.DDT  = 000400          1211#   3416
D.DOOR= 000200           1224#   3558    3643    4054    4129    4306    4348    4397    4432    4587    4645    4749    4824
                         4902    4960
D.DRA  = 000040          1208#   3562    3587    3641    4052    4127    4304    4346    4395    4430    4585    4643    4747
                         4822    4900    4958
D.DRDY= 000200           1210#   3641    3951    4052    4127    4304    4346    4395    4430    4585    4643    4747    4900
                         4958
D.DROT= 020000           1243#
D.DSC  = 040000          1217#   3641    3705    4052    4395    4822
D.FLT  = 000200          1237#   4047    4053    4396    4823
```

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D.FORM= 001000           1212#
D.FWD  = 002000          1227#
D.HDFL= 000200           1251#
D.HDHM= 000040           1222#  3564   3589   5764
D.IDAE= 000040           1235#
D.LIMD= 020000           1257#
D.LOAD= 010000           1229#  5782
D.MHD  = 000400          1252#
D.NMOV= 010000           1256#
D.NXF  = 000400          1238#  4042   4053
D.OFF  = 002000          1213#
D.PAR  = 001000          1239#  3701
D.PIP  = 020000          1216#  4822
D.PLO  = 004000          1255#
D.REV  = 004000          1228#  4824
D.RTZ  = 020000          1230#  6136
D.SECT= 000020           1248#
D.SKI  = 002000          1240#
D.SPIN= 010000           1215#  3583   3623   3641   3991   4052   4127   4304   4346   4395   4430   4585   4643
                         4747   4822   4900   4958   6110
D.SPLS= 010000           1242#  4823
D.SPOK= 001000           1226#  3643   4054   4129   4306   4348   4397   4432   4587   4645   4749   4902   4960
D.SSP  = 000020          1221#  3643   4054   4129   4306   4348   4397   4432   4587   4645   4749   4824   4902
                         4960
D.SUNS= 040000           1258#
D.TIB  = 002000          1254#
D.UNLD= 040000           1231#  4824
D.UNS  = 040000          1244#
D.VV   = 000100          1209#  3481   3489   3562   3587   3637   3659   3777   3814   3960   3971   4020   4025
                         4076   4127   4304   4346   4395   4430   4585   4643   4747   4822   4855   4900   4958
D.WCUR= 000040           1249#
D.WGAT= 000100           1250#
D.WLE  = 004000          1241#  4391   4396   4502
D.WRL  = 004000          1214#  4231   4238   4374   4395   4456   4691   4699
D.XERR= 001000           1253#
ECCW   = 020000          1202#
ECH    = 000100          1163#
EMTVEC= 000030           1081#  2888*  2889*
EM1     044402           5200   7948#
EM10    045156           2115   8014#
EM11    045241           2121   8023#
EM12    045305           2126   2136   2146   2156   2480   2485   2490   2510   2535   2585   2615   2695   2730
                         2840   8030#
EM13    045343           2161   2315   2465   2540   2590   8036#
EM14    045365           2252   8040#
EM15    045412           2258   8044#
EM16    045444           2264   8049#
EM17    045471           2232   2274   2300   2310   2325   2360   2390   2505   2650   2795   8053#
EM18    045512           2176   2196   2212   2279   2365   2395   2515   2655   2745   2800   8056#
EM19    045533           2237   2305   2320   2330   2345   2370   2400   2520   2660   2805   8059#
EM2     044456           2080   7956#
EM20    045554           2186   2207   2217   2242   2350   2375   2405   2525   2665   2810   8062#
EM21    045575           2131   2141   2171   2181   2710   2735   2770   2845   8065#
EM22    045617           2269   8069#
EM23    045660           2355   2410   8075#
EM24    045710           2202   8079#
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EM25	045746	2380	8084#										
EM26	046014	2725	8091#										
EM27	046056	2460	2500	2545	8097#								
EM28	046103	2440	8101#										
EM29	046135	2445	8106#										
EM3	044546	6181	7966#										
EM30	046162	2455	8110#										
EM31	046213	2530	8115#										
EM32	046244	2570	8120#										
EM33	046300	2575	8125#										
EM34	046331	2580	8130#										
EM35	046372	2595	8136#										
EM37	046426	2605	8141#										
EM4	044621	7974#											
EM42	046456	2610	8145#										
EM43	046503	2620	8149#										
EM44	046535	2222	2625	8154#									
EM45	046577	2635	8160#										
EM46	046654	2640	2670	8168#									
EM47	046733	2645	8176#										
EM48	046773	2450	8182#										
EM49	047033	2475	8188#										
EM5	044675	2086	2785	7982#									
EM50	047067	2495	2755	8193#									
EM51	047131	2550	2555	2560	2565	8199#							
EM52	047204	2435	8207#										
EM53	047231	2715	8212#										
EM54	047261	2720	8217#										
EM55	047331	2630	8224#										
EM56	047364	2740	8229#										
EM57	047430	2600	2750	2765	8235#								
EM58	047456	2470	8239#										
EM59	047506	2775	8243#										
EM6	044716	2092	7985#										
EM61	047527	2700	8246#										
EM63	047555	2705	8250#										
EM64	047576	2760	8253#										
EM67	047723	2780	8269#										
EM68	047744	2675	2685	8272#									
EM69	050007	2335	8278#										
EM7	044737	2098	7988#										
EM70	050105	2776	2781	2786	8289#								
EM71	050176	2247	8299#										
EM72	050246	2284	8306#										
EM73	050325	2290	8314#										
EM74	050444	2790	8328#										
EM75	050471	2340	8332#										
EM76	050545	2227	8340#										
EM8	045026	7998#											
EM80	050650	2151	8352#										
EM83	050707	2166	8358#										
EM9	045102	2109	8006#										
EM93	050744	2295	8363#										
ENDRV	023374	4361	4445	4600	4658	4915	4973	4979#	8943				
ERRVEC=	000004	1074#	2902	2903*	2914*	2922*	2923*	2936*	2937*	3005*	3009*	3016*	3054*	3072*
		3073*	6340	6341*	6343*	6346*							

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ESEC    001420          1921#
E.A0    005430          2022#  3562*  3587*  3641*  4052*  4127*  4304*  4346*  4395*  4430*  4585*  4643*  4747*
                        4822*  4900*  4958*  5420*  5425*  5429   5431*  5460   8696   8707   8719
E.A1    005434          2024#  3564*  3589*  3643*  4054*  4129*  4306*  4348*  4397*  4432*  4587*  4645*  4749*
                        4824*  4902*  4960*  5421*  5433   5435*  5480   8696   8707   8719
E.A2    005440          2026#  4131*  4308*  4350*  4434*  4589*  4647*  4751*  4904*  4962*  5422*  5437   5439*
                        8707   8719
E.A3    005444          2028#  5423*
E.B0    005432          2023#  3563*  3588*  3642*  4053*  4128*  4305*  4347*  4396*  4431*  4586*  4644*  4748*
                        4823*  4901*  4959*  5441   5443*  5470   8696   8707   8719
E.B1    005436          2025#  3565*  3590*  3644*  4055*  4130*  4307*  4349*  4398*  4433*  4588*  4646*  4750*
                        4825*  4903*  4961*  5445   5447*  5490   8696   8707   8719
E.B2    005442          2027#  4132*  4309*  4351*  4435*  4590*  4648*  4752*  4905*  4963*  5449   5451*  8707
