RK11/RK05

DYNAMIC TEST
MD-11-DZRKL-E

EP-DZRKL-E-DL-A
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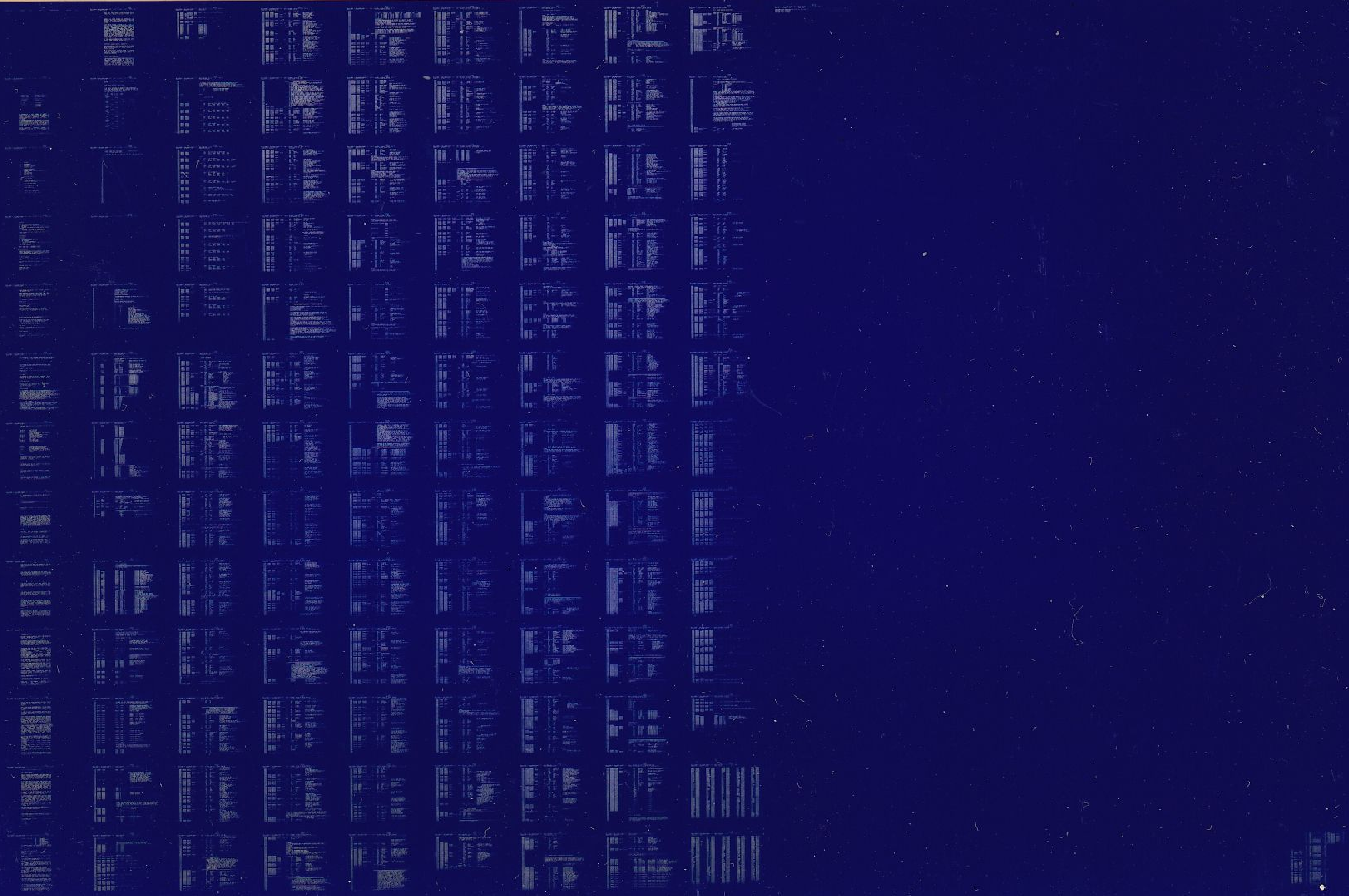

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EOF1MIR11 SEQ          00010000    770715          PDP10 411          -AHDR1DZRKLESEQ          00010000    770715
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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZRKL-E-D
PRODUCT NAME:	RK11/RK05 DYNAMIC TEST
DATE CREATED:	APRIL, 1977
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	JIM KAPADIA
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1.0     ABSTRACT

        THE RK11/RK05 DYNAMIC TEST AIMS AT
        1.  DEMONSTRATING THE  ELECTROMECHANICAL  INTREGRITY
        OF THE DRIVE.
        2.  CHECKING THE LINEAR POSITIONER CONTROL AND SPEED  .
        CONTROL
        3.  VERIFYING THE INTREGITY OF THE READ/WRITE LOGIC
        4.  PROVIDING A TIMER FOR THE SEEK FUNCTION.

        THIS IS A TEST ONE LEVEL HIGHER THAN THE BASIC  RK11
        LOGIC TESTS.


2.0     REQUIREMENTS

2.1     EQUIPMENT

        A.  PDP11 WITH CONSOLE TELETYPE.
        B.  8K OF MEMORY
        C.  RK11 OR RKV11 CONTROLLER
        D.  1-8 RK05 OR RK05F DRIVES  (DRIVE TYPES MAY BE MIXED)

2.2     PRELIMINARY PROGRAMS

        RK11 LOGIC TEST I  (MAINDEC-11-DZRKJ)
        RK11 LOGIC TEST II (MAINDEC-11-DZRKK)

2.3     EXECUTION TIME

        ERROR FREE FIRST PASS ON PDP11/20 WITH  CORE  MEMORY
        TAKES  APPROXIMATELY  5  MINUTES  (WITHOUT  THE SEEK
        TIMER AND GRAPH, ADDITIONAL 3.5 MINUTES FOR  THESE).
        LESS FOR FASTER MACHINES OR MEMORIES.


3.0     STARTING ADDRESS

        200 FOR ANY NORMAL MODE OF OPERATION.  ALL SWITCHESS
        DOWN

        210 FOR FUNCTION SELECTING  PROGRAM  (CONVERSATIONAL
        MODE).


4.0     PROGRAM CONTROL MODES & OPERATOR ACTION

        PAPER TAPE LOADING
        RKDP DUMP MODE
        RKDP CHAIN MODE
        ACT11
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4.1      PAPER TAPE LOADING

4.1.1    LOAD PROGRAM INTO MEMORY  USING  STANDARD  PROCEDURE
         FOR ABSOLUTE TAPES.

4.1.2    MAKE SURE THAT THE DRIVES TO BE CHECKED  ARE  LOADED
         WITH  DISKS  AND  ARE  IN 'RUN'.  'WRT ENABLE' THEM.
         CHECK THAT 'WRT PROT' LIGHT ON THESE DRIVES IS  OFF.
         PUT DRIVES THAT ARE NOT TO BE TESTED ON 'LOAD'.

4.1.3    LOAD ADDRESS 200

4.1.4    SET SWITCHES IF DESIRED (SEE SEC 6.0)

         PRESS START.

4.1.5    THE PROGRAM IDENTIFIES ITSELF

         RK11 DYNAMIC TEST
         MAINDEC-11-DZRKL-E

         THEN IT PROCEEDS TO FIND WHICH  DRIVES  ARE  PRESENT
         AND PRINTS OUT THE DRIVES FOUND.  IF AN RK-05F
         IS DETECTED, AN F IS APPENDED TO THE DRIVE NUMBER:


         DRIVES PRESENT
         0
         1

         AFTER TYPING OUT THE DRIVE NUMBER THAT IS  GOING  TO
         BE TESTED, EXECUTION OF THE TESTS START.

         AFTER ALL THE TESTS HAVE BEEN EXECUTED ON ONE  DRIVE
         THEY  ARE  EXECUTED  ON  THE NEXT DRIVE, IF PRESENT.
         THIS IS REPEATED TILL ALL DRIVES ARE TESTED.

         AT THE END OF A PASS THE FOLLOWING IS TYPED OUT:

         END PASS X              X=0,1,2......

         CONTROL IS TRANSFERRED BACK TO THE BEGINNING OF  THE
         PROGRAM AND RE-EXECUTION BEGINS.


4.2      RKDP DUMP MODE

4.2.1    THE PROGRAM IS LOADED BY THE RKDP MONITOR.

4.2.2    SET SA=200.  SELECT ANY SWITCHES YOU WANT AND  PRESS
         START.

4.2.3    THE PROGRAM IDENTIFIES ITSELF AND PRINTS OUT:
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'TO TEST DRIVE 'N' HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM'

4.3 RKDP CHAIN MODE

THE PROGRAM IS CHAIN LOADED FROM RKDP PACK ON DRIVE 'N'. AFTER IDENTIFYING ITSELF, THE FOLLOWING MESSAGE APPEARS:

'DRIVE 'N' NOT TESTED'

DRIVE 'N' WILL NOT BE TESTED SINCE THE RKDP PACK IS ON THAT DRIVE.

4.4 ACT11 MODE

THE PROGRAM IS LOADED BY THE ACT11 MONITOR. AFTER IDENTIFYING ITSELF, ASCERTAINS THE NUMBER OF DRIVES PRESENT AND PROCEEDS TO TEST EACH OF THEM AS BEFORE.

5.0 DRIVE SELECTION

IF ANY PARTICULAR DRIVE IS TO BE SELECTED FOR TESTING, PUT THAT DRIVE ON 'RUN', 'WRITE ENABLE'. PUT THE REST OF THE DRIVES ON 'LOAD', 'WRITE LOCK'. THEN START AS USUAL.

6.0 SWITCH OPTIONS

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

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        'SWR = NNNNNN    NEW ='
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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.

SW<15>=1	HALT ON ERROR
SW<14>=1	LOOP ON TEST
SW<13>=1	INHIBIT ERROR PRINTOUTS
SW<12>=1	CYCLE ON ERROR TO THE PREVIOUS 'SCOPE' STATEMENT
SW<11>=1	DUMP ALL RK11 REGISTERS ON ERROR
SW<10>=1	RING BELL ON ERROR
SW<09>=1	LOOP ON SPECIFIC ERROR
SW<08>=1	LOOP ON TEST INDICATED BY USER (SEE SEC. 6.8)
SW<06>=1	TYPE SEEK TIMER
SW<05>=1	TYPE THE GRAPHS
SW<04>=1	PRINT THE COMPLETE GRAPH
SW<03>=1	TERMINATE FUNCTION SELECTED BY USER
SW<02>=1	DROP THE DRIVE AFTER MAXIMUM ALLOWABLE NUMBER OF ERRORS OCCUR
SW<00>=1	ASK FOR PATTERN TO BE WRITTEN OR WRITE CHECKED (FUNCTION SELECTION PROGRAM)

6.1 SW<15>

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

6.2 SW<14>

THE PROGRAM LOOPS ON THE SUBTEST THAT IS BEING EXECUTED WHEN THE SWITCH IS PUT ON. THIS SWITCH IS USED NORMALLY ALONG WITH SW 15.

6.3 SW<13>

THIS SWITCH INHIBITS ALL ERROR MESSAGES. NORMALLY USED WHEN LOOPING ON TEST (SW 14) OR LOOOPING ON ERROR (SW 9).

6.4 SW<12>

THIS SWITCH ALLOWS THE PROGRAM TO CYCLE FROM THE POINT OF ERROR TO THE PREVIOUS SCOPE STATEMENT. NOTE THAT IN DOING SO ANY INITIALIZATION BEING DONE

AT THE BEGINNING OF THE SUBTEST WILL BE DONE AGAIN AND AGAIN. SEE SEC. 6.7 FOR A DIFFERENT KIND OF SCOPE LOOP.

6.5 SW<11>

THIS SWITCH ALLOWS DUMPING OF ALL RK11 REGISTERS ON ENCOUNTERING AN ERROR.

6.6 SW<10>

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

6.7 SW<09>

THIS SWITCH PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP. NOTE THAT UNLIKE SW12 THE INITIALIZATION OF PARAMETERS AT THE BEGINNING OF THE SUBTEST MAY NOT BE DONE IN THIS CASE. THIS SWITCH IS HELPFUL WHEN A PARTICULAR PART OF A SUBTEST IS BEING REPEATED USING DIFFERENT PARAMETERS AND YOU WANT TO SCOPE ON THE PARAMETER IN ERROR. (EXAMPLE: RKDA IS BEING WRITTEN AND READ BACK WITH COUNT PATTERNS FROM 1 TO 177777. PATTERN 561 IS GIVING ERROR, YOU MIGHT NOT WANT TO GO THROUGH THE 560 PATTERNS BEFORE HITTING ERROR ON THE 561TH PATTERN. IN THIS CASE SW 9 WILL GIVE YOU A SCOPE LOOP ON THE 561TH PATTERN ONLY.)

6.8 SW<08>

THIS SWITCH IS USED TO SELECT A PARTICULAR TEST FOR EXECUTION. WHEN THE PROGRAM IS STARTED (200) WITH THIS SWITCH SET, THE FOLLOWING MESSAGE APEARS:

OCTAL TEST#?

THE USER SHOULD REPLY WITH THE TEST NUMBER (OCTAL) HE WANTS TO SELECT, FOLLOWED BY CARRIAGE RETURN.

THE SELECTED TEST IS EXECUTED AGAIN AND AGAIN. TO GET OUT OF THIS LOOP, PUT SW 8 BACK TO 0. THIS WILL RESUME NORMAL OPERATION OF THE PROGRAM. NOTE THAT BEFORE TEST 4 CAN BE EXECUTED TEST 2 SHOULD HAVE BEEN DONE AND TEST 6 SHOULD HAVE BEEN DONE BEFORE TEST 7.

6.9 SW<06>

THIS SWITCH WHEN SET MAKES THE PROGRAM TYPE THE SEEK TIMER. THIS SWITCH CAN BE SET OR RESET BEFORE OR DURING THE SEEK TIMER EXECUTION, AND EVEN WHILE THE TYPEOUT IS OCCURING.

6.10 SW<05>

THIS SWITCH MAKES THE PROGRAM TYPE THE GRAPHS. IF RESET BEFORE THE GRAPH-PLOTTING ROUTINE IS ENTERED, THE GRAPHS WILL BE SKIPPED ENTIRELY. IT CAN BE RESET EVEN AFTER SOME OF THE POINTS HAVE BEEN PLOTTED, TO SKIP PLOTTING REST OF THE POINTS.

6.11 SW<04>

THIS SWITCH IS USED TO SELECT THE COMPLETE GRAPH OUTPUT (SEEK TIMES OF ALL CYLINDERS ARE PLOTTED) NORMALLY WHEN THIS SWITCH IS NOT SET, THE SMALL GRAPH (ONLY SELECTED CYLINDERS PLOTTED) IS PRINTED OUT.

6.12 SW<03>

THIS SWITCH WHEN SET TERMINATES THE EXECUTION OF THE FUNCTION SELECTED BY THE USER (SA=210). A NEW FUNCTION MAY BE INITIATED NOW. IF YOU WANT TO KEEP ON LOOPING ON THE SAME FUNCTION, PUT SW 3 DOWN. SEE SEC. 9.0.

6.13 SW<02>

THIS SWITCH ALLOWS THE PROGRAM TO DROP A DRIVE FROM THE SELECTION LIST AND TESTING, AFTER MAXIMUM ALLOWABLE ERROR COUNT (TOTAL NUMBER OF ERRORS) ON THAT DRIVE IS EXCEEDED. THE MAXIMUM ALLOWABLE ERROR COUNT IS 6, AFTER 6 ERRORS HAVE OCCURED THE DRIVE IS DROPPED AND A MESSAGE (DRIVE # XXXXX DROPPED) IS PRINTED.

6.14 SW<00>

THIS SWITCH IS TO BE USED WITH THE FUNCTION SELECTION PROGRAM (SA=210). IF A WRITE OR A WRITE CHECK FUNCTION IS SELECTED WITH THIS SW SET, THE PROGRAM WILL ASK FOR THE PATTERN TO BE WRITTEN OR WRITE CHECKED (PATRN?). THE USER SHOULD TYPE IN THE (OCTAL) PATTERN. THIS PATTERN WILL BE WRITTEN (OR WRITE CHECKED) ON THE DISK. FOR FURTHER INFORMATION REFER TO SEC. 9.0.

7.0 PROGRAM DESCRIPTION

THE FIRST TEST IS AIMED AT DETECTING IMPEPENDING ELECTRO- MECHANICAL FAILURES IN THE DRIVE AND INNER/OUTER LIMIT SWITCHES.

IN THE NEXT TWO TESTS, THE DISK IS FORMATTED AND CHECKED FOR CORRECT FORMATTING. IF THE DISK IS AN RK-05F, THE ENTIRE DISK IS FORMATTED EACH TIME THE EVEN DRIVE IS TESTED. NO FORMATTING IS DONE WHEN THE ODD DRIVE IS TESTED. THE DISK IS CHECKED EACH TIME FOR PROPER FORMAT, HOWEVER.

IN NEXT TWO TESTS THE SEEK LOGIC, POSITIONER, ETC ARE CHECKED OUT BY DOING IMPLIED SEEK, USING TWO DIFFERENT SEEKING PATTERNS. THE FIRST ONE IS A DECREASING SAW-TOOTH PATTERN (0-312-0-311-0-310....), THE SECOND ONE IS A CONVERGING-DIVERGING PATTERN (0-312-1-311-2-310....). ON GETTING AN ERROR, FURTHER ANALYSIS IS DONE TO FIND OUT MORE ABOUT THE NATURE OF ERROR. MANY TIMES ADDITIONAL INFORMATION IS GIVEN FOR THE CONVIENCE OF THE USER. RETRIES ARE DONE WHENEVER AN ERROR OCCURS.

IN THE SUBSEQUENT TESTS EXTENSIVE WRITING IS DONE USING MORE THAN 2000 DIFFERENT PATTERNS. THE DATA IS READ, (SOFTWARE) COMPARED, AND WRITE CHECKED.

EVERYTIME AN ERROR OCCURS RETRIES ARE DONE, TO CHECK IF IT WAS A RECOVERABLE ERROR OR NOT. THE USER CAN CHANGE THE PATTERNS TO BE WRITTEN ON THE DISK. THE DATA TRANSFER BUFFERS CAN BE RE-LOCATED BY THE USER TO DIFFERENT PARTS OF MEMORY. REFER TO LOCATIONS 'PBUF0', 'PBUF1', 'PAT1', 'PTRN01' IN THE LISTINGS FOR MORE DETAILS. SEE SEC 7.1.

THE SHUNT CURRENT CHANGE TEST WRITES, READS AND CHECKS FOR ERRORS ON CYLINDERS 127 AND 128. THIS REGION HAS CRITICAL "PACKING DENSITY" TO "WRITE CURRENT" RATIOS.

THE SEEK TIMER PROVIDES SEEK TIMES AND GRAPHS AS EXPLAINED IN SEC 8.0

A FUNCTION SELECTION SUB-PROGRAM IS PROVIDED FOR USER SELECTION OF FUNCTIONS. SEE SEC 9.0

EVERY TEST IN THE PROGRAM IS PRECEEDED BY AN EXPLANATION OF THAT TEST, THE USER IS ADVISED TO REFER TO THAT, IF MORE INFORMATION IS NEEDED.

7.1 PERMISSIBLE USER PROGRAM MODIFICATIONS

THE USER CAN MAKE MINOR CHANGES IN POINTERS, TABLES, ETC. TO TAKE CARE OF HIS SPECIAL NEEDS. IT IS ADVISABLE TO MAKE CHANGES IF ANY, RIGHT AT THE BEGINING.

7.1.1 SEEK TIMING CAN BE DONE BETWEEN ANY TWO CYLINDERS, BY MAKING CHANGES DESCRIBED IN THE CYLINDER ADDRESS TABLE AT LOCATIONS 'SOAD' AND 'SIAD' IN THE LISTINGS.

7.1.2 IN CASE YOU HAVE A LINE PRINTER AND WANT YOUR OUTPUT ON THE LINE PRINTER, CHANGE LOCATION '$TPS' TO 177514 AND LOCATION '$TPB' TO 177516 (LINE PRINTER VECTORS).

7.1.3 INPUT/OUTPUT DATA BUFFERS (FROM WHERE DATA TRANSFERS WILL BE DONE TO AND FROM THE DISK) CAN BE RELOCATED TO ANYWHERE IN THE 28K OF MEMORY (DO NOT OVERLAY THE PROGRAM). THIS CAN BE DONE BY CHANGING THE CONTENTS OF LOCATIONS 'PBUF0' AND 'PBUF1' TO THE STARTING ADDRESSES OF THE TWO USER SELECTED BUFFERS. IT SHOULD BE NOTED THAT EACH OF THE TWO BUFFERS SHOULD BE 768 (DECIMAL) WORD LONG.

7.1.4 FOUR DIFFERENT PATTERN GENERATOR ROUTINES HAVE BEEN USED IN THIS PROGRAM: A. PTGEN0 B. PTGEN1 C. PTGEN2 D. PTGEN3. THEY HAVE BEEN DESCRIBED IN DETAIL AT CORRESPONDING LOCATIONS IN THE LISTING. THE ORDER IN WHICH THEY ARE CALLED IS DESCRIBED AT THE BEGINING OF TEST 6. THIS CALLING ORDER CAN BE CHANGED BY MAKING CHANGES IN THE FOUR POINTERS A.'PAT0' B. 'PAT1' C. 'PAT2' D. 'PAT3'. THESE 4 POINTERS CONTAIN THE STARTING ADDRESS OF EACH ROUTINE.

7.1.5 AS A SPECIAL CASE OF THE ABOVE, YOU CAN WRITE THE SAME TWO (OR ONE) PATTERN/S ON THE ENTIRE DISK USING 'PTGEN0' ROUTINE. TO WRITE THE SAME ONE PATTERN:
CHANGE LOCATION 'PAT1' TO 'PTGEN0' (STARTING ADDRESS OF PTGEN0)
CHANGE LOCATION 'PAT2' TO 'PTGEN0' (STARTING ADDRESS OF PTGEN0)
CHANGE LOCATION 'PAT3' TO 'PTGEN0' (STARTING ADDRESS OF PTGEN0)
FILL LOCATIONS 'PTRN01' AND 'PTRN02' WITH THE PATTERN YOU WANT.
TO WRITE 2 DIFFERENT PATTERNS (IN ALTERNATING SECTORS):
CHANGE 'PAT1', 'PAT2' AND 'PAT3' AS DESCRIBED ABOVE.
FILL 'PATRN01' AND 'PATRN02' WITH THE TWO PATTERNS YOU WANT.

7.1.6 IN TEST 10, IF YOU WANT TO WRITE AND CHECK CYLINDERS 127 AND 128 WITH PATTERNS OTHER THAN THE 12 USED, CHANGE ANY OR ALL OF THE 12 POINTERS 'SP1' THROUGH

'SP12' TO CONTAIN PATTERNS YOU WANT.

8.0 SEEK TIMER & GRAPHS

THE LAST TEST IN THIS PROGRAM IS THE SEEK TIMER. IN ORDER TO TIME THE SEEKS, THE SECTOR COUNTER HAS BEEN USED AS A TIME BASE. THUS THE ACCURACY OF THE TIMES RECORDED IS AS GOOD AS THE ACCURACY OF THE SECTOR COUNTER (WHICH IN TURN DEPENDS ON THE ROTATION SPEED OF THE DISK).

IN THE FIRST PART OF THIS TIMER, SOME CRITICAL SEEKS HAVE BEEN TIMED (CYLINDERS 0-1, 179-181, 0-3, 0-16, 0-32, 0-202, 0=100) EACH SEEK IS DONE 100 TIMES, TIMES ARE RECORDED, THEN THE TIMES ARE SORTED OUT AND A PRINTOUT IS GIVEN SHOWING HOW MANY TIMES A PARTICULAR SEEK TIME WAS OBTAINED. EXAMPLE: SEEK BETWEEN 0 AND LAST CYLINDER WAS DONE 100 TIMES. 99 TIMES A SEEK TIME OF 95 MS WAS OBTAINED, ONCE IT GAVE 100 MS. THIS GIVES THE USER AN IDEA OF HOW CONSISTENT ARE THE SEEK TIMES.

IF YOU WANT TO TIME SEEK BETWEEN ANY OTHER SET OF CYLINDERS, YOU CAN DO BY FOLLOWING THE INSTRUCTIONS AT LOCATION 'SOAD' IN LISTINGS. SEE SEC 7.1

IN THE SECOND PART, A GRAPH OF THE 'CYLINDER SEEKED FROM 0' IS PLOTTED AGAINST 'SEEK TIME'. TWO GRAPHS ARE AVAILABLE, NORMALLY THE SMALL GRAPH IS PRINTED OUT. THE SMALL GRAPH PLOTS THE SEEK TIMES FOR SELECTED CYLINDERS (ABOUT 49) COVERING THE RANGE FROM CYLINDER 0 TO 202. IT GIVES THE USER A QUICK SEEK CHARACTERISTICS OF A DRIVE.

