RK611

UNIBUS DRIVE PART 2

CZR6IE0

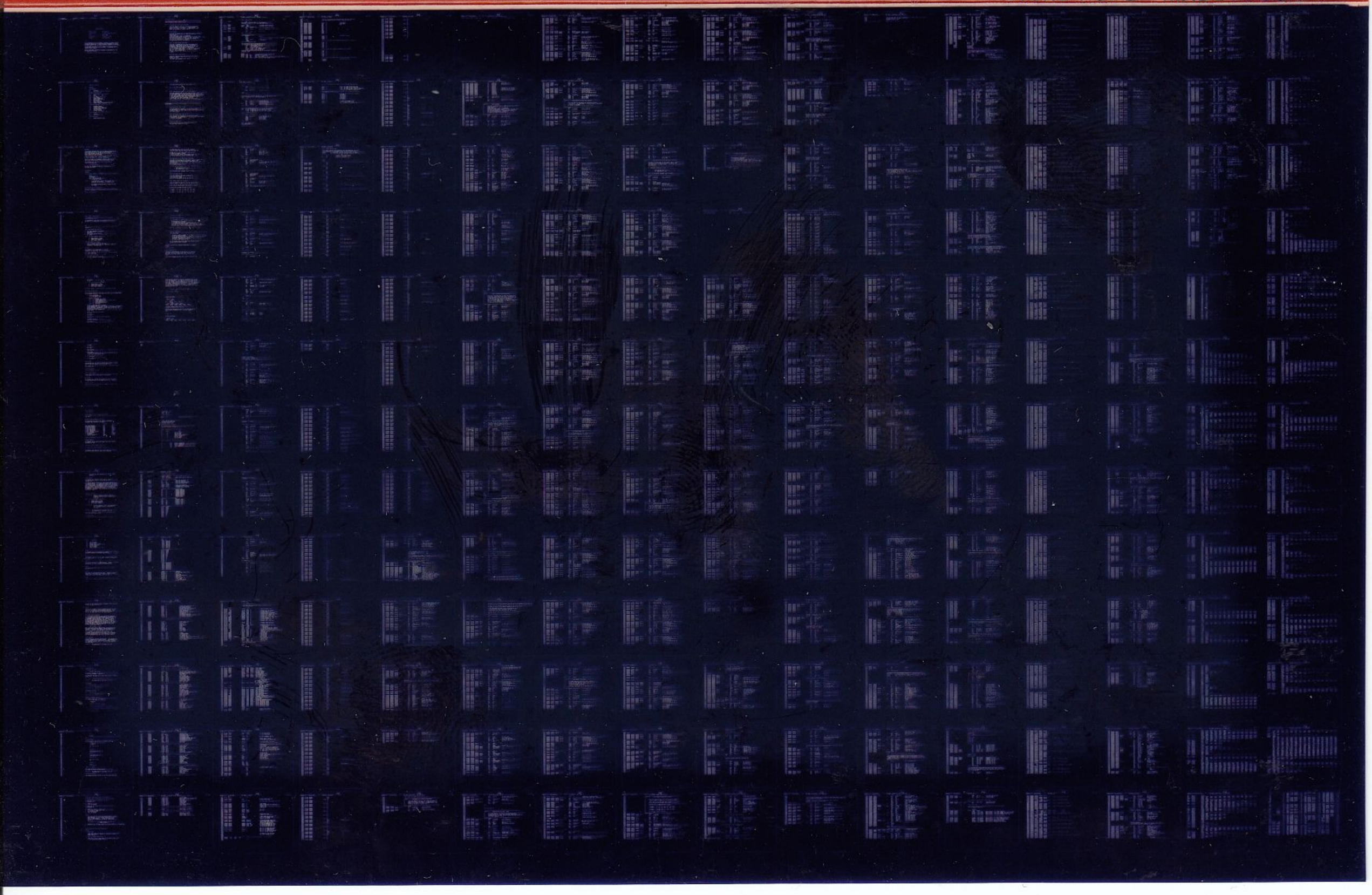
AH-9122E-MC

FICHE 1 OF 2

MAR 1978

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	AC-9120E-MC
PRODUCT NAME:	CZR6IEO UNIBUS RK6 DR PRT 2
DATE:	FEB 1978
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	GARY PAPAZIAN

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1.0 ABSTRACT

THIS PROGRAM PERFORMS PART 2 OF THE DRIVE DIAGNOSTICS TO INSURE THAT THE DISK IS CAPABLE OF PERFORMING READ AND WRITE DATA OPERATIONS IN BOTH 20 AND 22 SECTOR FORMATS. WORST CASE PATTERNS, SPIRAL WRITING AND READING, AND ALL OFFSET OPERATIONS ARE PERFORMED. ERROR DETECTION LOGIC IS CHECKED BY SOFTWARE ERROR FORCING.

AFTER A SUCCESSFUL RUN (WITH NO ERRORS) OF PART 2, THE DRIVE IS READY FOR PART 3 OF THE DRIVE DIAGNOSTICS.

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 INTERVENTION.

*****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. A 22 SECTOR FORMATTED PACK IS REQ'D, BUT WILL BE A RESULT OF RUNNING DRIVE DIAGNOSTOC PART 1 (SEE BELOW).

2.2 PRELIMINARY TESTING & PROGRAMS

THE RK611 DISKLESS CONTROLLER DIAGNOSTICS (ALL PARTS) SHOULD FIRST RUN SUCCESSFULLY FOLLOWED BY THE RK06 DRIVE DIAGNOSTIC- PART 1.

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 CAN BE CHAINED BY XXDP & WILL NOT OVERLAY THE LOADER.

CHAIN MODE OPERATION (MONITOR)

1. THE INPUT DIALOGUE IS BYPASSED.
2. THE BUSS ADDRESS & CONTROLLER INTERRUPT VECTOR IS DEFAULTED.
3. DRIVE 0 WILL NOT BE TESTED.
4. ALL OTHER DRIVES IN THE 'DRIVE PRESENT' CONDITION WILL BE TESTED.

NOTE: THE DRIVE PRESENT CONDITION IS:

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

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. IT IS APT COMPATABLE TO THE EXTENT THAT APT HOOKS WILL BE IN THE PROGRAM & WILL WORK THRU THE 'UPTON INTERFACE'.

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

AUTOMATIC MODE (MONITOR)

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

DEFAULTED.
3. ALL DRIVES IN THE 'DRIVE PRESENT' CONDITION WILL BE TESTED.

NOTE: THE DRIVE PRESENT CONDITION IS:

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

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:BYTE
   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

THE EXECUTION TIMES SHOWN BELOW ARE BASED ON THE PDP 11/50.

TOTAL TIME: 1 MIN, 30 SEC

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 BUSS ADDRESS	1264	177440
CONTROLLER INTERRUPT VECTOR	1314	210
CONTROLLER PRIORITY	1316	240
P-CLOCK STATUS REG	1320	172540
P-CLOCK SET BUFFER	1322	172542
P-CLOCK READ BUFFER	1324	172544
L-CLOCK STATUS REG	1326	177546
L-CLOCK INTERRUPT VECTOR	1330	100
P-CLOCK INTERRUPT VECTOR	1332	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 AUTOMATICALLY DETERMINE WHETHER THE DRIVE IS AN RK06 OR RK07.

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
8	LOOP ON TEST IN SW<07:00>

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).
WITH SWITCH <13> SET, SWITCH <15> SHOULD NOT BE SET.

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.

4.3.8 SW<08>

THIS SWITCH IS USED TO SELECT A PARTICULAR TEST (AS PER SW<00-7>) FOR EXECUTION AND SUBSEQUENT LOOPING. THUS IF TEST 15 IS TO BE SELECTED THE SWITCH SETTING WOULD BE 000415. IT SHOULD BE NOTED THAT BEFORE SELECTING & LOOPING TEST 15, ALL THE PREVIOUS TESTS (1-14) WILL BE EXECUTED.

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.

```
UNIBUS RK06 DRIVE DIAGNOSTIC
   PART 2
CZR6IE0

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.

                                UNIBUS RK06 DRIVE DIAGNOSTIC
                                   PART 2
                                CZR6IEO

                                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

A. WRITE TESTS

THESE TESTS CHECK THE ABILITY OF THE DRIVE TO WRITE & READ
WORSE CASE PATTERNS; PERFORM ALL OFFSETS & PERFORM ALL
SPIRAL WRITING.

B. SERVO & SPINDLE TIMING TESTS

THESE TESTS CHECK & TYPE HEAD LOAD, UNLOAD & INDEX TIMING,
ALSO MIN, MAX, AND AVERAGE SEEK TIMES, AND MAX VELOCITY
OF THE HEADS ARE MEASURED & TYPED.

```
                        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 WIL
                                        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 IS DUE TO DTYE, THE DRIVE WILL BE TESTED AS  N 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 IS 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 THE DRIVE
                                        DRIVE IS AN 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  READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #

                        THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
                        THIS AREA CONTAINS BAD SECTOR INFO WHICH IS WRITTEN BY THE
                        FACTORY DURING MANF.  ALL BAD SECTOR INFO (BSE) WILL BE STORED
                        AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
                        IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
                        IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
                        A MESSAGE WILL BE TYPED INDICATING THAT ALL
                        FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
                        THIS IS DONE SO AS NOT TO DESTROY BSE INFO OR AN ALIGNMENT PACK BY WRITI

                        THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.


                    ;*******************************************************************
                    ;WRITE TESTS
                    ;*******************************************************************


                    TEST 10 BASIC WRITE DATA TEST; 1 WORD

                        THIS TEST VERIFIES THE ABILITY OF THE DRIVE TO WRITE JUST ONE WORD,
                        ALL SECTORS ON CYL 0 ARE GIVEN IDENTICAL HEADERS &
                        A WRITE COMMAND IS ISSUED. READ & WRITE CHECK COMMANDS ARE NOT
                        PERFORMED. THIS TEST PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP
                        FOR A WRITE ERROR.


                    TEST 11 BASIC WRITE DATA TEST; FULL SECTOR

                        THIS TEST VERIFIES THE ABILITY OF THE DRIVE TO WRITE
                        A FULL SECTOR.  ALL ZEROS ARE WRITTEN BY THE WRITE DATA COMMAND
                        & CHECKED BY A RD DATA COMMAND.  A FURTHER CHECK IS PERFORMED
                        BY THE WRT CHK COMMAND.
                        THE ABOVE IS REPEATED FOR AN ALL ONES PATTERN.


                    TEST 12 20 SECTOR FORMAT TEST

                        DATA IS WRITTEN ON A FULL TRACK IN 20 SECTOR FORMAT.
                        MSG B0,B1 ARE CHECKED FOR ANY ERROR CONDITION.
                        CYLINDER,TRACK, SECTOR 0 IS USED.


                    TEST 13 TEST OFFSET & RTC LOGIC
```

```
                                THE HEADS ARE FIRST OFFSET BY OFFSET COMMANDS.
                                THIS TEST CHECKS THE RTC LOGIC BY VERIFYING THAT THE
                                'OFFSET ON' BIT (MSG A,00) RESETS AND THE OFFSET REG

                                BECOMES THE CYL DIFF INFO WHEN A SEEK CMD TO A
                                DIFFERENT CYLINDER IS ISSUED
                                IT ALSO TESTS THAT DRIVE CLEAR & SEEK TO SELF WILL NOT
                                CLEAR THE 'OFFSET ON' BIT OR THE OFFSET REG.
                                ALL OFFSET POSITIONS IN BOTH DIRECTIONS ARE CHECKED


                        TEST 14 TEST READ DATA AT ALL HEAD OFFSET POSITIONS

                                THIS TEST VERIFIES THAT THE HEAD OFFSET LOGIC IS OPERATIONAL BY
                                WRITING ALL 1'S PATTERNS ON CYLINDER 0, HEAD 0. THEN
                                PERFORMING READ DATA FROM CENTERLINE AND MOVING OUT + AND - OFFSET
                                POSITIONS UNTIL A FAILURE OCCURES. THE OFFSET POSITIONS
                                ARE TYPED OUT.
                                OFFSET CODES ARE ALSO VERIFIED BY READING MSG A, STATUS 00 & 10.
                                ALL HEADS ARE TESTED AT CYL 0.

                                IF THERE ARE NO FAILURES AT ALL, THIS INDICATES THAT

                                        A. HEADS DID NOT MOVE AT ALL
                                OR      B. THE COMBINATION OF DISC SURFACE, HEADS, R/W AMP
                                           ARE EXCEPTIONALLY GOOD.

                                NOTE THAT THE OFFSET FAILURE IS NOT AN ERROR,
                                BUT AN INDICATION OF SURFACE, HEAD, & R/W ELECTRONICS QUALITY ONLY


                        TEST 15 WRITE WITH HEADS OFFSET

                                THIS TEST VERIFIES THAT WHEN ATTEMPTING TO
                                WRITE WITH HEADS OFFSET THAT THE OFFSET WILL CLEAR
                                & THE DRIVE WILL WRITE
                                SINCE THE WRITE COMMAND HAS AN IMPLIED RTC.
                                THIS TEST IS PERFORMED FOR MAX POS & NEG OFFSETS ONLY


                        TEST 16 TEST CURRENT CROSS-OVER CYLINDERS

                                THIS TEST VERIFIES THAT THE DRIVE CAN WRITE & READ OFF
                                CURRENT CHANGE CYLINDERS X & Y IN THE FOLLOWING WAY:

                                SPIRAL WRITING IS PERFORMED FROM CYLINDER X TO CYLINDER Y
                                WITH A DATA PATTERN FILLING THE ENTIRE 2 CYLINDERS.

                                A WRITE CHECK IS THEN PREFORMED TO VERIFY DATA WAS PROPERLY WRITTEN.
                                THIS TEST IS PERFORMED FOR ALL 3 HEADS.

                                CYLINDER X:   63  127  191  255  319  383  RK06
                                CYLINDER Y:   64  128  192  256  320  384  RK06

                                CYLINDER X:  127  255  383  511  639  767  RK07
                                CYLINDER Y:  128  256  384  512  640  768  RK07
```

THE ABOVE CYL NUMBERS ARE IN DECIMAL.

TEST 17 TEST HEAD SWITCHING TIME

TESTS THE ABILITY TO SWITCH HEADS IN LESS THEN 10MS WHEN HEADS SPIRAL.

1. SECTOR 23(8) IS FIRST LOCATED AND A WRITE DATA COMMAND OF 512 WORDS TO SECTOR 25(8) IS ISSUED.
2. THE PROGRAM NOW KNOWS THAT THE DRIVE WILL NOT HAVE TO TRAVEL A FULL REVOLUTION BEFORE FINDING SECTOR 25(8).
3. SINCE EACH SECTOR TAKES APPROX. 1.2MS, THE TIME BETWEEN THE START OF THE WRITE COMMAND (FROM SECTOR 25(8), HEAD 0; TO SECTOR 0, HEAD 1) AND CONTROLLER READY SHOULD BE APPROX 6MS

THE ABOVE IS REPEATED FOR HEAD SWITCHING BETWEEN 1 TO 2

THIS TEST IS BYPASSED IF NEITHER L OR P CLOCK IS PRESENT

TEST 20 DRIVE OFF TRACK TEST

THIS TEST CHECKS FOR SERVO OSCILLATIONS DURING SETTLING TIME BEYOND THE ALLOTED 3MS.

1. INITIALLY, EVERY CYLINDER IS FORMATTED WITH IDENTICAL HEADERS (UNIQUE TO EACH CYLINDER)
2. A FULL SECTOR WRITE COMMAND IS ISSUED BY A SINGLE CYL SEEK FROM 0 TO AS HEADERS ARE IDENTICAL, THE NEXT SECTOR TO COME UNDER THE HEADS WILL IMMEDIATELY BE WRITTEN.
3. IF THERE IS OSCILLATION SENSED BY READING THE TRIBITS, DRIVE OFF TRACK ERROR WILL SET.

IN THIS MANNER OSCILLATING SEEKS ARE PERFORMED BETWEEN ALL MAJOR CYLINDE
100 OSCILLATIONS ARE PERFORMED AT EACH MAJOR CYLINDER
BEFORE DOING THE NEXT CYLINDER

ANY TEST THAT MODIFIES STANDARD FORMATTING IS FOLLOWED BY A 'CLEAN UP' TEST TO PUT THOSE CYLINDERS BACK TO STANDARD FORMAT.

6.0 ERROR REPORTING

6.1 ERROR INTERPRETATION

WHENEVER AN ERROR MESSAGE IS PRINTED OUT, ALL REGISTERS AND OTHER DATA PERTAINING TO THE ERROR ARE ALSO GIVEN. MSG A(00), MSG B(01), RKER, RKBA...ETC, INDICATE THE CONTENTS OF THE CORRESPONDING REGISTERS AT THE TIME OF ERROR.

EVERY ERROR MESSAGE CONTAINS A PC. THIS PC INDICATES THE 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 EXAMPLES:

EXAMPLE #1

MESSAGE A0 ERROR
AFTER START SPINDLE CMD & FWD SET

```
  TEST NO.   PC
  000014   016530
           EXPECT
A0       B0       A1       B1       A2       B2       B3
030144   100000   013704   000001
           ACTUAL
  140144   100000   101744   000001
RKCS1    RKCS2    RKASOF   RKER     RKDS     RKDC
040200   000100   010000   000000   000000   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.

EXAMPLE #2:

NO ATTN IN RKASOF
AFTER UNLOAD COMMAND

```
  TEST NO.   PC
  000003   014330
RKMR2    RKMR3    RKER     RKDS     RKCS1    RKCS2    RKASOF
000144   100000   000000   100101   000206   000104   000000
```

```
987
988
989                                                    [ END OF DOCUMENT ]
990                                 %
```

```
                                ;*** PGM REV 032 ***
                                .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  CZR6IEO UNIBUS RK6 DR PRT2
                                ;*COPYRIGHT (C) 1976,1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY GARY PAPAZIAN
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        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
                                ;*              204     DEFAULT PARAMETERS & BYPASS WRITE TESTS
                                ;*              214     DEFAULT PARAMETERS & BYPASS TIMING TESTS
                                ;*              220     INPUT PARAMETERS
                                ;*              224     INPUT PARAMETERS & BYPASS WRITE TESTS
                                ;*              230     INPUT PARAMETERS & BYPASS TIMING TESTS
                                ;*              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
```

```
1098            000002                  SW01=   2
1099            000001                  SW00=   1
1100                                    .EQUIV  SW09,SW9
1101                                    .EQUIV  SW08,SW8
1102                                    .EQUIV  SW07,SW7
1103                                    .EQUIV  SW06,SW6
1104                                    .EQUIV  SW05,SW5
1105                                    .EQUIV  SW04,SW4
1106                                    .EQUIV  SW03,SW3
1107                                    .EQUIV  SW02,SW2
1108                                    .EQUIV  SW01,SW1
1109                                    .EQUIV  SW00,SW0
1110
1111                                    ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
1112            100000                  BIT15=  100000
1113            040000                  BIT14=  40000
1114            020000                  BIT13=  20000
1115            010000                  BIT12=  10000
1116            004000                  BIT11=  4000
1117            002000                  BIT10=  2000
1118            001000                  BIT09=  1000
1119            000400                  BIT08=  400
1120            000200                  BIT07=  200
1121            000100                  BIT06=  100
1122            000040                  BIT05=  40
1123            000020                  BIT04=  20
1124            000010                  BIT03=  10
1125            000004                  BIT02=  4
1126            000002                  BIT01=  2
1127            000001                  BIT00=  1
1128                                    .EQUIV  BIT09,BIT9
1129                                    .EQUIV  BIT08,BIT8
1130                                    .EQUIV  BIT07,BIT7
1131                                    .EQUIV  BIT06,BIT6
1132                                    .EQUIV  BIT05,BIT5
1133                                    .EQUIV  BIT04,BIT4
1134                                    .EQUIV  BIT03,BIT3
1135                                    .EQUIV  BIT02,BIT2
1136                                    .EQUIV  BIT01,BIT1
1137                                    .EQUIV  BIT00,BIT0
1138
1139                                    ;*BASIC "CPU" TRAP VECTOR ADDRESSES
1140            000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
1141            000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRI  TIONS
1142            000014                  TBITVEC=14              ;;"T" BIT
1143            000014                  TRTVEC= 14              ;;TRACE TRAP
1144            000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
1145            000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
1146            000024                  PWRVEC= 24              ;;POWER FAIL
1147            000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
1148            000034                  TRAPVEC=34              ;;"TRAP" TRAP
1149            000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
1150            000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
1151            000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
1152
1153                                    .SBTTL  RK06 CONTROLLER REGISTER DEFINITION
```

```
1154
1155                            ;       $BASE=177440
1156
1157    000000                  RKCS1=  0               ;CONTROL AND STATUS REGISTER 1
1158    000002                  RKWC=   2               ;WORD COUNT REGISTER
1159    000004                  RKBA=   4               ;BUS ADDRESS REGISTER
1160    000006                  RKDA=   6               ;DESIRED TRACK SECTOR REGISTER
1161    000010                  RKCS2=  10              ;CONTROL AND STATUS REGISTER 2
1162    000012                  RKDS=   12              ;DRIVE STATUS REGISTER
1163    000014                  RKER=   14              ;ERROR REGISTER
1164    000016                  RKASOF= 16              ;ATTENTION SUMMARY AND OFFSET REGISTER
1165    000020                  RKDC=   20              ;DESIRED CYLINDER REGISTER
1166    000024                  RKDB=   24              ;DATA BUFFER
1167    000026                  RKMR1=  26              ;MAINTENANCE REGISTER 1
1168    000034                  RKMR2=  34              ;MAINTENANCE REGISTER 2 (MESSAGE LINE A)
1169    000036                  RKMR3=  36              ;MAINTENANCE REGISTER 3 (MESSAGE LINE B)
1170    000030                  RKECPS= 30              ;ECC POSITION INFORMATION
1171    000032                  RKECPT= 32              ;ECC PATTERN INFORMATION
1172
1173                            .SBTTL  CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)
1174
1175                            ;       DRIVE COMMANDS
1176
1177    000001                  SELDRV= 1               ;SELECT DRIVE (GET STATUS)
1178    000003                  PACK=   3               ;PACK ACKNOWLEDGE
1179    000005                  CLEAR=  5               ;DRIVE CLEAR
1180    000007                  UNLOAD= 7               ;UNLOAD
1181    000011                  SRTSPL= 11              ;START SPINDLE
1182    000013                  RECAL=  13              ;RECALIBRATE
1183    000015                  OFFSET= 15              ;OFFSET
1184    000017                  SEEK=   17              ;SEEK
1185    000021                  RDDATA= 21              ;READ DATA
1186    000023                  WRDATA= 23              ;WRITE DATA
1187    000025                  RDHEAD= 25              ;READ HEADER
1188    000027                  WRHEAD= 27              ;WRITE HEADER AND DATA
1189    000031                  WRTCHK= 31              ;WRITE CHECK
1190
1191    000001                  GO=     BIT0            ;GO BIT
1192    000100                  IE=     BIT6            ;INTERRUPT ENABLE
1193    000200                  RDY=    BIT7            ;CONTROLLER READY
1194    000400                  BA16=   BIT8            ;BUS ADDRESS BIT 16
1195    001000                  BA17=   BIT9            ;BUS ADDRESS BIT 17
1196    002000                  CDT=    BIT10           ;CONTROLLER DRIVE TYPE (0=RK06,1=RK07)
1197    004000                  CTO=    BIT11           ;CONTROLLER TIMEOUT
1198    010000                  CFMT=   BIT12           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
1199    020000                  DCPAR=  BIT13           ;SERCON PARITY ERROR DETECTED BY CONTROLLER
1200    040000                  DI=     BIT14           ;DRIVE INTERRUPT
1201    100000                  CERR=   BIT15           ;CONTROLLER ERROR
```

```
                        CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)

1202    100000          CCLR=   BIT15                   ;CONTROLLER CLEAR
1203
1204                    .SBTTL  CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)
1205
1206    000007          DRVMSK= 7                       ;MASK FOR DRIVE SELECTION CODE
1207    000010          RLS=    BIT3                    ;DESELECT OR RELEASE DRIVE IN BITS 0-2
1208    000020          BAI=    BIT4                    ;BUS ADDRESS INCREMENT INHIBIT
1209    000040          SCLR=   BIT5                    ;SUBSYSTEM CLEAR CONTROLLER AND ALL DRIVES
1210    000100          IR=     BIT6                    ;INPUT READY
1211    000200          OR=     BIT7                    ;OUTPUT READY
1212    000400          UFE=    BIT8                    ;UNIT FIELD ERROR
1213    001000          MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
1214    002000          PGE=    BIT10                   ;PROGRAMMING ERROR
1215    004000          NEM=    BIT11                   ;NON-EXISTENT MEMORY
1216    010000          NED=    BIT12                   ;NON-EXISTENT DRIVE
1217    020000          UPE=    BIT13                   ;UNIBUS PARITY ERROR
1218    040000          WCE=    BIT14                   ;WRITE CHECK ERROR
1219    100000          DLT=    BIT15                   ;DATA LATE ERROR
1220
1221                    .SBTTL  ERROR REGISTER BIT DEFINITION (RKER:14)
1222
1223    000001          ILF=    BIT0                    ;ILLEGAL FUNCTION CODE
1224    000002          SKI=    BIT1                    ;SEEK INCOMPLETE
1225    000004          NXF=    BIT2                    ;NON-EXECUTABLE FUNCTION
1226    000010          DRPAR=  BIT3                    ;DRIVE DETECTED SERCON PARITY ERROR
1227    000020          FMTE=   BIT4                    ;FORMAT ERROR
1228    000040          DTYE=   BIT5                    ;DRIVE TYPE ERROR
1229    000100          ECH=    BIT6                    ;ECC HARD
1230    000200          BSE=    BIT7                    ;BAD SECTOR ERROR
1231    000400          HVRC=   BIT8                    ;HEADER VRC ERROR
1232    001000          COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
1233    002000          IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR: HEAD/CYL
1234    004000          WLE=    BIT11                   ;WRITE LOCK ERROR
1235    010000          DTE=    BIT12                   ;DRIVE TIMING ERROR
1236    020000          OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
1237    040000          UNS=    BIT14                   ;DRIVE UNSAFE
1238    100000          DCK=    BIT15                   ;DATA CHECK
1239
1240                    .SBTTL  STATUS REGISTER BIT DEFINITION (RKDS:12)
1241
1242    000001          DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
1243                                                    ;    THIS BIT IS RESET)
1244    000004          OFST=   BIT2                    ;DRIVE OFFSET
1245    000010          ACLO=   BIT3                    ;AC LOW
1246    000020          DCLO=   BIT4                    ;DC LOW
1247    000040          DROT=   BIT5                    ;DRIVE OFF TRACK
1248    000100          VV=     BIT6                    ;VOLUME VALID
1249    000200          DRDY=   BIT7                    ;DRIVE READY
1250    000400          DDT=    BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1251    004000          WRL=    BIT11                   ;WRITE LOCK
1252    020000          PIP=    BIT13                   ;POSITIONING IN PROGRESS
1253    040000          DSC=    BIT14                   ;DRIVE STATUS CHANGE
1254    100000          SVAL=   BIT15                   ;STATUS VALID
1255
1256                    .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)
1257
```

```
                        MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)

000017          MESMSK= 17                      ;MESSAGE MASK
000020          PAT=    BIT4                    ;FORCE EVEN PARITY ON SERCON MESSAGE LINES
000040          DMD=    BIT5                    ;DIAGNOSTIC MODE
000100          MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
000200          MIND=   BIT7                    ;MAINTENANCE INDEX
000400          MCLK=   BIT8                    ;MAINTENANCE CLOCK
001000          MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
002000          MEWD=   BIT10                   ;MAINTENANCE ENCODED WRITE DATA
004000          PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
010000          PCD=    BIT12                   ;PRECOMPENSATION DELAY
020000          ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
040000          WRTGAT= BIT14                   ;WRITE GATE
100000          RDGATE= BIT15                   ;READ GATE

                .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A (RKMR2:34)

000040          D.DRA=  BIT5                    ;DRIVE AVAILABLE
000100          D.VV=   BIT6                    ;VOLUME VALID
000200          D DRDY= BIT7                    ;DRIVE READY
000400          D.DDT=  BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
001000          D.FORM= BIT9                    ;DRIVE FORMAT
002000          D.OFF=  BIT10                   ;OFFSET ON
004000          D.WRL=  BIT11                   ;WRITE LOCK
010000          D.SPIN= BIT12                   ;SPINDLE ON
020000          D.PIP=  BIT13                   ;POSITIONING IN PROGRESS
040000          D.DSC=  BIT14                   ;DRIVE STATUS CHANGE

                .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34)

000020          D.SSP=  BIT4                    ;SERVO SIG PRES
000040          D.HDHM= BIT5                    ;HEADS HOME
000100          D.BRHM= BIT6                    ;BRUSHES HOME
000200          D.DOOR= BIT7                    ;DOOR INTERLOCKED
000400          D.CART= BIT8                    ;CARTRAGE INTERLOCK
001000          D.SPOK= BIT9                    ;SPEED OK
002000          D.FWD=  BIT10                   ;FORWARD
004000          D.REV=  BIT11                   ;REVERSE
010000          D.LOAD= BIT12                   ;HEADS LOADING
020000          D.RTZ=  BIT13                   ;RETURN TO ZERO
040000          D.UNLD= BIT14                   ;HEADS UNLOADING

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

000040          D.IDAE= BIT5                    ;INVALID DISK ADDRESS ERROR:HEAD/CYL
000100          D.ACLO= BIT6                    ;AC LOW
000200          D.FLT=  BIT7                    ;DRIVE FAULT
000400          D.ILF=  BIT8                    ;ILLEGAL FUNCTION CODE
001000          D.PAR=  BIT9                    ;DRIVE DETECTED SERCON PARITY ERROR
002000          D.SKI=  BIT10                   ;SEEK INCOMPLETE
004000          D.WLE=  BIT11                   ;WRITE LOCK ERROR
010000          D.SPLS= BIT12                   ;SPEED LOSS
020000          D.DROT= BIT13                   ;DRIVE OFF TRACK
040000          D.UNS=  BIT14                   ;R/W UNSAFE

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

```
1314    000020          D.SECT= BIT4                    ;SECTOR ERROR
1315    000040          D.WCUR= BIT5                    ;WRITE CURRENT AND NO WRITE GATE
1316    000100          D.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
1317    000200          D.HDFL= BIT7                    ;HEAD FAULT
1318    000400          D.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
1319    001000          D.XERR= BIT9                    ;INDEX ERROR
1320    002000          D.TIB=  BIT10                   ;TRIBIT ERROR
1321    004000          D.PLO=  BIT11                   ;PLO ERROR
1322    010000          D.NMOV= BIT12                   ;SEEK AND NO MOTION
1323    020000          D.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
1324    040000          D.SUNS= BIT14                   ;SERVO UNSAFE
1325
1326                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE A (RKMR2:34)
1327
1328    000007          M.DRV=  7                       ;DRIVE CODE, ALL BYTES
1329    077770          M.SER=  77770                   ;DRIVE SERIAL #, BYTE 11
1330
1331                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE B (RKMR3:36)
1332
1333    000003          M.ID=   3                       ;BYTE ID, ALL BYTES
1334    040000          M.ALGN= BIT14                   ;ALIGN SIGN, BYTE 10
1335    000760          M.SECT= 760                     ;SECTOR COUNT, BYTE 11
1336    007000          M.HEAD= 7000                    ;HEAD DECODE, BYTE 11
1337    100000          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  012556          JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
        000220          .=220
000220  000137  012546          JMP     PARSRT          ;INPUT ALL PARAMETERS & START TESTING

        000240          .=240
000240  000137  055500          JMP     0.ODT           ;ENTER ODT11

                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************
                                ;HOOKS REQUIRED BY ACT11
        000244                  $SVPC=.                 ;SAVE PC
        000046          .=46
000046  031600          $ENDAD                          ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
        000052          .=52
000052  100000          .WORD   100000                  ;;2)SET LOC.52 TO 100000
        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  000430          $TSTM:  .WORD   280.    ;;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  000042                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)


                                .LIST   MD

                                ;
```

```
1394                            ;USE LOOP X TO OMIT SUBCLR
1395                            ;
1396
1397                            .MACRO  LOOP    A
1398                                    SCOP1
1399                                    MOV     #STACK,SP       ;RESTORE STK PTR
1400
1401                            .IF     B       A
1402                                    JSR     PC,SUBCLR
1403                                    ERROR   24              ;CERR AFTER SCLR
1404
1405                            .ENDC
1406                            .ENDM   LOOP
1407
1408                            ;
1409                            ;THIS MACRO FILLS EXPECTED MSG A0, B0, A1, B1, A2, B2 & B3 WITH STANDARD BITS
1410                            ;A=D.DSC AFTER ATTN OR 0 AFTER DRIVE CLEAR OR ANY IMPLIED SEEKS
1411                            ;NOTE: A CAN BE ANY BIT COMBINATION DESIRED.
1412                            ;
1413                            .MACRO  F.EAB   A
1414
1415                                    MOV     #<A!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
1416                                    CLR     E.B0                ;EXPECTED MSG B0
1417                                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
1418                                    MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
1419                                    CLR     E.A2                ;EXPECTED MSG A2
1420                                    MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
1421                                    MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
1422                            .ENDM   F.EAB
1423
1424                            ;
1425                            ;THIS MACRO ASSUMES DRIVE MSG A0, B0, A1, B1 WILL ALWAYS BE TESTED
1426                            ;USE    A,C,D,E FOR MSG A0, B0, A1, B1 ERROR NUMBERS RESP.
1427                            ;USE    G=T.A2  TO READ MSG A2 & PUT INFO INTO 'CYLDIF'
1428                            ;       H=T.B2  TO READ MSG B2 & PUT INFO INTO 'CYLADD'
1429                            ;       I=T.B3  TO READ MSG B3 & PUT INFO INTO 'SECTOR' & 'HEADA'
1430                            ;
1431                            ;USE    F=<ERROR DESCRIPTION>
1432                            ;
1433                            .MACRO  CHECK   A,C,D,E,F,G,H,I
1434
1435                                    JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
1436                                    .WORD   G!A!I               ;& MSGS SPECIFIED HERE
1437                                    ERROR   A                   ;MSG A0 ERROR F
1438                                    ERROR   C                   ;MSH B0 ERROR
1439                                    ERROR   D                   ;MSG A1 ERROR
1440                                    ERROR   E                   ;MSG B1 ERROR
1441                            .ENDM   CHECK
1442
1443                            ;
1444                            ;A=CYL DIFF/OFFSET ERROR #
1445                            ;B=CYL ADDR ERROR #
1446                            ;C=<ERROR DESCRIPTION>
1447                            ;
1448                            .MACRO  CWD2    A,B,C,?D,?E
1449
```

```
1450                                    MOV     #2,RKMR1(R5)    ;SELECT WORD 2
1451                                    JSR     PC,GSTAT
1452                                    TST     CYLDIF          ;SEE IF MSG A2=0
1453                                    BEQ     D               ;BR IF YES
1454                                    ERROR   A               ;MSG A2 NOT CLEARED C
1455                            D:      TST     CYLADD          ;SEE IF MSG B2=0
1456                                    BEQ     E               ;BR IF YES
1457                                    ERROR   B               ;MSG B2 NOT CLEARED C
1458                            E:
1459                            .ENDM   CWD2
1460
1461                            .MACRO  DRCLR   ?A
1462
1463                                    MOV     #CCLR,RKCS1(R5)
1464                                    MOV     $UNIT,RKCS2(R5) ;DRIVE#
1465                                    MOV     #CLEAR,HCS1
1466                                    JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
1467                                    ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
1468                                    JSR     PC,TSTATN       ;TEST FOR ATTN
1469                                    BR      A
1470                                    ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
1471                            A:
1472
1473                            .ENDM   DRCLR
1474
1475
1476                            ;
1477                            ;USE CALIB      X   TO OMIT CHECKING MSGS A0, B0, A1, B1, A2 & B2
1478                            ;
1479                            .MACRO  CALIB   A,?C
1480
1481                                    MOV     #CCLR,RKCS1(R5)
1482                                    MOV     $UNIT,RKCS2(R5)
1483                                    MOV     #RECAL,HCS1
1484                                    JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
1485                                    ERROR   129             ;RDY NOT SET AFTER RECAL CMD
1486
1487                                    MOV     #1,RKMR1(R5)    ;SELECT WORD 1
1488                                    JSR     PC,GSTAT
1489                                    BIT     #D.RTZ,HMR2
1490                                    BNE     C
1491                                    ERROR   244             ;RTZ NOT SET DURING RECAL CMD
1492                            C:      MOV     T10,TEMP2       ;SETUP TIMEOUT
1493                                    JSR     PC,FATT1        ;FIND ATTN
1494                                    ERROR   55              ;NO ATTN AFTER RECAL CMD
1495                            .IF B   A
1496                                    F.EAB   DSC
1497                                    CHECK   221,275,222,276,<AFTER RECAL CMD>,T.A2,T.B2,T.B3
1498                                    CWD2    47,50,<AFTER RECAL CMD>
1499                            .ENDC
1500                                    DRCLR
1501
1502                            .ENDM   CALIB
1503
1504                            ;
1505                            ;QUICK START SPINDLE
```

```
1506                                    ;
1507                                    .MACRO  QKSRT
1508
1509                                            JSR     PC,SUBCLR
1510                                            ERROR   24              ;CERR AFTER SCLR
1511
1512                                            MOV     #SRTSPL,HCS1
1513                                            JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
1514                                            ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
1515
1516                                            MOV     T100,TEMP2      ;SETUP TIMEOUT
1517                                            JSR     PC,FATT1        ;FIND ATTN
1518                                            ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
1519
1520                                            CLR     UNLD
1521
1522                                    .ENDM   QKSRT
1523
1524                                    ;
1525                                    ; A=WRHEAD/<CFMT!WRHEAD>
1526                                    ; USE WRHDR     <A>,X   TO OMIT CHECKING A0, B0, A1 & B1
1527                                    ;
1528                                    .MACRO  WRHDR   A,C,K,?D
1529
1530                                            MOV     #<A>,HCS1
1531                                            JSR     PC,DATA'C'D     ;DO DATA X FOR CMD & GET CONTR RDY
1532                                            ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
1533                                    .IF     B       K
1534                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1535                                    .ENDC
1536                                    .IF     NB      K
1537                                            MOV     #<CFMT!SELDRV>,HCS1
1538                                            JSR     PC,DOCMD
1539                                            ERROR   117             ;NO RDY AFTER SELDRV CMD
1540                                    .ENDC
1541                                            BIT     #CERR,HCS1
1542                                            BEQ     D
1543                                            ERROR   201             ;CERR AFTER WRITE HEADER CMD
1544                                            TYPE    ,MSG26          ;ABORTING BAL OF TESTS
1545                                            JMP     $EOP
1546                                    D:
1547                                    .IF B   C
1548                                            F.EAB   0
1549                                            CHECK   277,267,300,270,<AFTER WRITE HEADER CMD>,0,0,0
1550                                    .ENDC
1551
1552                                    .ENDM   WRHDR
1553
1554                                    ;
1555                                    ; A=RDHEAD/<CFMT!RDHEAD>
1556                                    ;USE RDHDR <A>,X TO OMIT CHECKING A0, B0, A1, B1
1557                                    ;
1558                                    .MACRO  RDHDR   A,C,?D,?E
1559
1560                                            MOV     #RHTAB,R0
1561                                            MOV     #<A>,HCS1
```

```
1562                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1563                                    ERROR   171             ;NO RDY AFTER READ HEADER CMD
1564                                    BIT     #CERR.HCS1
1565                                    BEQ     D
1566                                    ERROR   174             ;CERR AFTER READ HEADER CMD
1567                                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
1568                                    JMP     $EOF
1569
1570                            D:      MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
1571                                    MOV     RKDB(R5),(R0)+  ;2'ND WORD
1572                                    MOV     RKDB(R5),(R0)+  ;3'RD WORD
1573
1574
1575                                    BIT     #DLT,RKCS2(R5)
1576                                    BEQ     E
1577                                    JSR     PC,GSTAT
1578                                    ERROR   173             ;DLT AFTER READ HEADER CMD
1579                                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
1580                                    JMP     $EOP
1581                            E:
1582                            .IF     B       C
1583                                    F.EAB   0
1584                                    CHECK 301,271,302,272,<AFTER READ HEADER CMD>,T.A2,T.B2,0
1585                            .ENDC
1586
1587                            .ENDM   RDHDR
1588
1589
1590                            .MACRO  HDCHK3  ?A
1591
1592                                    RDHDR   RDHEAD
1593                                    CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
1594                                    BEQ     A               ;BR IF SAME
1595                                    ERROR   51              ;WRONG CYL# ON HEADER
1596                            A:
1597
1598                            .ENDM   HDCHK3
1599
1600
1601                            ; A=TOCYL/FRCYL , B=HEAD#, C = 0 FOR 22 SECTOR, 1 FOR 20 SECTOR
1602
1603                            .MACRO  HDTBL   A,B,C
1604
1605                                    MOV     A,CALADD        ;SETUP
1606                                    MOV     #B,HEAD         ;TO FILL
1607                                    MOV     #C,FORMAT       ;HEADER
1608                                    JSR     PC,FHDTAB       ;TABLE
1609
1610                            .ENDM   HDTBL
1611
1612
1613                            ;QUICK SEEK.    ENTER WITH CYL# IN RKDC
1614
1615                            .MACRO  QKSEEK   A
1616
1617                                    MOV     #SEEK,HCS1
```

```
                        JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
                        ERROR   131             ;NO RDY AFTER SEEK CMD

                        MOV     T50000,TEMP1    ;SETUP TIMEOUT
                        JSR     PC,FATT2        ;FIND ATTN
                        ERROR   132             ;NO ATTN AFTER SEEK CMD

                        BIT     #CERR,HCS1
                        BEQ     A
                        ERROR   210             ;CERR AFTER SEEK CMD

                    A:

                    .ENDM   QKSEEK


                    ;
                    ;A=WRDATA/<CFMT!WRDATA>
                    ;C=ADDR TO JMP TO ATTEMPT TO WRITE ON ANOTHER SECTOR
                    ;D=ADDR TO JMP TO BYPASS TEST
                    ;E: IF BLANK WILL CHECK A0, B0, A1 & B1 AT THE END OF WRITING
                    ;E: IF NON BLANK WILL OMIT CHECKING A0 THRU B1
                    ;

                    .MACRO  WDATA   A,C,D,E,J,K,?F,?G,?H,?I

                        MOV     #<A>,HCS1
                        JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
                        ERROR   11              ;NO RDY AFTER WRITE DATA CMD
                    .IF     B       K
                        JSR     PC,GSTAT        ;GET FRESH STATUS
                    .ENDC
                    .IF     NB      K
                        MOV     #<CFMT!SELDRV>,HCS1
                        JSR     PC,DOCMD
                        ERROR   117             ;NO RDY AFTER SELDRV CMD
                    .ENDC
                        BIT     #CERR,HCS1
                        BEQ     I               ;BR IF NO ERRORS

                        BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
                        BEQ     G               ;BR IF NO
                        JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
                        BR      H               ;RETURN HERE IF NO
                    .IF     B       J

                        INC     SECTOR          ;RETURN HERE IF YES
                        CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
                        BNE     F               ;BR IF NO
                        ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
                        JMP     D               ;BYPASS TEST
                    F:  MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
                        JMP     C

                    .ENDC
                    .IF     NB      J
                        JMP     3$              ;RET HERE IF YES
```

```
1674                                    .ENDC
1675                                    G:      ERROR   12              ;CERR WITH WRITE DATA CMD
1676                                            F.EAB   0
1677                                            CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1678                                            TYPE    $MSG26          ;ABORTING BAL OF TESTS
1679                                            JMP     $EOP
1680                                    H:      ERROR   63              ;BAD SECTOR NOT LISTED IN TABLE
1681                                    I:
1682                                    .IF     B       E
1683                                            F.EAB   0
1684                                            CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1685                                    .ENDC
1686                                    .ENDM   WDATA
1687
1688
1689                                    ;
1690                                    ;A=RDDATA/<CFMT!RDDATA>
1691                                    ;USE RDATA      <A>,X TO OMIT CHECKING A0, B0, A1 & B1
1692                                    ;
1693
1694                                    .MACRO  RDATA   A,C,K,?D,?E,?F,?G,?H
1695
1696                                            MOV     #<A>,HCS1
1697                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1698                                            ERROR   13              ;NO RDY AFTER READ DATA CMD
1699                                    .IF     B       K
1700                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1701                                    .ENDC
1702                                    .IF     NB      K
1703                                            MOV     #<CFMT!SELDRV>,HCS1
1704                                            JSR     PC,DOCMD
1705                                            ERROR   117             ;NO RDY AFTER SELDRV CMD
1706                                    .ENDC
1707                                            BIT     #CERR,HCS1
1708                                            BEQ     G
1709                                            BIT     #BSE,HER        ;SEE IF BAD SECTOR
1710                                            BEQ     E
1711                                            ERROR   65              ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
1712                                            BR      H
1713                                    D:      TYPE    $MSG26          ;ABORTING BAL OF TESTS
1714                                            JMP     $EOP
1715
1716                                    E:      BIT     #DCK,HER        ;SEE IF DATA CHECK ERROR
1717                                            BEQ     F
1718                                            ERROR   21              ;DATA CHECK ERROR AFTER READ CMD (ECC)
1719                                            BR      H
1720
1721                                    F:      ERROR   14              ;CERR AFTER READ DATA CMD.
1722
1723                                    H:      F.EAB   0
1724                                            CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1725                                            BR      D
1726                                    G:
1727                                    .IF     B       C
1728                                            F.EAB   0
1729                                            CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
```

```
1730                                    .ENDC
1731                                    .ENDM   RDATA
1732
1733
1734                                    ;
1735                                    ;A=WRTCHK/<CFMT!WRTCHK>
1736                                    ;C=EXPECTED DATA FOR TYPEOUT
1737                                    ;USE WRCHK      <A>,DATA0,X TO OMIT CHECKING A0, B0, A1 & B1
1738                                    ;
1739
1740                                    .MACRO  WRCHK   A,C,D,K,?E,?F
1741
1742                                            MOV     #<A>,HCS1
1743                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1744                                            ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
1745                                    .IF     B       K
1746                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1747                                    .ENDC
1748                                    .IF     NB      K
1749                                            MOV     #<CFMT!SELDRV>,HCS1
1750                                            JSR     PC,DOCMD
1751                                            ERROR   117             ;NO RDY AFTER SELDRV CMD
1752                                    .ENDC
1753                                            BIT     #CERR,HCS1
1754                                            BEQ     F
1755                                            BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
1756                                            BEQ     E
1757                                            MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
1758                                            MOV     C,WD2           ;EXPECTED WORD FOR TYPEOUT
1759                                            ERROR   16              ;WCE AFTER WRITE CMD
1760                                            BR      F
1761
1762                                    E:      ERROR   22              ;CERR AFTER WRITE CHECK CMD
1763                                            F.EAB   0
1764                                            CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1765                                            TYPE    ,MSG26          ;ABORTING BAL OF TESTS
1766                                            JMP     $EOP
1767
1768                                    F:
1769                                    .IF     B       D
1770                                            F.EAB   0
1771                                            CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1772                                    .ENDC
1773                                    .ENDM   WRCHK
1774
1775
1776                                    .MACRO  OFSET ?A
1777
1778                                            MOV     #A,$ESCAPE
1779                                            MOV     #OFFSET,HCS1
1780                                            JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
1781                                            ERROR   33              ;NO RDY AFTER OFFSET CMD
1782
1783                                            MOV     #<D.PIP!D.SPIN!D.OFF!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
1784                                            CLR     E.B0
1785                                            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
```

```
1786                            MOV     #1,E.B1
1787                            CHECK   35,61,36,62,<DURING OFFSET CMD>,0,0,0
1788
1789                    A:      CLR     $ESCAPE
1790                            MOV     T5000,TEMP1     ;SETUP TIMEOUT
1791                            JSR     PC,FATT2        ;FIND ATTN
1792                            ERROR   34              ;NO ATTN AFTER OFFSET CMD
1793
1794                            F.EAB   <D.DSC!D.OFF>
1795                            CHECK   260,261,37,40,<AFTER OFFSET CMD>,T.A2,T.B2,0
1796
1797                    .ENDM   OFSET
1798
1799
1800                    .MACRO  EOPGM
1801
1802                            SCOPE
1803                            CLR     $ESCAPE
1804                            MOV     #1,$TIMES
1805                            MOV     #STACK,SP
1806                            INC     $DEVCT          ;INCR COUNT FOR # DRIVES CHECKED
1807                            CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
1808                            BEQ     $EOP1+2         ;BR IF YES
1809                            JMP     NUDRV           ;ELSE TEST NEXT DRIVE PRESENT
1810                    $EOP1:  SCOPE
1811                    .ENDM   EOPGM
1812                    ;
1813                    ;A= ERROR #
1814                    ;B = ERROR CONDITION
1815                    ;
1816                    .MACRO  OFFDIR  A,B,?C,?D
1817                            MOV     R2,RKASOF(R5)   ;REFRESH RKASOF
1818
1819                            BIT     #BIT7,R2
1820                            BNE     C               ;BR IF NEG OFFSET
1821
1822                            CMP     R2,CYLDIF       ;CHECK POS OFFSET
1823                            BEQ     D
1824                            ERROR   A               ;OFFSET IN A2 NOT = RKASOF
1825                            BR      D               ;B
1826
1827                    C:      CMP     R1,CYLDIF       ;CHECK NEG OFFSET
1828                            BEQ     D
1829                            ERROR   A               ;OFFSET IN A2 NOT = RKASOF
1830                                                    ;B
1831                    D:
1832                    .ENDM   OFFDIR
1833
1834                            .NLIST  MD
1835
```

```
                                .SBTTL  COMMON TAGS

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

                                        .=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
```

```
1892  001212  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
1893  001214  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
1894  001216  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
1895  001220  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
1896  001222  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
1897  001224  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
1898  001226  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
1899  001230                        $ETABLE:                ;;APT ENVIRONMENT TABLE
1900  001230     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
1901  001231     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
1902  001232  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
1903  001234  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
1904  001236  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
1905                                ;*                      BITS 15-11=CPU TYPE
1906                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
1907                                ;*                              11/70=06,PDQ=07,Q=10
1908                                ;*                      BIT 10=REAL TIME CLOCK
1909                                ;*                      BIT  9=FLOATING POINT PROCESSOR
1910                                ;*                      BIT  8=MEMORY MANAGEMENT
1911  001240     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
1912  001241     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
1913                                ;*                      MEM.TYPE BYTE    --  (HIGH BYTE)
1914                                ;*                              900 NSEC CORE=001
1915                                ;*                              300 NSEC BIPOLAR=002
1916                                ;*                              500 NSEC MOS=003
1917  001242  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
1918                                ;*                       MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
1919  001244     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
1920  001245     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
1921  001246  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
1922  001250     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
1923  001251     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
1924  001252  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
1925  001254     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
1926  001255     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
1927  001256  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
1928  001260  000000                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
1929  001262  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
1930  001264  177440                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
1931  001266  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
1932  001270  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
1933  001272  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
1934  001274  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
1935  001276  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
1936  001300  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
1937  001302  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
1938  001304  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
1939  001306  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
1940  001310  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
1941  001312  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
1942  001314                        $ETEND:
1943                                .MEXIT
1944          177440                ABASE=  177440                  ;DEFAULT BUSS ADDRESS
1945  001314  000210                RKVEC:  210                     ;DEFAULT CONTROLLER INTERRUPT VECTOR
1946  001316  000240                RKPRI:  PR5                     ;PRIORITY
1947  001320  172540                PKS:    172540                  ;P-CLOCK STATUS REG
```

```
1948  001322  172542          PKSB:   172542          ;P-CLOCK SET BUFFER
1949  001324  172544          PKRB:   172544          ;P-CLOCK READ BUFFER
1950  001326  177546          LKS:    177546          ;L-CLOCK STATUS REG.
1951
1952  001330  000100          LCVEC:  100             ;L-CLOCK INTERRUPT VECTOR
1953  001332  000104          PCVEC:  104             ;P-CLOCK INTERRUPT VECTOR.
1954
1955          000114          MEMVEC= 114
1956          172100          MEMBAS= 172100          ;MEMORY PARITY OPTION CSR START ADDR
1957  001334  000000          TRAPPC: 0               ;PC FOR MEM CHECK ENABLE TRAP
1958
1959  001336  000000          PARAM:  0               ;1 FOR 220 START, NO DEFAULT
1960  001340  000000          FTITLE: 0               ;FLAG FOR PRINTING OUT 1ST PROGRAM TITLE
1961
1962  001342  000000          DRVPTR: 0               ;CONTAINS THE POINTER TO THE DRIVE FLAG
1963                                                  ;(DRIV0-DRIV7) OF THE DRIVE TO BE CHECKED NEXT.
1964  001344  000000          FRCYL:  0               ;FROM CYLINDER
1965  001346  000000          TOCYL:  0               ;TO CYLINDER
1966  001350  000000          CCYL:   0               ;CURRENT CYL, USED IN N SQUARE TEST
1967  001352  000000          PCYL:   0               ;PREV CYL., USED IN N SQUARE TEST
1968  001354  000000          CALDIF: 0               ;CALC CYL DIFF USED IN N SQUARE TEST
1969  001356  000000          CYLDIF: 0               ;CYL DIFF, RIGHT JUSTIFIED FROM RKMR3
1970  001360  000000          CYLADD: 0               ;CYL ADDR, RIGHT JUSTIFIED FROM RKMP3
1971  001362  000000          CALADD: 0               ;CYL ADDR USED IN FHDTAB ROUTINE
1972
1973  001364  000074          HZ:     60.             ;60 FOR 60 CPS
1974                                                  ;50 FOR 50 CPS
1975  001366  000000          COUNT:  0               ;LOADED TO 50 OR 60 TO COUNT TO 1 SEC
1976                                                  ;OR ANY OTHER NUMBER TO COUNT OFF FRACTIONAL SECOND
1977  001370  000000          SEC:    0               ;SECOND COUNTER
1978  001372  000000          TIMUP:  0               ;FLAG TO INDICATE TIME IS UP
1979  001374  000000          SECNT:  0               ;SECTOR COUNT
1980  001376  000000          PSEC:   0               ;PREVIOUS SECTOR
1981  001400  000000          ESEC:   0               ;EXPECTED SECTOR
1982  001402  000000          SECTOR: 0               ;SECTOR COUNT, RIGHT JUSTIFIED FROM RKMR3
1983
1984  001404  000001          T1:     1               ;TIMEOUT CONSTANTS
1985  001406  000012          T10:    10.
1986  001410  000062          T50:    50.
1987  001412  000764          T500:   500.
1988  001414  000144          T100:   100.
1989  001416  011610          T5000:  5000.
1990  001420  141520          T50000: 50000.
1991
1992  001422  000077          CYL:    63.             ;CYLINDER NUMBERS USED IN
1993  001424  000177                  127.            ;CURRENT CROSSOVER TEST FOR RK06
1994  001426  000277                  191.
1995  001430  000377                  255.
1996  001432  000477                  319.
1997  001434  000577                  383.
1998
1999  001436  000177          CYL7:   127.            ;FOR RK07
2000  001440  000377                  255.
2001  001442  000577                  383.
2002  001444  000777                  511.
2003  001446  001177                  639.
```

```
2004  001450  001377                    767.
2005
2006  001452  000000          WD1:      0                ;ACTUAL HEADER/DATA WORD
2007  001454  000000          WD2:      0                ;EXPECTED DATA WORD
2008
2009  001456  000000          OFFERR:   0                ;SET WHEN WRITE CHECK ERROR ON OFFSET
2010
2011
2012  001460  000000          HEAD:     0                ;HEAD NUMBER
2013  001462  000000          HEADA:    0                ;HEAD # FROM H.B3, RT. JUSTIFIED
2014  001464  000000          HD1:      0                ;SHIFTED HEAD# FOR FORMATTER ROUTINE
2015  001466  000000          FORMAT:   0                ;FORMAT TYPE
2016  001470  000000          FMT1:     0                ;SHIFTED FORMAT FOR FORMATTER ROUTINE
2017  001472  000000          WDCNT:    0                ;WORD COUNT
2018
2019  001474  000000          DATA0:    0                ;ALL 0'S
2020  001476  052525          DATA01:   52525            ;0101 PATT
2021  001500  177777          DATA1:    177777           ;ALL 1'S
2022  001502  133467          DPAT1:    133467
2023  001504  070627          DPAT2:    70627
2024
2025  001506  000000          WORD:     0                ;HEADER/DATA WORD
2026  001510  000000          HDWD:     0                ;HEADER WORD FROM RKDB
2027
2028  001512  000000          BSERR:    0                ;CANNOT READ BSE INFO WHEN SET
2029  001514  000000          LIMERR:   0                ;LIMIT DETECT ERROR FLAG
2030  001516  000000          BYPCERR:  0                ;SET TO 1 TO BYPASS CKCERR IN 'GSTAT1'
2031  001520  000000          CHKFLG:   0                ,WORDS TO BE TESTED
2032
2033  001522  000102          HDTAB:    .BLKW 66.        ;CALCULATED HEADER WORD TABLE
2034  001726  000102          RHTAB:    .BLKW 66.        ;FILLED AFTER READ HEADER CMD
2035  002132  000102          SRTTAB:   .BLKW 66.        ;ABOVE RHTAB SORTED STARTING FORM
2036                                                     ;SECTOR 0 BY SORT ROUTINE
2037  002336  000400          BSE20H:   .BLKW 256.       ;20 SECTOR HARDWARE BSE INFO
2038  003336  000400          BSE22H:   .BLKW 256.       ;22 SECTOR HARDWARE BSE INFO.
2039  004336  000400          BSE20S:   .BLKW   256.     ;20 SECTOR SOFTWARE BSE INFO.
2040  005336  000400          BSE22S:   .BLKW   256.     ;22 SECTOR SOFTWARE BSE INFO.
2041  006336  000400          RDTAB:    .BLKW 256.       ;FILLED AFTER READ DATA CMD
2042
2043  007336  000000          UNLD:     0                ;SET TO 0 IF HEADS ARE LOADED
2044                                                     ;SET TO 1 IF HEADS UNLOADED
2045  007340  000000          BADHDR:   0                ;SET TO 0 IF FORMATTING OK
2046                                                     ;SET TO 1 IF FORMATTING ALTERED
2047  007342  000000          HPEND:    0                ;SET TO 0 IF HALT NOT PENDING
2048                                                     ;SET TO 1 IF HALT PENDING
2049
2050                                                     ;THE ABOVE 3 FLAGS ARE USED
2051                                                     ;BY 'STOP' ROUTINE TO BRING
2052                                                     ;THE CPU TO A VALID HALT.
2053
2054
2055  007344    001     002     004   ATTN:     .BYTE 1,2,4,10,20,40,100,200    ;ATN 0-7 RESP.
2056  007347    010     020     040
2057  007352    100     200
2058                                    .EVEN
2059
```

```
2060                                    ;
2061                                    ;THE FOLLOWING ARE HOLDING REGISTERS FOR THE RK611 REGISTERS
2062                                    ;THEY ARE LOADED AFTER RDY IS REC'D FROM WRDY ROUTINE.
2063                                    ;
2064
2065   007354   000000                  HCS1:   0                       ;HOLD RKCS1
2066   007356   000000                  HCS2:   0                       ;HOLD RKCS2
2067   007360   000000                  HWC:    0                       ;HOLD RKWC
2068   007362   000000                  HBA:    0                       ;ETC.
2069   007364   000000                  HDA:    0
2070   007366   000000                  HDS:    0
2071   007370   000000                  HER:    0
2072   007372   000000                  HASOF:  0
2073   007374   000000                  HDC:    0
2074   007376   000000                  HDB:    0
2075   007400   000000                  HMR1:   0
2076   007402   000000                  HMR2:   0
2077   007404   000000                  HMR3:   0
2078   007406   000000                  HPOS:   0
2079   007410   000000                  HPAT:   0
2080
2081
2082   007412   000000                  TEMP1:  0                       ;TEMPORARY STORAGE.
2083   007414   000000                  TEMP2:  0
2084   007416   000000                  TEMP3:  0
2085   007420   000000                  TEMP4:  0
2086   007422   000000                  TEMP5:  0
2087                                    ;
2088                                    ;THE FOLLOWING ARE HOLDING REGISTERS FOR MSGA(0-3) & MSGB(0-3).
2089                                    ;
2090   007424   000000                  H.A0:   0
2091   007426   000000                  H.B0:   0
2092   007430   000000                  H.A1:   0
2093   007432   000000                  H.B1:   0
2094   007434   000000                  H.A2:   0
2095   007436   000000                  H.B2:   0
2096   007440   000000                  H.A3:   0
2097   007442   000000                  H.B3:   0
2098                                    ;
2099                                    ;THE FOLLOWING ARE 'EXPECTED' REGISTER FOR THE ABOVE.
2100                                    ;
2101   007444   000000                  E.A0:   0
2102   007446   000000                  E.B0:   0
2103   007450   000000                  E.A1:   0
2104   007452   000000                  E.B1:   0
2105   007454   000000                  E.A2:   0
2106   007456   000000                  E.B2:   0
2107   007460   000000                  E.A3:   0
2108   007462   000000                  E.B3:   0
2109                                    ;
2110                                    ;THE FOLLOWING ARE IDENTIFIERS FOR DRIVE MSG WORDS TO BE TESTED.
2111                                    ;
2112            000001                  T.A2=BIT0                       ;TEST MSG A2 IF SET
2113            000002                  T.B2=BIT1
2114            000004                  T.B3=BIT2
2115
```

```
2116
2117                            ;ALL THE FLAGS BELOW ARE CLEARED INITIALLY BY THE CLRFLG ROUTINE.
2118                            ;
2119
2120  007464  000000            DDUMP:  0                       ;FLAG - SET WHEN IN DDP DUMP MODE
2121  007466  000000            DDPCH:  0                       ;FLAG - SET WHEN IN DDP CHAIN MODE
2122  007470  000000            ACT11:  0                       ;FLAG - SET WHEN IN ACT11 MODE OF OPERATION
2123  007472  000000            PPTP:   0                       ;FLAG - SET WHEN PROGRAM LOADED BY PAPER TAPE
2124  007474  000000            DRIVS:  0                       ;CONTAINS THE NUMBER OF DRIVES PRESENT
2125
2126                            ;THE FLAGS BELOW ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
2127                            ;IS PRESENT AND IS TO BE TESTED.
2128
2129  007476  000000            DRIV0:  0                       ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
2130  007500  000000            DRIV1:  0                       ;FOR DRIVE 1
2131  007502  000000            DRIV2:  0                       ;FOR DRIVE 2
2132  007504  000000            DRIV3:  0                       ;FOR DRIVE 3
2133  007506  000000            DRIV4:  0                       ;FOR DRIVE 4
2134  007510  000000            DRIV5:  0                       ;FOR DRIVE 5
2135  007512  000000            DRIV6:  0                       ;FOR DRIVE 6
2136  007514  000000            DRIV7:  0                       ;FOR DRIVE 7
2137
2138  007516  000000            LCLKF:  0                       ;L-CLOCK FLAG PRESENT FLAG
2139  007520  000000            PCLKF:  0                       ;P-CLOCK FLAG PRESENT FLAG
2140  007522  000000            DOTIM:  0                       ;SET IF EITHER CLOCK PRESENT FOR TIMING TESTS.
2141  007524  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


007526                          $ERRTB:

                                ;ERROR 1
007526  046213                          EM2                     ;DR # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RkMR2
007530  051647                          DH1
007532  053732                          DT1
007534  054534                          DF1

                                ;ERROR 2
007536  046432                          EM5                     ;DETECTED MDS
007540  051647                          DH1
007542  053732                          DT1
007544  054534                          DF1

                                ;ERROR 3
007546  046453                          EM6                     ;DETECTED UFE
007550  051647                          DH1
007552  053732                          DT1
007554  054534                          DF1

                                ;ERROR 4
007556  046474                          EM7                     ;DETECTED DRA & NED RESET (WRONG PORT SELECTED?)
007560  051647                          DH1
007562  053732                          DT1
007564  054534                          DF1
                                ;ERROR 5
007566  000000                          0
007570  000000                          0
007572  000000                          0
007574  000000                          0

                                ;ERROR 6
007576  046637                          EM9                     ;DR NOT PRESENT BUT SPECIFIED BY OPERATOR
007600  051647                          DH1
007602  053732                          DT1
007604  054534                          DF1

                                ;ERROR 7
007606  046713                          EM10                    ;ABORT TEST, COULD NOT REFERENCE CONTROLLER REGISTER
007610  051647                          DH1
007612  053732                          DT1
007614  054534                          DF1
```

```
2198
2199                                    ;ERROR 10
2200  007616  046776                            EM11            ;DRA & NED BOTH SET
2201  007620  051647                            DH1
2202  007622  053732                            DT1
2203  007624  054534                            DF1
2204                                    ;ERR 11
2205  007626  047042                            EM12            ;NO RDY
2206  007630  052632                            DH27            ;AFTER WRITE DATA CMD
2207  007632  053732                            DT1
2208  007634  054664                            DF10
2209                                    ;ERR 12
2210  007636  047436                            EM21            ;CERR SET
2211  007640  052632                            DH27
2212  007642  053732                            DT1
2213  007644  054664                            DF10
2214                                    ;ERR 13
2215  007646  047042                            EM12            ;NO RDY
2216  007650  052602                            DH26            ;AFTER READ DATA CMD
2217  007652  053732                            DT1
2218  007654  054664                            DF10
2219                                    ;ERR 14
2220  007656  047436                            EM21            ;CERR SET
2221  007660  052602                            DH26
2222  007662  053732                            DT1
2223  007664  054664                            DF10
2224                                    ;ERR 15
2225  007666  047042                            EM12            ;NO RDY
2226  007670  052762                            DH32            ;AFTER WRITE CHECK CMD
2227  007672  053732                            DT1
2228  007674  054664                            DF10
2229                                    ;ERR 16
2230  007676  050624                            EM80            ;WRITE CHECK ERROR SET
2231  007700  052762                            DH32            ;AFTER WRITE CHECK CMD
2232  007702  054044                            DT6
2233  007704  054554                            DF3
2234                                    ;ERR 17
2235  007706  050663                            EM81            ;WRITE CHECK CMD NOT FUNCTIONING
2236  007710  053511                            DH52            ;WITH INTENTIONAL MISCOMPARE
2237  007712  053732                            DT1
2238  007714  054664                            DF10
2239                                    ;ERR 20
2240  007716  050727                            EM82            ;READ DATA NOT COMPARE WITH WRITE DATA
2241  007720  052602                            DH26            ;AFTER READ DATA CMD
2242  007722  054044                            DT6
2243  007724  054554                            DF3
2244                                    ;ERR 21
2245  007726  051001                            EM83            ;DATA CHECK ERROR
2246  007730  052602                            DH26
2247  007732  053732                            DT1
2248  007734  054664                            DF10
2249                                    ;ERR 22
2250  007736  047436                            EM21            ;CERR SET
2251  007740  052762                            DH32            ;AFTER WRITE CHECK CMD
2252  007742  053732                            DT1
2253  007744  054664                            DF10
```