                        8719
E.B3    005446          2029#  4133*  4310*  4352*  4436*  4591*  4649*  4753*  4906*  4964*  5453   5455*  8719
E.DDT   012662          3410*  3416*  3424#  5425
FATT1   025056          4000   5349#  6119   6140
FATT2   025152          4039   4196   5377#
FCYL    027206          5736#
FHDHM   027276          5761#  5770
FHDTAB  027420          4248   4709   5795#
FLGTST  027650          5837   5841   5856#
FLOAD   027352          5779#
FMTE  = 000020          1161#
FMT1    001452          1940#  5805*  5806*  5807*  5812
FORM    031022          6154   6167#
FORMAT  001450          1939#  4246*  4707*  5805   5834
FRCYL   001364          1904#
FRDY    024542          3147   3162   3171   3275   3284   5254   5265   5277#  5280   5615
FRDY1   024610          5291#  5294   5602
FSEC17  027116          5712#
FTITLE  001360          1898#  5147   5149*
GBA     024350          2972   5214#
GDRVS   024210          2970   5169#
GETSP   030452          3550   3555   3580   3605   3620   3631   3716   3733   3822   3848   3858   3869   3878
                        3893   3946   4017   4235   4370   4454   4489   4508   4696   4780   4811   4839   5041
                        5048   6078#  6084
GINT    024376          2974   5227#
GNS   = ****** U        1279   7313   7314   7315   7316   7317   7319   7321   7322   7323   7324   7325   7326
                        7327
GO    = 000001          1125#
GSTAT   026106          3445   3557   3582   3608   3622   3636   3700   3710   3719   3725   3813   3850   3870
                        3888   3925   3936   4019   4122   4230   4237   4260   4284   4335   4373   4387   4419
                        4455   4574   4632   4690   4698   4720   4741   4803   4889   4947   5359   5364   5384
                        5388   5550#  5619   5630   5642   5658   5763   5781   6135
GSTAT1  026142          5418   5561#
GSTAT2  026372          5566   5574   5582   5589   5598#
GTSWR = 104406          5158   7319#
HASOF   005356          1994#  5316*  5332   8676   8684   8693   8703   8715   8728
HBA     005346          1990#  5312*  8676   8684   8693   8703   8715   8728
HCS1    005340          1987#  3165*  3166*  3167   3173   3278*  3279*  3280   3286   3485*  3511*  3655*  3668*
                        3766*  3781*  3795*  3926   3967*  3995*  4034*  4072*  4119*  4123   4191*  4199   4257*
                        4261   4281*  4285   4332*  4336   4383*  4388   4416*  4420   4478*  4482   4571*  4575
                        4629*  4633   4717*  4721   4738*  4742   4799*  4804   4851*  4886*  4890   4944*  4948
                        5054*  5055*  5056   5251*  5252   5262*  5263   5309*  5524   5528   5552*  5598*  5599*
                        5600   5620   5931   6114*  6130*  6145*  8673   8681   8690   8700   8712   8725
```

```
HCS2    005342  1988#  3212  3214  3218  3230  3315  3317  3321  3324  4338  4422  4577  4635
                4892  4950  5310*  5533  5537  8673  8681  8690  8700  8712  8725
HDA     005350  1991#  4510  4511  4834  4835  5313*  5968  8676  8684  8693  8703  8715  8728
HDB     005362  1996#
HDC     005360  1995#  5317*  5960  8676  8684  8693  8703  8715  8728
HDS     005352  1992#  3216  3319  5314*  8673  8681  8690  8700  8712  8725
HDTAB   001506  1958#  4250  4711  5797
HDWD    001472  1950#
HD1     001446  1938#  5799*  5800*  5801*  5802*  5803*  5804*  5811
HEAD    001442  1936#  4245*  4252*  4253  4254*  4267*  4268  4706*  4713*  4714  4715*  4726*  4727
                5799  5868
HEADA   001444  1937#  5702*  5703*  5704*  5705*
HER     005354  1993#  3208  3309  4288  4494  4744  5315*  8673  8681  8690  8700  8712  8725
HMR1    005364  1997#  5318*  8673  8681  8690  8700  8712  8725
HMR2    005366  1998#  3175  3288  3446  3481  3489  3558  3583  3609  3623  3637  3659  3705
                3777  3814  3951  3960  3971  3991  4020  4025  4076  4231  4238  4374  4456
                4691  4699  4855  5295*  5300*  5319*  5568  5576  5584  5591  5643  5764  5782
                6110  6136  8673  8681  8690  8700  8712  8725
HMR3    005370  1999#  3701  3956  4042  4047  4391  4502  4817  4844  5296*  5301*  5320*  5569
                5577  5585  5592  5631  5659  8673  8681  8690  8700  8712  8725
HOLD    024676  5281  5285  5309#  5562
HPAT    005374  2001#  5322*  8676  8684  8693  8703  8715  8728
HPEND   005326  1970#  2999*  6127*
HPOS    005372  2000#  5321*  8676  8684  8693  8703  8715  8728
HT    = 000011   984#  6475  6533
HVRC  = 000400  1165#
HWC     005344  1989#  5311*  8676  8684  8693  8703  8715  8728
HZ      001404  1913#  5995
H.A0    005410  2011#  5460  5591*  8696  8710  8722
H.A1    005414  2013#  5480  5584*  8696  8710  8722
H.A2    005420  2015#  5576*  5669  8710  8722
H.A3    005424  2017#  5568*
H.B0    005412  2012#  5470  5592*  8696  8710  8722
H.B1    005416  2014#  5490  5585*  8696  8710  8722
H.B2    005422  2016#  5577*  5682  8710  8722
H.B3    005426  2018#  5569*  5692  5702  8722
IDAE  = 002000  1167#
IE    = 000100  1126#
ILF   = 000001  1157#
INTER   031152  5242  6221#
IOTVEC= 000020  1079#  2886*  2887*
IR    = 000100  1144#
LC      012654  3409*  3415*  3421#  4117
LCLKF   005502  2059#  3007*
LCVEC   001350  1889#  3008
LF    = 000012   985#  6527  6533  7333  7336  7338  7342  7352  7361  7368  7376  7381  7386
                7391  7397  7403  7409  7413  7419  7424  7431  7440  7445  7450  7454  7459
                7463  7469  7471  7476  7481  7485  7487  7491  7495  7500  7505  7511  7520
                7524  7530  7534  7540  7546  7555  7556  7562  7571  7581  7592  7603  7610
                7617  7627  7633  7637  7646  7654  7662  7666  7670  7677  7686  7694  7701
                7711  7716  7721  7728  7738  7748  7756  7761  7768  7779  7786  7795  7807
                7815  7820  7827  7833  7838  7846  7851  7860  7867  7875  7881  7889  7893
                7902  7908  7915  7920  7923  7926  7934  7941  7948  7966  7974  8261  8282
                8319  8332  8347  8605  8612  8615
LIMERR  001476  1953#
LKS     001346  1887#  3006  5984*  6005*
```

```
MASK    012656          3411* 3417* 3422# 5650  5675
MASK1   012660          3412* 3418* 3423# 5645  5660  5670  5683
MCLK  = 000400          1197#
MDS   = 001000          1147# 3212  3315  5060  5537
MDSERR  001500          1954#
MEMBAS= 172100          1893# 2925  2934
MEMERR  031110          2928  6207#
MEMPAR  010312          2922#
MEMVEC= 000114          1892# 2928* 2929*
MERD  = 001000          1198#
MESMSK= 000017          1192#
MEWD  = 002000          1199#
MIND  = 000200          1196#
MSG1    035736          5150  7333#
MSG10   037205          3106  3152  7459#
MSG100  044233          4515  4520  4525  4530  7926#
MSG11   037232          6254  7463#