THE OPTIONAL COMPLETE GRAPH (SW 4) GIVES A GRAPH SIMILAR TO THE ABOVE ONE, BUT PLOTS ALL THE CYLINDERS (203).

THE GRAPH SHOWN ON LAST PAGE IS A SAMPLE OUTPUT. IT SHOULD BE REALIZED THAT DIFFERENT DRIVES MAY HAVE A SLIGHTLY DIFFERENT CHARACTERISTIC.

9.0 FUNCTION SELECTION PROGRAM

THIS PROGRAM GIVES THE USER A CAPABILITY TO SELECT A FUNCTION AND EXECUTE IT, FROM THE CONSOLE TELETYPE.

STARTING ADDRESS=210

ON STARTING THE PROGRAM AT 210, THE FOLLOWING QUESTION APPEARS:

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FUNCTION?
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THE REPLY SHOULD BE:     WR       FOR WRITE
                         WC       FOR WRITE CHECK
                         RD       FOR READ
                         RC       FOR READ CHECK
                         CR       FOR CONTROL RESET
                         DR       FOR DRIVE RESET
                         SK       FOR SEEK DR
ALL COMMANDS SHOULD  BE  TERMINATED  BY  A  CARRIAGE
RETURN.  DEPENDING  ON  WHICH FUNCTION IS GIVEN THE



FOLLOWING QUESTIONS APPEAR:

RKBA?           TYPE  IN  THE  BUS  ADDRESS  (OCTAL)
FOLLOWED BY A C.R.

RKDA?           TYPE  IN  THE  DISK  ADDRES  (OCTAL)
FOLLOWED BY C.R.

IF A NON-EXISTENT CYLINDER OR  SECTOR  IS  SELECTED,
THE QUESTION IS REPEATED AGAIN.

#WORDS?         TYPE IN THE NUMBER OF WORDS YOU WANT
TO  TRANSFER.  IT  SHOULD BE IN OCTAL.  THUS IF YOU
WANT TO READ A SECTOR TYPE IN 400 FOLLOWED  BY  C.R.
ANY  NUMBER OF WORDS CAN BE TRANSFERRED DEPENDING ON
THE BUFFER SIZE AVAILABLE.

FOR A WRITE FUNCTION: IF SW0 IS SET TO 1 THE PROGRAM
WILL ASK FOR THE DATA PATTERN TO BE WRITTEN:
        PATRN?      THE USER SHOULD TYPE IN THE DATA
PATTERN (OCTAL)  TO BE WRITTEN,FOLLOWED BY <CR>. THE
PATTERN WILL BE WRITTEN ON THE DISK. NOTE THE NUMBER
OF WORDS TO BE WRITTEN AND THE DISK  ADDRESS  SHOULD
BE SPECIFIED.

FOR A WRITE CHECK FUNCTION: IF SW 0 IS SET TO 1, THE
USER IS ASKED FOR THE PATTERN TO BE WRITE CHECKED:
PATRN?  THE USER SHOULD TYPE IN THE (OCTAL) PATTERN.

FOR A SEEK FUNCTION: CYL1? CYL2? IN REPLY TO  THESE,
TYPE  IN  THE CYLINDER NUMBERS (OCTAL) BETWEEN WHICH
THE SEEK IS TO BE DONE.  IF A NON EXISTENT  CYLINDER
IS TYPED IN THE QUESTION IS REPEATED AGAIN.


THE FUNCTION IS EXECUTED AGAIN AND  AGAIN.   TO  GET
OUT  OF  THIS LOOP SW 3 SHOULD BE SET, AT THIS POINT
THE QUESTION (FUNCTION?) IS ASKED AGAIN.

IF UPON EXECUTION OF A FUNCTION AN ERROR  OCCURS  IT
IS  REPORTED.  ALL SWITCH OPTIONS WHICH APPLY TO ANY
OTHER ERROR, ALSO APPLY TO THIS ERROR.
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IF ON INPUTTING A NUMBER OR COMMAND A MISTAKE IS MADE, THE INPUT STRING CAN BE DELETED BY HITTING 'RUBOUT' KEY, THE NEW STRING CAN BE TYPED IN AGAIN.

10.0 ERROR INFORMATION

WHENEVER AN ERROR MESSAGE IS PRINTED OUT, ALL REGISTERS AND OTHER DATA PERTAININNG TO THE ERROR ARE ALSO GIVEN. RKDS, RKER...RKBA 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. A BRIEF EXPLANATION OF WHAT IS BEING CHECKED IN THE SUBTEST IS GIVEN AT THE BEGINNING OF EVERY SUBTEST. ALL THE NUMBERS GIVEN WITH ERROR MESSAGES ARE IN OCTAL.

AT TIMES WHEN AN ERROR OCCURS BESIDES THE ERROR PRINTOUT MORE PRINTOUTS OCCUR. THEY ARE GIVEN TO HELP THE USER UNDERSTAND THE PROBLEM.

11.0 UNEXPECTED TIMEOUTS AND RK11 INTERRUPTS

WHEN AN UNEXPECTED TIMEOUT OCCURS, THE PC AT WHICH TIME OUT OCCURRED IS TYPED OUT AND THE PROGRAM HALTS. IF IT IS INTACT, IT CAN BE RESTARTED BY PRESSING CONTINUE.

IF AN UNEXPECTED RK11 INTERRUPT OCCURS THE PROGRAM TYPES OUT THE PC AT WHICH THE INTERRUPT CAME IN AND THEN HALTS. PRESSING CONTINUE WOULD RESTART THE PROGRAM FROM BEGINNING.

12.0 COMMONLY USED SUBROUTINES

A BRIEF EXPLAINATION OF EVERY SUBROUTINE IS GIVEN IN THE LISTINGS (JUST BEFORE THE CODE FOR THAT SUBROUTINE). ALL SUB-ROUTINES ARE LISTED IN THE 'TABLE OF CONTENTS' FOUND AT THE BEGINNING OF LISTINGS. THESE ARE TWO WAYS IN WHICH ROUTINES ARE CALLED, 1. JSR PC,ROUTINE 2. THROUGH AN ENCODED TRAP INSTRUCTION. THE LOWER BYTE OF THE 'TRAP' INSTRUCTION IS USED TO INDEX THROUGH THE TRAP TABLE

($TRPAD) FOR THE STARTING ADDRESS OF THE DESIRED
ROUTINE.

13.0 SAMPLE GRAPH AND SEEK TIMER OUTPUTS

'# OF SEEKS' INDICATES THE NUMBER OF TIMES A PARTICULAR
'SEEK TIME' WAS OBTAINED. NOTE THAT TIMES ARE RECORDED FOR
BOTH FORWARD AND REVERSE SEEKS, BETWEEN A SET OF CYLINDERS.

```
SEEK TIME SCALE FACTOR=0.01 MILI SECS

 #  OF      SEEK    #  OF      SEEK
SEEKS       TIME   SEEKS       TIME

CYLS:0-202
  FRWRD               REVRSE

   100      9075     100        9075

CYLS:0-1
  FRWRD               REVRSE

   100      825     100        1155

CYLS:179-181
  FRWRD               REVRSE

   100      1155     100        1155

CYLS:0-3
  FRWRD               REVRSE

   100      1485     100        1485

CYLS:0-16
  FRWRD               REVRSE

   100      3135     100        3135

CYLS:0-32
  FRWRD               REVRSE

   100      3795     100        3795

CYLS:0-100
  FRWRD               REVRSE

   100      5775     100        5775
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D02

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MD-11-DZRKL-E, RK11-RK05 DYNAMIC TEST   MACY11 30(1046)  14-JUL-77  08:03  PAGE 16
DZRKLE.P11    26-APR-77 12:27

               X AXIS - SEEK TIME - MILI SECS          **SAMPLE OUTPUT**
               Y AXIS - CYLINDER SEEKED FROM 0

     0    10   20   30   40   50   60   70   80   90   100  110  120  130
     I----I----I----I----I----I----I----I----I----I----I----I----I----I
  0-  X
  1-    X
  2-      X
  3-       X
  4-         X
  6-         X
  8-           X
 10-            X
 12-            X
 14-              X
 16-              X
 18-              X
 20-                X
 25-                 X
 30-                 X
 35-                   X
 40-                     X
 45-                     X
 50-                      X
 55-                      X
 60-                        X
 65-                        X
 70-                          X
 75-                          X
 80-                           X
 85-                           X
 90-                             X
 95-                             X
100-                             X
105-                               X
110-                               X
115-                                X
120-                                X
125-                                  X
130-                                  X
135-                                   X
140-                                   X
145-                                     X
150-                                     X
155-                                       X
160-                                       X
165-                                        X
170-                                        X
175-                                          X
180-                                          X
185-                                            X
190-                                            X
195-                                             X
200-                                             X
202-                                             X
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.TITLE  MD-11-DZRKL-E, RK11-RK05 DYNAMIC TEST
;*COPYRIGHT (C) 1974,1977
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;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY JIM KAPADIA
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
;*
;*JANUARY 1975
;*
;*REVISED MARCH 1976 BY TOM SAWYER
;*REVISED BY CHUCK HESS, AUGUST, 1976

.SBTTL  OPERATIONAL SWITCH SETTINGS
;*
;*      SWITCH                  USE
;*      ------          --------------------
;*        15            HALT ON ERROR
;*        14            LOOP ON TEST
;*        13            INHIBIT ERROR TYPEOUTS
;*        12            CYCLE ON ERROR TO PREVIOUS 'SCOPE'
;*        10            BELL ON ERROR
;*         9            LOOP ON ERROR
;*         8            SELECT TEST TYPED IN BY USER
;*         6            EXECUTE THE SEEK TIMER (TEST 11)
;*         5            TYPE THE SEEK TIMER GRAPHS (TEST 11)
;*         4            TYPE THE COMPLETE GRAPH (ALL SEEK TIMES)
;*                      NOTE, OTHERWISE YOU GET SMALL GRAPH
;*         3            TERMINATE FUNCTION SELECTED BY USER
;*                      (FOR FUNCTION SELECTION PROGRAM SA=210)
;*         2            DROP THE DRIVE AFTER MAXIMUM ALLOWABLE
;*                      NUMBER OF ERRORS HAVE OCCURED
;*         0            ASK FOR PATTERN TO BE WRITTEN (OR WRITE
;*                      CHECKED), IN FUNCTION SELECTION PROGRAM
;*        11            DUMP OUT ALL RK11 REGISTERS ON ERROR



;*      YOU ARE ADVISED TO READ THE DOCUMENT FOR THIS PROGRAM.
;*      FUNCTION SELECTION PROGRAM STARTS AT 210.
```

```
                        .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
        000002          SW01=   2
        000001          SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
        100000          BIT15=  100000
        040000          BIT14=  40000
        020000          BIT13=  20000
        010000          BIT12=  10000
        004000          BIT11=  4000
        002000          BIT10=  2000
        001000          BIT09=  1000
        000400          BIT08=  400
        000200          BIT07=  200
        000100          BIT06=  100
        000040          BIT05=  40
        000020          BIT04=  20
        000010          BIT03=  10
        000004          BIT02=  4
        000002          BIT01=  2
        000001          BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

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

                        .SBTTL  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  002462          JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM

        000210                  .=210
000210  105237  001216          INCB    FFUNC           ;SET FLAG INDICATING SELECTION OF
000214  000137  002462          JMP     @#START         ;FUNCTION PROGRAM.
                        .SBTTL  ACT11 HOOKS

                        ;;*************************************************************
                        ;HOOKS REQUIRED BY ACT11
        000220                  $SVPC=.                 ;SAVE PC
        000046                  .=46
000046  015330                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
        000052                  .=52
000052  000000                  .WORD   0               ;;2)SET LOC.52 TO ZERO
        000220                  .=$SVPC                 ;; RESTORE PC

```

J02

```
                                .SBTTL  COMMON TAGS

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

                 001100                 .=1100
        001100                  $CMTAG:                                 ;;START OF COMMON TAGS
        001100  000000          $PASS:  .WORD   0                       ;;CONTAINS PASS COUNT
        001102     000          $TSTNM: .BYTE   0                       ;;CONTAINS THE TEST NUMBER
        001103     000          $ERFLG: .BYTE   0                       ;;CONTAINS ERROR FLAG
        001104  000000          $ICNT:  .WORD   0                       ;;CONTAINS SUBTEST ITERATION COUNT
        001106  000000          $LPADR: .WORD   0                       ;;CONTAINS SCOPE LOOP ADDRESS
        001110  000000          $LPERR: .WORD   0                       ;;CONTAINS SCOPE RETURN FOR ERRORS
        001112  000000          $ERTTL: .WORD   0                       ;;CONTAINS TOTAL ERRORS DETECTED
        001114     000          $ITEMB: .BYTE   0                       ;;CONTAINS ITEM CONTROL BYTE
        001115     001          $ERMAX: .BYTE   1                       ;;CONTAINS MAX. ERRORS PER TEST
        001116  000000          $ERRPC: .WORD   0                       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
        001120  000000          $GDADR: .WORD   0                       ;;CONTAINS ADDRESS OF 'GOOD' DATA
        001122  000000          $BDADR: .WORD   0                       ;;CONTAINS ADDRESS OF 'BAD' DATA
        001124  000000          $GDDAT: .WORD   0                       ;;CONTAINS 'GOOD' DATA
        001126  000000          $BDDAT: .WORD   0                       ;;CONTAINS 'BAD' DATA
        001130  000000                  .WORD   0                       ;;RESERVED--NOT TO BE USED
        001132  000000                  .WORD   0
        001134     000          $AUTOB: .BYTE   0                       ;;AUTOMATIC MODE INDICATOR
        001135     000          $INTAG: .BYTE   0                       ;;INTERRUPT MODE INDICATOR
        001136  000000                  .WORD   0
        001140  177570          SWR:    .WORD   DSWR                    ;;ADDRESS OF SWITCH REGISTER
        001142  177570          DISPLAY: .WORD  DDISP                   ;;ADDRESS OF DISPLAY REGISTER
        001144  177560          $TKS:   177560                          ;;TTY KBD STATUS
        001146  177562          $TKB:   177562                          ;;TTY KBD BUFFER
        001150  177564          $TPS:   177564                          ;;TTY PRINTER STATUS REG. ADDRESS
        001152  177566          $TPB:   177566                          ;;TTY PRINTER BUFFER REG. ADDRESS
        001154     000          $NULL:  .BYTE   0                       ;;CONTAINS NULL CHARACTER FOR FILLS
        001155     002          $FILLS: .BYTE   2                       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
        001156     012          $FILLC: .BYTE   12                      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
        001157     000          $TPFLG: .BYTE   0                       ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
        001160  000000          $REGAD: .WORD   0                       ;;CONTAINS THE ADDRESS FROM
                                                                        ;;WHICH  ($REG0) WAS OBTAINED
        001162  000000          $REG0:  .WORD   0                       ;;CONTAINS (($REGAD)+0)
        001164  000000          $REG1:  .WORD   0                       ;;CONTAINS (($REGAD)+2)
        001166  000000          $REG2:  .WORD   0                       ;;CONTAINS (($REGAD)+4)
        001170  000000          $REG3:  .WORD   0                       ;;CONTAINS (($REGAD)+6)
        001172  000000          $REG4:  .WORD   0                       ;;CONTAINS (($REGAD)+10)
        001174  000000          $REG5:  .WORD   0                       ;;CONTAINS (($REGAD)+12)
        001176  000000          $REG6:  .WORD   0                       ;;CONTAINS (($REGAD)+14)
        001200  000000          $REG7:  .WORD   0                       ;;CONTAINS (($REGAD)+16)
        001202  000000          $REG10: .WORD   0                       ;;CONTAINS (($REGAD)+20)
        001204  000000          $ESCAPE:0                               ;;ESCAPE ON ERROR ADDRESS
        001206  177607  000377  $BELL:  .ASCIZ  <207><377><377>         ;;CODE FOR BELL
        001212     077          $QUES:  .ASCII  /?/                     ;;QUESTION MARK
        001213     015          $CRLF:  .ASCII  <15>                    ;;CARRIAGE RETURN
        001214  000012          $LF:    .ASCIZ  <12>                    ;;LINE FEED
                                ;;*************************************************************


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                                        ;IN CASE YOU WANT THE OUTPUT TO COME OUT ON LINE PRINTER, (IF YOU HAVE
                                        ;ONE), MAKE THE FOLLOWING CHANGES ABOVE:

                                        ;CHANGE CONTENTS OF '$TPS' TO 177514  (LPT VECTOR)
                                        ;CHANGE CONTENTS OF '$TPB' TO 177516     ( " ")

                                        ;TAGS AND GENERAL DATA AREA

 001216  000000                         FFUNC:  .WORD   0       ;FLAG SET, TO INDICATE ENTRY INTO FUNCTION PROGRAM
 001220  000000                         XXDPMD: .WORD   0       ;IF PROGRAM LOADED BY XXDP, THE
                                                                ;LOWER BYTE HAS THE DRIVE NUMBER
                                                                ;AND THE UPPER BYTE CONTAINS THE RK05 'XXDP' CODE
 001222     000                         LUPSW:  .BYTE   0       ;FLAG, SET TO INDICATE THAT A
                                                                ;PARTICULAR TEST WAS SELECTED BY USER (SW 8)



 001223     000                         DRVDON: .BYTE   0       ;CONTAINS NUMBER OF DRIVES THAT HAVE
                                                                ;BEEN ALREADY CHECKED
 001224     000                         DRIVS:  .BYTE   0       ;CONTAINS TOTAL # OF DRIVES PRESENT

         001226                                 .EVEN


 001226  000000                         DRVPTR: 0               ;CONTAINS POINTER TO INDICATOR STARTING
                                                                ;WHICH CHECKING SHOULD BE DONE FOR NEXT
                                                                ;AVAILABLE DRIVE
 001230  000000                         DRIVAD: 0               ;CONTAINS THE ADDRESS OF THE DRIVE
                                                                ;BEING TESTED

 001232  000000                         DRIV0:  000000          ;THESE ARE FLAGS TO INDICATE
 001234  020000                         DRIV1:  020000          ;THAT A PARTICULAR DRIVE IS
 001236  040000                         DRIV2:  040000          ;PRESENT.  BIT 0 IS SET TO
 001240  060000                         DRIV3:  060000          ;INDICATE THAT.  BITS 13, 14, 15
 001242  100000                         DRIV4:  100000          ;CONTAIN THE LOGICAL DRIVE
 001244  120000                         DRIV5:  120000          ;ADDRESS
 001246  140000                         DRIV6:  140000
 001250  160000                         DRIV7:  160000



 001252  000000                         RETRY1: 0               ;GENERAL REGISTERS
 001254  000000                         RETRY2: 0
 001256  000000                         RETRY3: 0


 001260  000000                         INADR:  0               ;CONTAINS INNER ADDRESS
 001262  000000                         OUTADR: 0               ;CONTAINS OUTER ADDRESS
 001264  000000                         TIMER:  0



 001266  000015                         BUFR:   .BLKW   13.     ;GENERAL BUFFERS
 001320  000015                         BUFR1:  .BLKW   13.
 001352  000015                         BUFR2:  .BLKW   13.

```

```

                                 ;IN CASE, YOU WANT TO USE BUFFERS STARTING AT SOME OTHER MEMORY
                                 ;ADDRESS YOU CAN DO SO BY CHANGING THE FOLLOWING POINTERS.
                                 ;BOTH THE BUFFERS SHOULD BE 768 (DECIMAL) WORDS LONG.

 001404  026446                  PBUF0:  IOBUF0             ;POINTER TO THE STARTING ADDRESS OF THE
                                                            ;BUFFER USED TO READ INTO FROM DIBK.
 001406  031446                  PBUF1:  IOBUF1             ;POINTER TO STARTING ADDRESS OF BUFFER
                                                            ;IN WHICH PATTERNS ARE GENERATED. (WRITING
                                                            ;IS DONE FROM THIS BUFFER)
 001410  000000                  BUFLG0: .WORD   0          ;FLAG FOR 'IOBUF0'
 001412  000000                  BUFLG1: .WORD   0          ;FLAG FOR 'IOBUF1'


 001414  010106                  PAT0:   PTGEN0             ;ADRES OF 'PATRN GENERATOR 0'
                                                            ;ROUTINE
 001416  010170                  PAT1:   PTGEN1             ;ADRES OF 'PATRN GENERATOR 1'

 001420  010272                  PAT2:   PTGEN2             ;ADRES OF 'PATRN GENRATOR 2'

 001422  010334                  PAT3:   PTGEN3             ;ADRES OF 'PATRN GENRATOR 3'

 001424  000000                  PRSPAT: .WORD   0          ;CONTAINS THE POINTER TO THE
                                                            ;ADRES OF 1 OF THE 3 'PATRN
                                                            ;GENRATOR' ROUTINES
 001426  000000                  NXTPAT: .WORD   0          ;SAME AS ABOVE

 001430  000000                  PGSUBR: .WORD   0

 001432  000000                  DSKADR: .WORD   0          ;CONTAINS DISK ADRES (DA)

 001434  000000                  BUSADR: .WORD   0          ;CONTAINS BUS ADRES (BA)

 001436  000000                  WRDCNT: .WORD   0          ;CONTAINS WORD COUNT

 001440  000000                  WDSKAD: .WORD   0          ;CONTAINS DISK ADRES

 001442  000000                  WBUSAD: .WORD   0          ;CONTAINS BUS ADRES

 001444  000000                  WWRDCN: .WORD   0          ;CONTAINS WORD COUNT

 001446  000000                  BUFNO:  .WORD   0          ;CONTAINS STARTING ADRES

 001450  000000                  ADRES:  .WORD   0          ;OF A BUFFER

                                 ;RK11 REGISTERS
                                 ;IF FOR ANY REASON THE REGISTER ADDRESSES ARE DIFFERENT FROM
                                 ;THESE (BELOW), THE CONTENTS OF THE APPROPRIATE POINTERS SHOULD
                                 ;BE MODIFIED SO THAT THE CORRECT REGISTER ADDRESS IS USED.


 001452  177400                  RKDS:   177400
 001454  177402                  RKER:   177402
 001456  177404                  RKCS:   177404
 001460  177406                  RKWC:   177406
 001462  177410                  RKBA:   177410
```

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001464  177412          RKDA:   177412
001466  177416          RKDB:   177416

001470  000200          RKPRI:  200                     ;CONTAINS THE CPU LEVEL (4) AT WHICH
                                                        ;RK11 NORMALLY INTERRUPTS.  THIS WORD
                                                        ;SHOULD BE CHANGED IF RK11 IS DESIGNATED
                                                        ;A BR LEVEL OTHER THAN 5.EXP: IF IT
                                                        ;IS CHANGED TO 6, THE CPU LEVEL WOULD
                                                        ;BE 1 LESS (5) & HENCE THIS WORD
                                                        ;SHOULD BE 240 (BIT POSITIONS ARE
                                                        ;IDENTICAL TO THE PRIORITY BITS IN PSW)
001472  000220          RKVEC:  220                     ;CONTAINS THE NORMAL VECTOR ADDRESS
                                                        ;TO WHICH THE RK11 INTERRUPTS.  IF THE
                                                        ;VECTOR ADDRESS HAS BEEN CHANGED, MODIFY
                                                        ;THIS WORD.




001474  000000          INDX1:  0                       ;GENERAL INDEX REGISTERS
001476  000000          INDX2:  0
001500  000000          INDX3:  0
001502  000000          INDX4:  0

001504  000000          ERCNT1: 0                       ;GENERAL REGISTERS
001506  000000          ERCNT2: 0                       ;GENERAL REGISTERS
001510  000000          ERCNT3: 0                       ;GENERAL REGISTERS
001512  000000          ERCNT4: 0
001514  000000          ERCNT5: 0
001516  000000          ERCNT6: 0
001520  000000          ERCNT7: 0
001522  000000          ERCNT8: 0


                        ;*THE FOLLOWING TABLE CONTAINS THE CYLINDERS BETWEEN WHICH THE SEEKS WILL BE
                        ;*TIMED. THEY HAVE BEEN SELECTED TO GIVE SOME TYPICAL SEEKS TIMES FOR THE
                        ;*3 SEEK SPEEDS. IF FOR  ANY REASON YOU WANT  TO TIME SEEKS BETWEEN ANY
                        ;*OTHER SET OF CYLINDERS, MAKE CHANGES IN THE CORRESPONDING SEEK CYLINDER
                        ;*ADDRESSES.