```
2254
2255  007746  047353          ;ERR 23
2256  007750  052632                EM18            ;MSG B0 ERROR
2257  007752  054270                DH27            ;AFTER WRITE DATA CMD
2258  007754  055014                DT13
2259                                 DF21
2260  007756  047436          ;ERROR 24
2261  007760  052452                EM21            ;CERR SET
2262  007762  053732                DH21            ;AFTER SCLR
2263  007764  054664                DT1
2264                                 DF10
2265  007766  047415          ;ERR 25
2266  007770  052632                EM20            ;MSG B1 ERROR
2267  007772  054270                DH27
2268  007774  055014                DT13
2269                                 DF21
2270  007776  047353          ;ERR 26
2271  010000  052602                EM18
2272  010002  054270                DH26            ;AFTER READ DATA CMD
2273  010004  055014                DT13
2274                                 DF21
2275
2276  010006  047665          ;ERROR 27
2277  010010  052374                EM24            ;VOL VALID NOT SET
2278  010012  053732                DH19            ;AFTER PACK CMD
2279  010014  054664                DT1
2280                                 DF10
2281  010016  047415          ;ERR 30
2282  010020  052602                EM20            ;MSG B1 ERROR
2283  010022  054270                DH26            ;AFTER READ DATA CMD.
2284  010024  055014                DT13
2285                                 DF21
2286  010026  047353          ;ERR 31
2287  010030  052762                EM18            ;MSG B0 ERROR
2288  010032  054270                DH32            ;AFTER WRITE CHECK CMD
2289  010034  055014                DT13
2290                                 DF21
2291  010036  047415          ;ERR 32
2292  010040  052762                EM20            ;MSG B1 ERROR
2293  010042  054270                DH32
2294  010044  055014                DT13
2295                                 DF21
2296  010046  047042          ;ERR 33
2297  010050  052532                EM12            ;CONTR NOT READY
2298  010052  053732                DH24            ;AFTER OFFSET CMD
2299  010054  054664                DT1
2300                                 DF10
2301  010056  047100          ;ERR 34
2302  010060  052532                EM13            ;NO ATTN
2303  010062  053732                DH24
2304  010064  054664                DT1
2305                                 DF10
2306  010066  047332          ;ERR 35
2307  010070  053545                EM17            ;MSG A0 ERROR
2308  010072  054270                DH53            ;DURING OFFSET COMMAND
2309  010074  055014                DT13
                                     DF21
```

```
2310                                    ;ERR 36
2311   010076  047374                             EM19                    ;MSG A1 ERROR
2312   010100  053545                             DH53
2313   010102  054270                             DT13
2314   010104  055014                             DF21
2315                                    ;ERR 37
2316   010106  047374                             EM19                    ;MSG A1 ERROR
2317   010110  052532                             DH24                    ;AFTER OFFSET CMD
2318   010112  054270                             DT13
2319   010114  055014                             DF21
2320                                    ;ERR 40
```

```
2321  010116  047415                    EM20                    ;MSG B1 ERROR
2322  010120  052532                    DH24
2323  010122  054270                    DT13
2324  010124  055014                    DF21
2325                          ;ERR 41
2326  010126  047122                    EM14                    ;UNEXP MEM PCRITY TRAP
2327  010130  052040                    DH8                     ;TEST #, TRAP PC
2328  010132  053772                    DT3
2329  010134  054550                    DF2
2330                          ;ERR 42
2331  010 _6  050340                    EM41                    ;CYL ADDR IN B2 DID NOT REMAIN CLEARED
2332  010140  052532                    DH24
2333  010142  054350                    DT14
2334  010144  055050                    DF22
2335                          ;ERR 43
2336  010146  051127                    EM85
2337  010150  052500                    DH22
2338  010152  053732                    DT1
2339  010154  054664                    DF10
2340                          ;ERR 44
2341  010156  047160                    EM15                    ;WCE AT CYL 411,TRK 2, SEC 21
2342  010160  051647                    DH1
2343  010162  053732                    DT1
2344  010164  054600                    DF4
2345                          ;ERR 45
2346  010166  051127                    EM85                    ;OFFSET BIT IN RKMR2 CLEARED
2347  010170  053456                    DH51                    ;AFTER SEEK TO SELF
2348  010172  053732                    DT1
2349  010174  054664                    DF10
2350                          ;ERR 46
2351  010176  047720                    EM25                    ;DETECTED 10 BAD SECTORS
2352  010200  052632                    DH27                    ;AFTER WRITE DATA CMD.
2353  010202  053732                    DT1
2354  010204  054664                    DF10
2355                          ;ERROR 47
2356  010206  050233                    EM39                    ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
2357  010210  052350                    DH17                    ;AFTER RECAL CMD
2358  010212  054350                    DT14
2359  010214  055050                    DF22
2360                          ;ERROR 50
2361  010216  050302                    EM40                    ;CYL ADDR IN RKMR3 NOT CLEARED
2362  010220  052350                    DH17                    ;AFTER RECAL COMD
2363  010222  054350                    DT14
2364  010224  055050                    DF22
2365                          ;ERR 51
2366  010226  051271                    EM93                    ;WRONG CYL# IN HEADER WORD (MISPOSITION)
2367  010230  052557                    DH25                    ;AFTER SEEK CMD
2368  010232  054224                    DT9
2369  010234  054770                    DF20
2370                          ;ERR 52
2371  010236  047332                    EM17                    ;MSG A0 ERROR
2372  010240  052632                    DH27                    ;AFTER WRITE DATA CMD
2373  010242  054270                    DT13
2374  010244  055014                    DF21
2375                          ;ERR 53
2376  010246  047374                    EM19                    ;MSG A1 ERROR
```

```
2377  010250  052632                    DH27
2378  010252  054270                    DT13
2379  010254  055014                    DF21
2380                          ;ERR 54
2381  010256  047332                    EM17          ;MSG AO ERROR
2382  010260  052602                    DH26          ;AFTER READ DATA CMD
2383  010262  054270                    DT13
2384  010264  055014                    DF21
2385                          ;ERROR 55
2386  010266  047100                    EM13          ;NO ATTN
2387  010270  052350                    DH17          ;AFTER RECAL CMD
2388  010272  053732                    DT1
2389  010274  054664                    DF10
2390                          ;ERR 56
2391  010276  047374                    EM19          ;MSG A1 ERROR
2392  010300  052602                    DH26
2393  010302  054270                    DT13
2394  010304  055014                    DF21
2395                          ;ERR 57
2396  010306  047332                    EM17          ;MSG AO ERROR
2397  010310  052762                    DH32          ;AFTER WRITE CHECK CMD
2398  010312  054270                    DT13
2399  010314  055014                    DF21
2400                          ;ERR 60
2401  010316  047374                    EM19          ;MSG A1 ERROR
2402  010320  052762                    DH32
2403  010322  054270                    DT13
2404  010324  055014                    DF21
2405                          ;ERR 61
2406  010326  047353                    EM18          ;MSG BO ERROR
2407  010330  053545                    DH53          ;DURING OFFSET CMD
2408  010332  054270                    DT13
2409  010334  055014                    DF21
2410                          ;ERR 62
2411  010336  047415                    EM20          ;MSG B1 ERROR
2412  010340  053545                    DH53
2413  010342  054270                    DT13
2414  010344  055014                    DF21
2415                          ;ERR 63
2416  010346  047772                    EM26          ;BSE ERROR IN WRITE CMD NOT ON BSE TABLE
2417  010350  052632                    DH27          ;AFTER WRITE DATA CMD
2418  010352  053732                    DT1
2419  010354  054664                    DF10
2420                          ;ERR 64
2421  010356  051230                    EM88          ;DID NOT FIND SECTOR 0 FROM INDEX
2422  010360  053573                    DH54          ;AFTER FORMAT CHANGE AND READY REC'D
2423  010362  053732                    DT1
2424  010364  054664                    DF10
2425                          ;ERR 65
2426  010366  050051                    EM27          ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
2427  010370  051647                    DH1
2428  010372  053732                    DT1
2429  010374  054534                    DF1
2430                          ;ERR 66
2431  010376  000000                    0
2432  010400  000000                    0
```

```
2433  010402  000000                    0
2434  010404  000000                    0
2435                          ;ERR 67
2436  010406  000000                    0
2437  010410  000000                    0
2438  010412  000000                    0
2439  010414  000000                    0
2440                          ;ERROR 70
2441  010416  000000                    0
2442  010420  000000                    0
2443  010422  000000                    0
2444  010424  000000                    0
2445                          ;ERR 71
2446  010426  000000                    0
2447  010430  000000                    0
2448  010432  000000                    0
2449  010434  000000                    0
2450                          ;ERROR 72
2451  010436  000000                    0
2452  010440  000000                    0
2453  010442  000000                    0
2454  010444  000000                    0
2455                          ;ERR 73
2456  010446  000000                    0
2457  010450  000000                    0
2458  010452  000000                    0
2459  010454  000000                    0
2460                          ;ERR 74
2461  010456  047100                    EM13          ;NO ATTN
2462  010460  052134                    DH10          ;AT END OF HEAD LOADING
2463  010462  053732                    DT1
2464  010464  054664                    DF10
2465                          ;ERR 75
2466  010466  047460                    EM22          ;NO DRIVS IN $DEVM
2467  010470  051647                    DH1
2468  010472  053732                    DT1
2469  010474  054534                    DF1
2470                          ;ERR 76
2471  010476  047565                    EM23          ;NO DRIVS ON BUSS
2472  010500  051647                    DH1
2473  010502  053732                    DT1
2474  010504  054534                    DF1
2475                          ;ERR 77
2476  010506  000000                    0
2477  010510  000000                    0
2478  010512  000000                    0
2479  010514  000000                    0
2480                          ;ERR 100
2481  010516  000000                    0
2482  010520  000000                    0
2483  010522  000000                    0
2484  010524  000000                    0
2485                          ;ERROR 101
2486  010526  051352                    EM94          ;OFFSET NOT CLEARED
2487  010530  053331                    DH47          ;AFTER READ HEADER WITH MOVEMENT
2488  010532  054350                    DT14
```

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2489  010534  055050                DF22
2490                          ;ERROR 102
2491  010536  051406                EM95          ;FORMAT NOT SET
2492  010540  052632                DH27          ;AFTER WRITE DATA CMD
2493  010542  053732                DT1
2494  010544  05   ,4                DF10
2495                          ;ERR 103
2496  010546  051406                EM95
2497  010550  052762                DH32          ;AFTER WRITE CHECK CMD
2498  010552  053732                DT1
2499  010554  054664                DF10
2500                          ;ERR 104
2501  010556  050233                EM39          ;OFFSET NOT RESET
2502  010560  053671                DH57          ;AFTER WRITE CMD WITH OFFSET
2503  010562  054350                DT14
2504  010564  055050                DF22
2505                          ;ERR 105
2506  010566  050302                EM40          ;CYL ADDR NOT 0
2507  010570  053671                DH57
2508  010572  054350                DT14
2509  010574  055050                DF22
2510                          ;ERR 106
2511  010576  051442                EM96          ;CANNOT FIND SECTOR 23(8)
2512  010600  051647                DH1
2513  010602  053732                DT1
2514  010604  054534                DF1
2515                          ;ERR 107
2516  010606  051473                EM97          ;HEAD SWITCHING TOO LONG
2517  010610  052632                DH27          ;AFTER WRITE DTA CMD
2518  010612  053732                DT1
2519  010614  054724                DF15
2520                          ;ERR 110
2521  010616  000000                0
2522  010620  000000                0
2523  010622  000000                0
2524  010624  000000                0
2525                          ;ERR 111
2526  010626  000000                0
2527  010630  000000                0
2528  010632  000000                0
2529  010634  000000                0
2530                          ;ERR 112
2531  010636  051560                EM100         ;DRIVE OFF TRACK SET
2532  010640  052632                DH27          ;AFTER WRITE DATA CMD
2533  010642  053776                DT4
2534  010644  054640                DF6
2535                          ;ERR 113
2536  010646  050170                EM36          ;CYL ADDR IN RKMR3 INCORRECT
2537  010650  052632                DH27
2538  010652  053776                DT4
2539  010654  054640                DF6
2540                          ;ERROR 114
2541  010656  051172                EM86          ;OFFSET IN A2 NOT = RKASOF
2542  010660  052532                DH24          ;AFTER OFFSET CMD
2543  010662  054350                DT14
2544  010664  055050                DF22
```

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2545
2546  010666  051172                ;ERR 115
2547  010670  052500                        EM86
2548  010672  054350                        DH22                    ;AFTER DRIVE CLEAR CMD
2549  010674  055050                        DT14
2550                                        DF22
2551  010676  047042                ;ERROR 116
2552  010700  052374                        EM12                    ;CONT NOT RDY
2553  010702  053732                        DH19                    ;AFTER PACK CMD
2554  010704  054664                        DT1
2555                                        DF10
2556  010706  047042                ;ERROR 117
2557  010710  052417                        EM12                    ;CONT NOT RDY
2558  010712  053732                        DH20                    ;AFTER SEL DR CMD
2559  010714  054664                        DT1
2560                                        DF10
2561  010716  047042                ;ERROR 120
2562  010720  052452                        EM12
2563  010722  053732                        DH21                    ;AFTER SUBSYS CLEAR
2564  010724  054664                        DT1
2565                                        DF10
2566  010726  047042                ;ERROR 121
2567  010730  052061                        EM12
2568  010732  053732                        DH9                     ;AFTER START SPINDLE CMD
2569  010734  054664                        DT1
2570                                        DF10
2571  010736  051615                ;ERROR 122
2572  010740  052703                        EM101                   ;DID NOT GO TO CYL 10
2573  010742  054350                        DH30                    ;AFTER READ HEADER CMD
2574  010744  055050                        DT14
2575                                        DF22
2576  010746  051172                ;ERROR 123
2577  010750  053456                        EM86                    ;A2 OFFSET NOT = RKASOF
2578  010752  054350                        DH51                    ;AFTER SEEK TO SELF
2579  010754  055050                        DT14
2580                                        DF22
2581  010756  047042                ;ERROR 124
2582  010760  052350                        EM12
2583  010762  053732                        DH.7                    ;AFTER RECAL CMD
2584  010764  054664                        DT1
2585                                        DF10
2586  010766  050535                ;ERR 125
2587  010770  051036                        EM73                    ;CTO SET
2588  010772  053732                        EM84                    ;WHILE WAITING FOR OR REC'D CONTR RDY. MSG A&B BAD
2589  010774  054614                        DT1
2590                                        DF5
2591  010776  050603                ;ERR 126
2592  011000  051036                        EM79                    ;NED SET
2593  011002  053732                        EM84
2594  011004  054614                        DT1
2595                                        DF5
2596  011006  046432                ;ERR 127
2597  011010  051036                        EM5                     ;MDS SET
2598  011012  053732                        EM84
2599  011014  054614                        DT1
2600                                        DF5
                                    ;ERROR 130
```

```
2601  011016  000000                    0
2602  011020  000000                    0
2603  011022  000000                    0
2604  011024  000000                    0
2605                          ;ERROR 131
2606  011026  047042                    EM12          ;NO RDY
2607  011030  052557                    DH25          ;AFTER SEEK CMD
2608  011032  053732                    DT1
2609  011034  054664                    DF10
2610                          ;ERROR 132
2611  011036  047100                    EM13          ;NO ATTN
2612  011040  052557                    DH25
2613  011042  053732                    DT1
2614  011044  054664                    DF10
2615                          ;ERROR 133
2616  011046  000000                    0
2617  011050  000000                    0
2618  011052  000000                    0
2619  011054  000000                    0
2620                          ;ERROR 134
2621  011056  000000                    0
2622  011060  000000                    0
2623  011062  000000                    0
2624  011064  000000                    0
2625                          ;ERROR 135
2626  011066  000000                    0
2627  011070  000000                    0
2628  011072  000000                    0
2629  011074  000000                    0
2630                          ;ERROR 136
2631  011076  000000                    0
2632  011100  000000                    0
2633  011102  000000                    0
2634  011104  000000                    0
2635                          ;ERROR 137
2636  011106  050233                    EM39          ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
2637  011110  052557                    DH25
2638  011112  053732                    DT1
2639  011114  054664                    DF10
2640                          ;ERR 140
2641  011116  047332                    EM17          ;MSG AO ERROR
2642  011120  053456                    DH51          ;AFTER SEEK TO SELF
2643  011122  054270                    DT13
2644  011124  055014                    DF21
2645                          ;ERR 141
2646  011126  047353                    EM18
2647  011130  053456                    DH51
2648  011132  054270                    DT13
2649  011134  055014                    DF21
2650                          ;ERR 142
2651  011136  047374                    EM19
2652  011140  053456                    DH51
2653  011142  054270                    DT13
2654  011144  055014                    DF21
2655                          ;ERR 143
2656  011146  047415                    EM20
```

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2657  011150  053456                  DH51
2658  011152  054270                  DT13
2659  011154  055014                  DF21
2660                          ;ERROR 144
2661  011156  000000                  0
2662  011160  000000                  0
2663  011162  000000                  0
2664  011164  000000                  0
2665                          ;ERROR 145
2666  011166  000000                  0
2667  011170  000000                  0
2668  011172  000000                  0
2669  011174  000000                  0
2670                          ;ERROR 146
2671  011176  000000                  0
2672  011200  000000                  0
2673  011202  000000                  0
2674  011204  000000                  0
2675                          ;ERROR 147
2676  011206  000000                  0
2677  011210  000000                  0
2678  011212  000000                  0
2679  011214  000000                  0
2680                          ;ERROR 150
2681  011216  000000                  0
2682  011220  000000                  0
2683  011222  000000                  0
2684  011224  000000                  0
2685                          ;ERROR 151
2686  011226  047042                  EM12                    ;NO RDY
2687  011230  052500                  DH22                    ;AFTER CLEAR CMD
2688  011232  053732                  DT1
2689  011234  054664                  DF10
2690                          ;ERROR 152
2691  011236  000000                  0
2692  011240  000000                  0
2693  011242  000000                  0
2694  011244  000000                  0
2695                          ;ERROR 153
2696  011246  000000                  0
2697  011250  000000                  0
2698  011252  000000                  0
2699  011254  000000                  0
2700                          ;ERROR 154
2701  011256  050406                  EM55                    ;ATTN NOT CLEARED
2702  011260  052500                  DH22
2703  011262  053732                  DT1
2704  011264  054664                  DF10
2705                          ;ERROR 155
2706  011266  000000                  0
2707  011270  000000                  0
2708  011272  000000                  0
2709  011274  000000                  0
2710                          ;ERROR 156
2711  011276  000000                  0
2712  011300  000000                  0
```

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2713  011302  000000                    0
2714  011304  000000                    0
2715                          ;ERROR 157
2716  011306  000000                    0
2717  011310  000000                    0
2718  011312  000000                    0
2719  011314  000000                    0
2720                          ;ERROR 160
2721  011316  000000                    0
2722  011320  000000                    0
2723  011322  000000                    0
2724  011324  000000                    0
2725                          ;ERROR 161
2726  011326  000000                    0
2727  011330  000000                    0
2728  011332  000000                    0
2729  011334  000000                    0
2730                          ;ERROR 162
2731  011336  000000                    0
2732  011340  000000                    0
2733  011342  000000                    0
2734  011344  000000                    0
2735                          ;ERROR 163
2736  011346  000000                    0
2737  011350  000000                    0
2738  011352  000000                    0
2739
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2741
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2756
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2759
2760  011354  000000                    0
2761                          ;ERROR 164
2762  011356  000000                    0
2763  011360  000000                    0
2764  011362  000000                    0
2765  011364  000000                    0
2766                          ;ERROR 165
2767  011366  000000                    0
2768  011370  000000                    0
```

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2769  011372  000000                    0
2770  011374  000000                    0
2771                            ;ERROR 166
2772  011376  000000                    0
2773  011400  000000                    0
2774  011402  000000                    0
2775  011404  000000                    0
2776                            ;ERROR 167
2777  011406  000000                    0
2778  011410  000000                    0
2779  011412  000000                    0
2780  011414  000000                    0
2781                            ;ERROR 170
2782  011416  000000                    0
2783  011420  000000                    0
2784  011422  000000                    0
2785  011424  000000                    0
2786                            ;ERROR 171
2787  011426  047042                    EM12                    ;NO RDY
2788  011430  052703                    DH30                    ;AFTER READ HEADER CMD
2789  011432  053732                    DT1
2790  011434  054664                    DF10
2791                            ;ERROR 172
2792  011436  000000                    0
2793  011440  000000                    0
2794  011442  000000                    0
2795  011444  000000                    0
2796                            ;ERROR 173
2797  011446  050441                    EM63                    ;DLT SET
2798  011450  052703                    DH30
2799  011452  053732                    DT1
2800  011454  054724                    DF15
2801                            ;ERROR 174
2802  011456  047436                    EM21                    ;CERR SET
2803  011460  052703                    DH30
2804  011462  053732                    DT1
2805  011464  054724                    DF15
2806                            ;ERROR 175
2807  011466  050233                    EM39                    ;CYL DIFF NOT CLEARED
2808  011470  052134                    DH10                    ;AT END OF HEAD LOADING
2809  011472  053732                    DT1
2810  011474  054664                    DF10
2811                            ;ERROR 176
2812  011476  050302                    EM40                    ;CYL ADDR NOT CLEARED.
2813  011500  052134                    DH10
2814  011502  053732                    DT1
2815  011504  054664                    DF10
2816                            ;ERROR 177
2817  011506  000000                    0
2818  011510  000000                    0
2819  011512  000000                    0
2820  011514  000000                    0
2821                            ;ERROR 200
2822  011516  047042                    EM12                    ;NO RDY
2823  011520  053014                    DH39                    ;AFTER WRITE HEADER CMD
2824  011522  053732                    DT1
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2825  011524  054724                        DF15
2826                          ;ERROR 201
2827  011526  047436                        EM21                    ;CERR SET
2828  011530  053014                        DH39
2829  011532  053732                        DT1
2830  011534  054724                        DF15
2831                          ;ERROR 202
2832  011536  050462                        EM65                    ;READ HEADER ERROR
2833  011540  051647                        DH1
2834  011542  054110                        DT7
2835  011544  054704                        DF14
2836                          ,ERROR 203
2837  011546  000000                        0
2838  011550  000000                        0
2839  011552  000000                        0
2840  011554  000000                        0
2841                          ;ERROR 204
2842  011556  000000                        0
2843  011560  000000                        0
2844  011562  000000                        0
2845  011564  000000                        0
2846                          ;ERROR 205
2847  011566  000000                        0
2848  011570  000000                        0
2849  011572  000000                        0
2850  011574  000000                        0
2851                          ;ERROR 206
2852  011576  000000                        0
2853  011600  000000                        0
2854  011602  000000                        0
2855  011604  000000                        0
2856                          ;ERROR 207
2857  011606  050170                        EM36                    ;CYL ADDR IN RKMR3 INCORRECT
2858  011610  052557                        DH25                    ;AFTER SEEK CMD
2859  011612  053776                        DT4
2860  011614  054640                        DF6
2861                          ;ERROR 210
2862  011616  047436                        EM21                    ;CERR SET
2863  011620  052557                        DH25
2864  011622  053732                        DT1
2865  011624  054664                        DF10
2866                          ;ERROR 211
2867  011626  000000                        0
2868  011630  000000                        0
2869  011632  000000                        0
2870  011634  000000                        0
2871                          ;ERROR 212
2872  011636  000000                        0
2873  011640  000000                        0
2874  011642  000000                        0
2875  011644  000000                        0
2876                          ;ERROR 213
2877  011646  000000                        0
2878  011650  000000                        0
2879  011652  000000                        0
2880  011654  000000                        0
```

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2881                                    ;ERROR 214
2882  011656  000000                            0
2883  011660  000000                            0
2884  011662  000000                            0
2885  011664  000000                            0
2886                                    ;ERROR 215
2887  011666  000000                            0
2888  011670  000000                            0
2889  011672  000000                            0
2890  011674  000000                            0
2891                                    ;ERROR 216
2892  011676  000000                            0
2893  011700  000000                            0
2894  011702  000000                            0
2895  011704  000000                            0
2896                                    ;ERROR 217
2897  011706  000000                            0
2898  011710  000000                            0
2899  011712  000000                            0
2900  011714  000000                            0
2901                                    ;ERROR 220
2902  011716  000000                            0
2903  011720  000000                            0
2904  011722  000000                            0
2905  011724  000000                            0
2906                                    ;ERROR 221
2907  011726  047332                            EM17                    ;MSG A0 ERROR
2908  011730  052350                            DH17
2909  011732  054270                            DT13
2910  011734  055014                            DF21
2911                                    ;ERROR 222
2912  011736  047374                            EM19                    ;MSG A1 ERROR
2913  011740  052350                            DH17
2914  011742  054270                            DT13
2915  011744  055014                            DF21
2916                                    ;ERROR 223
2917  011746  000000                            0
2918  011750  000000                            0
2919  011752  000000                            0
2920  011754  000000                            0
2921                                    ;ERROR 224
2922  011756  000000                            0
2923  011760  000000                            0
2924  011762  000000                            0
2925  011764  000000                            0
2926                                    ;ERROR 225
2927  011766  000000                            0
2928  011770  000000                            0
2929  011772  000000                            0
2930  011774  000000                            0
2931                                    ;ERROR 226
2932  011776  047042                            EM12                    ;NO RDY
2933  012000  052602                            DH26                    ;AFTER READ DATA CMD
2934  012002  053732                            DT1
2935  012004  054664                            DF10
2936                                    ;ERROR 227
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2937  012006  047436                    EM21                    ;CERP SET
2938  012010  052602                    DH26
2939  012012  053732                    DT1
2940  012014  054724                    DF15
2941                            ;ERROR 230
2942  012016  047267                    EM16                    ;CANNOT READ BSE INFO
2943  012020  052200                    DH13                    ;ON SEC 10, 12, 14, 16, 18, 20
2944  012022  053732                    DT1
2945  012024  054744                    DF17
2946                            ;ERROR 231
2947  012026  047267                    EM16
2948  012030  052264                    DH14                    ;ON SEC 11, 13, 15, 17, 19, 21
2949  012032  053732                    DT1
2950  012034  054744                    DF17
2951                            ;ERROR 232
2952  012036  000000                    0
2953  012040  000000                    0
2954  012042  000000                    0
2955  012044  000000                    0
2956                            ;ERROR 233
2957  012046  047267                    EM16                    ;CANNOT READ BSE INFO
2958  012050  053130                    DH42                    ;ON SECT 0,2,4,6,8
2959  012052  053732                    DT1
2960  012054  054744                    DF17
2961                            ;ERROR 234
2962  012056  047267                    EM16
2963  012060  053201                    DH43                    ;ON SECT 1,3,5,7,9
2964  012062  053732                    DT1
2965  012064  054744                    DF17
2966                            ;ERROR 235
2967  012066  050504                    EM69                    ;ALIGN CARTRIDGE USED
2968  012070  053252                    DH44                    ;WILL BYPASS FORMAT & ALL R/W TESTS
2969  012072  053732                    DT1
2970  012074  054664                    DF10
2971                            ;ERROR 236
2972  012076  000000                    0
2973  012100  000000                    0
2974  012102  000000                    0
2975  012104  000000                    0
2976                            ;ERROR 237
2977  012106  000000                    0
2978  012110  000000                    0
2979  012112  000000                    0
2980  012114  000000                    0
2981                            ;ERROR 240
2982  012116  000000                    0
2983  012120  000000                    0
2984  012122  000000                    0
2985  012124  000000                    0
2986                            ;ERROR 241
2987  012126  000000                    0
2988  012130  000000                    0
2989  012132  000000                    0
2990  012134  000000                    0
2991                            ;ERROR 242
2992  012136  000000                    0
```