MSG12   037272          7469#
MSG13   037301          3030  7471#
MSG14   037367          5406  7481#
MSG15   037412          3232  3397  7485#
MSG16   037424          3443  7487#
MSG17   037450          4180  7491#
MSG18   037500          3694  7495#
MSG19   037532          3841  7500#
MSG2    036575          2953  7409#
MSG21   037563          3916  7505#
MSG22   037624          4010  7511#
MSG24   037705          4225  7520#
MSG26   037731          4680  7524#
MSG27   037772          3375  7530#
MSG28   040022          5034  7534#
MSG29   040064          3993  6112  7540#
MSG3    036656          2969  7419#
MSG30   040130          3553  7546#
MSG31   040212          3759  6069  6083  7555#
MSG32   040220          3603  7556#
MSG33   040260          3577  7562#
MSG34   040345          3578  3618  7571#
MSG35   040433          3617  7581#
MSG36   040530          3628  7592#
MSG37   040625          3549  3554  3579  3604  3619  3715  3732  3821  3847  3857  3868  3877  3892
                        4016  4234  4369  4453  4488  4507  4695  4779  5040  5047  7603#
MSG38   040671          3735  7610#
MSG39   041027          3736  3807  3817  7627#
MSG4    036710          2971  7424#
MSG40   041072          3816  7633#
MSG41   041204          3846  7646#
MSG42   041264          3856  7654#
MSG43   041342          3867  7662#
MSG44   041372          3876  7666#
MSG45   041422          3891  7670#
MSG47   041473          3548  7677#
MSG49   041553          3921  4774  7686#
MSG5    036755          2973  7431#
MSG50   041626          3943  4809  4837  7694#
```

```
MSG51   041676            4015    7701#
MSG52   042017            3544    3695    3842    3917    4011    4226    4681    5035    7716#
MSG53   042120            4233    4452    4487    4506    4694    7728#
MSG54   042211            4368    4460    7738#
MSG55   042300            3737    3801    7748#
MSG56   042360            4162    7756#
MSG57   042564            4775    7779#
MSG58   042632            5039    7786#
MSG59   042714            5046    7795#
MSG6    037036            6226    7440#
MSG60   043017            5076    7807#
MSG61   043127            5068    7820#
MSG62   043175            5031    7827#
MSG63   043271            5077    7838#
MSG65   043464            3552    3602    3627    7860#
MSG67   043532            3731    7867#
MSG68   043607            5074    7875#
MSG69   043647            3630    3945    4810    4838    7881#
MSG7    037072            2988    7445#
MSG70   043724            3629    3944    7889#
MSG71   043752            3820    7893#
MSG72   044035            4318    4360    4444    4599    4657    4914    4972    7902#
MSG74   044071            6102    7908#
MSG75   044137            6104    7915#
MSG76   044174            6158    7920#
MSG77   044216            6163    7923#
MSG8    037127            3543    7450#
MSG9    037153            3714    7454#
MSP     = 000100          1195#
MULT6   030034            5888    5915#
M.ALGN= 040000            1268#
M.DPID  031274            6269#
M.DP40  031332            6280#   6302
M.DP41  031366            6285    6293#
M.DP42  031376            6291    6297#
M.DP44  031430            6304    6310#
M.DP50  031442            6278    6315#
M.DRV = 000007            1262#
M.HEAD= 007000            1270#   5703
M.ID  = 000003            1267#
M.PAR = 100000            1271#   6034
M.SECT= 000760            1269#   5632    5693
M.SER = 077770            1263#
NED   = 010000            1150#   3218    3230    3321    3324    3726    3770    3799    3851    3863    3871    3883    3889
                          3937    5533
NEM   = 004000            1149#
NUDRV   012402            3244    3354#   4998
NXF   = 000004            1159#
OFFERR  001440            1933#
OFFSET= 000015            1117#
OFST  = 000004            1178#
OPI   = 020000            1170#
OR    = 000200            1145#
O.ADR1  055476            9002*   9053*   9059*   9234    9235*   9273*   9288    9305    9496#
O.BACK  056222            9102    9143#
O.BD    057514            9292    9293    9441#
```

```
O.BKPT  055730          9048#   9106
O.BK1   056662          8996    9270#
O.BK2   056716          9275    9278#
O.BK3   056734          9277    9284#
O.BRK   056652          9013    9268#
O.BUF   057543          9350    9359    9364    9469#
O.B2    057016          9289    9298#
O.B3    057056          9297    9306#
O.CADV  057226          9119    9136    9159    9163    9197    9201    9306    9349#
O.CLGL  056044          9075    9077    9085#
O.CLGT= 000014          9089    9459#
O.CLS1  057452          9417    9419#
O.CR    057516          9426    9428    9429    9443#
O.CRET  056156          9097    9126#
O.CRLF  057462          9134    9195    9291    9330    9335    9426#
O.CRLS  057470          9070    9428#
O.CRS   057474          9427    9429#
O.CSR1  057512          9326*   9342    9437#
O.CSR2  057513          9327*   9343    9438#
O.CT    055500          9255*   9298*   9300*   9497#
O.C1    056630          9258#   9299
O.DCD   055774          9055    9060    9070#   9128    9183    9308
O.DCD1  056000          9071#   9120    9164
O.EFF   056304          9105    9174#
O.EFF1  056422          9186    9205#
O.ENTR  055510          8993#
O.ERR   055760          9040    9051    9067#   9090    9116    9178    9421
O.ERR1  056314          9178#   9251
O.ERR2  056134          9116#   9150    9227
O.FTYP  057370          9069    9138    9153    9199    9304    9375    9391    9396#
O.GET   057312          9019    9073    9372#   9377    9379    9381
O.GO    056466          9099    9225#
O.GO2   056544          9236#   9261
O.LG  = 000006          9023    9467#
O.LGCH  057521          9086    9447#   9459
O.LGDR  056074          9093    9096#   9108
O.LGL = 000030          9108#
O.LGL1  056046          9086#   9091
O.LGL2  056066          9087    9092#
O.MSK   055470          9179    9180    9182    9489#
O.ODT   055504          1288    8991#   9478
O.OFST  056232          9103    9149#
O.OF1   056300          9162    9164#
O.OP1   056170          9100    9132#
O.OP2   056176          9044    9134#   9145
O.ORPC  055702          9036#   9101
O.P     057511          9011*   9225*   9250    9252*   9301*   9435#
O.PRI   055466          9003    9274    9278    9488#
O.PROC  056574          9107    9250#
O.PR1   056616          9254    9256#
O.RALL  055750          9014    9049    9059#
O.RCSR= 177560          8978#   9326    9328*   9338    9340    9342*   9372
O.RDB = 177562          8977#   9374
O.REGT  055632          9019#   9098
O.RSE1  057210          9339    9342#
O.RSP   055642          9021#   9024
```

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O.RST   055546            8992    9001#
O.RSTT  057160            9231    9257    9335#
O.RST1  055576            9000    9008#