                        ;*OUTER CYLINDER ADDRESS, FROM WHERE SEEK WILL BE DONE
001524  000000          SOAD:   0               ;CYLINDER 0
001526  000000                  0               ;  "  0
001530  013140                  13140           ;  "  179
001532  000000                  0               ;  "  0
001534  000000                  0               ;  "  0
001536  000000                  0               ;  "  0
001540  000000                  0               ;  "  0


                        ;*INNER ADDRESS, TO WHICH SEEK WILL BE DONE
001542  014500          SIAD:   14500           ;CYLINDDER 202, LAST
001544  000040                  40              ;  "  1
001546  013240                  13240           ;  "  181
001550  000140                  140             ;  "  3
001552  001000                  1000            ;  "  16
001554  002000                  2000            ;  "  32
```

```
001556  006200                            6200              ;  "  100



                                          ;FOLLOWING POINTERS ARE USED TO TRANSFER CONROL TO THE
                                          ;TEST SELECTED BY USING SW 8.  IF ANY MORE TESTS ARE
                                          ;ADDED TO THIS PROGRAM ADDITIONAL POINTERS SHOULD BE INSERTED.
001560  004262                            PT1:    TST1+2
001562  004626                            PT2:    TST2+2
001564  005124                            PT3:    TST3+2
001566  005614                            PT4:    TST4+2
001570  006622                            PT5:    TST5+2
001572  007360                            PT6:    TST6+2
001574  010440                            PT7:    TST7+2
001576  012176                            PT10:   TST10+2
001600  012740                            PT11:   TST11+2


                                          ;MESSAGES & ASCII STRINGS
001602  005015  044523  000116            MSG1:   .ASCIZ  <15><12>/SIN/

001610  005015  045523  000105            MSG2:   .ASCIZ  <15><12>/SKE/

001616  005015  042524  052123            MSG3:   .ASCIZ  <15><12>/TEST # ABORTED:/
001624  021440  040440  047502
001632  052122  042105  000072

001640  005015  051120  043517            MSG4:   .ASCIZ  <15><12>/PROG ABORTED/
001646  040440  047502  052122
001654  042105     000

001657     015  051012  040505            MSG5:   .ASCIZ  <15><12>/READ HDRS OK FROM CYLB ABOVE/
001664  020104  042110  051522
001672  047440  020113  051106
001700  046517  041440  046131
001706  020102  041101  053117
001714  000105

001716  054105  041520  042124            MSG6:   .ASCIZ  /EXPCTD HDR= /
001724  044040  051104  020075
001732     000

001733     040  050040  036503            MSG7:   .ASCIZ  /  PC= /
001740  000040

001742  005015  047103  051124            MSG10:  .ASCIZ  <15><12>/CNTRL RDY DIDN'T SET/
001750  020114  042122  020131
001756  044504  047104  052047
001764  051440  052105     000

001771     123  041505  051124            MSG11:  .ASCIZ  /SECTR  EXPC P-HDR  RECV P-HDR/
001776  020040  054105  041520
002004  050040  044055  051104
002012  020040  042522  053103
002020  050040  044055  051104
002026     000
```

```
002027      015  051012  053457  MSG12:  .ASCIZ  <15><12>"R/W/S RDY NOT SET"
002034   051457  051040  054504
002042   047040  052117  051440
002050   052105     000

002053      040  052040  054522  MSG13:  .ASCIZ  /  TRY #:/
002060   021440  000072


002064   005015  051104  053111  MSG14:  .ASCIZ  <15><12>/DRIVE /
002072   020105     000

002075      040  020040          BLNK13: .ASCII  /   /
002100      040                  BLNK10: .ASCII  / /
002101      040                  BLNKS9: .ASCII  / /
002102      040                  BLNKS8: .ASCII  / /
002103      040                  BLNKS7: .ASCII  / /
002104      040                  BLNKS6: .ASCII  / /
002105      040                  BLNKS5: .ASCII  / /
002106      040                  BLNKS4: .ASCII  / /
002107      040                  BLNKS3: .ASCII  / /
002110      040                  BLNKS2: .ASCII  / /
002111      040     000          BLNKS1: .ASCIZ  / /

         002114                          .EVEN
002114   000000                  FDRIVE: 0
002116   000000                  FDRVE1: 0
002120   000000                  DRHOLD: 0
```

```
                                        .SBTTL  ERROR POINTER TABLE

                                        ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                        ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                        ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                        ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                        ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                        ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                        ;*      DH              ;;POINTS TO THE DATA HEADER
                                        ;*      DT              ;;POINTS TO THE DATA
                                        ;*      DF              ;;POINTS TO THE DATA FORMAT

        002122                          $ERRTB:


                                                ;ERROR ITEMS TABLE
                                                ;
                                                ;
                                                ;
                                        ;ITEM   1

        002122  024334                          EM1     ;CNTRL RDY DIDN'T SET AFTER SEEK
        002124  025500                          DH1     ;PC      RKCS    RKER    RKDS    RKDA
        002126  026334                          DT1     ;$ERRPC  $REG0   $REG1   $REG2   $REG3
        002130  000000                          0

                                        ;ITEM   2

        002132  024373                          EM2     ;SIN ON SEEK
        002134  025500                          DH1     ;PC      RKCS    RKER    RKDS    RKDA
        002136  026334                          DT1     ;$ERRPC  $REG0   $REG1   $REG2   $REG3
        002140  000000                          0

                                        ;ITEM   3

        002142  024407                          EM3     ;DRE ON SEEK
        002144  025500                          DH1     ;PC      RKCS    RKER    RKDS    RKDA
        002146  026334                          DT1     ;$ERRPC  $REG0   $REG1   $REG2   $REG3
        002150  000000                          0

                                        ;ITEM   4

        002152  024423                          EM4     ;'ERR' ON SEEK
        002154  025500                          DH1     ;PC      RKCS    RKER    RKDS    RKDA
        002156  026334                          DT1     ;$ERRPC  $REG0   $REG1   $REG2   $REG3
        002160  000000                          0

                                        ;ITEM   5

        002162  024441                          EM5     ;'DRU' ON SEEK; PUT DRIVE ON 'LOAD' BACK TO 'RUN'
        002164  025500                          DH1     ;PC      RKCS    RKER    RKDS    RKDA
        002166  026334                          DT1     ;$ERRPC  $REG0   $REG1   $REG2   $REG3
        002170  000000                          0
```

```
                          ;ITEM   6

002172  024510                    EM6       ;R/W/S RDY NOT SET AFTER SEEK
002174  025500                    DH1       ;PC      RKCS    RKER    RKDS    RKDA
002176  026334                    DT1       ;$ERRPC $REG0   $REG1   $REG2   $REG3
002200  000000                    0

                          ;ITEM   7

002202  024545                    EM7       ;SIN ON WRITE FMT
002204  025576                    DH7       ;PC      RKCS    RKER    RKDS    RKDA    CYLINDER
002206  026350                    DT7       ;$ERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002210  000000                    0

                          ;ITEM   10

002212  024564                    EM10      ;'ERR' ON DOING WRITE FMT
002214  025576                    DH7       ;PC      RKCS    RKER    RKDS    RKDA    CYLINDER
002216  026350                    DT7       ;$ERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002220  000000                    0

                          ;ITEM   11

002222  024615                    EM11      ;SIN ON READ FMT
002224  025653                    DH11      ;PC      RKCS    RKER    RKDS    RKDA:
                                            ;DRV#    CYL     SUR     SEC
002226  026366                    DT11      ;$ERRPC $REG0   $REG1   $REG2
                                            ;$REG4  $REG5   $REG6   $REG7
002230  000000                    0

                          ;ITEM   12

002232  024633                    EM12      ;'ERR' ON READ FMT
002234  025576                    DH7       ;PC      RKCS    RKER    RKDS    RKDA    CYLINDER
002236  026350                    DT7       ;$ERRPC $REG0   $REG1   REG2    $REG3   $REG4
002240  000000                    0

                          ;ITEM   13

002242  024655                    EM13      ;WRONG HEADERS FROM 'SEC #
002244  025750                    DH13      ;SECTOR #        HEADER RECVD
002246  000000                    0
002250  015456                    ESR13     ;USE THIS SUBROUTINE FOR TYPING OUT ERROR DATA

                          ;ITEM   14

002252  024704                    EM14      ;ERROR ON IMPLIED SEEK FROM CYLA TO CYLB
002254  025767                    DH14      ;PC      CYLA    CYLB    RKER    RKDS    TRY#
002256  026350                    DT7       ;$ERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002260  000000                    0

                          ;ITEM   15

002262  024757                    MS15      ;READ WRONG HDRS FROM CYLB ABOV
002264  025750                    DH13      ;SEC#    HEADER RECVD
002266  000000                    0
```

```
002270  015364                    ESR15   ;GO TO "ESR15" FOR TYPING OUT

                          ;ITEM   16

002272  025021                    EM16    ;READ WRONG, FIRST WORD FROM SECTOR 0, 'CYLB' (ON IMPLIED SEEK FROM CYLA
002274  026046                    DH16    ;PC      CYLA    CYLB    EXPCT   RECVD   TRY#
002276  026350                    DT7     ;$ERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002300  000000                    0

                          ;ITEM   17

002302  025126                    MS17    ;READ FIRST WORD FROM SECTOR 1, 'CYLB' ABOVE
002304  026123                    DH17    ;PC      CYLB    EXPCT   RECVD
002306  026410                    DT17    ;$ERRPC $REG0   $REG1   $REG2
002310  000000                    0

                          ;ITEM   20

002312  025174                    EM20    ;READ WRONG HEADER ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'
002314  025750                    DH13    ;SECTOR # HEADER RECVD
002316  000000                    0
002320  015532                    ESR20   ;USE THIS SUBROUTINE FOR TYPING OUT ERROR DATA


                          ;ITEM   21

002322  025262                    EM21    ;EROR ON DOING WRITE ON DSK
002324  025500                    DH1     ;PC      RKCS    RKER    RKDS    RKDA
002326  026334                    DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
002330  000000                    0

                          ;ITEM   22

002332  025316                    EM22    ;SIN ON DOING WRITE
002334  025500                    DH1     ;PC      RKCS    RKER    RKDS    RKDA
002336  026334                    DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
002340  000000                    0

                          ;ITEM   23

002342  025341                    EM23    ;HE ON DOING READ
002344  025653                    DH11    ;PC      RKCS    RKER    RKDS    RKDA:
                                          ;DRV#    CYL     SUR     SEC
002346  026366                    DT11    ;$ERRPC $REG0   $REG1   $REG2
                                          ;$REG4  $REG5   $REG6   $REG7
002350  000000                    0

                          ;ITEM   24

002352  025362                    EM24    ;CSE ON READ
002354  026161                    DH24    ;PC      TRY#    RKCS    RKER    RKDS    RKDA:
                                          ;DRV#    CYL     SUR     SEC
002356  026422                    DT24    ;$ERRPC $REG10  $REG0   $REG1   $REG2
                                          ;$REG4  $REG5   $REG6   $REG7
002360  000000                    0
```

```
                                  ;ITEM   25

        002362  025376                   EM25     ;DATA ERROR ON READ FROM DISK ADDRESS
        002364  026266                   DH25     ;WORD#  EXPCT   RECVD   CYL     SUR     SEC
        002366  000000                   0
        002370  015620                   ESR25    ;USE THIS ROUTINE FOR ERROR REPORTING

                                  ;ITEM   26

        002372  025440                   EM26     ;HE ON WRT CHK
        002374  025653                   DH11     ;PC     RKCS    RKER    RKDS    RKDA:
                                                  ;DRV#   CYL     SUR     SEC
        002376  026366                   DT11     ;$ERRPC $REG0   $REG1   $REG2
                                                  ;$REG4  $REG5   $REG6   $REG7
        002400  000000                   0

                                  ;ITEM   27

        002402  025456                   EM27     ;WRT CHK EROR
        002404  026161                   DH24     ;PC     TRY#    RKCS    RKER    RKDS    RKDA:
                                                  ;DRV#   CYL     SUR     SEC
        002406  026422                   DT24     ;$ERRPC $REG10  $REG0   $REG1   $REG2
                                                  ;$REG4  $REG5   $REG6   $REG7
        002410  000000                   0

                                  ;ITEM   30

        002412  025473                   EM30     ;ERROR
        002414  025500                   DH1      ;PC     RKCS    RKER    RKDS    RKDA
        002416  026334                   DT1      ;$ERRPC $REG0   $REG1   $REG2   $REG3
        002420  000000                   0
```

```

                                   ;THIS IS THE HANDLER FOR UNEXPECTED TIME OUT. PRESSING CONTINUE WILL
                                   ;RESTART THE PROGRAM.


002422  011600                     BADTMO: MOV     (SP),R0 ;SAVE PC WHERE TIME OUT OCCURED
002424  005740                             TST     -(R0)
002426  022626                             CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
002430  104401  002436                     TYPE    ,65$             ;;TYPE ASCIZ STRING
002434  000407                             BR      64$              ;;GET OVER THE ASCIZ
                                   ;;65$:  .ASCIZ  <15><12>/TIMOUT:PC=/
002454                             64$:
002454  010046                             MOV     R0,-(SP)         ;SET UP FOR TYPING OUT PC
002456  104402                             TYPOC                    ;GO TYPE OUT OCTAL PC
002460  000000                             HALT

002462  000005                     START:  RESET                    ;CLEAR THE BUS
                                   ;;GIVE DRIVES TIME TO RELOAD HEADS IN CASE OF AN APT START
002464  023737  000042  000046             CMP     @#42,@#46                ;ARE WE IN ACT11 AUTO MODE?
002472  001016                             BNE     STARTA                   ;NO, SKIP DELAY
002474  005077  176764                     CLR     @RKDA                    ;SELECT UNIT 0
002500  012700  000250                     MOV     #250,R0                  ;WAIT FOR..
002504  032777  000200  176740     20$:    BIT     #200,@RKDS               ;DRIVE READY..
002512  001006                             BNE     STARTA                   ;IN CASE..
002514  005001                             CLR     R1                       ;OF APT..
002516  005301                             DEC     R1                       ;START, BUT..
002520  001376                             BNE     .-2                      ;DON'T WAIT..
002522  005300                             DEC     R0                       ;FOREVER.
002524  001367                             BNE     20$
002526  000000                             HALT                             ;RKDS BIT 7 (DIRVE READY) NEVER SET
002530                             STARTA:
                                   .SBTTL  INITIALIZE THE COMMON TAGS
                                   ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
002530  012706  001100                     MOV     #$CMTAG,R6       ;;FIRST LOCATION TO BE CLEARED
002534  005026                             CLR     (R6)+            ;;CLEAR MEMORY LOCATION
002536  022706  001140                     CMP     #SWR,R6 ;;DONE?
002542  001374                             BNE     .-6              ;;LOOP BACK IF NO
002544  012706  001100                     MOV     #STACK,SP        ;;SETUP THE STACK POINTER
                                   ;;INITIALIZE A FEW VECTORS
002550  012737  017006  000020             MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
002556  012737  000340  000022             MOV     #340,@#IOTVEC+2  ;;LEVEL 7
002564  012737  017162  000030             MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
002572  012737  000340  000032             MOV     #340,@#EMTVEC+2  ;;LEVEL 7
002600  012737  022702  000034             MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
002606  012737  000340  000036             MOV     #340,@#TRAPVEC+2;LEVEL 7
002614  012737  023010  000024             MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
002622  012737  000340  000026             MOV     #340,@#PWRVEC+2  ;;LEVEL 7
002630  005037  001204                     CLR     $ESCAPE          ;;CLEAR THE ESCAPE ON ERROR ADDRESS
002634  112737  000001  001115             MOVB    #1,$ERMAX        ;;ALLOW ONE ERROR PER TEST
002642  012737  002642  001106             MOV     #.,$LPADR        ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
002650  012737  002650  001110             MOV     #.,$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.
002656  013746  000004                     MOV     @#ERRVEC,-(SP)   ;;SAVE ERROR VECTOR
002662  012737  002716  000004             MOV     #64$,@#ERRVEC    ;;SET UP ERROR VECTOR
002670  012737  177570  001140             MOV     #DSWR,SWR        ;;SETUP FOR A HARDWARE SWICH REGISTER
```

```
002676  012737  177570  001142           MOV     #DDISP,DISPLAY    ;;AND A HARDWARE DISPLAY REGISTER
002704  022777  177777  176226           CMP     #-1,@SWR          ;;TRY TO REFERENCE HARDWARE SWR
002712  001012                           BNE     66$               ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                   ;;AND  THE HARDWARE SWR IS NOT = -1
002714  000403                           BR      65$               ;;BRANCH IF NO TIMEOUT
002716  012716  002724           64$:    MOV     #65$,(SP)         ;;SET UP FOR TRAP RETURN
002722  000002                           RTI
002724  012737  000176  001140   65$:    MOV     #SWREG,SWR        ;;POINT TO SOFTWARE SWR
002732  012737  000174  001142           MOV     #DISPREG,DISPLAY
002740  012637  000004           66$:    MOV     (SP)+,@#ERRVEC    ;;RESTORE ERROR VECTOR

002744  004737  020622                   JSR     PC,$TKINT         ;INITIALIZE THE TTY HANDLER
002750  023737  000042  000046           CMP     @#42,@#46                 ;ARE WE IN ACT11 AUTO MODE?
002756  001416                           BEQ     69$                       ;YES, SKIP TITLE
                                 .SBTTL  TYPE PROGRAM NAME
                                 ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
002760  005227  177777                   INC     #-1               ;;FIRST TIME?
002764  001043                           BNE     67$               ;;BRANCH IF NO
002766  104401  003024                   TYPE    ,68$              ;;TYPE ASCIZ STRING
                                 .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
002772  005737  000042                   TST     @42               ;;ARE WE RUNNING UNDER XXDP/ACT?
002776  001006                           BNE     69$               ;;BRANCH IF YES
003000  023727  001140  000176           CMP     SWR,#SWREG        ;;SOFTWARE SWITCH REG SELECTED?
003006  001005                           BNE     70$               ;;BRANCH IF NO
003010  104406                           GTSWR                     ;;GET SOFT-SWR SETTINGS
003012  000403                           BR      70$
003014  112737  000001  001134   69$:    MOVB    #1,$AUTOB         ;;SET AUTO-MODE INDICATOR
003022                           70$:
003022  000424                           BR      67$               ;;GET OVER THE ASCIZ
                                 ;;68$:  .ASCIZ  <CRLF>/RK11 DYNAMIC TEST/<15><12>/MAINDEC-11-DZRKL-E/<CRLF>
003074                           67$:
003074  105737  001216           START1: TSTB    FFUNC             ;FUNCTION PROGRAM SELECTED?
003100  001404                           BEQ     7$                ;NO
003102  105037  001216                   CLRB    FFUNC             ;YES, CLEAR THE FLAG
003106  000137  023172                   JMP     @#FUNBEG          ;GO TO 'FUNTION SELECTION PROGRAM'
003112  012700  001220           7$:     MOV     #XXDPMD,R0        ;CLEAR FLAGS FROM
003116  105020                   5$:     CLRB    (R0)+             ;'XXDPMD' TO 'DRIVAD'
003120  020027  001232                   CMP     R0,#DRIVAD+2
003124  001374                           BNE     5$
003126  012701  177770                   MOV     #-10,R1
003132  042720  000003           6$:     BIC     #3,(R0)+          ;CLEAR BIT 0'S IN 'DRIVE
003136  005201                           INC     R1                ;PRESENT' FLAGS.
003140  001374                           BNE     6$

                                 ;THE FOLLOWING CODE FINDS OUT THE PROGRAM CONTROL MODE:
                                 ;PAPER TAPE (MANUAL), ACT11, RKDP CHAIN OR DUMP

003142  122737  000002  000041           CMPB    #2,41             ;LOADED FROM AN RK05 ?
003150  001160                           BNE     ST2               ;BR IF NOT
003152  013737  000040  001220           MOV     40,XXDPMD         ;GET DEVICE INDICATOR AND DRIVE ADDRESS OF
                                                                   ;LOADING RK05
003160  122737  000010  001220           CMPB    #10,XXDPMD        ;DRIVE ADDRESS 7 OR LESS ?
003166  101002                           BHI     2$                ;BR IF YES
003170  105037  001220                   CLRB    XXDPMD            ;DRIVE ZERO LOADED THE PROGRAM
003174  005737  000042           2$:     TST     42                ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
003200  001424                           BEQ     3$                ;BR IF NEITHER
```

```
003202  104401  003210                          TYPE    ,65$              ;;TYPE ASCIZ STRING
003206  000413                                  BR      64$               ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>/NOT TESTING DRIVE /
003236                                  64$:
003236  005046                                  CLR     -(SP)             ;CLEAR WORD ON STACK
003240  113716  001220                          MOVB    XXDPMD,(SP)       ;GET DRIVE ADDRESS
003244  104403                                  TYPOS                     ;TYPE THE ADDRESS
003246     001                                  .BYTE   1                 ;ONLY 1 CHARACTER
003247     000                                  .BYTE   0                 ;SUPRESS LEADING ZEROS
003250  000520                                  BR      ST2               ;GET NUMBER OF DRIVES
003252  005227  177777                  3$:     INC     #-1               ;FIRST TIME THROUGH HERE ?
003256  001115                                  BNE     ST2               ;BR IF NOT FIRST TIME
003260  104401  003266                          TYPE    ,67$              ;;TYPE ASCIZ STRING
003264  000411                                  BR      66$               ;;GET OVER THE ASCIZ
                                        ;;67$:  .ASCIZ  <15><12>/TO TEST DRIVE /
003310                                  66$:
003310  005046                                  CLR     -(SP)             ;CLEAR WORD ON THE STACK
003312  113716  001220                          MOVB    XXDPMD,(SP)       ;GET DRIVE ADDRESS
003316  104403                                  TYPOS                     ;TYPE THE DRIVE ADDRESS
003320     001                                  .BYTE   1                 ;ONLY 1 CHARACTER
003321     000                                  .BYTE   0                 ;SUPRESS LEADING ZEROS
003322  104401  003330                          TYPE    ,69$              ;;TYPE ASCIZ STRING
003326  000431                                  BR      68$               ;;GET OVER THE ASCIZ
                                        ;;69$:  .ASCIZ  / HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT/<15><12>
003412                                  68$:
003412  104401  003420                          TYPE    ,71$              ;;TYPE ASCIZ STRING
003416  000435                                  BR      70$               ;;GET OVER THE ASCIZ
                                        ;;71$:  .ASCIZ  /WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM/
003512                                  70$:


003512  012737  002422  000004          ST2:    MOV     #BADTMO,ERRVEC    ;SET TIMEOUT VECTOR FOR
                                                                          ;UNEXPECTED TIME OUT

                                        ;THIS CODE FINDS WHICH DRIVES ARE PRESENT & PRINTS OUT THE DRIVE
                                        ;DRIVE NUMBERS THAT WERE FOUND ON LINE.

003520  104401  003526                          TYPE    ,65$              ;;TYPE ASCIZ STRING
003524  000411                                  BR      64$               ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>/DRIVES PRESENT/
003550                                  64$:
003550  105037  001224                          CLRB    DRIVS             ;INITIALIZE NO. OF DRVS PRESENT
003554  005001                                  CLR     R1
003556  012702  001232                          MOV     #DRIV0,R2
003562  005003                                  CLR     R3                ;INITIALIZE COUNT TO 0
003564  005737  001220                  1$:     TST     XXDPMD            ;LOADED FROM AN RK05 ?
003570  001403                                  BEQ     6$                ;BR IF NOT
003572  120337  001220                          CMPB    R3,XXDPMD         ;CHECKING THE LOAD DRIVE ?
003576  001411                                  BEQ     2$                ;BR IF YES
003600  010177  175660                  6$:     MOV     R1,@RKDA          ;ADRES A DRIVE
003604  105777  175642                          TSTB    @RKDS             ;IS IT PRESENT?
003610  100004                                  BPL     2$                ;NO, BRANCH
003612  105237  001224                          INCB    DRIVS             ;INCREMENT TOTAL # OF DRVS
003616  052712  000001                          BIS     #1,(R2)           ;SET FLAG INDICATING THIS DRV PRSNT
003622  005722                          2$:     TST     (R2)+
003624  005203                                  INC     R3                ;INCREMENT COUNT
```

```
003626  062701  020000                  ADD     #20000,R1           ;ADRES THE NXT DRV
                                                                    ;CHKD ALL 8 DRIVES?
003632  001354                          BNE     1$                  ;IF NOT, GO CHK IF NEXT DRV PRSNT

003634  004737  024250                  JSR     PC,SIZEF            ;FIND WHICH ARE FS
003640  105737  001224                  TSTB    DRIVS               ;WERE ANY DRIVES FOUND?
003644  001010                          BNE     3$                  ;YES, BRANCH
003646  104401  003654                  TYPE    ,67$                ;;TYPE ASCIZ STRING
003652  000403                          BR      66$                 ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  / NONE/
003662                          66$:
003662  000137  015246                  JMP     $EOP                ;IF NONE WERE FOUND, GO
                                                                    ;TO THE END OF PROGRAM
003666  005002                  3$:     CLR     R2                  ;DRIVE NUMBER
003670  012700  001232                  MOV     #DRIV0,R0           ;TABLE OF AVAIL DRIVES
003674  105710                  5$:     TSTB    (R0)                ;DRIVE HERE?
003676  001414                          BEQ     4$                  ;NO
003700  104401                          TYPE
003702  001213                          $CRLF
003704  010246                          MOV     R2,-(SP)            ;PUSH NO ON THE STACK
003706  104403                          TYPOS                       ;TO TYPE OCTAL NO.
003710     001                          .BYTE   1                   ;TYPE 1 DIGIT, SUPRESS LDG 0'S
003711     000                          .BYTE   0
003712  032710  000002                  BIT     #2,(R0)             ;IS IT RK05F?
003716  001404                          BEQ     4$                  ;NO
003720  104401  003726                  TYPE    ,69$                ;;TYPE ASCIZ STRING
003724  000401                          BR      68$                 ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  /F/
003730                          68$:
003730  005202                  4$:     INC     R2                  ;POINT TO NEXT DRIVE #
003732  005720                          TST     (R0)+               ;NEXT DRIVE IN TABLE
003734  020027  001251                  CMP     R0,#DRIV7+1         ;ALL DONE?
003740  002755                          BLT     5$                  ;NO, CHECK REST

                                ;FIND OUT THE FIRST (FROM 0-7) DRIVE THAT IS PRESENT.  PUT THE ADDRESS
                                ;OF THAT DRIVE IN 'DRIVAD'.  INDICATE THAT DRIVE # WILL
                                ;BE TESTED.