```
2993  012140  000000                    0
2994  012142  000000                    0
2995  012144  000000                    0
2996
2997                              ;ERROR 243
2998  012146  050170                    EM36                ;CYL ADDR IN RKMR3 INCORRECT
2999  012150  052557                    DH25                ;AFTER SEEK CMD
3000  012152  054156                    DT8
3001  012154  054640                    DF6
3002                              ;ERR 244
3003  012156  050556                    EM74                ;RTZ NOT SET
3004  012160  053103                    DH41                ;DURING RECAL CMD
3005  012162  053732                    DT1
3006  012164  054664                    DF10
3007                              ;ERR 245
3008  012166  000000                    0
3009  012170  000000                    0
3010  012172  000000                    0
3011  012174  000000                    0
3012                              ;ERR 246
3013  012176  000000                    0
3014  012200  000000                    0
3015  012202  000000                    0
3016  012204  000000                    0
3017                              ;ERR 247
3018  012206  000000                    0
3019  012210  000000                    0
3020  012212  000000                    0
3021  012214  000000                    0
3022                              ;ERR 250
3023  012216  000000                    0
3024  012220  000000                    0
3025  012222  000000                    0
3026  012224  000000                    0
3027                              ;ERR 251
3028  012226  000000                    0
3029  012230  000000                    0
3030  012232  000000                    0
3031  012234  000000                    0
3032                              ;ERR 252
3033  012236  000000                    0
3034  012240  000000                    0
3035  012242  000000                    0
3036  012244  000000                    0
3037                              ;ERR 253
3038  012246  000000                    0
3039  012250  000000                    0
3040  012252  000000                    0
3041  012254  000000                    0
3042                              ;ERR 254
3043  012256  000000                    0
3044  012260  000000                    0
3045  012262  000000                    0
3046  012264  000000                    0
3047                              ;ERR 255
3048  012266  000000                    0
```

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3049  012270  000000                    0
3050  012272  000000                    0
3051  012274  000000                    0
3052                          ;ERR 256
3053  012276  000000                    0
3054  012300  000000                    0
3055  012302  000000                    0
3056  012304  000000                    0
3057                          ;ERR 257
3058  012306  000000                    0
3059  012310  000000                    0
3060  012312  000000                    0
3061  012314  000000                    0
3062                          ;ERR 260
3063  012316  047332                    EM17                ;MSG A0 ERROR
3064  012320  052532                    DH24                ;AFTER OFFSET CMD
3065  012322  054270                    DT13
3066  012324  055014                    DF21
3067                          ;ERR 261
3068  012326  047353                    EM18                ;MSG B0 ERROR
3069  012330  052532                    DH24
3070  012332  054270                    DT13
3071  012334  055014                    DF21
3072                          ;ERR 262
3073  012336  000000                    0
3074  012340  000000                    0
3075  012342  000000                    0
3076  012344  000000                    0
3077                          ;ERR 263
3078  012346  000000                    0
3079  012350  000000                    0
3080  012352  000000                    0
3081  012354  000000                    0
3082                          ;ERR 264
3083  012356  000000                    0
3084  012360  000000                    0
3085  012362  000000                    0
3086  012364  000000                    0
3087                          ;ERR 265
3088  012366  047353                    EM18                ;MSG B0 ERROR
3089  012370  052500                    DH22                ;AFTER DRIVE CLEAR CMD
3090  012372  054270                    DT13
3091  012374  055014                    DF21
3092                          ;ERR 266
3093  012376  047415                    EM20                ;MSG B1 ERROR
3094  012400  052500                    DH22
3095  012402  054270                    DT13
3096  012404  055014                    DF21
3097                          ;ERR 267
3098  012406  047353                    EM18                ;MSG B0 ERROR
3099  012410  053014                    DH39                ;AFTER WRITE HEADER CMD
3100  012412  054270                    DT13
3101  012414  055014                    DF21
3102                          ;ERR 270
3103  012416  047415                    EM20                ;MSG B1 ERROR
3104  012420  053014                    DH39
```

```
3105  012422  054270                    DT13
3106  012424  055014                    DF21
3107                          ;ERR 271
3108  012426  047353                    EM18
3109  012430  052703                    DH30          ;AFTER RD. HDR. CMD.
3110  012432  054270                    DT13
3111  012434  055014                    DF21
3112                          ;ERR 272
3113  012436  047415                    EM20
3114  012440  052703                    DH30
3115  012442  054270                    DT13
3116  012444  055014                    DF21
3117                          ;ERR 273
3118  012446  047332                    EM17          ;MSG A0 ERROR
3119  012450  052500                    DH22          ;AFTER DRV CLR CMD
3120  012452  054270                    DT13
312.  012454  055014                    DF21
3122                          ;ERR 274
3123  012456  047374                    EM19          ;MSG A1 ERROR
3124  012460  052500                    DH22
3125  012462  054270                    DT13
3126  012464  055014                    DF21
3127                          ;ERR 275
3128  012466  047353                    EM18          ;MSG B0 ERROR
3129  012470  052350                    DH17          ;AFTER RECAL CMD
3130  012472  054270                    DT13
3131  012474  055014                    DF21
3132                          ;ERR 276
3133  012476  047415                    EM20          ;MSG B1 ERROR
3134  012500  052350                    DH17
3135  012502  054270                    DT13
3136  012504  055014                    DF21
3137                          ;ERR 277
3138  012506  047332                    EM17          ;MSG A0 ERROR
3139  012510  053014                    DH39          ;AFTER WRITE HEADER CMD
3140  012512  054270                    DT13
3141  012514  055014                    DF21
3142                          ;ERR 300
3143  012516  047374                    EM19          ;MSG A1 ERROR
3144  012520  053014                    DH39
3145  012522  054270                    DT13
3146  012524  055014                    DF21
3147                          ;ERR 301
3148  012526  047332                    EM17
3149  012530  052703                    DH30          ;AFT RD HDR. CMD
3150  012532  054270                    DT13
3151  012534  055014                    DF21
3152                          ;ERR 302
3153  012536  047374                    EM19
3154  012540  052703                    DH30
3155  012542  054270                    DT13
3156  012544  055014                    DF21
3157
```

```
                                .SBTTL  PROGRAM SETUP

012546  012737  000001  001336  PARSRT: MOV     #1,PARAM        ;SET FLAG FOR 220 START
012554  000402                  BR      PRGSRT          ;START PROGRAM

012556  005037  001336          START:  CLR     PARAM           ;CLEAR FOR 200 START
012562  000005                  PRGSRT: RESET                   ;CLEAR ALL INT ENABLE & INIT
012564  012706  001100                  MOV     #STACK,SP       ;SETUP STACK POINTER
012570  012746  000000                  MOV     #PR0,-(SP)      ;PSW LOADED TO BE
012574  012746  012602                  MOV     #1$,-(SP)       ;LSI-11 COMPATABLE
012600  000002                  1$:     RTI                     ;ENABLE ALL INTERRUPTS

012602  004737  041112          1$:     JSR     PC,$TKINT       ;SETUP KB VECTOR ADDR, PRIORITY 4
                                                                ;& TURN ON KB INTERRUPT

                                        ;*** CPU PRIORITY LEVEL NOW AT 0 ***
                                        ;*** ANY DEVICE WHICH SETS ITS   ***
                                        ;*** INTERRUPT ENABLE BIT WILL   ***
                                        ;*** SERVICED.                   ***

                                        ;CLOCK INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 6 (IN 'ST5')
                                        ;RK06 CONTROLLER INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 5 IN 'SETINT')
                                        ;KEYBOARD INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 4 (SEE ABOVE)

                                        ;ALL 'SYSMAC' TRAPS WILL CHANGE CPU PRIORITY TO LEVEL 7 (SEE BELOW)

                                                                ;SYSMAC 'SETUP'
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
012606  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
012612  005026                  1$:     CLR     (R6)+           ;;CLEAR MEMORY LOCATION
012614  022706  001140                  CMP     #SWR,R6 ;;DONE?
012620  001374                          BNE     .-6             ;;LOOP BACK IF NO
012622  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
012626  012737  037220  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
012634  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
012642  012737  037500  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
012650  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
012656  012737  043330  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
012664  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
012672  012737  036754  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
012700  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
012706  013737  031546  031540          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
012714  005037  001174                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
012720  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
012724  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
012732  012737  012732  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
012740  012737  012740  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
012746  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
012752  012737  013006  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
012760  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
```

```
3214  012766  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
3215  012774  022777  177777  166136          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
3216  013002  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
3217                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
3218  013004  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
3219  013006  012716  013014          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
3220  013012  000002                          RTI
3221  013014  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
3222  013022  012737  000174  001142          MOV     #DISPREG,DISPLAY
3223  013030  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
3224
3225  013034  005037  001216                  CLR     $PASS           ;;CLEAR PASS COUNT
3226  013040  132737  000200  001231          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
3227  013046  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
3228  013050  012737  001232  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
3229  013056                          67$:
3230  013056  012737  013122  000004  MEMPAR: MOV     #1$,ERRVEC      ;SETUP TIMEOUT VECTOR
3231  013064  012737  000340  000006          MOV     #PR7,ERRVEC+2
3232
3233  013072  012701  172100                  MOV     #MEMBAS,R1      ;ADDR OF MEM CSR
3234  013076  005011                  3$:     CLR     (R1)            ;SEE IF CAN REFERENCE
3235  013100  012711  000001                  MOV     #1,(R1)         ;SET ENABLE BIT IF YES
3236  013104  012737  036656  000114          MOV     #MEMERR,MEMVEC  ;LOAD VECTOR IF NO TIMEOUT
3237  013112  012737  000340  000116          MOV     #PR7,MEMVEC+2
3238  013120  000401                          BR      2$
3239
3240  013122  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJ STACK
3241  013124  062701  000002          2$:     ADD     #2,R1           ;TRY NEXT CSR
3242  013130  020127  172140                  CMP     R1,#MEMBAS+40   ;SEE IF TRIED ALL
3243  013134  001360                          BNE     3$              ;BR IF NO
3244  013136  012737  000006  000004          MOV     #ERRVEC+2,ERRVEC        ;RESTORE TRAP CATCHER
3245  013144  005037  000006                  CLR     ERRVEC+2
3246
3247  013150  004737  031666                  JSR     PC,CLRFLG       ;CLEAR DDUMP THRU SIZFLG
3248  013154  005037  001220                  CLR     $DEVCT
3249  013160  005037  001222                  CLR     $UNIT
3250
3251                                  ;
3252                                  ;FIND OUT IF XXDP, ACT, APT; CHAIN OR DUMP MODE
3253                                  ;
3254
3255  013164  005737  000042          START1: TST     42
3256  013170  001015                          BNE     1$              ;BR IF AUTO
3257  013172  004737  031706                  JSR     PC,TITLE        ;MANUAL, TYPE PROG ID
3258  013176  123727  000041  000013          CMPB    41,#13          ;13=LOADED BY XXDP
3259  013204  001011                          BNE     2$
3260  013206  005237  007464                  INC     DDUMP           ;SET RK06 DUMP MODE FLAG
3261  013212  104401  044307                  TYPE    ,MSG2           ;REPLACE DRO PACK W/SCRATCH & DO<CR>
3262  013216  000000                          HALT                    ;HALT
3263  013220  000137  013234                  JMP     ST2
3264  013224  000137  013300          1$:     JMP     ST3
3265  013230  005237  007472          2$:     INC     PPTP            ;SET ACT/APT/PTP DUMP MODE FLAG
3266
3267                                  ;
3268                                  ;CHECK IF ALL PARAMETERS DEFAULTED.  IF NOT, BEGIN INPUT DIALOGUE
3269                                  ;WITH OPERATOR.  THE REPLY TO 'DRIVES TO BE TESTED' SHOULD BE
```

```
3270                                    ;DRIVE NOS.  SEPERATED BY COMMAS & TERMINATED BY <CR>
3271                                    ;       EX:     DRIVES TO BE TESTED:  1,2,4<CR>
3272                                    ;
3273
3274  013234  005737  001336      ST2:    TST     PARAM
3275  013240  001002                       BNE     1$              ;BR IF 220 START
3276  013242  000137  013332               JMP     ST4             ;200 START, DEFAULT & SIZE THE BUSS
3277  013246  104401  044370      1$:     TYPE    ,MSG3           ;DRIVES TO BE TESTED
3278  013252  004737  031766              JSR     PC,GDRVS        ;GET DR NOS.
3279  013256  104401  044422              TYPE    ,MSG4           ;BUSS ADDR
3280  013262  004737  032126              JSR     PC,GBA          ;GET BA
3281  013266  104401  044467              TYPE    ,MSG5           ;CONT INT VECTOR
3282  013272  004737  032154              JSR     PC,GINT         ;GET INT VECTOR
3283  013276  000427                       BR      ST5
3284
3285                                    ;
3286                                    ;AUTO MODE
3287                                    ;CHECK IF LOADED BY XXDP OR OTHER.  SET FLAGS & NO INPUT DIALOGUE.
3288                                    ;DEFAULT ALL PARAMETERS.  TEST ONLY THOSE DRIVES THAT ARE READY
3289                                    ;ON THE BUSS
3290                                    ;
3291
3292  013300  123727  000041  000013  ST3:    CMPB    41,#13          ;13=LOADED BY XXDP
3293  013306  001007                       BNE     1$
3294  013310  005237  007466              INC     DDPCH           ;SET RK06 CHAIN MODE FLAG
3295  013314  004737  031706              JSR     PC,TITLE
3296  013320  104401  044604              TYPE    ,MSG7           ;DRO NOT TSTD
3297  013324  000402                       BR      ST4
3298  013326  005237  007470      1$:     INC     ACT11           ;SET ACT AUTO FLAG.
3299
3300  013332  012737  177440  001264  ST4:    MOV     #177440,$BASE   ;DEFAULT VALUE
3301  013340  012737  000210  001314          MOV     #210,RKVEC      ;DEFAULT VALUE
3302  013346  004737  032206              JSR     PC,SETINT
3303  013352  005237  007524              INC     SIZFLG          ;DO "SIZE THE BUSS" TEST
3304
3305  013356  005037  007336      ST5:    CLR     UNLD            ;INITIALIZE FLAGS
3306  013362  005037  007340              CLR     BADHDR          ;USED IN 'STOP' ROUTINE
3307  013366  005037  007342              CLR     HPEND           ;FOR VALID PROGRAM HALTS
3308  013372  005037  001176              CLR     $ESCAPE
3309  013376  005037  001170              CLR     $TMP4           ;CLEAR RK07 FLAG
3310  013402  012737  007476  001342      MOV     #DRIV0,DRVPTR   ;SETUP
3311  013410  005037  001220              CLR     $DEVCT          ;NO. OF DRVS DONE
3312  013414  005037  001222              CLR     $UNIT           ;CURRENT DRV UNDER TEST
3313  013420  012737  013466  000004      MOV     #1$,ERRVEC      ;SETUP TIMEOUT ERROR VECTOR
3314  013426  005777  165674              TST     @LKS            ;SEE IF L-CLOCK THERE
3315  013432  005237  007516              INC     LCLKF           ;PRESENT, SET FLAG.
3316  013436  013700  001330              MOV     LCVEC,R0        ;VECTOR ADDR
3317  013442  012737  013530  000004      MOV     #2$,ERRVEC
3318  013450  005777  165644              TST     @PKS            ;SEE IF P-CLOCK THERE
3319  013454  005237  007520              INC     PCLKF           ;PRESENT, SET FLAG
3320  013460  013700  001332              MOV     PCVEC,R0        ;VECTOR ADDR
3321  013464  000412                       BR      3$
3322
3323  013466  022626              1$:     CMP     (SP)+,(SP)+     ;L-CLOCK NOT THERE, CLEAR STACK
3324  013470  012737  013534  000004      MOV     #4$,ERRVEC
3325  013476  005777  165616              TST     @PKS            ;SEE IF P-CLOCK THERE
```

```
3326  013502  005237  007520          INC     PCLKF           ;PRESENT, SET FLAG
3327  013506  013700  001332          MOV     PCVEC,R0        ;VECTOR ADDR
3328  013512  005237  007522    3$:   INC     DOTIM           ;INDICATES TIMING TESTS CAN BE DONE
3329  013516  012720  036100          MOV     #CLOCK,(R0)+    ;SERVICE ROUTINE FOR CLOCKS
3330  013522  012710  000300          MOV     #PR6,(R0)
3331  013526  000407                  BR      TST1            ;;GO TO NEXT TEST
3332
3333  013530  022626            2$:   CMP     (SP)+,(SP)+     ;P-CLOCK NOT THERE, CLEAR STACK
3334  013532  000767                  BR      3$
3335
3336  013534  022626            4$:   CMP     (SP)+,(SP)+     ;NEITHER CLOCK THERE, CLEAR STACK
3337  013536  005037  007522          CLR     DOTIM           ;TIMING TESTS CANNOT BE DONE.
3338  013542  104401  045145          TYPE    .MSG13          ;HEAD SW. TEST BYP SSED
3339
3340
```

```
                                        .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'
                                        ;*
                                        ;;*****************************************************************
013546  000004                  TST1:   SCOPE
013550  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
013556  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
013562  012746  000000                  MOV     #PR0,-(SP)      ;RESET PSW TO PRIORITY 0
013566  012746  013574                  MOV     #5$,-(SP)       ;& MAKE IT LSI COMPATABLE
013572  000002                          RTI
013574                          5$:
```

```
  3362  013574  012737  013720  000004          MOV     #1$,ERRVEC      ;SETUP TIMOUT ERROR VECTOR
```

```
3363  013602  013705  001264                  MOV     $BASE,R5        ;SETUP INDEX REG.
3364  013606  005765  000000                  TST     RKCS1(R5)       ;REFERENCE ALL THE
3365  013612  005765  000010                  TST     RKCS2(R5)       ;CONTROLLER REGISTERS
3366  013616  005765  000002                  TST     RKWC(R5)
3367  013622  005765  000004                  TST     RKBA(R5)
3368  013626  005765  000006                  TST     RKDA(R5)
3369  013632  005765  000012                  TST     RKDS(R5)        ;TIMEOUTS IN THIS SECTION
3370  013636  005765  000014                  TST     RKER(R5)        ;INDICATE THAT THE CONTROLLER
3371  013642  005765  000016                  TST     RKASOF(R5)      ;REGISTERS CANNOT BE READ.
3372  013646  005765  000020                  TST     RKDC(R5)        ;TESTING SHOULD NOT PROCEED
3373  013652  005765  000024                  TST     RKDB(R5)        ;UNTIL THIS IS REMEDIED.
3374  013656  005765  000026                  TST     RKMR1(R5)
3375  013662  005765  000034                  TST     RKMR2(R5)
3376  013666  005765  000036                  TST     RKMR3(R5)
3377  013672  005765  000030                  TST     RKECPS(R5)
3378  013676  005765  000032                  TST     RKECPT(R5)
3379
3380  013702  012737  036570  000004          MOV     #BADTMO,ERRVEC  ;SETUP TIMEOUT HANDLER
3381  013710  012737  000340  000006          MOV     #PR7,ERRVEC+2
3382  013716  000404                          BR      TST2            ;;GO TO NEXT TEST
3383
3384  013720  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
3385  013722  104007                          ERROR   7               ;ABORT-COULD NOT REFERENCE CONTROLLER REGISTER
3386  013724  000137  031512                  JMP     $EOP1
3387
3388
3389                          ;;*****************************************************************
3390                          ;*TEST 2         SIZE THE BUSS
3391                          ;*
3392                          ;*      THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
3393                          ;*      EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
3394                          ;*      MANUAL MODE.
3395                          ;*      EVERY DRIVE FROM 0 THRU 7 IS ADDRESSED.
3396                          ;*      CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
3397                          ;*      DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
3398                          ;*      TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
3399                          ;*      MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
3400                          ;*      DICATING THE OTHER PORT IS ACCESSED.
3401                          ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS RK07
3402                          ;*
3403                          ;;*****************************************************************
3404  013730  000004          TST2:   SCOPE
3405  013732  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3406  013740  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3407
3408  013744  005237  001516                  INC     BYPCERR         ;DO NOT TEST CERR IN 'FRDY'
3409
3410
3411  013750  132737  000200  001231          BITB    #BIT7,$ENVM     ;SEE IF USE APT SELECTED DRIVES
3412  013756  001002                          BNE     14$             ;BR IF YES
3413  013760  000137  014100                  JMP     12$             ;ELSE DO NORM SIZING OR VERIFY
3414
3415  013764  104401  044713          14$:    TYPE    ,MSG10          ;WILL TEST DRIVES
3416  013770  005037  007474                  CLR     DRIVS           ;# OF DRIVES PRESENT
3417  013774  005000                          CLR     R0              ;DRV ADDR
3418  013776  012701  007476                  MOV     #DRIV0,R1       ;DRV FLAG
```

```
3419  014002  013702  001266              MOV     $DEVM,R2        ;APT DEVICE MAP
3420
3421  014006  032702  000001      15$:    BIT     #BIT0,R2        ;SEE IF DRV IN DEVICE MAP
3422  014012  001410                      BEQ     16$             ;BR IF NO
3423  014014  005237  007474              INC     DRIVS           ;ELSE INCR DRIVE COUNT
3424  014020  005211                      INC     (R1)            ;& SET DRIVE PRESENT FLAG
3425  014022  104401  001205              TYPE    ,$CRLF
3426  014026  010046                      MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3427                                                              ;;TYPE DRIVE #
3428  014030  104403                      TYPOS                   ;;GO TYPE--OCTAL ASCII
3429  014032     001                      .BYTE   1               ;;TYPE 1 DIGIT(S)
3430  014033     000                      .BYTE   0               ;;SUPPRESS LEADING ZEROS
3431
3432  014034  005721              16$:    TST     (R1)+           ;ADV POINTER TO NEXT FLAG
3433  014036  005200                      INC     R0              ;INC DRIVE #
3434  014040  022700  000010              CMP     #8.,R0          ;ALL 8 TESTED?
3435  014044  001402                      BEQ     17$             ;BR IF YES
3436
3437  014046  006002                      ROR     R2              ;ELSE GET NEXT BIT OFF DEVICE MAP
3438  014050  000756                      BR      15$             ;& TRY AGAIN
3439
3440  014052  005737  007474      17$:    TST     DRIVS           ;SEE IF MORE DRIVES PRESENT
3441  014056  001402                      BEQ     18$             ;BR IF NO
3442  014060  000137  014554              JMP     VERIFY          ;ELSE EXIT TEST & SETUP FOR RK07'S
3443
3444  014064  104075      18$:    ERROR   75              ;NO DRIVES FOUND IN $DEVM
3445  014066  000000              HALT                    ;SETUP CORRECTLY & PRESS 'CONTINUE'
3446  014070  000137  013356      JMP     ST5             ;TO TRY AGAIN
3447  014074  000137  014554      20$:    JMP     VERIFY          ;DO NOT SIZE, GO TO NEXT TEST
3448
3449  014100  012765  000040  000010  12$:    MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3450  014106  013737  001406  007412          MOV     T10,TEMP1       ;SET TIMEOUT
3451  014114  004737  032320              JSR     PC,FRDY         ;FIND RDY
3452  014120  104120                      ERROR   120             ;RDY NOT SET BY END OF SCLR
3453  014122  005737  007524              TST     SIZFLG          ;SIZE BUS?
3454  014126  001762                      BEQ     20$             ;BR IF NO
3455  014130  104401  044713              TYPE    ,MSG10          ;WILL TEST DRIVES
3456  014134  005037  007474              CLR     DRIVS           ;# OF DRIVES PRESENT
3457  014140  005000                      CLR     R0              ;DRV ADDR
3458  014142  012701  007476              MOV     #DRIV0,R1       ;DRV FLAG
3459  014146                      1$:
3460  014146  104415                      SCOP1
3461  014150  012706  001100              MOV     #STACK,SP       ;RESTORE STK PTR
3462
3463  014154  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3464  014162  013737  001406  007412          MOV     T10,TEMP1       ;SET TIMEOUT
3465  014170  004737  032320              JSR     PC,FRDY         ;FIND RDY
3466  014174  104120                      ERROR   120             ;RDY NOT SET BY END OF SCLR
3467  014176  010065  000010              MOV     R0,RKCS2(R5)    ;SELECT THE DRIVE ADDR
3468  014202  012737  000001  007354          MOV     #SELDRV,HCS1
3469  014210  053737  001170  007354          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
3470  014216  013765  007354  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
3471  014224  013737  001420  007412          MOV     T50000,TEMP1
3472  014232  004737  033010              JSR     PC,DLY          ;DO DELAY TO CATCH MDS
3473  014236  013737  001406  007412          MOV     T10,TEMP1
3474  014244  004737  032320              JSR     PC,FRDY         ;FIND RDY
```

```
3475  014250  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
3476  014252  032737  1( 300  007354          BIT     #CERR,HCS1
3477  014260  001052                          BNE     2$
3478  014262  013737  007402  007412          MOV     HMR2,TEMP1
3479  014270  042737  177770  007412          BIC     #^C<DRVMSK>,TEMP1
3480  014276  020037  007412                  CMP     R0,TEMP1        ;S/B SAME
3481  014302  001020                          BNE     3$
3482  014304  005700                          TST     R0
3483  014306  001003                          BNE     4$
3484  014310  005737  007466                  TST     DDPCH           ;SEE IF XXDP CHAIN MODE
3485  014314  001016                          BNE     5$
3486  014316  005237  007474          4$:     INC     DRIVS           ;INC DRIVE COUNT.
3487  014322  005211                          INC     (R1)            ;SET DRIVE PRESENT FLAG
3488  014324  053711  001170                  BIS     $TMP4,(R1)      ;ADD CDT IF RK07
3489  014330  104401  001205                  TYPE    ,$CRLF
3490  014334  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3491                                                                  ;;TYPE DR #
3492  014336  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3493  014340     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3494  014341     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3495  014342  000403                          BR      5$
3496
3497  014344  004737  033026          3$:     JSR     PC,BYP          ;TYPE BYPASS DR #
3498  014350  104001                          ERROR   1               ;WRITTEN DR # DOES NOT MATCH RKMR2 DR #
3499
3500  014352  005721                  5$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR. FLAG
3501  014354  005200                          INC     R0              ;INC DR #
3502  014356  005037  001170                  CLR     $TMP4           ;CLEAR RK07 FLAG
3503  014362  022700  000010                  CMP     #8.,R0
3504  014366  001267                          BNE     1$              ;MORE LEFT.
3505  014370  005737  007474                  TST     DRIVS
3506  014374  001065                          BNE     10$
3507  014376  104076                          ERROR   76              ;NO DRIVES FOUND ON BUSS
3508  014400  000000                          HALT                    ;SETUP CORRECTLY
3509  014402  000137  013356                  JMP     ST5             ;AND PRESS 'CONTINUE'
3510  014406  032737  000040  007370  2$:     BIT     #DTYE,HER
3511  014414  001405                          BEQ     13$
3512  014416  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
3513  014424  000137  014146                  JMP     1$              ;TRY AGAIN
3514
3515  014430  032737  001000  007356  13$:    BIT     #MDS,HCS2
3516  014436  001015                          BNE     6$
3517  014440  032737  000400  007356          BIT     #UFE,HCS2
3518  014446  001015                          BNE     7$
3519  014450  032737  000001  007366          BIT     #DRA,HDS
3520  014456  001015                          BNE     8$
3521  014460  032737  010000  007356          BIT     #NED,HCS2
3522  014466  001424                          BEQ     9$
3523  014470  000730                          BR      5$
3524
3525  014472  004737  033026          6$:     JSR     PC,BYP          ;TYPE BYP DR #
3526  014476  104002                          ERROR   2               ;MDS DETECTED
3527  014500  000724                          BR      5$
3528
3529  014502  004737  033026          7$:     JSR     PC,BYP
3530  014506  104003                          ERROR   3               ;UFE DETECTED
```

```
3531  014510  000720                          BR      5$
3532
3533  014512  032737  010000  007356  8$:     BIT     #NED,HCS2
3534  014520  001676                          BEQ     4$
3535  014522  104401  045266                  TYPE    ,MSG15          ;DRV#
3536  014526  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3537                                                                  ;;TYPE DR#
3538  014530  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3539  014532     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3540  014533     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3541  014534  104010                          ERROR   10              ;DRA & NED BOTH SET
3542  014536  000705                          BR      5$
3543
3544  014540  004737  033026          9$:     JSR     PC,BYP
3545  014544  104004                          ERROR   4               ;NO DRA & NO NED = OTHER PORT SELECTED
3546  014546  000701                          BR      5$
3547  014550  000137  015146          10$:    JMP     NUDRV
3548
3549  014554                          VERIFY:
3550                                  ;;*****************************************************************
3551                                  ;*TEST 3        VERIFY OPERATOR DRIVE SELECTIONS
3552                                  ;*
3553                                  ;*      THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
3554                                  ;*      DEFAULTED.  EVERY DRIVE FROM 0 TO 7 IS ADDRESSED &
3555                                  ;*      CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
3556                                  ;*      PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06.
3557                                  ;*      IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
3558                                  ;*      ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
3559                                  ;*      NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
3560                                  ;*      NED ONLY, IT IS CHECKED AGAINT THE INPUTTED INFOR TO
3561                                  ;*      VERIFY IT WAS NOT SPECIFIED.
3562                                  ;*      IF CERR DUE TO DTYE, THE DRIVE WILL BE TESTED AS AN RK07.
3563                                  ;*
3564                                  ;;*****************************************************************
3565  014554  000004                  TST3:   SCOPE
3566  014556  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3567  014564  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3568  014570  005000                          CLR     R0              ;DRIVE ADDR
3569  014572  012701  007476                  MOV     #DRIV0,R1       ;DRIVE FLAG
3570  014576                          1$:
3571  014576  104415                          SCOP1
3572  014600  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3573
3574  014604  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3575  014612  013737  001406  007412          MOV     T10,TEMP1       ;SET TIME OUT
3576  014620  004737  032320                  JSR     PC,FRDY         ;FIND RDY
3577  014624  104120                          ERROR   120             ;NO RDY AFTER SCLR
3578  014626  010065  000010                  MOV     R0,RKCS2(R5)    ;DRV ADDR
3579  014632  012737  000001  007354          MOV     #SELDRV,HCS1
3580  014640  053737  001170  007354          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
3581  014646  013765  007354  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
3582  014654  013737  001420  007412          MOV     T50000,TEMP1
3583  014662  004737  033010                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
3584  014666  013737  001406  007412          MOV     T10,TEMP1
3585  014674  004737  032320                  JSR     PC,FRDY         ;FIND RDY
3586  014700  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
```

```
3587  014702  032737  100000  007354          BIT     #CERR,HCS1
3588  014710  001036                          BNE     2$
3589  014712  013737  007402  007412          MOV     HMR2,TEMP1
3590  014720  042737  177770  007412          BIC     #^C<DRVMSK>,TEMP1
3591  014726  020037  007412                  CMP     R0,TEMP1        ;S/B SAME
3592  014732  001014                          BNE     3$
3593  014734  005711                  11$:    TST     (R1)
3594  014736  001402                          BEQ     4$
3595  014740  053711  001170                  BIS     $TMP4,(R1)      ;SET CDT IF RK07.
3596  014744  005721                  4$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR FLAG
3597  014746  005200                          INC     R0              ;INC DR#
3598  014750  005037  001170                  CLR     $TMP4           ;CLEAR CDT FOR NEXT DRIVE
3599  014754  022700  000010                  CMP     #8.,R0
3600  014760  001306                          BNE     1$              ;MORE LEFT
3601  014762  000475                          BR      TST4            ;;GO TO NEXT TEST
3602
3603  014764  004737  033026          3$:     JSR     PC,BYP          ;TRY BYPASS DRIVE#
3604  014770  104001                          ERROR   1               ;WRITTEN DR# DOES NOT MATCH RkMR2 DR#
3605  014772  005711                          TST     (R1)
3606  014774  001763                          BEQ     4$              ;BRANCH IF NOT SPEC BY INPUT
3607  014776  005337  007474          12$:    DEC     DRIVS           ;DECREMENT TOTAL DRIVS
3608  015002  005011                          CLR     (R1)            ;CLEAR DRIVE FLAG
3609  015004  000757                          BR      4$
3610
3611  015006  032737  000040  007370  2$:     BIT     #DTYE,HER
3612  015014  001405                          BEQ     13$
3613  015016  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
3614  015024  000137  014576                  JMP     1$              ;TRY AGAIN
3615
3616  015030  032737  001000  007356  13$:    BIT     #MDS,HCS2
3617  015036  001027                          BNE     6$
3618  015040  032737  000400  007356          BIT     #UFE,HCS2
3619  015046  001027                          BNE     7$
3620  015050  032737  000001  007366          BIT     #DRA,HDS
3621  015056  001005                          BNE     8$
3622  015060  032737  010000  007356          BIT     #NED,HCS2
3623  015066  001423                          BEQ     9$
3624  015070  000404                          BR      10$
3625  015072  032737  010000  007356  8$:     BIT     #NED,HCS2
3626  015100  001715                          BEQ     11$
3627  015102  005711                  10$:    TST     (R1)
3628  015104  001717                          BEQ     4$
3629
3630  015106  004737  033026                  JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3631  015112  104006                          ERROR   6
3632  015114  000730                          BR      12$
3633
3634  015116  004737  033026          6$:     JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3635  015122  104002                          ERROR   2               ;MDS DETECTED
3636  015124  000724                          BR      12$
3637
3638  015126  004737  033026          7$:     JSR     PC,BYP
3639  015132  104003                          ERROR   3               ;UFE DETECTED
3640  015134  000720                          BR      12$
3641
3642  015136  004737  033026          9$:     JSR     PC,BYP
```

```
3643  015142  104004                        ERROR   4               ;DRA & NED RESET - OTHER PORT SELECTED
3644  015144  000714                        BR      12$
3645
3646
3647
3648                                        ;
3649                                        ;THIS PART OF THE PROGRAM WILL BE REPEATED FOR EACH
3650                                        ;DRIVE PRESENT
3651                                        ;
3652                                        ;'$UNIT' CONTAINS THE ADDRESS OF THE DRIVE CURRENTLY
3653                                        ;UNDER TEST
3654
3655  015146  005037  001516          NUDRV:  CLR     BYPCERR         ;ENTER HERE FROM LAST TEST
3656                                                                    ;ALLOW CHECKING CERR IN 'FRDY'
3657  015152  005037  001170                  CLR     $TMP4           ;CLEAR RK07 FLAG
3658
3659                                        ;;*************************************** ******************
3660                                        ;*TEST 4         FIND NEXT DRIVE TO BE TESTED
3661                                        ;*
3662                                        ;*      THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
3663                                        ;*      ADDRESS IN '$UNIT' & $TMP4 IS SET TO CDT IF DRIVE IS RK07.
3664                                        ;*      THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
3665                                        ;*      THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.
3666                                        ;*
3667                                        ;;*****************************************************************
3668  015156  000004                    TST4:   SCOPE
3669  015160  012737  000001  001174            MOV     #1,$TIMES       ;;DO 1 ITERATION
3670  015166  012706  001100                    MOV     #STACK,SP       ;RESTORE STK PTR
3671  015172  012737  000004  001214            MOV     #$TN-1,$TESTN
3672  015200  012737  000004  001102            MOV     #$TN-1,$TSTNM
3673
3674  015206  005737  007474                    TST     DRIVS           ;ANY DRIVES PRESENT?
3675  015212  001004                            BNE     4$              ;YES BRANCH
3676  015214  104401  045432                    TYPE    ,MSG27          ;ALL DRIVES TESTED
3677  015220  000137  031512                    JMP     $EOP1           ;NO, GO TO END
3678
3679  015224  013701  001342          4$:       MOV     DRVPTR,R1       ;ADDR OF NEXT DRIVE FLAG
3680  015230  005737  001220                    TST     $DEVCT          ;IS FIRST DRIVE BEING CHECKED
3681  015234  001402                            BEQ     2$              ;YES, BRANCH
3682  015236  005237  001222          1$:       INC     $UNIT           ;INCR DRIVE ADDR TO NEXT DRIVE
3683  015242  005711                  2$:       TST     (R1)            ;IS DRIVE PRESENT?
3684  015244  001002                            BNE     5$              ;BR IF YES
3685  015246  005721                            TST     (R1)+           ;ELSE FIND NEXT DRIVE
3686  015250  000772                            BR      1$
3687  015252  005737  007466          5$:       TST     DDPCH           ;DDP CHAIN MODE?
3688  015256  001405                            BEQ     3$              ;BR IF NO
3689  015260  005737  001222                    TST     $UNIT           ;ELSE SEE IF DRV 0
3690  015264  001002                            BNE     3$              ;BR IF NO
3691  015266  005721                            TST(R1)+                ;ELSE FIND NEXT DRIVE PRESENT
3692  015270  000762                            BR      1$
3693
3694  015272  032721  002000          3$:       BIT     #CDT,(R1)+      ;SEE IF DRIVE UNDER TEST IS RK07
3695  015276  001403                            BEQ     6$              ;BR IF NO
3696  015300  012737  002000  001170            MOV     #CDT,$TMP4      ;ELSE SET RK07 FLAG
3697  015306  010137  001342          6$:       MOV     R1,DRVPTR       ;STORE POINTER TO NEXT DR FLAG
3698  015312  104401  045266                    TYPE    ,MSG15          ;"DRIVE"
```

```
3699  015316  013700  001222          MOV     $UNIT,R0
3700  015322  010046                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3701                                                          ;;DRIVE #
3702  015324  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
3703  015326     001                  .BYTE   1               ;;TYPE 1 DIGIT(S)
3704  015327     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
3705
3706                              ;   TYPE    ,$CRLF
3707
3708  015330  005737  001170          TST     $TMP4           ;SEE IF RK07 UNDER TEST
3709  015334  001017                  BNE     7$              ;BR IF YES
3710  015336  012737  000632  015434  MOV     #632,LC         ;ELSE LOAD RK06 PARAMETERS
3711  015344  005037  015444          CLR     E.DDT
3712  015350  012737  001000  015436  MOV     #1000,MC1
3713  015356  012737  000777  015440  MOV     #777,MASK
3714  015364  012737  160017  015442  MOV     #160017,MASK1
3715  015372  000425                  BR      TST5            ;;GOTO NEXT TEST
3716
3717  015374  012737  001456  015434  7$:     MOV     #1456,LC        ;LOAD RK07 PARAMETERS
3718  015402  012737  000400  015444          MOV     #D.DDT,E.DDT
3719  015410  012737  002000  015436          MOV     #2000,MC1
3720  015416  012737  001777  015440          MOV     #1777,MASK
3721  015424  012737  140017  015442          MOV     #140017,MASK1
3722  015432  000405                  BR      TST5            ;;GOTO NEXT TEST
3723
3724  015434  000000              LC:     0                       ;LAST CYL
3725  015436  000000              MC1:    0                       ;MAJ CYL + 1 SHIFT
3726  015440  000000              MASK:   0
3727  015442  000000              MASK1:  0
3728  015444  000000              E.DDT:  0                       ;EXPECTED DRIVE TYPE TO E.AD
3729
3730  015446                      PFSRT:                          ;ENTER HERE FOR POWER FAIL RESTART
3731                              ;;*********************************************************************
3732                              ;*TEST 5        PRINT DRIVE SERIAL NUMBER
3733                              ;*
3734                              ;*      THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A, WORD 11
3735                              ;*      IN BCD & IS PERFORMED ON THE 1ST PASS ONLY
3736                              ;*
3737                              ;;*********************************************************************
3738  015446  000004              TST5:   SCOPE
3739  015450  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3740  015456  012706  001100          MOV     #STACK,SP       ;RESTORE STK PTR
3741
3742  015462  005737  001216          TST     $PASS
3743  015466  001042                  BNE     TST6            ;;GO TO NEXT IF NOT FIRST PASS
3744  015470  004737  034214          JSR     PC,SUBCLR       ;DO SUBSYS CLEAR
3745  015474  104024                  ERROR   24              ;CERR AFTER SCLR
3746
3747  015476  104401  045300          TYPE    ,MSG16          ;DRIVE SERIAL NO.
3748  015502  012765  000003  000026  MOV     #3,RKMR1(R5)    ;SELECT BYTE 3
3749  015510  004737  033664          JSR     PC,GSTAT        ;GET STATUS
3750  015514  013701  007402          MOV     HMR2,R1         ;GET SERIAL #
3751  015520  012704  042614          MOV     #$OCTVL,R4      ;GET ADDR CHAR BUFF
3752  015524  010446                  MOV     R4,-(SP)        ;STORE ON STACK FOR $SUPRS
3753  015526  012703  000003          MOV     #3,R3           ;SETUP CHAR COUNT
3754  015532  006101                  ROL     R1              ;INITIALIZE BIT POSITIONS
```

```
                        TS      PRINT DRIVE SERIAL NUMBER

3755  015534  006101                    ROL     R1
3756  015536  006101            1$:     ROL     R1              ;GET NEXT 4 BITS
3757  015540  006101                    ROL     R1
3758  015542  006101                    ROL     R1
3759  015544  006101                    ROL     R1
3760  015546  010100                    MOV     R1,R0           ;GET WORKING COPY
3761  015550  042700  177760            BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
3762  015554  052700  000060            BIS     #60,R0          ;CONVERT TO ASCII DIGIT
3763  015560  110024                    MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFF
3764  015562  005303                    DEC     R3
3765  015564  001364                    BNE     1$              ;BR IF ALL 3 CHARS NOT DONE
3766  015566  105014                    CLRB    (R4)            ;ELSE INSERT NULL TERMINATOR
3767
3768  015570  004737  043062            JSR     PC,$SUPRS       ;TYPE
3769                            ;       TYPE    ,$CRLF
3770                            ;       TYPE    ,$CRLF
3771
3772                            ;;**********************************************************************
3773                            ;*TEST 6         SET VV WITH PACK COMMAND
3774                            ;*
3775                            ;*      IF VV IS RESET, THE PACK COMMAND IS USED TO SET IT.
3776                            ;*
3777                            ;;**********************************************************************
3778  015574  000004            TST6:   SCOPE
3779  015576  012737  000001  001174    MOV     #1,$TIMES       ;;DO 1 ITERATION
3780  015604  012706  001100            MOV     #STACK,SP       ;RESTORE STK PTR
3781
3782  015610  004737  034214            JSR     PC,SUBCLR
3783  015614  104024                    ERROR   24              ;CERR AFTER SCLR
3784
3785  015616  032737  000100  007402    BIT     #D.VV,HMR2
3786  015624  001021                    BNE     TST7            ;;GO TO NEXT TEST IF VV SET
3787
3788  015626  104415            SCOP1
3789  015630  012706  001100            MOV     #STACK,SP       ;RESTORE STK PTR
3790
3791  015634  004737  034214            JSR     PC,SUBCLR
3792  015640  104024                    ERROR   24              ;CERR AFTER SCLR
3793
3794  015642  012737  000003  007354    MOV     #PACK,HCS1
3795  015650  004737  032224            JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
3796  015654  104116                    ERROR   116             ;RDY NOT SET AFTER PACK CMD
3797
3798  015656  032737  000100  007402    BIT     #D.VV,HMR2
3799  015664  001001                    BNE     TST7            ;;GO TO NEXT TEST IF VV NOW SET
3800  015666  104027                    ERROR   27              ;PACK DID NOT SET V.V.
3801
3802
3803
3804                            ;;**********************************************************************
3805                            ;*TEST 7         READ & SAVE BAD SECTOR INFO - TYPE PACK SERIAL #
3806                            ;*
3807                            ;*      THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
3808                            ;*      THIS AREA CONTAINS BAD SECTOR INFO WHICH IS WRITTEN BY THE
3809                            ;*      FACTORY DURING MANF.  ALL BAD SECTOR INFO (BSE) WILL BE STORED
3810                            ;*      AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
```

```
                                        ;*
                                        ;*      SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED BAD SEC
                                        ;*      SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE DETECTED
                                        ;*
                                        ;*      SECTORS 1,3,5,7,9 CONTAIN IDENTICAL INFO FOR 20 SECTOR HARDWARE DETECTED BAD SEC
                                        ;*      SECTORS 11,13,15,17,19,21 CONTAIN IDENTICAL INFO FOR 20 SECTOR SOFTWARE DETECTED
                                        ;*
                                        ;*      IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
                                        ;*      IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
                                        ;*      A MESSAGE WILL BE TYPED INDICATING THAT ALL
                                        ;*      FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
                                        ;*      THIS IS DONE SO AS NOT TO DESTROY BSE INFO OR AN ALIGNMENT PACK BY WRITING
                                        ;*
                                        ;*      THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
                                        ;*
                                        ;*************************************************************
015670  000004                  ST7:    SCOPE
015672  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
015700  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR

015704  004737  034214                  JSR     PC,SUBCLR
015710  104024                          ERROR   24              ;CERR AFTER SCLR

015712  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
015720  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
015726  012737  000013  007354          MOV     #RECAL,HCS1
015734  004737  032224                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
015740  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD

015742  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
015750  004737  033664                  JSR     PC,GSTAT
015754  032737  020000  007402          BIT     #D.RTZ,HMR2
015762  001001                          BNE     64$
015764  104244                          ERROR   244             ;RTZ NOT SET DURING RECAL CMD
015766  013737  001406  007414  64$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
015774  004737  032634                  JSR     PC,FATT1        ;FIND ATTN
016000  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD

016002  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
016010  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
016016  012737  000005  007354          MOV     #CLEAR,HCS1
016024  004737  032224                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
016030  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
016032  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
016036  000401                          BR      65$
016040  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
016042                          65$:


016042  004737  034214                  JSR     PC,SUBCLR
016046  104024                          ERROR   24              ;CERR AFTER SCLR

016050  005037  007414                  CLR     TEMP2           ;SECTOR CTR
016054  005037  007416                  CLR     TEMP3           ;0=22 SECTOR HARDWARE DETECTED TABLE
```

```
                                                        ;1=22 SECTOR SOFTWARE DETECTED TABLE
                                                        ;2=20 SECTOR HARDWARE DETECTED TABLE
                                                        ;3=20 SECTOR SOFTWARE DETECTED TABLE
016060  012737  003336  007420        MOV     #BSE22H,TEMP4   ;STORE 22 SECTOR HARDWARE BSE ADDR.
016066  013765  007420  000004        MOV     TEMP4,RKBA(R5)
016074  012737  001000  007422        MOV     #1000,TEMP5     ;TRACK 2, SECTOR 0
016102  013765  007422  000006        MOV     TEMP5,RKDA(R5)

016110  013765  015434  000020  1$:   MOV     LC,RKDC(R5)     ;LAST CYL
016116  012765  177400  000002        MOV     #-256.,RKWC(R5) ;LOAD WORD CT
016124  012737  000021  007354        MOV     #RDDATA,HCS1
016132  004737  032262                JSR     PC,DATCMD       ;DO READ DATA CMD & GET CONTR RDY
016136  104226                        ERROR   226             ;NO RDY AFTER READ DATA CMD
016140  004737  033664                JSR     PC,GSTAT        ;GET FRESH DATA
016144  032737  100000  007354        BIT     #CERR,HCS1
016152  001504                        BEQ     8$
016154  104227                        ERROR   227             ;CERR AFTER READ DATA CMD

016156  012737  010340  007444        MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
016164  005037  007446                CLR     E.B0            ;EXPECTED MSG B0
016170  012737  001720  007450        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
016176  012737  000001  007452        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
016204  005037  007454                CLR     E.A2            ;EXPECTED MSG A2
016210  012737  000002  007456        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
016216  012737  000003  007462        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3

016224  004737  033042                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
016230  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
016232  104054                        ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
016234  104026                        ERROR   26              ;MSH B0 ERROR
016236  104056                        ERROR   56              ;MSG A1 ERROR
016240  104030                        ERROR   30              ;MSG B1 ERROR

016242  004737  034214                JSR     PC,SUBCLR
016246  104024                        ERROR   24              ;CERR AFTER SUBCLR

016250  005237  007414                INC     TEMP2
016254  023727  007414  000005        CMP     TEMP2,#5        ;READ ALL 5 SECTORS?
016262  001023                        BNE     5$
016264  005737  007416                TST     TEMP3
016270  001002                        BNE     2$
016272  104233                        ERROR   233             ;CANT READ SECTORS 0,2,4,6,8
016274  000430                        BR      3$

016276  023727  007416  000001  2$:   CMP     TEMP3,#1
016304  001002                        BNE     4$
016306  104230                        ERROR   230             ;CANT READ SECTORS 10,12...
016310  000422                        BR      3$

016312  023727  007416  000002  4$:   CMP     TEMP3,#2
016320  001002                        BNE     6$
016322  104234                        ERROR   234             ;CANT READ SECTORS 1,3,5 ...
016324  000414                        BR      3$

016326  104231                  6$:   ERROR   231             ;CANT READ SECTORS 11,13,15 ...
016330  000412                        BR      3$
```

```
3923
3924  016332  013765  007420  000004  5$:     MOV     TEMP4,RKBA(R5)  ;RESTORE TABLE ADDR
3925  016340  062737  000002  007422          ADD     #2,TEMP5        ;READ 2 SECTORS FROM LAST
3926  016346  013765  007422  000006          MOV     TEMP5,RKDA(R5)
3927  016354  000655                          BR      1$
3928
3929  016356  005237  001512          3$:     INC     BSERR           ;SET BSE FLAG
3930  016362  000550                          BR      TST10           ;;GO TO NEXT TEST
3931  016364  005737  003344          8$:     TST     BSE22H+6        ;TEST CARTRIDGE TYPE
3932  016370  001404                          BEQ     9$              ;BRANCH IF DATA CARTRIDGE
3933  016372  104235                          ERROR   235             ;ALIGNMENT CARTRIDGE USED
3934  016374  005237  001512                  INC     BSERR           ;SET BSE ERROR FLAG
3935  016400  000476                          BR      10$
3936
3937  016402  005237  007416          9$:     INC     TEMP3
3938  016406  023727  007416  000001          CMP     TEMP3,#1
3939  016414  001020                          BNE     11$
3940  016416  005037  007414                  CLR     TEMP2           ;SECTOR CTR
3941  016422  012737  005336  007420          MOV     #BSE22S,TEMP4   ;STORE 22 SECTOR SOFTWARE BSE ADDR
3942  016430  013765  007420  000004          MOV     TEMP4,RKBA(R5)
3943  016436  012737  001012  007422          MOV     #1012,TEMP5     ;TRACK 2, SECTOR 12(8)
3944  016444  013765  007422  000006          MOV     TEMP5,RKDA(R5)
3945  016452  000137  016110                  JMP     1$              ;REPEAT
3946
3947  016456  023727  007416  000002  11$:    CMP     TEMP3,#2
3948  016464  001020                          BNE     12$
3949  016466  005037  007414                  CLR     TEMP2           ;SECTOR CTR
3950  016472  012737  002336  007420          MOV     #BSE20H,TEMP4   ;STORE 20 SECTOR HARDWARE BSE ADDR.
3951  016500  013765  007420  000004          MOV     TEMP4,RKBA(R5)
3952  016506  012737  001001  007422          MOV     #1001,TEMP5     ;TRACK 2, SECTOR 1
3953  016514  013765  007422  000006          MOV     TEMP5,RKDA(R5)
3954  016522  000137  016110                  JMP     1$              ;REPEAT
3955
3956  016526  023727  007416  000003  12$:    CMP     TEMP3,#3
3957  016534  001020                          BNE     10$
3958  016536  005037  007414                  CLR     TEMP2           ;SECTOR CTR
3959  016542  012737  004336  007420          MOV     #BSE20S,TEMP4   ;STORE 20 SECTOR SOFTWARE BSE ADDR
3960  016550  013765  007420  000004          MOV     TEMP4,RKBA(R5)
3961  016556  012737  001013  007422          MOV     #1013,TEMP5     ;TRACK 2, SECTOR 13(8)
3962  016564  013765  007422  000006          MOV     TEMP5,RKDA(R5)
3963  016572  000137  016110                  JMP     1$              ;REPEAT
3964
3965  016576  005737  001216          10$:    TST     $PASS
3966  016602  001040                          BNE     TST10           ;;GO TO NEXT TST IF NOT 1'ST PASS
3967  016604  104401  045324                  TYPE    ,MSG17          ;CART SERIAL #
3968  016610  012746  003336                  MOV     #BSE22H,-(SP)
3969  016614  004737  042512                  JSR     PC,$DB2O        ;CONVERT DBL BINARY WORD TO OCTAL
3970  016620  004737  043062                  JSR     PC,$SUPRS       ;TYPE SERIAL #
3971  016624  104401  001205                  TYPE    ,$CRLF
3972  016630  104401  001205                  TYPE    ,$CRLF
3973
3974  016634  004737  034214                  JSR     PC,SUBCLR
3975  016640  104024                          ERROR   24              ;CERR AFTER SCLR
3976                                                                  ;GO BACK TO CYL 0
3977
3978  016642  012737  000017  007354          MOV     #SEEK,HCS1
```

```
3979  016650  004737  032224                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
3980  016654  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
3981
3982  016656  013737  001420  007412          MOV     T50000,TEMP1    ;SETUP TIMEOUT
3983  016664  004737  032730                  JSR     PC,FATT2        ;FIND ATTN
3984  016670  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
3985
3986  016672  032737  100000  007354          BIT     #CERR,HCS1
3987  016700  001401                          BEQ     66$
3988  016702  104210                          ERROR   210             ;CERR AFTER SEEK CMD
3989
3990  016704                          66$:
3991
3992
3993
3994                                  .SBTTL WRITE TESTS
3995
3996
3997                                  ;;*****************************************************************
3998                                  ;*TEST 10       BASIC WRITE DATA TEST; 1 WORD
3999                                  ;*
4000                                  ;*      THIS TEST VERIFIES THE ABILITY OF THE DRIVE TO WRITE JUST ONE WORD,
4001                                  ;*      ALL SECTORS ON CYL 0 ARE GIVEN IDENTICAL HEADERS &
4002                                  ;*      A WRITE COMMAND IS ISSUED. READ & WRITE CHECK COMMANDS ARE NOT
4003                                  ;*      PERFORMED. THIS TEST PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP
4004                                  ;*      FOR A WRITE ERROR.
4005                                  ;*
4006                                  ;;*****************************************************************
4007  016704  000004                  TST10:  SCOPE
4008  016706  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4009  016714  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4010
4011  016720  005737  001512                  TST     BSERR           ;SEE IF ALIGN CART
4012  016724  001406                          BEQ     2$              ;BR IF NO
4013  016726  104401  045662                  TYPE    ,MSG40          ;BSE OR ALIGN CART USED
4014  016732  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4015  016736  000137  031452                  JMP     $EOP
4016
4017  016742  004737  034214          2$:     JSR     PC,SUBCLR
4018  016746  104024                          ERROR   24              ;CERR AFTER SCLR
4019
4020  016750  005237  007340                  INC     BADHDR          ;USED FOR VALID HALT
4021
4022  016754  012700  001522                  MOV     #HDTAB,R0       ;MAKE ALL CYL 0 HEADERS IDENTICAL
4023
4024  016760  005020                  1$:     CLR     (R0)+           ;HEADER WORD 0: CYL 0
4025  016762  012720  140000                  MOV     #140000,(R0)+   ;HEADER WORD 1: SECTOR 0
4026  016766  012720  140000                  MOV     #140000,(R0)+   ;HEADER WORD 2: XOR OF 1 & 2
4027
4028  016772  020027  001726                  CMP     R0,#HDTAB+132.  ;ALL HEADERS DONE? (22X6=132)
4029  016776  001370                          BNE     1$              ;BR IF NO
4030
4031  017000  012765  001522  000004          MOV     #HDTAB,RKBA(R5) ;HEADER TABLE
4032  017006  012765  177676  000002          MOV     #-66.,RKWC(R5)  ;WORD COUNT
4033
4034  017014  012737  000027  007354          MOV     #<WRHEAD>,HCS1
```

```
4035  017022  004737  032262                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4036  017026  104200                            ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4037  017030  004737  033664                    JSR     PC,GSTAT        ;GET FRESH STATUS
4038  017034  032737  100000  007354            BIT     #CERR,HCS1
4039  017042  001405                            BEQ     64$
4040  017044  104201                            ERROR   201             ;CERR AFTER WRITE HEADER CMD
4041  017046  104401  045354                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4042  017052  000137  031452                    JMP     $EOF
4043  017056                            64$:
4044
4045
4046  017056  104415                            SCOP1
4047  017060  012706  001100                    MOV     #STACK,SP       ;RESTORE STK PTR
4048
4049  017064  004737  034214                    JSR     PC,SUBCLR
4050  017070  104024                            ERROR   24              ;CERR AFTER SCLR
4051
4052  017072  005037  001402                    CLR     SECTOR
4053  017076  013765  001402  000006    3$:     MOV     SECTOR,RKDA(R5) ;TRACK/SECTOR #
4054  017104  012765  001500  000004            MOV     #DATA1,RKBA(R5) ;DATA TO BE ALL 1'S
4055  017112  012765  177777  000002            MOV     #-1,RKWC(R5)    ;WORD COUNT=1
4056
4057
4058  017120  012737  000023  007354            MOV     #<WRDATA>,HCS1
4059  017126  004737  032262                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4060  017132  104011                            ERROR   11              ;NO RDY AFTER WRITE DATA CMD
4061  017134  004737  033664                    JSR     PC,GSTAT        ;GET FRESH STATUS
4062  017140  032737  100000  007354            BIT     #CERR,HCS1
4063  017146  001465                            BEQ     68$             ;BR IF NO ERRORS
4064
4065  017150  032737  000200  007370            BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
4066  017156  001421                            BEQ     66$             ;BR IF NO
4067  017160  004737  035700                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
4068  017164  000455                            BR      67$             ;RETURN HERE IF NO
4069
4070  017166  005237  001402                    INC     SECTOR          ;RETURN HERE IF YES
4071  017172  023727  001402  000012            CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
4072  017200  001003                            BNE     65$             ;BR IF NO
4073  017202  104046                            ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
4074  017204  000137  017406                    JMP     5$              ;BYPASS TEST
4075  017210  012765  100000  000000  65$:     MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
4076  017216  000137  017076                    JMP     3$
4077  017222  104012                    66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
4078
4079  017224  012737  010340  007444            MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4080  017232  005037  007446                    CLR     E.B0            ;EXPECTED MSG B0
4081  017236  012737  001720  007450            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4082  017244  012737  000001  007452            MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4083  017252  005037  007454                    CLR     E.A2            ;EXPECTED MSG A2
4084  017256  012737  000002  007456            MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4085  017264  012737  000003  007462            MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4086
4087  017272  004737  033042                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4088  017276  000003                            .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4089  017300  104052                            ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4090  017302  104023                            ERROR   23              ;MSH B0 ERROR
```

```
                                        ERROR   53                  ;MSG A1 ERROR
                                        ERROR   25                  ;MSG B1 ERROR
                                        TYPE    .MSG26              ;ABORTING BAL OF TESTS
                                        JMP     $EOP
                                67$:    ERROR   63                  ;BAD SECTOR NOT LISTED IN TABLE
                                68$:

                                        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                  ;MSG B0 ERROR
                                        ERROR   53                  ;MSG A1 ERROR
                                        ERROR   25                  ;MSG B1 ERROR
                                5$:
                                ;;*****************************************************************
                                ;*TEST 11        BASIC WRITE DATA TEST; FULL SECTOR
                                ;*
                                ;*      THIS TEST VERIFIES THE ABILITY OF THE DRIVE TO WRITE
                                ;*      A FULL SECTOR.  ALL ZEROS ARE WRITTEN BY THE WRITE DATA COMMAND
                                ;*      & CHECKED BY A RD DATA COMMAND.  A FURTHER CHECK IS PERFORMED
                                ;*      BY THE WRT CHK COMMAND.
                                ;*      THE ABOVE IS REPEATED FOR AN ALL ONES PATTERN.
                                ;*
                                ;;*****************************************************************
                                TST11:  SCOPE
                                        MOV     #1,$TIMES           ;;DO 1 ITERATION
                                        MOV     #$TACK,SP           ;RESTORE STK PTR

                                        JSR     PC,SUBCLR
                                        ERROR   24                  ;CERR AFTER SCLR

                                        MOV     #HDTAB,RKBA(R5)     ;RESTORE TO 22 SECTOR
                                        MOV     #-66.,RKWC(R5)      ;STANDARD FORMAT
                                        CLR     TOCYL

                                        MOV     TOCYL,CALADD        ;SETUP
                                        MOV     #0,HEAD             ;TO FILL
                                        MOV     #0,FORMAT           ;HEADER
                                        JSR     PC,FHDTAB           ;TABLE

                                        MOV     #<WRHEAD>,HCS1
                                        JSR     PC,DATCMD           ;DO DATA X FOR CMD & GET CONTR RDY
                                        ERROR   200                 ;NO RDY AFTER WRITE HEADER CMD
                                        JSR     PC,GSTAT            ;GET FRESH STATUS
                                        BIT     #CERR,HCS1
                                        BEQ     64$
                                        ERROR   201                 ;CERR AFTER WRITE HEADER CMD
```

```
 4147  017530  104401  045354                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
 4148  017534  000137  031452                    JMP     $EOP
 4149  017540                            64$:
 4150
 4151  017540  005037  007340                    CLR     BADHDR          ;USED FOR VALID HALT
 4152  017544  104415                            SCOP1
 4153  017546  012706  001100                    MOV     #STACK,SP       ;RESTORE STK PTR
 4154
 4155  017552  004737  034214                    JSR     PC,SUBCLR
 4156  017556  104024                            ERROR   24              ;CERR AFTER SCLR
 4157
 4158  017560  005037  001402                    CLR     SECTOR
 4159  017564  013765  001402  000006    8$:     MOV     SECTOR,RKDA(R5) ;SETUP SECTOR
 4160  017572  012765  001474  000004            MOV     #DATA0,RKBA(R5) ;WRITE ALL 0'S
 4161  017600  013700  001474                    MOV     DATA0,R0
 4162  017604  052765  000020  000010    1$:     BIS     #BAI,RKCS2(R5)
 4163  017612  012765  177400  000002            MOV     #-256.,RKWC(R5)
 4164
 4165  017620  012737  000023  007354            MOV     #<WRDATA>,HCS1
 4166  017626  004737  032262                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
 4167  017632  104011                            ERROR   11              ;NO RDY AFTER WRITE DATA CMD
 4168  017634  004737  033664                    JSR     PC,GSTAT        ;GET FRESH STATUS
 4169  017640  032737  100000  007354            BIT     #CERR,HCS1
 4170  017646  001465                            BEQ     68$             ;BR IF NO ERRORS
 4171
 4172  017650  032737  000200  007370            BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
 4173  017656  001421                            BEQ     66$             ;BR IF NO
 4174  017660  004737  035700                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
 4175  017664  000455                            BR      67$             ;RETURN HERE IF NO
 4176
 4177  017666  005237  001402                    INC     SECTOR          ;RETURN HERE IF YES
 4178  017672  023727  001402  000012            CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
 4179  017700  001003                            BNE     65$             ;BR IF NO
 4180  017702  104046                            ERROR   46              ;ABORTING TEST DETECTED 1- BAD SECTORS
 4181  017704  000137  021156                    JMP     7$              ;BYPASS TEST
 4182  017710  012765  100000  000000    65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
 4183  017716  000137  017564                    JMP     8$
 4184  017722  104012                    66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
 4185
 4186  017724  012737  010340  007444            MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4187  017732  005037  007446                    CLR     E.B0            ;EXPECTED MSG B0
 4188  017736  012737  001720  007450            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4189  017744  012737  000001  007452            MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4190  017752  005037  007454                    CLR     E.A2            ;EXPECTED MSG A2
 4191  017756  012737  000002  007456            MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4192  017764  012737  000003  007462            MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4193
 4194  017772  004737  033042                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4195  017776  000003                            .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4196  020000  104052                            ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
 4197  020002  104023                            ERROR   23              ;MSG B0 ERROR
 4198  020004  104053                            ERROR   53              ;MSG A1 ERROR
 4199  020006  104025                            ERROR   25              ;MSG B1 ERROR
 4200  020010  104401  045354                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
 4201  020014  000137  031452                    JMP     $EOP
 4202  020020  104063                    67$:    ERROR   63              ;BAD SECTOR NOT LISTED IN TAB E
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```
4203  020022                          68$:
4204
4205  020022  012737  010340  007444        MOV   #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4206  020030  005037  007446              CLR   E.B0                ;EXPECTED MSG B0
4207  020034  012737  001720  007450        MOV   #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4208  020042  012737  000001  007452        MOV   #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4209  020050  005037  007454              CLR   E.A2                ;EXPECTED MSG A2
4210  020054  012737  000002  007456        MOV   #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4211  020062  012737  000003  007462        MOV   #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4212
4213  020070  004737  033042              JSR   PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4214  020074  000003                       .WORD T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
4215  020076  104052                       ERROR 52                  ;MSG A0 ERROR AFTER WRITE DATA CMD
4216  020100  104023                       ERROR 23                  ;MSH B0 ERROR
4217  020102  104053                       ERROR 53                  ;MSG A1 ERROR
4218  020104  104025                       ERROR 25                  ;MSG B1 ERROR
4219  020106  104415                       SCOP1
4220  020110  012706  001100              MOV   #STACK,SP           ;RESTORE STK PTR
4221
4222  020114  004737  034214              JSR   PC,SUBCLR
4223  020120  104024                       ERROR 24                  ;CERR AFTER SCLR
4224
4225  020122  013765  001402  000006        MOV   SECTOR,RKDA(R5)     ;SETUP SECTOR
4226  020130  012765  006336  000004        MOV   #RDTAB,RKBA(R5)
4227  020136  012765  177400  000002        MOV   #-256.,RKWC(R5)
4228
4229
4230  020144  012737  000021  007354        MOV   #<RDDATA>,HCS1
4231  020152  004737  032262              JSR   PC,DATCMD           ;DO DATA X FOR CMD & GET CONTR RDY
4232  020156  104013                       ERROR 13                  ;NO RDY AFTER READ DATA CMD
4233  020160  004737  033664              JSR   PC,GSTAT            ;GET FRESH STATUS
4234  020164  032737  100000  007354        BIT   #CERR,HCS1
4235  020172  001454                       BEQ   72$
4236  020174  032737  000200  007370        BIT   #BSE,HER            ;SEE IF BAD SECTOR
4237  020202  001406                       BEQ   70$
4238  020204  104065                       ERROR 65                  ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
4239  020206  000413                       BR    73$
4240  020210  104401  045354        69$:   TYPE  ,MSG26              ;ABORTING BAL OF TESTS
4241  020214  000137  031452              JMP   $EOP
4242
4243  020220  032737  100000  007370  70$:   BIT   #DCK,HER            ;SEE IF DATA CHECK ERROR
4244  020226  001402                       BEQ   71$
4245  020230  104021                       ERROR 21                  ;DATA CHECK ERROR AFTER READ CMD (ECC)
4246  020232  000401                       BR    73$
4247
4248  020234  104014                71$:   ERROR 14                  ;CERR AFTER READ DATA CMD.
4249
4250  020236                          73$:
4251
4252  020236  012737  010340  007444        MOV   #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4253  020244  005037  007446              CLR   E.B0                ;EXPECTED MSG B0
4254  020250  012737  001720  007450        MOV   #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4255  020256  012737  000001  007452        MOV   #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4256  020264  005037  007454              CLR   E.A2                ;EXPECTED MSG A2
4257  020270  012737  000002  007456        MOV   #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4258  020276  012737  000003  007462        MOV   #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
```

```
4259
4260  020304  004737  033042          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4261  020310  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4262  020312  104054                  ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
4263  020314  104026                  ERROR   26              ;MSH B0 ERROR
4264  020316  104056                  ERROR   56              ;MSG A1 ERROR
4265  020320  104030                  ERROR   30              ;MSG B1 ERROR
4266  020322  000732                  BR      69$
4267  020324                  72$:
4268
4269  020324  012737  010340  007444  MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4270  020332  005037  007446          CLR     E.B0            ;EXPECTED MSG B0
4271  020336  012737  001720  007450  MOV     #<D.SPOK!D.CAR!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4272  020344  012737  000001  007452  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4273  020352  005037  007454          CLR     E.A2            ;EXPECTED MSG A2
4274  020356  012737  000002  007456  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4275  020364  012737  000003  007462  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4276
4277  020372  004737  033042          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4278  020376  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4279  020400  104054                  ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
4280  020402  104026                  ERROR   26              ;MSH B0 ERROR
4281  020404  104056                  ERROR   56              ;MSG A1 ERROR
4282  020406  104030                  ERROR   30              ;MSG B1 ERROR
4283
4284  020410  012701  006336          MOV     #RDTAB,R1
4285  020414  011137  001452  2$:     MOV     (R1),WD1        ;ACTUAL WORD FOR TYPEOUT
4286  020420  010037  001454          MOV     R0,WD2          ;EXPECTED DATA FOR TYPEOUT
4287
4288  020424  020021                  CMP     R0,(R1)+        ;COMPARE READ DATA TABLE AGAINST
4289  020426  001401                  BEQ     3$              ;THE 'SHOULD BE' VALUE
4290  020430  104020                  ERROR   20              ;READ DATA DID NOT COMPARE WITH WRITE DATA
4291
4292  020432  020127  007336  3$:     CMP     R1,#RDTAB+512.  ;SEE IF REACHED END OF TABLE
4293  020436  001366                  BNE     2$              ;BR IF NO & DO NEXT WORD
4294
4295  020440  020037  001474          CMP     R0,DATA0        ;SEE IF DID ALL 0'S
4296  020444  001401                  BEQ     4$              ;BR IF YES
4297  020446  000412                  BR      5$
4298
4299  020450  012765  001500  000004  4$:     MOV     #DATA1,RKBA(R5) ;WRITE ALL 1'S
4300  020456  013700  001500          MOV     DATA1,R0
4301  020462  013765  001402  000006  MOV     SECTOR,RKDA(R5)
4302  020470  000137  017604          JMP     1$
4303
4304  020474                  5$:
4305  020474  104415                  SCOP1
4306  020476  012706  001100          MOV     #STACK,SP       ;RESTORE STK PTR
4307
4308  020502  004737  034214          JSR     PC,SUBCLR
4309  020506  104024                  ERROR   24              ;CERR AFTER SCLR
4310
4311  020510  052765  000020  000010  BIS     #BAI,RKCS2(R5)  ;THIS PORTION OF THE TEST CHECKS
4312  020516  012765  001500  000004  MOV     #DATA1,RKBA(R5) ;OUT THE WRITE CHECK CMD
4313  020524  012765  177400  000002  MOV     #-256.,RKWC(R5) ;ALL 1'S WERE PREVIOUSLY WRITTEN
4314  020532  013765  001402  000006  MOV     SECTOR,RKDA(R5)
```

```
4315
4316  020540  012737  000031  007354          MOV     #<WRTCHK>,HCS1
4317  020546  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4318  020552  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4319  020554  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
4320  020560  032737  100000  007354          BIT     #CERR,HCS1
4321  020566  001453                          BEQ     75$
4322  020570  032737  040000  007356          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4323  020576  001410                          BEQ     74$
4324  020600  016537  000024  001452          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4325  020606  013737  001500  001454          MOV     DATA1,WD2               ;EXPECTED WORD FOR TYPEOUT
4326  020614  104016                          ERROR   16              ;WCE AFTER WRITE CMD
4327  020616  000437                          BR      75$
4328
4329  020620  104022                  74$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4330
4331  020622  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4332  020630  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4333  020634  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4334  020642  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4335  020650  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4336  020654  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4337  020662  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4338
4339  020670  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4340  020674  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4341  020676  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4342  020700  104031                          ERROR   31              ;MSH B0 ERROR
4343  020702  104060                          ERROR   60              ;MSG A1 ERROR
4344  020704  104032                          ERROR   32              ;MSG B1 ERROR
4345  020706  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4346  020712  000137  031452                  JMP     $EOP
4347
4348  020716                          75$:
4349
4350  020716  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4351  020724  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4352  020730  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4353  020736  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4354  020744  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4355  020750  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4356  020756  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4357
4358  020764  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4359  020770  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4360  020772  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4361  020774  104031                          ERROR   31              ;MSG B0 ERROR
4362  020776  104060                          ERROR   60              ;MSG A1 ERROR
4363  021000  104032                          ERROR   32              ;MSG B1 ERROR
4364
4365  021002  104415                          SCOP1
4366  021004  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4367
4368  021010  004737  034214                  JSR     PC,SUBCLR
4369  021014  104024                          ERROR   24              ;CERR AFTER SCLR
4370
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```
4371  021016  012765  001474  000004          MOV     #DATA0,RKBA(R5)  SETUP TO CHECK AGAINST WRONG DATA
4372  021024  012765  177400  000002          MOV     #-256.,RKWC(R5)
4373  021032  013765  001402  000006          MOV     SECTOR,RKDA(R5)
4374  021040  012737  000031  007354          MOV     #WRTCHK,HCS1
4375  021046  004737  032262                  JSR     PC,DATCMD       ;DO WRITE CHECK CMD. & GET CONTR RDY.
4376  021052  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4377  021054  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
4378  021060  032737  040000  007356          BIT     #WCE,HCS2       ;EXPECT MISCOMPARE
4379  021066  001001                          BNE     6$
4380  021070  104017                          ERROR   17              ;WRITE CHECK CMD NOT FUNCTIONING
4381                                                                  ;WITH INTENTIONAL MISCOMPARE
4382  021072                          6$:
4383
4384  021072  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4385  021100  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4386  021104  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4387  021112  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4388  021120  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4389  021124  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4390  021132  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4391
4392  021140  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4393  021144  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4394  021146  104057                          ERROR   57              ;MSG A0 ERROR AFT WRT CHK CMD
4395  021150  104031                          ERROR   31              ;MSH B0 ERROR
4396  021152  104060                          ERROR   60              ;MSG A1 ERROR
4397  021154  104032                          ERROR   32              ;MSG B1 ERROR
4398  021156                          7$:
4399
4400                                  ;;*****************************************************************
4401                                  ;*TEST 12        20 SECTOR FORMAT TEST
4402                                  ;*
4403                                  ;*      ALL 1'S ARE WRITTEN ON A FULL SECTOR IN 20 SECTOR FORMAT.
4404                                  ;*      MSG B0,B1 ARE CHECKED FOR ANY ERROR CONDITION.
4405                                  ;*      CYL 0, TRACK 0, & SECTOR 0 IS USED.
4406                                  ;*
4407                                  ;*****************************************************************
4408  021156  000004                  TST12:  SCOPE
4409  021160  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4410  021166  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4411
4412  021172  004737  034214                  JSR     PC,SUBCLR
4413  021176  104024                          ERROR   24              ;CERR AFTER SCLR
4414
4415  021200  012765  001522  000004          MOV     #HDTAB,RKBA(R5) ;HEADER WORD TABLE
4416  021206  012765  177704  000002          MOV     #-60.,RKWC(R5)  ;WORD COUNT FOR 20 SECTOR FMT
4417  021214  005037  001346                  CLR     TOCYL
4418  021220  005237  007340                  INC     BADHDR          ;USED FOR VALID HALT
4419
4420
4421  021224  013737  001346  001362          MOV     TOCYL,CALADD    ;SETUP
4422  021232  012737  000000  001460          MOV     #0,HEAD         ;TO FILL
4423  021240  012737  000001  001466          MOV     #1,FORMAT       ;HEADER
4424  021246  004737  035212                  JSR     PC,FHDTAB       ;TABLE
4425
4426
```

```
4427  021252  012737  010027  007354          MOV     #<CFMT!WRHEAD>,HCS1
4428  021260  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4429  021264  104200                          ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4430  021266  012737  010001  007354          MOV     #<CFMT!SELDRV>,HCS1
4431  021274  004737  032224                  JSR     PC,DOCMD
4432  021300  104117                          ERROR   117             ;NO RDY AFTER SELDRV CMD
4433  021302  032737  100000  007354          BIT     #CERR,HCS1
4434  021310  001405                          BEQ     64$
4435  021312  104201                          ERROR   201             ;CERR AFTER WRITE HEADER CMD
4436  021314  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4437  021320  000137  031452                  JMP     $EOP
4438  021324                          64$:
4439
4440  021324  104415                          SCOP1
4441  021326  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4442
4443  021332  004737  034214                  JSR     PC,SUBCLR
4444  021336  104024                          ERROR   24              ;CERR AFTER SCLR
4445
4446  021340  005037  001402                  CLR     SECTOR
4447  021344  013765  001402  000006  4$:     MOV     SECTOR,RKDA(R5)
4448  021352  012765  001500  000004          MOV     #DATA1,RKBA(R5) ;WRITE ALL 1'S
4449  021360  052765  000020  000010          BIS     #BAI,RKCS2(R5)  ;BUSS ADDR INCR INHIBIT
4450  021366  012765  177400  000002          MOV     #-256.,RKWC(R5)  ;DO FULL SECTOR
4451
4452
4453  021374  012737  010023  007354          MOV     #<CFMT!WRDATA>,HCS1
4454  021402  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4455  021406  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
4456  021410  012737  010001  007354          MOV     #<CFMT!SELDRV>,HCS1
4457  021416  004737  032224                  JSR     PC,DOCMD
4458  021422  104117                          ERROR   117             ;NO RDY AFTER SELDRV CMD
4459  021424  032737  100000  007354          BIT     #CERR,HCS1
4460  021432  001465                          BEQ     68$             ;BR IF NO ERRORS
4461
4462  021434  032737  000200  007370          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
4463  021442  001421                          BEQ     66$             ;BR IF NO
4464  021444  004737  035700                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
4465  021450  000455                          BR      67$             ;RETURN HERE IF NO
4466
4467  021452  005237  001402                  INC     SECTOR          ;RETURN HERE IF YES
4468  021456  023727  001402  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
4469  021464  001003                          BNE     65$             ;BR IF NO
4470  021466  104046                          ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
4471  021470  000137  022374                  JMP     3$              ;BYPASS TEST
4472  021474  012765  100000  000000  65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
4473  021502  000137  021344                  JMP     4$
4474  021506  104012                  66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
4475
4476  021510  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4477  021516  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4478  021522  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4479  021530  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4480  021536  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4481  021542  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4482  021550  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
```

```
4483
4484  021556  004737  033042          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4485  021562  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4486  021564  104052                  ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4487  021566  104023                  ERROR   23              ;MSH B0 ERROR
4488  021570  104053                  ERROR   53              ;MSG A1 ERROR
4489  021572  104025                  ERROR   25              ;MSG B1 ERROR
4490  021574  104401  045354          TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4491  021600  000137  031452          JMP     $EOP
4492  021604  104063          67$:    ERROR   63              ;BAD SECTOR NOT LISTED IN TABLE
4493  021606                  68$:
4494  021606  012737  010001  007354  MOV     #<CFMT!SELDRV>,HCS1
4495  021614  004737  032224          JSR     PC,DOCMD
4496  021620  104117                  ERROR   117             ;RDY NOT FOUND AFTER SELDRV CMD
4497  021622  032737  001000  007402  BIT     #D.FORM,HMR2
4498  021630  001001                  BNE     1$
4499  021632  104102                  ERROR   102             ;FORMAT NOT SET
4500
4501  021634                  1$:
4502
4503  021634  012737  010340  007444  MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4504  021642  005037  007446          CLR     E.B0            ;EXPECTED MSG B0
4505  021646  012737  001720  007450  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4506  021654  012737  000001  007452  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4507  021662  005037  007454          CLR     E.A2            ;EXPECTED MSG A2
4508  021666  012737  000002  007456  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4509  021674  012737  000003  007462  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4510
4511  021702  004737  033042          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4512  021706  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4513  021710  104052                  ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4514  021712  104023                  ERROR   23              ;MSH B0 ERROR
4515  021714  104053                  ERROR   53              ;MSG A1 ERROR
4516  021716  104025                  ERROR   25              ;MSG B1 ERROR
4517  021720  012765  177400  000002  MOV     #-256.,RKWC(R5)
4518  021726  012765  001500  000004  MOV     #DATA1,RKBA(R5)
4519  021734  052765  000020  000010  BIS     #BAI,RKCS2(R5)
4520  021742  013765  001402  000006  MOV     SECTOR,RKDA(R5)
4521
4522  021750  012737  010031  007354  MOV     #<CFMT!WRTCHK>,HCS1
4523  021756  004737  032262          JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4524  021762  104015                  ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4525  021764  012737  010001  007354  MOV     #<CFMT!SELDRV>,HCS1
4526  021772  004737  032224          JSR     PC,DOCMD
4527  021776  104117                  ERROR   117             ;NO RDY AFTER SELDRV CMD
4528  022000  032737  100000  007354  BIT     #CERR,HCS1
4529  022006  001453                  BEQ     70$
4530  022010  032737  040000  007356  BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4531  022016  001410                  BEQ     69$
4532  022020  016537  000024  00145   MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4533  022026  013737  001500  001454  MOV     DATA1,WD2               ;EXPECTED WORD FOR TYPEOUT
4534  022034  104016                  ERROR   16              ;WCE AFTER WRITE CMD
4535  022036  000437                  BR      70$
4536
4537  022040  104022          69$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4538
```

```
4539  022042  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4540  022050  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
4541  022054  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4542  022062  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4543  022070  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
4544  022074  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4545  022102  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4546
4547  022110  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4548  022114  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
4549  022116  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
4550  022120  104031                          ERROR   31                  ;MSH B0 ERROR
4551  022122  104060                          ERROR   60                  ;MSG A1 ERROR
4552  022124  104032                          ERROR   32                  ;MSG B1 ERROR
4553  022126  104401  045354                  TYPE    ,MSG26              ;ABORTING BAL OF TESTS
4554  022132  000137  031452                  JMP     $EOP
4555
4556  022136                          70$:
4557  022136  012737  010001  007354          MOV     #<CFMT!SELDRV>,HCS1
4558  022144  004737  032224                  JSR     PC,DOCMD
4559  022150  104117                          ERROR   117                 ;NO RDY AFTER SELDRV CMD
4560  022152  032737  001000  007402          BIT     #D.FORM,HMR2
4561  022160  001001                          BNE     2$
4562  022162  104103                          ERROR   103                 ;FORMAT NOT SET
4563
4564  022164                          2$:
4565
4566  022164  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4567  022172  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
4568  022176  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4569  022204  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4570  022212  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
4571  022216  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4572  022224  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4573
4574  022232  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4575  022236  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
4576  022240  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
4577  022242  104031                          ERROR   31                  ;MSH B0 ERROR
4578  022244  104060                          ERROR   60                  ;MSG A1 ERROR
4579  022246  104032                          ERROR   32                  ;MSG B1 ERROR
4580  022250  104415                          SCOP1
4581  022252  012706  001100                  MOV     #STACK,SP           ;RESTORE STK PTR
4582
4583  022256  004737  034214                  JSR     PC,SUBCLR
4584  022262  104024                          ERROR   24                  ;CERR AFTER SCLR
4585
4586  022264  012765  001522  000004          MOV     #HDTAB,RKBA(R5)     ;RESTORE CYL 0 TO 22 SECTOR FMT
4587  022272  012765  177676  000002          MOV     #-66.,RKWC(R5)
4588  022300  005037  001346                  CLR     TOCYL
4589
4590
4591  022304  013737  001346  001362          MOV     TOCYL,CALADD        ;SETUP
4592  022312  012737  000000  001460          MOV     #0,HEAD             ;TO FILL
4593  022320  012737  000000  001466          MOV     #0,FORMAT           ;HEADER
4594  022326  004737  035212                  JSR     PC,FHDTAB           ;TABLE
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4595
4596
4597  022332  012737  000027  007354          MOV     #<WRHEAD>,HCS1
4598  022340  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
4599  022344  104200                          ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4600  022346  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
4601  022352  032737  100000  007354          BIT     #CERR,HCS1
4602  022360  001405                          BEQ     71$
4603  022362  104201                          ERROR   201             ;CERR AFTER WRITE HEADER CMD
4604  022364  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4605  022370  000137  031452                  JMP     $EOP
4606  022374                          71$:
4607
4608  022374  005037  007340          3$:     CLR     BADHDR          ;USED FOR VALID HALT
4609
4610                                  ;;**********************************************************************
4611                                  ;*TEST 13       TEST OFFSET & RTC LOGIC
4612                                  ;*
4613                                  ;*      THE HEADS ARE FIRST OFFSET BY OFFSET COMMANDS.
4614                                  ;*      THIS TEST CHECKS THE RTC LOGIC BY VERIFYING THAT THE
4615                                  ;*      'OFFSET ON' BIT (MSG A,00) RESETS AND THE OFFSET REG
4616                                  ;*      BECOMES THE CYL DIFF INFO WHEN A SEEK CMD TO A
4617                                  ;*      DIFFERENT CYLINDER IS ISSUED
4618                                  ;*      IT ALSO TESTS THAT DRIVE CLEAR & SEEK TO SELF WILL NOT
4619                                  ;*      CLEAR THE 'OFFSET ON' BIT OR THE OFFSET REG.
4620                                  ;*      ALL OFFSET POSITIONS IN BOTH DIRECTIONS ARE CHECKED
4621                                  ;*
4622                                  ;**********************************************************************
4623  022400  000004                  ST13:   SCOPE
4624  022402  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4625  022410  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4626
4627  022414  012702  000001                  MOV     #1,R2           ;MIN POS OFFSET
4628
4629  022420  004737  034214          1$:     JSR     PC,SUBCLR
4630  022424  104024                          ERROR   24              ;CERR AFTER SCLR
4631
4632  022426  010265  000016                  MOV     R2,RK.OF(R5)    ;SET OFFSET
4633
4634  022432  012737  022520  001176          MOV     #6+$,$ESCAPE
4635  022440  012737  000015  007354          MOV     #OFFSET,HCS1
4636  022446  004737  032224                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
4637  022452  104033                          ERROR   33              ;NO RDY AFTER OFFSET CMD
4638
4639  022454  012737  032140  007444          MOV     #<D.PIP!D.SPIN!D.OFF!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4640  022462  005037  007446                  CLR     E.B0
4641  022466  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4642  022474  012737  000001  007452          MOV     #1,E.B1
4643
4644  022502  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4645  022506  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4646  022510  104035                          ERROR   35              ;MSG A0 ERROR DURING OFFSET CMD
4647  022512  104061                          ERROR   61              ;MSH B0 ERROR
4648  022514  104036                          ERROR   36              ;MSG A1 ERROR
4649  022516  104062                          ERROR   62              ;MSG B1 ERROR
4650
```

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4651  022520  005037  001176          64$:    CLR     $ESCAPE
4652  022524  013737  001416  007412          MOV     T5000,TEMP1     ;SETUP TIMEOUT
4653  022532  004737  032730                  JSR     PC,FATT2        ;FIND ATTN
4654  022536  104034                          ERROR   34              ;NO ATTN AFTER OFFSET CMD
4655
4656
4657  022540  012737  052340  007444          MOV     #<D.DSC!D.OFF!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4658  022546  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4659  022552  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4660  022560  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4661  022566  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4662  022572  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4663  022600  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4664
4665  022606  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4666  022612  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4667  022614  104260                          ERROR   260             ;MSG A0 ERROR AFTER OFFSET CMD
4668  022616  104261                          ERROR   261             ;MSH B0 ERROR
4669  022620  104037                          ERROR   37              ;MSG A1 ERROR
4670  022622  104040                          ERROR   40              ;MSG B1 ERROR
4671
4672  022624  005737  001360                  TST     CYLADD
4673  022630  001401                          BEQ     17$
4674  022632  104042                          ERROR   42              ;CYL ADDR IN B2 WAS NOT 0
4675                                                                  ;AFTER OFFSET CMD FROM CYL 0
4676  022634  042737  001000  001356  17$:    BIC     #1000,CYLDIF    ;GET RID OF HIGH BIT
4677  022642  010265  000016                  MOV     R2,RKASOF(R5)   ;REFRESH RKASOF
4678
4679  022646  032702  000200                  BIT     #BIT7,R2
4680  022652  001005                          BNE     65$             ;BR IF NEG OFFSET
4681
4682  022654  020237  001356                  CMP     R2,CYLDIF       ;CHECK POS OFFSET
4683  022660  001406                          BEQ     66$
4684  022662  104114                          ERROR   114             ;OFFSET IN A2 NOT = RKASOF
4685  022664  000404                          BR      66$             ;AFTER OFFSET CMD
4686
4687  022666  020137  001356          65$:    CMP     R1,CYLDIF       ;CHECK NEG OFFSET
4688  022672  001401                          BEQ     66$
4689  022674  104114                          ERROR   114             ;OFFSET IN A2 NOT = RKASOF
4690                                                                  ;AFTER OFFSET CMD
4691  022676                          66$:
4692
4693  022676  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4694  022704  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
4695  022712  012737  000005  007354          MOV     #CLEAR,HCS1
4696  022720  004737  032224                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4697  022724  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4698  022726  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
4699  022732  000401                          BR      67$
4700  022734  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4701  022736                          67$:
4702
4703  022736  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4704  022744  004737  033664                  JSR     PC,GSTAT
4705  022750  032737  002000  007402          BIT     #D.OFF,HMR2
4706  022756  001001                          BNE     4$
```

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4707  022760  104043                        ERROR   43              ;OFFSET BIT IN RKMR2 CLEARED
4708                                                                  ;AFTER DRIVE CLEAR CMD & SELECT DRV CMD
4709  022762  012737  012340  007444  4$:   MOV     #<D.OFF!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED A0
4710  022770  005037  007446                CLR     E.B0
4711  022774  012737  001720  007450        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4712  023002  012737  000001  007452        MOV     #1,E.B1
4713
4714  023010  004737  033042                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4715  023014  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4716  023016  104273                        ERROR   273             ;MSG A0 ERROR AFTER DRIVE CLEAR CMD
4717  023020  104265                        ERROR   265             ;MSH B0 ERROR
4718  023022  104274                        ERROR   274             ;MSG A1 ERROR
4719  023024  104266                        ERROR   266             ;MSG B1 ERROR
4720  023026  042737  001000  001356        BIC     #1000,CYLDIF    ;GET RID OF HIGH BIT
4721  023034  010265  000016                MOV     R2,RKASOF(R5)   ;REFRESH RKASOF
4722
4723  023040  032702  000200                BIT     #BIT7,R2
4724  023044  001005                        BNE     68$             ;BR IF NEG OFFSET
4725
4726  023046  020237  001356                CMP     R2,CYLDIF       ;CHECK POS OFFSET
4727  023052  001406                        BEQ     69$
4728  023054  104115                        ERROR   115             ;OFFSET IN A2 NOT = RKASOF
4729  023056  000404                        BR      69$             ;AFTER DRIVE CLEAR CMD
4730
4731  023060  020137  001356        68$:    CMP     R1,CYLDIF       ;CHECK NEG OFFSET
4732  023064  001401                        BEQ     69$
4733  023066  104115                        ERROR   115             ;OFFSET IN A2 NOT = RKASOF
4734                                                                  ;AFTER DRIVE CLEAR CMD
4735  023070                        69$:
4736
4737  023070  012737  000017  007354        MOV     #SEEK,HCS1
4738  023076  004737  032224                JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
4739  023102  104131                        ERROR   131             ;NO RDY AFTER SEEK CMD
4740
4741  023104  013737  001420  007412        MOV     T50000,TEMP1    ;SETUP TIMEOUT
4742  023112  004737  032730                JSR     PC,FATT2        ;FIND ATTN
4743  023116  104132                        ERROR   132             ;NO ATTN AFTER SEEK CMD
4744
4745  023120  032737  100000  007354        BIT     #CERR,HCS1
4746  023126  001401                        BEQ     70$
4747  023130  104210                        ERROR   210             ;CERR AFTER SEEK CMD
4748
4749  023132                        70$:
4750
4751
4752  023132  032737  002000  007402        BIT     #D.OFF,HMR2
4753  023140  001001                        BNE     7$
4754  023142  104045                        ERROR   45              ;OFFSET BIT CLEARED IN RKMR2 AFTER SEEK TO SELF.
4755
4756  023144                        7$:
4757
4758  023144  012737  052340  007444        MOV     #<D.DSC!D.OFF!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4759  023152  005037  007446                CLR     E.B0            ;EXPECTED MSG B0
4760  023156  012737  001720  007450        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4761  023164  012737  000001  007452        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4762  023172  005037  007454                CLR     E.A2            ;EXPECTED MSG A2
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```
4763  023176  012737  000002  007456          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4764  023204  012737  000003  007462          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4765
4766  023212  004737  033042                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4767  023216  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
4768  023220  104140                          ERROR   140              ;MSG A0 ERROR AFTER SEEK TO SELF
4769  023222  104141                          ERROR   141              ;MSH B0 ERROR
4770  023224  104142                          ERROR   142              ;MSG A1 ERROR
4771  023226  104143                          ERROR   143              ;MSG B1 ERROR
4772  023230  042737  001000  001356          BIC     #1000,CYLDIF     ;GET RID OF HIGH BIT
4773  023236  010265  000016                  MOV     R2,RKASOF(R5)    ;REFRESH RKASOF
4774
4775  023242  032702  000200                  BIT     #BIT7,R2
4776  023246  001005                          BNE     71$              ;BR IF NEG OFFSET
4777
4778  023250  020237  001356                  CMP     R2,CYLDIF        ;CHECK POS OFFSET
4779  023254  001406                          BEQ     72$
4780  023256  104123                          ERROR   123              ;OFFSET IN A2 NOT = RKASOF
4781  023260  000404                          BR      72$              ;AFTER SEEK TO SELF
4782
4783  023262  020137  001356          71$:    CMP     R1,CYLDIF        ;CHECK NEG OFFSET
4784  023266  001401                          BEQ     72$
4785  023270  104123                          ERROR   123              ;OFFSET IN A2 NOT = RKASOF
4786                                                                   ;AFTER SEEK TO SELF
4787  023272                          72$:
4788
4789  023272  004737  034214                  JSR     PC,SUBCLR
4790  023276  104024                          ERROR   24               ;CERR AFTER SCLR
4791
4792  023300  012737  000012  001346          MOV     #10.,TOCYL
4793  023306  012765  000012  000020          MOV     #10.,RKDC(R5)    ;SETUP CYL 10
4794                                                                   ;DO ACTUAL IMPLIED SEEK TO CYL 10 TO VERIFY
4795                                                                   ;OFFSET BIT IN RKMR2 CLEARED
4796
4797
4798  023314  012700  001726                  MOV     #RHTAB,R0
4799  023320  012737  000025  007354          MOV     #<RDHEAD>,HCS1
4800  023326  004737  032262                  JSR     PC,DATCMD        ;DO DATA X FOR CMD & GET CONTR RDY
4801  023332  104171                          ERROR   171              ;NO RDY AFTER READ HEADER CMD
4802  023334  032737  100000  007354          BIT     #CERR,HCS1
4803  023342  001405                          BEQ     74$
4804  023344  104174                          ERROR   174              ;CERR AFTER READ HEADER CMD
4805  023346  104401  045354                  TYPE    ,MSG26           ;ABORTING BAL OF TESTS
4806  023352  000137  031452                  JMP     $EOP
4807
4808  023356  016520  000024          74$:    MOV     RKDB(R5),(R0)+   ;1'ST WORD FROM SILO TO RHTAB
4809  023362  016520  000024                  MOV     RKDB(R5),(R0)+   ;2'ND WORD
4810  023366  016520  000024                  MOV     RKDB(R5),(R0)+   ;3'RD WORD
4811
4812
4813  023372  032765  100000  000010          BIT     #DLT,RKCS2(R5)
4814  023400  001407                          BEQ     75$
4815  023402  004737  033664                  JSR     PC,GSTAT
4816  023406  104173                          ERROR   173              ;DLT AFTER READ HEADER CMD
4817  023410  104401  045354                  TYPE    ,MSG26           ;ABORTING BAL OF TESTS
4818  023414  000137  031452                  JMP     $EOP
```

```
4819  023420                                  75$:
4820
4821  023420  012737  010340  007444            MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4822  023426  005037  007446                    CLR     E.B0                ;EXPECTED MSG B0
4823  023432  012737  001720  007450            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4824  023440  012737  000001  007452            MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4825  023446  005037  007454                    CLR     E.A2                ;EXPECTED MSG A2
4826  023452  012737  000002  007456            MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4827  023460  012737  000003  007462            MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4828
4829  023466  004737  033042                    JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4830  023472  000003                            .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
4831  023474  104301                            ERROR   301                 ;MSG A0 ERROR AFTER READ HEADER CMD
4832  023476  104271                            ERROR   271                 ;MSH B0 ERROR
4833  023500  104302                            ERROR   302                 ;MSG A1 ERROR
4834  023502  104272                            ERROR   272                 ;MSG B1 ERROR
4835
4836  023504  023737  001726  001346            CMP     RHTAB,TOCYL         ;CHECK WORD 0 ONLY, CYL#
4837  023512  001401                            BEQ     73$                 ;BR IF SAME
4838  023514  104051                            ERROR   51                  ;WRONG CYL# ON HEADER
4839  023516                                  73$:
4840
4841
4842  023516  032737  002000  007402            BIT     #D.OFF,HMR2
4843  023524  001401                            BEQ     9$
4844  023526  104101                            ERROR   101                 ;OFFSET NOT CLEARED AFTER READ HEADER WITH MOVEMENT
4845
4846  023530  023727  001360  000012  9$:       CMP     CYLADD,#10.
4847  023536  001401                            BEQ     10$
4848  023540  104122                            ERROR   122                 ;DID NOT GO TO CYL 10
4849
4850  023542  005737  001356          10$:      TST     CYLDIF
4851  023546  001401                            BEQ     16$
4852  023550  104101                            ERROR   101                 ;OFFSET NOT CLEARED IN RKMR2
4853
4854  023552  004737  034214          16$:      JSR     PC,SUBCLR
4855  023556  104024                            ERROR   24                  ;CERR AFTER SCLR
4856
4857  023560  012737  000017  007354            MOV     #SEEK,HCS1
4858  023566  004737  032224                    JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
4859  023572  104131                            ERROR   131                 ;NO RDY AFTER SEEK CMD
4860
4861  023574  013737  001420  007412            MOV     T50000,TEMP1        ;SETUP TIMEOUT
4862  023602  004737  032730                    JSR     PC,FATT2            ;FIND ATTN
4863  023606  104132                            ERROR   132                 ;NO ATTN AFTER SEEK CMD
4864
4865  023610  032737  100000  007354            BIT     #CERR,HCS1
4866  023616  001401                            BEQ     76$
4867  023620  104210                            ERROR   210                 ;CERR AFTER SEEK CMD
4868
4869  023622                                  76$:
4870
4871
4872  023622  032702  000200                    BIT     #BIT7,R2            ;SEE IF DOING NEG OFFSETS
4873  023626  001014                            BNE     18$                 ;BR IF YES
4874
```

```
                                INC     R2
                                CMP     R2,#61          ;SEE IF JUST DID MAX POS OFFSET
                                BEQ     20$             ;BR IF YES
                                JMP     1$              ;ELSE DO NEXT POS OFFSET

                        20$:    MOV     #201,R2         ;SETUP NEG OFFSET FOR RKASOF
                                MOV     #101,R1         ;SETUP NEG OFFSET OFOR MSG A
                                JMP     1$              ;DO NEG OFFSET

                        18$:    INC     R1
                                INC     R2
                                CMP     R2,#261         ;SEE IF ALL NEG OFFSETS DONE
                                BEQ     TST14           ;;GO TO NEXT TST
                                JMP     1$              ;DO ANOTHER

;*****************************************************************
;*TEST 14        TEST READ DATA AT ALL HEAD OFFSET POSITIONS
;*
;*      THIS TEST VERIFIES THAT THE HEAD OFFSET LOGIC IS OPERATIONAL BY
;*      WRITING ALL 1'S PATTERNS ON CYLINDER 0, HEAD 0. THEN
;*      PERFORMING READ DATA FROM CENTERLINE AND MOVING OUT + AND - OFFSET
;*      POSITIONS UNTIL A FAILURE OCCURES.  THE FAILING OFFSET POSITIONS
;*      ARE TYPED OUT.
;*      OFFSET CODES ARE ALSO VERIFIED BY READING MSG A, STATUS 00 & 10.
;*
;*      ALL HEADS ARE TESTED AT CYLINDER 0
;*      IF THERE ARE NO FAILURES AT ALL, THIS INDICATES THAT
;*
;*              A. HEADS DID NOT MOVE AT ALL
;*      OR      B. THE COMBINATION OF DISC SURFACE, HEADS, R/W AMP
;*                 ARE EXCEPTIONALL ' GOOD.
;*
;*      NOTE THAT THE OFFSET FAILURE IS NOT AN ERROR,
;*      BUT AN INDICATION OF SURFACE, HEAD & R/W ELECTRONICS QUALITY ONLY.
;*
;*****************************************************************
TST14:  SCOPE
                                MOV     #1,$TIMES       ;;DO 1 ITERATION
                                MOV     #STACK,SP       ;RESTORE STK PTR

                                JSR     PC,SUBCLR
                                ERROR   24              ;CERR AFTER SCLR

                                CLR     SECTOR
                        11$:    MOV     SECTOR,RKDA(R5)
                                MOV     #DATA1,RKBA(R5) ;WRITE ALL 1'S
                                BIS     #BAI,RKCS2(R5)  ;BUS ADDR INCR INHIB
                                MOV     #-256.,RKWC(R5) ;SECTOR 0 ONLY
                                                        ;WILL DO IMPLIED SEEK TO CYL 0
                                                        ;WAS ON CYL 1 FROM LAST TEST

                                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
```

```
4931  024002  001465                          BEQ     67$             ;BR IF NO ERRORS
4932
4933  024004  032737  000200  007370          BIT     #BSE,HEP        ;SEE IF BAD SECTOR FLAG
4934  024012  001421                          BEQ     65$             ;BR IF NO
4935  024014  004737  035700                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
4936  024020  000455                          BR      66$             ;RETURN HERE IF NO
4937
4938  024022  005237  001402                  INC     SECTOR          ;RETURN HERE IF YES
4939  024026  023727  001402  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
4940  024034  001003                          BNE     64$             ;BR IF NO
4941  024036  104046                          ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
4942  024040  000137  025436                  JMP     10$             ;BYPASS TEST
4943  024044  012765  100000  000000  64$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
4944  024052  000137  023724                  JMP     11$
4945  024056  104012                  65$:    ERROR   12              ;CERR WITH WRITE DATA CMD
4946
4947  024060  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4948  024066  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4949  024072  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4950  024100  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4951  024106  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4952  024112  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4953  024120  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4954
4955  024126  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4956  024132  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4957  024134  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4958  024136  104023                          ERROR   23              ;MSH B0 ERROR
4959  024140  104053                          ERROR   53              ;MSG A1 ERROR
4960  024142  104025                          ERROR   25              ;MSG B1 ERROR
4961  024144  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
4962  024150  000137  031452                  JMP     $EOP
4963  024154  104063                  66$:    ERROR   63              ;BAD SECTOR NOT LISTED IN TABLE
4964  024156                           67$:
4965
4966  024156  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4967  024164  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
4968  024170  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4969  024176  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4970  024204  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
4971  024210  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4972  024216  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4973
4974  024224  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4975  024230  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4976  024232  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4977  024234  104023                          ERROR   23              ;MSH B0 ERROR
4978  024236  104053                          ERROR   53              ;MSG A1 ERROR
4979  024240  104025                          ERROR   25              ;MSG B1 ERROR
4980  024242  012765  001500  000004          MOV     #DATA1,RKBA(R5)
4981  024250  052765  000020  000010          BIS     #BAI,RKCS2(R5)
4982  024256  012765  177400  000002          MOV     #-256.,RKWC(R5)
4983  024264  013765  001402  000006          MOV     SECTOR,RKDA(R5)
4984
4985  024272  012737  000031  007354          MOV     #<WRTCHK>,HCS1
4986  024300  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
```

```
                                        ERROR   15                      ;NO RDY AFTER WRITE CHECK CMD
                                        JSR     PC,GSTAT                ;GET FRESH STATUS
                                        BIT     #CERR,HCS1
                                        BEQ     69$
                                        BIT     #WCE,HCS2               ;SEE IF WRITE CHECK ERROR
                                        BEQ     68$
                                        MOV     RKDB(R5),WD1            ;ACTUAL WORD FOR PRINTOUT
                                        MOV     DATA1,WD2                       ;EXPECTED WORD FOR TYPEOUT
                                        ERROR   16                      ;WCE AFTER WRITE CMD
                                        BR      69$

                                68$:    ERROR   22                      ;CERR AFTER WRITE CHECK 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   57                      ;MSG A0 ERROR AFTER WRITE CHECK CMD
                                        ERROR   31                      ;MSH B0 ERROR
                                        ERROR   60                      ;MSG A1 ERROR
                                        ERROR   32                      ;MSG B1 ERROR
                                        TYPE    ,MSG26                  ;ABORTING BAL OF TESTS
                                        JMP     $EOP

                                69$:

                                        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   57                      ;MSG A0 ERROR AFTER WRITE CHECK CMD
                                        ERROR   31                      ;MSH B0 ERROR
                                        ERROR   60                      ;MSG A1 ERROR
                                        ERROR   32                      ;MSG B1 ERROR

                                        TYPE    ,MSG8                   ;READ WITH OFFSET TEST
                                        CLR     R1                      ;HEAD #

                                9$:     MOV     #1,R0                   ;INIT OFFSET COUNTER
                                        TYPE    ,MSG9                   ;HEAD #
                                        MOV     R1,-(SP)                ;;SAVE R1 FOR TYPEOUT
                                                                        ;;TYPE HEAD #
                                        TYPOS                           ;;GO TYPE--OCTAL ASCII
                                        .BYTE   1                       ;;TYPE 1 DIGIT(S)
```

```
5043  024557  000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
5044  024560  104401  001205               TYPF    ,$CRLF
5045
5046  024564  005037  001456       1$:     CLR     OFFERR          ;WRITE CHECK ERROR FLAG
5047
5048  024570  004737  034214               JSR     PC,SUBCLR
5049  024574  104024                       ERROR   24              ;CERR AFTER SCLR
5050
5051  024576  010065  000016               MOV     R0,RKASOF(R5)   ;OFFSET VALUE
5052  024602  000301                       SWAB    R1
5053  024604  010165  000006               MOV     R1,RKDA(R5)     ;HEAD NO.
5054  024610  000301                       SWAB    R1
5055
5056  024612  012737  024700  001176       MOV     #70$,$ESCAPE
5057  024620  012737  000015  007354       MOV     #OFFSET,HCS1
5058  024626  004737  032224               JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
5059  024632  104033                       ERROR   33              ;NO RDY AFTER OFFSET CMD
5060
5061  024634  012737  032140  007444       MOV     #<D.PIP!D.SPIN!D.OFF!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5062  024642  005037  007446               CLR     E.B0
5063  024646  012737  001720  007450       MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
5064  024654  012737  000001  007452       MOV     #1,E.B1
5065
5066  024662  004737  033042               JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5067  024666  000000                       .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5068  024670  104035                       ERROR   35              ;MSG A0 ERROR DURING OFFSET CMD
5069  024672  104061                       ERROR   61              ;MSH B0 ERROR
5070  024674  104036                       ERROR   36              ;MSG A1 ERROR
5071  024676  104062                       ERROR   62              ;MSG B1 ERROR
5072
5073  024700  005037  001176       70$:    CLR     $ESCAPE
5074  024704  013737  001416  007412       MOV     T5000,TEMP1     ;SETUP TIMEOUT
5075  024712  004737  032730               JSR     PC,FATT2        ;FIND ATTN
5076  024716  104034                       ERROR   34              ;NO ATTN AFTER OFFSET CMD
5077
5078
5079  024720  012737  052340  007444       MOV     #<D.DSC!D.OFF!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5080  024726  005037  007446               CLR     E.B0            ;EXPECTED MSG B0
5081  024732  012737  001720  007450       MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5082  024740  012737  000001  007452       MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5083  024746  005037  007454               CLR     E.A2            ;EXPECTED MSG A2
5084  024752  012737  000002  007456       MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5085  024760  012737  000003  007462       MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5086
5087  024766  004737  033042               JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5088  024772  000003                       .WORD   T.A2!T.B2!0     ;& MSGS SPECIFIED HERE
5089  024774  104260                       ERROR   260             ;MSG A0 ERROR AFTER OFFSET CMD
5090  024776  104261                       ERROR   261             ;MSH B0 ERROR
5091  025000  104037                       ERROR   37              ;MSG A1 ERROR
5092  025002  104040                       ERROR   40              ;MSG B1 ERROR
5093
5094
5095  025004  012765  100000  000000       MOV     #CCLR,RKCS1(R5)
5096  025012  0137E-  001222  000010       MOV     $UNIT,RKCS2(R5) ;DRIVE#
5097  025020  01273/  000005  007354       MOV     #CLEAR,HCS1
5098  025026  004737  032224               JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
```

```
5099  025032  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5100  025034  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
5101  025040  000401                          BR      71$
5102  025042  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5103  025044                          71$:
5104
5105  025044  012765  001500  000004          MOV     #DATA1,RKBA(R5)
5106  025052  052765  000020  000010          BIS     #BAI,RKCS2(R5)
5107  025060  012765  177400  000002          MOV     #-256.,RKWC(R5)
5108  025066  013765  001402  000006          MOV     SECTOR,RKDA(R5)
5109  025074  012737  000031  007354          MOV     #WRTCHK,HCS1
5110  025102  004737  032262                  JSR     PC,DATCMD       ;DO WRITE CHECK CMD. & GET CONTR RDY.
5111  025106  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
5112  025110  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
5113  025114  032737  040000  007356          BIT     #WCE,HCS2
5114  025122  001421                          BEQ     2$
5115
5116  025124  016537  000024  001452          MOV     RKDB(R5),WD1    ;GET MISCOMPARED WORD
5117  025132  005237  001456                  INC     OFFERR          ;BAD WRITE CHK ERROR=SET ERR FLG.
5118
5119  025136  005737  001456                  TST     OFFERR
5120  025142  001411                          BEQ     2$
5121  025144  104401  045620                  TYPE    ,MSG39          ;WRITE CHECK FAILURE AT OFFSET
5122  025150  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
5123                                                                  ;;TYPE OFFSET VALUE
5124  025152  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
5125  025154     006                          .BYTE   6               ;;TYPE 6 DIGITS
5126  025155     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
5127  025156  104401  001205                  TYPE    ,$CRLF
5128  025162  104401  001205                  TYPE    ,$CRLF
5129
5130  025166  032700  000200          2$:     BIT     #BIT7,R0        ;SEE IF OFFSET IS + OR -
5131  025172  001023                          BNE     5$              ;BR IF - OFFSET
5132
5133  025174  020027  000060                  CMP     R0,#60
5134  025200  001412                          BEQ     4$
5135  025202  005737  001456                  TST     OFFERR
5136  025206  001404                          BEQ     3$
5137  025210  012700  000200          8$:     MOV     #200,R0         .SETUP FOR NEG OFFSET
5138  025214  000137  024564                  JMP     1$
5139
5140  025220  005200                  3$:     INC     R0
5141  025222  000137  024564                  JMP     1$
5142
5143  025226  005737  001456          4$:     TST     OFFERR
5144  025232  001366                          BNE     8$              ;DO NEG OFFSETS
5145  025234  104401  045462                  TYPE    .MSG37          ;NO WRITE CHECK ERROR AT MAX POS OFFSET
5146                                                                  ;NOTE! EITHER HEADS DID NOT MOVE
5147                                                                  ;OR READ/WRITE AMP IS EXCEPTIONALLY GOOD.
5148  025240  000763                          BR      8$              ;DO NEG OFFSETS
5149
5150  025242  020027  000260          5$:     CMP     R0,#260
5151  025246  001404                          BEQ     6$
5152  025250  005737  001456                  TST     OFFERR
5153  025254  001072                          BNE     TST15           ;;GO TO NEXT TST
5154  025256  000760                          BR      3$
```

```
5155
5156  025260  005737  001456          6$:     TST     OFFERR
5157  025264  001002                          BNE     7$
5158  025266  104401  045540                  TYPE    ,MSG38          ;NO WRITE CHECK ERROR AT MAX NEG OFFSET
5159                                                                  ;NOTE! EITHER HEADS DID NOT MOVE
5160                                                                  ;OR READ/WRITE AMP IS EXECEPTIONALLY GOOD.
5161  025272                          7$:
5162
5163  025272  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5164  025300  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5165  025306  012737  000013  007354          MOV     #RECAL,HCS1
5166  025314  004737  032224                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
5167  025320  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD
5168
5169  025322  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
5170  025330  004737  033664                  JSR     PC,GSTAT
5171  025334  032737  020000  007402          BIT     #D.RTZ,HMR2
5172  025342  001001                          BNE     72$
5173  025344  104244                          ERROR   244             ;RTZ NOT SET DURING RECAL CMD
5174  025346  013737  001406  007414  72$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
5175  025354  004737  032634                  JSR     PC,FATT1        ;FIND ATTN
5176  025360  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD
5177
5178  025362  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5179  025370  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5180  025376  012737  000005  007354          MOV     #CLEAR,HCS1
5181  025404  004737  032224                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5182  025410  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5183  025412  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
5184  025416  000401                          BR      73$
5185  025420  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5186  025422                          73$:
5187
5188
5189  025422  005201                          INC     R1              ;HEAD CTR
5190  025424  020127  000003                  CMP     R1,#3           ;SEE IF ALL HEADS DONE
5191  025430  001402                          BEQ     10$             ;BR IF YES
5192  025432  000137  024542                  JMP     9$              ;ELSE REPEAT ALL FOR NEXT HEAD
5193  025436  104401  045000          10$:    TYPE    ,MSG12          ;OFFSET FAILURES ARE NOT ERRORS
5194                                          ;;*****************************************************************
5195                                          ;*TEST 15       WRITE WITH HEADS OFFSET
5196                                          ;*
5197                                          ;*       THIS TEST VERIFIES THAT WHEN ATTEMPTING TO
5198                                          ;*       WRITE WITH HEADS OFFSET THAT THE OFFSET WILL CLEAR
5199                                          ;*       & THE DRIVE WILL WRITE
5200                                          ;*       SINCE THE WRITE COMMAND HAS AN IMPLIED RTC.
5201                                          ;*       THIS TEST IS PERFORMED FOR MAX POS & NEG OFFSETS ONLY
5202                                          ;*
5203                                          ;*****************************************************************
5204  025442  000004                  TST15:  SCOPE
5205  025444  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
5206  025452  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
5207
5208  025456  012700  000260                  MOV     #260,R0         ;MAX NEG OFFSET
5209
5210  025462  004737  034214          1$:     JSR     PC,SUBCLR
```

```
5211  025466  104024                          ERROR   24              ;CERR AFTER SCLR
5212
5213  025470  010065  000016                  MOV     R0,RKASOF(R5)   ;SET OFFSET
5214
5215  025474  012737  025562  001176          MOV     #64$,$ESCAPE
5216  025502  012737  000015  007354          MOV     #CLRFSET,HCS1
5217  025510  004737  032224                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
5218  025514  104033                          ERROR   33              ;NO RDY AFTER OFFSET CMD
5219
5220  025516  012737  032140  007444          MOV     #<D.PIP!D.SPIN!D.OFF!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5221  025524  005037  007446                  CLR     E.B0
5222  025530  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
5223  025536  012737  000001  007452          MOV     #1,E.B1
5224
5225  025544  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5226  025550  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5227  025552  104035                          ERROR   35              ;MSG A0 ERROR DURING OFFSET CMD
5228  025554  104061                          ERROR   61              ;MSH B0 ERROR
5229  025556  104036                          ERROR   36              ;MSG A1 ERROR
5230  025560  104062                          ERROR   62              ;MSG B1 ERROR
5231
5232  025562  005037  001176          64$:    CLR     $ESCAPE
5233  025566  013737  001416  007412          MOV     TS000,TEMP1     ;SETUP TIMEOUT
5234  025574  004737  032730                  JSR     PC,FATT2        ;FIND ATTN
5235  025600  104034                          ERROR   34              ;NO ATTN AFTER OFFSET CMD
5236
5237
5238  025602  012737  052340  007444          MOV     #<D.DSC!D.OFF!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5239  025610  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
5240  025614  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5241  025622  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5242  025630  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
5243  025634  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5244  025642  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5245
5246  025650  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5247  025654  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5248  025656  104260                          ERROR   260             ;MSG A0 ERROR AFTER OFFSET CMD
5249  025660  104261                          ERROR   261             ;MSH B0 ERROR
5250  025662  104037                          ERROR   37              ;MSG A1 ERROR
5251  025664  104040                          ERROR   40              ;MSG B1 ERROR
5252
5253
5254  025666  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5255  025674  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5256  025702  012737  000005  007354          MOV     #CLEAR,HCS1
5257  025710  004737  032224                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5258  025714  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5259  025716  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
5260  025722  000401                          BR      65$
5261  025724  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5262  025726                          65$:
5263
5264
5265  025726  005037  001402                  CLR     SECTOR
5266  025732  013765  001402  000006  4$:     MOV     SECTOR,RKDA(R5)
```

```
5267  025740  012765  001474  000004          MOV     #DATA0,RKBA(R5) ;WRITE ALL 0'S
5268  025746  012765  000020  000010          BIS     #BAI,RKCS2(R5)  ;BUS ADDR INCR INH
5269  025754  012765  177400  000002          MOV     #-256.,RKWC(R5) ;FULL SECTOR
5270
5271  025762  012737  000023  007354          MOV     #<WRDATA>,HCS1
5272  025770  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
5273  025774  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
5274  025776  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
5275  026002  032737  100000  007354          BIT     #CERR,HCS1
5276  026010  001465                          BEQ     69$             ;BR IF NO ERRORS
5277
5278  026012  032737  000200  007370          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
5279  026020  001421                          BEQ     67$             ;BR IF NO
5280  026022  004737  035700                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
5281  026026  000455                          BR      68$             ;RETURN HERE IF NO
5282
5283  026030  005237  001402                  INC     SECTOR          ;RETURN HERE IF YES
5284  026034  023727  001402  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
5285  026042  001003                          BNE     66$             ;BR IF NO
5286  026044  104046                          ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
5287  026046  000137  026756                  JMP     3$              ;BYPASS TEST
5288  026052  012765  100000  000000  66$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
5289  026060  000137  025732                  JMP     4$
5290  026064  104012                  67$:    ERROR   12              ;CERR WITH WRITE DATA CMD
5291
5292  026066  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5293  026074  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
5294  026100  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5295  026106  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5296  026114  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
5297  026120  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5298  026126  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5299
5300  026134  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5301  026140  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5302  026142  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
5303  026144  104023                          ERROR   23              ;MSH B0 ERROR
5304  026146  104053                          ERROR   53              ;MSG A1 ERROR
5305  026150  104025                          ERROR   25              ;MSG B1 ERROR
5306  026152  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
5307  026156  000137  031452                  JMP     $EOP
5308  026162  104063                  68$:    ERROR   63              ;BAD SECTOR NOT LISTED IN TABLE
5309  026164                           69$:
5310
5311  026164  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5312  026172  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
5313  026176  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5314  026204  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5315  026212  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
5316  026216  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5317  026224  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5318
5319  026232  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5320  026236  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5321  026240  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
5322  026242  104023                          ERROR   23              ;MSH B0 ERROR
```