O.RTIT  056572            9010*   9245#
O.SCAN  056004            9030    9073#   9084
O.SP    055674            9022    9031#
O.SPC   057240            9352#   9360
O.SP1   055662            9027#   9032
O.STM = 000340            8967#   9012    9230    9256    9258
O.STRT  055534            8991    8998#
O.SVR   057070            9001    9270    9312#
O.SVTT  057126            9290    9302    9326#
O.T     057510            9232*   9259*   9271    9434#
O.TBIT  056516            9232#   9272
O.TBT = 000020            8968#   9233    9260    9296
O.TC    057454            9414    9420#
O.TCLS  057436            9036    9126    9132    9143    9413#
O.TCSR= 177564            8980#   9327    9329*   9336    9343*   9396    9402
O.TDB = 177566            8979#   9398*   9404*
O.TL    057535            9020    9023    9031    9461#   9467
O.TRTC  057552            9059    9235    9474#
O.TVEC= 000014            8966#   8994    9012*   9013*
O.TYPE  057354            9294    9365    9388#   9392    9430
O.TYP1  057434            9389    9400    9408#
O.TYP2  057414            9402#   9403    9406
O.UIN   055502            9002    9234*   9273    9498#
O.UPC   055462            8995*   9229*   9244    9268*   9285    9287*   9486#
O.URO   055444            8998    9028    9479#
O.USP   055460            8999*   9313*   9314    9485#
O.UST   055464            8993*   9233*   9243    9260*   9269*   9276    9296*   9487#
O.WDS   056312            9175    9177#
O.WDS2  056330            9182#   9204
O.WDS3  056360            9193#   9206    9212    9221
O.WDS4  056416            9193    9203#
O.WRD   056124            9096    9112#
O.WRDA  056150            9113    9121#
O.WRD1  056132            9115#   9122    9139
O.WSCH  056310            9104    9176#
O.XXX   057506            9312*   9320    9433#
O.45    055610            9009    9011#
PACK  = 000003            1112#   3485    3655    3781    3967    4072    4851
PARAM   001356            1897#   2852*   2855*   2966
PARSRT  010002            1285    2852#
PAT   = 000020            1193#   3699
PCA   = 004000            1200#
PCD   = 010000            1201#
PCLKF   005504            2060#   3011*   3018*   5982    6003
PCVEC   001352            1890#   3012    3019
PCYL    001372            1907#
PFSRT   012664            3426#   6256
PGE   = 002000            1148#
PIP   = 020000            1186#
PIRQ  = 177772             991#
PIRQVE= 000240            1085#
PKRB    001344            1886#
PKS     001340            1884#   3010    3017    5987*   6007*
```

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PKSB     001342            1885#  5986*
PPTP     005456            2044#  2957*
PRGSRT   010016            2853   2856#  5201
PR0    = 000000            1008#  2858   3049
PR1    = 000040            1009#
PR2    = 000100            1010#
PR3    = 000140            1011#
PR4    = 000200            1012#
PR5    = 000240            1013#  1883
PR6    = 000300            1014#  3022
PR7    = 000340            1015#  2923   2929   3073   6251   6252
PS     = 177776             988#   989
PSEC     001416            1920#
PSW    = 177776             989#
PWRVEC= 000024             1080#  2892*  2893*  6241*  6250*  6251*
RCYLA    026774            5505   5682#
RCYLD    026722            5502   5669#
RDCHR  = 104410            6062   6079   6940   7322#
RDCYLA   026652            5657#
RDCYLD   026566            5641#  5737   5741   5744
RDDATA= 000021             1119#  4119
RDGATE= 100000             1204#
RDHEAD= 000025             1121#
RDLIN  = 104411            5169   7014   7323#
RDOCT  = 104412            5214   5227   7324#
RDSEC    026516            5629#  5713   5717   5720   5886
RDTAB    004322            1964#
RDY    = 000200            1127#  5277   5291
RECAL  = 000013            1116#  6130
RESREG= 104414             7074   7126   7326#  8937
RESVEC= 000010             1075#
RHEAD    027070            5510   5702#
RHTAB    001712            1959#  5893   5895   5900   5903   8688
RKASOF= 000016             1098#  3063   5316   5352   5379
RKBA   = 000004            1093#  3059   4113*  4153*  4171*  4250*  4277*  4326*  4379*  4410*  4470*  4473*  4559*
                           4564*  4568   4620*  4623*  4626   4711*  4734*  4791*  4794*  4874*  4879*  4883   4935*
                           4938*  4941   5312
RKCS1  = 000000            1091#  3056   3167*  3280*  3483*  3634*  3653*  3709*  3718*  3724*  3764*  3779*  3793*
                           3887*  3935*  3965*  4070*  4299*  4372*  4849*  5052*  5056*  5252*  5263*  5277   5291
                           5309   5563*  5571*  5579*  5587*  5600*  6128*  6143*
RKCS2  = 000010            1095#  3057   3140*  3160*  3164*  3273*  3277*  3484*  3654*  3726   3765*  3770   3780*
                           3794*  3799   3851   3863   3871   3883   3889   3937   3966*  4071*  4278*  4327*  4380*
                           4411*  4474*  4565*  4624*  4735*  4795*  4850*  4880*  4939*  5053*  5060   5310   5551*
                           5564*  5572*  5580*  5588*  5613*  5617*  6129*  6144*
RKDA   = 000006            1094#  3060   4115*  4155*  4173*  4253*  4275*  4330*  4382*  4414*  4476*  4535*  4540*
                           4544*  4546   4567*  4608*  4612*  4616*  4617   4714*  4797*  4882*  4923*  4927*  4931*
                           4932   5313
RKDB   = 000024            1100#  3065   4340   4424   4579   4637   4894   4952
RKDC   = 000020            1099#  3064   4033*  4117*  4477*  4569*  4627*  4737*  4798*  4884*  4942*  5317
RKDS   = 000012            1096#  3061   5314
RKECPS= 000030             1104#  3069   5321
RKECPT= 000032             1105#  3070   5322
RKER   = 000014            1097#  3062   5315
RKMR1  = 000026            1101#  3066   3444*  3556*  3607*  3635*  3699*  5318   5358*  5363*  5383*  5387*  5565*
                           5573*  5581*  5618*  5629*  5641*  5657*  5762*  5780*  6134*
RKMR2  = 000034            1102#  3067   5295   5300   5319
```

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RKMR3 = 000036          1103#  3068   5296   5301   5320
RKPRI   001336          1883#  5243
RKVEC   001334          1882#  2993*  5231*  5234*  5241
RKWC  = 000002          1092#  3058   4118*  4251*  4279*  4328*  4381*  4412*  4475*  4566*  4625*  4712*  4736*
                        4796*  4881*  4940*  5311
RLS   = 000010          1141#
RSEC    027032          5509   5692#
RTT   = 000006          8970#
SAVREG= 104413          7059   7100   7325#  8879
SBPAR   030306          5430   5434   5438   5442   5446   5450   5454   6020#
SCLR  = 000040          1143#  3140   3160   3273   5613
SCOP1 = 104415          3157   3270   7327#
SCOP1$  030360          6044#  7327
SEC     001410          1917#  5996*
SECFLG  027600          5813   5833#
SECNT   001414          1919#