003742  012737  001232  001226  ST3:    MOV     #DRIV0,DRVPTR
003750  105037  001223                  CLRB    DRV0ON
003754  005037  001230                  CLR     DRIVAD
003760  105037  001102          NXTDRV: CLRB    $TSTNM              ;RESET TEST NUMBER TO 1
003764  005037  001112                  CLR     $ERTTL              ;CLEAR ERROR COUNT FOR THIS DRIVE
003770  013701  001226                  MOV     DRVPTR,R1
003774  032721  000001          1$:     BIT     #1,(R1)+            ;IS THIS DRIVE PRESENT?
004000  001005                          BNE     2$                  ;YES, BRANCH
004002  020127  001252          4$:     CMP     R1,#DRIV7+2         ;CHECKED THE WHOLE LIST?
004006  001372                          BNE     1$                  ;NO
004010  000137  015246                  JMP     $EOP                ;YES, EXIT
004014  010137  001226          2$:     MOV     R1,DRVPTR           ;NO, GO AHEAD
004020  014104                          MOV     -(R1),R4            ;GET DRIVE NO. TO BE TESTED
004022  005037  002116                  CLR     FDRVE1
004026  005037  002114                  CLR     FDRIVE              ;SHOWS F IF -1
004032  032704  000002                  BIT     #2,R4               ;RK-05F?
004036  001410                          BEQ     7$                  ;NO
004040  005237  002116                  INC     FDRVE1              ;SHOWS F
```

```
004044  032704  020000                       BIT     #20000,R4          ;EVEN DRIVE?
004050  001003                               BNE     7$                 ;NO
004052  012737  177777  002114               MOV     #-1,FDRIVE         ;RKO5F AND EVEN
004060  042704  000003               7$:     BIC     #3,R4
004064  010437  001230                       MOV     R4,DRIVAD          ;SET UP DRIVE ADRES
004070  104401  002064                       TYPE    ,MSG14
004074  000241                               CLC
004076  006104                               ROL     R4                 ;TYPE OUT THE DRIVE NO.
004100  006104                               ROL     R4
004102  006104                               ROL     R4
004104  006104                               ROL     R4
004106  010446                               MOV     R4,-(SP)
004110  104403                               TYPOS
004112     001                               .BYTE   1
004113     000                               .BYTE   0

004114  005737  002116                       TST     FDRVE1             ;RK-05F?
004120  001404                               BEQ     6$                 ;NO
004122  104401  004130                       TYPE    ,65$               ;;TYPE ASCIZ STRING
004126  000401                               BR      64$                ;;GET OVER THE ASCIZ
                                     ;;65$:  .ASCIZ  /F/
004132                               64$:
004132                               6$:
                                     ;IF SW 8 IS SET THEN FIND OUT WHICH TEST NUMBER IS
                                     ;SELECTED AND JUMP TO THAT TEST.

004132  105037  001222                       CLRB    LUPSW              ;CLEAR FLAG INDICATING SW8 SET
004136  032777  000400  174774               BIT     #SW8,@SWR          ;SW 8 SET?
004144  001445                               BEQ     TST1               ;NO, BRANCH
004146                               5$:
004146  104401  004154                       TYPE    ,67$               ;;TYPE ASCIZ STRING
004152  000410                               BR      66$                ;;GET OVER THE ASCIZ
                                     ;;67$:  .ASCIZ  <15><12>/OCTAL TEST#?/
004174                               66$:
004174  104412                               RDOCT
004176  012600                               MOV     (SP)+,R0
004200  001762                               BEQ     5$
004202  020027  000011                       CMP     R0,#11             ;CHECK TYPED IN TEST #
004206  003357                               BGT     5$                 ;IS LEGAL, IF NOT ASK
004210  110037  001102                       MOVB    R0,$TSTNM
004214  005300                               DEC     R0                 ;FORM POINTERS FOR THE TEST #
004216  006300                               ASL     R0
004220  016037  001560  001106               MOV     PT1(R0),$LPADR     ;ADJUST POINTERS FOR SCOPE
004226  013737  001106  001110               MOV     $LPADR,$LPERR      ;LOOP, ETC.
004234  105237  001222                       INCB    LUPSW              ;SET FLAG INDICATING TEST #
                                                                        ;SELECTED
004240  000177  174642                       JMP     @$LPADR            ;GO TO THE TEST SELECTED






                                     ;ON RECOVERY FROM POWER FALIURE RETURN HERE

004244  005000                       PWRFL:  CLR     R0
004246  005001                               CLR     R1
```

```
004250  005201                      1$:     INC     R1
004252  001376                              BNE     1$
004254  105200                              INCB    R0
004256  001374                              BNE     1$




                                    ;;*******************************************************************
                                    ;*TEST 1          CHECK INNER LIMIT SWITCH & ELECTROMECHANICAL INTEGRITY
                                            ;*THIS TEST PERFORMS 200(8) PURE SEEKS FROM CYLINDER 0
                                            ;*TO CYLINDER 312 AND BACK TO 0.  IT IS SUPPOSED TO
                                            ;*CHECK THE INNER LIMIT SWITCH AND THE MECHANICAL
                                            ;*INTEGRITY OF THE DRIVE.  NOTE THAT A VISUAL CHECK FOR
                                            ;ANY MECHANICAL FAILURES WOULD BE VERY HELPFUL.
                                    ;;*******************************************************************
004260  000004                      TST1:   SCOPE
004262  005000                              CLR     R0                      ;INITIALIZE COUNT
004264  005001                              CLR     R1                      ;INITIALIZE COUNT FOR # OF SEEKS
004266  005002                              CLR     R2                      ;CONTAINS SEEK ADRES
004270  012737  004322  001110              MOV     #20$,$LPERR             ;SET RETURN ADRES FOR LUPING
                                                                            ;ON ERROR
004276  012703  001266                      MOV     #BUFR,R3                ;INITIALIZE POINTER TO THE TABLE
004302  012704  177767                      MOV     #-11,R4                 ;ALLOW ONLY 9 CNTRL-RDY, SIN, OR R/W/S RDY ERORS
004306  012705  177770                      MOV     #-10,R5                 ;ALLOW ONLY 8 DRU+DRE+ERR+DRY ERRORS
004312  000402                              BR      2$

004314  005703                      1$:     TST     R3                      ;WAS THERE ANY ERROR?
004316  001403                              BEQ     3$                      ;NO, BRANCH
004320  005003                      2$:     CLR     R3                      ;CLR EROR FLAG
004322  104415                      20$:    CON.RESET                       ;GO DO CNTRL RESET. SUB ROUTINE
                                                                            ;AT 'CNT.RST'
004324  104416                              DRV.RESET                       ;GO TO 'DRV.RST' & DO DRV RESET

004326  013777  001230  175130      3$:     MOV     DRIVAD,@RKDA            ;ADRES THE DRIVE
004334  050277  175124                      BIS     R2,@RKDA                ;SET SEEK ADRES
004340  105777  175106                      TSTB    @RKDS                   ;DRIVE RDY?
004344  100406                              BMI     21$                     ;YES
004346  004737  016162                      JSR     PC,GT4RG                ;NO, GET RKCS, ER, DS, DA
004352  104030                              ERROR   30                      ;DRIVE RDY BIT IS NOT SET
                                                                            ;IN RKDS
004354  005203                              INC     R3                      ;SET ERROR FLAG
004356  005205                              INC     R5                      ;ALLOW ONLY 5 ERORS, IF MORE
004360  001515                              BEQ     18$                     ;ABORT

004362  012777  000011  175066      21$:    MOV     #11,@RKCS               ;GO, SEEK
004370  005200                      4$:     INC     R0                      ;WAIT FOR CNTRL RDY
004372  001007                              BNE     5$                      ;WAITED LONG?
                                                                            ;IF YES, ERROR
004374  004737  016162                      JSR     PC,GT4RG                ;GO, GET RKCS, ER, DS, DA
004400  104001                              ERROR   1                       ;CNTRL RDY DIDN'T SET AFTER
                                                                            ;SEEK WAS DONE TO CYLINDER
                                                                            ;SHOWN IN RKDA. GO TO 'RK11 LOGIC TESTS'
004402  005203                              INC     R3                      ;SET ERROR FLAG
004404  005204                              INC     R4                      ;EXIT THIS TEST IF THERE R 5 OR MORE ERRORS
004406  001502                              BEQ     18$
004410  000403                              BR      6$
```

```
004412  105777  175040          5$:     TSTB    @RKCS           ;DID CNTRL RDY SET?
004416  100364                          BPL     4$              ;IF NOT WAIT FOR IT

004420  005000                  6$:     CLR     R0              ;INITIALIZE COUNT
004422  032777  000100  175022          BIT     #100,@RKDS      ;R/W/S RDY SET?
004430  001010                          BNE     7$              ;YES
004432  005200                          INC     R0              ;WAIT FOR R/W/S RDY
004434  001372                          BNE     6$+2
004436  004737  016162                  JSR     PC,GT4RG        ;GET RKCS, ER, DS, DA
004442  104006                          ERROR   6               ;R/W/S RDY DID NOT SET WHEN SEEK
                                                                ;WAS DONE TO CYLINDER INDICATED IN RKDA
004444  005203                          INC     R3              ;SET ERROR FLAG
004446  005204                          INC     R4              ;IF MAXM EROR COUNT, ABORT
004450  001461                          BEQ     18$
004452  032777  001000  174772  7$:     BIT     #1000,@RKDS     ;SIN ERROR?
004460  001406                          BEQ     8$              ;NO, BRANCH
004462  004737  016162                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
004466  104002                          ERROR   2               ;SIN ERROR, ON DOING SEEK TO
                                                                ;CYL AS SHOWN IN RKDA
004470  005203                          INC     R3              ;SET ERROR FLAG
004472  005204                          INC     R4              ;IF MAXM EROR COUNT REACHED,
004474  001447                          BEQ     18$             ;ABORT THE TEST
004476  005777  174752          8$:     TST     @RKER           ;DRE ERROR?
004502  100006                          BPL     10$             ;NO, BRANCH

004504  004737  016162                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
004510  104003                          ERROR   3               ;DRE ON DOING SEEK TO CYLINDER
                                                                ;AS SHOWN IN RKDA
004512  005203                          INC     R3              ;SET ERROR FLAG
004514  005205                          INC     R5              ;IF MAXM EROR COUNT REACHED,
004516  001767                          BEQ     8$              ;ABORT THE TEST

004520  005777  174732          10$:    TST     @RKCS           ;'ERR' BIT IN RKCS SET?
004524  100006                          BPL     12$             ;NO, BRANCH
004526  004737  016162                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
004532  104004                          ERROR   4               ;'ERR' IN RKCS SET, ON DOING SEEK
                                                                ;TO CYL AS SHOWN IN RKDA. NOTE
                                                                ;WHICH BIT IN RKER SET?
004534  005203                          INC     R3              ;SET ERROR FLAG
004536  005205                          INC     R5              ;IF MAXM EROR COUNT REACHED,
004540  001425                          BEQ     18$             ;ABORT THE TEST

004542  032777  002000  174702  12$:    BIT     #2000,@RKDS     ;DRU SET?
004550  001406                          BEQ     15$             ;NO, BRANCH
004552  004737  016162                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
004556  104005                          ERROR   5               ;DRU SET, THIS IS AN IRRECOVERABLE
                                                                ;ERROR.  HENCE PUT THE DRIVE ON
                                                                ;LOAD, BACK TO RUN.  DRU ERROR
                                                                ;SHOULD BE CLEARED. IF IT IS NOT
                                                                ;1) THE HEAD POSITION TRANSDVCER LAMP
                                                                ;IS INOPERATIVE
                                                                ;2) OR ERASE OR WRT CURRENT PRESENT
                                                                ;WITHOUT 'WRT GATE'
004560  005203                          INC     R3              ;SET EROR FLAG
004562  005205                          INC     R5              ;ALLOW ONLY 5 ERRORS
004564  001413                          BEQ     18$             ;IF MORE THAN 5
```

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                                                                          ;GO TO THE END OF THE PROGRAM

004566  005702                      15$:    TST     R2                    ;WAS SEEKING TO 0 OR 312?
004570  001402                              BEQ     16$                   ;TO 0, BRANCH
                                                                          ;TO 312,
004572  005002                              CLR     R2                    ;SEEK NXT TIME TO 0
004574  000647                              BR      1$                    ;GO BAK & SK TO 0

004576  012702  014500              16$:    MOV     #14500,R2             ;SEEK NXT TIME TO 312

004602  005201                              INC     R1                    ;DONE SEEKS 200 TIMES?
004604  022701  000200                      CMP     #200,R1

004610  001241                              BNE     1$                    ;IF NOT, GO BAK
004612  000404                              BR      TST2                  ;;EXIT


004614  104401  001640              18$:    TYPE    ,MSG4
004620  000137  015224                      JMP     TST12

                                    ;;*************************************************************
                                    ;*TEST 2            FORMAT THE DISK
                                            ;*THIS PROGRAM ASSUMES AN UNFORMATTED DISK AND ITS
                                            ;*FORMATTING IS DONE IN THIS TEST. A SECTOR IS FORMATTED
                                            ;*AT A TIME.  THE FIRST OWRD OF EVERY SECTOR IS WRITTEN
                                            ;*TO BE A PSUEDO-HEADER CONTAINING THE DRIVE #, CYLINDER
                                            ;*#, SURFACE AND SECTOR #.  THE FOLLOWING IS CHECKED
                                            ;*1.  'SIN' IF 'SIN' OCCURS, A DRIVE RESET IS DONE
                                            ;*AND THE SAME SECTOR IS FORMATTED AGAIN.  THREE
                                            ;*RETRIES ARE DONE BEFORE AN ERROR MESSAGE IS PRINTED.
                                            ;*2.  'ERR' ON FINDING THAT THE 'ERR' BIT SET, RKER
                                            ;*SCANNED TO FIND OUT WHAT CAUSED IT AND THE
                                            ;*ERROR IS REPORTED.
                                    ;;*************************************************************
004624  000004                      TST2:   SCOPE
004626  013737  001230  002120              MOV     DRIVAD,DRHOLD         ;SAVE DRIVE NUMBER
004634  005737  002114                      TST     FDRIVE                ;SEE IF EVEN RK-05F DRIVE
004640  001003                              BNE     11$                   ;YES
004642  005737  002116                      TST     FDRVE1                ;ODD RK-05F?
004646  001125                              BNE     TST3                  ;DO NOT FORMAT IF ODD RK-05F
004650                              11$:
004650  012702  177152                      MOV     #-626,R2              ;203 CYLINDERS, (406 TRAKS)
004654  012703  177764                      MOV     #-14,R3               ;12 SECTORS
004660  012701  177773                      MOV     #-5,R1                ;ALLOW ONLY 5 'SIN' ERRORS
004664  012705  177773                      MOV     #-5,R5                ;ALLOW ONLY 5 'ERR'S
004670  013704  001230                      MOV     DRIVAD,R4             ;STORE ADRES OF DRIVE.
004674  104415                      4$:     CON.RESET
004676  104416                              DRV.RESET                     ;GO TO 'DR-RST' & DO DRIVE RESET
004700  005000                      1$:     CLR     R0                    ;KEEP COUNT OF 'SIN' ERORS
                                                                          ;ALLOW 3 RETRIES ON SIN
004702  005777  174550                      TST     @RKCS                 ;ERR?
004706  100001                              BPL     3$                    ;NO

004710  104415                              CON.RESET                     ;GO TO 'CN-RST' & DO CONTROL RESET

004712  005046                      3$:     CLR     -(SP)
```

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004714  012746  004722                    MOV     #12$,-(SP)
004720  000002                            RTI                             ;SET PRIORITY TO ZERO
004722  010437  026446            12$:    MOV     R4,OUTBUF               ;WRITE THIS WORD
004726  012777  026446  174526            MOV     #OUTBUF,@RKBA           ;FROM THIS ADRES
004734  010477  174524                    MOV     R4,@RKDA                ;ON THIS DISK SECTOR
004740  012777  177777  174512            MOV     #-1,@RKWC               ;WRITE 1 WORD
004746  012737  004674  001110            MOV     #4$,$LPERR              ;SET RETURN ADDRESS FOR
                                                                          ;LUPING ON ERROR

004754  012777  002003  174474            MOV     #2003,@RKCS             ;GO WRT FMT

004762  104421                            CON.RDY                         ;WAIT FOR CONTROL READY
004764  032777  001000  174460    5$:     BIT     #1000,@RKDS             ;WAS THERE A SIN?
004772  001413                            BEQ     6$                      ;NO, SKIP DOING DRV RESET
004774  004737  016136                    JSR     PC,GTSRG                ;GO, GET RKCS, ER, DS, DA, CYLINDER
005000  104007                            ERROR   7                       ;SIN ERROR ON TRYING TO
                                                                          ;WRT FMT ON CYLINDER AS
                                                                          ;INDICATED IN RKDA.  3 RETRIES
                                                                          ;ARE DONE
                                                                          ;NOTE THAT BEFORE
005002  104415                            CON.RESET                       ;RETRYING A DRIVE RESET WAS DONE
005004  104416                            DRV.RESET                       ;GO TO 'DR-RST' & DO DRV RESET
005006  005200                            INC     R0                      ;INCRMNT SIN COUNT
005010  022700  000003                    CMP     #3,R0                   ;ALLOW 3 RETRIES WERE THERE 3?
005014  001332                            BNE     1$+2                    ;IF NOT, GO & RETRY

005016  005201                            INC     R1                      ;ALLOW ONLY 12 SIN ERRORS
                                                                          ;IF MORE THAN 5 EXIT THIS TEST
005020  001436                            BEQ     9$                      ;IF MORE THAN 5 EXIT THIS TEST
005022  005777  174430            6$:     TST     @RKCS                   ;DID 'ERR' BIT SET IN RKCS?
005026  100005                            BPL     7$                      ;NO, BRANCH
005030  004737  016136                    JSR     PC,GTSRG                ;GO, GET RKCS, ER, DS,DA,CYL
005034  104010                            ERROR   10                      ;'ERR' OCCURED WHILE DOING
                                                                          ;WRT FMT ON SECTOR, CYLINDER
                                                                          ;AS INDICATED IN RKDA.
005036  005205                            INC     R5                      ;ALLOW ONLY 5 'ERR'S. IF
005040  001426                            BEQ     9$                      ;MORE THAN 5 EXIT THIS TEST
005042  005204                    7$:     INC     R4                      ;INCRMNT DISK ADRES TO NXT SCTR
005044  005203                            INC     R3                      ;ALL 12 SECTORS DONE?
005046  001314                            BNE     1$                      ;IF NOT, GO BAK & FMT NXT SCTR
                                                                          ;IF YES
005050  012703  177764                    MOV     #-14,R3                 ;RESET COUNT FOR 12 SECTORS
005054  042704  000017                    BIC     #17,R4                  ;CLR OUT SEC BITS

005060  062704  000020            8$:     ADD     #20,R4                  ;ADRES THE NXT TRAK TO B FMTED
005064  005202                            INC     R2                      ;ALL TRAKS FMTED?
005066  001304                            BNE     1$                      ;IF NOT GO BAK B FMT NXT CYL, SUR 0
005070  005237  002114                    INC     FDRIVE                  ;EVEN RK05F?
005074  001004                            BNE     10$                     ;NO
005076  062737  020000  001230            ADD     #20000,DRIVAD           ;FORMAT ODD DRIVE OF F
005104  000661                            BR      11$
005106  013737  002120  001230    10$:    MOV     DRHOLD,DRIVAD           ;RESTORE DRIVE ADDR
005114  000402                            BR      TST3                    ;;EXIT

005116  004737  016772            9$:     JSR     PC,ABRT
```

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                                          ;;*******************************************************************
                                          ;*TEST 3          READ FORMAT OF THE DISK
                                                  ;* IN THIS TEST, THE HEADERS FROM ALL THE SECTORS ARE READ
                                                  ;* & CHECKED IF THEY ARE CORRECT.  THE FOLLOWING IS THE
                                                  ;* TEST SEQUENCE.
                                                  ;* 1.  READ 12 SECTORS (HDRS ONLY) AT A TIME
                                                  ;* 2.  IF THERE IS A 'SIN' ERROR RETRY ONCE MORE, IF SAW AGAIN
                                                  ;* REPORT ERROR & READ HEADER FROM NEXT CYLINDER
                                                  ;* 3.  IF THERE IS 'ERR' IN RKCS, DO A CONTROL RESET, REPORT
                                                  ;* ERROR & READ HEADER FROM NEXT CYLINDER.  IF THERE ARE
                                                  ;* MORE THAN 5 ERRORS OF THIS KIND, THIS TEST WILL BE EXITED
                                                  ;* 4.  THE 12 HEADERS ARE CHECKED.  IF THEY ARE CORRECT THE
                                                  ;* NEXT CYLINDER IS READ.
                                                  ;* IF THEY ARE NOT CORRECT, A RETRY IS DONE; IF AGAIN CORRECT
                                                  ;* HEADERS ARE NOT RECIEVED, AN ERROR IS REPORTED.  THE
                                                  ;* SECTOR #'S GIVING THE BAD HEADERS, & THE BAD HEADERS ARE
                                                  ;* STORED.
                                                  ;* 5.  IF INHIBIT TYPEOUT' SWITCH IS NOT SET, THE FIRST WORDS OF
                                                  ;* THE 12 SECTORS (PSUEDO-HEADERS) ARE READ.  IN A PREVIOUS
                                                  ;* TEST THE FIRST WORD OF EVERY SECTOR WAS WRITTEN
                                                  ;* AS A SOFTWARE HEADER (CONSISTING OF DRIVE #, CYL#, SUR,SEC#)
                                                  ;* THEN THE SECTOR # GIVING BAD HEADER, EXPECTED PSUEDO-HEADER,
                                                  ;* & THE PS-HEADER RECIEVED ARE TYPED OUT.  THIS WOULD
                                                  ;* WRONG, HEADER WAS READ WRONG, ETC.
                                                  ;* 6.  THE NEXT CYLINDER IN LINE IS READ.  ORDER OF READING IS
                                                  ;* CYL0,SUR0     CYL0,SUR1        CYL312,SUR1
                                          ;;*******************************************************************

 005122  000004                            TST3:    SCOPE

 005124  012737  177773  001504                     MOV     #-5,ERCNT1          ;ALLOW ONLY 5 ERRORS (OF BAD HEADER
                                                                                ;KIND FROM 5 CYLINDERS)
 005132  012737  177766  001506                     MOV     #-12,ERCNT2         ;ALLOW ONLY 12 'ERR'S
 005140  012737  177773  001510                     MOV     #-5,ERCNT3          ;ALLOW ONLY 5 ERRORS
 005146  013705  001230                             MOV     DRIVAD,R5           ;SET DRIVE #,CYL ADRES=0
 005152  012737  177152  001476                     MOV     #-626,INDX2         ;313 CYLS (626 TRAKS) TO B READ
 005160  104415                            4$:      CON.RESET                   ;GO DO CONTROL RESET
 005162  104416                                     DRV.RESET                   ;GO DO DRIVE RESET

 005164  005037  001254                    1$:      CLR     RETRY2              ;ALLOW 2 RETRIES IF HDRS READ WRONG
 005170  005037  001252                    2$:      CLR     RETRY1              ;ALLOW 2 RETRIES FOR 'SINS'

 005174  012777  026446  174260            3$:      MOV     #OUTBUF,@RKBA       ;RD HDRS INTO LOC STARTING AT THIS
 005202  010577  174256                             MOV     R5,@RKDA            ;FROM THIS DSK ADRES
 005206  012777  177764  174244                     MOV     #-14,@RKWC          ;12 HDRS TO BE READ
 005214  012737  005160  001110                     MOV     #4$,$LPERR          ;SET RETURN ADRES FOR LUPING ON ERROR

 005222  012777  002005  174226                     MOV     #2005,@RKCS         ;GO, RD FMT OF THIS CYLINDER

 005230  104421                                     CON.RDY                     ;WAIT FOR CNTRL RDY TO SET

 005232  032777  001000  174212            5$:      BIT     #1000,@RKDS         ;'SIN' ERROR?
 005240  001420                                     BEQ     6$                  ;NO, BRANCH
 005242  004737  016214                             JSR     PC,GETINF

 005246  104011                                     ERROR   11                  ;'SIN' OCCURED WHEN DOING RD FMT
                                                                                ;FROM CYL SHOWN IN RKDA.  IT
```