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5323  026244  104053                          ERROR   53              ;MSG A1 ERROR
5324  026246  104025                          ERROR   25              ;MSG B1 ERROR
5325
5326  026250  012765  000002  000026          MOV     #2,RKMR1(R5)    ;SELECT WORD 2
5327  026256  004737  033664                  JSR     PC,GSTAT
5328  026262  005737  001356                  TST     CYLDIF          ;SEE IF MSG A2=0
5329  026266  001401                          BEQ     70$             ;BR IF YES
5330  026270  104104                          ERROR   104             ;MSG A2 NOT CLEARED AFTER WRITE CMD WITH OFFSET
5331  026272  005737  001360          70$:    TST     CYLADD          ;SEE IF MSG B2=0
5332  026276  001401                          BEQ     71$             ;BR IF YES
5333  026300  104105                          ERROR   105             ;MSG B2 NOT CLEARED AFTER WRITE CMD WITH OFFSET
5334  026302                          71$:
5335
5336  026302  104415                          SCOP1
5337  026304  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
5338
5339  026310  004737  034214                  JSR     PC,SUBCLR
5340  026314  104024                          ERROR   24              ;CERR AFTER SCLR
5341
5342
5343  026316  012765  001474  000004          MOV     #DATAO,RKBA(R5)
5344  026324  052765  000020  000010          BIS     #BAI,RKCS2(R5)
5345  026332  012765  177400  000002          MOV     #-256.,RKWC(R5)
5346  026340  013765  001402  000006          MOV     SECTOR,RKDA(R5)
5347
5348  026346  012737  000031  007354          MOV     #<WRTCHK),HCS1
5349  026354  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
5350  026360  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
5351  026362  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
5352  026366  032737  100000  007354          BIT     #CERR,HCS1
5353  026374  001453                          BEQ     73$
5354  026376  032737  040000  007356          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
5355  026404  001410                          BEQ     72$
5356  026406  016537  000024  001452          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
5357  026414  013737  001474  001454          MOV     DATAO,WD2               ;EXPECTED WORD FOR TYPEOUT
5358  026422  104016                          ERROR   16              ;WCE AFTER WRITE CMD
5359  026424  000437                          BR      73$
5360
5361  026426  104022                  72$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
5362
5363  026430  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5364  026436  005037  007446                  CLR     E.B0                    ;EXPECTED MSG B0
5365  026442  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5366  026450  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5367  026456  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
5368  026462  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5369  026470  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5370
5371  026476  004737  033042                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5372  026502  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5373  026504  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
5374  026506  104031                          ERROR   31              ;MSH B0 ERROR
5375  026510  104060                          ERROR   60              ;MSG A1 ERROR
5376  026512  104032                          ERROR   32              ;MSG B1 ERROR
5377  026514  104401  045354                  TYPE    ,MSG26          ;ABORTING BAL OF TESTS
5378  026520  000137  031452                  JMP     $EOP
```

```
5379
5380  026524                                  73$:
5381
5382  026524  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5383  026532  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
5384  026536  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5385  026544  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5386  026552  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
5387  026556  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5388  026564  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5389
5390  026572  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5391  026576  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
5392  026600  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
5393  026602  104031                          ERROR   31                  ;MSH B0 ERROR
5394  026604  104060                          ERROR   60                  ;MSG A1 ERROR
5395  026606  104032                          ERROR   32                  ;MSG B1 ERROR
5396
5397  026610  020027  000260                  CMP     R0,#260
5398  026614  001004                          BNE     2$                  ;BR IF JUST DID POS OFFSET
5399  026616  012700  000060                  MOV     #60,R0              ;ELSE SETUP FOR POS OFFSET
5400  026622  000137  025462                  JMP     1$
5401
5402  026626                                  2$:
5403
5404  026626  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5405  026634  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5406  026642  012737  000013  007354          MOV     #RECAL,HCS1
5407  026650  004737  032224                  JSR     PC,DOCMD            ;DO RECAL CMD & GET CONTR RDY
5408  026654  104124                          ERROR   124                 ;RDY NOT SET AFTER RECAL CMD
5409
5410  026656  012765  000001  000026          MOV     #1,RKMR1(R5)        ;SELECT WORD 1
5411  026664  004737  033664                  JSR     PC,GSTAT
5412  026670  032737  020000  007402          BIT     #D.RTZ,HMR2
5413  026676  001001                          BNE     74$
5414  026700  104244                          ERROR   244                 ;RTZ NOT SET DURING RECAL CMD
5415  026702  013737  001406  007414  74$:    MOV     T10,TEMP2           ;SETUP TIMEOUT
5416  026710  004737  032634                  JSR     PC,FATT1            ;FIND ATTN
5417  026714  104055                          ERROR   55                  ;NO ATTN AFTER RECAL CMD
5418
5419  026716  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5420  026724  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;DRIVE#
5421  026732  012737  000005  007354          MOV     #CLEAR,HCS1
5422  026740  004737  032224                  JSR     PC,DOCMD            ;DO DRIVE CLEAR CMD & GET CONTR RDY
5423  026744  104151                          ERROR   151                 ;NO RDY AFTER DRIVE CLEAR CMD
5424  026746  004737  032602                  JSR     PC,TSTATN           ;TEST FOR ATTN
5425  026752  000401                          BR      75$
5426  026754  104154                          ERROR   154                 ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5427  026756                                  75$:
5428
5429
5430  026756                                  3$:
5431
```

```
                                ;;*****************************************************************
                                ;*TEST 16       TEST CURRENT CROSS-OVER CYLINDERS
                                ;*
                                ;*      THIS TEST VERIFIES THAT THE DRIVE CAN WRITE & READ OFF
                                ;*      CURRENT CHANGE CYLINDERS X & Y IN THE FOLLOWING WAY:
                                ;*
                                ;*      SPIRAL WRITING IS PERFORMED FROM CYLINDER X TO CYLINDER Y
                                ;*      WITH A DATA PATTERN FILLING THE ENTIRE 2 CYLINDERS.
                                ;*
                                ;*      A WRITE CHECK IS THEN PREFORMED TO VERIFY DATA WAS PROPERLY WRITTEN.
                                ;*      THIS TEST IS PERFORMED FOR ALL 3 HEADS.
                                ;*
                                ;*      CYLINDER X:  63  127  191  255  319  383  RK06
                                ;*      CYLINDER Y:  64  128  192  256  320  384  RK06
                                ;*
                                ;*      CYLINDER X:  127 255  383  511  639  767  RK07
                                ;*      CYLINDER Y:  128 256  384  512  640  768  RK07
                                ;*
                                ;*      ALL ABOVE CYLINDERS IN DECIMAL
                                ;*
                                ;*****************************************************************
026756  000004                  TST16:  SCOPE
026760  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
026766  012706  001100                  MOV     #STACK,SP

026772  005737  001170                  TST     $TMP4           ;SEE IF RK07
026776  001403                          BEQ     5$              ;BR IF NO
027000  012700  001436                  MOV     #CYL7,R0        ;ELSE LOAD UP RK07 TABLE
027004  000402                          BR      1$
027006  012700  001422          5$:     MOV     #CYL,R0         ;RK06 CYL ADDR TABLE

027012  004737  034214          1$:     JSR     PC,SUBCLR
027016  104024                          ERROR   24              ;CERR AFTER SCLR

027020  011065  000020                  MOV     (R0),RKDC(R5)   ;CYL #
027024  012765  001502  000004          MOV     #DPAT1,RKBA(R5) ;DATA PATTERN
027032  052765  000020  000010          BIS     #BAI,RKCS2(R5)  ;BUSS ADDR INCREMENT INHIBIT
027040  012765  076000  000002          MOV     #-6*22.*256.,RKWC(R5) ;WORD COUNT TO SPIRAL & FILL 2 CYLINDERS

027046  012737  000023  007354          MOV     #<WRDATA>,HCS1
027054  004737  032262                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
027060  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
027062  004737  033664                  JSR     PC,GSTAT        ;GET FRESH STATUS
027066  032737  100000  007354          BIT     #CERR,HCS1
027074  001451                          BEQ     67$             ;BR IF NO ERRORS

027076  032737  000200  007370          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
027104  001405                          BEQ     65$             ;BR IF NO
027106  004737  035700                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
027112  000441                          BR      66$             ;RETURN HERE IF NO
027114  000137  027574                  JMP     3$              ;RET HERE IF YES
027120  104012                  65$:    ERROR   12              ;CERR WITH WRITE DATA CMD

027122  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
027130  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
```

```
 5488  027134  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5489  027142  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
 5490  027150  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
 5491  027154  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
 5492  027162  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
 5493
 5494  027170  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
 5495  027174  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
 5496  027176  104052                          ERROR   52                  ;MSG A0 ERROR AFTER WRITE DATA CMD
 5497  027200  104023                          ERROR   23                  ;MSH B0 ERROR
 5498  027202  104053                          ERROR   53                  ;MSG A1 ERROR
 5499  027204  104025                          ERROR   25                  ;MSG B1 ERROR
 5500  027206  104401  045354                  TYPE    ,MSG26              ;ABORTING BAL OF TESTS
 5501  027212  000137  031452                  JMP     $EOP
 5502  027216  104063                  66$:    ERROR   63                  ;BAD SECTOR NOT LISTED IN TABLE
 5503  027220                           67$:
 5504
 5505  027220  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 5506  027226  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
 5507  027232  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5508  027240  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
 5509  027246  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
 5510  027252  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
 5511  027260  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
 5512
 5513  027266  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
 5514  027272  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
 5515  027274  104052                          ERROR   52                  ;MSG A0 ERROR AFTER WRITE DATA CMD
 5516  027276  104023                          ERROR   23                  ;MSH B0 ERROR
 5517  027300  104053                          ERROR   53                  ;MSG A1 ERROR
 5518  027302  104025                          ERROR   25                  ;MSG B1 ERROR
 5519
 5520  027304  011065  000020                  MOV     (R0),RKDC(R5)
 5521  027310  012765  001502  000004          MOV     #DPAT1,RKBA(R5)
 5522  027316  052765  000020  000010          BIS     #BAI,RKCS2(R5)
 5523  027324  012765  076000  000002          MOV     #-6*22.*256.,RKWC(R5)
 5524
 5525  027332  012737  000031  007354          MOV     #<WRTCHK>,HCS1
 5526  027340  004737  032262                  JSR     PC,DATCMD           ;DO DATA X FOR CMD & GET CONTR RDY
 5527  027344  104015                          ERROR   15                  ;NO RDY AFTER WRITE CHECK CMD
 5528  027346  004737  033b64                  JSR     PC,GSTAT            ;GET FRESH STATUS
 5529  027352  032737  100000  007354          BIT     #CERR,HCS1
 5530  027360  001453                          BEQ     69$
 5531  027362  032737  040000  007356          BIT     #WCE,HCS2           ;SEE IF WRITE CHECK ERROR
 5532  027370  001410                          BEQ     68$
 5533  027372  016537  000024  001452          MOV     RKDB(R5),WD1        ;ACTUAL WORD FOR PRINTOUT
 5534  027400  013737  001502  001454          MOV     DPAT1,WD2                   ;EXPECTED WORD FOR TYPEOUT
 5535  027406  104016                          ERROR   16                  ;WCE AFTER WRITE CMD
 5536  027410  000437                          BR      69$
 5537
 5538  027412  104022                  68$:    ERROR   22                  ;CERR AFTER WRITE CHECK CMD
 5539
 5540  027414  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 5541  027422  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
 5542  027426  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5543  027434  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
```

```
5544  027442  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
5545  027446  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5546  027454  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5547
5548  027462  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5549  027466  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
5550  027470  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
5551  027472  104031                          ERROR   31                  ;MSH B0 ERROR
5552  027474  104060                          ERROR   60                  ;MSG A1 ERROR
5553  027476  104032                          ERROR   32                  ;MSG B1 ERROR
5554  027500  104401  045354                  TYPE    ,MSG26              ;ABORTING BAL OF TESTS
5555  027504  000137  031452                  JMP     $EOP
5556
5557  027510                          69$:
5558
5559  027510  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5560  027516  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
5561  027522  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5562  027530  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5563  027536  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
5564  027542  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5565  027550  012737  000003  007462          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5566
5567  027556  004737  033042                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5568  027562  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
5569  027564  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
5570  027566  104031                          ERROR   31                  ;MSH B0 ERROR
5571  027570  104060                          ERROR   60                  ;MSG A1 ERROR
5572  027572  104032                          ERROR   32                  ;MSG B1 ERROR
5573  027574  022027  000577          3$:     CMP     (R0)+,#383.         ;ALL CYLINDERS DONE?
5574  027600  001402                          BEQ     4$                  ;BR IF YES
5575  027602  000137  027012                  JMP     1$                  ;ELSE REPEAT
5576
5577  027606                          4$:
5578
5579  027606  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5580  027614  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
5581  027622  012737  000013  007354          MOV     #RECAL,HCS1
5582  027630  004737  032224                  JSR     PC,DOCMD            ;DO RECAL CMD & GET CONTR RDY
5583  027634  104124                          ERROR   124                 ;RDY NOT SET AFTER RECAL CMD
5584
5585  027636  012765  000001  000026          MOV     #1,RKMR1(R5)        ;SELECT WORD 1
5586  027644  004737  033664                  JSR     PC,GSTAT
5587  027650  032737  020000  007402          BIT     #D.RTZ,HMR2
5588  027656  001001                          BNE     70$
5589  027660  104244                          ERROR   244                 ;RTZ NOT SET DURING RECAL CMD
5590  027662  013737  001406  007414  70$:    MOV     T10,TEMP2           ;SETUP TIMEOUT
5591  027670  004737  032634                  JSR     PC,FATT1            ;FIND ATTN
5592  027674  104055                          ERROR   55                  ;NO ATTN AFTER RECAL CMD
5593
5594  027676  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5595  027704  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;DRIVE#
5596  027712  012737  000005  007354          MOV     #CLEAR,HCS1
5597  027720  004737  032224                  JSR     PC,DOCMD            ;DO DRIVE CLEAR CMD & GET CONTR RDY
5598  027724  104151                          ERROR   151                 ;NO RDY AFTER DRIVE CLEAR CMD
5599  027726  004737  032602                  JSR     PC,TSTATN           ;TEST FOR ATTN
```

```
5600  027732  000401                        BR      71$
5601  027734  104154                        ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5602  027736                        71$:
5603
5604
5605  027736                        2$:
5606
5607                                ;;*****************************************************************
5608                                ;*TEST 17       TEST HEAD SWITCHING TIME
5609                                ;*
5610                                ;*      TESTS THE ABILITY TO SWITCH HEADS IN LESS THEN 10MS WHEN HEADS SPIRAL.
5611                                ;*
5612                                ;*      1. SECTOR 23(8) IS FIRST LOCATED AND A WRITE DATA COMMAND OF 512 WORDS
5613                                ;*         TO SECTOR 25(8) IS ISSUED.
5614                                ;*      2. THE PROGRAM NOW KNOWS THAT THE DRIVE WILL NOT HAVE TO TRAVEL
5615                                ;*         A FULL REVOLUTION BEFORE FINDING SECTOR 25(8).
5616                                ;*      3. SINCE EACH SECTOR TAKES APPROX. 1.2MS, THE TIME BETWEEN
5617                                ;*         THE START OF THE WRITE COMMAND (FROM SECTOR 25(8), HEAD 0; TO
5618                                ;*         SECTOR 0, HEAD 1) AND CONTROLLER READY SHOULD BE APPROX 6MS
5619                                ;*
5620                                ;*      THE ABOVE IS REPEATED FOR HEAD SWITCHING BETWEEN 1 TO 2
5621                                ;*
5622                                ;*      THIS TEST IS BYPASSED IF NEITHER L OR P CLOCK IS PRESENT
5623                                ;*
5624                                ;*****************************************************************
5625  027736  000004                T17:    SCOPE
5626  027740  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
5627  027746  012706  001100                MOV     #STACK,SP
5628
5629  027752  005737  007522                TST     DOTIM           ;BYPASS THIS TEST IF
```

```
 5630  027756  001001                    BNE     1$              ;NEITHER L OR P CLOCK PRESENT
 5631  027760  000526                    BR      TST20           ;;GO TO NEXT TEST
```

```
5632
5633  027762  012737  000025  007422  1$:     MOV     #25,TEMP5       ;HEAD 0, SECTOR 21 TO BE PUT IN RKDA
5634  027770  004737  034214          2$:     JSR     PC,SUBCLR
5635  027774  104024                  ERROR   24              ;CERR AFTER SCLR
5636
5637  027776  004737  035000          JSR     PC,FSEC23       ;FIND SECTOR 23
5638  030002  104106                  ERROR   106             ;CANNOT FIND SECTOR 23
5639  030004  000514                  BR      TST20           ;;GO TO NEXT TEST
5640
5641  030006  012765  001476  000004  MOV     #DATA01,RKBA(R5) ;DATA 0101
5642  030014  052765  000020  000010  BIS     #BAI,RKCS2(R5)  ;BUSS ADDR INCREMENT INHIBIT
5643  030022  012765  177000  000002  MOV     #-512.,RKWC(R5) ;WORD COUNT
5644  030030  013765  007422  000006  MOV     TEMP5,RKDA(R5)  ;HEAD & SECTOR
5645  030036  012737  000023  007354  MOV     #WRDATA,HCS1
5646  030044  053737  001170  007354  BIS     $TMP4,HCS1
5647  030052  013765  007354  000000  MOV     HCS1,RKCS1(R5)  ;DO WRITE DATA CMD
5648
5649  030060  012737  004000  007412  MOV     #4000,TEMP1     ;2000 IS IN VER 30,
5650                                                          ;CHANGE TO 4000 7-DEC-77
5651
5652  030066  004737  033010          JSR     PC,DLY          ;DO DELAY
5653
5654  030072  032765  000200  000000  7$:     BIT     #RDY,RKCS1(R5)  ;LOOK FOR CONTROLLER READY
5655  030100  001006                  BNE     8$
5656  030102  004737  032320          JSR     PC,FRDY         ;FIND RDY AND GET FRESH STATUS
5657  030106  104011                  ERROR   11              ;NO RDY AFTER SEL DRV CMD
5658  030110  004737  033664          JSR     PC,GSTAT
5659  030114  104107                  ERROR   107             ;HEAD SWITCHING LONGER THAN DELAY
5660
5661  030116  032737  100000  007354  8$:     BIT     #CERR,HCS1
5662  030124  001444                  BEQ     3$
5663  030126  104012                  ERROR   12              ;CERR AFTER WRITE DATA
5664
5665  030130  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5666  030136  005037  007446                  CLR     E.B0            ;EXPECTED MSG B0
5667  030142  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5668  030150  012737  000001  007452          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5669  030156  005037  007454                  CLR     E.A2            ;EXPECTED MSG A2
5670  030162  012737  000002  007456          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5671  030170  012737  000003  007462          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5672
5673  030176  004737  033042          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5674  030202  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5675  030204  104052                  ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
5676  030206  104023                  ERROR   23              ;MSH B0 ERROR
5677  030210  104053                  ERROR   53              ;MSG A1 ERROR
5678  030212  104025                  ERROR   25              ;MSG B1 ERROR
5679
5680  030214  023727  007422  000425  CMP     TEMP5 #425      ;HEAD 1,SECTOR 21 DONE?
5681  030222  001405                  BEQ     TST20           ;;GO TO NEXT TEST
5682  030224  012737  000425  007422  MOV     #425,TEMP5
5683  030232  000137  027770          JMP     2$              ;ELSE REPEAT FOR HEAD 1, SECTOR 21
5684  030236                  3$:
5685
5686                          ;;*****************************************************************
5687                          ;*TEST 20        DRIVE OFF TRACK TEST
```

```
                                        ;*
                                        ;*      THIS TEST CHECKS FOR SERVO OSCILLATIONS DURING SETTLING TIME BEYOND
                                        ;*      THE ALLOTED 3MS.
                                        ;*
                                        ;*      1.  INITIALLY, EVERY CYLINDER IS FORMATTED WITH IDENTICAL HEADERS
                                        ;*          (UNIQUE TO EACH CYLINDER)
                                        ;*      2.  A FULL SECTOR WRITE COMMAND IS ISSUED BY A SINGLE CYL SEEK FROM 0 TO 1.
                                        ;*          AS HEADERS ARE IDENTICAL, THE NEXT SECTOR TO COME UNDER THE
                                        ;*          HEADS WILL IMMEDIATELY BE WRITTEN.
                                        ;*      3.  IF THERE IS OSCILLATION SENSED BY READING THE TRIBITS,
                                        ;*          DRIVE OFF TRACK ERROR WILL SET.
                                        ;*
                                        ;*      IN THIS MANNER OSCILLATING SEEKS ARE PERFORMED BETWEEN ALL MAJOR CYLINDERS.
                                        ;*      100 OSCILLATIONS ARE PERFORMED AT EACH MAJOR CYLINDER
                                        ;*      BEFORE DOING THE NEXT CYLINDER
                                        ;*
                                        ;*****************************************************************
030236  000004                        ST20:   SCOPE
030240  012737  000001  001174                MOV     #1,$TIMES       ;;DO 1 ITERATION
030246  012706  001100                        MOV     #STACK,SP       ;RESTORE STK PTR
030252  005237  007340                        INC     BADHDR          ;USED FOR VALID HALT
030256  005037  001346                        CLR     TOCYL
030262  012737  100000  007422                MOV     #BIT15,TEMPS

030270  004737  034214                1$:     JSR     PC,SUBCLR
030274  104024                              ERROR   24              ;CERR AFTER SCLR

030276  012700  001522                        MOV     #HDTAB,R0       ;FORMAT HEADERS ON ALL MAJOR CYL.

030302  013720  001346                2$:     MOV     TOCYL,(R0)+     ;HEADER WORD 0: CYL #
030306  012720  140000                        MOV     #140000,(R0)+   ;HEADER WORD 1: ALL SECTOR 0
030312  012710  140000                        MOV     #140000,(R0)    ;HEADER WORD 2: XOR OF 0 & 1
030316  053720  001346                        BIS     TOCYL,(R0)+     ;ADD CYL # TO WORD 2

030322  020027  001726                        CMP     R0,#HDTAB+132.  ;ALL 22 SECTORS DONE? (22X6=132)
030326  001365                              BNE     2$              ;BR IF NO

030330  012765  001522  000004                MOV     #HDTAB,RKBA(R5)
030336  012765  177676  000002                MOV     #-66.,RKWC(R5)
030344  013765  001346  000020                MOV     TOCYL,RKDC(R5)

030352  012737  000027  007354                MOV     #<WRHEAD>,HCS1
030360  004737  032262                        JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
030364  104200                              ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
030366  004737  033654                        JSR     PC,GSTAT        ;GET FRESH STATUS
030372  032737  100000  007354                BIT     #CERR,HCS1
030400  001405                              BEQ     64$
030402  104201                              ERROR   201             ;CERR AFTER WRITE HEADER CMD
030404  104401  045354                      TYPE    ,MSG26          ;ABORTING BAL OF TESTS
030410  000137  031452                      JMP     $EOP
030414                                64$:

030414  006137  007422                        ROL     TEMPS           ;SET CARRY ONLY ONCE
030420  006137  001346                        ROL     TOCYL           ;SELECT NEXT MAJOR CYL
030424  023737  001346  015436                CMP     TOCYL,MC1       ;ALL MAJOR CYL FORMATTED?
```

```
5744  030432  001316                          BNE     1$                  ;BR IF NO
5745  030434  005065  000020                  CLR     RKDC(R5)            ;SETUP TO RETURN TO CYL 0
5746
5747  030440  012737  000017  007354          MOV     #SEEK,HCS1
5748  030446  004737  032224                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
5749  030452  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
5750
5751  030454  013737  001420  007412          MOV     T50000,TEMP1        ;SETUP TIMEOUT
5752  030462  004737  032730                  JSR     PC,FATT2            ;FIND ATTN
5753  030466  104132                          ERROR   132                 ;NO ATTN AFTER SEEK CMD
5754
5755  030470  032737  100000  007354          BIT     #CERR,HCS1
5756  030476  001401                          BEQ     65$
5757  030500  104210                          ERROR   210                 ;CERR AFTER SEEK CMD
5758
5759  030502                          65$:
5760
5761  030502  005000                          CLR     R0                  ;ITERATION COUNTER
5762  030504  012737  000001  001346          MOV     #1,TOCYL            ;SETUP TO CYL #
5763  030512  005037  001344                  CLR     FRCYL
5764
5765  030516  104415                          SCOP1
5766  030520  012706  001100                  MOV     #STACK,SP           ;RESTORE STK PTR
5767
5768  030524  013737  001346  001354          MOV     TOCYL,CALDIF        ;SETUP FOR ERROR PRINTOUT
5769
5770  030532  004737  034214          3$:     JSR     PC,SUBCLR
5771  030536  104024                          ERROR   24                  ;CERR AFTER SCLR
5772
5773  030540  012737  031174  001176          MOV     #FORM,$ESCAPE
5774  030546  013765  001346  000020          MOV     TOCYL,RKDC(R5)      ;GO TO CYL #
5775  030554  012765  001500  000004          MOV     #DATA1,RKBA(R5)     ;ALL 1'S
5776  030562  052765  000020  000010          BIS     #BAI,RKCS2(R5)
5777  030570  012765  177400  000002          MOV     #-256.,RKWC(R5)     ; SECTOR TO BE ALL 1'S
5778
5779  030576  012737  000023  007354          MOV     #WRDATA,HCS1
5780  030604  004737  032262                  JSR     PC,DATCMD           ;DO WRITE DATA CMD & GET CONTR RDY
5781  030610  104011                          ERROR   11                  ;NO RDY AFTER WRITE DATA CMD.
5782
5783  030612  004737  033664                  JSR     PC,GSTAT            ;GET FRESH STATUS
5784  030616  032737  020000  007404          BIT     #D.DROT,HMR3        ;SEE IF DRIVE OFF TRACK
5785  030624  001401                          BEQ     5$
5786  030626  104112                          ERROR   112                 ;DRIVE OFF TRACK AFTER WRITE DATA CMD
5787
5788  030630  032737  100000  007354  5$:     BIT     #CERR,HCS1
5789  030636  001401                          BEQ     6$
5790  030640  104012                          ERROR   12                  ;CERR SET AFTER WRITE DATA CMD
5791
5792  030642                          6$:
5793
5794  030642  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5795  030650  005037  007446                  CLR     E.B0                ;EXPECTED MSG B0
5796  030654  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5797  030662  012737  000001  007452          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5798  030670  005037  007454                  CLR     E.A2                ;EXPECTED MSG A2
5799  030674  012737  000002  007456          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
```

```
5800  030702  012737  000003  007462          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
5801
5802  030710  004737  033042                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
5803  030714  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
5804  030716  104052                          ERROR   52               ;MSG A0 ERROR AFTER WRITE DATA CMD
5805  030720  104023                          ERROR   23               ;MSH B0 ERROR
5806  030722  104053                          ERROR   53               ;MSG A1 ERROR
5807  030724  104025                          ERROR   25               ;MSG B1 ERROR
5808  030726  023737  001360  001346          CMP     CYLADD,TOCYL
5809  030734  001401                          BEQ     7$
5810  030736  104113                          ERROR   113              ;CYL ADDR IN RKMR3 NOT = RKDC
5811
5812  030740                          7$:
5813  030740  104415                          SCOP1
5814  030742  012706  001100                  MOV     #STACK,SP        ;RESTORE STK PTR
5815
5816  030746  004737  034214                  JSR     PC,SUBCLR
5817  030752  104024                          ERROR   24               ;CERR AFTER SCLR
5818
5819                                                                   ;RETURN TO CYL 0
5820  030754  012765  001500  000004          MOV     #DATA1,RKBA(R5)
5821  030762  052765  000020  000010          BIS     #BAI,RKCS2(R5)
5822  030770  012765  177400  000002          MOV     #-256.,RKWC(R5)
5823
5824  030776  012737  000023  007354          MOV     #WRDATA,HCS1
5825  031004  004737  032262                  JSR     PC,DATCMD        ;DO WRITE DATA CMD & GET CONTR RDY
5826  031010  104011                          ERROR   11               ;NO RDY AFTER WRITE DATA CMD
5827
5828  031012  004737  033664                  JSR     PC,GSTAT         ;GET FRESH STATUS
5829  031016  032737  020000  007404          BIT     #D.DROT,HMR3
5830  031024  001401                          BEQ     8$
5831  031026  104112                          ERROR   112              ;DRIVE OFF TRACK AFTER WRITE DATA CMD
5832
5833  031030  032737  100000  007354  8$:     BIT     #CERR,HCS1
5834  031036  001401                          BEQ     9$
5835  031040  104012                          ERROR   12               ;CERR AFTER WRITE DATA CMD
5836
5837  031042                          9$:
5838
5839  031042  012737  010340  007444          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
5840  031050  005037  007446                  CLR     E.B0             ;EXPECTED MSG B0
5841  031054  012737  001720  007450          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5842  031062  012737  000001  007452          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
5843  031070  005037  007454                  CLR     E.A2             ;EXPECTED MSG A2
5844  031074  012737  000002  007456          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
5845  031102  012737  000003  007462          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
5846
5847  031110  004737  033042                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
5848  031114  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
5849  031116  104052                          ERROR   52               ;MSG A0 ERROR AFTER WRITE DATA CMD
5850  031120  104023                          ERROR   23               ;MSH B0 ERROR
5851  031122  104053                          ERRCR   53               ;MSG A1 ERROR
5852  031124  104025                          ERROR   25               ;MSG B1 ERROR
5853  031126  005737  001360                  TST     CYLADD
5854  031132  001401                          BEQ     10$
5855  031134  104042                          ERROR   42               ;NOT BACK TO CYL 0
```

```
5856
5857  031136  005200                    10$:    INC     R0
5858  031140  020027  000144                    CMP     R0,#100.        ;ALL ITERATIONS DONE?
5859  031144  001402                            BEQ     13$             ;BR IF YES
5860  031146  000137  030532                    JMP     3$              ;ELSE DO AGAIN
5861
5862  031152  005000                    13$:    CLR     R0              ;RESET ITERATION CTR
5863  031154  006337  001346                    ASL     TOCYL
5864  031160  023737  001346  015436            CMP     TOCYL,MC1       ;ALL MAJOR CYL DONE?
5865  031166  001402                            BEQ     FORM            ;BR IF YES
5866  031170  000137  030532                    JMP     3$              ;ELSE DO NEXT CYL
5867
5868  031174  005037  001176            FORM:   CLR     $ESCAPE
5869  031200  005037  001346                    CLR     TOCYL           ;RESTORE TO ORIG 22 SECTOR FORMAT.
5870  031204  012737  100000  007422            MOV     #BIT15,TEMP5
5871
5872  031212  004737  034214            12$:    JSR     PC,SUBCLR
5873  031216  104024                            ERROR   24              ;CERR AFTER SCLR
5874
5875  031220  012765  001522  000004            MOV     #HDTAB,RKBA(R5) ;REFORMAT ALL MAJOR CYLINDERS
5876  031226  012765  177676  000002            MOV     #-66.,RKWC(R5)
5877  031234  013765  001346  000020            MOV     TOCYL,RKDC(R5)
5878
5879  031242  013737  001346  001362            MOV     TOCYL,CALADD    ;SETUP
5880  031250  012737  000000  001460            MOV     #0,HEAD         ;TO FILL
5881  031256  012737  000000  001466            MOV     #0,FORMAT       ;HEADER
5882  031264  004737  035212                    JSR     PC,FHDTAB       ;TABLE
5883
5884
5885  031270  012737  000027  007354            MOV     #<WRHEAD>,HCS1
5886  031276  004737  032262                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
5887  031302  104200                            ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
5888  031304  004737  033664                    JSR     PC,GSTAT        ;GET FRESH STATUS
5889  031310  032737  100000  007354            BIT     #CERR,HCS1
5890  031316  001405                            BEQ     64$
5891  031320  104201                            ERROR   201             ;CERR AFTER WRITE HEADER CMD
5892  031322  104401  045354                    TYPE    ,MSG26          ;ABORTING BAL OF TESTS
5893  031326  000137  031452                    JMP     $EOP
5894  031332                            64$:
5895
5896
5897  031332  006137  007422                    ROL     TEMP5
5898  031336  006137  001346                    ROL     TOCYL
5899  031342  023737  001346  015436            CMP     TOCYL,MC1       ;ALL MAJOR CYL REFORMATTED?
5900  031350  001320                            BNE     12$             ;BR IF NO
5901
5902  031352  005065  000020                    CLR     RKDC(R5)        ;SETUP TO RETURN TO CYL 0
5903  031356  005037  001176                    CLR     $ESCAPE
5904
5905  031362  012737  000017  007354            MOV     #SEEK,HCS1
5906  031370  004737  032224                    JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
5907  031374  104131                            ERROR   131             ;NO RDY AFTER SEEK CMD
5908
5909  031376  013737  001420  007412            MOV     T50000,TEMP1    ;SETUP TIMEOUT
5910  031404  004737  032730                    JSR     PC,FATT2        ;FIND ATTN
5911  031410  104132                            ERROR   132             ;NO ATTN AFTER SEEK CMD
```

```
5912
5913  031412  032737  100000  007354          BIT     #CERR,HCS1
5914  031420  001401                          BEQ     65$
5915  031422  104210                          ERROR   210             ;CERR AFTER SEEK CMD
5916
5917  031424                          65$:
5918
5919
5920  031424  005737  007342                  TST     HPEND           ;SEE IF HALT PENDING
5921  031430  001406                          BEQ     4$              ;BR IF NO
5922  031432  005037  007342                  CLR     HPEND           ;CLEAR FOR FUTURE FORMATTING
5923  031436  005037  007340                  CLR     BADHDR          ;HEADERS NOW OK
5924  031442  000137  036262                  JMP     STOP            ;GO BACK & HALT CPU
5925
5926  031446  005037  007340          4$:     CLR     BADHDR          ;HEADERS NOW OK
5927
```

```
                        .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 STAPT

031452                  $EOP:

031452  000004                  SCOPE
031454  005037  001176          CLR     $ESCAPE
031460  012737  000001  001174  MOV     #1,$TIMES
031466  012706  001100          MOV     #STACK,SP
031472  005237  001220          INC     $DEVCT          ;INCR COUNT FOR # DRIVES CHECKED
031476  023737  007474  001220  CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
031504  001403                  BEQ     $EOP1+2         ;BR IF YES
031506  000137  015146          JMP     NUDRV           ;ELSE TEST NEXT DRIVE PRESENT
031512  000004          $EOP1:  SCOPE
031514  005037  001102          CLR     $TSTNM          ;;ZERO THE TEST NUMBER
031520  005037  001174          CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
031524  005237  001216          INC     $PASS           ;;INCREMENT THE PASS NUMBER
031530  042737  100000  001216  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
031536  005327                  DEC     (PC)+           ;;LOOP?
031540  000001          $EOPCT: .WORD   1
031542  003022                  BGT     $DOAGN          ;;YES
031544  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
031546  000001          $ENDCT: .WORD   1
031550  031540                  $EOPCT
031552  104401  031617          TYPE    ,$ENDMG         ;;TYPE "END PASS #"
031556  013746  001216          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
031562  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
031564  104401  031614          TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
031570  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
031574  001405                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
031576  000005                  RESET                   ;;CLEAR THE WORLD
031600  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
031602  000240                  NOP                     ;;SAVE ROOM
031604  000240                  NOP                     ;;FOR
031606  000240                  NOP                     ;;ACT11
031610                  $DOAGN:
031610  000137                  JMP     @(PC)+          ;;RETURN
031612  031634          $RTNAD: .WORD   STAPT
031614     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
031617     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
031624  050040  051501  020123
031632  000043

                        ;ADD WAITING LOOP FOR THE APT MODE
031634  122737  000001  001230  $TAPT:  CMPB    #APTENV,$ENV
031642  001007                  BNE     2$
031644  023727  001216  000002  CMP     $PASS,#2        ;TWO PASS DONE ?,AS REQUIRED BY
031652  103403                  BLO     2$              ;NOT YET
031654  005237  001102  1$:     INC     $TSTNM  ;INCREMENT THE TEST NUMBER
031660  000775                  BR      1$              ;WAITING LOOP FOR APT TO DUMP NEXT PROG
031662  000137  013356  2$:     JMP     ST5             ;RETURN TO MAIN LOOP
```

```
                                        .SBTTL  SUBROUTINES
                                        ;SUBROUTINE TO CLEAR ALL FLAGS FROM DDUMP THRU DOTIM
                                        ;
031666  012700  007464          CLRFLG: MOV     #DDUMP,R0
031672  012701  177757                  MOV     #-17.,R1
031676  005020                  1$:     CLR     (R0)+
031700  005201                          INC     R1
031702  001375                          BNE     1$
031704  000207                          RTS     PC
                                        ;
                                        ;TYPE PROGRAM ID IF FTITLE=0
                                        ;
031706  005737  001340          TITLE:  TST     FTITLE
031712  001024                          BNE     1$
031714  005237  001340                  INC     FTITLE
031720  104401  043420                  TYPE    ,MSG1                   ;PROGRAM ID
                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
031724  005737  000042                  TST     @#42                    ;;ARE WE RUNNING UNDER XXDP/ACT?
031730  001012                          BNE     64$                     ;;BRANCH IF YES
031732  123727  001230  000001          CMPB    $ENV,#1                 ;;ARE WE RUNNING UNDER APT?
031740  001406                          BEQ     64$                     ;;BRANCH IF YES
031742  023727  001140  000176          CMP     SWR,#SWREG              ;;SOFTWARE SWITCH REG SELECTED?
031750  001005                          BNE     65$                     ;;BRANCH IF NO
031752  104406                          GTSWR                           ;;GET SOFT-SWR SETTINGS
031754  000403                          BR      65$
031756  112737  000001  001134  64$:    MOVB    #1,$AUTOB               ;;SET AUTO-MODE INDICATOR
031764                          65$:
031764  000207                  1$:     RTS     PC
                                        ;
                                        ;ROUTINE TO INPUT DRIVE NOS. TYPED IN & SET
                                        ;DRIVS, DRIV0-DRIV7 REGISTERS APPROPRIATELY
                                        ;
031766  104411                  GDRVS:  RDLIN
031770  012600                          MOV     (SP)+,R0                ;GET STARTING ADDR OF ASCII STRING
031772  012701  177770                  MOV     #-8.,R1                 ;SET UP COUNT
031776  112002                  1$:     MOVB    (R0)+,R2                ;GET ASCII CHAR
032000  042702  177400                  BIC     #177400,R2              ;MASK HI BYTE
032004  012703  007476                  MOV     #DRIV0,R3               ;DRIVE FLAG ADDR
032010  012704  000060                  MOV     #60,R4
                                        ;
032014  020402                  2$:     CMP     R4,R2                   ;WAS TYPED CHAR 0 THRU 7?
032016  001415                          BEQ     3$                      ;BRANCH IF YES
032020  005723                          TST     (R3)+                   ;NO, INCREMENT DR FLAG ADDR
032022  005204                          INC     R4
032024  020427  000070                  CMP     R4,#70
032030  001371                          BNE     2$                      ;S/B 0-7 OR TERMINATOR
032032  005702                          TST     R2
032034  001022                          BNE     4$
032036  020127  177770                  CMP     R1,#-F.
032042  001426                          BEQ     6$                      ;DEFAULT ALL DRIVES
```

```
6039  032044  005037  007524          7$:     CLR     SIZFLG          ;BYPASS TEST 1 (SIZING)
6040  032050  000207                          RTS     PC              ;FOUND TERMINATOR, EXIT
6041
6042  032052  005213                  3$:     INC     @R3             ;SET UP FLAG FOR THE DRIVE
6043  032054  005237  007474                  INC     DRIVS           ;INCREMENT TOTAL # DRIVES TO BE TESTED
6044  032060  112002                          MOVB    (PD)+,R2        ;GET NEXT ASCII CHAR.
6045  032062  042702  177400                  BIC     #177400,R2      ;MASK
6046  032066  022702  000054                  CMP     #54,R2          ;IS IT A COMMA?
6047  032072  001407                          BEQ     5$              ;YES, GO TO NEXT WORD.
6048  032074  005702                          TST     R2              ;NO, IS IT A TERMINATOR?
6049  032076  001001                          BNE     4$              ;IF NOT, SOMETHING WRONG.
6050  032100  000761                          BR      7$              ;FOUND TERMINATOR, EXIT
6051
6052  032102  104401  046137          4$:     TYPE    ,EM1            ;ONLY 0-7 ALLOWED.
6053  032106  000137  012562                  JMP     PRGSRT          ;START ALL OVER
6054
6055  032112  005201                  5$:     INC     R1              ;S/B NO MORE THAN 8 DIFF
6056  032114  001330                          BNE     1$              ;DRIVES TYPED IN.
6057  032116  000771                          BR      4$              ;IF NORE, HAVE ERROR.
6058
6059  032120  005237  007524          6$:     INC     SIZFLG          ;DO TEST 1 (SIZING)
6060  032124  000207                          RTS     PC              ;EXIT.
6061
6062                                  ;
6063                                  ;ROUTINE TO INPUT RKBAS OR DEFAULT.
6064                                  ;
6065
6066  032126  104412                  GBA:    RDOCT
6067  032130  012600                          MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
6068  032132  005700                          TST     R0
6069  032134  001403                          BEQ     1$              ;BRANCH IF DEFAULT.
6070  032136  010037  001264                  MOV     R0,$BASE
6071  032142  000207                          RTS     PC
6072  032144  012737  177440  001264  1$:     MOV     #177440,$BASE   ;DEFAULT VALUE
6073  032152  000207                          RTS     PC
6074
6075
6076                                  ;ROUTINE TO INPUT RKVEC OR DEFAULT
6077                                  ;
6078
6079  032154  104412                  GINT:   RDOCT
6080  032156  012600                          MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
6081  032160  005700                          TST     R0
6082  032162  001405                          BEQ     1$              ;BRANCH IF DEFAULT
6083  032164  010037  001314                  MOV     R0,RKVEC
6084  032170  004737  032206          2$:     JSR     PC,SETINT
6085  032174  000207                          RTS     PC
6086  032176  012737  000210  001314  1$:     MOV     #210,RKVEC      ;DEFAULT VALUE
6087  032204  000771                          BR      2$
6088
6089                                  ;
6090                                  ;ROUTINE TO SETUP INTERRUPT VECTOR & PRIORITY
6091                                  ;
6092
6093  032206  013700  001314          SETINT: MOV     RKVEC,R0
6094  032212  012720  036720                  MOV     #INTER,(R0)+    ;INTER ADDR TO RKVEC
```

```
6095  032216  013710  001316              MOV     RKPRI,(R0)      ;PR5 TO RKVEC+2
6096  032222  000207                      RTS     PC
6097
6098                                      ;
6099                                      ;THIS ROUTINE CDT IN RKCS1 IF DRIVE UNDER TEST IS AN RK07.
6100                                      ;ENTER WITH COMMAND IN HCS1
6101                                      ;
6102  032224  053737  001170  007354  DOCMD: BIS     $TMP4,HCS1      ;SET CDT IF RK07
6103  032232  013765  007354  000000        MOV     HCS1,RKCS1(R5)  ;DO COMMAND
6104  032240  013737  001406  007412        MOV     T10,TEMP1
6105  032246  004737  032320              JSR     PC,FRDY         ;FIND CONTR READY
6106  032252  000207                      RTS     PC              ;SET HERE IF NOT RDY
6107  032254  062716  000002              ADD     #2,(SP)         ;ELSE SKIP OVER ERROR
6108  032260  000207                      RTS     PC
6109                                      ;
6110                                      ;THIS ROUTINE IS SIMILAR TO THE ABOVE BUT IS USED FOR DATA TRANSFERS
6111                                      ;& REQUIRES A LONGER TIMEOUT
6112                                      ;
6113  032262  053737  001170  007354  DATCMD: BIS     $TMP4,HCS1      ;SET CDT IF RK07
6114  032270  013765  007354  000000        MOV     HCS1,RKCS1(R5)  ;DO CMD
6115  032276  013737  001420  007412        MOV     T50000,TEMP1
6116  032304  004737  032320              JSR     PC,FRDY         ;FIND CONTR RDY
6117  032310  000207                      RTS     PC
6118  032312  062716  000002              ADD     #2,(SP)
6119  032316  000207                      RTS     PC
6120
6121                                      ;
6122                                      ;ROUTINE TO FIND CONTROLLER READY (RDY) DURING A DELAY
6123                                      ;ENTER WITH A COUNT IN TEMP1
6124                                      ;RETURN IF RDY NOT PRESENT (ERROR CONDITION)
6125                                      ;RETURN +2 IF RDY PRESENT (SKIP OVER ERROR)
6126                                      ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
6127                                      ;
6128  032320  032765  000200  000000  FRDY:   BIT     #RDY,RKCS1(R5)
6129  032326  001010                      BNE     1$
6130  032330  005337  007412              DEC     TEMP1
6131  032334  001371                      BNE     FRDY
6132  032336  004737  032454              JSR     PC,HOLD         ;STORE ALL RK611 REGS IN HOLDING REGS.
6133  032342  004737  033602              JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
6134  032346  000207                      RTS     PC              ;NO RDY, EXIT
6135  032350  062716  000002        1$:   ADD     #2,(SP)         ;SKIP OVER ERROR
6136  032354  004737  032454              JSR     PC,HOLD
6137  032360  004737  033602              JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
6138  032364  000207                      RTS     PC
6139                                      ;
6140                                      ;ROUTINE TO FIND CONTROLLER READY AND STORE DRIVE REGS ONLY
6141                                      ;
6142  032366  032765  000200  000000  FRDY1:  BIT     #RDY,RKCS1(R5)
6143  032374  001014                      BNE     1$
6144  032376  005337  007412              DEC     TEMP1
6145  032402  001371                      BNE     FRDY1
6146  032404  016537  000034  007402        MOV     RKMR2(R5),HMR2
6147  032412  016537  000036  007404        MOV     RKMR3(R5),HMR3
6148  032420  004737  033602              JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
6149  032424  000207                      RTS     PC              ;NO RDY, EXIT
6150  032426  062716  000002        1$:   ADD     #2,(SP)         ;SKIP OVER ERROR
```

```
6151  032432  016537  000034  007402          MOV     RKMR2(R5),HMR2
6152  032440  016537  000036  007404          MOV     RKMR3(R5),HMR3
6153  032446  004737  033602                  JSR     PC,CKCEPR       ;CHECK FOR SPECIAL CERR CONDITIONS
6154  032452  000207                          RTS     PC
6155
6156                                  ;
6157                                  ;STORE ALL RK611 REGISTERS IN HOLDING REGS
6158                                  ;
6159
6160  032454  016537  000000  007354  HOLD:   MOV     R CS1(R5),HCS1
6161  032462  016537  000010  007356          MOV     RKCS2(R5),HCS2
6162  032470  016537  000002  007360          MOV     RKWC(R5),HWC
6163  032476  016537  000004  007362          MOV     RKBA(R5),HBA
6164  032504  016537  000006  007364          MOV     RKDA(R5),HDA
6165  032512  016537  000012  007366          MOV     RKDS(R5),HDS
6166  032520  016537  000014  007370          MOV     RKER(R5),HER
6167  032526  016537  000016  007372          MOV     RKASOF(R5),HASOF
6168  032534  016537  000020  007374          MOV     RKDC(R5),HDC
6169  032542  016537  000026  007400          MOV     RKMR1(R5),HMR1
6170  032550  016537  000034  007402          MOV     RKMR2(R5),HMR2
6171  032556  016537  000036  007404          MOV     RKMR3(R5),HMR3
6172  032564  016537  000030  007406          MOV     RKECPS(R5),HPOS
6173  032572  016537  000032  007410          MOV     RKECPT(R5),HPAT
6174  032600  000207                          RTS     PC
6175
6176                                  ;
6177                                  ;ROUTINE TO CHECK FOR CORRECT ATTN
6178                                  ;RETURN IF ATTN NOT PRESENT (ERROR CONDITION)
6179                                  ;RETURN +2 IF ATTN PRESENT (SKIP OVER ERROR)
6180                                  ;
6181  032602  010446                  STATN:  MOV     R4,-(SP)        ;SAV R4
6182  032604  013704  001222                  MOV     $UNIT,R4
6183  032610  136437  007344  007373          BITB    ATTN(R4),HASOF+1
6184  032616  001404                          BEQ     1$              ;BRANCH IF ATTN NOT PRESENT
6185  032620  012604                          MOV     (SP)+,R4        ;RESTOR R4
6186  032622  062716  000002                  ADD     #2,(SP)         ;INCR RET ADDR TO JUMP OVER ERROR.
6187  032626  000207                          RTS     PC
6188  032630  012604                  1$:     MOV     (SP)+,R4        ;RESTOR R4
6189  032632  000207                          RTS     PC
6190
6191                                  ;
6192                                  ;ROUTINE TO FIND ATTN WITHIN TIMES GREATER THAN 1 SEC
6193                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
6194                                  ;RETURN IF NO ATTN (ERROR CONDITION)
6195                                  ;RETURN +2 IF ATTN FOUND
6196                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
6197                                  ;
6198
6199  032634  010446                  FATT1:  MOV     R4,-(SP)        ;SAV R4
6200  032636  012737  177777  007412  3$:     MOV     #-1,TEMP1
6201  032644  013704  001222                  MOV     $UNIT,R4
6202  032650  136465  007344  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5) ;FIND CORRECT ATTN
6203  032656  001014                          BNE     2$
6204  032660  005337  007412                  DEC     TEMP1
6205  032664  001371                          BNE     1$
6206  032666  005337  007414                  DEC     TEMP2
```