SECTOR  001422          1922#  4274*  4275   4293*  4294   4330   4382   4414   5631*  5632*  5633*  5634*  5635*
                        5636*  5692*  5693*  5694*  5695*  5696*  5697*  5714   5718   5721   5887*  5891   5892*
                        5893*  5905   5915*  5916   5917*  5918*
SEEK  = 000017          1118#  4034   4191
SELDRV= 000001          1111#  3165   3278   3766   3795   5054   5552   5598
SETINT  024430          2994   5232   5241#
SIZFLG  005510          2062#  2995*  3150   5187*  5207*
SKI   = 000002          1158#
SORT    027726          5884#
SPACE2  055420          8915   8924   8935   8945#
SPBAR = 000040          1903#  6064   6081
SRTSPL= 000011          1115#  3995   6114
SRTTAB  002116          1960#  5896
ST    = 177776          8964#  8993   8994*  9007*  9230*  9256*  9258*  9284*
STACK = 001100           979#  2857   2884   3047   3098   3158   3266   3271   3369   3436   3476   3504   3536
                        3689   3836   3911   3986   4104   4217   4675   4993   5023   5515   6216   6253   8942
START   010012          1283   2855#
START1  010420          2947#
STKLMT= 177774           990#
STOP    030500          6093#  6781   6864
STOP1   030502          3758   6095#
ST2     010470          2955   2966#
ST3     010534          2956   2984#
ST4     010566          2968   2989   2992#
ST5     010612          2975   2997#  3137   3206   5130   6165
ST5XY   024056          5119   5124#
SUBCLR  026436          3440   3478   3508   3538   3574   3599   3614   3665   3691   3810   3838   3860   3880
                        3913   3948   3988   4007   4030   4067   4106   4141   4187   4222   4271   4323   4365
                        4407   4449   4465   4550   4677   4731   4771   4786   4841   4865   5043   5084   5613#
                        6095   6107
SVAL  = 100000          1188#
SWR     001140          1790#  2882   2904*  2906   2912*  2919*  5156   5466   5476   5486   5496   6044   6179
                        6187   6192   6212   6335   6349   6351   6357   6364   6402   6409   6421   6425   6784
                        6823   6878*  8880   8938
SWREG   000176          1281#  2912   5156   6784   6823   6846
SW0   = 000001          1043#
SW00  = 000001          1033#  1043
SW01  = 000002          1032#  1042
SW02  = 000004          1031#  1041
SW03  = 000010          1030#  1040
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SW04   = 000020            1029#  1039
SW05   = 000040            1028#  1038
SW06   = 000100            1027#  1037
SW07   = 000200            1026#  1036
SW08   = 000400            1025#  1035
SW09   = 001000            1024#  1034
SW1    = 000002            1042#
SW10   = 002000            1023#
SW11   = 004000            1022#
SW12   = 010000            1021#  8938
SW13   = 020000            1020#  6179   8880
SW14   = 040000            1019#  6192
SW15   = 100000            1018#
SW2    = 000004            1041#
SW3    = 000010            1040#
SW4    = 000020            1039#
SW5    = 000040            1038#
SW6    = 000100            1037#
SW7    = 000200            1036#
SW8    = 000400            1035#
SW9    = 001000            1034#  5466   5476   5486   5496   6044   6187   6212
TBITVE= 000014             1076#
TEMP1   005376             2003#  3146*  3161*  3168*  3170*  3175*  3176*  3177   3274*  3281*  3283*  3288*  3289*
                           3290   3924*  3928*  3934*  3939*  4038*  4195*  5057*  5253*  5264*  5279*  5293*  5350*
                           5354*  5381*  5397   5399*  5427   5429*  5431   5433*  5435   5437*  5439   5441*  5443
                           5445*  5447   5449*  5451   5453*  5455   5457*  5550   5555*  5561   5594*  5601*  5614*
                           5712*  5724*  5736*  5748*  5761*  5766*  5779*  5784*  5815*  5818*  5819   6026*  6034*
TEMP2   005400             2004#  3923*  3930*  3931   3999*  4108*  4143*  4144   4169*  5356*  5738   5742   5745
                           5769*  5816*  5817*  5819*  5820   6118*  6139*
TEMP3   005402             2005#  4109*  4146   4166*  4167
TEMP4   005404             2006#  4112*  4113   4153   4170*  4171
TEMP5   005406             2007#  4114*  4115   4154*  4155   4172*  4173
TERR1   030130             5937   5941   5958#  5963   5970
TIMUP   001412             1918#  5981*  5992*  5998*
TITLE   024130             2949   2987   5147#
TKVEC  = 000060            1083#  6756*  6757*
TOCYL   001366             1905#  4243*  4463*  4477   4496*  4497   4569   4627   4704*  4729*  4737   4763*  4764
                           4798   4884   4942   8688
TPVEC  = 000064            1084#
TRAPPC  001354             1895#  6208*  8687
TRAPVE= 000034             1082#  2890*  2891*  6252*
TRT    = 000003            8969#  9474
TRTVEC= 000014             1077#
TRUERR  030056             4290   5929#
TSTATN  025024             3514   3671   3711   3720   5330#  6148
TST1    011002             3023   3045#
TST10   013156             3534#
TST11   014020             3687#
TST12   014652             3834#
TST13   015130             3884   3890   3909#
TST14   015442             3984#
TST15   016070             4102#
TST16   016600             4159   4215#
TST17   021450             4673#
TST2    011164             3074   3096#
TST20   023374             4991#
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TST21    023430            4997    5021#
TST3     012010            3264#
TST4     012412            3300    3367#
TST5     012664            3413    3419    3434#
TST6     013012            3439    3474#
TST7     013106            3482    3502#
TYPDS  = 104405            5108    7317#
TYPE   = 104401            2953    2969    2971    2973    2988    3030    3106    3116    3152    3186    3232    3375    3397
                           3443    3543    3544    3548    3549    3552    3553    3554    3577    3578    3579    3602    3603
                           3604    3617    3618    3619    3627    3628    3629    3630    3694    3695    3714    3715    3731
                           3732    3735    3736    3737    3743    3759    3789    3801    3807    3816    3817    3820    3821
                           3841    3842    3846    3847    3856    3857    3867    3868    3876    3877    3891    3892    3916
                           3917    3921    3943    3944    3945    3993    4010    4011    4015    4016    4162    4180    4184
                           4185    4225    4226    4233    4234    4318    4360    4368    4369    4444    4452    4453    4460
                           4487    4488    4506    4507    4515    4520    4525    4530    4599    4657    4680    4681    4694
                           4695    4774    4775    4779    4809    4810    4837    4838    4914    4972    5031    5034    5035