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005250  104415                                  CON.RESET                       ;DO CNTRL RESET
005252  104416                                  DRV.RESET                       ;GO, DO DRIVE RESET
005254  005237  001252                          INC     RETRY1                  ;ALLOW ONLY 2 RETRIES FOR THIS  ERROR
005260  022737  000002  001252                  CMP     #2,RETRY1               ;IF TRIED 2 TIMES REPORT
005266  001342                                  BNE     3$                      ;ERROR, OTHERWISE GO BAK & RETRY
                                                                                ;WAS TRIED TWICE, BUT 'SIN'.
005270  005237  001510                          INC     ERCNT3                  ;ALLOW 5 ERRORS AT MOST
005274  001002                                  BNE     6$
005276  000137  005606                          JMP     16$

005302  005777  174150                  6$:     TST     @RKCS                   ;'ERR' IN RKCS?
005306  100010                                  BPL     7$                      ;NO, BRANCH
005310  004737  016136                          JSR     PC,GTSRG                ;GO, GET RKCS, ER,DS,DA,CYLNDR
005314  104012                                  ERROR   12                      ;'ERR' SET WHILE DOING RD FMT
                                                                                ;FROM CYL SHOWN IN RKDA
005316  104415                                  CON.RESET                       ;GO DO CNTRL RESET
                                                                                ;ALLOW ONLY 12 ERRORS OF THIS
005320  005237  001506                          INC     ERCNT2                  ;KIND, IF MORE THAN FIVE ERRORS
                                                                                ;SKIP THIS TEST
005324  001532                                  BEQ     TST4                    ;;EXIT
005326  000520                                  BR      14$                     ;GO SET UP TO RD FMT FROM NXT
                                                                                ;CYL IN LINE
                                                                                ;CHECK THAT CORRECT HEADERS WERE RECVD.
                                                                                ;SECTR # HAVING BAD HDR IS STORED ALONG
                                                                                ;WITH BAD HDR

005330  004737  007260                  7$:     JSR     PC,CHKHDRS              ;GO CHECK IF CORRECT HEADERS WERE READ

005334  005737  001500                          TST     INDX3                   ;WAS THERE A MISCOMPARISON?
005340  001513                                  BEQ     14$                     ;IF NOT, GO SET UP TO RD FMT
                                                                                ;NXT CYL IN LINE
005342  012737  005170  001110                  MOV     #2$,$LPERR
005350  104013                                  ERROR   13                      ;CORRECT HDRS WERE NOT RECVD
                                                                                ;FROM SECTRS AS TYPED OUT.
                                                                                ;THE SAME CYLINDER WAS READ TWICE
005352  005237  001254                          INC     RETRY2                  ;RETRY RD FMT ON SAME CYL AGAIN
005356  022737  000002  001254                  CMP     #2,RETRY2               ;TRIED RDING SAME CYL TWICE
005364  001301                                  BNE     2$                      ;IF NOT, GO RD AGAIN
                                                                                ;YES, REPORT ERROR
005366  005237  001504                          INC     ERCNT1                  ;ALLOW ONLY 5 ERRORS OF THE
                                                                                ;ABOVE TYPE.  IF MORE THAN 12
                                                                                ;EXIT THIS TEST
005372  001505                                  BEQ     16$

005374                                  20$:                                    ;THE PSUEDO-HEADERS (FIRST WORD OF EVERY
                                                                                ;SECTOR) FROM THIS CYLINDER (ABOVE,
                                                                                ;THE CYLINDER THAT GAVE WRONG HEADERS)
                                                                                ;WILL BE READ, NOW.  FOLLOWING WILL B TYPD OUT:
                                                                                ;SEC#, EXPCTD PSUEDO-HDR, RECVD PHDR.
                                                                                ;IF "INHIBIT TYPEOUT" SW IS SET THIS ENTIRE
                                                                                ;READING & TYPING WILL BE SKIPPED
005374  032777  020000  173536                  BIT     #20000,@SWR             ;INHIBIT TYPEOUT?
005402  001072                                  BNE     14$                     ;YES, SKIP THE FOLLOWING & GO
                                                                                ;SET UP TO RD FMT NXT CYL IN LINE

005404  012701  177764                          MOV     #-14,R1                 ;READ FROM 12 SECTRS
```

```
005410  010577  174050                  MOV     R5,@RKDA        ;FROM THIS DSK-ADRES
005414  012777  026446  174040          MOV     #OUTBUF,@RKBA   ;INTO THIS BUS-ADRES
005422  012777  177777  174030  10$:    MOV     #-1,@RKWC       ;RD 1 WRD

005430  012777  000005  174020          MOV     #5,@RKCS        ;GO, RD
005436  104421                          CON.RDY                 ;WAIT FOR CNTRL RDY
005440  005777  174012                  TST     @RKCS           ;ANY EROR?
005444  100002                          BPL     15$             ;NO, PROCEED
005446  104415                          CON.RESET               ;CLEAR THE EROR
005450  000447                          BR      14$             ;EROR, SO COULDN'T READ PSUEDO-HDRS

005452  005201                  15$:    INC     R1              ;READ FROM ALL 12 SECS
005454  001362                          BNE     10$             ;IF NOT GO RD THE NXT ONE

                                                                ;TYPE OUT PSUEDO-HDRS CORRESPONDING TO
                                                                ;THE SECTORS WHICH GAVE BAD HEADERS
                                                                ;TYPE: SEC #, EXPC P-HDR, RECVD P-HDR

005456  104401                          TYPE                    ;TYPE OUT
005460  001771                          MSG11
005462  012701  001266                  MOV     #BUFR,R1        ;SEC #'S ARE STORED HERE

005466  104401                  11$:    TYPE                    ;TYPE CR, LF
005470  001213                          $CRLF

005472  011102                          MOV     (R1),R2
005474  012703  026446                  MOV     #OUTBUF,R3      ;PSUEDO-HEADERS WHICH WERE
                                                                ;READ ARE STORED HERE

005500  005702                  12$:    TST     R2              ;IS THIS SEC # CORRESPONDING TO THE
005502  001403                          BEQ     13$             ;ONE IN ERROR
005504  005302                          DEC     R2              ;R2 CONTAINS THE SEC #
005506  005723                          TST     (R3)+
005510  000773                          BR      12$

005512  011146                  13$:    MOV     (R1),-(SP)      ;GO TYPEOUT SEC # GIVING
005514  104403                          TYPOS                   ;MISCOMPARISON OF HEADERS
005516     002                          .BYTE   2
005517     000                          .BYTE   0               ;SUPRES LDG 0'S

005520  104401                          TYPE                    ;TYPE 2 BLANKS
005522  002105                          BLNKS5

005524  010546                          MOV     R5,-(SP)        ;GO TYPE EXPCTD PSUEDO HEADER
005526  051116                          BIS     (R1),(SP)
005530  104402                          TYPOC

005532  104401                          TYPE                    ;TYPE 2 BLNKS
005534  002103                          BLNKS7

005536  011346                          MOV     (R3),-(SP)      ;GO TYPE PSUEDO-HEADER RECVD
005540  104402                          TYPOC

005542  005721                          TST     (R1)+           ;TYPED OUT ALL SEC #'S IN ERROR.
005544  021127  177777                  CMP     (R1),#177777
005550  001346                          BNE     11$             ;IF NOT GO BAK & TYPE NXT
```

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005552  104401  001733                   TYPE    ,MSG7           ;TYPE OUT PC
005556  012746  005374                   MOV     #20$,-(SP)
005562  104402                           TYPOC
005564  104401  001213                   TYPE    ,$CRLF
                                                                 ;TYPE ROUTINE ENDS HERE

                                                                 ;FIND OUT NXT TRAK TO B READ
                                                                 ;FORMATTED

005570  062705  000020          14$:     ADD     #20,R5          ;SET ADRES FOR SUR 0, NXT CYL IN LINE
005574  005237  001476                   INC     INDX2           ;READ ALL 313 CYLINDERS (626 TRAKS)?
005600  001404                           BEQ     TST4            ;;EXIT
005602  000137  005164                   JMP     1$              ;IF NOT, GO BAK & READ NXT

005606  004737  016772          16$:     JSR     PC,ABRT

                                ;;*********************************************************
                                ;*TEST 4          SEEK PATTERNS: 0-312-0-311-...,USING IMPLIED SEEK

                                         ;****TEST 2 (WRITING PSUEDO-HEADERS) SHOULD HAVE BEEN DONE BEFORE****
                                         ;**** DOING THIS TEST****
                                         ;*THIS TEST PERFORMS SEEKS (IMPLIED SEEKS USING 'READS') IN THE
                                         ;*FOLLOWING PATTERN.
                                         ;*0-312-0-311-0-310-.....0-1-0-0

                                         ;*THE FIRST WORD OF EVERY SECTOR IS A PSEUDO-HEADER (WRITTEN IN
                                         ;*A PREVIOUS TEST) CONSISTING OF DRIVE NO, CYLINDER NO., SURFACE
                                         ;*AND SECTOR NO.  AN IMPLIED SEEK IS DONE BY ISSUING A 'READ' FOR
                                         ;*THE PSEUDO-HEADER OF SECTOR 0, SURFACE 0.

                                         ;*IF A 'SIN' OCCURS TWO TRIES ARE DONE BEFORE ABORTING.  IF A 'SKE'
                                         ;*OCCURS IT COULD MEAN THAT 1) EITHER THE HEADERS WAS READ WRONG
                                         ;*OR 2) THE HEADS GOT POSITIONED ON THE WRONG CYLINDER.  IN
                                         ;*ORDER TO PROVIDE A FURTHER INSIGHT INTO THE PROBLEM, THE FOLLOWING
                                         ;*IS DONE:
                                         ;*THE HEADERS ARE READ FROM THE CYLINDER THAT GAVE 'SKE'.  IF THE HEADERS
                                         ;*ARE CORRECT IT IS SO REPORTED.  IF THE HEADERS ARE INCORECT, THEN THE
                                         ;*EXPECTED HEADERS AND THE RECEIVED ONES ARE REPORTED.  ONE MORE TRY IS
                                         ;*DONE (THE IMPLIED SEEK IS TRIED AGAIN BETWEEN THE CYLINDERS THAT GAVE RISE
                                         ;*TO 'SKE')

                                         ;*THE FOLLOWING ACTION IS TAKEN WHEN THERE IS NO 'SKE' OR 'SIN' BUT STILL THE
                                         ;*PSEUDO-HEADER IS READ WRONG:
                                         ;*FIRST THE HEADERS ARE READ FROM THAT CYLINDER AND CHECKED.  IF THEY ARE
                                         ;**CORRECT, IT IS SO REPORTED.  IF THEY ARE WRONG THEN THE EXPECTED AND RECEIVED
                                         ;*HEADERS ARE REPORTED.  THEN THE PSEUDO-HEADER FROM SECTOR 1 IS READ AND REPORT
                                         ;*ONE MORE TRY IS DONE BY REPEATING THE WHOLE PROCESS. (IMPLIED SEEK
                                         ;*BETWEEN THE TWO CYLINDERS AND READING PSEUDO-HEADER FROM SECTOR 0 OF THE DESTI
                                         ;*CYLINDER).

                                         ;*UP TO 12 ERRORS OF EACH KIND (SIN, SKE, BAD PSEUDO-HEADER) ARE ALLOWED.
                                         ;*IF ANY ERROR OCCURS MORE THAN 12 TIMES THE TEST IS ABORTED.
                                ;;*********************************************************
005612  000004                  TST4:    SCOPE
005614  104415                           CON.RESET               ;GO DO CONTROL RESET
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005616  104416                                  DRV.RESET                       ;GO DO DRIVE RESET

005620  005004                                  CLR     R4                      ;FLAG, CLR IF DOING IMPLIED
                                                                                ;SEEK IN FROM 0 TO 'INADR'
                                                                                ;=1, IF GOING FROM 'INADR'
                                                                                ;OUT TO CYL 0
005622  012737  177465  001476                  MOV     #-313,INDX2             ;313 SEEK PATTERNS
005630  012700  177764                          MOV     #-14,R0
005634  010037  001504                          MOV     R0,ERCNT1               ;ALLOW ONLY 12 ERRORS
005640  010037  001506                          MOV     R0,ERCNT2               ;OF THESE KINDS
005644  010037  001510                          MOV     R0,ERCNT3

005650  012737  014500  001260                  MOV     #14500,INADR            ;'INADR' CONTAINS THE INER
                                                                                ;CYL TO WHICH IMPLIED SEEK WILL
                                                                                ;BE DONE

005656  005704                          1$:     TST     R4                      ;GOING IN OR OUT?
005660  001005                                  BNE     2$                      ;GOING OUT, BRANCH
005662  013705  001260                          MOV     INADR,R5                ;SET CYL ADRES BITS FOR GOING IN
005666  053705  001230                          BIS     DRIVAD,R5               ;FORM DISK ADRES FOR INNER
005672  000402                                  BR      3$                      ;CYLINDER
005674  013705  001230                  2$:     MOV     DRIVAD,R5               ;FORM DISK ADRES FOR OUTER
                                                                                ;CYLINDER - 0
                                                                                ;ALLOW 2 TRIES WHEN
005700  012737  177776  001254          3$:     MOV     #-2,RETRY2              ;ERRORS OCCUR
005706  012737  177776  001252          13$:    MOV     #-2,RETRY1
005714  012737  177777  001256          4$:     MOV     #-1,RETRY3
005722  000404                                  BR      5$
005724  104415                          6$:     CON.RESET
005726  104416                                  DRV.RESET
005730  004737  006526                          JSR     PC,SBR1                 ;REPOSITION HEADS TO PRE-ERROR CYL

005734  012777  177777  173516          5$:     MOV     #-1,@RKWC               ;READ 1 WORD
005742  010577  173516                          MOV     R5,@RKDA                ;FROM THIS CYLINDER, SEC 0
005746  012777  026446  173506                  MOV     #OUTBUF,@RKBA           ;INTO THIS BUS ADRES
005754  012737  005724  001110                  MOV     #6$,$LPERR              ;SET RETURN ADRES FOR LUPING
                                                                                ;ON 'ERROR'

005762  012777  000005  173466                  MOV     #5,@RKCS                ;GO, READ

005770  104421                                  CON.RDY                         ;WAIT FOR CNTRL RDY

005772  032777  001000  173452                  BIT     #1000,@RKDS             ;SIN?
006000  001434                                  BEQ     8$                      ;NO, BRANCH
                                                                                ;YES, THERE WAS A SIN
006002  004737  016376                          JSR     PC,ERR1                 ;GO GET, CYLS BETW'N WHICH SK WAS TRIED
006006  017737  173440  001170                  MOV     @RKDS,$REG3
006014  017737  173434  001166                  MOV     @RKER,$REG2
006022  104420  001602                          TYPMSG  ,MSG1
006026  013737  001256  001172                  MOV     RETRY3,$REG4            ;SAVE TRY # ON 'SIN'
006034  062737  000002  001172                  ADD     #2,$REG4
006042  104014                                  ERROR   14                      ;AN IMPLIED SEEK WAS TRIED
                                                                                ;FROM 'CYLA' TO 'CYLB' (INDICATED
                                                                                ;IN EROR MESAGE), 'SIN' OCCURRED.
                                                                                ;2 TRIES ARE DONE BEFORE
                                                                                ;ABORTING
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006044  005737  001256                  TST     RETRY3          ;DONE RETRIES
006050  001403                          BEQ     7$              ;YES, BRANCH
006052  005237  001256                  INC     RETRY3          ;GO DO 2ND TRY
006056  000722                          BR      6$

006060  005237  001504          7$:     INC     ERCNT1          ;ALLOW LESS THAN 12 ERORS OF THIS TYPE
006064  001103                          BNE     19$             ;IF MORE SKIP THIS TEST
006066  000137  006614                  JMP     EXT4            ;EXIT THIS TEST

006072  032777  010000  173354  8$:     BIT     #10000,@RKER    ;SKE?
006100  001506                          BEQ     20$
006102  004737  016376          15$:    JSR     PC,ERR1         ;GO GET 2 CYL NOS. BETWEEN WHICH
006106  017737  173342  001166          MOV     @RKER,$REG2     ;IMPLIED SEEK WAS DONE
006114  017737  173332  001170          MOV     @RKDS,$REG3
006122  013737  001252  001172          MOV     RETRY1,$REG4    ;GET TRY # ON 'SKE'
006130  062737  000003  001172          ADD     #3,$REG4
006136  104420  001610                  TYPMSG  ,MSG2           ;GO PRINT 'SKE'
006142  104014                          ERROR   14              ;IMPLIED SEEK WAS TRIED FROM
                                                                ;'CYLA' TO 'CYLB' (INDICATED
                                                                ;IN EROR MESAGE); 'SKE' OCCURRED.
                                                                ;2 TRIES ARE DONE.
006144  104415                          CON.RESET               ;DO CONTROL RESET

006146  004737  006552          9$:     JSR     PC,SBR2         ;GO READ 12 HEADERS FROM
                                                                ;THIS CYLINDER & COMPARE
                                                                ;THEM.  NOTE R5 CONTAINS THE
                                                                ;DISK ADRES THAT WILL BE USED.

006152  012777  000015  173276          MOV     #15,@RKCS       ;GO DO DRIVE RESET
                                                                ;WHILE THE DRIVE IS DOING RESET
                                                                ;THE HDRS THAT WERE READ
                                                                ;ABOVE ARE CHECKED, PRINTED

006160  005737  001500                  TST     INDX3           ;WAS THERE A MISCOMPARISON
                                                                ;IN ANY HEADER?
006164  001006                          BNE     10$             ;IF INDX3>0, THERE WAS.
                                                                ;NO, THERE WASN'T. HDRS OK
006166  005237  001252                  INC     RETRY1          ;ONLY 2 TRIES FOR SKE
006172  001414                          BEQ     12$             ;BRANCH IF THIS WAS A 2ND TRY
006174  104420  001657                  TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE READ
                                                                ;CORRECTLY.  THIS WAS TRY # 1

006200  000405                          BR      11$

                                                                ;HDRS WERE READ INCORRECT.
006202  005237  001252          10$:    INC     RETRY1          ;ALLOW 2 TRIES FOR SKE
006206  001411                          BEQ     14$             ;BRANCH, IF THIS WAS 2ND TRY

                                                                ;THERE WAS SKE ON DOING IMPLIED
006210  104417  000015                  MESAGE  ,15             ;SEEK TO 'CYL B'. THEN HDRS WERE
                                                                ;READ FROM CYL B, WRONG HDRS
                                                                ;RECVD

006214  104423                  11$:    RESDON                  ;WAIT FOR PREVIOUS DRIVE RESET
                                                                ;TO BE DONE
006216  004737  006526                  JSR     PC,SBR1         ;GO, REPOSITION HEADS
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006222  000634                          BR      4$

                                                                ;2ND TRY, SKE THIS TIME ALSO. BUT
                                                                ;READ HDRS CORRECTLY FROM
                                                                ;CYLINDER THAT GAVE SKE
                                                                ;NOTE THIS WAS THE 2ND TRY
006224  104420  001657          12$:    TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE
                                                                ;READ CORRECTLY.

006230  000402                          BR      16$

                                                                ;2ND TRY, SKE THIS TIME ALSO.
006232  104417  000015          14$:    MESAGE  ,15             ;READ HDRS FROM CYL THAT
                                                                ;GAVE SKE, THEY WERE INCORRECT.

006236  104423                  16$:    RESDON                  ;WAIT FOR PREVIOUS DRIVE RESET
                                                                ;TO BE DONE

006240  005237  001506                  INC     ERCNT2          ;ALLOW ONLY LESS THAN 10 ERRORS OF
                                                                ;THIS TYPE (SKE)
006244  001002                          BNE     17$
006246  000137  006614                  JMP     EXT4            ;EXIT THIS TEST IF MORE

006252  005704                  17$:    TST     R4              ;WENT LAST TIME IN OR OUT?
006254  001007                          BNE     19$             ;OUT
                                                                ;IN
006256  005703                          TST     R3              ;WERE HDRS CORRECT?
006260  001005                          BNE     19$             ;NO
                                                                ;YES

006262  005204                  18$:    INC     R4
006264  004737  006526                  JSR     PC,SBR1         ;GO POSITION HEADS BAK ON INNER
                                                                ;CYL
006270  000137  005656                  JMP     1$              ;GO BAK & SEEK OUT NOW

006274  005237  001476          19$:    INC     INDX2           ;ALL SEEK PATTERNS DONE?
006300  001547                          BEQ     TST5            ;;EXIT

006302  162737  000040  001260          SUB     #40,INADR       ;SET ADDRESS FOR THE NXT
                                                                ;INNER CYLINDER
006310  005004                          CLR     R4              ;INDICATE THAT NOW SEEK IS GOING
                                                                ;TO BE IN
006312  000137  005656                  JMP     1$              ;GO BAK & SEEK IN TO 'INADR'

006316                          20$:                            ;IF THERE WAS NO SIN OR SKE
                                                                ;ENTER HERE

006316  012737  005700  001110          MOV     #3$,$LPERR      ;SET RETURN ADRES FOR LUPING
                                                                ;ON ERROR
006324  020537  026446                  CMP     R5,OUTBUF       ;CORRECT PSUEDO-HEADER READ?
006330  001471                          BEQ     24$             ;YES, BRANCH
006332  013737  001254  001172          MOV     RETRY2,$REG4    ;GET TRY #
006340  062737  000003  001172          ADD     #3,$REG4
006346  004737  016376                  JSR     PC,ERR1         ;GO GET CYL #'S BETW'N
                                                                ;WHICH IMPLIED SEEK (READ)
                                                                ;WAS DONE
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006352  010537  001166                  MOV     R5,$REG2                ;GET EXPCTD PSUEDO-HDR
006356  013737  026446  001170          MOV     OUTBUF,$REG3            ;GET PSUEDO-HDR RECVD
006364  104016                          ERROR   16                      ;IMPLIED SEEK FROM CYLA TO CYLB WAS DONE.
                                                                        ;READ PSEUDO-HEADER OF SEC 0,
                                                                        ;CYLB (IN EROR MESAGE), BUT
                                                                        ;THE WRONG PSEUDO-HEADER WAS
                                                                        ;RECEIVED
006366  005237  001254                  INC     RETRY2
006372  001402                          BEQ     21$
006374  000137  005706                  JMP     13$


006400  004737  006552          21$:    JSR     PC,SBR2                 ;GO READ HEADERS (12) FROM
                                                                        ;THIS CYLINDER, & CHECK THEM.
                                                                        ;IF MISCOMPARISON INDX3 WILL
                                                                        ;BE > 0.
006404  005737  001500                  TST     INDX3
006410  001003                          BNE     22$
006412  104420  001657                  TYPMSG  ,MSG5                   ;WRONG PSUEDO-HDR WAS READ
                                                                        ;BUT WHEN HDRS WERE READ
                                                                        ;FROM THE SAME CYLINDER, THEY
006416  000402                          BR      23$                     ;WERE CORRECT

006420  104417  000015          22$:    MESAGE  ,15                     ;WRONG PSUEDO-HDR WAS READ
                                                                        ;FROM 'CYLB' (IN ERROR MESAGE).
                                                                        ;THEN HEADERS WERE READ FROM THE
                                                                        ;SAME CYLINDER.  THEY WERE ALSO
                                                                        ;WRONG.
006424  010500                  23$:    MOV     R5,R0                   ;NOW READ THE PSUEDO-HEADER
006426  005200                          INC     R0                      ;FROM THE NEXT SECTOR (1)
006430  010077  173030                  MOV     R0,@RKDA                ;SAME CYLINDER
006434  012777  026446  173020          MOV     #OUTBUF,@RKBA
006442  012777  177777  173010          MOV     #-1,@RKWC
006450  012777  000005  173000          MOV     #5,@RKCS
006456  104421                          CON.RDY
006460  010537  001162                  MOV     R5,$REG0
006464  004737  016434                  JSR     PC,GCYL                 ;GO GET CYL # & STORE IT IN $REG0
006470  010037  001164                  MOV     R0,$REG1                ;GET EXPCT PSUEDO-HDR FROM SEC 1
006474  013737  026446  001166          MOV     OUTBUF,$REG2
006502  104417  000017                  MESAGE  ,17                     ;PSUEDO-HEADER FROM SEC 1, CYLB
                                                                        ;(IN MESAGE) WAS READ.  THE EXPCTD
                                                                        ;& RECVD DATA WORDS ARE REPORTED.
006506  005237  001510                  INC     ERCNT3                  ;ALLOW ONLY LESS THAN 10 ERRORS
                                                                        ;OF THIS TYPE (WRONG PS-HDRS)
006512  001440                          BEQ     EXT4

006514  005704                  24$:    TST     R4                      ;SEEKED IN OR OUT LAST TIME?
006516  001266                          BNE     19$                     ;IF OUT, GO SEEK NXT INNER CYL
                                                                        ;IF IN, GO SEEK BAK TO 0
006520  005204                          INC     R4                      ;INDICATE THAT SEEK OUT (0)
006522  000137  005656                  JMP     1$                      ;WILL BE DONE NOW



                                                                ;THIS ROUTINE IS USED IN THIS TEST ONLY.
                                                                ;R4=0 INDICATES SEEK BEING DONE FROM
                                                                ;CYL 0 TO INNER CYL.
                                                                ;R4=1 INDICATES SEEK BEING DONE FROM
                                                                ;INNER CYL TO 0. THIS ROUTINE POSITIONS
                                                                ;THE HEADS ON 'INADR' CYL IF R4=1

006526  005704                          SBR1:   TST     R4
006530  001407                                  BEQ     1$
006532  013777  001260  172724                  MOV     INADR,@RKDA
006540  012777  000011  172710                  MOV     #11,@RKCS
006546  104422                                  TST.RWS
006550  000207                          1$:     RTS     PC

                                                                ;THIS ROUTINE IS USED IN THIS TEST
                                                                ;ONLY. IT READS 12 HEADERS FROM CYLINDER
                                                                ;WHOSE ADRES IS IN R5. THEN IT CHECKS
                                                                ;IF THE EXPECTED HEADER IS RECEIVED.
                                                                ;IF IT IS NOT, INDX3 IS INCREMENTED INDICATING
                                                                ;THE ERROR

006552  012700  177764                  SBR2:   MOV     #-14,R0
006556  012701  026446                          MOV     #OUTBUF,R1
006562  010077  172672                          MOV     R0,@RKWC        ;READ 12 HDRS
006566  010177  172670                          MOV     R1,@RKBA        ;INTO THIS ADRES
006572  010577  172666                          MOV     R5,@RKDA        ;FROM THIS CYLINDER
006576  012777  002005  172652                  MOV     #2005,@RKCS     ;RD FMT, GO
006604  104421                                  CON.RDY

006606  004737  007260                          JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ

006612  000207                                  RTS     PC              ;EXIT

006614  004737  016772                  EXT4:   JSR     PC,ABRT

                                        ;;*****************************************************************
                                        ;*TEST 5        PERFORM CONVERGING-DIVERGING (IMPLIED) SEEKS
                                                ;*THIS TEST PERFORMS A CONVERGING-DIVERGING SEEK PATTERN
                                                ;*USING IMPLIED SEEK (READ FORMAT).  THE SEEK SEQUENCE IS:
                                                ;*0-312-1-311-2-310-3-307-------310-2-311-1-312
                                                ;ALL READ FORMATS ARE DONE FROM SURFACE 0.
                                                ;*THE CYLINDER ADDRESSES, BETWEEN WHICH THE IMPLIED SEEK IS
                                                ;*PERFROMED, ARE CONTAINED IN 'OUTADR' & 'INADR'.  IF 'SIN' OCCURS
                                                ;*AN ERROR IS REPORTED AND A RETRY IS DONE.  ON READING INCORRECT
                                                ;*HEADERS AN ERROR IS REPORTED AND A RETRY IS DONE.  NOTE THAT IF
                                                ;*ALL THE 12 HEADERS ARE INCORRECT, IT COULD MEAN THAT THE HEADS
                                                ;*COULD NOT POSITION CORRECTLY.  THIS WOULD BE CONFIRMED IF IN
                                                ;*PREVIOUS TESTS BAD HEADERS WERE NOT RECIEVED FROM THE SAME
                                                ;*CYLINDER.  IF THAT CYLINDER GAVE BAD HEADERS IN ALL THE PREVIOUS
                                                ;*TESTS THE PROBLEM COULD BE DIFFERENT.
                                                ;*MAXIMUM 12 ERRORS OF ANY KIND ARE ALLOWED.
                                                ;*IF MORE THAN 12 ERRORS OCCUR THE TEST IS ABORTED.
                                        ;;*****************************************************************
006620  000004                          TST5:   SCOPE
006622  104415                                  CON.RESET               ;GO,DO CONTROL RESET
006624  104416                                  DRV.RESET               ;GO,DO DRIVE RESET

006626  005004                                  CLR     R4              ;(R4)=0 SEEKING FROM 'OUTADR' TO 'INADR'
                                                                        ;(R4)=1 SEEKING FROM 'INADR' TO 'OUTADR'
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006630  012737  177466  001476            MOV     #-312,INDX2       ;SET COUNT FOR DOING 312 TIMES
006636  012700  177764                    MOV     #-14,R0
006642  010037  001504                    MOV     R0,ERCNT1         ;ALLOW ONLY 12 ERRORS
006646  010037  001506                    MOV     R0,ERCNT2

006652  005037  001262                    CLR     OUTADR            ;INITIALIZE 'OUTADR' TO 0
006656  012737  014500  001260            MOV     #14500,INADR      ;INITIALIZE 'INADR' TO 312

006664  005704                    1$:     TST     R4                ;GOING IN OR OUT?
006666  001005                            BNE     2$                ;GOING OUT,BRANCH
006670  013705  001260                    MOV     INADR,R5          ;SET CYL ADRES BITS FOR GOING IN
006674  053705  001230                    BIS     DRIVAD,R5         ;FORM DISK ADRES FOR INNER CYLINDER
006700  000404                            BR      3$

006702  013705  001262            2$:     MOV     OUTADR,R5         ;SET CYL ADRES BITS FOR GOING OUT
006706  053705  001230                    BIS     DRIVAD,R5         ;FORM DISK ADRES FOR GOING OUT

006712  005037  001254            3$:     CLR     RETRY2            ;ALLOW 2 RETRIES
006716  012737  177777  001252    4$:     MOV     #-1,RETRY1        ;WHEN ERRORS OCCUR
006724  000404                            BR      7$
006726  104415                    5$:     CON.RESET
006730  104416                            DRV.RESET
006732  004737  007224                    JSR     PC,SBR3           ;GO REPOSITION HEADS

006736  012777  177764  172514    7$:     MOV     #-14,@RKWC        ;READ ALL HDRS FROM THIS CYLINDER
006744  010577  172514                    MOV     R5,@RKDA          ;FROM THIS CYL, SEC 0
006750  012777  026446  172504            MOV     #OUTBUF,@RKBA     ;INTO THIS BUS ADRES
006756  012737  006726  001110            MOV     #5$,$LPERR        ;SET RETURN ADRES FOR LOOPING ON ERROR

006764  012777  002005  172464            MOV     #2005,@RKCS       ;READ FORMAT,GO

006772  104421                            CON.RDY                   ;WAIT FOR CONTRL RDY

006774  032777  001000  172450            BIT     #1000,@RKDS       ;SIN?
007002  001443                            BEQ     8$                ;NO, BRANCH
007004  017737  172444  001166            MOV     @RKER,$REG2       ;SAVE RKER
007012  017737  172434  001170            MOV     @RKDS,$REG3       ;SAVE RKDS
007020  013737  001252  001172            MOV     RETRY1,$REG4      ;GET RETRY #
007026  062737  000002  001172            ADD     #2,$REG4
007034  004737  016320                    JSR     PC,ERR2           ;GET CYL #'S BELOW 'N WHICH
                                                                    ;SEEK WAS TRIED
007040  104420  001602                    TYPMSG  ,MSG1             ;TYPE 'SIN'
007044  104014                            ERROR   14
                                                                    ;'SIN' OCCURRED ON DOING IMPLIED
                                                                    ;SEEK FROM 'CYLA' TO 'CYLB' (IN
                                                                    ;EROR MESAGE).
007046  005737  001252                    TST     RETRY1            ;DONE 2 TRIES?
007052  001403                            BEQ     6$                ;YES, BRANCH
007054  005237  001252                    INC     RETRY1            ;NO, RETRY
007060  000722                            BR      5$
007062  104415                    6$:     CON.RESET
007064  104416                            DRV.RESET


007066  005237  001504                    INC     ERCNT1            ;ALLOW LESS THAN 12 ERORS OF THE
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007072  001527                          BEQ     EXTS                    ;ABOVE KIND
                                                                        ;IF MORE SKIP THIS TEST
                                                                        ;SIN OCCURED WHEN GOING TO CYL (IN
                                                                        ;R5).  A DRVE RESET HAS BEEN DONE,
                                                                        ;NOW TRY POSITIONING HEADS ON
                                                                        ;THAT CYL.
007074  010577  172364                  MOV     R5,@RKDA                ;SET CYL ADRES
007100  012777  000011  172350          MOV     #11,@RKCS               ;SEEK,GO
007106  104422                          TST.RWS
007110  000424                          BR      11$
                                                                        ;IF NO SIN, ENTER HERE
007112  004737  007260          8$:     JSR     PC,CHKHDRS              ;GO CHECK IF CORRECT HEADERS WERE READ

007116  012737  006716  001110          MOV     #4$,$LPERR              ;SET LUP ADDRESS
007124  005737  001500                  TST     INDX3                   ;WAS THERE A BAD HDR?
007130  001414                          BEQ     11$                     ;NO, BRANCH
007132  104020                          ERROR   20                      ;WRONG HEADERS WERE READ FROM
                                                                        ;'SEC #'S, ON DOING AN IMPLIED
                                                                        ;SEEK (RDFMT) FROM 'CYLA' TO 'CYLB'
007134  005237  001254                  INC     RETRY2                  ;ALLOW 2 TRIES
007140  022737  000002  001254          CMP     #2,RETRY2
007146  001263                          BNE     4$                      ;GO TRY 2ND TIME
007150  005237  001506                  INC     ERCNT2                  ;ALLOW ONLY 12 ERRORS
007154  001002                          BNE     11$
007156  000137  007352                  JMP     EXTS                    ;IF MORE, EXIT THIS TEST

007162  005704                  11$:    TST     R4                      ;GOING WHICH WAY?
007164  001006                          BNE     12$                     ;'INADR' TO 'OUTADR', BRANCH
                                                                        ;'OUTADR' TO 'INADR'
007166  005204                          INC     R4                      ;INDICATE THAT NXT TIME GOING
                                                                        ;FROM 'INADR' TO 'OUTADR'
007170  062737  000040  001262          ADD     #40,OUTADR              ;INCREMENT CYCLINDER ADRES
007176  000137  006664                  JMP     1$                      ;GO BAK & DO IMPLIED SEEK
                                                                        ;FROM 'INADR' TO 'OUTADR'

007202  005004                  12$:    CLR     R4                      ;INDICATE THAT NXT TIME GOING
                                                                        ;FROM 'OUTADR' TO 'INADR'
007204  162737  000040  001260          SUB     #40,INADR               ;DECREMENT CYLINDER ADRES
007212  005237  001476                  INC     INDX2                   ;DONE ALL 312 FORWARD-BACKWARD
                                                                        ;SEEK PATTERNS
007216  001457                          BEQ     TST6                    ;;IF YES, EXIT

007220  000137  006664                  JMP     1$                      ;IF NOT, GO BAK & DO IMPLIED
                                                                        ;SEEK FROM 'OUTADR' TO 'INADR'

                                ;THIS SUBROUTINE IS ENTERED AFTER A 'SIN' ERROR OCCURED ON GOING FROM
                                ;'CYLA' TO 'CYLB' AS INDICATED IN THE ERROR MESSAGE. BEFORE RETRYING THE
                                ;HEADS HAVE TO BE POSITIONED BACK TO 'CYLA'. NOTE THAT A DRIVE RESET
                                ;WAS DONE TO CLEAR SIN.
                                ;R4=0, INDICATES SEEK IS BEING DONE FROM 'OUTADR' CYLINDER TO 'INADR'CYLINDER.
                                ;R4=1, INDICATES THAT SEEK IS BEING DONE FROM 'INADR' TO 'OUTADR'.
007224  005704                  SBR3:   TST     R4                      ;GOING WHICH WAY?
007226  001404                          BEQ     1$                      ;IF FROM 'OUTADR' TO 'INADR', BRANCH.
007230  013777  001260  172226          MOV     INADR,@RKDA
007236  000403                          BR      2$
007240  013777  001262  172216  1$:     MOV     OUTADR,@RKDA
```