```
                        ;GET VALUE FOR SOFTWARE SWITCH REGISTER

6207  032672  001361              BNE     3$
6208  032674  005065  000026      CLR     RKMR1(R5)           ;SE  E   WORD 0
6209  032700  004737  033664      JSR     PC,GSTAT            ;GE  LA EST STATUS
6210  032704  012604              MOV     (SP)+,R4            ;RESTOR  4
6211  032706  000207              RTS     PC
6212  032710  005065  000026  2$: CLR     RKMR1(R5)
6213  032714  004737  033664      JSR     PC,GSTAT            ;GET STATUS AFTER ATTN SEEN
6214  032720  012604              MOV     (SP)+,R4            ;RESTOR R4
6215  032722  062716  000002      ADD     #2,(SP)             ;SKIP OVER ERROR
6216  032726  000207              RTS     PC
6217
6218                            ;
6219                            ;ROUTINE TO FIND ATTN WITHIN 1 SEC
6220                            ;ENTER WITH COUNT IN TEMP1
6221                            ;RETURN IF NO ATTN (ERROR)
6222                            ;RETURN +2 IF ATTN FOUND
6223                            ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
6224                            ;
6225
6226  032730  010446          FATT2:  MOV     R4,-(SP)            ;SAV R4
6227  032732  013704  001222  2$:     MOV     $UNIT,R4
6228  032736  136465  007344  000017      BITB    ATTN(R4),RKASOF+1(R5)  ;FIND CORRECT ATTN
6229  032744  001011              BNE     1$
6230  032746  005337  007412      DEC     TEMP1
6231  032752  001367              BNE     2$
6232  032754  005065  000026      CLR     RKMR1(R5)           ;SELECT WORD 0
6233  032760  004737  033664      JSR     PC,GSTAT            ;GET LATEST STATUS.
6234  032764  012604              MOV     (SP)+,R4            ;RESTOR R4
6235  032766  000207              RTS     PC
6236  032770  005065  000026  1$: CLR     RKMR1(R5)
6237  032774  004737  033664      JSR     PC,GSTAT
6238  033000  012604              MOV     (SP)+,R4            ;RESTOR R4
6239  033002  062716  000002      ADD     #2,(SP)             ;SKIP OVER ERROR
6240  033006  000207              RTS     PC
6241
6242                            ;ENTER WITH A COUNT IN TEMP1
6243                            ;THE DELAY IS APPROX 17 US/ITERATION + 12 US TO EXIT
6244                            ;WHEN COUNT IS 0. BASED ON AN 11/05
6245                            ;
6246  033010  005737  007412  DLY:    TST     TEMP1               ;5.6 US
6247  033014  001403              BEQ     1$                  ;1.9 US
6248  033016  005337  007412      DEC     TEMP1               ;6.8 US
6249  033022  000772              BR      DLY                 ;2.5 US
6250  033024  000207          1$: RTS     PC                  ;3.8 US
6251
6252                            ;THIS ROUTINE TYPES BYPASSED DRIVE#.  ENTER WITH DRIVE# IN R0
6253                            ;
6254
6255  033026  104401  045243  BYP:    TYPE    ,MSG14              ;BYPASS DRIVE
6256  033032  010046              MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
6257                                                          ;;TYPE DR#
6258  033034  104403              TYPOS                       ;;GO TYPE--OCTAL ASCII
6259  033036     001              .BYTE   1                   ;;TYPE 1 DIGIT(S)
6260  033037     000              .BYTE   0                   ;;SUPPRESS LEADING ZEROS
6261  033040  000207              RTS     PC
6262                            ;
```

```
                                        ;THIS ROUTINE READS ALL MSG A & B WORDS & CHECKS THEM AS REQ'D.
                                        ;
033042 017637 000000 001520 CHKMSG: MOV     @(SP),CHKFLG    ;PASS MSGS TO BE TESTED
033050 062716 000002                ADD     #2,(SP)         ;BUMP RETURN ADDR TO 1ST ERROR
033054 004737 033720                JSR     PC,GSTAT1       ;GET ALL ACTUAL DRIVE & CONTR STATUS
                                    ;
033060 053737 001222 007444         BIS     $UNIT,E.A0      ;SET UNIT #
033066 053737 001222 007450         BIS     $UNIT,E.A1
033074 053737 001222 007454         BIS     $UNIT,E.A2
033102 053737 001222 007460         BIS     $UNIT,E.A3
033110 053737 015444 007444         BIS     E.DDT,E.A0      ;ADD DRIVE TYPE
                                    ;
033116 013746 007412                MOV     TEMP1,-(SP)     ;SAVE TEMP1
                                    ;
033122 013737 007444 007412         MOV     E.A0,TEMP1
033130 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG A0
033134 013737 007412 007444         MOV     TEMP1,E.A0
                                    ;
033142 013737 007450 007412         MOV     E.A1,TEMP1
033150 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG A1
033154 013737 007412 007450         MOV     TEMP1,E.A1
                                    ;
033162 013737 007454 007412         MOV     E.A2,TEMP1
033170 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG A2
033174 013737 007412 007454         MOV     TEMP1,E.A2
                                    ;
033202 013737 007446 007412         MOV     E.B0,TEMP1
033210 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG B0
033214 013737 007412 007446         MOV     TEMP1,E.B0
                                    ;
033222 013737 007452 007412         MOV     E.B1,TEMP1
033230 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG B1
033234 013737 007412 007452         MOV     TEMP1,E.B1
                                    ;
033242 013737 007456 007412         MOV     E.B2,TEMP1
033250 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG B2
033254 013737 007412 007456         MOV     TEMP1,E.B2
                                    ;
033262 013737 007462 007412         MOV     E.B3,TEMP1
033270 004737 036156                JSR     PC,$BPAR        ;GET PARITY FOR MSG B3
033274 013737 007412 007462         MOV     TEMP1,E.B3
                                    ;
033302 012637 007412                MOV     (SP)+,TEMP1     ;RESTORE TEMP1
033306 013737 001176 001172         MOV     $ESCAPE,$TMP5   ;SAVE ESCAPE
                                    ;
033314 023737 007424 007444         CMP     H.A0,E.A0       ;TEST MSG A0
033322 001411                       BEQ     2$              ;BR IF OK
033324 012737 033336 001176         MOV     #1$,$ESCAPE     ;ELSE SETUP ESCAPE
033332 011646                       MOV     (SP),-(SP)      ;COPY RET ADDR.
033334 000207                       RTS     PC              ;& RETURN TO MAINLINE ERROR
                                    ;
033336 032777 001000 145574 1$:     BIT     #SW9,@SWR       ;RET HERE FROM MAINLINE ERROR
033344 001107                       BNE     20$             ;& BR IF LOOP ON ERROR
033346 062716 000002        2$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
                                    ;
033352 023737 007426 007446         CMP     H.B0,E.B0       ;TEST MSG B0
```

```
6319  033360  001411                          BEQ     5$              ;BR IF OK
6320  033362  012737  033374  001176          MOV     #4$,$ESCAPE     ;ELSE SETUP ESCAPE
6321  033370  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR
6322  033372  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
6323
6324  033374  032777  001000  145536  4$:     BIT     #SW9,@SWR       ;RETURN HERE FROM MAINLINE ERROR
6325  033402  001070                          BNE     20$             ;& BR IF LOOP ON ERROR
6326  033404  062716  000002          5$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
6327
6328  033410  023737  007430  007450          CMP     H.A1,E.A1       ;TEST MSG A1
6329  033416  001411                          BEQ     8$              ;BR IF OK
6330  033420  012737  033432  001176          MOV     #7$,$ESCAPE
6331  033426  011646                          MOV     (SP),-(SP)
6332  033430  000207                          RTS     PC
6333
6334  033432  032777  001000  145500  7$:     BIT     #SW9,@SWR
6335  033440  001051                          BNE     20$
6336  033442  062716  000002          8$:     ADD     #2,(SP)
6337
6338  033446  023737  007432  007452          CMP     H.B1,E.B1       ;TEST MSG B1
6339  033454  001411                          BEQ     11$             ;BR IF OK
6340  033456  012737  033470  001176          MOV     #10$,$ESCAPE
6341  033464  011646                          MOV     (SP),-(SP)
6342  033466  000207                          RTS     PC
6343
6344  033470  032777  001000  145442  10$:    BIT     #SW9,@SWR
6345  033476  001032                          BNE     20$
6346  033500  062716  000002          11$:    ADD     #2,(SP)
6347
6348  033504  032737  000001  001520  12$:    BIT     #T.A2,CHKFLG    ;TEST MSG A2?
6349  033512  001402                          BEQ     13$             ;BR IF NO
6350  033514  004737  034604                  JSR     PC,RCYLD        ;PUT INFO CYLDIF, DO NOT CHECK
6351  033520  032737  000002  001520  13$:    BIT     #T.B2,CHKFLG    ;TEST MSG B2?
6352  033526  001402                          BEQ     14$             ;BR IF NO
6353  033530  004737  034656                  JSR     PC,RCYLA        ;PUT INFO IN CYLADD, DO NOT CHECK
6354
6355  033534  032737  000004  001520  14$:    BIT     #T.B3,CHKFLG    ;TEST MSG B3?
6356  033542  001404                          BEQ     15$
6357  033544  004737  034714                  JSR     PC,RSEC         ;PUT INFO IN SECTOR, DO NOT CHECK
6358  033550  004737  034752                  JSR     PC,RHEAD        ;PUT INFO IN HEADA, DO NOT CHECK
6359
6360  033554  013737  001172  001176  15$:    MOV     $TMP5,$ESCAPE   ;RESTORE ESCAPE
6361  033562  000207                          RTS     PC
6362
6363  033564  012706  001100          20$:    MOV     #STACK,SP       ;RESET STACK PTR
6364  033570  013737  001172  001176          MOV     $TMP5,$ESCAPE   ;RESTORE ESCAPE
6365  033576  000177  145306                  JMP     @$LPERR
6366                                  ;
6367                                  ;THIS ROUTINE CHECKS FOR CERTAIN ERROR CONDITIONS ONLY
6368                                  ;I.E.: IF NED, CTO OR MDS SET MESSAGE A & B ARE INVALID
6369                                  ;
6370  033602  005737  001516          CKCERR: TST     BYPCERR
6371  033606  001025                          BNE     4$
6372  033610  032737  100000  007354          BIT     #CERR,HCS1
6373  033616  001001                          BNE     1$              ;BR IF CERR
6374  033620  000207                          RTS     PC
```

```
6375
6376  033622  032737  004000  007354  1$:     BIT     #CTO,HCS1
6377  033630  001402                          BEQ     2$              ;BR IF NOT CTO
6378  033632  104125                          ERROR   125             ;CTO ERROR, MSG A & B INVALID
6379  033634  000207                          RTS     PC
6380
6381  033636  032737  010000  007356  2$:     BIT     #NED,HCS2
6382  033644  001401                          BEQ     3$              ;BR IF NOT NED
6383  033646  104126                          ERROR   126             ;NED ERROR, MSG A & B INVALID
6384
6385  033650  032737  001000  007356  3$:     BIT     #MDS,HCS2
6386  033656  001401                          BEQ     4$
6387  033660  104127                          ERROR   127             ;MDS ERROR, MSG A & B INVALID
6388
6389  033662  000207                  4$:     RTS     PC
6390
6391                                  ;
6392                                  ;THIS ROUTINE DOES THE SELECT DRIVE COMMAND TO GET STATUS
6393                                  ;IT THEN WAITS FOR CONTROLLER READY
6394                                  ;IF RDY NOT RECEIVED BY THE TIMEOUT, AN ERROR IS FLAGGED
6395                                  ;
6396
6397  033664  013746  007412          GSTAT:  MOV     TEMP1,-(SP)     ;SAVE TEMP1
6398  033670  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
6399  033676  012737  000001  007354          MOV     #SELDRV,HCS1
6400  033704  004737  032224                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6401  033710  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRIVE CMD
6402  033712  012637  007412                  MOV     (SP)+,TEMP1     ;RESTOR TEMP1.
6403  033716  000207                          RTS     PC
6404                                  ;
6405                                  ;THIS ROUTINE GETS STATUS OF ALL DRIVE REGISTERS (MSG A0-A3, B0-B3)
6406                                  ;& ALL CONTROLLER REGISTERS.
6407                                  ;
6408  033720  013746  007412          GSTAT1: MOV     TEMP1,-(SP)     ;SAVE TEMP1
6409  033724  004737  032454                  JSR     PC,HOLD         ;GET ALL CONTR REG
6410  033730  012765  100000  000000          MOV     #CCLR,RKCS1(R5) ;CLEAR CONTR
6411  033736  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
6412  033744  012765  000003  000026          MOV     #3,RKMR1(R5)    ;SELECT WORD 3
6413  033752  004737  034150                  JSR     PC,GSTAT2
6414  033756  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
6415  033760  013737  007402  007440          MOV     HMR2,H.A3       ;STORE MSG A3
6416  033766  013737  007404  007442          MOV     HMR3,H.B3       ;STORE MSG B3
6417
6418  033774  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
6419  034002  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
6420  034010  012765  000002  000026          MOV     #2,RKMR1(R5)    ;SELECT WORD 2
6421  034016  004737  034150                  JSR     PC,GSTAT2
6422  034022  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
6423  034024  013737  007402  007434          MOV     HMR2,H.A2       ;STORE MSG A2
6424  034032  013737  007404  00743F          MOV     HMR3,H.B2       ;STORE MSG B2
6425
6426  034040  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
6427  034046  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
6428  034054  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
6429  034062  004737  034150                  JSR     PC,GSTAT2
6430  034066  104117                          ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
```

```
 6431  034070  013737  007402  007430          MOV     HMR2,H.A1       ;STORE MSG A1
 6432  034076  013737  007404  007432          MOV     HMR3,H.B1       ;STORE MSG B1
 6433
 6434  034104  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 6435  034112  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 6436  034120  004737  034150                  JSR     PC,GSTAT2
 6437  034124  104117                          ERROR   117             ;RDY NOT SET BY END OF SEL DRV CMD
 6438  034126  013737  007402  007424          MOV     HMR2,H.A0       ;STORE MSG A0
 6439  034134  013737  007404  007426          MOV     HMR3,H.B0       ;STORE MSG B0
 6440
 6441  034142  012637  007412                  MOV     (SP)+,TEMP1     ;RESTORE TEMP1
 6442  034146  000207                          RTS     PC
 6443
 6444  034150  012737  000001  007354  GSTAT2: MOV     #SELDRV,HCS1
 6445  034156  053737  001170  007354          BIS     $TMP4,HCS1      ;RET CDT IF RK07
 6446  034164  013765  007354  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
 6447  034172  013737  001406  007412          MOV     T10,TEMP1
 6448  034200  004737  032366                  JSR     PC,FRDY1        ;FIND CONTR RDY & STORE DRIVE REGS ONLY
 6449  034204  000207                          RTS     PC              ;RET HERE IF NOT RDY
 6450  034206  062716  000002                  ADD     #2,(SP)         ;RET HERE IF OK
 6451  034212  000207                          RTS     PC
 6452
 6453                                  ;
 6454                                  ;THIS ROUTINE DOES A SUBSYSTEM CLEAR & WAITS FOR CONTROLLER READY
 6455                                  ;IF RDY IS NOT RECEIVED BY THE END OF THE TIMEOUT, AN ERROR IS FLAGGED.
 6456                                  ;THE ROUTINE THEN GETS CURRENT STATUS & CHECKS FOR CONTROLLER ERROR (CERR)
 6457                                  ;RETURN IF CERR SET
 6458                                  ;RETURN +2 IF CERR CLEAR
 6459                                  ;
 6460  034214  012765  000040  000010  SUBCLR: MOV     #SCLR,RKCS2(R5) ;SUBSYS CLEAR
 6461  034222  013737  001406  007412          MOV     T10,TEMP1
 6462  034230  004737  032320                  JSR     PC,FRDY         ;FIND RDY
 6463  034234  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
 6464  034236  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
 6465  034244  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
 6466  034250  004737  033664                  JSR     PC,GSTAT        ;GET STATUS
 6467  034254  032737  100000  007354          BIT     #CERR,HCS1      ;CHECK FOR CONT ERROR
 6468  034262  001401                          BEQ     1$
 6469  034264  000207                          RTS     PC
 6470  034266  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
 6471  034272  000207                          RTS     PC
 6472
 6473                                  ;
 6474                                  ;READ THE SECTOR COUNT IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
 6475                                  ;
 6476  034274  012765  000003  000026  RDSEC:  MOV     #3,RKMR1(R5)    ;WORD 3
 6477  034302  004737  033664                  JSR     PC,GSTAT
 6478  034306  013737  007404  001402          MOV     HMR3,SECTOR
 6479  034314  042737  177017  001402          BIC     #^C<M.SECT>,SECTOR
 6480  034322  006237  001402                  ASR     SECTOR          ;RIGHT JUSTIFY
 6481  034326  006237  001402                  ASR     SECTOR          ;SECTOR
 6482  034332  006237  001402                  ASR     SECTOR          ;INFO
 6483  034336  006237  001402                  ASR     SECTOR
 6484  034342  000207                          RTS     PC
 6485                                  ;
 6486                                  ;READ THE CYL DIFF/OFFSET IN RKMR2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
```

```
6487
6488  034344  012765  000002  000026  RDCYLD: MOV     #2,RKMR1(R5)     ;WORD 2
6489  034352  004737  033664          JSR     PC,GSTAT
6490  034356  013737  007402  001356  MOV     HMR2,CYLDIF
6491  034364  043737  015442  001356  BIC     MASK1,CYLDIF
6492  034372  006237  001356          ASR     CYLDIF           ;RIGHT JUSTIFY
6493  034376  006237  001356          ASR     CYLDIF           ;CYL DIFF/OFFSET
6494  034402  006237  001356          ASR     CYLDIF           ;INFO
6495  034406  006237  001356          ASR     CYLDIF
6496  034412  023737  001356  015440  CMP     CYLDIF,MASK      ;CHK TO SEE IF RET IN COMPL. FORM
6497  034420  001002                  BNE     1$               ;BR IF NOT
6498  034422  005037  001356          CLR     CYLDIF           ;CLR IF YES
6499  034426  000207                  1$:     RTS     PC
6500
6501                                  ;QUICK SELECT DRIVE COMMAND TO OBTAIN CYL DIFF
6502
6503
6504  034430  013746  007412          QKCYLD: MOV     TEMP1,-(SP)      ;SAVE TEMP1
6505  034434  012765  000002  000026  MOV     #2,RKMR1(R5)     ;SELECT WORD 2
6506  034442  012737  000001  007354  MOV     #SELDRV,HCS1     ;SELECT DRIVE CMD
6507  034450  053737  001170  007354  BIS     $TMP4,HCS1
6508  034456  013765  007354  000000  MOV     HCS1,RKCS1(R5)
6509  034464  013737  001406  007412  MOV     T10,TEMP1
6510  034472  032765  000200  000000  1$:     BIT     #RDY,RKCS1(R5)   ;TEST FOR CONT RDY
6511  034500  001004                  BNE     2$               ;BR IF THERE
6512  034502  005337  007412          DEC     TEMP1
6513  034506  001371                  BNE     1$
6514  034510  104117                  ERROR   117              ;NO RDY AFTER SEL DRV CMD
6515
6516  034512  016537  000034  001356  2$:     MOV     RKMR2(R5),CYLDIF
6517  034520  043737  015442  001356  BIC     MASK1,CYLDIF     ;GET CYL DIFF ONLY (NO SHIFTING)
6518  034526  012637  007412          MOV     (SP)+,TEMP1      ;RESTORE TEMP1
6519  034532  000207                  RTS     PC
6520
6521                                  ;READ THE CYL ADDR IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN  'CYLADD'
6522
6523  034534  012765  000002  000026  RDCYLA: MOV     #2,RKMR1(R5)     ;WORD 2
6524  034542  004737  033664          JSR     PC,GSTAT
6525  034546  013737  007404  001360  MOV     HMR3,CYLADD
6526  034554  043737  015442  001360  BIC     MASK1,CYLADD
6527  034562  006237  001360          ASR     CYLADD           ;RIGHT JUSTIFY
6528  034566  006237  001360          ASR     CYLADD           ;CYL ADDR
6529  034572  006237  001360          ASR     CYLADD           ;INFO
6530  034576  006237  001360          ASR     CYLADD
6531  034602  000207                  RTS     PC
6532
6533                                  ;READ THE CYL DIFF/OFFSET IN H.A2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
6534
6535  034604  013737  007434  001356  RCYLD:  MOV     H.A2,CYLDIF
6536  034612  043737  015442  001356  BIC     MASK1,CYLDIF   ;CLEAR UNWANTED INFO
6537  034620  006237  001356          ASR     CYLDIF   ;RIGHT JUSTIFY
6538  034624  006237  001356          ASR     CYLDIF
6539  034630  006237  001356          ASR     CYLDIF
6540  034634  006237  001356          ASR     CYLDIF
6541  034640  023737  001356  015440  CMP     CYLDIF,MASK      ;CHK TO SEE IF RET IN COMPL. FORM
6542  034646  001002                  BNE     1$               ;BR IF NO
```

```
                        ;GET VALUE FOR SOFTWARE SWITCH REGISTER

6543  034650  005037  001356            CLR     CYLDIF          ;ELSE CLEAR
6544  034654  000207                1$: RTS     PC
6545                                    ;
6546                                    ;READ THE CYL ADDR IN H.B2, RIGHT JUSTIFY IT & STORE IT IN 'CYLADD'
6547                                    ;
6548  034656  013737  007436  001360  RCYLA:  MOV     H.B2,CYLADD
6549  034664  043737  015442  001360          BIC     MASK1,CYLADD  ;CLEAR UNWANTED INFO
6550  034672  006237  001360                  ASR     CYLADD          ;RIGHT JUSTIFY
6551  034676  006237  001360                  ASR     CYLADD
6552  034702  006237  001360                  ASR     CYLADD
6553  034706  006237  001360                  ASR     CYLADD
6554  034712  000207                          RTS     PC
6555                                    ;
6556                                    ;READ THE SECTOR COUNT IN H.B3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
6557                                    ;
6558  034714  013737  007442  001402  RSEC:   MOV     H.B3,SECTOR
6559  034722  042737  177017  001402          BIC     #^C<M.SECT>,SECTOR  ;CLEAR UNWANTED INFO
6560  034730  006237  001402                  ASR     SECTOR          ;RIGHT JUSTIFY
6561  034734  006237  001402                  ASR     SECTOR
6562  034740  006237  001402                  ASR     SECTOR
6563  034744  006237  001402                  ASR     SECTOR
6564  034750  000207                          RTS     PC
6565                                    ;
6566                                    ;READ THE HEAD ADDR IN H.B3, RIGHT IT & STORE IT IN 'HEADA'
6567                                    ;
6568  034752  013737  007442  001462  RHEAD:  MOV     H.B3,HEADA
6569  034760  042737  170777  001462          BIC     #^C<M.HEAD>,HEADA  ;CLEAR UNWANTED INFO
6570  034766  006237  001462                  ASR     HEADA           ;RIGHT JUSTIFY IT
6571  034772  000337  001462                  SWAB    HEADA
6572  034776  000207                          RTS     PC
6573                                    ;
6574                                    ;FIND SECTOR 23
6575                                    ;RETURN IF NOT FOUND
6576                                    ;RETURN +4 IF FOUND
6577                                    ;
6578  035000  013737  001416  007412  FSEC23: MOV     T5000,TEMP1     ;SETUP TIMEOUT
6579  035006  004737  034274          1$:     JSR     PC,RDSEC        ;READ SECTOR
6580  035012  023727  001402  000023          CMP     SECTOR,#23      ;TEST FOR SECTOR 23(8)
6581  035020  001014                          BNE     2$              ;BR IF NOT 23(8)
6582
6583  035022  004737  034274                  JSR     PC,RDSEC
6584  035026  023727  001402  000023          CMP     SECTOR,#23
6585  035034  001412                          BEQ     3$              ;BR IF READ SAME TWICE
6586  035036  004737  034274                  JSR     PC,RDSEC        ;ELSE TRY 1 MORE TIME
6587  035042  023727  001402  000023          CMP     SECTOR,#23
6588  035050  001404                          BEQ     3$              ;BR IF 23(8)
6589
6590  035052  005337  007412          2$:     DEC     TEMP1
6591  035056  001353                          BNE     1$              ;TRY AGAIN
6592  035060  000207                          RTS     PC
6593
6594  035062  062716  000004          3$:     ADD     #4,(SP)         ;SKIP OVER ERROR
6595  035066  000207                          RTS     PC
6596                                    ;
6597                                    ;ROUTINE TO FIND HEADS HOME IN RKMR2 WORD 1 BEFORE SPECIFIED DELAY
6598                                    ;ENTER WITH TIME IN SECONDS IN TEMP2
```

```
                                        ;RETURN IF NOT FOUND
                                        ;RETURN+2 IF FOUND - SKIP OVER ERROR
                                        ;
035070  012737  177777  007412  FHDHM:  MOV     #-1,TEMP1       ;ALL 1'S
035076  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
035104  004737  033664          1$:     JSR     PC,GSTAT
035110  032737  000040  007402          BIT     #D.HDHM,HMR2
035116  001007                          BNE     2$
035120  005337  007412                  DEC     TEMP1
035124  001367                          BNE     1$
035126  005337  007414                  DEC     TEMP2
035132  001356                          BNE     FHDHM
035134  000207                          RTS     PC
035136  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
035142  000207                          RTS     PC
                                        ;
                                        ;ROUTINE TO FIND LOAD HEADS IN RKMR2 WORD 1 BEFORE THE TIMEOUT
                                        ;RETURN IF NOT FOUND
                                        ;RETURN+2 IF FOUND: SKIP OVER ERROR
                                        ;
035144  012737  000372  007412  FLOAD:  MOV     #250.,TEMP1
035152  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
035160  004737  033664          1$:     JSR     PC,GSTAT
035164  032737  010000  007402          BIT     #D.LOAD,HMR2
035172  001004                          BNE     2$
035174  005337  007412                  DEC     TEMP1
035200  001367                          BNE     1$
035202  000207                          RTS     PC
035204  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
035210  000207                          RTS     PC
                                        ;
                                        ;FILL HEADER TABLE WITH 66 WORDS OF VALID HEADERS
                                        ;ENTER WITH CYL # IN 'CALADD'
                                        ;ENTER WITH HEAD # IN 'HEAD'
                                        ;ENTER WITH FORMAT IN 'FORMAT'
                                        ;
035212  010046          FHDTAB: MOV     R0,-(SP)        ;SAV R0
035214  010146                  MOV     R1,-(SP)        ;SAV R1
035216  012700  001522          MOV     #HDTAB,R0       ;HEADER WORD TABLE ADDR
035222  005001                  CLR     R1              ;SECTOR COUNTER
035224  013737  001460  001464  MOV     HEAD,HD1
035232  006337  001464          ASL     HD1
035236  006337  001464          ASL     HD1
035242  006337  001464          ASL     HD1
035246  006337  001464          ASL     HD1
035252  006337  001464          ASL     HD1             ;SETUP HEAD # FOR WORD 2 OF HEADER
035256  013737  001466  001470  MOV     FORMAT,FMT1
035264  000337  001470          SWAB    FMT1
035270  006337  001470          ASL     FMT1            ;SETUP FORMAT FOR WORD 2 OF HEADER
                                        ;
035274  013720  001362          1$:     MOV     CALADD,(R0)+    ;HEADER WORD 1-CYL ADDR
035300  010110                  MOV     R1,(R0)         ;HEADER WORD 2-SECTOR NO
035302  053710  001464          BIS     HD1,(R0)        ;               -HEAD NO
035306  053710  001470          BIS     FMT1,(R0)       ;               -FORMAT
035312  004737  035372          JSR     PC,SECFLG
                                        ;
```

```
6655  035316  013737  001362  007412          MOV     CALADD,TEMP1
6656  035324  011037  007414                  MOV     (R0),TEMP2
6657  035330  043737  001362  007414          BIC     CALADD,TEMP2
6658  035336  042037  007412                  BIC     (R0)+,TEMP1
6659  035342  053737  007412  007414          BIS     TEMP1,TEMP2
6660  035350  013720  007414                  MOV     TEMP2,(R0)+     ;HEADER WORD 3-HEADER CHECK
6661
6662  035354  005201                          INC     R1              ;SECTOR CTR
6663  035356  020127  000026                  CMP     R1,#22.         ;ALL 22 SECTORS DONE? (66 WORDS)
6664  035362  001344                          BNE     1$              ;BR IF NO
6665
6666  035364  012601                          MOV     (SP)+,R1        ;RESTOR R1
6667  035366  012600                          MOV     (SP)+,R0        ;RESTOR R0
6668  035370  000207                          RTS     PC
6669                                  ;
6670                                  ;THIS ROUTINE GETS INFORMATION FROM THE BAD SECTOR TABLE FILLED BY A PREVIOUS
6671                                  ;TEST & SETS BITS 14 & 15 APPROPRIATLY.
6672                                  ;
6673  035372  010246                  SECFLG: MOV     R2,-(SP)        ;SAVE R2
6674  035374  005737  001466                  TST     FORMAT
6675  035400  001016                          BNE     1$              ;BR IF 20 SECTOR FORMAT
6676  035402  012702  003346                  MOV     #BSE22H+8.,R2
6677  035406  004737  035472                  JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
6678  035412  052710  100000                  BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
6679
6680  035416  012702  005346                  MOV     #BSE22S+8.,R2   ;ELSE RETURN HERE
6681  035422  004737  035472                  JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
6682  035426  052710  040000                  BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
6683
6684  035432  012602                          MOV     (SP)+,R2        ;ELSE RETURN HERE
6685  035434  000207                          RTS     PC
6686
6687  035436  012702  002346          1$:     MOV     #BSE20H+8.,R2
6688  035442  004737  035472                  JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
6689  035446  052710  100000                  BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
6690
6691  035452  012702  004346                  MOV     #BSE20S+8.,R2
6692  035456  004737  035472                  JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
6693  035462  052710  040000                  BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
6694
6695  035466  012602                          MOV     (SP)+,R2        ;RESTORE R2
6696  035470  000207                          RTS     PC
6697
6698                                  ;
6699                                  ;THIS ROUTINE DOES THE ACTUAL SCANNING OF THE BAD SECTOR TABLES
6700                                  ;ENTER WITH THE ADDRESS OF TABLE (BSE22H, BSE22S, ETC.) IN TEMP1
6701                                  ;RETURN IF NO COMPARE
6702                                  ;RETURN+4 IF COMPARE
6703                                  ;
6704  035472  010346                  FLGTST: MOV     R3,-(SP)        ;SAVE R3
6705
6706  035474  021227  177777          1$:     CMP     (R2),#-1        ;SEE IF ALL 1'S
6707  035500  001002                          BNE     2$              ;BR IF NO
6708  035502  012603                          MOV     (SP)+,R3        ;RESTORE R3
6709  035504  000207                          RTS     PC
6710
```

```
6711  035506  022237  001362          2$:     CMP     (R2)+,CALADD    ;SEE IF=CYL # & ADR PTR TO TRK/SECTOR WORD
6712  035512  001403                          BEQ     3$
6713  035514  062702  000002                  ADD     #2,R2           ;GO TO NEXT CYL WORD IN TABLE
6714  035520  000765                          BR      1$
6715
6716  035522  013703  001460          3$:     MOV     HEAD,R3         ;GET HEAD # FROM FHDTAB ROUTINE
6717  035526  000303                          SWAB    R3
6718  035530  050103                          BIS     R1,R3           ;ADD SECTOR # FROM FHDTAB ROUTINE
6719  035532  022203                          CMP     (R2)+,R3        ;SEE IF SECTOR/HEAD COMPARE
6720                                                                  ;& INCR PTR TO NEXT CYL WORD
6721  035534  001401                          BEQ     4$              ;BR IF COMPARE
6722  035536  000756                          BR      1$              ;ELSE TRY NEXT CYL
6723
6724  035540  012603          4$:     MOV     (SP)+,R3        ;RESTORE R3
6725  035542  062716  000004                  ADD     #4,(SP)         ;INCREMENT RET ADDR
6726  035546  000207                          RTS     PC
6727
6728                                  ;
6729                                  ;THIS ROUTINE SORTS THE RHTAB TABLE FROM WHATEVER SECTOR IT BEGINS
6730                                  ;WITH AND RE-WRITES THE INFO IN SRTTAB TABLE TO BEGIN WITH SECTOR 0
6731                                  ;
6732  035550  010046          SORT:   MOV     R0,-(SP)        ;SAVE R0
6733  035552  010146                  MOV     R1,-(SP)        ;SAVE R1
6734  035554  004737  034274                  JSR     PC,RDSEC
6735  035560  062737  000001  001402          ADD     #1,SECTOR
6736  035566  004737  035656                  JSR     PC,MULT6        ;MULT SECTOR BY 6
6737
6738  035572  012700  000204                  MOV     #132.,R0
6739  035576  163700  001402                  SUB     SECTOR,R0       ;R0-SECTOR TO R0 = INDEX
6740  035602  010037  001402                  MOV     R0,SECTOR
6741  035606  062737  001726  001402          ADD     #RHTAB,SECTOR   ;SAVE INDEX
6742
6743  035614  062700  001726                  ADD     #RHTAB,R0       ;INDEX TO BOT HALF OF RHTAB
6744  035620  012701  002132                  MOV     #SRTTAB,R1      ;INDEX TO TOP HALF OF SRTTAB
6745
6746  035624  012021          1$:     MOV     (R0)+,(R1)+     ;PUT BOTTOM OF RHTAB TO TOP OF SRTTAB
6747  035626  020027  002132                  CMP     R0,#RHTAB+132.
6748  035632  001374                          BNE     1$
6749
6750  035634  012700  001726                  MOV     #RHTAB,R0       ;PUT TOP OF RHTAB TO BOT OF SRTTAB
6751  035640  012021          2$:     MOV     (R0)+,(R1)+
6752  035642  020037  001402                  CMP     R0,SECTOR
6753  035646  001374                          BNE     2$
6754
6755  035650  012601                  MOV     (SP)+,R1        ;RESTOR R1
6756  035652  012600                  MOV     (SP)+,R0        ;RESTOR R0
6757  035654  000207                  RTS     PC
6758
6759
6760                                  ;MULT BY 6. ENTER WITH DESIRED # IN 'SECTOR'
6761                                  ;
6762  035656  006337  001402          MULT6:  ASL     SECTOR          ;2 X SECTOR
6763  035662  013746  001402                  MOV     SECTOR,-(SP)
6764  035666  006337  001402                  ASL     SECTOR          ;4 X SECTOR
6765  035672  062637  001402                  ADD     (SP)+,SECTOR    ;(4 X S)+(2 X S) = 6 X SECTOR
6766  035676  000207                  RTS     PC
```

```
6767
6768                                    ;
6769                                    ;THIS ROUTINE IS ENTERED ONLY IF THERE IS A BSE ERROR AFTER A WRITE DATA
6770                                    ;CMD.  IT VERIFIES THAT THE BAD SECTOR IS LISTED IN THE BSE INFORMATION
6771                                    ;CYLINDER AT CYL 410, TRACK 2.
6772                                    ;
6773                                    ;RETURN IF SECTOR NOT LISTED IN BSE TABLE, ERROR CONDITION.
6774                                    ;RETURN+2 IF LISTED, SKIP OVER ERROR
6775                                    ;
6776  035700  010446                   TRUERR: MOV     R4,-(SP)                ;SAVE R4
6777
6778  035702  032737  010000  007354            BIT     #CFMT,HCS1      ;CHECK FORMAT
6779  035710  001014                            BNE     2$              ;BR FOR 20 SECTOR FORMAT
6780
6781  035712  012704  003346                    MOV     #BSE22H+8.,R4
6782  035716  004737  036000                    JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
6783  035722  000422                            BR      3$              ;RETURN HERE IF YES
6784
6785  035724  012704  005346                    MOV     #BSE22S+8.,R4   ;ELSE RETURN HERE
6786  035730  004737  036000                    JSR     PC,TERR1        ;& SEE IF ON SOFTWARE DETECTED TABLE
6787  035734  000415                            BR      3$              ;RETURN HERE IF YES
6788
6789  035736  012604                    1$:     MOV     (SP)+,R4        ;RESTORE R4
6790  035740  000207                            RTS     PC              ;RETURN WITHOUT JUMPING OVER ERROR
6791
6792  035742  012704  002346            2$:     MOV     #BSE20H+8.,R4
6793  035746  004737  036000                    JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
6794  035752  000406                            BR      3$              ;RETURN HERE IF YES
6795
6796  035754  012704  004346                    MOV     #BSE20S+8.,R4   ;ELSE RETURN HERE
6797  035760  004737  036000                    JSR     PC,TERR1        ;SEE IF ON SOFTWARE DETECTED TABLE
6798  035764  000401                            BR      3$              ;RETURN HERE IF YES
6799  035766  000763                            BR      1$              ;RETURN HERE IF NO
6800
6801  035770  012604                    3$:     MOV     (SP)+,R4        ;RESTORE R4
6802  035772  062716  000002                    ADD     #2,(SP)         ;SKIP OVER ERROR ON RETURN
6803  035776  000207                            RTS     PC
6804
```

```
 6805                                   ;
 6806                                   ;THIS ROUTINE DOES THE ACTUAL COMPARING OF CYLINDER, HEAD & TRACK AGAINST
 6807                                   ;THE BSE TABLE FOR THE ABOVE SUBROUTINE.
 6808                                   ;RETURN IF FOUND ON TABLE
 6809                                   ;RETURN+2 IF NOT FOUND
 6810                                   ;
 6811  036000  021427  177777           ERR1:  CMP     (R4),#-1        ;SEE IF ALL 1'S
```

```
6812  036004  001405                        BEQ     1$              ;BR IF YES, NOT ON TABLE
6813  036006  022437  007374                CMP     (R4)+,HDC       ;SEE IF CYL MATCH
6814  036012  001405                        BEQ     2$              ;BR IF YES
6815  036014  005724                        TST     (R4)+           ;ELSE ADV TO NEXT CYL WORD
6816  036016  000770                        BR      TERR1           ;& TRY AGAIN.
6817
6818  036020  062716  000002        1$:     ADD     #2,(SP)
6819  036024  000207                        RTS     PC
6820
6821  036026  022437  007364        2$:     CMP     (R4)+,HDA       ;SEE IF SECTOR & TRACK MATCH
6822  036032  001401                        BEQ     3$              ;BR IF YES
6823  036034  000761                        BR      TERR1           ;OR TRY AGAIN
6824
6825  036036  000207                3$:     RTS     PC
6826                                ;
6827                                ;ROUTINE TO TURN L OR P CLOCK INTERRUPT ON
6828                                ;
6829  036040  005037  001372        CLKON:  CLR     TIMUP
6830  036044  005737  007520                TST     PCLKF
```

```
6831  036050  001004                        BNE     1$                      ;BRANCH IF P-CLOCK PRESENT
6832  036052  012777  000100  143246        MOV     #100,@LKS               ;L-CLOCK, ENABLE INT
6833  036060  000207                        RTS     PC
6834  036062  012777  177777  143232  1$:   MOV     #-1,@PKSB               ;P-CLOCK, ALL 1'S
6835  036070  012777  000135  143222        MOV     #135,@PKS               ;ENABLE INT, CT UP, REP INT
6836  036076  000207                        RTS     PC                      ;LINE FREQ & RUN
6837
6838                                        ;KW11-L & KW11-P INTERRUPT HANDLER
6839                                        ;
6840  036100  005037  001372        CLOCK:  CLR     TIMUP
6841  036104  005337  001366                DEC     COUNT
6842  036110  001010                        BNE     1$
6843  036112  013737  001364  001366        MOV     HZ,COUNT
6844  036120  005337  001370                DEC     SEC
6845  036124  001002                        BNE     1$
6846  036126  005237  001372                INC     TIMUP                   ;SORRY, TIME IS UP
6847  036132  000002                1$:     RTI
6848                                        ;
6849                                        ;ROUTINE TO TURN L OR P CLOCK INTERRUPT OFF
6850                                        ;
6851  036134  005737  007520        CLKOF:  TST     PCLKF
6852  036140  001003                        BNE     1$                      ;BRACH IF P-CLOCK PRESENT
6853  036142  005077  143160                CLR     @LKS                    ;L-CLOCK, CLEAR INTERRUPT
6854  036146  000207                        RTS     PC
6855  036150  005077  143144        1$:     CLR     @PKS                    ;P-CLOCK, CLEAR INTERRUPT
6856  036154  000207                        RTS     PC
6857
6858
6859                                        ;THIS ROUTINE GENERATES PARITY FOR THE EXPECTED MESSAGE
6860                                        ;ENTER WITH THE EXPECTED WORD IN TEMP1
6861                                        ; TEMP1 IS ROTATED LEFT 17 TIMES. EACH TIME THE CARRY BIT IS SET,
6862                                        ;R1 IS INCREMENTED. AT THE END OF 17 ROTATES ( TEMP1 BACK TO ORIG),
6863                                        ;R1 BIT 0 IS EXAMINED. IF IT IS SET, INDICATING AN ODD # OF 1'S,
6864                                        ; THE PARITY BIT IS NOT SET IN B .
6865                                        ;IF IT IS NOT SET, INDICATING AN EVEN # OF 1'S ,THE PARITY BIT IS
6866                                        ;SET IN TEMP1
6867                                        ;
6868  036156  010046                SBPAR:  MOV     R0,-(SP)                ;SAVE R0
6869  036160  010146                        MOV     R1,-(SP)                ;SAVE R1
6870  036162  012700  000021                MOV     #17.,R0                 ;SHIFT COUNTER
6871  036166  005001                        CLR     R1                      ;COUNT # OF 1'S IN TEMP1
6872  036170  000241                        CLC                             ;CLEAR CARRY
6873
6874  036172  006137  007412        1$:     ROL     TEMP1
6875  036176  103001                        BCC     2$                      ;BR IF CARRY CLEAR
6876  036200  005201                        INC     R1                      ;COUNT # OF 1'S
6877  036202  005300                2$:     DEC     R0                      ;SHIFT COUNTER
6878  036204  001372                        BNE     1$
6879
6880  036206  032701  000001                BIT     #BIT0,R1
6881  036212  001003                        BNE     3$                      ;BR IF ODD # IN R0
6882  036214  052737  100000  007412        BIS     #M.PAR,TEMP1            ;SET PARITY BIT
6883  036222  012601                3$:     MOV     (SP)+,R1                ;RESTORE R1
6884  036224  012600                        MOV     (SP)+,R0                ;RESTORE R0
6885  036226  000207                        RTS     PC
6886
```

```
                                        ;
                                        ;ROUTINE TO ENABLE LOOPING ON INTERMITTANT ERRORS
                                        ;WHEN $LPERR SET BY OTHER THAN SCOPE ROUTINE
                                        ;  IE: MY LOOP MACRO
                                        ;
036230  032777  001000  142702  $COP1$: BIT     #SW9,@SWR       ;LOOP ON ERROR?
036236  001406                        BEQ     1$              ;BR IF NO
036240  105737  001103                TSTB    $ERFLG          ;HAD ERROR?
036244  001403                        BEQ     1$              ;BR IF NO
036246  013716  001110                MOV     $LPERR,(SP)
036252  000002                        RTI
                                        ;
036254  011637  001110        1$:     MOV     (SP),$LPERR     ;SET LOOP ADDR FOR TIGHT SCOPE LOOP
036260  000002                        RTI
                                        ;
                                        ;THIS ROUTINE IS ENTERED BY TYPING A CONTROL-C.
                                        ;IT IS USED TO ALLOW THE OPERATOR TO HLAT THE CPU WHILE INSURING
                                        ;THAT HEADS ARE LOADED & FORMATTING IS VALID BEFORE ACTUALLY HALTING
                                        ;THE CPU.
                                        ;
036262  022626                $STOP:  CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INTERRUPT
                                        ;
036264  004737  034214                  JSR     PC,SUBCLR
036270  104024                        ERROR   24              ;CERR AFTER
                                        ;
036272  005737  007336                  TST     UNLD            ;SEE IF HEADS UNLOADED
036276  001431                        BEQ     3$              ;BR IF NO
036300  005737  000042                  TST     42              ;SEE IF MANUAL OR AUTO MODE
036304  001403                        BEQ     1$              ;BR IF MANUAL MODE
036306  104401  045775                TYPE    ,MSG74          ;PGM ABORT PENDING
036312  000402                        BR      2$
036314  104401  046043        1$:     TYPE    ,MSG75          ;HALT PENDING
036320                          2$:
                                        ;
036320  004737  034214                  JSR     PC,SUBCLR
036324  104024                        ERROR   24              ;CERR AFTER SCLR
                                        ;
036326  012737  000011  007354          MOV     #SRTSPL,HCS1
036334  004737  032224                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
036340  104121                        ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
                                        ;
036342  013737  001414  007414          MOV     T100,TEMP2      ;SETUP TIMEOUT
036350  004737  032634                  JSR     PC,FATT1        ;FIND ATTN
036354  104074                        ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
                                        ;
036356  005037  007336                  CLR     UNLD
                                        ;
                                        ;
036362  005737  007340          3$:     TST     BADHDR          ;SEE IF HEADERS VALID
036366  001460                        BEQ     4$              ;BR IF YES
036370  005237  007342                  INC     HPEND
                                        ;
036374  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
036402  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
036410  012737  000013  007354          MOV     #RECAL,HCS1
036416  004737  032224                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
```

```
6943  036422  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD
6944
6945  036424  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
6946  036432  004737  033664                  JSR     PC,GSTAT
6947  036436  032737  020000  007402          BIT     #D.RTZ,HMR2
6948  036444  001001                          BNE     64$
6949  036446  104244                          ERROR   244             ;RTZ NOT SET DURING RECAL CMD
6950  036450  013737  001406  007414  64$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
6951  036456  004737  032634                  JSR     PC,FATT1        ;FIND ATTN
6952  036462  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD
6953
6954  036464  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
6955  036472  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
6956  036500  012737  000005  007354          MOV     #CLEAR,HCS1
6957  036506  004737  032224                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
6958  036512  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
6959  036514  004737  032602                  JSR     PC,TSTATN       ;TEST FOR ATTN
6960  036520  000401                          BR      65$
6961  036522  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
6962  036524                          65$:
6963
6964
6965  036524  000137  031174                  JMP     FORM            ;WRITE VALID FORMATS
6966
6967  036530  005737  000042          4$:     TST     42              ;SEE IF MANUAL OR AUTO MODE
6968  036534  001410                          BEQ     5$              ;BR IF MANUAL MODE
6969  036536  104401  046100                  TYPE    ,MSG76          ;PGM ABORTED
6970  036542  005037  031540                  CLR     $EOPCT          ;SET UP EOP TO EXIT TO MONITOR
6971  036546  005037  001176                  CLR     $ESCAPE
6972  036552  000137  031512                  JMP     $EOP1           ;ABORT PGM
6973
6974  036556  104401  046122          5$:     TYPE    ,MSG77          ;CPU HALTED
6975  036562  000000                          HALT
6976  036564  000137  013356                  JMP     ST5             ;START OVER IF CONTINUE PRESSED
6977
6978
6979
6980                                  .SBTTL  UNEXPECTED TIMEOUT HANDLER
6981
6982                                  ;
6983                                  ;THIS ROUTINE IS ENTERED IF THERE IS
6984                                  ;       A.  NON EXISTANT MEMORY (NO SSYN)
6985                                  ;       B.  BOUNDRY ERROR
6986                                  ;       C.  STACK OVERFLOW
6987                                  ;
6988
6989  036570  011600                  BADTMO: MOV     (SP),R0         ;SAVE PC WHERE TIMEOUT OCCURRED.
6990  036572  005740                          TST     -(R0)           ;GET PC BEFORE UPDATE
6991  036574  032777  020000  142336          BIT     #SW13,@SWR      ;INHIBIT ERR TYPOUT?
6992  036602  001005                          BNE     1$              ;YES, DON'T TYPE
6993  036604  104401  046303                  TYPE    ,EM3            ;ABORT TESTS,UNEXP T.O. @ PC=
6994  036610  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
6995                                          ;;TYPE PC
6996  036612  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
6997  036614     006                          .BYTE   6               ;;TYPE 6 DIGIT(S)
6998  036615     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
```

```
 6999  036616  032777  001000  142314  1$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
 7000  036624  001403                          BEQ     2$              ;NO, BRANCH
 7001  036626  022626                          CMP     (SP)+,(SP)+     ;YES, RESTORE STACK
 7002  036630  000177  142252                  JMP     @$LPADR         ;GO TO STARTING ADDR OF TEST
 7003                                                                  ;THAT GAVE BAD TIMEOUT
 7004  036634  032777  040000  142276  2$:     BIT     #SW14,@SWR      ;LOOP ON TEST?
 7005  036642  001401                          BEQ     3$              ;NO BRANCH
 7006  036644  000002                          RTI                     ;YES
 7007
 7008  036646  000000                  3$:     HALT                    ;UNEXPECTED TIME OUT OCCURRED
 7009                                                                  ;AS INDICATED. YOU CAN LOOP ON
 7010                                                                  ;ERROR, LOOP ON TEST OR INHIBIT
 7011                                                                  ;ERROR TYPEOUT BY SETTING THOSE
 7012                                                                  ;SWITCHES.
 7013                                                                  ;
 7014  036650  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK
 7015  036652  000137  031512                  JMP     $EOP1           ;ABORT TESTS
 7016
 7017                          .SBTTL  MEMORY CHECK ENABLE TRAP
 7018
 7019  036656  012737  036672  001176  MEMERR: MOV     #1$,$ESCAPE
 7020  036664  011637  001334                  MOV     (SP),TRAPPC     ;STORE PC
 7021  036670  104041                          ERROR   41              ;UNEXP MEM PARITY TRAP
 7022  036672  005037  001176          1$:     CLR     $ESCAPE
 7023  036676  032777  001000  142234          BIT     #SW9,@SWR       ;CHECK IF LOOP ON ERROR
 7024  036704  001001                          BNE     2$              ;YES, FORCE STACK AND TRY AGAIN
 7025  036706  000002                          RTI                     ;ELSE RETURN
 7026
 7027  036710  012706  001100          2$:     MOV     #STACK,SP       ;INIT STACK
 7028  036714  000177  142170                  JMP     @$LPERR         ;LOOP ON ERROR
 7029
 7030
 7031                          .SBTTL  RK06 INTERRUPT HANDLER
 7032
 7033  036720  000240          INTER:  NOP
 7034  036722  000240                  NOP
 7035  036724  000240                  NOP
 7036  036726  011600                  MOV     (SP),R0         ;SAVE PC WHERE INT OCCURRED.
 7037  036730  005740                  TST     (R0)            ;GET PC BEFORE UPDATE.
 7038  036732  104401  044550          TYPE    ,MSG6           ;INT AT PC=
 7039  036736  010046                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
 7040                                                          ;;TYPE PC
 7041  036740  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
 7042  036742     006                  .BYTE   6               ;;TYPE 6 DIGIT(S)
 7043  036743     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
 7044  036744  000000                  HALT
 7045  036746  000240                  NOP
 7046  036750  000240                  NOP
 7047  036752  000002                  RTI
 7048
 7049                          .SBTTL  POWER DOWN AND UP ROUTINES
 7050
 7051                          ;POWER DOWN ROUTINE
 7052
 7053  036754  012737  036766  000024  $PWRDN: MOV     #$PWRUP,PWRVEC  ;SET UP VECTOR
 7054  036762  000000                  HALT
```

```
 7055  036764  000776                        BR      .-2             ;HANG UP.
 7056
 7057                                  ;POWER UP ROUTINE
 7058
 7059  036766  005037  037040          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY
 7060  036772  005237  037040          1$:     INC     $PWRCT          ;WAIT FOR THE INCR
 7061  036776  001375                          BNE     1$              ;OF WORD
 7062  037000  012737  036754  000024          MOV     #$PWRDN,PWRVEC  ;SET POWER DOWN VECTOR
 7063  037006  012737  000340  000026          MOV     #PR7,PWRVEC+2   ;PRIORITY 7
 7064  037014  012737  000340  000036          MOV     #PR7,TRAPVEC+2  ;LOCKOUT ALL INTERRUPTS FOR TRAPS
 7065  037022  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK
 7066  037026  104401  044740                  TYPE    ,MSG11          ;REPORT POWER FAIL
 7067  037032  000005                          RESET
 7068  037034  000137  015446                  JMP     PFSRT
 7069
 7070  037040  000000                  $PWRCT: 0                       ;WAIT COUNT FOR TTY
 7071
 7072                                  ;
 7073                                  ;DIVISION UTILITY ROUTINE
 7074                                  ;
 7075                                  ;R0-R1-R2-R3=DIVIDEND
 7076                                  ;R4-R5=DIVISOR
 7077                                  ;R0-R1=REMAINDER AFTER DIVISION
 7078                                  ;R2-R3=QUOTIENT AFTER DIVISION
 7079                                  ;ENTER WITH JSR PC,M.DPID
 7080                                  ;
 7081  037042  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 7082  037046  010446                          MOV     R4,-(SP)        ;HI ORDER
 7083  037050  010546                          MOV     R5,-(SP)        ;LO ORDER TO THE STACK
 7084  037052  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
 7085  037056  005416                          NEG     @SP             ;VERSION OF DIVISOR
 7086  037060  005666  000002                  SBC     2(SP)
 7087  037064  061601                          ADD     @SP,R1
 7088  037066  005500                          ADC     R0              ;PERFORM INIT SUBT.
 7089  037070  066600  000002                  ADD     2(SP),R0
 7090  037074  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
 7091  037076  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
 7092  037100  006103          M.DP40: ROL     R3
 7093  037102  006102                  ROL     R2
 7094  037104  006101                  ROL     R1
 7095  037106  006100                  ROL     R0
 7096  037110  005716                  TST     @SP             ;TEST CARRY INDICATOR
 7097  037112  001410                  BEQ     M.DP41          ;IF TO CARRY THEN ADD, ELSE SUBT.
 7098  037114  005016                  CLR     @SP             ;CLEAR UP FOR NEXT TIME
 7099  037116  066601  000002                  ADD     2(SP),R1
 7100  037122  005500                  ADC     R0              ;ADD -(DIVISOR)
 7101  037124  005516                  ADC     @SP             ;SET CARRY
 7102  037126  066600  000004                  ADD     4(SP),R0
 7103  037132  000404                  BR      M.DP42
 7104
 7105  037134  060501          M.DP41: ADD     R5,R1
 7106  037136  005500                  ADC     R0              ;ADD +(DIVISOR)
 7107  037140  005516                  ADC     @SP             ;SET CARRY
 7108  037142  060400                  ADD     R4,R0
 7109  037144  005516          M.DP42: ADC     @SP             ;SET CARRY
 7110  037146  005716                  TST     @SP             ;TEST THE UPDATE INDICATOR
```

```
7111  037150  001401                    BEQ     .+4             ;IF 0,FORGET IT
7112  037152  005203                    INC     R3              ;NO CARRY POSSIBLE HERE
7113  037154  005366  000006            DEC     6(SP)           ;DECREMENT CTR
7114  037160  003347                    BGT     M.DP40          ;BR IF MORE TO DO
7115  037162  006003                    ROR     R3
7116  037164  103404                    BCS     M.DP44
7117  037166  060501                    ADD     R5,R1
7118  037170  005500                    ADC     R0
7119  037172  060400                    ADD     R4,R0
7120  037174  000241                    CLC
7121
7122  037176  006103            M.DP44: ROL     R3
7123  037200  062706  000010            ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
7124  037204  000242                    CLV
7125  037206  000207                    RTS     PC
7126
7127  037210  062706  000006    M.DP50: ADD     #6,SP
7128  037214  000262                    SEV
7129  037216  000207                    RTS     PC
7130
```

```
                                .SBTTL  SCOPE HANDLER ROUTINE

                                ;;*****************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERPOR FLAG ($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

037220                          $SCOPE:
037220  104407                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
037222  032777  040000  141710  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
037230  001114                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
037232  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
037234  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
037240  012737  037260  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
037246  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
037252  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
037256  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
037260  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
037262  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
037266  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
037270                          6$:;#####END OF CODE FOR THE XOR TESTER#####
037270  032777  000400  141642          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
037276  001404                          BEQ     2$              ;;BR IF NO
037300  127737  141634  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
037306  001465                          BEQ     $OVER           ;;BR IF YES
037310  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
037314  001421                          BEQ     3$              ;;BR IF NO
037316  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
037324  101015                          BHI     3$              ;;BR IF NO
037326  032777  001000  141604          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
037334  001404                          BEQ     4$              ;;BR IF NO
037336  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
037344  000446                          BR      $OVER
037346  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
037352  005037  001174                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
037356  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
037360  032777  004000  141552  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
037366  001011                          BNE     1$              ;;BR IF YES
037370  005737  001216                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
037374  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
037376  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
037402  023737  001174  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
037410  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
037412  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
037420  013737  037476  001174          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
037426  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
037432  113737  001102  001214          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
```

```
 7187  037440  011637  001106                 MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 7188  037444  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 7189  037450  005037  001176                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 7190  037454  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 7191  037462  013777  001102  141452 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 7192  037470  013716  001106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 7193  037474  000002                         RTI                     ;;FIXES PS
 7194  037476  003720                 $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 7195                                 .SBTTL  ERROR HANDLER ROUTINE
 7196
 7197                                 ;;**************************************************************
 7198                                 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 7199                                 ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 7200                                 ;*AND GO TO TYPERR ON ERROR
 7201                                 ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 7202                                 ;*SW15=1        HALT ON ERROR
 7203                                 ;*SW13=1        INHIBIT ERROR TYPEOUTS
 7204                                 ;*SW10=1        BELL ON ERROR
 7205                                 ;*SW09=1        LOOP ON ERROR
 7206                                 ;*CALL
 7207                                 ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 7208
 7209  037500                         $ERROR:
 7210  037500  104407                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 7211  037502  105237  001103         7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 7212  037506  001775                         BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 7213  037510  013777  001102  141424         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 7214  037516  032777  002000  141414         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 7215  037524  001402                         BEQ     1$              ;;NO - SKIP
 7216  037526  104401  001200                 TYPE    ,$BELL          ;;RING BELL
 7217  037532  005237  001112         1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 7218  037536  011637  001116                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 7219  037542  162737  000002  001116         SUB     #2,$ERRPC
 7220  037550  117737  141342  001114         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 7221  037556  032777  020000  141354         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 7222  037564  001004                         BNE     20$             ;;SKIP TYPEOUTS
 7223  037566  004737  055140                 JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
 7224  037572  104401  001205                 TYPE    ,$CRLF
 7225  037576                         20$:
 7226  037576  122737  000001  001230         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 7227  037604  001007                         BNE     2$              ;;NO,SKIP APT ERROR REPORT
 7228  037606  113737  001114  037620         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 7229  037614  004737  040424                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 7230  037620     000                 21$:    .BYTE   0
 7231  037621     000                         .BYTE   0
 7232  037622  000777                 22$:    BR      22$             ;;APT ERROR LOOP
 7233  037624  005777  141310         2$:     TST     @SWR            ;;HALT ON ERROR
 7234  037630  100002                         BPL     3$              ;;SKIP IF CONTINUE
 7235  037632  000000                         HALT                    ;;HALT ON ERROR!
 7236  037634  104407                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 7237  037636  032777  001000  141274 3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 7238  037644  001402                         BEQ     4$              ;;BR IF NO
 7239  037646  013716  001110                 MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 7240  037652  005737  001176         4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 7241  037656  001402                         BEQ     5$              ;;BR IF NONE
 7242  037660  013716  001176                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
```

```
7243  037664                          5$:
7244  037664  022737  031600  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
7245  037672  001001                          BNE     6$              ;;BRANCH IF NO
7246  037674  000000                          HALT                    ;;YES
7247  037676                          6$:
7248  037676  000002                          RTI                     ;;RETURN
7249                                  .SBTTL  TYPE ROUTINE
7250
7251                                  ;;*****************************************************************
7252                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
7253                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
7254                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
7255                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
7256                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
7257                                  ;*
7258                                  ;*CALL:
7259                                  ;*1) USING A TRAP INSTRUCTION
7260                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
7261                                  ;*OR
7262                                  ;*      TYPE
7263                                  ;*      MESADR
7264                                  ;*
7265
7266  037700  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
7267  037704  100002                          BPL     1$              ;;BR IF YES
7268  037706  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
7269  037710  000430                          BR      3$              ;;LEAVE
7270  037712  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
7271  037714  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
7272  037720  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
7273  037726  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
7274  037730  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
7275  037736  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
7276  037740  010037  037750                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
7277  037744  004737  040414                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
7278  037750  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
7279  037752  132737  000040  001231  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
7280  037760  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
7281  037762  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
7282  037764  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
7283  037766  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
7284  037770  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
7285  037772  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
7286  037776  000002                          RTI                     ;;RETURN
7287  040000  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
7288  040004  001430                          BEQ     8$
7289  040006  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
7290  040012  001006                          BNE     5$
7291  040014  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
7292  040016  104401                          TYPE                    ;;TYPE A CR AND LF
7293  040020  001205                          $CRLF
7294  040022  105037  040156                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
7295  040026  000755                          BR      2$              ;;GET NEXT CHARACTER
7296  040030  004737  040112          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
7297  040034  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
7298  040040  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
```

```
7299  040042  013746  001154            MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
7300                                                              ;;AND THE NULL CHAR.
7301  040046  105366  000001      7$:   DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
7302  040052  002770                    BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
7303  040054  004737  040112            JSR     PC,$TYPEC       ;;GO TYPE A NULL
7304  040060  105337  040156            DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
7305  040064  000770                    BR      7$              ;;LOOP
7306
7307                                    ;HORIZONTAL TAB PROCESSOR
7308
7309  040066  112716  000040      8$:   MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
7310  040072  004737  040112      9$:   JSR     PC,$TYPEC       ;;TYPE A SPACE
7311  040076  132737  000007  040156    BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
7312  040104  001372                    BNE     9$              ;;TAB STOP
7313  040106  005726                    TST     (SP)+           ;;POP SPACE OFF STACK
7314  040110  000724                    BR      2$              ;;GET NEXT CHARACTER
7315  040112  105777  141032    $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
7316  040116  100375                    BPL     $TYPEC
7317  040120  116677  000002  141024    MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
7318  040126  122766  000015  000002    CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
7319  040134  001003                    BNE     1$              ;;BRANCH IF NO
7320  040136  105037  040156            CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
7321  040142  000406                    BR      $TYPEX          ;;EXIT
7322  040144  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
7323  040152  001402                    BEQ     $TYPEX          ;;BRANCH IF YES
7324  040154  105227                    INCB    (PC)+           ;;COUNT THE CHARACTER
7325  040156  000000    $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
7326  040160  000207    $TYPEX: RTS     PC
7327
7328                                    .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
7329
7330                                    ;;**************************************************************
7331                                    ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
7332                                    ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
7333                                    ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
7334                                    ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
7335                                    ;*REPLACED WITH SPACES.
7336                                    ;*CALL:
7337                                    ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
7338                                    ;*      TYPDS                   ;;GO TO THE ROUTINE
7339
7340  040162                    $TYPDS:
7341  040162  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7342  040164  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7343  040166  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7344  040170  010346                    MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7345  040172  010546                    MOV     R5,-(SP)        ;;PUSH R5 ON STACK
7346  040174  012746  020200            MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
7347  040200  016605  000020            MOV     20(SP),R5       ;;GET THE INPUT NUMBER
7348  040204  100004                    BPL     1$              ;;BR IF INPUT IS POS.
7349  040206  005405                    NEG     R5              ;;MAKE THE BINARY NUMBER POS.
7350  040210  112766  000055  000001    MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
7351  040216  005000            1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
7352  040220  012703  040376            MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
7353  040224  112723  000040            MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
7354  040230  005002            2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
```

```
7355  040232  016001  040366          MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
7356  040236  160105          3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
7357  040240  002402                  BLT     4$              ;;BR IF DONE
7358  040242  005202                  INC     R2              ;;INCREASE THE BCD DIGIT BY 1
7359  040244  000774                  BR      3$
7360  040246  060105          4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
7361  040250  005702                  TST     R2              ;;CHECK IF BCD DIGIT=0
7362  040252  001002                  BNE     5$              ;;FALL THROUGH IF 0
7363  040254  105716                  TSTB    (SP)            ;;STILL DOING LEADING 0'S?
7364  040256  100407                  BMI     7$              ;;BR IF YES
7365  040260  106316          5$:     ASLB    (SP)            ;;MSD?
7366  040262  103003                  BCC     6$              ;;BR IF NO
7367  040264  116663  000001  177777  MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
7368  040272  052702  000060  6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
7369  040276  052702  000040  7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
7370  040302  110223                  MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
7371  040304  005720                  TST     (R0)+           ;;JUST INCREMENTING
7372  040306  020027  000010          CMP     R0,#'0          ;;CHECK THE TABLE INDEX
7373  040312  002746                  BLT     2$              ;;GO DO THE NEXT DIGIT
7374  040314  003002                  BGT     8$              ;;GO TO EXIT
7375  040316  010502                  MOV     R5,R2           ;;GET THE LSD
7376  040320  000764                  BR      6$              ;;GO CHANGE TO ASCII
7377  040322  105726          8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
7378  040324  100003                  BPL     9$              ;;BR IF NO
7379  040326  116663  177777  177776  MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
7380  040334  105013          9$:     CLRB    (R3)            ;;SET THE TERMINATOR
7381  040336  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
7382  040340  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
7383  040342  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
7384  040344  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
7385  040346  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
7386  040350  104401  040376          TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
7387  040354  016666  000002  000004  MOV     2(SP),4(SP)     ;;ADJUST THE STACK
7388  040362  012616                  MOV     (SP)+,(SP)
7389  040364  000002                  RTI                     ;;RETURN TO USER
7390  040366  023420          $DTBL:  10000.
7391  040370  001750                  1000.
7392  040372  000144                  100.
7393  040374  000012                  10.
7394  040376  000004          $DBLK:  .BLKW   4
7395                           .SBTTL  APT COMMUNICATIONS ROUTINE
7396
7397                           ;;*****************************************************************
7398  040406  112737  000001  040652  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
7399  040414  112737  000001  040650  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
7400  040422  000403                  BR      $ATYC
7401  040424  112737  000001  040652  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
7402  040432          $ATYC:
7403  040432  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7404  040434  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7405  040436  105737  040650          TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
7406  040442  001450                  BEQ     5$              ;;IF NOT:  BR
7407  040444  122737  000001  001230  CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
7408  040452  001031                  BNE     3$              ;;IF NOT:  BR
7409  040454  132737  000100  001231  BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
7410  040462  001425                  BEQ     3$              ;;IF NOT:  BR
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7411  040464  017600  000004            MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
7412  040470  062766  000002  000004    ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7413  040476  005737  001210          1$: TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
7414  040502  001375                    BNE     1$              ;;IF NOT:  WAIT
7415  040504  010037  001224            MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
7416  040510  105720                  2$: TSTB    (R0)+           ;;FIND END OF MESSAGE
7417  040512  001376                    BNE     2$
7418  040514  163700  001224            SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
7419  040520  006200                    ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
7420  040522  010037  001226            MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
7421  040526  012737  000004  001210    MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
7422  040534  000413                    BR      5$
7423  040536  017637  000004  040562  3$: MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
7424  040544  062766  000002  000004    ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
7425  040552  013746  177776            MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
7426  040556  004737  037700            JSR     PC,$TYPE        ;;CALL TYPE MACRO
7427  040562  000000                  4$: .WORD   0
7428  040564                          5$:
7429  040564  105737  040652         10$: TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
7430  040570  001416                    BEQ     12$             ;;IF NOT:  BR
7431  040572  005737  001230            TST     $ENV            ;;RUNNING UNDER APT?
7432  040576  001413                    BEQ     12$             ;;IF NOT:  BR
7433  040600  005737  001210         11$: TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
7434  040604  001375                    BNE     11$             ;;IF NOT:  WAIT
7435  040606  017637  000004  001212    MOV     @4(SP),$FATAL   ;;GET ERROR #
7436  040614  062766  000002  000004    ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7437  040622  005237  001210            INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
7438  040626  105037  040652         12$: CLRB    $FFLG           ;;CLEAR FATAL FLAG
7439  040632  105037  040651            CLRB    $LFLG           ;;CLEAR LOG FLAG
7440  040636  105037  040650            CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
7441  040642  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
7442  040644  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
7443  040646  000207                    RTS     PC              ;;RETURN
7444  040650     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
7445  040651     000          $LFLG:  .BYTE   0               ;;LOG FLAG
7446  040652     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
7447          040654                  .EVEN
7448          000200          APTSIZE=200
7449          000001          APTENV=001
7450          000100          APTSPOOL=100
7451          000040          APTCSUP=040
7452                          .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
7453
7454                          ;;*****************************************************************
7455                          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
7456                          ;*OCTAL (ASCII) NUMBER AND TYPE IT.
7457                          ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
7458                          ;*CALL:
7459                          ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
7460                          ;*      TYPOS                   ;;CALL FOR TYPEOUT
7461                          ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
7462                          ;*      .BYTE   M               ;;M=1 OR 0
7463                          ;*                                      ;;1=TYPE LEADING ZEROS
7464                          ;*                                      ;;0=SUPPRESS LEADING ZEROS
7465                          ;*
7466                          ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
```