                           5039    5040    5046    5047    5068    5074    5076    5077    5106    5109    5150    5200    5406
                           6069    6083    6102    6104    6112    6158    6163    6181    6226    6254    6404    6412    6480
                           6591    6717    6778    6790    6844    6845    6848    6859    6869    6880    6899    6947    6953
                           6958    6962    6967    6968    6970    6973    6977    7043    7045    7185    7313#   8891    8892
                           8896    8897    8906    8915    8919    8924    8926    8932    8935
TYPERR   055134            6411    8879#
TYPOC  = 104402            6847    7314#   8912
TYPON  = 104404            7316#
TYPOS  = 104403            3119    3189    3235    3401    3740    3786    3804    5071    5409    6184    6229    7315#
T.A2   = 000001            2033#   4058    4313    4355    4439    4594    4652    4756    4909    4967    5500
T.B2   = 000002            2034#   4058    4313    4355    4439    4594    4652    4756    4909    4967    5503
T.B3   = 000004            2035#   5507
T10      001424            1924#   3146    3161    3170    3274    3283    5253    5601    5614    6139
T100     001426            1925#   3999    6118
T5000    001430            1926#   4461    5712    5736
T50000   001432            1927#   3168    3281    3934    4038    4195    4783    5057    5264
UFE    = 000400            1146#   3214    3317
UNLD     005322            1966#   2997*   3506*   3632*   3663*   3955*   4003*   4005*   4821*   4848*   5075*   5080*   5082*
                           6098    6122*
UNLOAD=  000007            1114#   3511    3668
UNS    = 040000            1171#
UPE    = 020000            1151#
VERIFY   012010            3133    3138    3246#
VV     = 000100            1182#
WCE    = 040000            1152#   4338    4422    4577    4635    4892    4950
WDCNT    001454            1941#
WD1      001434            1930#   4340*   4424*   4579*   4637*   4894*   4952*   8679
WD2      001436            1931#   4329*   4413*   4568*   4626*   4883*   4941*   8679
WLE    = 004000            1168#
WORD     001470            1949#
WRDATA=  000023            1120#   4281    4383    4478    4738    4799
WRHEAD=  000027            1122#   4257    4717
WRL    = 004000            1185#
WRTCHK=  000031            1123#   4332    4416    4571    4629    4886    4944
WRTGAT=  040000            1203#
$APTHD   001000            1310    1316#
$ASTAT=  ****** U          6634    6649
$ATYC    032736            6605    6607#
$ATY1    032712            6603#
$ATY3    032720            6465    6604#
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$AUTOB  001134          1787#   5160*   6837    6994
$BASE   001264          1857#   2992*   3055    5218*   5220*
$BDADR  001122          1782#
$BDDAT  001126          1784#
$BELL   001200          1808#   6404    6437    6790    6987
$CDW1   001270          1859#
$CDW2   001272          1860#
$CHARC  032462          6482*   6492*   6499    6525*   6530#
$CKSWR  033716          6823#   7321
$CMTAG  001100          1770#   2879    2880    2888    2894    2895    2896
$CM3  =  000000         1800#
$CM4  =  000006         1800#   1801#   1802#   1803#   1804#   1805#   1806#
$CNTLC  034626          6778    6859    6987#
$CNTLG  034640          6844    6989#
$CNTLU  034633          6869    6962    6988#
$CPUOP  001236          1831#
$CRLF   001205          1810#   3116    3186    3743    3789    4184    4185    6412    6437    6481    6533    6880    6967
                        6987    7048    8891    8896    8906    8919    8932
$DBLK   032702          6557    6591    6599#
$DB2D   035150          7100#   7162
$DB2O   035030          4182    7059#
$DDW0   001274          1861#
$DDW1   001276          1862#
$DDW10  001320          1871#
$DDW11  001322          1872#
$DDW12  001324          1873#
$DDW13  001326          1874#
$DDW14  001330          1875#
$DDW15  001332          1876#
$DDW2   001300          1863#
$DDW3   001302          1864#
$DDW4   001304          1865#
$DDW5   001306          1866#
$DDW6   001310          1867#
$DDW7   001312          1868#
$DDW8   001314          1869#
$DDW9   001316          1870#
$DECVL  035330          7102    7148#
$DEVCT  001220          1822#   2940*   3003*   3379    4995*   4996
$DEVM   001266          1858#   3110
$DOAGN  024032          5102    5111    5117#
$DTBL   032672          6560    6595#
$ENDAD  024022          1296    5113#   6432
$ENDCT  023770          2894    5104#
$ENDMG  024041          5106    5121#
$ENULL  024036          5109    5120#
$ENV    001230          1827#   5124    5154    6414    6460    6612    6636
$ENVM   001231          1828#   2917    3102    6462    6467    6614
$EOP    023734          3078    3376    4319    5094#   6161    6203
$EOPCT  023762          2894*   5101#   5105    6159*
$ERFLG  001103          1773#   6046    6324    6353    6355    6361*   6383    6399*   6437    8940
$ERMAX  001115          1779#   2897*   6355    6378*   6383
$ERROR  031732          2888    6397#
$ERRPC  001116          1780#   6406*   6407*   6408    6437    8672    8679    8688    8696    8707    8719
$ERRTB  005512          2077#   8888
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$ESCAP  001176          1807#   2896*   3000*   5458    5462*   5472*   5482*   5492*   5512*   5516*   6160*   6207*   6211*
                        6377*   6428    6430    6437
$ETABL  001230          1826#
$ETEND  001334          1322    1879#
$FATAL  001212          1819#   6640*
$FFLG   033156          6603*   6606*   6634    6643*   6651#
$FILLC  001156          1798#   6485    6533
$FILLS  001155          1797#   6533
$GDADR  001120          1781#
$GDDAT  001124          1783#
$GET42  024012          5110#
$GTSWR  034006          6845#   7319
$HD   = 000000           955
$HIBTS  001000          1317#
$HIOCT  035026          7036*   7047#
$ICNT   001104          1774#   6368*   6369    6371*   6382
$INTAG  001135          1788#   6842*   6861    6881    6994
$ITEMB  001114          1778#   6408*   6416    6437    8882
$LF     001206          1811#   6437    6533    6977    6987    7048
$LFLG   033155          6644*   6650#
$LPADR  001106          1775#   2898*   6190    6359*   6375*   6380    6382
$LPERR  001110          1776#   2899*   5517    6048    6051*   6217    6359    6376*   6382    6427
$MADR1  001242          1844#
$MADR2  001246          1848#
$MADR3  001252          1851#
$MADR4  001256          1854#
$MAIL   001210          1318    1322    1817#   2916    5154    6374    6414    6460
$MAMS1  001240          1838#
$MAMS2  001244          1846#
$MAMS3  001250          1849#
$MAMS4  001254          1852#
$MBADR  001002          1318#
$MFLG   033154          6604*   6610    6645*   6649#