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007246  012777  000011  172202  2$:     MOV     #11,@RKCS
007254  104422                          TST.RWS
007256  000207                          RTS     PC


                                ;CHKHDRS
                                ;THIS ROUTINE CHECKS THAT THE HEADERS READ PREVIOUSLY WERE CORRECT.
                                ;IF NOT, THE BAD HEADERS AND THE SECTOR #'S FROM WHICH THEY WERE READ
                                ;ARE STORED.
                                ;ON ENTRY:
                                ;R5 CONTAINS DISK ADDRESS FROM WHERE HEADERS WERE READ.
                                ;OUTBUF - 12 HEADRERS READ PREVIOUSLY ARE STORED STARTING 'OUTBUF'.
                                ;ON EXIT:
                                ;INDX3=0, IF THE HEADERS WERE CORRECT
                                ;INDX3=1, IF THE HEADERS WERE INCORRECT
                                ;BUFR - SECTOR #'S GIVING BAD HEADRERS ARE STORED STARTING AT 'BUFR'.
                                ;BUFR1 - BAD HEADERS FOR THE ABOVE SECTORS ARE STORED STARTING 'BUFR1'.
                                ;THE BAD SECTOR TABLE IS TERMINATED BY A '177777' WORD.

007260  005000                  CHKHDRS: CLR    R0                      ;INITIALIZE FOR 14 HDRS
007262  012701  026446                   MOV    #OUTBUF,R1              ;INITIZLIZE PTR TO HDRS RECVD
007266  012702  001266                   MOV    #BUFR,R2                ;INITIALIZE PTR TO SECTOR TABLE
007272  012703  001320                   MOV    #BUFR1,R3               ;INITIALIZE PTR TO BAD HDR TABLE
007276  010537  001120                   MOV    R5,$GDADR
007302  042737  160037  001120           BIC    #160037,$GDADR          ;GET EXPCTD HEADER
007310  005037  001500                   CLR    INDX3                   ;CLR FLG INDICATING BAD HDRS

007314  023711  001120          9$:      CMP    $GDADR,(R1)             ;HEADER OK?
007320  001406                           BEQ    10$                     ;YES,BRANCH
007322  011123                           MOV    (R1),(R3)+              ;SAVE BAD HDR
007324  010022                           MOV    R0,(R2)+                ;SAVE BAD SECTR #

007326  012712  177777                   MOV    #177777,(R2)            ;PUT TERMINATR ON SECTR TABLE
007332  005237  001500                   INC    INDX3                   ;SET FLG INDICATING BAD HDR
007336  005721                  10$:     TST    (R1)+                   ;INCRMNT PTR TO NXT HDR
007340  005200                           INC    R0                      ;ALL HDRS CHKD?
007342  022700  000014                   CMP    #14,R0
007346  001362                           BNE    9$                      ;IF NOT, LUP BAK
007350  000207                           RTS    PC

007352  004737  016772          EXT5:    JSR    PC,ABRT

                                ;;*************************************************************
                                ;*TEST 6         WRITE PATTERNS ON THE DISK
                                        ;*IN THIS TEST DIFFERENT PATTERNS ARE WRITTEN ON THE ENTIRE DISK.  768
                                        ;*WORDS (3 SECTORS) ARE WRITTEN AT A TIME.  TWO 768 WORDS LONG
                                        ;*BUFFERS HAVE BEEN USED IN THIS TEST.  WHILE ONE BUFFER IS
                                        ;*USED TO WRITE ON THE DISK, THE OTHER BUFFER GETS FILLED UP WITH
                                        ;*PATTERNS TO BE USED NEXT!  THIS OVERLAPPING IS DONE TO SAVE TIME.

                                        ;*THREE PATTERN-GENERATOR SUB-ROUTINES ARE USED:
                                        ;*1.  PTGEN0     2.  PTGEN1      3.  PTGEN2      4.  PTGEN3
                                        ;*THESE THREE ROUTINES ARE CALLED IN A CYCLIC ORDER:
                                        ;*       PTGEN0-PTGEN1-PTGEN2-PTGEN3-PTGEN0-PTGEN1........
                                        ;*THE FOLLOWING ORDER IS MAINTAINED IN WRITING BLOCKS (EACH
                                        ;*3 SECTORS LONG) USING ONE OF THE FOUR PATTERN GENERATORS:
                                                ;*CYL   SECTORS         CYL   SECTORS         CYL   SECTORS         CYL   SECTORS
                                                ;*   SUR        ROUTINE    SUR        ROUTINE    SUR        ROUTINE    SUR        ROUTI
                                                ;* 0   0   0-2  PTGEN0  0   0  6-10  PTGEN1  0   0   3-5  PTGEN2  0   0 11-13 PTGEN3
                                                ;* 0   1   0-2  PTGEN0  0   1  6-10  PTGEN1  0   1   3-5  PTGEN2  0   1 11-13 PTGEN3
                                                ;* 1   0   0-2  PTGEN0  1   0  6-10  PTGEN1  1   0   3-5  PTGEN2  1   0 11-13 PTGEN3
                                                ;* 1   1   0-2  PTGEN0  1   1  6-10  PTGEN1  1   1   3-5  PTGEN2  1   1 11-13 PTGEN3
                                                ;* 2   0   0-2  PTGEN0  2   0  6-10  PTGEN1  2   0   3-5  PTGEN2  2   0 11-13 PTGEN3
                                                ;*ETC, ETC.....
                                                ;*THE ABOVE SHOWN STAGGERING (OF SECTORS TO BE WRITTEN) IS DONE TO
                                                ;*SAVE ONE REV (40MS) EVERY TIME A BLOCK (3 SECTORS) IS WRITTEN.
                                                ;*IF YOU WANT TO USE BUFFERS STARTING AT SOME OTHER MEMORY ADDRESS
                                                ;*MAKE THE FOLLOWING CHANGES:
                                                ;*CHANGE 'PBUF0' TO STARTING ADDRESS OF THE FIRST 768 WORDS LONG BUFFER.
                                                ;*CHANGE 'PBUF1' TO STARTING ADDRESS OF SECOND 768 WORDS LONG BUFFER.

                                                ;*IF YOU WANT TO WRITE YOUR OWN PATTERNS USING PATTERN GENERATOR 'PTGEN0'
                                                ;*CHANGE 'PTRN01' AND 'PTRN02' TO THE PATTERNS YOU WANT.

                                                ;*TO WRITE THE SAME TWO (OR ONE) PATTERNS ON THE ENTIRE DISK CHANGE
                                                ;*LOCATION 'PAT1' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
                                                ;*LOCATION 'PAT2' TO 'PTGEN0' THE STARTING ADDRES OF PAT-GENERATOR 0
                                                ;*LOCATION 'PAT3' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
                                         ;;************************************************************************
 007356  000004                          TST6:  SCOPE
 007360  012737  177764  001504                 MOV     #-14,ERCNT1
 007366  012737  177764  001506                 MOV     #-14,ERCNT2
 007374  012737  177152  001474                 MOV     #-626,INDX1         ;SET COUNT FOR 313X2 TRACKS
 007402  005037  001410                         CLR     BUFLG0              ;CLR FLAG FOR BUFR 0
 007406  005037  001412                         CLR     BUFLG1              ;CLR FLAG FOR BUFR 1
                                                                            ;BIT 7 OF ABOVE FLAGS WHEN SET
                                                                            ;INDICATES, THAT BUFR TO BE USED
                                                                            ;FOR WRITING ON DSK
 007412  013737  001230  001432                 MOV     DRIVAD,DSKADR       ;GET DRIVE #, DISK ADRES
 007420  012737  001414  001424                 MOV     #PAT0,PRSPAT        ;INITIALIZE PTR TO THE FIRST
                                                                            ;PATRN GENERATOR
 007426  004737  010044                         JSR     PC,GETBUF
 007432  017737  171766  001430                 MOV     @PRSPAT,PGSUBR
 007440  004777  171764                         JSR     PC,@PGSUBR          ;GO GENERATE PATRNS FOR
                                                                            ;3 SECTOR (400X3)
 007444  005005                          1$:    CLR     R5                  ;INITIALIZE COUNT FOR 4 BLOCKS
 007446  005737  001410                  2$:    TST     BUFLG0              ;FIND OUT WHICH BUFR TO USE
 007452  100407                                 BMI     3$                  ;FOR WRITING ON DSK
 007454  013737  001406  001434                 MOV     PBUF1,BUSADR        ;USE 'IOBUF1' FOR TRANSFER
                                                                            ;OR THE ONE INDICATED BY THE USER
 007462  052737  000200  001412                 BIS     #BIT7,BUFLG1        ;SET FLAG TO INDICATE THAT
                                                                            ;WRITING ON DSK WILL B DONE FROM
                                                                            ;THIS BUFR (BUF 1)
 007470  000406                                 BR      13$

 007472  013737  001404  001434          3$:    MOV     PBUF0,BUSADR        ;USE 'IOBUF0' FOR TRANSFER
                                                                            ;OR THE ONE INDICATED BY THE USER