```
                                        ;*$TYPOS OR $TYPOC
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPON                   ;;CALL FOR TYPEOUT
                                        ;*
                                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT
                                        
040654  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
040660  116637  000001  041077          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
040666  112637  041101                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
040672  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
040676  000406                          BR      $TYPON
040700  112737  000001  041077  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
040706  112737  000006  041101          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
040714  112737  000005  041076  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
040722  010346                          MOV     R3,-(SP)        ;;SAVE R3
040724  010446                          MOV     R4,-(SP)        ;;SAVE R4
040726  010546                          MOV     R5,-(SP)        ;;SAVE R5
040730  113704  04110                   MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
040734  005404                          NEG     R4
040736  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
040742  110437  041100                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
040746  113704  041077                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
040752  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
040756  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
040760  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
040762  000404                          BR      3$              ;;GO DO MSB
040764  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
040766  006105                          ROL     R5
040770  006105                          ROL     R5
040772  010503                          MOV     R5,R3
040774  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
040776  105337  041100                  DECB    $OMODE          ;;TYPE THIS DIGIT?
041002  100016                          BPL     7$              ;;BR IF NO
041004  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
041010  001002                          BNE     4$              ;;TEST FOR 0
041012  005704                          TST     R4              ;;SUPPRESS THIS 0?
041014  001403                          BEQ     5$              ;;BR IF YES
041016  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
041020  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
041024  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
041030  110337  041074                  MOVB    R3,8$           ;;SAVE FOR TYPING
041034  104401  041074                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
041040  105337  041076          7$:     DECB    $OCNT           ;;COUNT BY 1
041044  003347                          BGT     2$              ;;BR IF MORE TO DO
041046  002402                          BLT     6$              ;;BR IF DONE
041050  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
041052  000744                          BR      2$              ;;GO DO THE LAST DIGIT
041054  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
041056  012604                          MOV     (SP)+,R4        ;;RESTORE R4
041060  012603                          MOV     (SP)+,R3        ;;RESTORE R3
041062  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
041070  012616                          MOV     (SP)+,(SP)
```

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                                        RTI                             ;;RETURN
                                8$:     .BYTE   0                       ;;STORAGE FOR ASCII DIGIT
                                        .BYTE   0                       ;;TERMINATOR FOR TYPE ROUTINE
                                $OCNT:  .BYTE   0                       ;;OCTAL DIGIT COUNTER
                                $OFILL: .BYTE   0                       ;;ZERO FILL SWITCH
                                $OMODE: .WORD   0                       ;;NUMBER OF DIGITS TO TYPE
                                .SBTTL  TTY INPUT ROUTINE

                                ;;******************************************************************
                                .ENABL  LSB
                                $TKCNT: .WORD   0                       ;;NUMBER OF ITEMS IN QUEUE
                                $TKQIN: .WORD   0                       ;;INPUT POINTER
                                $TKQOUT: .WORD  0                       ;;OUTPUT POINTER
                                $TKQSRT: .BLKB  1                       ;;TTY KEYBOARD QUEUE
                                $TKQEND=.
                                .EVEN

                                ;*TK INITIALIZE ROUTINE
                                ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
                                ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
                                ;
                                ;*CALL:
                                ;*      JSR     PC,$TKINT
                                ;*      RETURN
                                ;
                                $TKINT: CLR     $TKCNT                  ;;CLEAR COUNT OF ITEMS IN QUEUE
                                        MOV     #$TKQSRT,$TKQIN         ;;MOVE THE STARTING ADDRESS OF THE
                                        MOV     $TKQIN,$TKQOUT          ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
                                        MOV     #$TKSRV,@#TKVEC         ;;INITIALIZE THE KEYBOARD VECTOR
                                        MOV     #200,@#TKVEC+2          ;;"BR" LEVEL 4
                                        TST     @$TKB                   ;;CLEAR DONE FLAG
                                        MOV     #100,@$TKS              ;;ENABLE TTY KEYBOARD INTERRUPT
                                        RTS     PC                      ;;RETURN TO CALLER

                                ;*TK SERVICE ROUTINE
                                ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                ;*IT IN THE QUEUE.
                                ;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
                                ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (STOP)
                                ;
                                $TKSRV: MOVB    @$TKB,-(SP)             ;;PICKUP THE CHARACTER
                                        BIC     #^C177,(SP)             ;;STRIP THE JUNK
                                        CMP     (SP),#3                 ;;IS IT A CONTROL C?
                                        BNE     1$                      ;;BRANCH IF NO
                                        TYPE    ,$CNTLC                 ;;TYPE A CONTROL-C (^C)
                                        JSR     PC,$TKINT               ;;INIT THE KEYBOARD
                                        TST     (SP)+                   ;;CLEAN UP STACK
                                        JMP     STOP                    ;;CONTROL C RESTART
                                1$:     CMP     (SP),#7                 ;;IS IT A CONTROL G?
                                        BNE     2$                      ;;BRANCH IF NO
                                        CMP     #SWREG,SWR              ;;IS SOFT-SWR SELECTED?
                                        BEQ     6$                      ;;GO TO SWR CHANGE

                                2$:
                                        CMP     #1,$TKCNT               ;;IS THE QUEUE FULL?
```

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7579  041242  001004                        BNE     3$              ;;BRANCH IF NO
7580  041244  104401  001200                TYPE    ,$BELL          ;;RING THE TTY BELL
7581  041250  005726                        TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
7582  041252  000451                        BR      5$              ;;EXIT
7583  041254  021627  000023        3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
7584  041260  001021                        BNE     32$             ;;BRANCH IF NO
7585  041262  005077  137656                CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
7586  041266  005726                        TST     (SP)+           ;;CLEAN CHAR OFF STACK
7587  041270  105777  137650        31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
7588  041274  100375                        BPL     31$             ;;LOOP UNTIL ITS THERE
7589  041276  117746  137644                MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
7590  041302  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
7591  041306  022627  000021                CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
7592  041312  001366                        BNE     31$             ;;BRANCH IF NO
7593  041314  012777  000100  137622        MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
7594  041322  000002                        RTI                     ;;RETURN
7595  041324  005237  041102        32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
7596  041330  021627  000140                CMP     (SP),#140       ;;IS IT UPPER CASE?
7597  041334  002405                        BLT     4$              ;;BRANCH IF YES
7598  041336  021627  000175                CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
7599  041342  003002                        BGT     4$              ;;BRANCH IF YES
7600  041344  042716  000040                BIC     #40,(SP)        ;;MAKE IT UPPER CASE
7601  041350  112677  177530        4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
7602  041354  005237  041104                INC     $TKQIN          ;;UPDATE THE POINTER
7603  041360  023727  041104  041111        CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
7604  041366  001003                        BNE     5$              ;;BRANCH IF NO
7605  041370  012737  041110  041104        MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
7606  041376  000002                5$:     RTI                     ;;RETURN
7607
7608                                        ;;**********************************************************************
7609                                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
7610                                        ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
7611                                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
7612                                        ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
7613  041400  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
7614  041406  001124                        BNE     15$             ;;EXIT IF NOT
7615  041410  105777  137530                TSTB    @$TKS           ;;IS A CHAR WAITING?
7616  041414  100121                        BPL     15$             ;;IF NOT, EXIT
7617  041416  117746  137524                MOVB    @$TKB,-(SP)     ;;YES
7618  041422  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
7619  041426  021627  000007                CMP     (SP),#7         ;;IS IT A CONTROL-G?
7620  041432  001300                        BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
7621                                                                ;;AND EXIT
7622
7623                                        ;;**********************************************************************
7624                                        ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
7625                                        ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
7626                                        ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
7627  041434  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
7628  041442  001674                        BEQ     2$              ;;BRANCH IF YES
7629  041444  005726                        TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
7630  041446  004737  041112                JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
7631  041452  005077  137466                CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
7632  041456  112737  000001  001135        MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
7633
7634  041464  104401  042322                TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
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 7635  041470  104401  042327          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 7636  041474  013746  000176                  MOV     $SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
 7637  041500  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 7638  041502  104401  042340                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 7639  041506  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 7640  041510  005046                          CLR     -(SP)           ;;THE NEW SWR
 7641  041512  105777  137426          7$      TSTB    @$TKS           ;;CHAR THERE?
 7642  041516  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 7643
 7644  041520  117746  137422                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 7645  041524  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 7646
 7647  041530  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
 7648  041534  001015                          BNE     9$              ;;BRANCH IF NOT
 7649  041536  104401  042310                  TYPE    ,$CNTLC         ;;YES, ECHO CONTRC_-C (^C)
 7650  041542  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
 7651  041546  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 7652  041554  001003                          BNE     8$              ;;BRANCH IF NO
 7653  041556  012777  000100  137360          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 7654  041564  000137  036262          8$:     JMP     STOP            ;;CONTROL-C RESTART
 7655
 7656
 7657  041570  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 7658  041574  001005                          BNE     10$             ;;BRANCH IF NOT
 7659  041576  104401  042315                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 7660  041602  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 7661  041606  000737                          BR      19$             ;;LET'S TRY IT AGAIN
 7662
 7663
 7664  041610  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 7665  041614  001022                          BNE     16$             ;;BRANCH IF NO
 7666  041616  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 7667  041622  001403                          BEQ     11$             ;;BRANCH IF YES
 7668  041624  016677  000002  137306          MOV     2(SP),@SWR      ;;SAVE NEW SWR
 7669  041632  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 7670  041636  104401  001205          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 7671  041642  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 7672  041650  001003                          BNE     15$             ;;BRANCH IF NOT
 7673  041652  012777  000100  137264          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 7674  041660  000002                  15$:    RTI                     ;;RETURN
 7675  041662  004737  040112          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 7676  041666  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 7677  041672  002420                          BLT     18$             ;;BRANCH IF YES
 7678  041674  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 7679  041700  003015                          BGT     18$             ;;BRANCH IF YES
 7680  041702  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 7681  041706  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 7682  041712  001403                          BEQ     17$             ;;BRANCH IF YES
 7683  041714  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 7684  041716  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 7685  041720  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 7686  041722  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 7687  041726  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 7688  041732  000667                          BR      7$              ;;GET THE NEXT ONE
 7689  041734  104401  001204          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 7690  041740  000720                          BR      20$             ;;SIMULATE CONTROL-U
```

```
 7691                                   .DSABL  LSB
 7692
 7693
 7694                                   ;;*****************************************************************
 7695                                   ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 7696                                   ;*CALL:
 7697                                   ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
 7698                                   ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 7699                                   ;*                              ;;WITH PARITY BIT STRIPPED OFF
 7700                                   ;
 7701
 7702  041742  011646                   $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
 7703  041744  016666  000004  000002           MOV     4(SP),2(SP)     ;;THE PS
 7704  041752  005066  000004                   CLR     4(SP)           ;;GET READY FOR A CHARACTER
 7705  041756  005046                           CLR     -(SP)           ;;PUT NEW PS ON STACK
 7706  041760  012746  041766                   MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 7707  041764  000002                           RTI                     ;;POP NEW PC AND PS
 7708  041766                           64$:
 7709  041766  005737  041102           1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
 7710  041772  001775                           BEQ     1$
 7711  041774  005337  041102                   DEC     $TKCNT          ;;DECREMENT THE COUNTER
 7712  042000  117766  177102  000004           MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
 7713  042006  005237  041106                   INC     $TKQOUT         ;;UPDATE THE POINTER
 7714  042012  023727  041106  041111           CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END
 7715  042020  001003                           BNE     2$              ;;BRANCH IF NO
 7716  042022  012737  041110  041106           MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
 7717  042030  000002           2$:             RTI                     ;;RETURN
 7718                                   ;;*****************************************************************
 7719                                   ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
 7720                                   ;*CALL:
 7721                                   ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
 7722                                   ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
 7723                                   ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
 7724
 7725  042032  010346           $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
 7726  042034  005046                   CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
 7727  042036  012703  042266   1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
 7728  042042  022703  042310   2$:     CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
 7729  042046  101456                   BLOS    4$              ;;BR IF YES
 7730  042050  104410                   RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 7731  042052  112613                   MOVB    (SP)+,(R3)      ;;GET CHARACTER
 7732  042054  122713  000177   10$:     CMPB    #177,(R3)       ;;IS IT A RUBOUT
 7733  042060  001022                   BNE     5$              ;;BR IF NO
 7734  042062  005716                   TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
 7735  042064  001007                   BNE     6$              ;;BR IF NO
 7736  042066  112737  000134  042264   MOVB    #'\,9$          ;;TYPE A BACK SLASH
 7737  042074  104401  042264           TYPE    ,9$
 7738  042100  012716  177777           MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
 7739  042104  005303           6$:     DEC     R3              ;;BACKUP BY ONE
 7740  042106  020327  042266           CMP     R3,#$TTYIN      ;;STACK EMPTY?
 7741  042112  103434                   BLO     4$              ;;BR IF YES
 7742  042114  111337  042264           MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
 7743  042120  104401  042264           TYPE    ,9$             ;;GO TYPE
 7744  042124  000746                   BR      2$              ;;GO READ ANOTHER CHAR.
 7745  042126  005716           5$:     TST     (SP)            ;;RUBOUT KEY SET?
 7746  042130  001406                   BEQ     7$              ;;BR IF NO
```

```
7747  042132  112737  000134  042264          MOVB    #'\,9$          ;;TYPE A BACK SLASH
7748  042140  104401  042264                  TYPE    ,9$
7749  042144  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
7750  042146  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
7751  042152  001003                          BNE     8$              ;;BR IF NO
7752  042154  104401  042315                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
7753  042160  000726                          BR      1$              ;;GO START OVER
7754  042162  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
7755  042166  001011                          BNE     3$              ;;BRANCH IF NO
7756  042170  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
7757  042172  104401  001205                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
7758  042176  104401  042266                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
7759  042202  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
7760  042204  104401  001204          4$:     TYPE    ,$QUES          ;;TYPE A '?'
7761  042210  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
7762  042212  111337  042264          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
7763  042216  104401  042264                  TYPE    ,9$
7764  042222  122723  000015                  CMPB    #15,(R3)+       ;; HECK FOR RETURN
7765  042226  001305                          BNE     2$              ;;LOOP IF NOT RETURN
7766  042230  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
7767  042234  104401  001206                  TYPE    ,$LF            ;;TYPE A LINE FEED
7768  042240  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
7769  042242  012603                          MOV     (SP)+,R3        ;;RESTORE R3
7770  042244  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
7771  042246  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
7772  042254  012766  042266  000004          MOV     #$TTYIN,4(SP)
7773  042262  000002                          RTI                     ;;RETURN
7774  042264     000          9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
7775  042265     000                  .BYTE   0                       ;;TERMINATOR
7776  042266  000022          $TTYIN: .BLKB   22                      ;;RESERVE 22 BYTES FOR TTY INPUT
7777  042310  041536  005015     000  $CNTLC: .ASCIZ  /↑C/<15><12>    ;;CONTROL "C"
7778  042315     136  006525  000012  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
7779  042322  043536  005015     000  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
7780  042327     015  051412  051127  $MSWR:  .ASCIZ  <15><12>/SWR = /
7781  042334  036440  000040
7782  042340  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
7783  042346  020075     000
7784          042352                  .EVEN
7785                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
7786
7787                                  ;;*****************************************************************
7788                                  ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
7739                                  ;*CHANGE IT TO BINARY.
7790                                  ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
7791                                  ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
7792                                  ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
7793                                  ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
7794                                  ;*CALL:
7795                                  ;*      RDOCT                   ;;READ AN OCTAL NUMBER
7796                                  ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
7797                                  ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
7798
7799  042352  011646          $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
7800  042354  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
7801  042362  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7802  042364  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

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                        READ AN OCTAL NUMBER FROM THE TTY

7803  042366  010246                1$:     MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7804  042370  104411                        RDLIN                   ;;READ AN ASCIZ LINE
7805  042372  012600                        MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
7806  042374  010037  042500                MOV     R0,5$           ;;AND SAVE IT
7807  042400  005001                        CLR     R1              ;;CLEAR DATA WORD
7808  042402  005002                        CLR     R2
7809  042404  112046                2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
7810  042406  001420                        BEQ     3$              ;;IF ZERO GET OUT
7811  042410  122716  000060              CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
7812  042414  003026                        BGT     4$              ;;IS AN OCTAL DIGIT
7813  042416  122716  000067              CMPB    #'7,(SP)
7814  042422  002423                        BLT     4$
7815  042426  006301                        ASL     R1              ;;*2
7816  042430  006102                        ROL     R2
7817  042432  006301                        ASL     R1              ;;*4
7818  042434  006102                        ROL     R2
7819  042436  006301                        ASL     R1              ;;*8
7820  042440  006102                        ROL     R2
7821  042444  042716  177770              BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
7822  042450  062601                        ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
7823  042452  000756                        BR      2$              ;;LOOP
7824  042454  005726                3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
7825  042456  010166  000012              MOV     R1,12(SP)       ;;SAVE THE RESULT
7826  042462  010237  042510              MOV     R2,$HIOCT
7827  042466  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
7828  042470  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
7829  042472  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
7830  042474  000002                        RTI                     ;;RETURN
7831  042476  005726                4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
7832  042500  105010                        CLRB    (R0)            ;;SET A TERMINATOR
7833  042502  104401                        TYPE                    ;;TYPE UP THRU THE BAD CHAR.
7834  042504  000000                5$:     .WORD   0
7835  042506  104401  001204              TYPE    $QUES           ;;"?" "CR" & "LF"
7836  042512  000730                        BR      1$              ;;TRY AGAIN
7837  042514  000000                $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
7838                                .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
7839
7840                                ;;**************************************************************
7841                                ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
7842                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
7843                                ;*CALL
7844                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7845                                ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
7846                                ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
7847
7848
7849  042516  104413                $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
7850  042520  016601  000002              MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
7851  042524  012705  042631              MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
7852  042530  012704  000014              MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
7853  042534  012703  177770              MOV     #^C7,R3         ;;MASK
7854  042540  012100                        MOV     (R1)+,R0        ;;LOWER WORD
7855  042542  012101                        MOV     (R1)+,R1        ;;HIGH WORD
7856  042544  005002                        CLR     R2              ;;TERMINATOR
7857  042546  110245                1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
7858  042550  010002                        MOV     R0,R2           ;;GET THIS DIGIT
```

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7859  042546  005304                          DEC     R4              ;;COUNT THIS CHARACTER
7860  042550  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
7861  042552  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
7862  042554  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
7863  042556  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
7864  042562  104414                          RESREG                  ;;RESTORE ALL REGISTERS
7865  042564  000207                          RTS     PC              ;;RETURN TO USER
7866  042566  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
7867  042570  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
7868  042572  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
7869  042574  006001                          ROR     R1
7870  042576  006000                          ROR     R0
7871  042600  006001                          ROR     R1
7872  042602  006000                          ROR     R0
7873  042604  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
7874  042606  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
7875  042612  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
7876  042614  000016                  $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
7877                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
7878
7879                                  ;;*****************************************************************
7880                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
7881                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
7882                                  ;*POSITIVE.
7883                                  ;*CALL
7884                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7885                                  ;*      JSR     PC,@#$DB2D
7886                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
7887                                                                  ;;IS ON THE STACK
7888
7889
7890  042632  104413                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
7891  042634  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
7892  042640  012700  043012                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
7893  042644  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
7894  042650  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
7895  042652  012202                          MOV     (R2)+,R2
7896  042654  012737  000012  042730          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
7897  042662  012704  042742                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
7898  042666  012705  042744                  MOV     #$TNPWR+2,R5
7899  042672  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
7900  042674  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
7901  042676  005602                          SBC     R2
7902  042700  161502                          SUB     (R5),R2
7903  042702  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
7904  042704  005203                          INC     R3              ;;ADD 1 TO PARTIAL
7905  042706  000772                          BR      2$              ;;LOOP
7906  042710  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
7907  042712  005502                          ADC     R2
7908  042714  062402                          ADD     (R4)+,R2
7909  042716  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
7910  042720  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
7911  042724  110320                          MOVB    R3,(R0)+        ;;SAVE IT
7912  042726  005327                          DEC     (PC)+           ;;DONE?
7913  042730  000000                  4$:     .WORD   0
7914  042732  001357                          BNE     1$              ;;BR IF NO
```

```
7915  042734  105020                  CLRB    (R0)+           ;;TERMINATOR
7916  042736  104414                  RESREG                  ;;RESTORE REGISTERS
7917  042740  000207                  RTS     PC              ;;RETURN
7918  042742  145000          $TNPWR: 145000                  ;;1.0E09
7919  042744  035632                  35632
7920  042746  160400                  160400                  ;;1.0E08
7921  042750  002765                  2765
7922  042752  113200                  113200                  ;;1.0E07
7923  042754  000230                  230
7924  042756  041100                  041100                  ;;1.0E06
7925  042760  000017                  17
7926  042762  103240                  103240                  ;;1.0E05
7927  042764  000001                  1
7928  042766  023420                  23420                   ;;1.0E04
7929  042770  000000                  0
7930  042772  001750                  1750                    ;;1.0E03
7931  042774  000000                  0
7932  042776  000144                  144                     ;;1.0E02
7933  043000  000000                  0
7934  043002  000012                  12                      ;;1.0E01
7935  043004  000000                  0
7936  043006  000001                  1                       ;;1.0E00
7937  043010  000000                  0
7938  043012  000014          $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
7939                                  .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
7940
7941                                  ;;*****************************************************************
7942                                  ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7943                                  ;*UNSIGNED DECIMAL ASCIZ NUMBER.
7944                                  ;*CALL
7945                                  ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
7946                                  ;*      JSR     PC,@#$SB2D      ;;CALL
7947                                  ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
7948
7949
7950  043026  016637  000002  043056  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
7951  043034  012746  043056          MOV     #1$,-(SP)       ;;SET POINTER
7952  043040  004737  042632          JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
7953  043044  062716  000005          ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
7954  043050  012666  000002          MOV     (SP)+,2(SP)     ;;PICKUP POINTER
7955  043054  000207                  RTS     PC              ;;RETURN
7956  043056  000000  000000          1$:     .WORD   0,0
7957                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
7958
7959                                  ;;*****************************************************************
7960                                  ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
7961                                  ;*LEADING NUMBERS.
7962                                  ;*CALL
7963                                  ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
7964                                  ;*      JSR     PC,@#$SUPRS
7965
7966
7967  043062  010046          $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
7968  043064  016600  000004          MOV     4(SP),R0        ;;PICKUP THE POINTER
7969  043070  105710          1$:     TSTB    (R0)            ;;TERMINATEOR?
7970  043072  001403                  BEQ     2$              ;;BR IF YES
```

```
 7971  043074  122720  000060            CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
 7972  043100  001773                    BEQ     1$              ;;BR IF YES
 7973  043102  005300                2$: DEC     R0              ;;BACKUP BY "1"
 7974  043104  010037  043112            MOV     R0,3$           ;;SAVE FOR TYPING
 7975  043110  104401                    TYPE                    ;;GO TYPE
 7976  043112  000000                3$: .WORD   0               ;;ASCIZ POINTER GOES HERE
 7977  043114  012600                    MOV     (SP)+,R0        ;;RESTORE R0
 7978  043116  012616                    MOV     (SP)+,(SP)      ;;RESTORE THE STACK
 7979  043120  000207                    RTS     PC              ;;RETURN
 7980                            .SBTTL  INTEGER MULTIPLY ROUTINE
 7981
 7982                            ;;*****************************************************************
 7983                            ;*CALL
 7984                            ;*      MOV     MULTIPLER,-(SP)
 7985                            ;*      MOV     MULTIPLICAND,-(SP)
 7986                            ;*      JSR     PC,@#$MULT
 7987                            ;*      RETURN  ;;PRODUCT IS ON THE STACK
 7988                            ;*
 7989                            ;*      STACK   PRODUCT
 7990                            ;*      -----   -------
 7991                            ;*      TOP     LSB'S
 7992                            ;*      +2      MSB'S
 7993
 7994  043122                    $MULT:
 7995  043122  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 7996  043124  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 7997  043126  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 7998  043130  005046                    CLR     -(SP)           ;;CLEAR THE SIGN KEY
 7999  043132  016601  000012            MOV     12(SP),R1       ;;GET THE MULTIPLICAND
 8000  043136  100002                    BPL     1$              ;;BR IF PLUS
 8001  043140  005216                    INC     (SP)            ;;SET THE SIGN KEY
 8002  043142  005401                    NEG     R1              ;;MAKE THE MULTIPLICAND POSTIVE
 8003  043144  016602  000014        1$: MOV     14(SP),R2       ;;GET THE MULTIPLIER
 8004  043150  100002                    BPL     2$              ;;BR IF PLUS
 8005  043152  005316                    DEC     (SP)            ;;UPDATE THE SIGN KEY
 8006  043154  005402                    NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
 8007  043156  012746  000021        2$: MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
 8008  043162  005000                    CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
 8009  043164  103001                3$: BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
 8010  043166  060200                    ADD     R2,R0
 8011  043170  006000                4$: ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
 8012  043172  006001                    ROR     R1              ;;THE MULTIPLICAND
 8013  043174  005316                    DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
 8014  043176  001372                    BNE     3$              ;;BR IF NO
 8015  043200  022616                    CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
 8016  043202  001403                    BEQ     5$              ;;GO TO EXIT IF NO
 8017  043204  005400                    NEG     R0              ;;YES--SO MAKE IT SO
 8018  043206  005401                    NEG     R1
 8019  043210  005600                    SBC     R0
 8020  043212  005726                5$: TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
 8021  043214  010066  000012            MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
 8022  043220  010166  000010            MOV     R1,10(SP)       ;;LSB'S
 8023  043224  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
 8024  043226  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
 8025  043230  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
 8026  043232  000207                    RTS     PC
```

```
 8027                                   .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
 8028
 8029                                   ;;*****************************************************************
 8030                                   ;*SAVE R0-R5
 8031                                   ;*CALL:
 8032                                   ;*       SAVREG
 8033                                   ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
 8034                                   ;*
 8035                                   ;*TOP---(+16)
 8036                                   ;* +2---(+18)
 8037                                   ;* +4---R5
 8038                                   ;* +6---R4
 8039                                   ;* +8---R3
 8040                                   ;*+10---R2
 8041                                   ;*+12---R1
 8042                                   ;*+14---R0
 8043
 8044  043234                           $SAVREG:
 8045  043234  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 8046  043236  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8047  043240  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 8048  043242  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 8049  043244  010446                           MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 8050  043246  010546                           MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 8051  043250  016646  000022                   MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
 8052  043254  016646  000022                   MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
 8053  043260  016646  000022                   MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
 8054  043264  016646  000022                   MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
 8055  043270  000002                           RTI
 8056
 8057                                   ;*RESTORE R0-R5
 8058                                   ;*CALL:
 8059                                   ;*       RESREG
 8060  043272                           $RESREG:
 8061  043272  012666  000022                   MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
 8062  043276  012666  000022                   MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
 8063  043302  012666  000022                   MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
 8064  043306  012666  000022                   MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
 8065  043312  012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
 8066  043314  012604                           MOV     (SP)+,R4        ;;POP STACK INTO R4
 8067  043316  012603                           MOV     (SP)+,R3        ;;POP STACK INTO R3
 8068  043320  012602                           MOV     (SP)+,R2        ;;POP STACK INTO R2
 8069  043322  012601                           MOV     (SP)+,R1        ;;POP STACK INTO R1
 8070  043324  012600                           MOV     (SP)+,R0        ;;POP STACK INTO R0
 8071  043326  000002                           RTI
 8072                                   .SBTTL  TRAP DECODER
 8073
 8074                                   ;;*****************************************************************
 8075                                   ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 8076                                   ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 8077                                   ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 8078                                   ;*GO TO THAT ROUTINE.
 8079
 8080  043330  010046                   $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
 8081  043332  016600  000002                   MOV     2(SP),R0        ;;GET TRAP ADDRESS
 8082  043336  005740                           TST     -(R0)           ;;BACKUP BY 2
```

```
 8083  043340  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 8084  043342  006300                        ASL     R0              ;;POSITION FOR INDEXING
 8085  043344  016000  043364                MOV     $TRPAD(P0),R0   ;;INDEX TO TABLE
 8086  043350  000200                        RTS     R0              ;;GO TO ROUTINE
 8087
 8088
 8089                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 8090
 8091  043352  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 8092  043354  016666  000004  000002        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 8093  043362  000002                        RTI                     ;;RESTORE THE PSW
 8094
 8095                                .SBTTL  TRAP TABLE
 8096
 8097                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 8098                                ;*BY THE "TRAP" INSTRUCTION
 8099
 8100                                ;       ROUTINE
 8101                                ;       -------
 8102  043364  043352                $TRPAD: .WORD   $TRAP2
 8103  043366  037700                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
 8104  043370  040700                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 8105  043372  040654                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 8106  043374  040714                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 8107  043376  040162                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
 8108
 8109  043400  041470                        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
 8110
 8111  043402  041400                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 8112  043404  041742                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 8113  043406  042032                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 8114  043410  042352                        $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 8115  043412  043234                        $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
 8116  043414  043272                        $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
 8117  043416  036230                        SCOP1$  ;;CALL=SCOP1    TRAP+15(104415) INTERNAL LOOP ON ERROR
 8118
```

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8119
8120                                    .SBTTL  SERVICE MESSAGES
8121
8122
8123  043420  005015  047125  041111  MSG1:   .ASCII  <CR><LF>/UNIBUS RK06-RK07 DRIVE DIAGNOSTIC--PART 2/
8124  043426  051525  051040  030113
8125  043434  026466  045522  033460
8126  043442  042040  044522  042526
8127  043450  042040  040511  047107
8128  043456  051517  044524  026503
8129  043464  050055  051101  020124
8130  043472     062
8131  043473     015  041412  051132          .ASCII  <CR><LF>/CZR6IEO/<CR><LF>
8132  043500  044466  030105  005015
8133  043506  005015  025011  025052          .ASCII  <CR><LF>/       ***** CAUTION *****/<CR><LF>
8134  043514  025052  041440  052501
8135  043522  044524  047117  025040
8136  043530  025052  025052  005015
8137  043536  005015  044124  051511          .ASCII  <CR><LF>/THIS PROGRAM SHOULD  BE HALTED ONLY BY TYPING CONTROL-C/
8138  043544  050040  047522  051107
8139  043552  046501  051440  047510
8140  043560  046125  020104  041040
8141  043566  020105  040510  052114
8142  043574  042105  047440  046116
8143  043602  020131  054502  052040
8144  043610  051131  047111  020107
8145  043616  044503  052116  047522
8146  043624  026514     103
8147  043627     015  047412  044124          .ASCII  <CR><LF>/OTHERWISE, CARTRIDGE FORMATTING AND, OR THE DRIVE/
8148  043634  051105  044527  042523
8149  043642  020054  040503  052122
8150  043650  044522  043504  020105
8151  043656  047506  046522  052101
8152  043664  044524  043516  040440
8153  043672  042116  020054  051117
8154  043700  052040  042510  042040
8155  043706  044522  042526
8156  043712  005015  040515  020131          .ASCII  <CR><LF>/MAY BE LEFT IN AN UNDETERMINED STATE/
8157  043720  042502  046040  043105
8158  043726  020124  047111  040440
8159  043734  020116  047125  042504
8160  043742  042524  046522  047111
8161  043750  042105  051440  040524
8162  043756  042524
8163  043760  005015  047111  052111          .ASCII  <CR><LF>/INITIALLY, DRIVES TO BE TESTED SHOULD HAVE:/<CR><LF>
8164  043766  040511  046114  026131
8165  043774  042040  044522  042526
8166  044002  020123  047524  041040
8167  044010  020105  042524  052123
8168  044016  042105  051440  047510
8169  044024  046125  020104  040510
8170  044032  042526  006472     012
8171  044037     015  040412  020056          .ASCII  <CR><LF>/A. HEADS MANUALLY LOADED/
8172  044044  042510  042101  020123
8173  044052  040515  052516  046101
8174  044060  054514  046040  040517
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8175  044066  042504     104
8176  044071     015  041012  020056          .ASCII  <CR><LF>/B. CORRECT PORT SELECTED/
8177  044076  047503  051122  041505
8178  044104  020124  047520  052122
8179  044112  051440  046105  041505
8180  044120  042524     104
8181  044123     015  041412  020056          .ASCII  <CR,<LF>/C. WRITE LOCK DISABLED/
8182  044130  051127  052111  020105
8183  044136  047514  045503  042040
8184  044144  051511  041101  042514
8185  044152     104
8186  044153     015  042012  020056          .ASCII  <CR><LF>/D. DRIVE READY INDICATOR ON/<CR><LF>
8187  044160  051104  053111  020105
8188  044166  042522  042101  020131
8189  044174  047111  044504  040503
8190  044202  047524  020122  047117
8191  044210  005015
8192  044212  005015  051104  053111          .ASCII  <CR><LF>/DRIVES NOT TO BE TESTED MUST HAVE/
8193  044220  051505  047040  052117
8194  044226  052040  020117  042502
8195  044234  052040  051505  042524
8196  044242  020104  052515  052123
8197  044250  044040  053101     105
8198  044255     015  041012  052117          .ASCIZ  <CR><LF>/BOTH PORTS DESELECTED/<CR><LF>
8199  044262  020110  047520  052122
8200  044270  020123  042504  042523
8201  044276  042514  052103  042105
8202  044304  005015     000
8203
8204  044307     015  041412  040510  MSG2:   .ASCII  <CR><LF>/CHANGE XXDP PACK/
8205  044314  043516  020105  054130
8206  044322  050104  050040  041501
8207  044330     113
8208  044331     015  041412  042514          .ASCIZ  <CR><LF>/CLEAR LOC 40,RESTART PROGRAM/
8209  044336  051101  046040  041517
8210  044344  032040  026060  042522
8211  044352  052123  051101  020124
8212  044360  051120  043517  040522
8213  044366  000115
8214  044370  005015  051104  053111  MSG3:   .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED: /
8215  044376  024105  024523  052040
8216  044404  020117  042502  052040
8217  044412  051505  042524  035104
8218  044420  000040
8219  044422  005015  054524  042520  MSG4:   .ASCIZ  <CR><LF>/TYPE BUSS ADDRESS IF NOT 177440:  /
8220  044430  041040  051525  020123
8221  044436  042101  051104  051505
8222  044444  020123  043111  047040
8223  044452  052117  030440  033467
8224  044460  032064  035060  020040
8225  044466     000
8226  044467     015  052012  050131  MSG5:   .ASCIZ  <CR><LF>/TYPE CONTROLLER INTERRUPT VECTOR IF NOT 210:  /
8227  044474  020105  047503  052116
8228  044502  047522  046114  051105
8229  044510  044440  052116  051105
8230  044516  052522  052120  053040
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8231  044524  041505  047524  020122
8232  044532  043111  047040  052117
8233  044540  031040  030061  020072
8234  044546  000040
8235  044550  005015  047111  042524  MSG6:   .ASCIZ  <CR><LF>/INTERRUPT OCCURRED AT PC=/
8236  044556  051122  050125  020124
8237  044564  041517  052503  051122
8238  044572  042105  040440  020124
8239  044600  041520  000075
8240  044604  005015  051104  053111  MSG7:   .ASCIZ  <CR><LF>/DRIVE 0 WILL NOT BE TESTED/
8241  044612  020105  020060  044527
8242  044620  046114  047040  052117
8243  044626  041040  020105  042524
8244  044634  052123  042105     000
8245  044641     015  051012  040505  MSG8:   .ASCIZ  <CR><LF>/READ DATA WITH OFFSET TEST/<CR><LF>
8246  044646  020104  040504  040524
8247  044654  053440  052111  020110
8248  044662  043117  051506  052105
8249  044670  052040  051505  006524
8250  044676  000012
8251  044700  005015  042510  042101  MSG9:   .ASCIZ  <CR><LF>/HEAD NO./
8252  044706  047040  027117     000
8253  044713     015  005012  044527  MSG10:  .ASCIZ  <CR><LF><LF>/WILL TEST DRIVES:/
8254  044720  046114  052040  051505
8255  044726  020124  051104  053111
8256  044734  051505  000072
8257  044740  005015  050012  053517  MSG11:  .ASCIZ  <CR><LF><LF>/POWER UP RESTART TO TEST 1/<CR><LF>
8258  044746  051105  052440  020120
8259  044754  042522  052123  051101
8260  044762  020124  047524  052040
8261  044770  051505  020124  006461
8262  044776  000012
8263  045000  005015  052012  042510  MSG12:  .ASCII  <CR><LF><LF>/THE ABOVE OFFSET FAILURES ARE NOT ERRORS/
8264  045006  040440  047502  042526
8265  045014  047440  043106  042523
8266  045022  020124  040506  046111
8267  045030  051125  051505  040440
8268  045036  042522  047040  052117
8269  045044  042440  051122  051117
8270  045052     123
8271  045053     015  041012  052125          .ASCIZ  <CR><LF>/BUT INDICATORS OF SURFACE,HEAD, & ELECTRONICS QUALITY/<CR><LF>
8272  045060  044440  042116  041511
8273  045066  052101  051117  020123
8274  045074  043117  051440  051125
8275  045102  040506  042503  044054
8276  045110  040505  026104  023040
8277  045116  042440  042514  052103
8278  045124  047522  044516  051503
8279  045132  050440  040525  044514
8280  045140  054524  005015     000
8281  045145     015  047012  020117  MSG13:  .ASCII  <CR><LF>/NO L OR P CLOCKS PRESENT/
8282  045152  020114  051117  050040
8283  045160  041440  047514  045503
8284  045166  020123  051120  051505
8285  045174  047105     124
8286  045177     015  044012  040505          .ASCIZ  <CR><LF>/HEAD SWITCHING TIME TEST BYPASSED/
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8287  045204  020104  053523  052111
8288  045212  044103  047111  020107
8289  045220  044524  042515  052040
8290  045226  051505  020124  054502
8291  045234  040520  051523  042105
8292  045242     000
8293  045243     015  041012  050131  MSG14:  .ASCIZ  <CR><LF>/BYPASSING DRIVE /
8294  045250  051501  044523  043516
8295  045256  042040  044522  042526
8296  045264  000040
8297  045266  005015  042012  044522  MSG15:  .ASCIZ  <CR><LF><LF>/DRIVE /
8298  045274  042526  000040
8299  045300  005015  051104  053111  MSG16:  .ASCIZ  <CR><LF>/DRIVE SERIAL NO. /
8300  045306  020105  042523  044522
8301  045314  046101  047040  027117
8302  045322  000040
8303  045324  005015  040503  052122  MSG17:  .ASCIZ  <CR><LF>/CARTRIDGE SERIAL NO. /
8304  045332  044522  043504  020105
8305  045340  042523  044522  046101
8306  045346  047040  027117  000040
8307  045354  005015  040412  047502  MSG26:  .ASCIZ  <CR><LF><LF>/ABORTING BALANCE OF TESTS ON THIS DRIVE/<CR><LF><LF>
8308  045362  052122  047111  020107
8309  045370  040502  040514  041516
8310  045376  020105  043117  052040
8311  045404  051505  051524  047440
8312  045412  040116  044124  051511
8313  045420  040040  044522  042526
8314  045426  005015  000012
8315  045432  005015  040412  046114  MSG27:  .ASCIZ  <CR><LF><LF>/ALL DRIVES TESTED/<CR><LF><LF>
8316  045440  042040  044522  042526
8317  045446  020103  042524  052123
8318  045454  042105  005015  000012
8319  045462  005015  047516  053440  MSG37:  .ASCIZ  <CR><LF> NO WRITE CHECK ERROR AT MAX POSITIVE OFFSET/
8320  045470  044522  042524  041440
8321  045476  042510  045503  042440
8322  045504  051122  051117  040440
8323  045512  020124  040515  020130
8324  045520  047520  044523  044524
8325  045526  042526  047440  043106
8326  045534  042523  000124
8327  045540  005015  047516  053440  MSG38:  .ASCIZ  <CR><LF>/NO WRITE CHECK ERROR AT MAX NEGATIVE OFFSET/<CR><LF>
8328  045546  044522  042524  041440
8329  045554  042510  045503  042440
8330  045562  051122  051117  040440
8331  045570  020124  040515  020130
8332  045576  042516  040507  044524
8333  045604  042526  047440  043106
8334  045612  042523  006524  000012
8335  045620  005015  051127  052111  MSG39:  .ASCIZ  <CR><LF>/WRITE CHECK FAILURE AT OFFSET =/
8336  045626  020105  044103  041505
8337  045634  020113  040506  046111
8338  045642  051125  020105  052101
8339  045650  047440  043106  042523
8340  045656  020124  000075
8341  045662  005015  047503  046125  MSG40:  .ASCII  <CR><LF /COULD NOT READ BAD SECTOR INFO ON CYL 410/
8342  045670  020104  047516  020124
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8343  045676  042522  042101  041040
8344  045704  042101  051440  041505
8345  045712  047524  020122  047111
8346  045720  047506  047440  020116
8347  045726  054503  020114  030464
8348  045734     060
8349  045735     015  047412  020122          .ASCIZ  <CR><LF>/OR ALIGNMENT CARTRIDGE USED/<CR><LF>
8350  045742  046101  043511  046516
8351  045750  047105  020124  040503
8352  045756  052122  044522  043504
8353  045764  020105  051525  042105
8354  045772  005015     000
8355  045775     015  050012  047522  MSG74:  .ASCIZ  <CR><LF>/PROGRAM ABORT PENDING...PLEASE WAIT/
8356  046002  051107  046501  040440
8357  046010  047502  052122  050040
8358  046016  047105  044504  043516
8359  046024  027056  050056  042514
8360  046032  051501  020105  040527
8361  046040  052111     000
8362  046043     015  044012  046101  MSG75:  .ASCIZ  <CR><LF>/HALT PENDING...PLEASE WAIT/
8363  046050  020124  042520  042116
8364  046056  047111  027107  027056
8365  046064  046120  040505  042523
8366  046072  053440  044501  000124
8367  046100  005015  051120  043517  MSG76:  .ASCIZ  <CR><LF>/PROGRAM ABORTED/
8368  046106  040522  020115  041101
8369  046114  051117  042524  000104
8370  046122  005015  050103  020125  MSG77:  .ASCIZ  <CR><LF>/CPU HALTED/
8371  046130  040510  052114  042105
8372  046136     000
8373
8374                                  .SBTTL  ERROR MESSAGES
8375
8376  046137     015  042412  051122  EM1:    .ASCIZ  <CR><LF>/ERROR, ONLY 0 THRU 7 ALLOWED, TRY AGAIN/<CR><LF>
8377  046144  051117  020054  047117
8378  046152  054514  030040  052040
8379  046160  051110  020125  020067
8380  046166  046101  047514  042527
8381  046174  026104  052040  054522
8382  046202  040440  040507  047111
8383  046210  005015     000
8384  046213     104  044522  042526  EM2:    .ASCIZ  /DRIVE # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2/
8385  046220  021440  044440  020116
8386  046226  045522  051503  020062
8387  046234  040503  047116  052117
8388  046242  041040  020105  042522
8389  046250  042101  041040  041501
8390  046256  020113  047503  051122
8391  046264  041505  046124  020131
8392  046272  047111  051040  046513
8393  046300  031122     000
8394  046303     015  040412  047502  EM3:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED TIME OUT AT PC=/
8395  046310  052122  052040  051505
8396  046316  051524  027056  052456
8397  046324  042516  050130  041505
8398  046332  042524  020104  044524
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8399   046340  042515  047440  052125
8400   046346  040440  020124  041520
8401   046354  000075
8402   046356  005015  041101  051117  EM4:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED INTERRUPT AT PC=/
8403   046364  020127  042524  052123
8404   046372  027123  027056  047125
8405   046400  054105  042520  052103
8406   046406  042105  044440  052116
8407   046414  051105  052522  052120
8408   046422  040440  020124  041520
8409   046430  000075
8410   046432  042115  020123  042523  EM5:    .ASCIZ  /MDS SET IN RKCS2/
8411   046440  020124  047111  051040
8412   046446  041513  031123  000
8413   046453  125     042506  051440  EM6:    .ASCIZ  /UFE SET IN RKCS2/
8414   046460  052105  044440  020116
8415   046466  045522  051503  000062
8416   046474  051104  020101  047111  EM7:    .ASCIZ  /DRA IN RKDS & NED IN RKCS2 RESET; WRONG PORT SELECTED?/
8417   046502  051040  042113  020123
8418   046510  020046  042516  020104
8419   046516  047111  051040  041513
8420   046524  031123  051040  051505
8421   046532  052105  020073  051127
8422   046540  047117  020107  047520
8423   046546  052122  051440  046105
8424   046554  041505  042524  037504
8425   046562  000
8426   046563  104     044522  042526  EM8:    .ASCIZ  /DRIVE PRESENT BUT NOT SPECIFIED BY OPERATOR/
8427   046570  050040  042522  042523
8428   046576  052116  041040  052125
8429   046604  047040  052117  051440
8430   046612  042520  044503  044506
8431   046620  042105  041040  020131
8432   046626  050117  051105  052101
8433   046634  051117  000
8434   046637  104     044522  042526  EM9:    .ASCIZ  /DRIVE NOT PRESENT BUT SPECIFIED BY OPERATOR/
8435   046644  047040  052117  050040
8436   046652  042522  042523  052116
8437   046660  041040  052125  051440
8438   046666  042520  044503  044506
8439   046674  042105  041040  020131
8440   046702  050117  051105  052101
8441   046710  051117  000
8442   046713  101     047502  052122  EM10:   .ASCIZ  /ABORT TESTS...CANNOT REFERENCE CONTROLLER REGISTER/
8443   046720  052040  051505  051524
8444   046726  027056  041456  047101
8445   046734  047516  020124  042522
8446   046742  042506  042522  041516
8447   046750  020105  047503  052116
8448   046756  047522  046114  051105
8449   046764  051040  043505  051511
8450   046772  042524  000122
8451   046776  051104  020101  047111  EM11:   .ASCIZ  /DRA IN RKDS & NED IN RKCS2 BOTH SET/
8452   047004  051040  042113  020123
8453   047012  020046  042516  020104
8454   047020  047111  051040  041513
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8455  047026  031123  041040  052117
8456  047034  020110  042523  000124
8457  047042  047503  052116  047522  EM12:   .ASCIZ  /CONTROLLER NOT READY IN RKCS1
8458  047050  046114  051105  047040
8459  047056  052117  051040  040505
8460  047064  054504  044440  020116
8461  047072  045522  051503  000061
8462  047100  047516  040440  052124  EM13:   .ASCIZ  /NO ATTN IN RKASOF/
8463  047106  020116  047111  051040
8464  047114  040513  047523  000106
8465  047122  047124  054105  042520  EM14:   .ASCIZ  /UNEXPECTED MEMORY PARITY TRAP/
8466  047130  052103  042105  046440
8467  047136  046505  051117  020131
8468  047144  040520  044522  054524
8469  047152  052040  040522  000120
8470  047160  045522  041504  023040  EM15:   .ASCII  /RKDC & RKDA INDICATE THAT WCE OCCURRED AT/
8471  047166  051040  042113  020101
8472  047174  047111  044504  040503
8473  047202  042524  052040  040510
8474  047210  020124  041527  020105
8475  047216  041517  052503  051122
8476  047224  042105  040440     124
8477  047231     015  041412  046131          .ASCIZ  <CR><LF>/CYL 411, TRACK 2, SECTOR 21/
8478  047236  032040  030461  020054
8479  047244  051124  041501  020113
8480  047252  026062  051440  041505
8481  047260  047524  020122  030462
8482  047266     000
8483  047267     103  047101  047516  EM16:   .ASCIZ  /CANNOT READ BAD SECTOR INFORMATION/
8484  047274  020124  042522  042101
8485  047302  041040  042101  051440
8486  047310  041505  047524  020122
8487  047316  047111  047506  046522
8488  047324  052101  047511  000116
8489  047332  042515  051523  043501  EM17:   .ASCIZ  /MESSAGE A0 ERROR/
8490  047340  020105  030101  042440
8491  047346  051122  051117     000
8492  047353     115  051505  040523  EM18:   .ASCIZ  /MESSAGE B0 ERROR/
8493  047360  042507  041040  020060
8494  047366  051105  047522  000122
8495  047374  042515  051523  043501  EM19:   .ASCIZ  /MESSAGE A1 ERROR/
8496  047402  020105  030501  042440
8497  047410  051122  051117     000
8498  047415     115  051505  040523  EM20:   .ASCIZ  /MESSAGE B1 ERROR/
8499  047422  042507  041040  020061
8500  047430  051105  047522  000122
8501  047436  042503  051122  051440  EM21:   .ASCIZ  /CERR SET IN RKCS1/
8502  047444  052105  044440  020116
8503  047452  045522  051503  000061
8504  047460  047516  042040  044522  EM22:   .ASCII  /NO DRIVES FOUND IN DEVICE MAP ($DEVM)/<CR> LF>
8505  047466  042526  020123  047506
8506  047474  047125  020104  047111
8507  047502  042040  053105  041511
8508  047510  020105  040515  020120
8509  047516  022050  042504  046526
8510  047524  006451     012
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8511  047527  123     052105  050125          .ASCIZ  /SETUP CORRECTLY AND RESTART/<CR><LF>
8512  047534  041440  051117  042522
8513  047542  052103  054514  040440
8514  047550  042116  051040  051505
8515  047556  040524  052122  005015
8516  047564  000
8517  047565  116     020117  051104  EM23:   .ASCII  /NO DRIVES FOUND ON BUSS/<CR><LF>
8518  047572  053111  051505  043040
8519  047600  052517  042116  047440
8520  047606  020116  052502  051523
8521  047614  005015
8522  047616  042523  052524  020120          .ASCIZ  /SETUP CORRECTLY AND PRESS 'CONTINUE'/<CR><LF>
8523  047624  047503  051122  041505
8524  047632  046124  020131  047101
8525  047640  020104  051120  051505
8526  047646  020123  041447  047117
8527  047654  044524  052516  023505
8528  047662  005015  000
8529  047665  126     046117  053040  EM24:   .ASCIZ  /VOL VALID NOT SET IN RKMR2/
8530  047672  046101  042111  047040
8531  047700  052117  051440  052105
8532  047706  044440  020116  045522
8533  047714  051115  000062
8534  047720  005015  042504  042524  EM25:   .ASCIZ  <CR><LF>/DETECTED 10 BAD SECTORS...ABORTING TEST/
8535  047726  052103  042105  030440
8536  047734  020060  040502  020104
8537  047742  042523  052103  051117
8538  047750  027123  027056  041101
8539  047756  051117  044524  043516
8540  047764  052040  051505  000124
8541  047772  042504  042524  052103  EM2F:   .ASCIZ  /DETECTED BSE BUT NOT LISTED IN BAD SECTOR FILE/
8542  050000  042105  041040  042523
8543  050006  041040  052125  047040
8544  050014  052117  046040  051511
8545  050022  042524  020104  047111
8546  050030  041040  042101  051440
8547  050036  041505  047524  020122
8548  050044  044506  042514  000
8549  050051  004     052105  041505  EM27:   .ASCII  /DETECTED BSE IN READ COMMAND/
8550  050056  042524  020104  051502
8551  050064  020105  047111  051040
8552  050072  040505  020104  047503
8553  050100  046515  047101  104
8554  050105  015     041012  052125          .ASCIZ  <CR><LF>/BUT NOT IN PREVIOUS WRITE COMMAND TO SAME SECTOR/
8555  050112  047040  052117  044440
8556  050120  020116  051120  053105
8557  050126  047511  051525  053440
8558  050134  044522  042524  041440
8559  050142  045517  040515  042116
8560  050150  052040  020117  040523
8561  050156  042515  051440  041505
8562  050164  047524  000122
8563  050170  054503  020114  042101  EM36:   .ASCIZ  /CYL ADDR IN RKMR3 NOT SAME AS RKDC/
8564  050176  051104  044440  020116
8565  050204  045522  051115  020063
8566  050212  047516  020124  040523
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8567  050220  042515  040440  020123
8568  050226  045522  041504     000
8569  050233     103  046131  042040  EM39:   .ASCIZ  /CYL DIFF & OFFSET IN RKMR2 NOT CLEARED/
8570  050240  043111  020106  020046
8571  050246  043117  051506  052105
8572  050254  044440  020116  045522
8573  050262  051115  020062  047516
8574  050270  020124  046103  040505
8575  050276  042522  000104
8576  050302  054503  020114  042101  EM40:   .ASCIZ  /CYL ADDR IN RKMR3 NOT CLEARED/
8577  050310  051104  044440  020116
8578  050316  045522  051115  020063
8579  050324  047516  020124  046103
8580  050332  040505  042522  000104
8581  050340  054503  020114  042101  EM41:   .ASCIZ  /CYL ADDR IN B2 DID NOT REMAIN CLEARED/
8582  050346  051104  044440  020116
8583  050354  031102  042040  042111
8584  050362  047040  052117  051040
8585  050370  046505  044501  020116
8586  050376  046103  040505  042522
8587  050404  000104
8588  050406  052101  047124  047040  EM55:   .ASCIZ  /ATTN NOT CLEARED IN RKASOF/
8589  050414  052117  041440  042514
8590  050422  051101  042105  044440
8591  050430  020116  045522  051501
8592  050436  043117     000
8593  050441     104  052114  051440  EM63:   .ASCIZ  /DLT SET IN RKCS2/
8594  050446  052105  044440  020116
8595  050454  045522  051503  000062
8596  050462  042522  042101  044040  EM65:   .ASCIZ  /READ HEADER ERROR/
8597  050470  040505  042504  020122
8598  050476  051105  047522  000122
8599  050504  046101  043511  046516  EM69:   .ASCIZ  /ALIGNMENT CARTRIDGE USED/
8600  050512  047105  020124  040503
8601  050520  052122  044522  043504
8602  050526  020105  051525  042105
8603  050534     000
8604  050535     103  047524  051440  EM73:   .ASCIZ  /CTO SET IN RKCS1/
8605  050542  052105  044440  020116
8606  050550  045522  051503  000061
8607  050556  052122  020132  047516  EM74:   .ASCIZ  /RTZ NOT SET IN RKMR2/
8608  050564  020124  042523  020124
8609  050572  047111  051040  046513
8610  050600  031122     000
8611  050603     116  042105  051440  EM79:   .ASCIZ  /NED SET IN RKCS2/
8612  050610  052105  044440  020116
8613  050616  045522  051503  000062
8614  050624  051127  052111  020105  EM80:   .ASCIZ  /WRITE CHECK ERROR SET IN RKCS2/
8615  050632  044103  041505  020113
8616  050640  051105  047522  020122
8617  050646  042523  020124  047111
8618  050654  051040  041513  031123
8619  050662     000
8620  050663     127  044522  042524  EM81:   .ASCIZ  /WRITE CHECK COMMAND NOT FUNCTIONING/
8621  050670  041440  042510  045503
8622  050676  041440  046517  040515
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8623  050704  042116  047040  052117
8624  050712  043040  047125  052103
8625  050720  047511  044516  043516
8626  050726     000
8627  050727     122  040505  020104  EM82:   .ASCIZ  /READ DATA DID NOT COMPARE WITH WRITE DATA/
8628  050734  040504  040524  042040
8629  050742  042111  047040  052117
8630  050750  041440  046517  040520
8631  050756  042522  053440  052111
8632  050764  020110  051127  052111
8633  050772  020105  040504  040524
8634  051000     000
8635  051001     104  052101  020101  EM83:   .ASCIZ  /DATA CHECK ERROR SET IN RKER/
8636  051006  044103  041505  020113
8637  051014  051105  047522  020122
8638  051022  042523  020124  047111
8639  051030  051040  042513  000122
8640  051036  044127  046111  020105  EM84:   .ASCIZ  /WHILE WAITING FOR CONTR READY OR AFTER CONTR READY REC'D/
8641  051044  040527  052111  047111
8642  051052  020107  047506  020122
8643  051060  047503  052116  020122
8644  051066  042522  042101  020131
8645  051074  051117  040440  052106
8646  051102  051105  041440  047117
8647  051110  051124  051040  040505
8648  051116  054504  051040  041505
8649  051124  042047     000
8650  051127     117  043106  042523  EM85:   .ASCIZ  /OFFSET STATUS BIT IN RKMR2 CLEARED/
8651  051134  020124  052123  052101
8652  051142  051525  041040  052111
8653  051150  044440  020116  045522
8654  051156  051115  020062  046103
8655  051164  040505  042522  000104
8656  051172  043117  051506  052105  EM86:   .ASCIZ  /OFFSET REG IN A2 NOT = RKASOF/
8657  051200  051040  043505  044440
8658  051206  020116  031101  047040
8659  051214  052117  036440  051040
8660  051222  040513  047523  000106
8661  051230  044504  020104  047516  EM88:   .ASCIZ  /DID NOT FIND SECTOR 0 FROM INDEX/
8662  051236  020124  044506  042116
8663  051244  051440  041505  047524
8664  051252  020122  020060  051106
8665  051260  046517  044440  042116
8666  051266  054105     000
8667  051271     122  040505  044504  EM93:   .ASCIZ   READING WRONG CYLINDER # IN HEADER...MISPOSITION/
8668  051276  043516  053440  047522
8669  051304  043516  041440  046131
8670  051312  047111  042504  020122
8671  051320  020043  047111  044040
8672  051326  040505  042504  027122
8673  051334  027056  044515  050123
8674  051342  051517  052111  047511
8675  051350  000116
8676  051352  043117  051506  052105  EM94:   .ASCIZ  /OFFSET IT IN A2 NOT CLEARED/
8677  051360  044440  020124  047111
8678  051366  040440  020062  047516
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8679  051374  020124  046103  040505
8680  051402  042522  000104
8681  051406  047506  046522  052101  EM95:   .ASCIZ  /FORMAT BIT NOT SET IN RKMR2/
8682  051414  041040  052111  047040
8683  051422  052117  051440  052105
8684  051430  044440  020116  045522
8685  051436  051115  000062
8686  051442  040503  047116  052117  EM96:   .ASCIZ  /CANNOT FIND SECTOR 23(8)/
8687  051450  043040  047111  020104
8688  051456  042523  052103  051117
8689  051464  031040  024063  024470
8690  051472     000
8691  051473     110  040505  020104  EM97:   .ASCIZ  /HEAD SWITCHING REQ'D ANOTHER FULL REVOLUTION OF DISK/
8692  051500  053523  052111  044103
8693  051506  047111  020107  042522
8694  051514  023521  020104  047101
8695  051522  052117  042510  020122
8696  051530  052506  046114  051040
8697  051536  053105  046117  052125
8698  051544  047511  020116  043117
8699  051552  042040  051511  000113
8700  051560  051104  053111  020105  EM100:  .ASCIZ  /DRIVE OFF TRACK SET IN RKMR3/
8701  051566  043117  020106  051124
8702  051574  041501  020113  042523
8703  051602  020124  047111  051040
8704  051610  046513  031522     000
8705  051615     104  042111  047040  EM101:  .ASCIZ  /DID NOT GO TO CYLINDER 10/
8706  051622  052117  043440  020117
8707  051630  047524  041440  046131
8708  051636  047111  042504  020122
8709  051644  030061     000
8710
8711                                  .SBTTL  DATA HEADERS
8712
8713  051647     124  051505  020124  DH1:    .ASCIZ  /TEST NO.  PC/
8714  051654  047516  020056  050040
8715  051662  000103
8716  051664  045522  051115  004461  DH2:    .ASCIZ  /RKMR1  RKMR2  RKMR3  RKER  RKDS  RKCS1  RKCS2/
8717  051672  045522  051115  004462
8718  051700  045522  051115  004463
8719  051706  045522  051105  051011
8720  051714  042113  004523  045522
8721  051722  051503  004461  045522
8722  051730  051503  000062
8723  051734  045522  041527  051011  DH3:    .ASCIZ  /RKWC  RKBA  RKDA  RKASOF  RkDC  RKECPS  RKECPT/
8724  051742  041113  004501  045522
8725  051750  040504  051011  040513
8726  051756  047523  004506  045522
8727  051764  041504  051011  042513
8728  051772  050103  004523  045522
8729  052000  041505  052120     000
8730  052005     106  047522  020115  DH6:    .ASCIZ  /FROM CYL  TO CYL  CYL DIFF/
8731  052012  054503  020114  052040
8732  052020  020117  054503  020114
8733  052026  041440  046131  042040
8734  052034  043111  000106
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8735  052040  042524  052123  047040  DH8:    .ASCIZ  /TEST NO.       TRAP PC/
8736  052046  027117  052011  040522
8737  052054  020120  041520     000
8738  052061     101  052106  051105  DH9:    .ASCIZ  /AFTER START SPINDLE COMMAND REC'D BY DRIVE/
8739  052066  051440  040524  052122
8740  052074  051440  044520  042116
8741  052102  042514  041440  046517
8742  052110  040515  042116  051040
8743  052116  041505  042047  041040
8744  052124  020131  051104  053111
8745  052132  000105
8746  052134  052101  042440  042116  DH10:   .ASCIZ  /AT END OF HEAD LOADING/
8747  052142  047440  020106  042510
8748  052150  042101  046040  040517
8749  052156  044504  043516     000
8750  052163     105  050130  041505  DH11:   .ASCIZ  /EXPECTED       WAS/
8751  052170  042524  004504  040527
8752  052176  000123
8753  052200  047117  051440  041505  DH13:   .ASCIZ  /ON SECTORS 10, 12, 14, 16, 18 OR 20 CYL 410 TRACK 2/
8754  052206  047524  051522  030440
8755  052214  026060  030440  026062
8756  052222  030440  026064  030440
8757  052230  026066  030440  020070
8758  052236  051117  031040  020060
8759  052244  054503  020114  030464
8760  052252  020060  051124  041501
8761  052260  020113  000062
8762  052264  047117  051440  041505  DH14:   .ASCIZ  /ON SECTORS 11, 13, 15, 17, 19 OR 21 CYL 410 TRACK 2/
8763  052272  047524  051522  030440
8764  052300  026061  030440  02 063
8765  052306  030440  026065  030440
8766  052314  026067  030440  020071
8767  052322  051117  031040  020061
8768  052330  054503  020114  030464
8769  052336  020060  051124  041501
8770  052344  020113  000062
8771  052350  043101  042524  020122  DH17:   .ASCIZ  /AFTER RECAL COMMAND/
8772  052356  042522  040503  020114
8773  052364  047503  046515  047101
8774  052372  000104
8775  052374  043101  042524  020122  DH19:   .ASCIZ  /AFTER PACK COMMAND/
8776  052402  040520  045503  041440
8777  052410  046517  040515  042116
8778  052416     000
8779  052417     101  052106  051105  DH20:   .ASCIZ  /AFTER SELECT DRIVE COMMAND/
8780  052424  051440  046105  041505
8781  052432  020124  051104  053111
8782  052440  020105  047503  046515
8783  052446  047101  000104
8784  052452  043101  042524  020122  DH21:   .ASCIZ  /AFTER SUBSYSTEM CLEAR/
8785  052460  052523  051502  051531
8786  052466  042524  020115  046103
8787  052474  040505  000122
8788  052500  043101  042524  020122  DH22:   .ASCIZ  /AFTER DRIVE CLEAR COMMAND/
8789  052506  051104  053111  020105
8790  052514  046103  040505  020122
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8791  052522  047503  046515  047101
8792  052530  000104
8793  052532  043101  042524  020122  DH24:   .ASCIZ  /AFTER OFFSET COMMAND/
8794  052540  043117  051506  052105
8795  052546  041440  046517  040515
8796  052554  042116     000
8797  052557     101  052106  051105  DH25:   .ASCIZ  /AFTER SEEK COMMAND/
8798  052564  051440  042505  020113
8799  052572  047503  046515  047101
8800  052600  000104
8801  052602  043101  042524  020122  DH26:   .ASCIZ  /AFTER READ DATA COMMAND/
8802  052610  042522  042101  042040
8803  052616  052101  020101  047503
8804  052624  046515  047101  000104
8805  052632  043101  042524  020122  DH27:   .ASCIZ  /AFTER WRITE DATA COMMAND/
8806  052640  051127  052111  020105
8807  052646  040504  040524  041440
8808  052654  046517  040515  042116
8809  052662     000
8810  052663     011  054105  042520  DH28:   .ASCIZ  /       EXPECT/
8811  052670  052103     000
8812  052673     011  041501  052524  DH29:   .ASCIZ  /       ACTUAL/
8813  052700  046101     000
8814  052703     101  052106  051105  DH30:   .ASCIZ  /AFTER READ HEADER COMMAND/
8815  052710  051040  040505  020104
8816  052716  042510  042101  051105
8817  052724  041440  046517  040515
8818  052732  042116     000
8819  052735     101  004460  030102  DH31:   .ASCIZ  /A0     B0      A1      B1      A2      B2      B3/
8820  052742  040411  004461  030502
8821  052750  040411  004462  031102
8822  052756  041011  000063
8823  052762  043101  042524  020122  DH32:   .ASCIZ  /AFTER WRITE CHECK COMMAND/
8824  052770  051127  052111  020105
8825  052776  044103  041505  020113
8826  053004  047503  046515  047101
8827  053012  000104
8828  053014  043101  042524  020122  DH39:   .ASCIZ  /AFTER WRITE HEADER COMMAND/
8829  053022  051127  052111  020105
8830  053030  042510  042101  051105
8831  053036  041440  046517  040515
8832  053044  042116     000
8833  053047     127  051117  021504  DH40:   .ASCIZ  /WORD#  HEADER WAS  SHOULD BE/
8834  053054  044011  040505  042504
8835  053062  020122  040527  020123
8836  053070  051440  047510  046125
8837  053076  020104  042502     000
8838  053103     104  051125  047111  DH41:   .ASCIZ  /DURING RECAL COMMAND/
8839  053110  020107  042522  040503
8840  053116  020114  047503  046515
8841  053124  047101  000104
8842  053130  047117  051440  041505  DH42:   .ASCIZ  /ON SECTORS 0,2,4,6 OR 8  CYL 410 TRACK 2/
8843  053136  047524  051522  030040
8844  053144  031054  032054  033054
8845  053152  047440  020122  020070
8846  053160  041440  046131  032040
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8847  053166  030061  052040  040522
8848  053174  045503  031040     000
8849  053201     117  020116  042523  DH43:   .ASCIZ  /ON SECTORS 1,3,5,7 OR 9  CYL 410 TRACK 2/
8850  053206  052103  051117  020123
8851  053214  026061  026063  026065
8852  053222  020067  051117  034440
8853  053230  020040  054503  020114
8854  053236  030464  020060  051124
8855  053244  041501  020113  000062
8856  053252  047506  046522  052101  DH44:   .ASCIZ  /FORMAT & ALL READ-WRITE TESTS WILL BE BYPASSED/
8857  053260  023040  040440  046114
8858  053266  051040  040505  026504
8859  053274  051127  052111  020105
8860  053302  042524  052123  020123
8861  053310  044527  046114  041040
8862  053316  020105  054502  040520
8863  053324  051523  042105     000
8864  053331     101  052106  051105  DH47:   .ASCIZ  /AFTER READ HEADER COMMAND WITH MOVEMENT/
8865  053336  051040  040505  020104
8866  053344  042510  042101  051105
8867  053352  041440  046517  040515
8868  053360  042116  053440  052111
8869  053366  020110  047515  042526
8870  053374  042515  052116     000
8871  053401     115  043523  040440  DH49:   .ASCIZ  /MSG A & B IN RKMR2 & RKMR3 RESP. ARE INVALID/
8872  053406  023040  041040  044440
8873  053414  020116  045522  051115
8874  053422  020062  020046  045522
8875  053430  051115  020063  042522
8876  053436  050123  020056  051101
8877  053444  020105  047111  040526
8878  053452  044514  000104
8879  053456  043101  042524  020122  DH51:   .ASCIZ  /AFTER SEEK TO SELF COMMAND/
8880  053464  042523  045505  052040
8881  053472  020117  042523  043114
8882  053500  041440  046517  040515
8883  053506  042116     000
8884  053511     127  052111  020110  DH52:   .ASCIZ  /WITH INTENTIONAL MISCOMPARE/
8885  053516  047111  042524  052116
8886  053524  047511  040516  020114
8887  053532  044515  041523  046517
8888  053540  040520  042522     000
8889  053545     104  051125  047111  DH53:   .ASCIZ  /DURING OFFSET COMMAND/
8890  053552  020107  043117  051506
8891  053560  052105  041440  046517
8892  053566  040515  042116     000
8893  053573     101  052106  051105  DH54:   .ASCIZ  /AFTER FORMAT CHANGE AND CONTR READY REC'D/
8894  053600  043040  051117  040515
8895  053606  020124  044103  047101
8896  053614  042507  040440  042116
8897  053622  041440  047117  051124
8898  053630  051040  040505  054504
8899  053636  051040  041505  042047
8900  053644     000
8901  053645     103  046131  021440  DH56:   .ASCIZ  /CYL #  HEADER WORD 0/
9902  053652  044011  040505  042504
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8903  053660  020122  047527  042122
8904  053666  030040     000
8905  053671     101  052106  051105  DH57:   .ASCIZ  /AFTER WRITE COMMAND WITH OFFSET/
8906  053676  053440  044522  042524
8907  053704  041440  046517  040515
8908  053712  042116  053440  052111
8909  053720  020110  043117  051506
8910  053726  052105     000
8911
8912                                  .SBTTL  ERROR OUTPUT DATA
8913
8914          053732                  .EVEN
8915  053732  001214  001116          DT1:    $TESTN,$ERRPC
8916  053736  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8917  053744  007370  007366  007354
8918  053752  007356
8919  053754  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8920  053762  007372  007374  007406
8921  053770  007410
8922  053772  001214  001334          DT3:    $TESTN,TRAPPC
8923  053776  001214  001116  001344  DT4:    $TESTN,$ERRPC,FRCYL,TOCYL,CALDIF
8924  054004  001346  001354
8925  054010  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8926  054016  007370  007366  007354
8927  054024  007356
8928  054026  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8929  054034  007372  007374  007406
8930  054042  007410
8931  054044  001214  001116  001454  DT6:    $TESTN,$ERRPC,WD2,WD1
8932  054052  001452
8933  054054  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8934  054062  007370  007366  007354
8935  054070  007356
8936  054072  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8937  054100  007372  007374  007406
8938  054106  007410
8939  054110  001214  001116  001472  DT7:    $TESTN,$ERRPC,WDCNT,HDWD,TEMP1
8940  054116  001510  007412
8941  054122  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8942  054130  007370  007366  007354
8943  054136  007356
8944  054140  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8945  054146  007372  007374  007406
8946  054154  007410
8947  054156  001214  001116  001346  DT8:    $TESTN,$ERRPC,TOCYL,FRCYL,CALDIF
8948  054164  001344  001354
8949  054170  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8950  054176  007370  007366  007354
8951  054204  007356
8952  054206  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8953  054214  007372  007374  007406
8954  054222  007410
8955  054224  001214  001116  001346  DT9:    $TESTN,$ERRPC,TOCYL,RHTAB
8956  054232  001726
8957  054234  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8958  054242  007370  007366  007354
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8959  054250  007356
8960  054252  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8961  054260  007372  007374  007406
8962  054266  007410
8963  054270  001214  001116  007444  DT13:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,H.A0,H.B0,H.A1,H.B1
8964  054276  007446  007450  007452
8965  054304  007424  007426  007430
8966  054312  007432
8967  054314  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8968  054322  007370  007366  007354
8969  054330  007356
8970  054332  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8971  054340  007372  007374  007406
8972  054346  007410
8973  054350  001214  001116  007444  DT14:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2
8974  054356  007446  007450  007452
8975  054364  007454  007456
8976  054370  007424  007426  007430          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2
8977  054376  007432  007434  007436
8978  054404  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8979  054412  007370  007366  007354
8980  054420  007356
8981  054422  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8982  054430  007372  007374  007406
8983  054436  007410
8984  054440  001214  001116  007444  DT15:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2,E.B3
8985  054446  007446  007450  007452
8986  054454  007454  007456  007462
8987  054462  007424  007426  007430          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2,H.B3
8988  054470  007432  007434  007436
8989  054476  007442
8990  054500  007400  007402  007404          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
8991  054506  007370  007366  007354
8992  054514  007356
8993  054516  007360  007362  007364          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
8994  054524  007372  007374  007406
8995  054532  007410
8996
8997                                  .SBTTL  ERROR DATA FORMATS
8998
8999  054534  000003                DF1:    3
9000  054536     002        000              .BYTE 2,0
9001  054540  051664                        DH2
9002  054542     007        000              .BYTE 7,0
9003  054544  051734                        DH3
9004  054546     007        000              .BYTE   7,0
9005
9006  054550  000001                DF2:    1
9007  054552     002        000              .BYTE   2,0
9008
9009  054554  000005                DF3:    5
9010  054556     000        000              .BYTE   0,0
9011  054560  051647                        DH1
9012  054562     002        000              .BYTE   2,0
9013  054564  052163                        DH11
9014  054566     002        000              .BYTE   2,0
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9015  054570  051664                        DH2
9016  054572     007     000                .BYTE   7,0
9017  054574  051734                        DH3
9018  054576     007     000                .BYTE   7,0
9019
9020  054600  000003                DF4:    3
9021  054602     002     000                .BYTE   2,0
9022  054604  051664                        DH2
9023  054606     007     000                .BYTE   7,0
9024  054610  051734                        DH3
9025  054612     007     000                .BYTE   7,0
9026
9027  054614  000005                DF5:    5
9028  054616     000     000                .BYTE   0,0
9029  054620  053401                        DH49
9030  054622     000     000                .BYTE   0,0
9031  054624  051647                        DH1
9032  054626     002     000                .BYTE   2,0
9033  054630  051664                        DH2
9034  054632     007     000                .BYTE   7,0
9035  054634  051734                        DH3
9036  054636     007     000                .BYTE   7,0
9037
9038  054640  000005                DF6:    5
9039  054642     000     000                .BYTE 0,0
9040  054644  051647                        DH1
9041  054646     002     000                .BYTE 2,0
9042  054650  052005                        DH6
9043  054652     003     000                .BYTE 3,0
9044  054654  051664                        DH2
9045  054656     007     000                .BYTE   7,0
9046  054660  051734                        DH3
9047  054662     007     000                .BYTE   7,0
9048
9049
9050  054664  000004                DF10:   4
9051  054666     000     000                .BYTE 0,0
9052  054670  051647                        DH1
9053  054672     002     000                .BYTE 2,0
9054  054674  051664                        DH2
9055  054676     007     000                .BYTE 7,0
9056  054700  051734                        DH3
9057  054702     007     000                .BYTE   7,0
9058
9059  054704  000004                DF14:   4
9060  054706     002     000                .BYTE   2,0
9061  054710  053047                        DH40
9062  054712     003     000                .BYTE   3,0
9063  054714  051664                        DH2
9064  054716     007     000                .BYTE   7,0
9065  054720  051734                        DH3
9066  054722     007     000                .BYTE   7,0
9067
9068
9069  054724  000004                DF15:   4
9070  054726     000     000                .BYTE   0,0
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9071  054730  051647                        DH1
9072  054732  002     000                   .BYTE   2,0
9073  054734  051664                        DH2
9074  054736  007     000                   .BYTE   7,0
9075  054740  051734                        DH3
9076  054742  007     000                   .BYTE   7,0
9077
9078  054744  000005              DF17:     5
9079  054746  000     000                   .BYTE   0,0
9080  054750  053252                        DH44
9081  054752  000     000                   .BYTE   0,0
9082  054754  051647                        DH1
9083  054756  002     000                   .BYTE   2,0
9084  054760  051664                        DH2
9085  054762  007     000                   .BYTE   7,0
9086  054764  051734                        DH3
9087  054766  007     000                   .BYTE   7,0
9088  054770  000005              DF20:     5
9089  054772  000     000                   .BYTE   0,0
9090  054774  051647                        DH1
9091  054776  002     000                   .BYTE   2,0
9092  055000  053645                        DH56
9093  055002  002     000                   .BYTE   2,0
9094  055004  051664                        DH2
9095  055006  007     000                   .BYTE   7,0
9096  055010  051734                        DH3
9097  055012  007     000                   .BYTE   7,0
9098
9099  055014  000007              DF21:     7
9100  055016  000     000                   .BYTE   0,0
9101  055020  051647                        DH1
9102  055022  002     000                   .BYTE   2,0
9103  055024  052663                        DH28
9104  055026  000     000                   .BYTE   0,0
9105  055030  052735                        DH31
9106  055032  004     000                   .BYTE   4,0
9107  055034  052673                        DH29
9108  055036  004     000                   .BYTE   4,0
9109  055040  051664                        DH2
9110  055042  007     000                   .BYTE   7,0
9111  055044  051734                        DH3
9112  055046  007     000                   .BYTE   7,0
9113
9114  055050  000007              DF22:     7
9115  055052  000     000                   .BYTE   0,0
9116  055054  051647                        DH1
9117  055056  002     000                   .BYTE   2,0
9118  055060  052663                        DH28
9119  055062  000     000                   .BYTE   0,0
9120  055064  052735                        DH31
9121  055066  006     000                   .BYTE   6,0
9122  055070  052673                        DH29
9123  055072  006     000                   .BYTE   6,0
9124  055074  051664                        DH2
9125  055076  007     000                   .BYTE   7,0
9126  055100  051734                        DH3
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9127  055102  007  000                .BYTE   7,0
9128
9129  055104  000007                 DF23:   7
9130  055106  000  000                .BYTE   0,0
9131  055110  051647                 DH1
9132  055112  002  000                .BYTE   2,0
9133  055114  052663                 DH28
9134  055116  000  000                .BYTE   0,0
9135  055120  052735                 DH31
9136  055122  007  000                .BYTE   7,0
9137  055124  052673                 DH29
9138  055126  007  000                .BYTE   7,0
9139  055130  051664                 DH2
9140  055132  007  000                .BYTE   7,0
9141  055134  051734                 DH3
9142  055136  007  000                .BYTE   7,0
9143                                .EVEN
9144                                ;*****************************************************************
9145                                .SBTTL  TYPE ERROR ROUTINE
9146                                ;*ENTRY JSR PC,TYP ERR
9147                                ;*RETURN RTS PC
9148                                ;*
9149                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
9150                                ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
9151                                ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
9152                                ;*THE ERROR.
9153                                ;*****************************************************************
9154  055140  104413                TYPERR: SAVREG
9155  055142  113700  001114               MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
9156  055146  042700  177400               BIC     #177400,R0      ;CLEAR SIGN EXTENSION
9157  055152  005300                        DEC     R0              ;FORM INDEX FOR ERROR TABLE
9158  055154  006300                        ASL     R0
9159  055156  006300                        ASL     R0
9160  055160  006300                        ASL     R0
9161  055162  062700  007526         1$:   ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
9162  055166  012037  055202               MOV     (R0)+,2$        ;GET EM POINTER
9163  055172  001404                        BEQ     3$              ;BRANCH IF THERE ISN'T ONE
9164  055174  104401  001205               TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
9165  055200  104401                        TYPE                    ;TYPE ERROR MESSAGE (EM)
9166  055202  000000                 2$:    .WORD   0               ;EM POINTER GOES HERE
9167  055204  012037  055220         3$:   MOV     (R0)+,4$        ;GET DH POINTER
9168  055210  001404                        BEQ     5$              ;BRANCH IF THERE ISN'T ONE
9169  055212  104401  001205               TYPE    ,$CRLF          ;TYPE CR-LF
9170  055216  104401                        TYPE                    ;TYPE DATA HEADER
9171  055220  000000                 4$:    .WORD   0               ;DH POINTER GOES HERE
9172  055222  012001                 5$:    MOV     (R0)+,R1        ;GET DT POINTER
9173  055224  001455                        BEQ     20$             ;BRANCH IF THERE ARE NONE
9174  055226  005004                        CLR     R4              ;SET INDENT SWITCH
9175  055230  012000                        MOV     (R0)+,R0        ;GET DF POINTER
9176  055232  012002                        MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
9177  055234  001446                        BEQ     17$             ;DH NUM IS 0-BRANCH
9178  055236  005104                        COM     R4              ;NO INDENT
9179  055240  104401  001205               TYPE    ,$CRLF
9180  055244  112003                10$:    MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
9181  055246  105720                        TSTB    (R0)+           ;BUMP PAST FORMAT WORD
9182  055250  005703                        TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
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9183  055252  001407                    BEQ     14$             ;NO - SKIP DATA PRINT
9184  055254  013146              11$:  MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
9185  055256  104402                    TYPOC                   ;TYPE IT
9186  055260  005303                    DEC     R3              ;MORE DATA WORDS
9187  055262  001403                    BEQ     14$             ;NO-BRANCH
9188  055264  104401  055414            TYPE    ,SPACE2         ;TYPE SEPARATORS
9189  055270  000771                    BR      11$             ;LOOP
9190  055272  005302              14$:  DEC     R2              ;MORE DH'S?
9191  055274  003431                    BLE     20$             ;NO-BRANCH
9192  055276  104401  001205            TYPE    ,$CRLF
9193  055302  005760  000002            TST     2(R0)           ;ONLY A DH IN THIS REQUEST?
9194  055306  001404                    BEQ     15$             ;YES-BRANCH BYPASS INDENT
9195  055310  005104                    COM     R4              ;INDENT?
9196  055312  001002                    BNE     15$             ;NO-BRANCH
9197  055314  104401  055414            TYPE    ,SPACE2         ;YES-TYPE SPACES
9198  055320  012037  055326      15$:  MOV     (R0)+,16$       ;GET NEXT DH POINTER
9199  055324  104401                    TYPE                    ;TYPE DH
9200  055326  000000              16$:  .WORD   0               ;DH POINTER GOES HERE
9201  055330  105710                    TSTB    (R0)            ;TYPE A DT?
9202  055332  001003                    BNE     21$             ;YES-BRANCH
9203  055334  062700  000002            ADD     #2,R0           ;INCREMENT DF POINTER
9204  055340  000754                    BR      14$             ;SEE IF END OF DF BLOCK
9205  055342  104401  001205      21$:  TYPE    ,$CRLF
9206  055346  005704                    TST     R4              ;INDENT?
9207  055350  001335                    BNE     10$             ;NO-BRANCH
9208  055352  104401  055414      17$:  TYPE    ,SPACE2         ;YES-TYPE SPACES
9209  055356  000732                    BR      10$             ;LOOP
9210  055360  104414              20$:  RESREG
9211
9212  055362  032777  010000  123550    BIT     #SW12,@SWR      ;SEE IF ABORT DRV AFTER 20 ERRORS
9213  055370  001410                    BEQ     25$             ;BR IF NO
9214  055372  023727  001103  000024    CMP     $ERFLG,#20.     ;ELSE SEE IF HAVE 20 ERRORS
9215  055400  001004                    BNE     25$             ;BR IF NO
9216  055402  012706  001100            MOV     #STACK,SP       ;ELSE RESTORE STACK PTR
9217  055406  000137  031452            JMP     $EOP            ;AND GO TO NEXT DRV
9218
9219  055412  000207              25$:  RTS     PC
9220  055414  020040  000        SPACE2: .ASCIZ/  /              ;2 SPACES
9221                              ;  ODT-11 -- V005A
9222
9223                              ; DEC-11-U0DPA-A-LA
9224
5225                              ; COPYRIGHT 1969,1970,1972
9226                              ; DIGITAL EQUIPMENT CORPORATION
9227                              ; MAYNARD, MASSACHUSETTS 01754
9228                                      .ENABL  ABS,AMA
9229          055420                      .EVEN
9230          055500                      .=.+60
9231          000000              R0      =       %0      ; REGISTER
9232          000001              R1      =       %1      ;  NAMING
9233          000002              R2      =       %2      ;   CONVENTIONS
9234          000003              R3      =       %3
9235          000004              R4      =       %4
9236          000005              R5      =       %5
9237          000006              SP      =       %6
9238          000007              PC      =       %7
```