$MNEW   034656          6848    6992#
$MSGAD  001224          1824#   6620*   6623
$MSGLG  001226          1825#   6625*
$MSGTY  001210          1818#   6618    6626*   6638    6642*
$MSWR   034645          6845    6990#
$MTYP1  001241          1839#
$MTYP2  001245          1847#
$MTYP3  001251          1850#
$MTYP4  001255          1853#
$MULT   035440          7204#
$MXCNT  031730          6372    6382#
$NULL   001154          1796#   6487    6533
$NWTST= 000001          3035#   3037    3081#   3083    3249#   3251    3358#   3360    3427#   3429    3468#   3470    3495#
                        3497    3520#   3522    3675#   3677    3826#   3828    3897#   3899    3977#   3979    4082#   4084
                        4206#   4208    4664#   4666    4981#   4983    5000#   5002
$OCNT   033402          6689*   6718*   6731#
$OCTVL  035132          3447    7061    7086#
$OMODE  033404          6684*   6688*   6693    6696*   6707*   6733#
$OVER   031714          6336    6352    6360    6370    6379#
$PASS   001216          1821#   2916*   3438    4176    5025    5098*   5099*   5107    5120    5126    6366    6383
$PASTM  001006          1320#
$PWRCT  031272          6247*   6248*   6258#
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$PWRUP  031220            6241    6247#
$QUES   001204            1809#   6437    6533    6899    6970    6987    7045    7048
$RDCHR  034260            6912#   7322
$RDDEC= ****** U          7325
$RDLIN  034350            6935#   7323
$RDOCT  034670            7009#   7324
$RDSZ = 000022            6928#
$RESRE  035610            7270#   7326
$RTNAD  024034            5119#
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$SAVRE  035552            7254#   7325
$SB2D   035344            7160#
$SCOPE  031452            2886    6333#
$SETUP= 000137            2849#   2885    2886    2888    2890    2892    2894    2895    2896    2898    5096    5151    6334
                          6398    6424    6432    6782    6787    6788    6818    6994
$STUP = 177777            2849#
$SUPRS  035400            3464    4183    7177#
$SVLAD  031660            6344    6373#
$SVPC = 000244            1294#   1299
$SWR  = 167400             941#    955     959     960     961     962     963     964     965     966    1806    1807    1808
                          2895    2896    2898    2899    3046    3097    3265    3368    3435    3475    3503    3535    3688
                          3835    3910    3985    4103    4216    4674    4992    5022    5091    5097    5112    5118    5120
                          6325    6326    6327    6328    6329    6335    6347    6349    6350    6353    6354    6355    6362
                          6363    6364    6376    6379    6382    6389    6390    6391    6392    6393    6402    6409    6421
                          6425    6437
$SWREG  001232            1829#   2919
$SWRMK= 000000             966     967    6329    6330    6351
$TESTN  001214            1820#   3370*   6374*   8672    8679    8687    8688    8696    8707    8719
$TIMES  001174            1806#   2895*   3046*   3097*   3265*   3368*   3435*   3475*   3503*   3535*   3688*   3835*   3910*
                          3985*   4103*   4216*   4674*   4992*   5022*   5097*   6362*   6369    6372*   6382
$TKB    001146            1793#   6061    6078    6506    6513    6533    6737    6758    6769    6799    6827    6854
$TKCNT  033406            6738#   6753*   6788    6805*   6919    6921*
$TKINT  033416            2862    3748    3757    3761    3792    6753#   6779    6840
$TKQEN= 033415            6742#   6813    6924
$TKQIN  033410            6739#   6754*   6755    6811*   6812*   6813    6815*
$TKQOU  033412            6740#   6755*   6922    6923*   6924    6926*
$TKQSR  033414            3745*   3749    3760*   6741#   6754    6815    6926
$TKS    001144            1792#   6504    6511    6533    6737    6759*   6795*   6797    6803*   6825    6841*   6851    6863*
                          6883*
$TKSRV  033466            6756    6769#
$TMP0   001160            1800#   3746*   3749*   3750*   3751    3753    3755    4461*   4484*   4783*   4806*
$TMP1   001162            1801#   4462*   4468    4492*   4557    4618    4784*   4789    4814*   4872    4933
$TMP2   001164            1802#   4510*   4513    4518    4523    4528    4533    4538    4543*   4544    4553    4555    4606
                          4610    4615*   4616    4834*   4868    4870    4921    4925    4930*   4931
$TMP3   001166            1803#   4511*   4546*   4567    4617*   4835*   4882    4932*   8679
$TMP4   001170            1804#   3166    3185    3199*   3210*   3279    3294    3297*   3311*   3356*   3395*   3407    5055
                          5251    5262    5599
$TMP5   001172            1805#   3001*   5458*   5512    5516
$TN   = 000022             942#    955    3023    3035    3046#   3074    3081    3097#   3249    3265#   3300    3358    3368#
                          3370    3371    3413    3419    3427    3435#   3439    3468    3475#   3482    3495    3503#   3520
                          3535#   3675    3688#   3826    3835#   3884    3890    3897    3910#   3977    3985#   4082    4103#
                          4159    4206    4216#   4664    4674#   4981    4992#   4997    5000    5022#
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$TPB    001152            1795#   6522*   6533
$TPFLG  001157            1799#   6454    6533
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$TRAP   035646          2890    7290#
$TRAP2  035670          7301#   7312
$TRP  = 000016          7305#   7314#   7315#   7316#   7317#   7318#   7319    7320#   7321    7322#   7323#   7324#   7325#
                        7326#   7327#   7328#
$TRPAD  035702          7295    7312#
$TSTM   001004          1319#
$TSTNM  001102          1772#   3371*   5096*   5128*   6324    6351    6373*   6374    6379    6383    6401    6437
$TTYIN  034604          6937    6938    6950    6968    6982    6986#
$TYPBN= ****** U        7318
$TYPDS  032466          6545#   7317
$TYPE   032132          6454#   6631    7305    7313
$TYPEC  032344          6484    6491    6498    6503#   6885
$TYPEX  032464          6526    6528    6531#
$TYPOC  033204          6687#   7314
$TYPON  033220          6686    6689#   7316
$TYPOS  033160          6682#   7315
$UNIT   001222          1823#   2941*   3004*   3381*   3388    3398    3484    3654    3738    3794    3802    3966    4071
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                        5617    6129    6144
$UNITM  001010          1321#
$USWR   001234          1830#
$VECT1  001260          1855#
$VECT2  001262          1856#
$XOFF = 000023          6508    6533
$XON  = 000021          6515    6533    6771
$XTSTR  031464          6338#
$$GET4= 000000          5112#