 007500  052737  000200  001410                 BIS     #BIT7,BUFLG0        ;INDICATE THAT 'IOBUF0' WILL
                                                                            ;B USED FOR WRTING ON DISK
 007506  012737  007514  001110          13$:   MOV     #4$,$LPERR
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007514  013777  001432  171742  4$:   MOV     DSKADR,@RKDA         ;SET RKDA
007522  013777  001434  171732        MOV     BUSADR,@RKBA
007530  012777  176400  171722        MOV     #-1400,@RKWC
007536  012777  000003  171712        MOV     #3,@RKCS             ;WRITE THE 4 SECTORS ON
                                                                   ;DISK
007544  013737  001424  001426        MOV     PRSPAT,NXTPAT        ;WHILE THE PATRNS R BEING WRITTEN
007552  023727  001424  001422        CMP     PRSPAT,#PAT3         ;GO GENERATE THE NXT PATRNS
007560  001004                        BNE     5$                   ;TO B WRITTEN
007562  012737  001414  001426        MOV     #PAT0,NXTPAT         ;KEEP GENERATING PATRNS IN THIS
007570  000403                        BR      6$                   ;WAY "PAT0"-"PAT1"-"PAT2"-"PAT3"-"PAT0"-
007572  062737  000002  001426  5$:   ADD     #2,NXTPAT
007600  004737  010044          6$:   JSR     PC,GETBUF
007604  017737  171616  001430        MOV     @NXTPAT,PGSUBR
007612  004777  171612                JSR     PC,@PGSUBR           ;GO GENERATE THESE PATRNS.
                                                                   ;(3 X 400) WORDS
007616  104421                        CON.RDY
007620  032777  140000  171630        BIT     #140000,@RKCS        ;ANY ERROR?
007626  001411                        BEQ     12$                  ;GET RKCS,ER,DS,DA
007630  004737  016162                JSR     PC,GT4RG
007634  104021                        ERROR   21                   ;ERROR ON DOING WRITE
007636  104415                        CON.RESET                    ;CLEAR IT
007640  005237  001504                INC     ERCNT1               ;ALLOW 12 ERRORS AT MOST
007644  001002                        BNE     12$
007646  000137  010432                JMP     EXT6                 ;IF MORE, EXIT
007652  032777  001000  171572  12$:  BIT     #BIT9,@RKDS          ;SIN, ON DOING WRITE?
007660  001412                        BEQ     7$
007662  004737  016162                JSR     PC,GT4RG
007666  104022                        ERROR   22                   ;SIN ERROR ON DOING WRITE
007670  104415                        CON.RESET
007672  104416                        DRV.RESET
007674  005237  001506                INC     ERCNT2               ;ALLOW 12 ERRORS AT MOST
007700  001002                        BNE     7$
007702  000137  010432                JMP     EXT6
                                                                   ;FIGURE OUT WHICH BUFFER IS
                                                                   ;AVAILABLE FOR USE
007706  105737  001410          7$:   TSTB    BUFLG0               ;WAS PREVIOUS DSK-WRITE DONE
007712  100003                        BPL     8$                   ;USING BUFR 0?
007714  005037  001410                CLR     BUFLG0               ;YES, CLR FLAG INDICATING IT'S
                                                                   ;AVAILABLE NOW
007720  000402                        BR      9$
007722  005037  001412          8$:   CLR     BUFLG1               ;CLR FLAG INDICATING BUFR1
                                                                   ;IS AVAILABLE NOW
007726  013737  001426  001424  9$:   MOV     NXTPAT,PRSPAT        ;'PRSPAT'S PATRNS WILL BE USED
                                                                   ;ON NEXT WRITE
007734  010500                        MOV     R5,R0                ;FORM SEC # TO BE USED NXT TIME
007736  116000  010426                MOVB    SECPTR(R0),R0        ;GET SEC #
007742  042737  000017  001432  10$:  BIC     #17,DSKADR           ;MASK SECTOR BITS FROM DSK-ADRES
007750  050037  001432                BIS     R0,DSKADR            ;FORM NXT DSK-ADRES
007754  005205                        INC     R5                   ;DONE WITH 12 SECTRS (3 BLOCKS)?
007756  022705  000004                CMP     #4,R5
007762  001231                        BNE     2$                   ;ON THIS SURFACE? IF NOT, GO
                                                                   ;DO NXT 4 SECTRS
007764  032737  000001  001474        BIT     #BIT0,INDX1          ;WHICH SURFACE WAS DONE, 0 OR 1?
007772  001415                        BEQ     11$                  ;IF 0, GO DO SURFACE 1
007774  005237  001474                INC     INDX1                ;COUNT # OF TRACKS
010000  001002                        BNE     .+6
```

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010002  000137  010436                   JMP     TST7            ;EXIT IF DONE
010006  042737  000020  001432           BIC     #20,DSKADR      ;GO TO SUR 0, NEXT CYLINDER
010014  062737  000040  001432           ADD     #40,DSKADR
010022  000137  007444                   JMP     1$              ;GO BACK AND DO WRITE
010026  005237  001474          11$:     INC     INDX1           ;COUNT # OF TRACKS
010032  052737  000020  001432           BIS     #20,DSKADR      ;SET BIT FOR SUR 1
010040  000137  007444                   JMP     1$              ;GO, WRITE PATRNS ON SURFACE 1
                                ;*GET BUF*
                                ;*THIS ROUTINE FINDS OUT  WHICH BUFFER (IOBUF0, IOBUF1) OR ONE OF
                                ;*THE TWO BUFFERS SELECTED BY THE USER) TO USE
                                ;*FOR GENERATING PATTERNS. THEN IT SETS UP A FLAG INDICATING THAT
                                ;*BUFFER HAS TO BE FILLED UP. THE STARTING ADDRESS OF THE
                                ;*BUFFER IS STORED IN 'BUF #'.

010044  005737  001410          GETBUF:  TST     BUFLG0          ;BUFR 0 AVAILABLE FOR USE?
010050  100007                           BPL     1$              ;YES, BRANCH
010052  052737  100000  001412           BIS     #BIT15,BUFLG1   ;NO, USE BUFR 1. INDICATE SO.
010060  013737  001406  001446           MOV     PBUF1,BUFNO     ;SAVE STARTING ADRES OF BUFR1
010066  000207                           RTS     PC
010070  052737  100000  001410  1$:      BIS     #BIT15,BUFLG0   ;INDICATED, USING BUF 0
010076  013737  001404  001446           MOV     PBUF0,BUFNO     ;SAVE STARTING ADRES OF BUFR 0
010104  000207                           RTS     PC              ;RETURN
                                ;*PTGENO
                                ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
                                ;*BUFFER CONTAINING THE FOLLOWING PATTERNS
                                ;*FIRST BLOCK OF 256 WORDS:      125252
                                ;*SECOND BLOCK OF 256 WORDS:     052525 (COMPLEMENT OF ABOVE)
                                ;*THIRD BLOCK OF 256 WORDS:      010421
                                ;*YOU CAN USE ANY OTHER PATTERN/S (& ITS COMPLEMENT)
                                ;*MAKING THE CHANGES IN THE 2 LOCATIONS SHOWN BELOW.

010106  013700  001446          PTGENO:  MOV     BUFNO,R0               ;GET STARTING ADRES OF BUFR
010112  013701  010164                   MOV     PTRNO1,R1       ;GET PATRN TO BE GENERATED
010116  012702  177400                   MOV     #-400,R2        ;IN THE FIRST 400 WORD BLOCK

010122  010120                  1$:      MOV     R1,(R0)+        ;GENERATE THE FIRST BLOCK
010124  005202                           INC     R2              ;WITH 'PAT01' PATRN
010126  001375                           BNE     1$              ;ALL DONE?

010130  012702  177400                   MOV     #-400,R2
010134  005101                           COM     R1              ;COMPLEMENT 'PAT01' PATAN
010136  010120                  2$:      MOV     R1,(R0)+        ;GENERATE 2ND BLOCK WITH
010140  005202                           INC     R2              ;'PAT01'S COMPLEMENT PATRN
010142  001375                           BNE     2$              ;ALL DONE?
010144  012702  177400                   MOV     #-400,R2
010150  013701  010166                   MOV     PTRNO2,R1       ;GET PATRN TO BE GENERATED
                                                                 ;FOR 3RD BLOCK
010154  010120                  3$:      MOV     R1,(R0)+        ;GENERATE 3RD BLOCK USING
                                                                 ;'PAT02' PATRN
010156  005202                           INC     R2
010160  001375                           BNE     3$              ;ALL DONE?

010162  000207                           RTS     PC              ;RETURN

010164  125252                  PTRNO1:  125252                  ;CHANGE THESE LOCATIONS IF
010166  010421                  PTRNO2:  010421                  ;YOU WANT ANY OTHER PATTERNS
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                                ;*PTGEN1
                                ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS
                                ;*LONG BUFFER CONTAINING THE FOLLOWING PATTERNS:

                                ;*FIRST BLOCK-256 WORDS 000001  FILL 1'S
                                ;*                      000003
                                ;*                        :
                                ;*                      177777

                                ;*SECOND BLOCK          177776  FILL 0'S
                                ;*                      177774
                                ;*                        :
                                ;*                      000000

                                ;*THIRD BLOCK           000001  FLOAT A 1
                                ;*                      000020
                                ;*                        :
                                ;*                      100000

                                ;*'BUFNO' CONTAINS THE STARTING ADDRESS OF THE
                                ;*BUFFER.

010170  012703  000001          PTGEN1: MOV     #1,R3           ;INITIALIZE PATRNS
010174  012704  177776                  MOV     #177776,R4
010200  013700  001446                  MOV     BUFNO,R0                ;GET STARTING ADRES OF BUFR
010204  012702  177760                  MOV     #-20,R2         ;SET COUNT
010210  010301                  1$:     MOV     R3,R1           ;INITIALIZE PATRN
010212  010120                  2$:     MOV     R1,(R0)+        ;GENERATE THE FIRST
010214  000261                          SEC                     ;BLOCK USING "FILL 1'S"
010216  006101                          ROL     R1
010220  103374                          BCC     2$
010222  005202                          INC     R2
010224  001371                          BNE     1$              ;ALL DONE?

010226  012702  177760                  MOV     #-20,R2
010232  010401                  3$:     MOV     R4,R1           ;INITIALIZE PATRN
010234  010120                  4$:     MOV     R1,(R0)+        ;GENERATE 2ND BLOCK
010236  000241                          CLC                     ;USING "FILL 0'S"
010240  006101                          ROL     R1
010242  103774                          BCS     4$
010244  005202                          INC     R2
010246  001371                          BNE     3$              ;DONE?

010250  012702  177760                  MOV     #-20,R2         ;SET COUNT
010254  010301                  5$:     MOV     R3,R1           ;INITIALIZE PATRN
010256  010120                  6$:     MOV     R1,(R0)+        ;GENERATE THE 3RD BLOCK
010260  006301                          ASL     R1              ;USING "FLOAT A 1"
010262  103375                          BCC     6$
010264  005202                          INC     R2
010266  001372                          BNE     5$              ;DONE?
010270  000207                          RTS     PC              ;RETURN

                                ;*PTGEN2
                                ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
                                ;*BUFFER CONTAINING THE FOLLOWING PATTERNS:
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                                ;*FIRST BLOCK-256 WORDS 000000  COUNT PATRN-LOWER BYTE
                                ;*                      000001  0-377
                                ;*                      000002
                                ;*                        :
                                ;*                      000377

                                ;*SECOND BLOCK          000000  COUNT PATRN-HIGHER BYTE
                                ;*                      000400  0-377
                                ;*                      001000
                                ;*                        :
                                ;*                      177400

                                ;*THIRD BLOCK           000000  COUNT PATRN-HIGHER & LOWER BYTE
                                ;*                      000401  0-377, 0-377
                                ;*                        :
                                ;*                      177777

                                ;*'BUFNO' CONTAINS THE STARTING ADDRESS OF THE BUFFER.

010272  005001                  PTGEN2: CLR     R1                      ;INITIALIZE PATRN

010274  013700  001446                  MOV     BUFNO,R0
010300  010120                  1$:     MOV     R1,(R0)+                ;GENERATE 1ST BLOCK USING
010302  105201                          INCB    R1                      ;USING 'COUNT UP LOWER BYTE'
010304  001375                          BNE     1$                      ;DONE?

010306  005001                          CLR     R1
010310  010120                  2$:     MOV     R1,(R0)+                ;GENERATE 2ND BLOCK
010312  062701  000400                  ADD     #400,R1                 ;USING 'COUNT UP HIGHER BYTE'
010316  103374                          BCC     2$                      ;DONE?
010320  005001                          CLR     R1
010322  010120                  3$:     MOV     R1,(R0)+                ;GENERATE 3RD BLOCK USING
010324  062701  000401                  ADD     #401,R1                 ;'COUNT UP HIGHER & LOWER BYTE'
010330  103374                          BCC     3$                      ;ALL DONE?
010332  000207                          RTS     PC                      ;RETURN



                                ;PTGEN3
                                ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
                                ;*BUFFER CONTAINING THE FOLLOWING PATTERNS:

                                ;*FIRST BLOCK OF 256 WORDS:      167356 (COMPLEMENT OF 010421)

                                ;*SECOND BLOCK          177776  FLOAT A 0
                                ;*                      177775
                                ;*                        :
                                ;*                      077777

                                ;*THIRD BLOCK           000377  COUNT UP HIGHER BYTE 0-377
                                ;*                      000776  COUNT DOWN LOWER BYTE 377-0
                                ;*                        :
                                ;*                      177400

                                ;*'BUFNO' CONTAINS THE STARTING ADDRESS OF THE BUFFER.

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010334  013700  001446          PTGEN3: MOV     BUFNO,R0
010340  012702  177400                  MOV     #-400,R2
010344  013701  010166                  MOV     PTRNO2,R1               ;GET PATTERN
010350  005101                          COM     R1                      ;COMPLEMENT 'PAT02' PATRN
010352  010120                  4$:     MOV     R1,(R0)+                ;GENERATE 1ST BLOCK
010354  005202                          INC     R2
010356  001375                          BNE     4$                      ;ALL DONE?

                                                                        ;2ND BLOCK
010360  012702  177760                  MOV     #-20,R2
010364  000261                  7$:     SEC
010366  012701  177776                  MOV     #177776,R1
010372  010120                  8$:     MOV     R1,(R0)+
010374  006101                          ROL     R1
010376  103775                          BCS     8$
010400  005202                          INC     R2
010402  001370                          BNE     7$                      ;ALL DONE?

                                                                        ;3RD BLOCK
010404  012701  000377                  MOV     #377,R1
010410  010102                          MOV     R1,R2                   ;GENERATE 3RD BLOCK USING
010412  010120                  9$:     MOV     R1,(R0)+                ;'COUNT DOWN LOWER BYTE'
010414  060201                          ADD     R2,R1                   ;'COUNT UP HIGHER BYTE'
010416  022701  177777                  CMP     #-1,R1
010422  001373                          BNE     9$                      ;ALL DONE?
010424  000207                          RTS     PC                      ;RETURN

                                ;SECTOR POINTER TABLE. DATA TRANSFERS ARE DONE IN BLOCKS (3 SECTORS
                                ;EACH) IN THE CYCLIC ORDER:  0-2, 6-10, 3-5, 11-13, 0-2, AND SO ON.
010426     006                  SECPTR: .BYTE   6
010427     003                          .BYTE   3
010430     011                          .BYTE   11
010431     000                          .BYTE   0

010432  004737  016772          EXT6:   JSR     PC,ABRT



                                ;;****************************************************************
                                ;*TEST 7          READ, SOFTWARE COMPARE, WRITE CHECK OF THE PATTERNS

                                        ;****TEST 6 (WRITING PATTERNS ON DISK) SHOULD BE DONE BEFORE DOING****
                                        ;****THIS TEST.****

                                        ;*IN THIS TEST THE PATTERNS THAT WERE WRITTEN BEFORE (IN THE
                                        ;*PREVIOUS TEST) ARE READ BACK AND SOFTWARE COMPARED.
                                        ;*WHILE THE SOFTWARE COMPARISON IS TAKING PLACE, AN OVERLAPPING
                                        ;*'WRITE CHECK' IS DONE FOR THE SAME BLOCK.  THE READING
                                        ;*BACK OF EACH BLOCK (4 SECTORS) IS DONE IN THE SAME
                                        ;*MANNER AS DESCRIBED IN THE BEGINNING OF PREVIOUS TEST.
                                        ;*OVERLAPPING OPERATIONS AND STAGGERING OF BLOCKS ARE DONE IN
                                        ;*A SIMILIAR MANNER.
                                        ;*THE FOLLOWING IS A DESCRIPTION OF HOW ERRORS ARE HANDLED.
                                        ;*IF A 'SIN' OR 'HE' OCCURS IT IS REPORTED AND THAT BLOCK
                                        ;*IS SKIPPED.  IN THIS STAGE OF TESTING THESE ERRORS SHOULD NOT
                                        ;*NORMALLY OCCUR.
                                        ;*IF A CHECKSUM ERROR OCCURS, CONTROL IS TRANSFERRED TO
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                                                 ;*'CSERROR'.  FIRST THE CSE IS REPORTED.  THE SECTOR GIVING
                                                 ;*CSE IS READ AGAIN.  IN ALL 3 TRIES ARE DONE.  IF STILL
                                                 ;*THE ERROR PRESISTS THAT SECTOR IS ABORTED AND THE REST
                                                 ;*OF THE SECTORS ARE READ AND CHECKED FOR CSE.  IF
                                                 ;*AGAIN SOME OTHER SECTOR GIVES CSE, REPORTING AND RETRIES
                                                 ;*ARE DONE AGAIN.
                                                 ;*NEXT SOFTWARE COMPARISON IS DONE OF THE DATA THAT WAS
                                                 ;*READ BACK.  ON GETTING A DATA MISCOMPARISON
                                                 ;*THE RELEVANT INFO(GOOD DATA, BAD DATA, ADDRESS ETC.) IS
                                                 ;*STORED.  AFTER THE WHOLE BLOCK HAS BEEN CHECKED, THE DATA
                                                 ;*ERROR/S IS/ARE REPORTED.  THEN THE BLOCK IS READ AGAIN.  IN ALL
                                                 ;*THREE TRIES ARE DONE.
                                                 ;*WHILE THE DATA COMPARISON (SOFTWARE) IS GOING ON THE 'WRITE
                                                 ;*CHECK' IS ALSO IN PROGRESS.  IF A WRITE CHECK ERROR OCCURS THE
                                                 ;*CONTROL IS TRANSFERRED TO 'WCEROR'.  WRITE CHECK OF THE SECTOR
                                                 ;*THAT GAVE WCE IS DONE AGAIN.  IN ALL THREE TRIES ARE DONE.
                                                 ;*NOTE THAT EVERY WCE IS REPORTED. IF ALL THE 4 SECTOR OF
                                                 ;*A BLOCK GAVE WCE'S, ALL 4 WILL BE REPORTED AND RETRIED.

                                                 ;*DEPENDING ON THE NATURE OF THE PROBLEM, THE ABOVE ERRORS
                                                 ;*CAN OCCUR IN ANY COMBINATION.  IT IS RECOMMENDED THAT ALL
                                                 ;*THE ERROR MESSAGE BE CAREFULLY CO-RELATED AND EXAMINED.  IT
                                                 ;*WILL PROVIDE A DEEP INSIGHT INTO THE PROBLEM.
                                         ;;*************************************************************
 010436  000004                          TST7:   SCOPE
 010440  012737  177764  001510                  MOV     #-14,ERCNT3      ;ALLOW 12 ERRORS AT THE MOST
 010446  012737  177773  001512                  MOV     #-5,ERCNT4       ;ALLOW 5 ERRORS AT THE MOST
 010454  012737  177742  001514                  MOV     #-36,ERCNT5      ;ALLOW 10 ERRORS AT THE MOST
 010462  012737  177742  001516                  MOV     #-36,ERCNT6      ;ALLOW 10 ERRORS AT THE MOST
 010470  012737  177764  001520                  MOV     #-14,ERCNT7      ;ALLOW 12 ERRORS AT THE MOST
 010476  012737  177742  001522                  MOV     #-36,ERCNT8      ;ALLOW 10 ERRORS AT THE MOST
 010504  012737  177152  001474                  MOV     #-626,INDX1      ;SET COUNT FOR 626 TRACKS
 010512  005037  001476                          CLR     INDX2            ;CLR COUNT FOR 4 BLOCKS ON A TRACK

 010516  012737  001414  001424                  MOV     #PAT0,PRSPAT     ;INITLZE PTR TO PATRN GENRTR
 010524  013737  001230  001450                  MOV     DRIVAD,ADRES     ;INITLZE DRV#,ADRES


 010532  005037  001504                  BEGIN:  CLR     ERCNT1           ;IF > 0, MEANS THAT RETRIES
 010536  005037  001506                          CLR     ERCNT2           ;DONE AFTER CSE OR CSE CHKD
 010542  012737  177775  001252                  MOV     #-3,RETRY1       ;RETRY COUNT FOR CSE
 010550  012737  177776  001254                  MOV     #-2,RETRY2       ;RETRY COUNT FOR SFTWRE MISCMP'N
 010556  012737  000003  001256                  MOV     #3,RETRY3        ;RETRY COUNT FOR WCE

 010564  013737  001450  001440                  MOV     ADRES,WDSKAD     ;DISK ADRES TO WRT CHK WITH
 010572  013737  001406  001442                  MOV     PBUF1,WBUSAD     ;USE THIS BUFR 1 TO WRT CHK
                                                                          ;OR THE BUFR INDICATED BY THE USER
 010600  012737  176400  001444                  MOV     #-1400,WWRDCN    ;WRT CHK 1 BLOCK=3SECS=1400 WRDS

 010606  013737  001450  001432          READ:   MOV     ADRES,DSKADR     ;DISK ADRES TO READ FROM
 010614  012737  176400  001436                  MOV     #-1400,WRDCNT    ;1 BLOCK = 3 SECTORS = 1400 WRDS
 010622  013737  001404  001434                  MOV     PBUF0,BUSADR     ;USE 'IOBUF0' TO READ INTO
                                                                          ;OR THE BUFR INDICATED BY THE USER

 010630  000404                                  BR      RDAGAIN
```

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010632  104415                    LUPSIN: CON.RESET
010634  104416                            DRV.RESET
010636  000401                            BR      RDAGAIN

010640  104415                    LUPHE:  CON.RESET

010642  013777  001432  170614    RDAGAIN:        MOV     DSKADR,@RKDA    ;READ FROM THIS DSK-ADRES
010650  013777  001436  170602            MOV     WRDCNT,@RKWC    ;THIS # OF WORDS
010656  013777  001434  170576            MOV     BUSADR,@RKBA    ;INTO THIS BUFR

010664  012777  000405  170564            MOV     #405,@RKCS      ;READ,SSE,GO


010672  013737  001406  001446            MOV     PBUF1,BUFNO     ;SET UP STARTING ADRES
010700  017737  170520  001430            MOV     @PRSPAT,PGSUBR
010706  004777  170516                    JSR     PC,@PGSUBR      ;GO GENERATE A BUFFER
                                                                  ;OF 1400 WORDS USING THIS
                                                                  ;PATRN GENRATR

010712  104421                            CON.RDY                 ;DONE WITH PATRN GENRTNG,
                                                                  ;WAIT FOR CNT RDY TO SET
                                                                  ;(FROM PREVIOUS READ)

                                                                  ;CNT RDY SET
010714  032777  040000  170534            BIT     #BIT14,@RKCS    ;HARD ERROR?
010722  001416                            BEQ     NOHE

010724  012737  010640  001110            MOV     #LUPHE,$LPERR
010732  004737  016214                    JSR     PC,GETINF
010736  104023                            ERROR   23              ;HARD ERROR
010740  104415                            CON.RESET
010742  005237  001510                    INC     ERCNT3          ;ALLOW 12 ERRORS AT MOST
010746  001002                            BNE     1$
010750  000137  012170                    JMP     EXT7            ;IF MORE, EXIT
010754  000137  011512            1$:     JMP     FINISH
010760  032777  001000  170464    NOHE:   BIT     #BIT9,@RKDS     ;SIN SET?
010766  001417                            BEQ     NOSIN           ;NO

010770  012737  010632  001110            MOV     #LUPSIN,$LPERR
010776  004737  016214                    JSR     PC,GETINF
011002  104011                            ERROR   11              ;SIN ON READ
011004  104415                            CON.RESET
011006  104416                            DRV.RESET
011010  005237  001512                    INC     ERCNT4          ;ALLOW 5 ERRORS AT MOST
011014  001002                            BNE     1$
011016  000137  012170                    JMP     EXT7            ;IF MORE, EXIT
011022  000137  011512            1$:     JMP     FINISH

011026  005737  001504            NOSIN:  TST     ERCNT1          ;CHECKING CSE FOR 1ST TIME
011032  001031                            BNE     WRTCHK          ;NO,BRANCH
011034  005237  001504                    INC     ERCNT1          ;INDICATE THAT CSE HAS BEEN
                                                                  ;CHECKED ONCE

011040  032777  000002  170406            BIT     #BIT1,@RKER     ;CHECK SUM EROR?
011046  001423                            BEQ     WRTCHK
011050  012737  010532  001110            MOV     #BEGIN,$LPERR
```

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011056  004737  016214                   JSR     PC,GETINF
011062  013737  001252  001202           MOV     RETRY1,$REG10    ;GET THE RETRY #
011070  062737  000004  001202           ADD     #4,$REG10        ;SAVE IT FOR TYPEOUT
011076  104024                           ERROR   24               ;CSE
011100  005237  001514                   INC     ERCNT5           ;ALLOW 10 ERRORS AT MOST
011104  001002                           BNE     1$
011106  000137  012170                   JMP     EXT7             ;IF MORE, EXIT
011112  000137  011654          1$:      JMP     CSEROR           ;GO, SERVICE CSE

011116  005037  001506          WRTCHK:  CLR     ERCNT2           ;CLR FLAG INDICATING SOFTWARE
                                                                  ;COMPARE DONE
011122  022737  000003  001256           CMP     #3,RETRY3        ;WRT CHK DONE BEFORE OR
011130  001016                           BNE     SFTCMP           ;IT'S 1ST TIME?
                                                                  ;IF DONE,BRANCH OTHERWISE DO IT
011132  013777  001440  170324  WCAGAIN: MOV     WDSKAD,@RKDA     ;WRT CHK FROM THIS DSK-ADRES
011140  013777  001444  170312           MOV     WWRDCN,@RKWC     ;THIS # FO WORDS
011146  013777  001442  170306           MOV     WBUSAD,@RKBA     ;WITH THIS BUFFER

011154  012777  000407  170274           MOV     #407,@RKCS       ;WRT CHK,GO,SSE

011162  005337  001256                   DEC     RETRY3           ;INDICATE WRT CHK DONE

011166  005737  001506          SFTCMP:  TST     ERCNT2           ;SFTWARE CMPARE DONE ONCE BEFORE?
011172  001060                           BNE     WCREPT           ;IF SFTWARE CMPARE HAS BEEN DONE
                                                                  ;ONCE DON'T DO IT AGAIN. OTHERWISE,
011174  005237  001506                   INC     ERCNT2           ;DO IT. INDICATE IT IS DONE.
                                                                  ;MORE THAN ONCE BEFORE.
                                                                  ;IF THIS IS 1ST TIME THRU &
                                                                  ;WRT CHK WAS DONE ONCE BEFORE
                                                                  ;DO SOFTWARE COMPARISON OF
                                                                  ;THE DATA THAT WAS READ FROM
                                                                  ;THE DISK

011200  012702  001266                   MOV     #BUFR,R2         ;INITLZE PTR TO BUFR STORING
                                                                  ;ADRES OF BAD DATA
011204  012703  001320                   MOV     #BUFR1,R3        ;STORE EXPCTD DATA STARTING HERE
011210  012704  001352                   MOV     #BUFR2,R4        ;STORE RECVD (BAD) DATA
                                                                  ;STARTING HERE

011214  005037  001500                   CLR     INDX3            ;CLR FLAG INDICATING MISCMPRE

011220  013700  001404          COMPAR:  MOV     PBUF0,R0         ;INITLZE PTR TO 'RECVD DATA' BUFR
011224  012737  177764  001502           MOV     #-14,INDX4       ;STORE AND REPORT 12 OR LESS DATA ERRORS
011232  013701  001406                   MOV     PBUF1,R1         ;INITLZE PTR TO 'EXPCTD DATA' BUFR
011236  012737  176400  001260           MOV     #-1400,INADR     ;SET COUNT
011244  021011                  CMPAGAN: CMP     (R0),(R1)        ;CORRECT WORD READ FROM DISK?
011246  001402                           BEQ     1$
011250  000137  012016                   JMP     MISCMP           ;BRANCH IF MISCMPRE ERROR
011254  005720                  1$:      TST     (R0)+            ;INCRMNT PTRS
011256  005721                           TST     (R1)+            ;TO NXT WORDS
011260  005237  001260                   INC     INADR            ;DONE WITH CMPRISON?
011264  001367                           BNE     CMPAGAN          ;IF NOT, COMPARE THE REST

011266  005737  001500                   TST     INDX3            ;WAS THERE A BAD DATA WORD
                                                                  ;(EVEN AFTR RETRYING)
011272  001420                           BEQ     WCREPT           ;NO, BRANCH
```