```
 9239            177776                  ST      =       177776          ;STATUS REGISTER
 9240                                    ;
 9241            000014                  O.TVEC  =       14              ;TRT VECTOR LOCATION
 9242            000340                  O.STM   =       340             ;PRIORITY MASK - STATUS REGISTER
 9243            000020                  O.TBT   =       20              ;T-BIT MASK - STATUS REGISTER
 9244            000003                  TRT     =       000003          ;TRT INSTRUCTION
 9245            000006                  RTT     =       000006          ;RTT INSTRUCTION
 9246                                    ;
 9247                                    ; R5 IS USUALLY CONSIDERED SAFE, THE CURRENT ADDRESS WORD
 9248                                    ; RESIDES IN IT.  AFTER A BREAKPOINT, IT IS SET TO ZERO, AND SEARCH
 9249                                    ; OPERATIONS LEAVE IT RANDOMLY FILLED.  OTHERWISE, IT SHOULD NOT
 9250                                    ; BE USED EXCEPT FOR JSR'S AND THE CURRENT ADDRESS POINTER (CAD).
 9251                                    ;
 9252            177562                  O.RDB   =       177562  ;R DATA BUFFER
 9253            177560                  O.RCSR  =       177560  ;R C/SR
 9254            177566                  O.TDB   =       177566  ;T DATA BUFFER
 9255            177564                  O.TCSR  =       177564  ;T C/SR
 9256                                    ;
 9257                                    ;
 9258                                    ; INITIALIZE ODT
 9259                                    ;  USE O.ODT FOR A NORMAL ENTRY
 9260                                    ;  USE O.ODT+2 TO RESTART ODT - WIPING OUT ALL BREAKPOINTS
 9261                                    ;  USE O.ODT+4 TO RE-ENTER (I.E. - FAKE A BREAKPOINT)
 9262                                    ;
 9263  055500  000413                    O.ODT:  BR      O.STRT          ;NORMAL ENTRY
 9264  055502  000417                            BR      O.RST           ;RESTART
 9265  055504  013737  177776  055460  O.ENTR: MOV     ST,O.UST        ;RE-ENTER  --  SAVE STATUS
 9266  055512  013737  000016  177776          MOV     O.TVEC+2,ST     ;SET UP LOCAL STATUS
 9267  055520  010737  055456                  MOV     PC,O.UPC        ;FAKE THE PC
 9268  055524  000137  056656                  JMP     O.BK1
 9269                                    ;
 9270  055530  012706  055440            O.STRT: MOV     #O.URO,SP       ;SET UP STACK
 9271  055534  010637  055454                    MOV     SP,O.USP        ;FAKE THE SAVED STACK
 9272  055540  000414                            BR      O.RST1          ;CLEAR BREAKPOINT TABLES
 9273  055542  004037  057064            O.RST:  JSR     0,O.SVR         ;SAVE REGISTERS
 9274  055546  013777  055476  177716          MOV     O.UIN,@O.ADR1   ;REMOVE THE BREAKPOINT
 9275  055554  113704  055462                  MOVB    O.PRI,R4        ;GET ODT PRIORITY
 9276  055560  106004                          RORB    R4              ;SHIFT
 9277  055562  106004                          RORB    R4              ;  INTO
 9278  055564  106004                          RORB    R4              ;  POSITION
 9279  055566  110437  177776                  MOVB    R4,ST           ;STORE IN STATUS
 9280  055572  000127                  O.RST1: JMP     (PC)+
 9281  055574  000403                          BR      O.45
 9282  055576  012737  000002  056566          MOV     #RTI,O.RTIT     ;SET TO RTI IF 11/20 OR /05
 9283  055604  105037  057505            O.45:  CLRB    O.P             ;DISALLOW PROCEED
 9284  055610  012737  000340  000016          MOV     #O.STM,O.TVEC+2 ;STATUS WORD TO TRT VECTOR + 2
 9285  055616  012737  056646  000014          MOV     #O.BRK,O.TVEC   ;PC TO TRT VECTOR
 9286  055624  000447                          BR      O.RALL          ;CLEAR BREAKPOINT TABLES
 9287                                    ;
 9288                                    ; SPECIAL NAME HANDLER
 9289                                    ;  DEPENDS UPON THE EXPLICIT ORDER OF THE TWO TABLES O.TL AND O.URO
 9290                                    ;
 9291  055626  004537  057306            O.REGT: JSR     5,O.GET         ;SPECIAL NAME, GET ONE MORE CHARACTER
 9292  055632  012704  057531                    MOV     #O.TL,R4        ;TABLE START ADDRESS
 9293  055636  120024                    O.RSP:  CMPB    R0,(R4)+        ;IS THIS THE CORRECT CHARACTER?
 9294  055640  001413                            BEQ     O.SP            ;JUMP IF YES
```

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9295  055642  022704  057537            CMP     #0.TL+0.LG,R4   ;IS THE SEARCH DONE?
9296  055646  101373                    BHI     0.RSP           ;BRANCH IF NOT
9297  055650  042700  177770            BIC     #177770,R0      ;MASK OFF OCTAL
9298  055654  010004                    MOV     R0,R4
9299  055656  006304            0.SP1:  ASL     R4
9300  055660  062704  055440            ADD     #0.URO,R4       ;GENERATE ADDRESS
9301  055664  005202                    INC     R2              ;SET FOUND FLAG
9302  055666  000444                    BR      0.SCAN          ;GO FIND NEXT CHARACTER
9303  055670  162704  057522    0.SP:   SUB     #0.TL-7,R4      ;CORRECT CONSTANT
9304  055674  000770                    BR      0.SP1
9305                            ;
9306                            ; ^ HANDLER - OPEN INDEXED ON THE PC
9307                            ;
9308  055676  004737  057432    0.ORPC: JSR     PC,0.TCLS
9309  055702  010502                    MOV     R5,R2           ;CURRENT ADDRESS IN R2
9310  055704  061202                    ADD     @R2,R2          ;COMPUTE
9311  055706  006202                    ASR     R2              ;MOVE ONE BIT TO CARRY
9312  055710  103421                    BCS     0.ERR           ;ERROR IF ODD NUMBER
9313  055712  006302                    ASL     R2              ;RESTORE WORD
9314  055714  005722                    TST     (R2)+           ; AND INCREMENT BY TWO
9315  055716  010205                    MOV     R2,R5           ;UPDATE CAD
9316  055720  000137  056172            JMP     0.OP2           ;GO FINISH UP
9317                            ;
9318                            ; B HANDLER - SET AND REMOVE BREAKPOINTS
9319                            ;
9320  055724  005702    0.BKPT: TST     R2              ;IF NO NUMBER TYPED
9321  055726  001406                    BEQ     0.RALL          ;  REMOVE BREAKPOINT
9322  055730  006204                    ASR     R4              ;CHECK IF ODD
9323  055732  103410                    BCS     0.ERR           ;JUMP IF ODD
9324  055734  006304                    ASL     R4              ;RESTORE ONE BIT
9325  055736  010437  055472            MOV     R4,0.ADR1       ;SET A BREAKPOINT
9326  055742  000412                    BR      0.DCD
9327  055744  012737  057546  055472  0.RALL: MOV     #0.TRTC,0.ADR1  ;CLEAR BREAKPOINT
9328  055752  000406                    BR      0.DCD
9329
9330                            ; COMMAND DECODER - ODT11
9331                            ;
9332                            ;   REGISTERS R0-R4 MAY BE USED,
9333                            ;    REGISTER R5 WILL BE CONSIDERED SAFE
9334                            ;
9335  055754  052705  000001    0.ERR:  BIS     #1,R5           ;CLOSE EVERYTHING
9336  055760  012700  000077            MOV     #'?,R0          ;  ? TO BE TYPED
9337  055764  004537  057364            JSR     5,0.FTYP        ; OUTPUT ?
9338  055770  004537  057464    0.DCD:  JSR     5,0.CRLS        ;TYPE  <CR><LF>*
9339  055774  005004            0.DCD1: CLR     R4              ; R4 CONTAINS THE CONVERTED OCTAL
9340  055776  005002                    CLR     R2              ; R2 IS THE NUMBER FOUND FLAG
9341  056000  004537  057306    0.SCAN: JSR     5,0.GET         ;GET A CHAR, RETURN IN R0
9342  056004  022700  000060            CMP     #'0,R0          ;COMPARE WITH ASCII 0
9343  056010  101013                    BHI     0.CLGL          ;CHECK LEGALITY IF NON-NUMERIC
9344  056012  022700  000067            CMP     #'7,R0          ;COMPARE WITH ASCII 7
9345  056016  103410                    BLO     0.CLGL          ;CHECK LEGALITY IF NOT OCTAL
9346  056020  042700  177770            BIC     #177770,R0      ;CONVERT TO BCD
9347  056024  006304                    ASL     R4              ; MAKE ROOM
9348  056026  006304                    ASL     R4              ;   IN
9349  056030  006304                    ASL     R4              ;     R4
9350  056032  060004                    ADD     R0,R4           ;PACK THREE BITS IN R4
```

```
 9351  056034  005202                          INC     R2              ;R2 HAS NUMERIC FLAG
 9352  056036  000760                          BR      O.SCAN          ;   AND TRY AGAIN
 9353  056040  005001                  O.CLGL: CLR     R1              ;CLEAR INDEX
 9354  056042  120061  057515          O.LGL1: CMPB    R0,O.LGCH(R1)   ;DO THE CODES MATCH?
 9355  056046  001405                          BEQ     O.LGL2          ;JUMP IF YES
 9356  056050  005201                          INC     R1              ; SET INDEX FOR NEXT SEARCH
 9357  056052  020127  000014                  CMP     R1,#O.CLGT      ;IS THE SEARCH DONE?
 9358  056056  103336                          BHIS    O.ERR           ;    OOPS!
 9359  056060  000770                          BR      O.LGL1          ;RE-LOOP
 9360  056062  006301                  O.LGL2: ASL     R1              ;MULTIPLY BY TWO
 9361  056064  000171  056070                  JMP     @O.LGDR(R1)     ;GO TO PROPER ROUTINE
 9362
 9363  056070  056120                  O.LGDR: O.WRD   ;  /    OPEN WORD
 9364  056072  056152                          O.CRET  ;  CARRIAGE RETURN    CLOSE
 9365  056074  055626                          O.REGT  ;  $  REGISTER OPS
 9366  056076  056462                          O.GO    ;  G  GO TO ADDRESS K
 9367  056100  056164                          O.OP1   ;  <LF>  MODIFY, CLOSE, OPEN NEXT
 9368  056102  055676                          O.ORPC  ;  ←  OPEN RELATED, INDEX - PC
 9369  056104  056216                          O.BACK  ;  ↑  OPEN PREVIOUS
 9370  056106  056226                          O.OFST  ;  O  OFFSET
 9371  056110  056304                          O.WSCH  ;  W  SEARCH WORD
 9372  056112  056300                          O.EFF   ;  E  SEARCH EFFECTIVE ADDRESS
 9373  056114  055724                          O.BKPT  ;  B  BREAKPOINTS
 9374  056116  056570                          O.PROC  ;  P  PROCEED
 9375          000030                  O.LGL   =       .-O.LGDR        ;LGL MUST EQUAL 2X CHLGT ALWAYS
 9376
 9377                                          ; PROCESS / - OPEN WORD
 9378                                          ;
 9379  056120  005702                  O.WRD:  TST     R2              ;GET VALUE IF R2 IS NON-ZERO
 9380  056122  001410                          BEQ     O.WRDA          ;SKIP OTHERWISE
 9381  056124  010405                          MOV     R4,R5           ;    PUT VALUE IN CAD
 9382  056126  006205                  O.WRD1: ASR     R5              ;MOVE ONE BIT TO CARRY
 9383  056130  103711                  O.ERR2: BCS     O.ERR           ;JUMP IF ODD ADDRESS
 9384  056132  006305                          ASL     R5              ;RESTORE THE CARRY BIT
 9385  056134  011500                          MOV     @R5,R0          ;GET CONTENTS OF WORD
 9386  056136  004537  057222                  JSR     5,O.CADV        ;GO GET AND TYPE OUT @CAD
 9387  056142  000714                          BR      O.DCD1          ;GO BACK TO DECODER
 9388  056144  042705  000001          O.WRDA: BIC     #1,R5           ;CLEAR CLOSED BIT
 9389  056150  000766                          BR      O.WRD1          ;GO BACK TO MAIN-LINE
 9390
 9391                                          ; PROCESS CARRIAGE RETURN
 9392                                          ;
 9393  056152  004737  057432          O.CRET: JSR     PC,O.TCLS       ;CLOSE LOCATION
 9394  056156  052705  000001                  BIS     #1,R5           ;CLOSE EVERYTHING
 9395  056162  000702                          BR      O.DCD           ;RETURN TO DECODER
 9396
 9397                                          ; PROCESS <LF>, OPEN NEXT WORD
 9398                                          ;
 9399  056164  004737  057432          O.OP1:  JSR     PC,O.TCLS       ;CLOSE PRESENT CELL
 9400  056170  005725                          TST     (R5)+           ;GENERATE NEW ADDRESS
 9401  056172  004537  057456          O.OP2:  JSR     5,O.CRLF        ;<CR><LF>
 9402  056176  010500                          MOV     R5,R0           ;NUMBER TO TYPE
 9403  056200  004537  057222                  JSR     5,O.CADV        ;  TYPE OUT ADDRESS
 9404  056204  012700  000057                  MOV     #'/,R0          ;TYPE A /
 9405  056210  004537  057364                  JSR     5,O.FTYP
 9406  056214  000744                          BR      O.WRD1          ;GO PROCESS IT
```

```
 9407                                   ;
 9408                                   ; PROCESS *, OPEN PREVIOUS WORD
 9409                                   ;
 9410  056216  004737  057432           0.BACK: JSR     PC,0.TCLS
 9411  056222  005745                           TST     -(R5)           ;GENERATE NEW ADDRESS
 9412  056224  000762                           BR      0.OP2           ;GO DO THE REST
 9413                                   ;
 9414                                   ; PROCESS 0, COMPUTE OFFSET
 9415                                   ;
 9416  056226  006205                   0.OFST: ASR     R5              ;GET LOW ORDER BIT
 9417  056230  103737                           BCS     0.ERR2          ;ERROR IF CLOSED
 9418  056232  006305                           ASL     R5              ;RESTORE WORD
 9419  056234  012700  000040                   MOV     #' ,R0          ;TYPE ONE BLANK
 9420  056240  004537  057364                   JSR     5,0.FTYP        ; AS A SEPARATOR
 9421  056244  160504                           SUB     R5,R4           ;COMPUTE
 9422  056246  005304                           DEC     R4
 9423  056250  005304                           DEC     R4              ;    16 BIT OFFSET
 9424  056252  010400                           MOV     R4,R0           ;TYPE A
 9425  056254  010402                           MOV     R4,R2           ;SAVE R4
 9426  056256  004537  057222                   JSR     5,0.CADV        ;NUMBER IN R0 - WORD MODE
 9427  056262  010200                           MOV     R2,R0
 9428  056264  006200                           ASR     R0              ;DIVIDE BY TWO
 9429  056266  103402                           BCS     0.OF1           ;BRANCH IF ODD
 9430  056270  004537  057222                   JSR     5,0.CADV        ;NUMBER IN R0 - BYTE MODE
 9431  056274  000137  055774           0.OF1:  JMP     0.DCD1          ;ALL DONE
 9432                                   ;
 9433                                   ; SEARCHES - $MSK   HAS THE MASK
 9434                                   ;            $MSK+2 HAS THE FWA
 9435                                   ;            $MSK+4 HAS THE LWA
```

```
9436
9437  056300  005201                  0.EFF:  INC     R1              ;SET EFFECTIVE SEARCH
9438  056302  000401                          BR      0.WDS
9439  056304  005001                  0.WSCH: CLR     R1              ;SET WORD SEARCH
9440  056306  005702                  0.WDS:  TST     R2              ;CHECK FOR OBJECT FOUND
9441  056310  001621                  0.ERR1: BEQ     0.ERR           ;ERROR IF NO OBJECT
9442  056312  013702  055466                  MOV     0.MSK+2,R2      ;SET ORIGIN
9443  056316  013705  055464                  MOV     0.MSK,R5        ;SET MASK
9444  056322  005105                          COM     R5              ;AND COMPLEMENT IT
9445  056324  020237  055470          0.WDS2: CMP     R2,0.MSK+4      ; IS THE SEARCH ALL DONE?
9446  056330  101217                          BHI     0.DCD           ;  YES
9447  056332  011200                          MOV     @R2,R0          ; GET OBJECT
9448  056334  005701                          TST     R1              ;NO
9449  056336  001027                          BNE     0.EFF1          ;BRANCH IF EFFECTIVE SEARCH
9450  056340  010046                          MOV     R0,-(SP)
9451  056342  010403                          MOV     R4,R3           ;EXCLUSIVE OR
9452  056344  040400                          BIC     R4,R0           ; IS DONE
9453  056346  042603                          BIC     (SP)+,R3        ;          . IN A VERY
9454  056350  050003                          BIS     R0,R3           ;    FANCY MANNER HERE
9455  056352  040503                          BIC     R5,R3           ;AND RESULT WITH MASK
9456  056354  001016                  0.WDS3: BNE     0.WDS4          ;RE-LOOP IF NO MATCH
9457  056356  010446                          MOV     R4,-(SP)        ;REGISTERS R2,R4, AND R5 ARE SAFE
9458  056360  004537  057456                  JSR     5,0.CRLF        ;TYPE <CR,LF>
9459  056364  010200                          MOV     R2,R0           ;GET READY TO TYPE
9460  056366  004537  057222                  JSR     5,0.CADV        ;  TYPE ADDRESS
9461  056372  012700  000057                  MOV     #'/,R0          ;SLASH TO R0
9462  056376  004537  057364                  JSR     5,0.FTYP        ;TYPE IT
9463  056402  011200                          MOV     @R2,R0          ;GET CONTENTS
9464  056404  004537  057222                  JSR     5,0.CADV        ;TYPE CONTENTS
9465  056410  012604                          MOV     (SP)+,R4        ; RESTORE R4
9466  056412  005722                  0.WDS4: TST     (R2)+           ;INCREMENT TO NEXT CELL AND
9467  056414  000743                          BR      0.WDS2          ;    RETURN
9468  056416  020004                  0.EFF1: CMP     R0,R4           ; IS (X)=K?
9469  056420  001755                          BEQ     0.WDS3          ;TYPE IF EQUAL
9470  056422  010003                          MOV     R0,R3           ;(X) TO R3
9471  056424  060203                          ADD     R2,R3           ;(X)+X
9472  056426  005203                          INC     R3
9473  056430  005203                          INC     R3              ;(X)+X+2
9474  056432  020304                          CMP     R3,R4           ;IS (X)+X+2=K?
9475  056434  001747                          BEQ     0.WDS3          ;BRANCH IF EQUAL
9476  056436  042700  177400                  BIC     #177400,R0      ;WIPE OUT EXTRANEOUS BITS
9477  056442  110000                          MOVB    R0,R0           ;EXTEND SIGN
9478  056444  000257                          CCC
9479  056446  006300                          ASL     R0              ;MULTIPLY BY TWO
9480  056450  005200                          INC     R0              ;ADD TWO
9481  056452  005200                          INC     R0
9482  056454  060200                          ADD     R2,R0           ;ADD PC
9483  056456  020004                          CMP     R0,R4           ;IS THE RESULT A PROPER REL. BRANCH?
9484  056460  000735                          BR      0.WDS3
9485
9486                          ;
                              ; PROCESS G - GO
9487                          ;
9488  056462  105037  057505  0.GO:   CLRB    0.P             ;DISALLOW PROCEED
9489  056466  006204                  ASR     R4              ;CHECK LOW ORDER BIT
9490  056470  103617                  BCS     0.ERR2          ;ERROR IF ODD NUMBER
9491  056472  006304                  ASL     R4              ;RESTORE WORD
```

```
 9492  056474  010437  055456                 MOV     R4,0.UPC        ;SET UP NEW PC
 9493  056500  112737  000340  177776         MOVB    #0.STM,ST       ;SET HIGH PRIORITY
 9494  056506  004537  057154                 JSR     5,0.RSTT        ;RESTORE TELETYPE
 9495  056512  105037  057504         0.TBIT: CLRB    0.T             ;CLEAR BOTH
 9496  056516  042737  000020  055460         BIC     #0.TBT,0.UST    ;  T-BIT FLAGS
 9497  056524  017737  176742  055476         MOV     @0.ADR1,0.UIN   ;SAVE INSTRUCTION
 9498  056532  013777  057546  176732         MOV     0.TRTC,@0.ADR1  ;REPLACE WITH TRAP
 9499  056540  012600                 0.GO2:  MOV     (SP)+,R0        ;RESTORE
 9500  056542  012601                         MOV     (SP)+,R1        ;  R0
 9501  056544  012602                         MOV     (SP)+,R2        ;    THRU
 9502  056546  012603                         MOV     (SP)+,R3
 9503  056550  012604                         MOV     (SP)+,R4        ;
 9504  056552  012605                         MOV     (SP)+,R5        ;     R5
 9505  056554  012606                         MOV     (SP)+,SP        ;  AND SP
 9506  056556  013746  055460                 MOV     0.UST,-(SP)     ;     AND STATUS
 9507  056562  013746  055456                 MOV     0.UPC,-(SP)     ;     AND PC
 9508  056566  000006                 0.RTIT: RTT                     ;CHANGED TO RTI FOR 11/20 AND /05
 9509                                 ;
 9510                                 ; PROCESS P - PROCEED
 9511                                 ;   ONLY ALLOWED AFTER A BREAKPOINT
 9512                                 ;
 9513  056570  105737  057505         0.PROC: TSTB    0.P             ;CHECK LEGALITY OF PROCEED
 9514  056574  001645                         BEQ     0.ERR1          ;NOT LEGAL
 9515  056576  105037  057505                 CLRB    0.P             ;CLEAR PROCEED FLAG
 9516  056602  005702                         TST     R2              ;WAS COUNT SPECIFIED?
 9517  056604  001402                         BEQ     0.PR1           ;NO
 9518  056606  010437  055474                 MOV     R4,0.CT         ;YES, PUT AWAY COUNT
 9519  056612  112737  000340  177776 0.PR1:  MOVB    #0.STM,ST       ;FORCE HIGH PRIORITY
 9520  056620  004537  057154                 JSR     5,0.RSTT        ;RESTORE TTY
 9521  056624  112737  000340  177776 0.C1:   MOVB    #0.STM,ST       ;SET HIGH PRIORITY
 9522  056632  105237  057504                 INCB    0.T             ;SET T-BIT FLAG
 9523  056636  052737  000020  055460         BIS     #0.TBT,0.UST    ;SET T-BIT
 9524  056644  000735                         BR      0.GO2
 9525                                 ;
 9526                                 ; BREAKPOINT HANDLER
 9527                                 ;  A TRT BREAKPOINT CAUSES 0.BRK TO BE ENTERED, WHICH SAVES
 9528                                 ;  VARIOUS ODDS AND ENDS, FINDS OUT IF THE BREAKPOINT WAS LEGAL,
 9529                                 ;  AND GIVES CONTROL TO THE COMMAND DECODER
 9530                                 ;
 9531  056646  012637  055456         0.BRK:  MOV     (SP)+,0.UPC     ;PRIORITY IS 7 UPON ENTRY
 9532  056652  012637  055460                 MOV     (SP)+,0.UST     ;SAVE STATUS AND PC
 9533  056656  004037  057064         0.BK1:  JSR     0,0.SVR         ;SAVE VARIOUS REGISTERS
 9534  056662  105737  057504                 TSTB    0.T             ;CHECK FOR T-BIT SET
 9535  056666  001311                         BNE     0.TBIT          ;JUMP IF SET
 9536  056670  013777  055476  176574         MOV     0.UIN,@0.ADR1   ;REMOVE BREAKPOINTS
 9537  056676  105737  055462                 TSTB    0.PRI           ;CHECK IF PRIORITY
 9538  056702  100003                         BPL     0.BK2           ;  IS AS SAME AS USER PGM
 9539  056704  113705  055460                 MOVB    0.UST,R5        ;PICK UP USER UST IF SO
 9540  056710  000407                         BR      0.BK3           ;AND DON'T COMPUTE THE PRIORITY
 9541  056712  113705  055462         0.BK2:  MOVB    0.PRI,R5        ;OTHERWISE PICK UP ACTUAL PRIORITY
 9542  056716  000257                         CCC                     ;CLEAR CARRY
 9543  056720  106005                         RORB    R5              ;SHIFT LOW ORDER BITS
 9544  056722  106005                         RORB    R5              ;  INTO
 9545  056724  106005                         RORB    R5              ;    HIGH ORDER
 9546  056726  106005                         RORB    R5              ;      POSITION
 9547  056730  110537  177776         0.BK3:  MOVB    R5,ST           ;PUT THE STATUS AWAY WHERE IT BELONGS
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 9548  056734  013705  055456                  MOV     0.UPC,R5        ;GET PC, IT POINTS TO THE TRT
 9549  056740  005745                          TST     -(R5)           ;SUBTRACT TWO
 9550  056742  010537  [illegible]              MOV     R5,0.UPC        ;FROM THE USER'S PC
 9551  056746  020537  055472                  CMP     R5,0.ADR1       ;COMPARE WITH LIST
 9552  056752  001417                          BEQ     0.B2            ;JUMP IF FOUND
 9553  056754  004537  057122                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS
 9554  056760  004537  057456                  JSR     5,0.CRLF
 9555  056764  012704  057510                  MOV     #0.BD,R4        ;ERROR, NOTHING FOUND
 9556  056770  012703  057511                  MOV     #0.BD+1,R3
 9557  056774  004537  057350                  JSR     5,0.TYPE        ;OUTPUT "BE" FOR BAD ENTRY
 9558  057000  010500                          MOV     R5,R0
 9559  057002  042737  000020  055460          BIC     #0.TBT,0.UST    ;CLEAR OUT ANY POSSIBLE FAKE T-BIT
 9560  057010  000420                          BR      0.B3            ; AND CONTINUE
 9561  057012  005337  055474          0.B2:   DEC     0.CT
 9562  057016  003302                          BGT     0.C1            ;JUMP IF REPEAT
 9563  057020  012737  000001  055474          MOV     #1,0.CT         ;RESET COUNT TO 1
 9564  057026  105237  057505                  INCB    0.P             ;ALLOW PROCEED
 9565  057032  004537  057122                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS, R4 IS SAFE
 9566  057036  012700  000102                  MOV     #'B,R0
 9567  057042  004537  057364                  JSR     5,0.FTYP        ;TYPE "B"
 9568  057046  013700  055472                  MOV     0.ADR1,R0       ;GET ADDRESS OF BREAK
 9569  057052  004537  057222          0.B3:   JSR     5,0.CADV        ;TYPE ADDRESS
 9570  057056  005005                          CLR     R5              ;CLEAR CAD
 9571  057060  000137  055770                  JMP     0.DCD           ;GO TO DECODER
 9572                                  ;
 9573                                  ; SAVE REGISTERS R0-R6 IN INTERNAL STACK
 9574                                  ;
 9575  057064  012637  057502          0.SVR:  MOV     (SP)+,0.XXX     ;PICK REGISTER FROM STACK AND SAVE
 9576  057070  010637  055454                  MOV     SP,0.USP        ;SAVE USER STACK ADDRESS
 9577  057074  012706  055454                  MOV     #0.USP,SP       ;SET TO INTERNAL STACK
 9578  057100  010546                          MOV     R5,-(SP)        ;SAVE
 9579  057102  010446                          MOV     R4,-(SP)        ; REGISTERS
 9580  057104  010346                          MOV     R3,-(SP)        ;1
 9581  057106  010246                          MOV     R2,-(SP)        ; THRU
 9582  057110  010146                          MOV     R1,-(SP)        ;    5
 9583  057112  013746  057502                  MOV     0.XXX,-(SP)     ;PUT SAVED REGISTER ON STACK
 9584  057116  005746                          TST     -(SP)
 9585  057120  000200                          RTS     R0
 9586                                  ;
 9587                                  ; SAVE TELETYPE STATUS
 9588                                  ;
 9589  057122  113737  177560  057506  0.SVTT: MOVB    0.RCSR,0.CSR1   ;SAVE R C/SR
 9590  057130  113737  177564  057507          MOVB    0.TCSR,0.CSR2   ;SAVE T C/SR
 9591  057136  105037  177560                  CLRB    0.RCSR          ;CLEAR ENABLE AND MAINTENANCE
 9592  057142  105037  177564                  CLRB    0.TCSR          ;  BITS IN BOTH C/SR
 9593  057146  004537  057456                  JSR     5,0.CRLF        ;TYPE <CR,LF>
 9594  057152  000205                          RTS     R5
 9595                                  ;
 9596                                  ; RESTORE TELETYPE STATUS
 9597                                  ;
 9598  057154  004537  057456          0.RSTT: JSR     5,0.CRLF                ;<CR,LF> BEFORE RESTORING
 9599  057160  105737  177564                  TSTB    0.TCSR          ;WAIT READY ON PRINTER
 9600  057164  100375                          BPL     .-4
 9601  057166  032737  004000  177560          BIT     #4000,0.RCSR    ;CHECK BUSY FLAG ON READER
 9602  057174  001403                          BEQ     0.RSE1          ;SKIP READY LOOP IF NOT BUSY
 9603  057176  105737  177560                  TSTB    0.RCSR          ;WAIT READY
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 9604  057202  100375                          BPL     .-4             ;     ON READER
 9605  057204  113737  057506  177560  0.RSE1: MOVB    0.CSR1,0.RCSR   ;RESTORE
 9606  057212  113737  057507  177564          MOVB    0.CSR2,0.TCSR   ;  THE STATUS REGISTERS
 9607  057220  000205                          RTS     R5
 9608
 9609                                  ;
 9610                                  ; TYPE OUT CONTENTS OF WORD OR BYTE WITH ONE TRAILING SPACE
 9611                                  ; WORD IS IN R0
 9612                                  ;
 9612  057222  010246                  0.CADV: MOV     R2,-(SP)        ;SAVE R2
 9613  057224  012704  057545                  MOV     #0.BUF+6,R4     ;BUFFER START ADDRESS
 9614  057230  012746  000060                  MOV     #'0,-(SP)               ;CONSTANT ASCII 0
 9615  057234  010002                  0.SPC:  MOV     R0,R2           ; GET
 9616  057236  042702  177770                  BIC     #177770,R2      ;    OCTAL CHARACTER
 9617  057242  061602                          ADD     @SP,R2          ;CONVERT TO ASCII
 9618  057244  110244                          MOVB    R2,-(R4)        ;STORE IN BUFFER
 9619  057246  006200                          ASR     R0              ;SHIFT THIS MESS
 9620  057250  006200                          ASR     R0              ; RIGHT
 9621  057252  006200                          ASR     R0              ;    THREE WHOLE PLACES
 9622  057254  020427  057540                  CMP     R4,#0.BUF+1     ;DONE?
 9623  057260  101365                          BHI     0.SPC           ;    NO
 9624  057262  042700  177776                  BIC     #177776,R0      ;GET LAST BIT
 9625  057266  062600                          ADD     (SP)+,R0                ;CONVERT TO ASCII
 9626  057270  110044                          MOVB    R0,-(R4)        ;AND PUT IT AWAY
 9627  057272  012703  057545                  MOV     #0.BUF+6,R3     ;LWA
 9628  057276  004537  057350                  JSR     5,0.TYPE        ;TYPE WHOLE STRING OF CHARACTERS
 9629  057302  012602                          MOV     (SP)+,R2        ;RESTORE R2
 9630  057304  000205                          RTS     R5
 9631
 9632                                  ;
 9633                                  ; GENERAL CHARACTER INPUT ROUTINE
 9634                                  ; CHARACTER INPUT GOES TO R0
 9635  057306  105737  177560          ;
 9636  057312  100375                  0.GET:  TSTB    0.RCSR          ;WAIT FOR
 9637  057314  113700  177562                  BPL     .-4             ;    INPUT FROM KEYBOARD
 9638  057320  004537  057364                  MOVB    0.RDB,R0        ;GET A CHARACTER
 9639  057324  042700  177600                  JSR     5,0.FTYP        ;ECHO CHARACTER
 9640  057330  001766                          BIC     #177600,R0      ;STRIP OFF PARITY FROM CHARACTER
 9641  057332  122700  000040                  BEQ     0.GET           ;IGNORE NULLS
 9642  057336  001763                          CMPB    #40,R0          ;CHECK FOR SPACES
 9643  057340  122700  000073                  BEQ     0.GET           ;IGNORE NULLS
 9644  057344  001760                          CMPB    #';,R0          ;CHECK FOR SEMI-COLON
 9645  057346  000205                          BEQ     0.GET           ;IGNORE THEM IF FOUND
 9646                                          RTS     R5
 9647                                  ;
 9648                                  ; GENERAL CHARACTER OUTPUT ROUTINE
 9649                                  ;  ADDRESS OF FIRST BYTE IN R4,
 9650                                  ;  ADDRESS OF LAST BYTE IN R3, (R3)>(R4)
 9651  057350  020304                  ;
 9652  057352  103426                  0.TYPE: CMP     R3,R4           ;CHECK FOR COMPLETION
 9653  057354  112400                          BLO     0.TYP1          ;  EXIT WHEN DONE
 9654  057356  004537  057364                  MOVB    (R4)+,R0        ;GET A CHARACTER
 9655  057362  000772                          JSR     5,0.FTYP        ;TYPE ONE CHARACTER
 9656                                          BR      0.TYPE          ;LOOP UNTIL DONE
 9657                                  ;
 9658                                  ; TYPE ONLY ONE CHARACTER (CONTAINED IN R0)
 9659  057364  105737  177564          ;
                                       0.FTYP: TSTB    0.TCSR          ;CHECK STATUS
```

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9660  057370  100375                  BPL     .-4             ;WAIT UNTIL READY
9661  057372  110037  177566          MOVB    R0,@TDB         ;TYPE ONE CHARACTER
9662  057376  120037  000045          CMPB    R0,@#45         ;IS CHAR TO BE FILLED?
9663  057402  001012                  BNE     0.TYP1          ;NO
9664  057404  113746  000044          MOVB    @#44,-(SP)      ;YES, INIT THE COUNT
9665  057410  105737  177564  0.TYP2: TSTB    @TCSR
9666  057414  100375                  BPL     0.TYP2
9667  057416  105037  177566          CLRB    @TDB            ;GENERATE NULL FILLER
9668  057422  105316                  DECB    @SP
9669  057424  003371                  BGT     0.TYP2
9670  057426  005726                  TST     (SP)+           ;POP STACK
9671  057430  000205          0.TYP1: RTS     R5
9672                          ;
9673                          ; CLOSE WORD OR BYTE AND EXIT.
9674                          ; UPON ENTERING, R2 HAS NUMERIC FLAG, R4 HAS CONTENTS
9675                          ;
9676  057432  006205          0.TCLS: ASR     R5              ;GET LOW ORDER BIT
9677  057434  103405                  BCS     0.TC            ;JUMP IF ALREADY CLOSED
9678  057436  006305                  ASL     R5
9679  057440  005702                  TST     R2              ;IF NO NUMBER WAS TYPED THERE IS
9680  057442  001401                  BEQ     0.CLS1          ;NO CHANGE TO THE OPEN CELL
9681  057444  010415                  MOV     R4,@R5          ;STORE WORD
9682  057446  000207          0.CLS1: RTS     PC
9683  057450  005746          0.TC:   TST     -(SP)           ;POP EXTRA CELL FROM STACK
9684  057452  000137  055754          JMP     0.ERR           ;AND SCREAM BLOODY MURDER
9685                          ;
9686                          ; 0.CRLF - TYPE <CR,LF>
9687                          ; 0.CRLS - TYPE <CR,LF>*
9688                          ;
9689  057456  012703  057513  0.CRLF: MOV     #0.CR+1,R3      ;LWA <CR,LF>
9690  057462  000402                  BR      0.CRS
9691  057464  012703  057514  0.CRLS: MOV     #0.CR+2,R3      ;LWA <CR,LF>*
9692  057470  012704  057512  0.CRS:  MOV     #0.CR,R4        ;FWA
9693  057474  004537  057350          JSR     5,0.TYPE        ;TYPE SOMETHING
9694  057500  000205                  RTS     R5
9695                          ;
9696  057502  000000  0.XXX:  .WORD   0               ;TEMPORARY STORAGE
9697  057504     000  0.T:    .BYTE   0               ;  T-BIT FLAG
9698  057505     000  0.P:    .BYTE   0               ;PROCEED FLAG = 0 IF PROCEED NOT ALLOWED
9699                                                  ;               = 1 IF PROCEED ALLOWED
9700  057506     000  0.CSR1: .BYTE   0               ;SAVE CELL - R C/SR
9701  057507     000  0.CSR2: .BYTE   0               ;SAVE CELL - T C/SR
9702                          ;
9703                          .EVEN
9704  057510  042502  0.BD:   .WORD   "BE
9705                          ;
9706  057512     015  0.CR:   .BYTE   015     ;  <CR>
9707  057513     012          .BYTE   012     ;  <LF>
9708  057514     052          .BYTE   '*      ;  *
9709                          ;
9710  057515     057  0.LGCH: .BYTE   '/     ;  /
9711  057516     015          .BYTE   015     ;  CARRIAGE RETURN
9712  057517     044          .BYTE   '$      ;  $
9713  057520     107          .BYTE   'G      ;  G
9714  057521     012          .BYTE   012     ;  <LF>
9715  057522     137          .BYTE   '_      ;  _
```

```
 9716  057523  136                    .BYTE   '↑      ;  ↑
 9717  057524  117                    .BYTE   'O      ;  O
 9718  057525  127                    .BYTE   'W      ;  W
 9719  057526  105                    .BYTE   'E      ;  E
 9720  057527  102                    .BYTE   'B      ;  B
 9721  057530  120                    .BYTE   'P      ;  P
 9722          000014          0.CLGT  =       .-0.LGCH                ;TABLE LENGTH
 9723                          ;
 9724  057531  123           0.TL:    .BYTE   'S      ;DO       1
 9725  057532  120                    .BYTE   'P      ;NOT      2
 9726  057533  115                    .BYTE   'M      ;CHANGE   3
 9727  057534  000                    .BYTE   0       ;THE      4
 9728  057535  000                    .BYTE   0       ;ORDER    5
 9729  057536  102                    .BYTE   'B      ;HERE     6
 9730          000006          0 LG    =       .-0.TL
 9731                          ;
 9732  057537                 0.BUF:                          ;6 CHAR. BUFFER WITH
 9733          057545                  =       .       ;+6
 9734  057545  040                    .BYTE   ' '             ;TRAILING BLANK
 9735                                  .EVEN
 9736                          ;
 9737  057546  000003         0.TRTC: TRT                     ;TRACE TRAP PROTOTYPE
 9738                          ;
 9739                          ;THE ORDER OF THE FOLLOWING ENTRIES IS CRITICAL
 9740                          ;
 9741          055440                  =       0.ODT-40
 9742  055440  000000         0.URO:  0       ;USER R0
 9743  055442  000000                 0       ;     R1
 9744  055444  000000                 0       ;     R2
 9745  055446  000000                 0       ;     R3
 9746  055450  000000                 0       ;     R4
 9747  055452  000000                 0       ;     R5
 9748  055454  000000         0.USP:  0       ;USER SP
 9749  055456  000000         0.JPC:  0       ;USER PC
 9750  055460  000000         0.UST:  0       ;USER ST
 9751  055462  000007         0.PRI:  7       ;ODT PRIORITY
 9752  055464  000000         0.MSK:  0       ;MASK
 9753  055466  000000                 0       ;LOW LIMIT
 9754  055470  000000                 0       ;HIGH LIMIT
 9755                          ;
 9756                          ; BREAK POINT LISTS, ADR1 = ADDRESS OF BREAKPOINT,CT = COUNT,
 9757                          ;   UIN = CONTENTS
 9758                          ;
 9759  055472  000000         0.ADR1: 0
 9760  055474  000000         0.CT:   0
 9761  055476  000000         0.UIN:  0
 9762          000001                 .END
```

```
ABASE = 177440            1889    1930    1944#
ACDW1 = 000000            1889    1932
ACDW2 = 000000            1889    1933
ACLO  = 000010            1245#
ACPUOP= 000000            1889    1904
ACT11   007470            2122#   3298*
ADDW0 = 000000            1889    1934
ADDW1 = 000000            1889    1935
ADDW10= 000000            1889
ADDW11= 000000            1889
ADDW12= 000000            1889
ADDW13= 000000            1889
ADDW14= 000000            1889
ADDW15= 000000            1889
ADDW2 = 000000            1889    1936
ADDW3 = 000000            1889    1937
ADDW4 = 000000            1889    1938
ADDW5 = 000000            1889    1939
ADDW6 = 000000            1889    1940
ADDW7 = 000000            1889    1941
ADDW8 = 000000            1889
ADDW9 = 000000            1889
ADEVCT= 000000            1889    1895
ADEVM = 000000            1889    1931
AENV  = 000000            1889    1900
AENVM = 000000            1889    1901
AFATAL= 000000            1889    1892
AMADR1= 000000            1889    1917
AMADR2= 000000            1889    1921
AMADR3= 000000            1889    1924
AMADR4= 000000            1889    1927
AMAMS1= 000000            1889    1911
AMAMS2= 000000            1889    1919
AMAMS3= 000000            1889    1922
AMAMS4= 000000            1889    1925
AMSGAD= 000000            1889    1897
AMSGLG= 000000            1889    1898
AMSGTY= 000000            1889    1891
AMTYP1= 000000            1889    1912
AMTYP2= 000000            1889    1920
AMTYP3= 000000            1889    1923
AMTYP4= 000000            1889    1926
APASS = 000000            1889    1894
APRIOR= 000000            1889
APTCSU= 000040            7279    7451#
APTENV= 000001            5976    7226    7272    7407    7449#
APTSIZ= 000200            3226    7448#
APTSP0= 000100            7274    7409    7450#
ASWREG= 000000            1889    1902
ATESTN= 000000            1889    1893
ATTN    007344            2055#   6183    6202    6228
AUNIT = 000000            1889    1896
AUSWR = 000000            1889    1903
AVECT1= 000000            1889    1928
AVECT2= 000000            1889    1929
BADHDR  007340            2045#   3306*   4020*   4151*   4418*   4608*   5708*   5923*   5926*   6935
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```
BADTMO  036570          3380    6989#
BAI     = 000020        1208#   4162    4311    4449    4519    4921    4981    5106    5268    5344    5469    5522    5642
                        5776    5821
BA16    = 000400        1194#
BA17    = 001000        1195#
BIT0    = 000001        1137#   1191    1223    1242    2112    3421    6880
BIT00   = 000001        1127#   1137
BIT01   = 000002        1126#   1136
BIT02   = 000004        1125#   1135
BIT03   = 000010        1124#   1134
BIT04   = 000020        1123#   1133
BIT05   = 000040        1122#   1132
BIT06   = 000100        1121#   1131
BIT07   = 000200        1120#   1130
BIT08   = 000400        1119#   1129    7161
BIT09   = 001000        1118#   1128    7169    7237
BIT1    = 000002        1136#   1224    2113
BIT10   = 002000        1117#   1196    1214    1233    1265    1279    1293    1306    1320    7214
BIT11   = 004000        1116#   1197    1215    1234    1251    1266    1280    1294    1307    1321    7176
BIT12   = 010000        1115#   1198    1216    1235    1267    1281    1295    1308    1322
BIT13   = 020000        1114#   1199    1217    1236    1252    1268    1282    1296    1309    1323    7221
BIT14   = 040000        1113#   1200    1218    1237    1253    1269    1283    1297    1310    1324    1334    6682    6693
                        7147
BIT15   = 100000        1112#   1201    1202    1219    1238    1254    1270    1337    5710    5870    6678    6689
BIT2    = 000004        1135#   1225    1244    2114
BIT3    = 000010        1134#   1207    1226    1245
BIT4    = 000020        1133#   1208    1227    1246    1259    1287    1314
BIT5    = 000040        1132#   1209    1228    1247    1260    1274    1288    1301    1315
BIT6    = 000100        1131#   1192    1210    1229    1248    1261    1275    1289    1302    1316
BIT7    = 000200        1130#   1193    1211    1230    1249    1262    1276    1290    1303    1317    3411    46[illegible]3    4723
                        4775    4872    5130
BIT8    = 000400        1129#   1194    1212    1231    1250    1263    1277    1291    1304    1318
BIT9    = 001000        1128#   1195    1213    1232    1264    1278    1292    130[illegible]    1319
BPTVEC= 000014          1144#
BSE     = 000200        1230#   4065    4172    4236    4462    4933    5278    547[illegible]
BSERR   001512          2028#   3929*   3934*   4011
BSE20H  002336          2037#   3950    6687    6792
BSE20S  004336          2039#   3959    6691    6796
BSE22H  003336          2038#   3870    3931    3968    6676    6781
BSE22S  005336          2040#   3941    6680    6785
BYP     033026          3497    3525    3529     544    3603    3630    3634    3638    3642    6255#
BYPCER  001516          2030#   3408*   3655*   6370
CALADD  001362          1971#   4134*   4421*   4591*   5879*   6649    6655    6657    6711
CALDIF  001354          1968#   5768*   8923    8947
CCLR    = 100000        1202#   3835    3850    4075    4182    4472    4693    4703    4943    5095    5163    5178    5254
                        5288    5404    5419    5579    5594    6410    6418    6426    6434    6939    6954
CCYL    001350          1966#
CDT     = 002000        1196#   3512    3613    3694    3696
CERR    = 100000        1201#   3476    3587    3881    3986    4038    4062    4144    4169    4234    4320    4433    4459
                        4528    4601    4745    4802    4865    4930    4989    5275    5352    5476    5529    5661    5733
                        5755    5788    5833    5889    5913    6372    6467
CFMT    = 010000        1198#   4427    4430    4453    4456    4494    4522    4525    4557    6778
CHKFLG  001520          2031#   6265*   6348    6351    6355
CHKMSG  033042          3893    4087    4106    4194    4213    4260    4277    4339    4358    4392    4484    4511    4547
                        4574    4644    4665    4714    4766    4829    4955    4974    5008    5027    5066    5087    5225
                        5246    5300    5319    5371    5390    5494    5513    5548    5567    56[illegible]3    5802    5847    6265#
```