$OFILL  033403          6683*   6687*   6697    6732#
$40CAT= ****** U        6335    6411
.     = 055504          1275#   1279#   1284#   1287#   1294    1295#   1297#   1299#   1300#   1306    1307#   1309#   1311#
                        1769#   1812    1958#   1959#   1960#   1962#   1963#   1964#   2883    2898    2899    5120    5124
                        6243    6299    6382    6383    6437    6533    6599#   6652#   6737    6741#   6742    6743#   6986#
                        6987    6994#   7048    7086#   7148#   8671#   8954#   8955#   9108    9337    9341    9373    9397
                        9459    9467    9470#   9478#
.$ASTA= ****** U        6604    6607
.$X   = 001000          1306#   1311
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CHECK    1366#  3566  3591  3645  4056  4134  4311  4353  4399  4437  4592  4650  4754  4826  4907
         4965
COMMEN      1#  1086#
CWD2     1381#
DRCLR    1394#  6142
ENDCOM      1#  1086#
ERROR     980#  3077  3135  3148  3163  3172  3195  3204  3223  3227  3238  3242  3276  3285  3303
          3330  3334  3338  3342  3441  3479  3487  3491  3509  3513  3515  3539  3560  3569  3570
          3571  3572  3575  3585  3594  3595  3596  3597  3600  3611  3615  3625  3639  3648  3649
          3650  3651  3657  3661  3666  3670  3672  3692  3703  3707  3712  3722  3728  3768  3783
          3797  3811  3839  3853  3861  3865  3873  3881  3885  3914  3933  3941  3949  3953  3958
          3962  3969  3973  3989  3997  4001  4008  4022  4027  4031  4036  4040  4044  4049  4059
          4060  4061  4062  4065  4068  4074  4078  4107  4121  4125  4137  4138  4139  4140  4142
          4148  4150  4188  4193  4197  4201  4223  4240  4259  4263  4272  4283  4296  4302  4314
          4315  4316  4317  4320  4324  4334  4341  4344  4356  4357  4358  4359  4366  4376  4385
          4390  4393  4402  4403  4404  4405  4408  4418  4425  4428  4440  4441  4442  4443  4450
          4466  4480  4486  4499  4504  4551  4573  4580  4583  4595  4596  4597  4598  4631  4638
          4641  4653  4654  4655  4656  4678  4701  4719  4723  4732  4740  4757  4758  4759  4760
          4766  4772  4787  4801  4808  4819  4829  4830  4831  4832  4842  4846  4853  4857  4866
          4888  4895  4898  4910  4911  4912  4913  4946  4953  4956  4968  4969  4970  4971  5044
          5065  5085  5530  5535  5539  5554  5567  5575  5583  5590  5616  6096  6108  6116  6120
          6132  6138  6141  6147  6150  6209
ESCAPE      1#  1086#
F.EAB    1346#  4126  4303  4345  4429  4584  4642  4746  4899  4957
GETPRI      1#  1086#
GETSWR      1#  1086#  5151
HDCHK3   1483#
HDTBL    1496#
LOOP     1330#  3156  3269
MSG      3035#  3037  3081#  3083  3249#  3251  3358#  3360  3427#  3429  3468#  3470  3495#  3497  3520#
          3522  3675#  3677  3826#  3828  3897#  3899  3977#  3979  4082#  4084  4206#  4208  4664#  4666
         4981#  4983  5000#  5002
MULT        1#  1086#
NEWTST      1#  1086#  3035  3081  3249  3358  3427  3468  3495  3520  3675  3826  3897  3977  4082
          4206  4664  4981  5000
OWNTAG   1324#  1881
POP         1#  1086#  6586  6646  6647  7037  7233  7275
PUSH        1#  1086#  6545  6607  6609  6630  7011  7204  7255
QKPACK   1730#  3483  3653  3964  4070  4849
QKSEEK   1508#  4190
QKSRT    1706#  3987  6105
QKUNLD   1746#  3507  3664
RDATA    1577#
RDHDR    1454#
REPORT      1#  1086#
SBOUND   1651#  4549  4863
SCOPE     981#  3045  3096  3264  3367  3434  3474  3502  3534  3687  3834  3909  3984  4102  4215
          4673  4991  5021  5095
SETPRI      1#  1086#  6915
SETTRA   7305#  7314  7315  7316  7317  7319  7321  7322  7323  7324  7325  7326  7327
SETUP       1#  1086#  2878
SKIP        1#  1086#  3023  3074  3300  3413  3419  3439  3482  3884  3890  4159  4997
SLASH       1#  1086#
SPACE    1086#
STARS       1#  1086#  1292  1303  1305  1312  1765  1812  1815  3035  3044  3081  3095  3249  3263
```

```
                3358    3366    3427    3433    3468    3473    3495    3501    3520    3533    3675    3686    3826    3833    3897
                3908    3977    3983    4082    4101    4206    4214    4664    4672    4981    4990    5000    5020    5088    6321
                6385    6439    6535    6602    6659    6736    6818    6833    6904    6928    6997    7050    7089    7151    7169
                7192    7239    7284    8869    8878
SWRSU             1#    1086#   2900#
TRMTRP         7305#
TYPBIN            1#    1086#
TYPDEC            1#    1086#   5107
TYPNAM            1#    1086#
TYPNUM            1#    1086#
TYPOCS            1#    1086#   3117    3187    3233    3399    3738    3784    3802    5069    5407    6182    6227
TYPOCT            1#    1086#   6846
TYPTXT            1#    1086#
WDATA          1535#    4280
WRCHK          1618#    4331    4415    4570    4628    4885    4943
WRHDR          1433#    4256    4716
$$CMRE         1763#
$$CMTM         1763#    1800    1801    1802    1803    1804    1805
$$ESCA            1#    1086#
$$NEWT            1#    1086#   3035    3081    3249    3358    3427    3468    3495    3520    3675    3826    3897    3977    4082
                4206    4664    4981    5000
$$SET          7305#    7314    7315    7316    7317    7319    7321    7322    7323    7324    7325    7326    7327
$$SETM         2916#
$$SKIP            1#    1086#   3023    3074    3300    3413    3419    3439    3482    3884    3890    4159    4997
.EQUAT            1#     941#    976
.HEADE            1#     941#    945
.KT11             1#
.SETUP            1#     941#   2849
.SWRHI            1#     941#    955
.SWRLO         941#      967#
.$ACT1            1#     941#   1290
.$APTB            1#    1813#
.$APTH            1#     941#   1301
.$APTY            1#     941#   6600
.$ASTA            1#
.$CATC            1#     941#   1273
.$CMTA            1#     941#   1763
.$DB2D            1#     941#   7087
.$DB2O            1#     941#   7048
.$DIV             1#
.$EOP             1#     941#   5086
.$ERRO            1#     941#   6383
.$ERRT            1#
.$MULT            1#     941#   7190
.$POWE            1#
.$RAND            1#
.$RDDE            1#
.$RDOC            1#     941#   6995
.$READ            1#     941#   6734
.$R2AZ            1#
.$SAVE            1#     941#   7237
.$SB2D            1#     941#   7149
.$SB2O            1#
.$SCOP            1#     941#   6319
.$SIZE            1#
.$SUPR            1#     941#   7167
```

```
.$TRAP      1#    941#   7282
.$TYPB      1#
.$TYPD      1#    941#   6533
.$TYPE      1#    941#   6437
.$TYPO      1#    941#   6657
.$40CA      1#
.1170       1#


. ABS.  057554     000


 ERRORS DETECTED:  0

 CZR6JF,CZR6JF.LST/SOL/CRF/NL:TOC=SYSMAC.SML,CZR6JF.P11
 RUN-TIME: 20 24 2 SECONDS
 RUN-TIME RATIO: 178/47=3.7
 CORE USED:  43K  (86 PAGES)
```