```
CKCERR  033602  6133  6137  6148  6153  6370#
CKSWR = 104407  7146  7210  7236  8111#
CLEAR = 000005  1179#  3852  4695  5097  5180  5256  5421  5596  6956
CLKOF   036134  6851#
CLKON   036040  6829#
CLOCK   036100  3329  6840#
CLRFLG  031666  3247  5988#
COE   = 001000  1232#
COUNT   001366  1975#  6841*  6843*
CR    = 000015  1052#  7318  7328  8123  8131  8133  8137  8147  8156  8163  8171  8176  8181
                8186  8192  8198  8204  8208  8214  8219  8226  8235  8240  8245  8251  8253
                8257  8263  8271  8281  8286  8293  8297  8299  8303  8307  8315  8319  8327
                8335  8341  8349  8355  8362  8367  8370  8376  8394  8402  8477  8504  8511
                8517  8522  8534  8554
CRLF  = 000200  1053#  7289  7328
CTO   = 004000  1197#  6376
CYL     001422  1992#  5462
CYLADD  001360  1970#  4672  4846  5331  5808  5853  6525*  6526*  6527*  6528*  6529*  6530*  6548*
                6549*  6550*  6551*  6552*  6553*
CYLDIF  001356  1969#  4676*  4682  4687  4720*  4726  4731  4772*  4778  4783  4850  5328  6490*
                6491*  6492*  6493*  6494*  6495*  6496  6498*  6516*  6517*  6535*  6536*  6537*  6538*
                6539*  6540*  6541  6543*
CYL7    001436  1999#  5460
DATAO   001474  2019#  4160  4161  4295  4371  5267  5343  5357
DATAO1  001476  2020#  5641
DATAI   001500  2021#  4054  4299  4300  4312  4325  4448  4518  4533  4920  4980  4994  5105
                5775  5820
DATCMD  032262  3878  4035  4059  4141  4166  4231  4317  4375  4428  4454  4523  4598  4800
                4927  4986  5110  5272  5349  5473  5526  5730  5780  5825  5886  6113#
DCK   = 100000  1238#  4243
DCLO  = 000020  1246#
DCPAR = 020000  1139#
DDISP = 177570  1059#  1864  3214
DDPCH   007466  2121#  3294*  3484  3687
DDT   = 000400  1250#
DDUMP   007464  2120#  3260*  5988
DF1     054534  2162  2168  2174  2180  2191  2197  2203  2429  2469  2474  2514  8999#
DF10    054664  2208  2213  2218  2223  2228  2238  2248  2253  2263  2279  2299  2304  2339
                2349  2354  2389  2419  2424  2464  2494  2499  2554  2559  2564  2569  2584
                2609  2614  2639  2689  2704  2790  2810  2815  2865  2935  2970  3006  9050#
DF14    054704  2335  9059#
DF15    054724  2519  2800  2805  2825  2830  2940  9069#
DF17    054744  2945  2950  2960  2965  9078#
DF2     054550  2329  9006#
DF20    054770  2369  9088#
DF21    055014  2258  2268  2273  2284  2289  2294  2309  2314  2319  2324  2374  2379  2384
                2394  2399  2404  2409  2414  2644  2649  2654  2659  2910  2915  3066  3071
                3091  3096  3101  3106  3111  3116  3121  3126  3131  3136  3141  3146  3151
                3156  9099#
DF22    055050  2334  2359  2364  2489  2504  2509  2544  2549  2574  2579  9114#
DF23    055104  9129#
DF3     054554  2233  2243  9009#
DF4     054600  2344  9020#
DF5     054614  2589  2594  2599  9027#
DF6     054640  2534  2539  2860  3001  9038#
DH1     051647  2160  2166  2172  2178  2189  2195  2201  2342  2427  2467  2472  2512  2833
```

		8713#	9011	9031	9040	9052	9071	9082	9090	9101	9116	9131	
DH10	052134	2462	2808	2813	8746#								
DH11	052163	8750#	9013										
DH13	052200	2943	8753#										
DH14	052264	2948	8762#										
DH17	052350	2357	2362	2387	2582	2908	2913	3129	3134	8771#			
DH19	052374	2277	2552	8775#									
DH2	051664	8716#	9001	9015	9022	9033	9044	9054	9063	9073	9084	9094	9109	9124
		9139												
DH20	052417	2557	8779#											
DH21	052452	2261	2562	8784#										
DH22	052500	2337	2547	2687	2702	3089	3094	3119	3124	8788#				
DH24	052532	2297	2302	2317	2322	2332	2542	3064	3069	8793#				
DH25	052557	2367	2607	2612	2637	2858	2863	2999	8797#					
DH26	052602	2216	2221	2241	2246	2271	2282	2382	2392	2933	2938	8801#		
DH27	052632	2206	2211	2256	2266	2352	2372	2377	2417	2492	2517	2532	2537	8805#
DH28	052663	8810#	9103	9118	9133									
DH29	052673	8812#	9107	9122	9137									
DH3	051734	8723#	9003	9017	9024	9035	9046	9056	9065	9075	9086	9096	9111	9126
		9141												
DH30	052703	2572	2788	2798	2803	3109	3114	3149	3154	8814#				
DH31	052735	8819#	9105	9120	9135									
DH32	052762	2226	2231	2251	2287	2292	2397	2402	2497	8823#				
DH39	053014	2823	2828	3099	3104	3139	3144	8828#						
DH40	053047	8833#	9061											
DH41	053103	3004	8838#											
DH42	053130	2958	8842#											
DH43	053201	2963	8849#											
DH44	053252	2968	8856#	9080										
DH47	053331	2487	8864#											
DH49	053401	8871#	9029											
DH51	053456	2347	2577	2642	2647	2652	2657	8879#						
DH52	053511	2236	8884#											
DH53	053545	2307	2312	2407	2412	8889#								
DH54	053573	2422	8893#											
DH56	053645	8901#	9092											
DH57	053671	2502	2507	8905#										
DH6	052005	8730#	9042											
DH8	052040	2327	8735#											
DH9	052061	2567	8738#											
DI =	040000	1200#												
DISPLA	001142	1864#	3214*	3222*	7191*	7213*								
DISPRE	000174	1346#	3222											
DLT =	100000	1219#	4813											
DLY	033010	3472	3583	5652	6246#	6249								
DMD =	000040	1260#												
DOCMD	032224	3795	3838	3853	3979	4431	4457	4495	4526	4558	4636	4696	4738	4858
		5058	5098	5166	5181	5217	5257	5407	5422	5582	5597	5748	5906	6102#
		6400	6925	6942	6957									
DOTIM	007522	2140#	3328*	3337*	5629									
DPAT1	001502	2022#	5468	5521	5534									
DPAT2	001504	2023#												
DRA =	000001	1242#	3519	3620										
DRDY =	000200	1249#												
DRIVS	007474	2124#	3416*	3423*	3440	3456*	3486*	3505	3607*	3674	5943	6043*		
DRIVO	007476	2129#	3310	3418	3458	3569	6026							

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DRIV1   007500          2130#
DRIV2   007502          2131#
DRIV3   007504          2132#
DRIV4   007506          2133#
DRIV5   007510          2134#
DRIV6   007512          2135#
DRIV7   007514          2136#
DROT  = 000040          1247#
DRPAR = 000010          1226#
DRVMSK= 000007          1206#  3479   3590
DRVPTR  001342          1962#  3310*  3679   3697*
DSC   = 040000          1253#
DSWR  = 177570          1058#  1863   3213
DTE   = 010000          1235#
DTYE  = 000040          1228#  3510   3611
DT1     053732          2161   2167   2173   2179   2190   2196   2202   2207   2212   2217   2222   2227   2237
                        2247   2252   2262   2278   2298   2303   2338   2343   2348   2353   2388   2418   2423
                        2428   2463   2468   2473   2493   2498   2513   2518   2553   2558   2563   2568   2583
                        2588   2593   2598   2608   2613   2638   2688   2703   2789   2799   2804   2809   2814
                        2824   2829   2864   2934   2939   2944   2949   2959   2964   2969   3005   8915*
DT13    054270          2257   2267   2272   2283   2288   2293   2308   2313   2318   2323   2373   2378   2383
                        2393   2398   2403   2408   2413   2643   2648   2653   2658   2909   2914   3065   3070
                        3090   3095   3100   3105   3110   3115   3120   3125   3130   3135   3140   3145   3150
                        3155   8963*
DT14    054350          2333   2358   2363   2488   2507   2508   2543   2548   2573   2578   8973*
DT15    054440          8984*
DT3     053772          2328   8922*
DT4     053776          2533   2538   2859   8923*
DT6     054044          2232   2242   8931*
DT7     054110          2834   8939*
DT8     054156          3000   8947*
DT9     054224          2368   8955*
D.ACLO= 000100          1302#
D.BRHM= 000100          1289#  3887   4081   4100   4188   4207   4254   4271   4333   4352   4386   4478   4505
                        4541   4568   4641   4659   4711   4760   4823   4949   4968   5002   5021   5063   5081
                        5222   5240   5294   5313   5365   5384   5488   5507   5542   5561   5667   5796   5841
D.CART= 000400          1291#  3887   4081   4100   4188   4207   4254   4271   4333   4352   4386   4478   4505
                        4541   4568   4641   4659   4711   4760   4823   4949   4968   5002   5021   5063   5081
                        5222   5240   5294   5313   5365   5384   5488   5507   5542   5561   5667   5796   5841
D.DDT = 000400          1277#  3718
D.DOOR= 000200          1290#  3887   4081   4100   4188   4207   4254   4271   4333   4352   4386   4478   4505
                        4541   4568   4641   4659   4711   4760   4823   4949   4968   5002   5021   5063   5081
                        5222   5240   5294   5313   5365   5384   5488   5507   5542   5561   5667   5796   5841
D.DRA = 000040          1274#  3885   4079   4098   4186   4205   4252   4269   4331   4350   4384   4476   4503
                        4539   4566   4639   4657   4709   4758   4821   4947   4966   5000   5019   5061   5079
                        5220   5238   5292   5311   5363   5382   5486   5505   5540   5559   5665   5794   5839
D.DRDY= 000200          1276#  3885   4079   4098   4186   4205   4252   4269   4331   4350   4384   4476   4503
                        4539   4566   4657   4709   4758   4821   4947   4966   5000   5019   5079   5238   5292
                        5311   5363   5382   5486   5505   5540   5559   5665   5794   5839
D.DROT= 020000          1309#  5784   5829
D.DSC = 040000          1283#  4657   4758   5079   5238
D.FLT = 000200          1303#
D.FORM= 001000          1278#  4497   4560
D.FWD = 002000          1293#
D.HDFL= 000200          1317#
D.HDHM= 000040          1288#  6605
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D.IDAE= 000040          1301#
D.ILF = 000400          1304#
D.LIMD= 020000          1323#
D.LOAD= 010000          1295#   6622
D.MHD = 000400          1318#
D.NMOV= 010000          1322#
D.OFF = 002000          1279#   4639    4657    4705    4709    4752    4758    4842    5061    5079    5220    5238
D.PAR = 001000          1305#
D.PIP = 020000          1282#   4639    5061    5220
D.PLO = 004000          1321#
D.REV = 004000          1294#
D.RTZ = 020000          1296#   3843    5171    5412    5587    6947
D.SECT= 000020          1314#
D.SKI = 002000          1306#
D.SPIN= 010000          1281#   3885    4079    4098    4186    4205    4252    4269    4331    4350    4384    4476    4503
                        4539    4566    4639    4657    4709    4758    4821    4947    4966    5000    5019    5061    5079
                        5220    5238    5292    5311    5363    5382    5486    5505    5540    5559    5665    5794    5839
D.SPLS= 010000          1308#
D.SPOK= 001000          1292#   3887    4081    4100    4188    4207    4254    4271    4333    4352    4386    4478    4505
                        4541    4568    4641    4659    4711    4760    4823    4949    4968    5002    5021    5063    5081
                        5222    5240    5294    5313    5365    5384    5488    5507    5542    5561    5667    5796    5841
D.SSP = 000020          1287#   3887    4081    4100    4188    4207    4254    4271    4333    4352    4386    4478    4505
                        4541    4568    4641    4659    4711    4760    4823    4949    4968    5002    5021    5063    5081
                        5222    5240    5294    5313    5365    5384    5488    5507    5542    5561    5667    5796    5841
D.SUNS= 040000          1324#
D.TIB = 002000          1320#
D UNLD= 040000          1297#
D.UNS = 040000          1310#
D.VV  = 000100          1275#   3785    3798    3885    4079    4098    4186    4205    4252    4269    4331    4350    4384
                        4476    4503    4539    4566    4639    4657    4709    4758    4821    4947    4966    5000    5019
                        5061    5079    5220    5238    5292    5311    5363    5382    5486    5505    5540    5559    5665
                        5794    5839
D.WCUR= 000040          1315#
D.WGAT= 000100          1316#
D.WLE = 004000          1307#
D.WRL = 004000          1280#
D.XERR= 001000          1319#
ECCW  = 020000          1268#
ECH   = 000100          1229#
EMTVEC= 000030          1147#   3197*   3198*
EM1     046137          6052    8376#
EM10    046713          2194    8442#
EM100   051560          2531    8700#
EM101   051615          2571    8705#
EM11    046776          2200    8451#
EM12    047042          2205    2215    2225    2296    2551    2556    2561    2566    2581    2606    2686    2787    2822
                        2932    8457#
EM13    047100          2301    2386    2461    2611    8462#
EM14    047122          2326    8465#
EM15    047160          2341    8470#
EM16    047267          2942    2947    2957    2962    8483#
EM17    047332          2306    2371    2381    2396    2641    2907    3063    3118    3138    3148    8489#
EM18    047353          2255    2270    2286    2406    2646    3068    3088    3098    3108    3128    8492#
EM19    047374          2311    2316    2376    2391    2401    2651    2912    3123    3143    3153    8495#
EM2     046213          2159    8384#
EM20    047415          2265    2281    2291    2321    2411    2656    3093    3103    3113    3133    8498#
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EM21    047436  2210    2220    2250    2260    2802    2827    2862    2937    8501#
EM22    047460  2466    8504#
EM23    047565  2471    8517#
EM24    047665  2276    8529#
EM25    047720  2351    8534#
EM26    047772  2416    8541#
EM27    050051  2426    8549#
EM3     046303  6993    8394#
EM36    050170  2536    2857    2998    8563#
EM39    050233  2356    2501    2636    2807    8569#
EM4     046356  8402#
EM40    050302  2361    2506    2812    8576#
EM41    050340  2331    8581#
EM5     046432  2165    2596    8410#
EM55    050406  2701    8588#
EM6     046453  2171    8413#
EM63    050441  2797    8593#
EM65    050462  2832    8596#
EM69    050504  2967    8599#
EM7     046474  2177    8416#
EM73    050535  2586    8604#
EM74    050556  3003    8607#
EM79    050603  2591    8611#
EM8     046563  8426#
EM80    050624  2230    8614#
EM81    050663  2235    8620#
EM82    050727  2240    8627#
EM83    051001  2245    8635#
EM84    051036  2587    2592    2597    8640#
EM85    051127  2336    2346    8650#
EM86    051172  2541    2546    2576    8656#
EM88    051230  2421    8661#
EM9     046637  2188    8434#
EM93    051271  2366    8667#
EM94    051352  2486    8676#
EM95    051406  2491    2496    8681#
EM96    051442  2511    8686#
EM97    051473  2516    8691#
ERRVEC= 000004  1140#  3211    3212#   3223#   3230#   3231#   3244#   3245#   3313#   3317#   3324#   3362#   3380#
                3381#   7152    7153#   7155#   7158#
ESEC    001400  1981#
E.A0    007444  2101#  3885#   4079#   4098#   4186#   4205#   4252#   4269#   4331#   4350#   4384#   4476#   4503#
                4539#  4566#   4639#   4657#   4709#   4758#   4821#   4947#   4966#   5000#   5019#   5061#   5079#
                5220#  5238#   5292#   5311#   5363#   5382#   5486#   5505#   5540#   5559#   5665#   5794#   5839#
                6269#  6273#   6277    6279#   6308    8963    8973    8984
E.A1    007450  2103#  3887#   4081#   4100#   4188#   4207#   4254#   4271#   4333#   4352#   4386#   4478#   4505#
                4541#  4568#   4641#   4659#   4711#   4760#   4823#   4949#   4968#   5002#   5021#   5063#   5081#
                5222#  5240#   5294#   5313#   5365#   5384#   5488#   5507#   5542#   5561#   5667#   5796#   5841#
                6270#  6281    6283#   6328    8963    8973    8984
E.A2    007454  2105#  3889#   4083#   4102#   4190#   4209#   4256#   4273#   4335#   4354#   4388#   4480#   4507#
                4543#  4570#   4661#   4762#   4825#   4951#   4970#   5004#   5023#   5083#   5242#   5296#   5315#
                5367#  5386#   5490#   5509#   5544#   5563#   5669#   5798#   5843#   6271#   6285    6287#   8973
                8984
E.A3    007460  2107#  6272#
E.B0    007446  2102#  3886#   4080#   4099#   4187#   4206#   4253#   4270#   4332#   4351#   4385#   4477#   4504#
                4540#  4567#   4640#   4658#   4710#   4759#   4822#   4948#   4967#   5001#   5020#   5062#   5080#
```

```
                        5221*   5239*   5293*   5312*   5364*   5383*   5487*   5506*   5541*   5560*   5666*   5795*   5840*
                        6289    6291*   6318    8963    8973    8984
E.B1    007452          2104#   3888*   4082*   4101*   4189*   4208*   4255*   4272*   4334*   4353*   4387*   4479*   4506*
                        4542*   4569*   4642*   4660*   4712*   4761*   4824*   4950*   4969*   5003*   5022*   5064*   5082*
                        5223*   5241*   5295*   5314*   5366*   5385*   5489*   5508*   5543*   5562*   5668*   5797*   5842*
                        6293    6295*   6338    8963    8973    8984
E.B2    007456          2106#   3890*   4084*   4103*   4191*   4210*   4257*   4274*   4336*   4355*   4389*   4481*   4508*
                        4544*   4571*   4662*   4763*   4826*   4952*   4971*   5005*   5024*   5084*   5243*   5297*   5316*
                        5368*   5387*   5491*   5510*   5545*   5564*   5670*   5799*   5844*   6297    6299*   8973    8984
E.B3    007462          2108#   3891*   4085*   4104*   4192*   4211*   4258*   4275*   4337*   4356*   4390*   4482*   4509*
                        4545*   4572*   4663*   4764*   4827*   4953*   4972*   5006*   5025*   5085*   5244*   5298*   5317*
                        5369*   5388*   5492*   5511*   5546*   5565*   5671*   5800*   5845*   6301    6303*   8984
E.DDT   015444          3711*   3718*   3728#   6273
FATT1   032634          3847    5175    5416    5591    6199#   6929    6951
FATT2   032730          3983    4653    4742    4862    5075    5234    5752    5910    6226#
FHDHM   035070          6602#   6610
FHDTAB  035212          4137    4424    4594    5882    6635#
FLGTST  035472          6677    6681    6688    6692    6704#
FLOAD   035144          6619#
FMTE  = 000020          1227#
FMT1    001470          2016#   6645*   6646*   6647*   6652
FORM    031174          5773    5865    5868#   6965
FORMAT  001466          2015#   4136*   4423*   4593*   5881*   6645    6674
FRCYL   001344          1964#   5763*   8923    8947
FRDY    032320          3451    3465    3474    3576    3585    5656    6105    6116    6128#   6131    6462
FRDY1   032366          6142#   6145    6448
FSEC23  035000          5637    6578#
FTITLE  001340          1960#   5999    6001*
GBA     032126          3280    6066#
GDRVS   031766          3278    6021#
GINT    032154          3282    6079#
GNS   = ****** U        1345    8103    8104    8105    8106    8107    8109    8111    8112    8113    8114    8115    8116
                        8117
GO    = 000001          1191#
GSTAT   033664          3749    3842    3880    4037    4061    4143    4168    4233    4319    4377    4600    4704    4815
                        4929    4988    5112    5170    5274    5327    5351    5411    5475    5528    5586    5658    5732
                        5783    5828    5888    6209    6213    6233    6237    6397#   6466    6477    6489    6524    6604
                        6621    6946
GSTAT1  033720          6267    6408#
GSTAT2  034150          6413    6421    6429    6436    6444#
GTSWR = 104406          6010    8109#
HASOF   007372          2072#   6167*   6183    8919    8928    8936    8944    8952    8960    8970    8981    8993
HBA     007362          2068#   6163*   8919    8928    8936    8944    8952    8960    8970    8981    8993
HCS1    007354          2065#   3468*   3469*   3470    3476    3579*   3580*   3581    3587    3794*   3837*   3852*   3877*
                        3881    3978*   3986    4034*   4038    4058*   4062    4140*   4144    4165*   4169    4230*   4234
                        4316*   4320    4374*   4427*   4430*   4433    4453*   4456*   4459    4494*   4522*   4525*   4528
                        4557*   4597*   4601    4635*   4695*   4737*   4745    4799*   4802    4857*   4865    4926*   4930
                        4985*   4989    5057*   5097*   5109*   5165*   5180*   5216*   5256*   5271*   5275    5348*   5352
                        5406*   5421*   5472*   5476    5525*   5529    5581*   5596*   5645*   5646*   5647    5661    5729*
                        5733    5747*   5755    5779*   5788    5824*   5833    5885*   5889    5905*   5913    6102*   6103
                        6113*   6114    6160*   6372    6376    6399*   6444*   6445*   6446    6467    6506*   6507*   6508
                        6778    6924*   6941*   6956*   8916    8925    0933    8941    8949    8957    8967    8978    8990
HCS2    007356          2066#   3515    3517    3521    3533    3616    3618    3622    3625    4322    4378    4530    4991
                        5113    5354    5531    6161*   6381    6385    8916    8925    8933    8941    8949    8957    8967
                        8978    8990
HDA     007364          2069#   6164*   6821    8919    8928    8936    8944    8952    8960    8970    9981    8993
```

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HDB     007376          2074#
HDC     007374          2073#  6168*  6813   8919   8928   8936   8944   8952   8960   8970   8981   8993
HDS     007366          2070#  3519   3620   6165*  8916   8925   8933   8941   8949   8957   8967   8978   8990
HDTAB   001522          2033#  4022   4028   4031   4130   4415   4586   5715   5722   5725   5875   6637
HDWD    001510          2026#  8939
HD1     001464          2014#  6639*  6640*  6641*  6642*  6643*  6644*  6651
HEAD    001460          2012#  4135*  4422*  4592*  5860*  6639   6716
HEADA   001462          2013#  6568*  6569*  6570*  6571*
HER     007370          2071#  3510   3611   4065   4172   4236   4243   4462   4933   5278   5479   6166*  8916
                        8925   8933   8941   8949   8957   8967   8978   8990
HMR1    007400          2075#  6169*  8916   8925   8933   8941   8949   8957   8967   8978   8990
HMR2    007402          2076#  3478   3589   3750   3785   3798   3843   4497   4560   4705   4752   4842   5171
                        5412   5587   6146*  6151*  6170*  6415   6423   6431   6438   6490   6605   6622   6947
                        8916   8925   8933   8941   8949   8957   8967   8978   8990
HMR3    007404          2077#  5784   5829   6147*  6152*  6171*  6416   6424   6432   6439   6478   6525   8916
                        8925   8933   8941   8949   8957   8967   8978   8990
HOLD    032454          6132   6136   6160#  6409
HPAT    007410          2079#  6173*  8919   8928   8936   8944   8952   8960   8970   8981   8993
HPEND   007342          2047#  3307*  5920   5922*  6937*
HPOS    007406          2078#  6172*  8919   8928   8936   8944   8952   8960   8970   8981   8993
HT    = 000011          1050#  7287   7328
HVRC  = 000400          1231#
HWC     007360          2067#  6162*  8919   8928   8936   8944   8952   8960   8970   8981   8993
HZ      001364          1973#  6843
H.A0    007424          2090#  6308   6438*  8963   8976   8987
H.A1    007430          2092#  6328   6431*  8963   8976   8987
H.A2    007434          2094#  6423*  6535   8976   8987
H.A3    007440          2096#  6415*
H.B0    007426          2091#  6318   6439*  8963   8976   8987
H.B1    007432          2093#  6338   6432*  8963   8976   8987
H.B2    007436          2095#  6424*  6548   8976   8987
H.B3    007442          2097#  6416*  6558   6568   8987
IDAE  = 002000          1233#
IE    = 000100          1192#
ILF   = 000001          1223#
INTER   036720          6094   7033#
IOTVEC= 000020          1145#  3195*  3196*
IR    = 000100          1210#
LC      015434          3710*  3717*  3724#  3875
LCLKF   007516          2138#  3315*
LCVEC   001330          1952#  3316
LF    = 000012          1051#  7322   7328   8123   8131   8133   8137   8147   8156   8163   8171   8176   8181
                        8186   8192   8198   8204   8208   8214   8219   8226   8235   8240   8245   8251   8253
                        8257   8263   8271   8281   8286   8293   8297   8299   8303   8307   8315   8319   8327
                        8335   8341   8349   8355   8362   8367   8370   8376   8394   8402   8477   8504   8511
                        8517   8522   8534   8554
LIMERR  001514          2029#
LKS     001326          1950#  3314   6832*  6853*
MASK    015440          3713#  3720*  3726#  6496   6541
MASK1   015442          3714#  3721*  3727#  6491   6517   6526   6536   6549
MCLK  = 000400          1263#
MCI     015436          3712#  3719*  3725#  5743   5864   5899
MDS   = 001000          1213#  3515   3616   6385
MEMBAS= 172100          1956#  3233   3242
MEMERR  036656          3236   7019#
MEMPAR  013056          3230#
```

```
MEMVEC= 000114          1955*   3236*   3237*
MERD   = 001000          1264*
MESMSK= 000017          1258*
MEWD   = 002000          1265*
MIND   = 000200          1262*
MSG1    043420          6002    8123*
MSG10   044713          3415    3455    8253*
MSG11   044740          7066    8257*
MSG12   045000          5193    8263*
MSG13   045145          3338    8281*
MSG14   045243          6255    8293*
MSG15   045266          3535    3698    8297*
MSG16   045300          3747    8299*
MSG17   045324          3967    8303*
MSG2    044307          3261    8204*
MSG26   045354          4014    4041    4093    4147    4200    4240    4345    4436    4490    4553    4604    4805    4817
                        4961    5014    5306    5377    5500    5554    5736    5892    8307*
MSG27   045432          3676    8315*
MSG3    044370          3277    8214*
MSG37   045462          5145    8319*
MSG38   045540          5158    8327*
MSG39   045620          5121    8335*
MSG4    044422          3279    8219*
MSG40   045662          4013    8341*
MSG5    044467          3281    8226*
MSG6    044550          7038    8235*
MSG7    044604          3296    8240*
MSG74   045775          6916    8355*
MSG75   046043          6918    8362*
MSG76   046100          6969    8367*
MSG77   046122          6974    8370*
MSG8    044641          5034    8245*
MSG9    044700          5038    8251*
MSP    = 000100          1261*
MULT6   035656          6736    6762*
M.ALGN= 040000          1334*
M.DPID  037042          7081*
M.DP40  037100          7092*   7114
M.DP41  037134          7097    7105*
M.DP42  037144          7103    7109*
M.DP44  037176          7116    7122*
M.DP50  037210          7090    7127*
M.DRV  = 000007          1328*
M.HEAD= 007000          1336*   6569
M.ID   = 000003          1333*
M.PAR  = 100000          1337*   6882
M.SECT= 000760          1335*   6479    6559
M.SER  = 077770          1329*
NED    = 010000          1216*   3521    3533    3622    3625    6381
NEM    = 004000          1215*
NUDRV   015146          3547    3655*   5945
NXF    = 000004          1225*
OFFERR  001456          2009*   5046*   5117*   5119    5135    5143    5152    5156
OFFSET= 000015          1183*   4635    5057    5216
OFST   = 000004          1244*
OPI    = 020000          1236*
```

```
OP     = 000200            1211#
0.ADR1   055472            9274*  9325*  9327*  9497   9498*  9536*  9551   9568   9759#
0.BACK   056216            9369   9410#
0.BD     057510            9555   9556   9704#
0.BKPT   055724            9320#  9373
0.BK1    056656            9268   9533#
0.BK2    056712            9538   9541#
0.BK3    056730            9540   9547#
0.BRK    056646            9285   9531#
0.BUF    057537            9613   9622   9627   9732#
0.B2     057012            9552   9561#
0.B3     057052            9560   9569#
0.CADV   057222            9386   9403   9426   9430   9460   9464   9569   9612#
0.CLGL   056040            9343   9345   9353#
0.CLGT=  000014            9357   9722#
0.CLS1   057446            9680   9682#
0.CR     057512            9689   9691   9692   9706#
0.CRET   056152            9264   9393#
0.CRLF   057456            9401   9458   9554   9593   9598   9689#
0.CRLS   057464            9338   9691#
0.CRS    057470            9690   9692#
0.CSR1   057506            9589*  9605   9700#
0.CSR2   057507            9590*  9606   9701#
0.CT     055474            9518*  9561*  9563*  9760#
0.C1     056624            9521#  9562
0.DCD    055770            9326   9328   9338#  9395   9446   9571
0.DCD1   055774            9339#  9387   9431
0.EFF    056300            9372   9437#
0.EFF1   056416            9449   9468#
0.ENTR   055504            9265#
0.ERR    055754            9312   9323   9335#  9358   9383   9441   9684
0.ERR1   056310            9441#  9514
0.ERR2   056130            9383#  9417   9490
0.FTYP   057364            9337   9405   9420   9462   9567   9638   9654   9659#
0.GET    057306            9291   9341   9635#  9640   9642   9644
0.GO     056462            9366   9488#
0.GO2    056540            9499#  9524
0.LG   = 000006            9295   9730#
0.LGCH   057515            9354   9710#  9722
0.LGDR   056070            9361   9363#  9375
0.LGL  = 000030            9375#
0.LGL1   056042            9354#  9359
0.LGL2   056062            9355   9360#
0.MSK    055464            9442   9443   9445   9752#
0.ODT    055500            1354   9263#  9741
0.OFST   056226            9370   9416#
0.OF1    056274            9429   9431#
0.OP1    056164            9367   9399#
0.OP2    056172            9316   9401#  9412
0.ORPC   055676            9308#  9368
0.P      057505            9283*  9488*  9513   9515*  9564*  9698#
0.PRI    055462            9275   9537   9541   9751#
0.PROC   056570            9374   9513#
0.PR1    056612            9517   9519#
0.RALL   055744            9286   9321   9327#
0.RCSR=  177560            9253#  9589   9591*  9601   9603   9605*  9635
```

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0.RDB  = 177562          9252#   9637
0.REGT   055626          9291#   9365
0.RSE1   057204          9602    9605#
0.RSP    055636          9293#   9296
0.RST    055542          9264    9273#
0.RSTT   057154          9494    9520    9598#
0.RST1   055572          9272    9280#
0.RTIT   056566          9282*   9508#
0.SCAN   056000          9302    9341#   9352
0.SP     055670          9294    9303#
0.SPC    057234          9615#   9623
0.SP1    055656          9299#   9304
0.STM  = 000340          9242#   9284    9493    9519    9521
0.STRT   055530          9263    9270#
0.SVR    057064          9273    9533    9575#
0.SVTT   057122          9553    9565    9589#
0.T      057504          9495*   9522*   9534    9697#
0.TBIT   056512          9495#   9535
0.TBT  = 000020          9243#   9496    9523    9559
0.TC     057450          9677    9683#
0.TCLS   057432          9308    9393    9399    9410    9676#
0.TCSR=  177564          9255#   9590    9592*   9599    9606*   9659    9665
0.TDB  = 177566          9254#   9661*   9667*
0.TL     057531          9292    9295    9303    9724#   9730
0.TRTC   057546          9327    9498    9737#
0.TVEC=  000014          9241#   9266    9284*   9285*
0.TYPE   057350          9557    9628    9651#   9655    9693
0.TYP1   057430          9652    9663    9671#
0.TYP2   057410          9665#   9666    9669
0.UIN    055476          9274    9497*   9536    9761#
0.UPC    055456          9267*   9492*   9507    9531*   9548    9550*   9749#
0.URO    055440          9270    9300    9742#
0.USP    055454          9271*   9576*   9577    9748#
0.UST    055460          9265*   9496*   9506    9523*   9532*   9539    9559*   9750#
0.WDS    056306          9438    9440#
0.WDS2   056324          9445#   9467
0.WDS3   056354          9456#   9469    9475    9484
0.WDS4   056412          9456    9466#
0.WRD    056120          9363    9379#
0.WRDA   056144          9380    9388#
0.WRD1   056126          9382#   9389    9406
0.WSCH   056304          9371    9439#
0.XXX    057502          9575*   9583    9696#
0.45     055604          9281    9283#
PACK   = 000003          1178#   3794
PARAM    001336          1959#   3161*   3164*   3274
PARSRT   012546          1351    3161#
PAT    = 000020          1259#
PCA    = 004000          1266#
PCD    = 010000          1267#
PCLKF    007520          2139#   3319*   3326*   6830    6851
PCVEC    001332          1953#   3320    3327
PCYL     001352          1967#
PFSRT    015446          3730#   7068
PGE    = 002000          1214#
PIP    = 020000          1252#
```

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PIRQ   = 177772            1057#
PIRQVE= 000240             1151#
PKRB    001324             1949#
PKS     001320             1947#   3318    3325    6835*   6855*
PKSB    001322             1948#   6834*
PPTP    007472             2123#   3265*
PRGSRT  012562             3162    3165#   6053
PR0    = 000000            1074#   3167    3357
PR1    = 000040            1075#
PR2    = 000100            1076#
PR3    = 000140            1077#
PR4    = 000200            1078#
PR5    = 000240            1079#   1946
PR6    = 000300            1080#   3330
PR7    = 000340            1081#   3231    3237    3381    7063    7064
PS     = 177776            1054#   1055
PSEC    001376             1980#
PSW    = 177776            1055#
PWRVEC= 000024             1146#   320.*   3e0e*   7053*   7062*   7063*
QKCYLD  034430             6504#
RCYLA   034656             6353    6548#
RCYLD   034604             6350    6535#
RDCHR  = 104410            7730    8112#
RDCYLA  034534             6523#
RDCYLD  034344             6488#
RDDATA= 000021             1185#   3877    4230
RDGATE= 100000             1270#
RDHEAD= 000025             1187#   4799
RDLIN  = 104411            6021    7804    8113#
RDOCT  = 104412            6066    6079    8114#
RDSEC   034274             6476#   6579    6583    6586    6734
RDTAB   006336             2041#   4226    4284    4292
RDY    = 000200            1193#   5654    6128    6142    6510
RECAL  = 000013            1182#   3837    5165    5406    5581    6941
RESREG= 104414             7864    7916    8116#   9210
RESVEC= 000010             1141#
RHEAD   034752             6358    6568#
RHTAB   001726             2034#   4798    4836    6741    6743    6747    6750    8955
RKASOF= 000016             1164#   3371    4632*   4677*   4721*   4773*   5051*   5213*   6167    6202    6228
RKBA   = 000004            1159#   3367    3871*   3924*   3942*   3951*   3960*   4031*   4054*   4130*   4160*   4226*   4299*
                           4312*   4371*   4415*   4448*   4518*   4586*   4920*   4980*   5105*   5267*   5343*   5468*   5521*
                           5641*   5725*   5775*   5820*   5875*   6163
RKCS1  = 000000            1157#   3364    3470*   3581*   3835*   3850*   4075*   4182*   4472*   4693*   4703*   4943*   5095*
                           5163*   5178*   5254*   5288*   5404*   5419*   5579*   5594*   5647*   5654    6103*   6114*   6128
                           6142    6160    6410*   6418*   6426*   6434*   6446*   6508*   6510    6939*   6954*
RKCS2  = 000010            1161#   3365    3449*   3463*   3467*   3574*   3578*   3836*   3851*   4162*   4311*   4449    4519*
                           4694*   4813    4921*   4981*   5096*   5106*   5164*   5179*   5255*   5268*   5344*   5405*   5420*
                           5469*   5522*   5580*   5595*   5642*   5776*   5821*   6161    6398*   6411*   6419*   6427*   6435*
                           6460*   6464*   6940*   6955*
RKDA   = 000006            1160#   3368    3873*   3926*   3944*   3953*   3962*   4053*   4159*   4225*   4301*   4314*   4373*
                           4447*   4520*   4919*   4983*   5053*   5108*   5266*   5346*   5644*   6164
RKDB   = 000024            1166#   3373    4324    4532    4808    4809    4810    4993    5116    5356    5533
RKDC   = 000020            1165#   3372    3875*   4793*   5467*   5520*   5727*   5745*   5774*   5877*   5902*   6168
RKDS   = 000012            1162#   3369    6165
RKECPS= 000030             1170#   3377    6172
RKECPT= 000032             1171#   3378    6173
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RKER   = 000014  1163* 3370  6166
RKMR1  = 000026  1167* 3374  3748* 3841* 5169* 5326* 5410* 5585* 6169  6208* 6212* 6232* 6236*
                 6412* 6420* 6428* 6465* 6476* 6488* 6505* 6523* 6603* 6620* 6945*
RKMR2  = 000034  1168* 3375  6146  6151  6170  6516
RKMR3  = 000036  1169* 3376  6147  6152  6171
RKPRI    001316  1946* 6095
RKVEC    001314  1945* 3301* 6083* 6086* 6053
RKWC   = 000002  1158* 3366  3876* 4032* 4055* 4131* 4163* 4227* 4313* 4372* 4416* 4450* 4517*
                 4587* 4922* 4982* 5107* 5269* 5345* 5470* 5523* 5643* 5726* 5777* 5822* 5876*
                 6162
RLS    = 000010  1207*
RSEC     034714  6357  6558*
RTT    = 000006  9245*
SAVREG= 104413   7849  7890  8115* 9154
SBPAR    036156  6278  6282  6286  6290  6294  6298  6302  6868*
SCLR   = 000040  1209* 3449  3463  3574  6460
SCOP1  = 104415  3460  3571  3788  4046  4152  4219  4305  4365  4440  4580  5336  5765  5813
                 8117*
SCOP1$   036230  6892* 8117
SEC      001370  1977* 6844*
SECFLG   035372  6653  6673*
SECNT    001374  1979*
SECTOR   001402  1982* 4052* 4053  4070* 4071  4158* 4159  4177* 4178  4225  4301  4314  4373
                 4446* 4447  4467* 4468  4520  4918* 4919  4938* 4939  4983  5108  5265* 5266
                 5283* 5284  5346  6478* 6479* 6480* 6481* 6482* 6483* 6558* 6559* 6560* 6561*
                 6562* 6563* 6580  6584  6587  6735* 6739  6740* 6741* 6752  6762* 6763  6764*
                 6765*
SEEK   = 000017  1184* 3978  4737  4857  5747  5905
SELDRV= 000001   1177* 3468  3579  4430  4456  4494  4525  4557  6399  6444  6506
SETINT   032206  3302  6084  6093*
SIZFLG   007524  2141* 3303* 3453  6039* 6059*
SKI    = 000002  1224*
SORT     035550  6732*
SPACE2   055414  9188  9197  9208  9220*
SRTSPL= 000011   1181* 6924
SRTTAB   002132  2035* 6744
ST     = 177776  9239* 9265  9266* 9279* 9493* 9519* 9521* 9547*
STACK  = 001100  1045* 3166  3193  3355  3406  3461  3567  3572  3670  3740  3780  3789  3829
                 4009  4047  4125  4153  4220  4306  4366  4410  4441  4581  4625  4913  5206
                 5337  5456  5627  5707  5766  5814  5941  6363  7027  7065  9216
                 5970  5976*
STAPT    031634  1349  3164*
START    012556  3255*
START1   013164  1056*
STKLMT= 177774   5924  6907* 7571  7654
STOP     036262  3263  3274*
ST2      013234  3264  3292*
ST3      013300  3276  3297  3300*
ST4      013332  3283  3305* 3446  3509  5982  6976
ST5      013356  3744  3782  3791  3831  3862  3900  3974  4017  4049  4127  4155  4222  4308
SUBCLR   034214  4368  4412  4443  4583  4629  4789  4854  4915  5048  5210  5339  5464  5634
                 5712  5770  5816  5872  6460* 6909  6921
SVAL   = 100000  1254*
SWR      001140  1863* 3191  3213* 3215  3221* 3228* 6008  6314  6324  6334  6344  6892  6991
                 6999  7004  7023  7147  7161  7163  7169  7176  7214  7221  7233  7237  7574
                 7613  7668* 9212
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SWREG   000176          1347#   3221    6008    7574    7613    7636
SW0   = 000001          1109#
SW00  = 000001          1099#   1109
SW01  = 000002          1098#   1108
SW02  = 000004          1097#   1107
SW03  = 000010          1096#   1106
SW04  = 000020          1095#   1105
SW05  = 000040          1094#   1104
SW06  = 000100          1093#   1103
SW07  = 000200          1092#   1102
SW08  = 000400          1091#   1101
SW09  = 001000          1090#   1100
SW1   = 000002          1108#
SW10  = 002000          1089#
SW11  = 004000          1088#
SW12  = 010000          1087#   9212
SW13  = 020000          1086#   6991
SW14  = 040000          1085#   7004
SW15  = 100000          1084#
SW2   = 000004          1107#
SW3   = 000010          1106#
SW4   = 000020          1105#
SW5   = 000040          1104#
SW6   = 000100          1103#
SW7   = 000200          1102#
SW8   = 000400          1101#
SW9   = 001000          1100#   6314    6324    6334    6344    6892    6999    7023
TBITVE= 000014          1142#
TEMP1   007412          2082#   3450*   3464*   3471*   3473*   3478*   3479*   3480    3575*   3582*   3584*   3589*   3590*
                        3591    3982*   4652*   4741*   4861*   5074*   5233*   5649*   5751*   5909*   6104*   6115*   6130*
                        6144*   6200*   6204*   6230*   6246    6248*   6275    6277*   6279    6281*   6283    6285*   6287
                        6289*   6291    6293*   6295    6297*   6299    6301*   6303    6305*   6397    6402*   6408    6441*
                        6447*   6461*   6504    6509*   6512*   6518*   6578*   6590*   6602*   6607*   6619*   6624*   6655*
                        6658*   6659    6874*   6882*   8939
TEMP2   007414          2083#   3846*   3865*   3903*   3904    3940*   3949*   3958*   5174*   5415*   5590*   6206*   6609*
                        6656*   6657*   6659*   6660    6928*   6950*
TEMP3   007416          2084#   3866*   3906    3911    3916    3937*   3938    3947    3956
TEMP4   007420          2085#   3870*   3871    3924    3941*   3942    3950*   3951    3959*   3960
TEMP5   007422          2086#   3872*   3873    3925*   3926    3943*   3944    3952*   3953    3961*   3962    5633*   5644
                        5680    5682*   5710*   5741*   5870*   5897*
TERR1   036000          6782    6786    6793    6797    6811#   6816    6823
TIMUP   001372          1978#   6829*   6840*   6846*
TITLE   031706          3257    3295    5999#
TKVEC = 000060          1149#   7551*   7552*
TOCYL   001346          1965#   4132*   4134    4417*   4421    4588*   4591    4792*   4836    5709*   5717    5720    5727
                        5742*   5743    5762*   5768    5774    5808    5863*   5864    5869*   5877    5879    5898*   5899
                        8923    8947    8955
TPVEC = 000064          1150#
TRAPPC  001334          1957#   7020*   8922
TRAPVE= 000034          1148#   3199*   3200*   7064*
TRT   = 000003          9244#   9737
TRTVEC= 000014          1143#
TRUERR  035700          4067    4174    4464    4935    5280    5481    6776#
TSTATN  032602          3855    4698    5100    5183    5259    5424    5599    6181#   6959
TST1    013546          3331    3353#
TST10   016704          3930    3966    4007#
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TST11   017406  4123#
TST12   021156  4408#
TST13   022400  4623#
TST14   023676  4887    4911#
TST15   025442  5153    5204#
TST16   026756  5454#
TST17   027736  5625#
TST2    013730  3382    3404#
TST20   030236  5631    5639    5681    5705#
TST3    014554  3565#
TST4    015156  3601    3668#
TST5    015446  3715    3722    3738#
TST6    015574  3743    3778#
TST7    015670  3786    3799    3827#
TYPDS = 104405  5959    8107#
TYPE  = 104401  3261    3277    3279    3281    3296    3338    3415    3425    3455    3489    3535    3676    3698
                3747    3967    3971    3972    4013    4014    4041    4093    4147    4200    4240    4345    4436
                4490    4553    4604    4805    4817    4961    5014    5034    5038    5044    5121    5127    5128
                5145    5158    5193    5306    5377    5500    5554    5736    5892    5957    5960    6002    6052
                6255    6916    6918    6969    6974    6993    7038    7066    7216    7224    7292    7386    7512
                7568    7580    7634    7635    7638    7649    7659    7670    7689    7737    7743    7748    7752
                7757    7758    7760    7763    7767    7833    7835    7975    8103#   9164    9165    9169    9170
                9179    9188    9192    9197    9199    9205    9208
TYPERR  055140  7223    9154#
TYPOC = 104402  7637    8104#   9185
TYPON = 104404  8106#
TYPOS = 104403  3428    3492    3538    3702    5041    5124    6258    6996    7041    8105#
T.A2  = 000001  2112#   4088    4107    4195    4214    4261    4278    4340    4359    4485    4548    4666    4715
                4767    4830    4956    4975    5009    5028    5088    5247    5301    5320    5372    5391    5495
                5514    5549    5568    5803    5848    6348
T.B2  = 000002  2113#   4088    4107    4195    4214    4261    4278    4340    4359    4485    4548    4666    4715
                4767    4830    4956    4975    5009    5028    5088    5247    5301    5320    5372    5391    5495
                5514    5549    5568    5803    5848    6351
T.B3  = 000004  2114#   6355
T1      001404  1984#
T10     001406  1985#   3450    3464    3473    3575    3584    3846    5174    5415    5590    6104    6447    6461
                6509    6950
T100    001414  1988#   6928
T50     001410  1986#
T500    001412  1987#
T5000   001416  1989#   4652    5074    5233    6578
T50000  001420  1990#   3471    3582    3982    4741    4861    5151    5909    6115
UFE   = 000400  1212#   3517    3618
UNLD    007336  2043#   3305*   6912    6932*
UNLOAD= 000007  1180#
UNS   = 040000  1237#
UPE   = 020000  1217#
VERIFY  014554  3442    3447    3549#
VV    = 000100  1248#
WCE   = 040000  1218#   4322    4378    4530    4991    5113    5354    5531
WDCNT   001472  2017#   8939
WD1     001452  2006#   4285*   4324*   4532*   4993*   5116*   5356*   5533*   8931
WD2     001454  2007#   4286*   4325*   4533*   4994*   5357*   5534*   8931
WLE   = 004000  1234#
WORD    001506  2025#
WRDATA= 000023  1186#   4058    4165    4453    4926    5271    5472    5645    5779    5824
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WRHEAD= 000027            1188*   4034    4140    4427    4597    5729    5885
WRL   = 004000            1251*
WRTCHK= 000031            1189*   4316    4374    4522    4985    5109    5348    5525
WRTGAT= 040000            1269*
$APTHD  001000            1376    1382*
$ASTAT= ****** U          7429    7444
$ATYC   040432            7400    7402*
$ATY1   040406            7398*
$ATY3   040414            7277    7399*
$ATY4   040424            7229    7401*
$AUTOB  001134            1860*   6012*   7627    7784
$BASE   001264            1930*   3300*   3363    6070*   6072*
$BDADR  001122            1855*
$BDDAT  001126            1857*
$BELL   001200            1881*   7216    7249    7580    7777
$CDW1   001270            1932*
$CDW2   001272            1933*
$CHARC  040156            7294*   7304*   7311    7320*   7325*
$CKSWR  041400            7613*   8111
$CMTAG  001100            1843*   3188    3189    3197    3203    3204    3205
$CM3  = 000000            1873*
$CM4  = 000006            1873*   1874*   1875*   1876*   1877*   1878*   1879*
$CNTLC  042310            7568    7649    7777*
$CNTLG  042322            7634    7779*
$CNTLU  042315            7659    7752    7778*
$CPUOP  001236            1904*
$CRLF   001205            1883*   3425    3489    3971    3972    5044    5127    5128    7224    7249    7293    7328    7670
                          7757    7777    7838    9164    9169    9179    9192    9205
$DBLK   040376            7352    7386    7394*
$DB2D   042632            7890*   7952
$DB20   042512            3969    7849*
$DDW0   001274            1934*
$DDW1   001276            1935*
$DDW2   001300            1936*
$DDW3   001302            1937*
$DDW4   001304            1938*
$DDW5   001306            1939*
$DDW6   001310            1940*
$DDW7   001312            1941*
$DECVL  043012            7892    7938*
$DEVCT  001220            1895*   3248*   3311*   3680    5942*   5943
$DEVM   001266            1931*   3419
$DOAGN  031610            5953    5962    5968*
$DTBL   040366            7355    7390*
$ENDAD  031600            1362    5964*   7244
$ENDCT  031546            3203    5955*
$ENDMG  031617            5957    5972*
$ENULL  031614            5960    5971*
$ENV    001230            1900*   5976    6006    7226    7272    7407    7431
$ENVM   001231            1901*   3226    3411    7274    7279    7409
$EOP    031452            4015    4042    4094    4148    4201    4241    4346    4437    4491    4554    4605    4806    4818
                          4962    5015    5307    5378    5501    5555    5737    5893    5936*   9217
$EOPCT  031540            3203*   5952*   5956    6970*
$EOPI   031512            3386    3677    5944    5946*   6972    7015
$ERFLG  001103            1846*   6894    7136    7165    7167    7173*   7195    7211*   7249    9214
$ERMAX  001115            1852*   3206*   7167    7190*   7195
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$ERROR  037500          3197    7209#
$ERRPC  001116          1853#   7218*   7219*   7220    7249    8915    8923    8931    8939    8947    8955    8963    8373
                        8984
$ERRTB  007526          2156#   9161
$ERTTL  001112          1850#   7217*   7249
$ESCAP  001176          1880#   3205*   3308*   4634*   4651*   5056*   5073*   5215*   5232*   5773*   5868*   5903*   5939*
                        6306    6310*   6320*   6330*   6340*   6360*   6364*   6971*   7019*   7022*   7189*   7240    7242
                        7249
$ETABL  001230          1899#
$ETEND  001314          1388    1942#
$FATAL  001212          1892#   7435#
$FFLG   040652          7398*   7401*   7429    7438*   7446#
$FILLC  001156          1871#   7297    7328
$FILLS  001155          1870#   7328
$GDADR  001120          1854#
$GDDAT  001124          1856#
$GET42  031570          5961#
$GTSWR  041470          7635#   8109
$HD     =  000000       1016
$HIBTS  001000          1383#
$HIOCT  042510          7826*   7837#
$ICNT   001104          1847#   7180*   7181    7183*   7194
$INTAG  001135          1861#   7632*   7651    7671    7784
$ITEMB  001114          1851#   7220*   7228    7249    9155
$LF     001206          1884#   7249    7328    7767    7777    7838
$LFLG   040651          7439*   7445#
$LPADR  001106          1848#   3207*   7002    7171*   7187*   7192    7194
$LPERR  001110          1849#   3208*   6365    6896    6899*   7028    7171    7188*   7194    7239
$MADR1  001242          1917#
$MADR2  001246          1921#
$MADR3  001252          1924#
$MADR4  001256          1927#
$MAIL   001210          1384    1388    1890#   3225    6006    7186    7226    7272
$MAMS1  001240          1911#
$MAMS2  001244          1919#
$MAMS3  001250          1922#
$MAMS4  001254          1925#
$MBADR  001002          1384#
$MFLG   040650          7399*   7405    7440*   7444#
$MNEW   042340          7638    7782#
$MSGAD  001224          1897#   7415*   7418
$MSGLG  001226          1898#   7420*
$MSGTY  001210          1891#   7413    7421*   7433    7437*
$MSWR   042327          7635    7780#
$MTYP1  001241          1912#
$MTYP2  001245          1920#
$MTYP3  001251          1923#
$MTYP4  001255          1926#
$MULT   043122          7994#
$MXCNT  037476          7184    7194#
$NULL   001154          1869#   7299    7328
$NWTST=  000001         3343#   3345    3389#   3391    3550#   3552    3659#   3661    3731#   3733    3772#   3774    3804#
                        3806    3997#   3999    4113#   4115    4400#   4402    4610#   4612    4890#   4892    5194#   5196
                        5432#   5434    5607#   5609    5686#   5688
$OCNT   041076          7484*   7513*   7526#
$OCTVL  042614          3751    7851    7876#
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$OVER   037462          7148  7164  7172  7182  7191#
$PASS   001216          1894# 3225* 3742  3965  5949* 5950* 5958  5971  5978  7178  7195
$PASTM  001006          1386#
$PWRCT  037040          7059* 7060* 7070#
$PWRDN  036754          3201  7053# 7062
$PWRUP  036766          7053  7059#
$QUES   001204          1882# 7249  7328  7689  7760  7777  7835  7838
$RDCHR  041742          7702# 8112
$RDDEC= ****** U        8115
$RDLIN  042032          7725# 8113
$RDOCT  042352          7799# 8114
$RDSZ = 000022          7718#
$RESRE  043272          8060# 8116
$RTNAD  031612          5970#
$R2A  = ****** U        8117
$SAVRE  043234          8044# 8115
$SB2D   043026          7950#
$SCOPE  037220          3195  7145#
$SETUP= 000137          3158# 3194  3195  3197  3199  3201  3203  3204  3205  3207  5947  6003  7146
                        7210  7236  7244  7572  7577  7578  7608  7784
$STUP = 177777          3158#
$SUPRS  043062          3768  3970  7967#
$SVLAD  037426          7156  7185#
$SVPC = 000244          1360# 1365
$SWR  = 167400          1001# 1016  1021  1022  1023  1024  1025  1026  1027  1028  1879  1880  1881
                        3204  3205  3207  3208  3354  3405  3566  3669  3739  3779  3828  4008  4124
                        4409  4624  4912  5205  5455  5626  5706  5933  5948  5963  5969  5971  7137
                        7138  7139  7140  7141  7147  7159  7161  7162  7165  7166  7167  7174  7175
                        7176  7188  7191  7194  7201  7202  7203  7204  7205  7214  7221  7233  7237
                        7249
$SWREG  001232          1902# 3228
$SWRMK= 000000          1028  1029  7141  7142  7163
$TESTN  001214          1893# 3671* 7186* 8915  8922  8923  8931  8939  8947  8955  8963  8973  9984
$TIMES  001174          1879# 3204* 3354* 3405* 3566* 3669* 3739* 3779* 3828* 4008* 4124* 4409* 4624*
                        4912* 5205* 5455* 5626* 5706* 5940* 5948* 7174* 7181  7184* 7194
$TKB    001146          1866# 7532  7553  7564  7589  7617  7644
$TKCNT  041102          7533# 7548* 7578  7595* 7709  7711*
$TKINT  041112          3171  7548# 7569  7630
$TKQEN= 041111          7537# 7603  7714
$TKQIN  041104          7534# 7549* 7550  7601* 7602* 7603  7605*
$TKQOU  041106          7535# 7550* 7712  7713* 7714  7716*
$TKQSR  041110          7536# 7549  7605  7716
$TKS    001144          1865# 7532  7554* 7585* 7587  7593* 7615  7631* 7641  7653* 7673*
$TKSRV  041162          7551  7564#
$TMP0   001160          1873#
$TMP1   001162          1874#
$TMP2   001164          1875#
$TMP3   001166          1876#
$TMP4   001170          1877# 3309* 3469  3488  3502* 3512* 3580  3595  3598* 3613* 3657* 3696* 3708
                        5458  5646  6102  6113  6445  6507
$TMPS   001172          1878# 6306* 6360  6364
$TN   = 000021          1002# 1016  3331  3343  3354# 3382  3389  3405# 3550  3566# 3601  3659  3669#
                        3671  3672  3715  3722  3731  3739# 3743  3772  3779# 3786  3799  3804  3828#
                        3930  3966  3997  4008# 4113  4124# 4400  4409# 4610  4624# 4887  4890  4912#
                        5153  5194  5205# 5432  5455# 5607  5626# 5631  5639  5681  5686  5706#
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$TNPWR  042742            7897    7898    7918#
$TPB    001152            1868#   7317*   7328
$TPFLG  001157            1872#   7266    7328
$TPS    001150            1867#   7315    7328
$TRAP   043330            3199    8080#
$TRAP2  043352            8091#   8102
$TRP  = 000015            8095#   8104#   8105#   8106#   8107#   8108#   8109    8110#   8111    8112#   8113#   8114#   8115#
                          8116#   8117#   8118#
$TRPAD  043364            8085    8102#
$TSTM   001004            1385#
$TSTNM  001102            1845#   3672*   5947*   5380*   7136    7163    7185*   7186    7191    7195    7213    7249
$TTYIN  042266            7727    7728    7740    7758    7772    7776#
$TYPBN= ****** U          8108
$TYPDS  040162            7340#   8107
$TYPE   037700            7266#   7426    8095    8103
$TYPEC  040112            7296    7303    7310    7315#   7316    7675
$TYPEX  040160            7321    7323    7326#
$TYPOC  040700            7482#   8104
$TYPON  040714            7481    7484#   8106
$TYPOS  040654            7477#   8105
$UNIT   001222            1896#   3249*   3312*   3682*   3689    3699    3836    3851    4694    5096    5164    5179    5255
                          5405    5420    5580    5595    6182    6201    6227    6269    6270    6271    6272    6398    6411
                          6419    6427    6435    6464    6940    6955
$UNITM  001010            1387#
$USWR   001234            1903#
$VECT1  001260            1928#
$VECT2  001262            1929#
$XTSTR  037232            7150#
.$GET4= 000000            5963#
$OFILL  041077            7479#   7482#   7492    7527#
$40CAT= ****** U          7147    7223
.     = 055500            1341#   1345#   1350#   1353#   1360    1361#   1363#   1365#   1366#   1372    1373#   1375#   1377#
                          1842#   1885    2033#   2034#   2035#   2037#   2038#   2039#   2040#   2041#   3192    3207    3208
                          5971    5975    7055    7111    7194    7195    7249    7328    7394#   7447#   7532    7536#   7537
                          7538#   7776#   7777    7784#   7838    7876#   7938#   8914#   9229#   9230#   9375    9600    9604
                          9636    9660    9722    9730    9733#   9741#
.$ASTA= ****** U          7399    7402
.$X   = 001000            1372#   1377
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CALIB   1479#  3834  5161  5402  5577  6938
CHECK   1433#  3892  4086  4105  4193  4212  4259  4276  4338  4357  4391  4483  4510  4546  4573
        4643   4664  4713  4765  4828  4954  4973  5007  5026  5065  5086  5224  5245  5299  5318
        5370   5389  5493  5512  5547  5566  5672  5801  5846
COMMEN  1152#
CWD2    1448#  5325
DRCLR   1461#  3849  4692  5094  5177  5253  5418  5593  6953
ENDCOM  1152#
EOPGM   1800#  5937
ERROR   1046#  3385  3444  3452  3466  3475  3498  3507  3526  3530  3541  3545  3577  3586  3604
        3631   3635  3639  3643  3745  3783  3792  3796  3800  3832  3839  3845  3848  3854  3857
        3863   3879  3883  3895  3896  3897  3898  3901  3908  3913  3918  3921  3933  3975  3980
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        4109   4110  4111  4128  4142  4146  4156  4167  4180  4184  4196  4197  4198  4199  4202
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        4369   4376  4380  4394  4395  4396  4397  4413  4429  4432  4435  4444  4455  4458  4470
        4474   4486  4487  4488  4489  4492  4496  4499  4513  4514  4515  4516  4524  4527  4534
        4537   4549  4550  4551  4552  4559  4562  4576  4577  4578  4579  4584  4599  4603  4630
        4637   4646  4647  4648  4649  4654  4667  4668  4669  4670  4674  4684  4689  4697  4700
        4707   4716  4717  4718  4719  4728  4733  4739  4743  4747  4754  4768  4769  4770  4771
        4780   4785  4790  4801  4804  4816  4831  4832  4833  4834  4838  4844  4848  4852  4855
        4859   4863  4867  4916  4928  4941  4945  4957  4958  4959  4960  4963  4976  4977  4978
        4979   4987  4995  4998  5010  5011  5012  5013  5029  5030  5031  5032  5049  5059  5068
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        5550   5551  5552  5553  5569  5570  5571  5572  5583  5589  5592  5598  5601  5635  5638
        5657   5659  5663  5675  5676  5677  5678  5713  5731  5735  5749  5753  5757  5771  5781
        5786   5790  5804  5805  5806  5807  5810  5817  5826  5831  5935  5849  5850  5851  5852
        5855   5873  5887  5891  5907  5911  5915  6378  6383  6387  5401  6414  6422  6430  6437
        6463   6514  6910  6322  6926  6930  6943  6949  6952  6958  6961  7021
ESCAPE  1152#
F.EAB   1413#  3884  4078  4097  4185  4204  4250  4268  4330  4349  4382  4475  4501  4538  4564
        4656   4756  4820  4946  4965  4999  5018  5078  5237  5291  5310  5362  5381  5485  5504
        5539   5558  5664  5792  5837
GETPRI  1152#
GETSWR  1152#  6003
HDCHK3  1590#  4796
HDTBL   1603#  4133  4420  4590  5878
LOOP    1397#  3459  3570  3788  4046  4152  4219  4304  4365  4440  4580  5336  5765  5812
MSG     3343#  3345  3389#  3391  3550#  3552  3659#  3661  3731#  3733  3772#  3774  3804#  3806  3997#
        3999   4113#  4115  4400#  4402  4609#  4612  4890#  4892  5194#  5196  5432#  5434  5607#  5609
        5686#  5688
MULT    1152#
NEWTST  1152#  3343  3389  3550  3659  3731  3772  3804  3997  4113  4400  4610  4890  5194  5432
        5607   5686
OFFDIR  1816#  4677  4721  4773
OFSET   1776#  4633  5055  5214
OWNTAG  1390#  1944
POP     1152#  7381  7441  7442  7827  8023  8065
PUSH    1152#  7340  7402  7404  7425  7801  7994  8045
QKSEEK  1615#  3977  4736  4856  5746  5904
QKSRT   1507#  6919
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RDATA   1694#  4229
RDHDR   1558#  4797
REPORT  1152#
SCOPE   1047#  3353  3404  3565  3668  3738  3778  3827  4007  4123  4408  4623  4911  5204  5454
        5625   5705  5938  5946
SETPRI  1152#  7705
SETTRA  8035#  8104  8105  8106  8107  8109  8111  8112  8113  8114  8115  8116  8117
SETUP   1152#  3187
SKIP    1152#  3331  3382  3601  3715  3722  3743  3786  3799  3930  3966  4887  5153  5631  5639
        5681
SLASH   1152#
SPACE   1152#
STARS   1152#  1358  1369  1371  1378  1838  1885  1888  3343  3352  3389  3403  3550  3564  3659
        3667   3731  3737  3772  3777  3804  3826  3997  4006  4113  4122  4400  4407  4610  4622
        4890   4910  5194  5203  5432  5453  5607  5624  5686  5704  5930  7133  7197  7251  7330
        7397   7454  7531  7608  7623  7694  7718  7787  7840  7879  7941  7959  7982  8029  8074
        9144   9153
SWRSU   1152#  3209#
TRMTRP  8095#
TYPBIN  1152#
TYPDEC  1152#  5958
TYPNAM  1152#
TYPNUM  1152#
TYPOCS  1152#  3426  3490  3536  3700  5039  5122  6256  6994  7039
TYPOCT  1152#  7636
TYPTXT  1152#
WDATA   1642#  4057  4164  4452  4925  5270  5471
WRCHK   1740#  4315  4521  4984  5347  5524
WRHDR   1528#  4033  4139  4426  4596  5728  5884
$$CMRE  1836#
$$CMTM  1836#  1873  1874  1875  1876  1877  1878
$$ESCA  1152#
$$INCMT 1152#  3343  3389  3550  3659  3731  3772  3804  3997  4113  4400  4610  4890  5194  5432
        5607   5686
$$SET   8095#  8104  8105  8106  8107  8109  8111  8112  8113  8114  8115  8116  8117
$$SETM  3225#
$$SKIP  1152#  3331  3382  3601  3715  3722  3743  3786  3799  3930  3966  4887  5153  5631  5639
        5681
.EQUAT  1001#  1042
.HEADE  1001#  1006
.SETUP  1001#  3158
.SWRHI  1001#  1017
.SWRLO  1001#  1029#
.$ACTI  1001#  1356
.$APTB  1886#
.$APTH  1001#  1367
.$APTY  1001#  7395
.$CATC  1001#  1339
.$CMTA  1001#  1836
.$DB2D  1001#  7877
.$DB2O  1001#  7838
.$EOP   1001#  5928
.$ERRO  1001#  7195
.$MULT  1001#  7980
.$RDOC  1001#  7785
.$READ  1001#  7529
```

```
.$SAVE    1001#   8027
.$SB2D    1001#   7939
.$SCOP    1001#   7131
.$SUPR    1001#   7957
.$TRAP    1001#   8072
.$TYPD    1001#   7328
.$TYPE    1001#   7249
.$TYPO    1001#   7452

. ABS.   057550      000

 ERRORS DETECTED:  0

 DSKZ:CZR6IE,DSKZ:CZR6IE.SEQ/SOL/CRF/NL:TOC/DOC=DSKM:CZR6IE.P11
 RUN-TIME:  33 25 3 SECONDS
 RUN-TIME RATIO: 273/62=4.3
 CORE USED:  30K  (59 PAGES)

 DOCUMENT PAGES:  209
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