K05

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011274  012737  010606  001110  REPMSC: MOV     #READ,$LPERR
011302  104025                          ERROR   25              ;DATA ERROR
011304  005237  001516                  INC     ERCNT6          ;ALLOW 10 ERRORS AT MOST
011310  001002                          BNE     1$
011312  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
011316  005737  001254          1$:     TST     RETRY2
011322  001404                          BEQ     WCREPT
011324  005237  001254                  INC     RETRY2
011330  000137  010606                  JMP     READ

011334  104421                  WCREPT: CON.RDY                 ;WAIT FOR CNTRL RDY FROM
                                                                ;PREVIOUS WRT CHK
011336  022737  177776  001254          CMP     #-2,RETRY2      ;IF THERE WAS A RETRY AFTER MISC
                                                                ;-OMPARISON, DO WRT CHK AGAIN
011344  001417                          BEQ     ERWCHK
011346  000401                          BR      LUPWCE+2
011350  104415                  LUPWCE: CON.RESET
011352  013777  001440  170104          MOV     WDSKAD,@RKDA    ;WRT CHK WITH THIS DSK-ADRES
011360  013777  001444  170072          MOV     WWRDCN,@RKWC    ;THIS # OF WORDS
011366  013777  001442  170066          MOV     WBUSAD,@RKBA    ;THIS BUS ADRES
011374  012777  000407  170054          MOV     #407,@RKCS

011402  104421                          CON.RDY
011404  012737  011350  001110  ERWCHK: MOV     #LUPWCE,$LPERR
011412  032777  040000  170032          BIT     #BIT14,@RKDS    ;HARD EROR?(FROM WRT CHK)
011420  001410                          BEQ     XHE             ;NO,BRANCH

011422  004737  016214                  JSR     PC,GETINF
011426  104026                          ERROR   26              ;HE ON WRT CHK
011430  005237  001520                  INC     ERCNT7          ;ALLOW 12 ERRORS AT MOST
011434  001002                          BNE     XHE
011436  000137  012170                  JMP     EXT7            ;IF MORE, EXIT

011442  032777  000001  170004  XHE:    BIT     #BIT0,@RKER     ;WRITE CHECK EROR?
011450  001420                          BEQ     FINISH
011452  004737  016214                  JSR     PC,GETINF
011456  012737  000003  001202          MOV     #3,$REG10       ;GET TRY #
011464  163737  001256  001202          SUB     RETRY3,$REG10   ;SAVE IT FOR TYPEOUT
011472  104027                          ERROR   27              ;WRT CHK EROR
011474  005237  001522                  INC     ERCNT8          ;ALLOW 10 ERRORS AT MOST
011500  001002                          BNE     1$
011502  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
011506  000137  012062          1$:     JMP     WCEROR



                                                                ;THERE WAS NO WCE. DONE
                                                                ;WITH ALL CHECKING FOR SOFT
                                                                ;ERORS,ETC. MODIFY PARAMETERS
                                                                ;TO CHECK NXT BLOCK ON
                                                                ;THE DISK

011512  022737  001422  001424  FINISH: CMP     #PAT3,PRSPAT    ;FIND OUT THE NXT PATRN GENRATR
011520  001404                          BEQ     1$              ;TO USE FOR GENRATING THE
011522  062737  000002  001424          ADD     #2,PRSPAT       ;BUFR,STORE POINTER TO
011530  000403                          BR      2$              ;GENRATR ROUTINE IN 'PRSPAT'
011532  012737  001414  001424  1$:     MOV     #PAT0,PRSPAT    ;NOTE THER R 4 PAT-GENRATRS
```

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                                                                                ;PAT0-PAT1-PAT2-PAT3----PAT0-
011540  013701  001476          2$:     MOV     INDX2,R1                        ;FORM SECTR # TO BE USED NEXT
011544  116101  010426                  MOVB    SECPTR(R1),R1                   ;GET SECTR #
011550  042737  000017  001450  3$:     BIC     #17,ADRES                       ;MASK SECTR BITS
011556  050137  001450                  BIS     R1,ADRES                        ;FORM THE NEW DISK-ADRES
                                                                                ;FORM THE NXT BLOCK TO BE
                                                                                ;CHECKED.
011562  005237  001476                  INC     INDX2                           ;DONE ALL 4 BLOCKS(3 SECS
                                                                                ;EACH) ON THIS TRACK?
011566  022737  000004  001476          CMP     #4,INDX2
011574  001025                          BNE     GOBAK                           ;IF NOT, GO BAK & DO THE
                                                                                ;NXT BLOCK ON THIS TRACK

011576  005037  001476          DONTRK: CLR     INDX2                           ;REINITLZE COUNT FOR
                                                                                ;4 BLOCKS ON THIS TRACK
011602  032737  000001  001474          BIT     #BIT0,INDX1                     ;WHICH SUR TO DO NXT? 0 OR 1
011610  001407                          BEQ     DOSUR1                          ;BRANCH, DO SUR 1 NXT

011612  062737  000040  001450          ADD     #40,ADRES

011620  042737  000020  001450          BIC     #20,ADRES                       ;CLR SUR BIT, DO SUR 0 NXT
011626  000403                          BR      DONE

011630  052737  000020  001450  DOSUR1: BIS     #20, ADRES                      ;SET SUR BIT, DO SUR 1 NXT

011636  005237  001474          DONE:   INC     INDX1                           ;DONE WITH ALL 626 TRACKS?
011642  001002                          BNE     GOBAK
011644  000137  012174                  JMP     TST10

011650  000137  010532          GOBAK:  JMP     BEGIN                           ;IF NOT, GO BAK & CHECK
                                                                                ;THE NXT TRACK

                                ;CSEROR                                         ;THIS IS THE ENTRY POINT
                                                                                ;FOR SERVICE ROUTINE FOR CHECK
011654                          CSEROR:                                         ;SUM EROR. CONTROL IS XFERED
                                                                                ;HERE ONCE CSE OCCURS

011654  017700  167604                  MOV     @RKDA,R0                        ;GET RKDA AFTER CSE
011660  010001                          MOV     R0,R1                           ;SAVE RKDA
011662  032700  000017                  BIT     #17,R0                          ;FORM THE ADRES OF THE SECTR
011666  001002                          BNE     1$                              ;WHICH GAVE CSE
011670  162700  000004                  SUB     #4,R0
011674  005300                  1$:     DEC     R0                              ;R0 CONTAINS DSK-ADRES WHERE
                                                                                ;CSE OCURED
011676  020037  001432                  CMP     R0,DSKADR                       ;DID A PREVIOUS RETRY (IF ANY)
                                                                                ;GIVE CSE ON SAME ADRES
011702  001021                          BNE     2$                              ;NO, THIS IS A FRESH CSE, BRANCH.
                                                                                ;IF THIS WAS A CSE ON A
011704  005237  001252                  INC     RETRY1                          ;RETRY INCMNT RETRY COUNT.
                                                                                ;BRANCH IF 3 RETRIES HAVEN'T
011710  001021                          BNE     3$                              ;BEEN DONE
                                                                                ;GO REPORT CSE
                                                                                ;IF CSE WAS IN THE LAST SECTR OF
                                                                                ;THE 3 SEC BLOCK, GO TO 'WRTCHK'
                                                                                ;OTHERWISE CHECK THE REST OF
                                                                                ;THE SECTORS FOR CSE.
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011712  010102                           MOV     R1,R2
011714  042702  177760                   BIC     #177760,R2
011720  001002                   7$:     BNE     8$
011722  000137  011116                   JMP     WRTCHK
011726  162702  000003           8$:     SUB     #3,R2
011732  100372                           BPL     7$

011734  010100                   6$:     MOV     R1,R0
011736  012737  177775  001252           MOV     #-3,RETRY1
011744  000403                           BR      3$

011746  012737  177776  001252   2$:     MOV     #-2,RETRY1        ;ALLOW 2 MORE TRIES FOR
                                                                   ;THE CSE ON SAME DISK-ADRES

011754  010037  001432           3$:     MOV     R0,DSKADR         ;SAVE DSK-ADRES FOR DOING
                                                                   ;THE RETRY-READ
011760  163700  001450                   SUB     ADRES,R0          ;MODIFY THE
011764  005200                           INC     R0                ;BUS ADRES & WORD COUNT
011766  005300                   4$:     DEC     R0                ;TO BE USE ON RETRY-
011770  001407                           BEQ     5$                ;READ
011772  062737  001000  001434           ADD     #1000,BUSADR
012000  062737  000400  001436           ADD     #400,WRDCNT
012006  000767                           BR      4$

012010  104415                   5$:     CON.RESET                 ;CLR THE CSE IN RKER
012012  000137  010642                   JMP     RDAGAIN           ;GO BACK, READ AGAIN
                                                                   ;RETRY




                                 ;MISCMP                           ;THIS IS THE ENTRY POINT
                                                                   ;FOR SERVICE ROUTINE, FOR
                                                                   ;DATA EROR (MISCOMPARISON)
                                                                   ;ON SOFTWARE COMPARISON
                                                                   ;OF DATA READ FROM THE DISK BLOCK


012016  104421                   MISCMP: CON.RDY                   ;WAIT FOR CNTRL RDY FROM
                                                                   ;PREVIOUS WRT CHK
012020  032777  040000  167430           BIT     #BIT14,@RKCS
012026  001401                           BEQ     1$
012030  104415                           CON.RESET                 ;CLR WCE IN RKER
                                                                   ;BUT STILL DATA EROR ENTER HERE
012032  010022                   1$:     MOV     R0,(R2)+          ;STORE MEM ADRES WHERE
                                                                   ;DATA EROR OCCURED
012034  012123                           MOV     (R1)+,(R3)+       ;SAVE EXPCTD DATA
012036  012024                           MOV     (R0)+,(R4)+       ;SAVE DATA RECVD (BAD)
012040  005237  001500                   INC     INDX3             ;INDICATE MISCMPRISON

012044  005237  001502                   INC     INDX4             ;STORE ONLY 12(DEC) ERORS
012050  001402                           BEQ     4$                ;IF 12 ERORS, GO REPORT THEM

012052  000137  011244                   JMP     CMPAGAN           ;GO BACK & CMPARE THE REST

012056  000137  011274           4$:     JMP     REPMSC
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                                                                  ;THIS THE ENTRY POINT FOR
                                                                  ;EROR SERVICE ON GETTING A
                                                                  ;WRITE CHECK EROR.

 012062  005737  001256          WCEROR: TST     RETRY3           ;DONE 3 TRIES?
 012066  003035                          BGT     CLRERR           ;IF NOT SKIP, OTHERWISE REPORT
                                                                  ;W C EROR

 012070  012737  000003  001256          MOV     #3,RETRY3        ;SET CONT FOR RETRIES

 012076  017700  167362                  MOV     @RKDA,R0         ;IF WCE WAS IN THE LAST SECTOR
 012102  010002                          MOV     R0,R2            ;OF THE BLOCK, NO MORE SECS
 012104  042702  177760                  BIC     #177760,R2       ;TO CHECK, GO TO 'FINISH'
 012110  001002                  3$:     BNE     4$               ;IF IT WASN'T LAST SECTOR OF THE
 012112  000137  011512                  JMP     FINISH           ;BLOCK, THEN CHECK REMAINING
 012116  162702  000003          4$:     SUB     #3,R2            ;SECTORS. (STARTING FROM THE
 012122  100372                          BPL     3$               ;SEC AFTER THE ONE GIVING WCE)
 012124  010001                  1$:     MOV     R0,R1            ;SAVE DISK ADRES
 012126  163700  001440                  SUB     WDSKAD,R0
 012132  010137  001440                  MOV     R1,WDSKAD        ;GET SAVED DISK ADRES
 012136  005200                          INC     R0
 012140  005300                  2$:     DEC     R0
 012142  001407                          BEQ     CLRERR
 012144  062737  001000  001442          ADD     #1000,WBUSAD     ;FORM THE NEW BUS ADRES
 012152  062737  000400  001444          ADD     #400,WWRDCN      ;FORM THE NEW WORD COUNT
 012160  000767                          BR      2$
 012162  104415                  CLRERR: CON.RESET
 012164  000137  011132                  JMP     WCAGAIN

 012170  004737  016772          EXT7:   JSR     PC,ABRT



                                 ;;*****************************************************************
                                 ;*TEST 10        WRITE, WRITE CHECK ON CYLINDERS 127, 128
                                         ;*THIS TEST WRITES 12 UNIQUE PATTERNS (ONE FOR EACH
                                         ;*SECTOR) ON CYLINDERS 127 AND 128, THEN WRITE
                                         ;*CHECK IS DONE TO SEE IF THEY WERE WRITTEN
                                         ;*CORRECTLY.  IT SHOULD BE NOTED THAT THERE IS
                                         ;*CHANGE IN 'WRITE' CURRENT AT THIS CYLINDER.
                                         ;*PATTERNS ARE RELOCATED ON THE CYLINDERS AFTER EACH
                                         ;*WRITE/WRITE CHECK CYCLE.  THUS THE FIRST TIME
                                         ;*PATTERN 'SP1' IS WRITTEN ON SECTOR 0, PATTERN 'SP2' ON
                                         ;*SECTOR 2, ETC.  AFTER THIS WRITE/WRITE CHECK CYCLE
                                         ;*IS OVER PATTERN 'SP2' IS WRITTEN ON SECTOR 0, PATTERN
                                         ;*:'SP3' ON SECTOR 1 AND SO ON.  THIS WRITE/WRITE
                                         ;*CHECK CYCLE IS REPEATED 12 TIMES, THUS
                                         ;*THE LAST WRITE/WRITE CHECK IS DONE USING
                                         ;*PATTERN 'SP12' ON SECTOR 0, PATTERN 'SP1' IS
                                         ;*WRITTEN ON SECTOR 1, PATTERN 'SP2' ON SECTOR 2,
                                         ;*ETC.  IF YOU WANT TO WRITE ANY OTHER PATTERNS
                                         ;*FILL IN THE PATTERNS YOU WANT IN LOCATIONS
                                         ;*'SP1', 'SP2',...ETC.
                                 ;;*****************************************************************
 012174  000004                  TST10:  SCOPE
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012176  012737  177764  001504           MOV     #-14,ERCNT1         ;ALLOW 12 ERRORS AT MOST
012204  012737  177764  001506           MOV     #-14,ERCNT2         ;ALLOW 12 ERRORS AT MOST
012212  012737  177723  001510           MOV     #-55,ERCNT3         ;ALLOW 15 ERRORS AT MOST
012220  012702  012702                   MOV     #SP1,R2             ;INITIALIZE POINTER TO PATRN
012224  010201                   DOWRT:  MOV     R2,R1
012226  012700  007740                   MOV     #7740,R0            ;SET UP CYL ADRES BITS (127)
012232  053700  001230                   BIS     DRIVAD,R0           ;SET UP DRIVE # BITS
012236  005003                   WRL01:  CLR     R3
012240  104415                   WRERR:  CON.RESET

012242  010077  167216           WRLO:   MOV     R0,@RKDA            ;ADRES THE DRIVE
012246  012777  177400  167204           MOV     #-400,@RKWC         ;WRITE 1 SECTOR
012254  010177  167202                   MOV     R1,@RKBA            ;USE THIS PATTERN
012260  012777  004003  167170           MOV     #4003,@RKCS         ;WRITE, GO
012266  104421                           CON.RDY
012270  032777  140000  167160           BIT     #140000,@RKCS       ;ANY ERROR?
012276  001414                           BEQ     4$
012300  012737  012240  001110           MOV     #WRERR,$LPERR       ;SET ADRES FOR LOOPING ON ERROR
012306  004737  016162                   JSR     PC,GT4RG            ;GET TKCS, ER, DS, DA
012312  104021                           ERROR   21                  ;ERROR OCCURRED ON DOING A WRITE
012314  104415                           CON.RESET                   ;CLEAR THE ERROR
012316  005237  001504                   INC     ERCNT1              ;ALLOW 12 ERRORS ONLY
012322  001002                           BNE     4$
012324  000137  012732                   JMP     EXT10

012330  005200                   4$:     INC     R0
012332  005203                           INC     R3                  ;KEEP COUNT
012334  022701  012730                   CMP     #SP12,R1            ;USE PATTERNS IN A CYCLIC FASHION
012340  001002                           BNE     3$
012342  012701  012700                   MOV     #SP1-2,R1
012346  005721                   3$:     TST     (R1)+               ;INCREMENT POINTERS TO NEXT PATTERN
012350  020327  000014                   CMP     R3,#14              ;DONE SURFACE 0?
012354  002732                           BLT     WRLO                ;NO
012356  001005                           BNE     2$                  ;YES, IF CHANGING HEADS
012360  010201                           MOV     R2,R1
012362  042700  000017                   BIC     #17,R0              ;SET UP CORRECT ADDRESS ETC.
012366  052700  000020                   BIS     #20,R0

012372  020327  000030           2$:     CMP     R3,#30              ;DONE WITH WRITING SURFACE 1?
012376  001321                           BNE     WRLO                ;NO, BRANCH

012400  032700  007700           WRHI:   BIT     #7700,R0            ;DONE WITH BOTH CYLINDERS - 127 & 128?
012404  001405                           BEQ     DOWCHK              ;YES
012406  012700  010000                   MOV     #10000,R0           ;NO, DO CYLINDER 128
012412  053700  001230                   BIS     DRIVAD,R0
012416  000707                           BR      WRL01               ;GO BACK
                                                                     ;CYLINDERS 127 AND 128 HAVE BEEN


012420  010201                   DOWCHK: MOV     R2,R1               ;WRITTEN, NOW DO WRITE CHECK
012422  012737  177775  001252           MOV     #-3,RETRY1          ;INITIALIZE POINTER TO FIRST PATTERN
012430  012700  010000                   MOV     #10000,R0           ;RETRY COUNT
012434  053700  001230                   BIS     DRIVAD,R0           ;DO CYLINDER 128 FIRST
012440  005003                   WCHI1:  CLR     R3
012442  010077  167016           WCERR:  MOV     R0,@RKDA            ;ADRES THE DRIVE
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012446  012777  177400  167004  WCHI:   MOV     #-400,@RKWC     ;WRITE CHECK 1 SECTOR
012454  010177  167002                  MOV     R1,@RKBA        ;WITH THIS PATTERN
012460  012777  004007  166770          MOV     #4007,@RKCS     ;WRITE CHECK, GO
012466  104421                          CON.RDY

012470  032777  040000  166754          BIT     #40000,@RKDS    ;HE?
012476  001406                          BEQ     1$              ;NO
012500  004737  016214                  JSR     PC,GETINF
012504  104026                          ERROR   26              ;HE ON DOING WRT CHK
012506  005237  001506                  INC     ERCNT2          ;ALLOW 12 ERRORS ONLY
012512  001507                          BEQ     EXT10           ;IF MORE, EXIT
012514  032777  000001  166732  1$:     BIT     #BIT0,@RKER     ;WCE?
012522  001425                          BEQ     4$              ;NO
012524  012737  012442  001110          MOV     #WCERR,$LPERR   ;SET ADRES FOR LOOPING ON ERROR
012532  004737  016214                  JSR     PC,GETINF       ;GET INFO ON ERROR
012536  013737  001252  001202          MOV     RETRY1,$REG10
012544  062737  000004  001202          ADD     #4,$REG10       ;WCE ON DOING WRITE CHECK, WITH
012552  104027                          ERROR   27              ;PATTERN STORED IN R1
012554  005237  001252                  INC     RETRY1          ;DO 3 TIMES IN ALL
012560  001330                          BNE     WCERR
012562  005237  001510                  INC     ERCNT3          ;ALLOW 15 ERRORS ONLY
012566  001461                          BEQ     EXT10           ;IF MORE, EXIT
012570  012737  177775  001252          MOV     #-3,RETRY1

012576  005200                  4$:     INC     R0              ;KEEP TRACK OF DISK-ADRES
012600  005203                          INC     R3              ;AND COUNT
012602  022701  012730                  CMP     #SP12,R1        ;USE PATTERNS IN CYCLIC
012606  001002                          BNE     3$
012610  012701  012700                  MOV     #SP1-2,R1       ;FASHION
012614  005721                  3$:     TST     (R1)+           ;INCREMENT POINTER TO NEXT PATTERN
012616  020327  000014                  CMP     R3,#14          ;DONE SURFACE 0?
012622  002711                          BLT     WCHI            ;NO
012624  001005                          BNE     2$
012626  010201                          MOV     R2,R1           ;IF CHANGING HEADS (0-1), SET CORRECT
012630  042700  000017                  BIC     #17,R0          ;ADRES BITS
012634  052700  000020                  BIS     #20,R0

012640  020327  000030          2$:     CMP     R3,#30          ;DONE WRITE CHECKING SURFACE 1?
012644  001300                          BNE     WCHI            ;NO, GO BACK

012646  032700  007700          WCLO:   BIT     #7700,R0        ;DONE BOTH CYLINDERS - 127, 128?
012652  001005                          BNE     REPEAT          ;YES, BRANCH
012654  012700  007740                  MOV     #7740,R0        ;DO CYLINDER 127 NOW
012660  053700  001230                  BIS     DRIVAD,R0
012664  000665                          BR      WCHI1


012666  005722                  REPEAT: TST     (R2)+           ;RELOCATE THE PATTERNS ON THE
012670  020227  012732                  CMP     R2,#SP12+2      ;CYLINDERS AND DO IT AGAIN
012674  001420                          BEQ     TST11           ;;EXIT
012676  000137  012224                  JMP     DOWRT           ;THIS TEXT)




                                ;PATTERNS TO BE USED
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 012702  177777                        SP1:    .WORD   177777                  ;IF YOU WANT TO WRITE ANY
 012704  052525                        SP2:    .WORD   052525                  ;OTHER PATTERNS, CHANGE THESE
 012706  111111                        SP3:    .WORD   111111                  ;12 LOCATIONS TO ANY PATTERN
 012710  010421                        SP4:    .WORD   010421                  ;YOU WANT.
 012712  102041                        SP5:    .WORD   102041
 012714  010101                        SP6:    .WORD   010101
 012716  040201                        SP7:    .WORD   040201
 012720  000401                        SP8:    .WORD   000401
 012722  031463                        SP9:    .WORD   031463
 012724  070707                        SP10:   .WORD   070707
 012726  007417                        SP11:   .WORD   007417
 012730  041020                        SP12:   .WORD   041020

 012732  004737  016772                EXT10:  JSR     PC,ABRT






                                       ;;***********************************************************
                                       ;*TEST 11        SEEK FUNCTION TIMER
                                       ;*SEEK TIMER
                                       ;*IN THIS PART OF THE PROGRAM SEEKS ARE TIMED BETWEEN A PARTICULAR SET
                                       ;*OF CYLINDERS, BOTH IN THE FORWRAD  DIRECTION (0-312) AND REVERSE(312-0).
                                       ;*******CAUTION******
                                       ;*IT SHOULD BE NOTED THAT THE SECTOR COUNTER (IN RK05) IS USED AS THE REAL
                                       ;*TIME CLOCK TO DO THE SEEK TIMING. FOR THE TIMES TO BE RELIABLE, THE
                                       ;*SECTOR COUNTER SHOULD BE ACCURATE WITHIN THE SPECIFICATIONS OF THE DISK
                                       ;*SPEED:      1500 RPM = 40 MILI SECS/REV =3.33 MILI SECS/SECTOR.
                                       ;*VARIATION: +-30  RPM
                                       ;;***********************************************************
 012736  000004                        TST11:  SCOPE
 012740  032777  000100  166172                BIT     #SW6,@SWR       ;INHIBIT TIMER?
 012746  001002                                BNE     .+6
 012750  000137  014106                        JMP     PLTGRPH
 012754  104415                                CON.RESET
 012756  104416                                DRV.RESET

 012760  012737  177771  001252                MOV     #-7,RETRY1      ;COUNT FOR 7 DIFRNT SEEK TIMES
                                                                       ;TO BE RECORDED

 012766  104401  012774                        TYPE    ,65$            ;;TYPE ASCIZ STRING
 012772  000424                                BR      64$             ;;GET OVER THE ASCIZ
                                       ;;65$:  .ASCIZ  <15><12>/SEEK TIME SCALE FACTOR=0.01 MILI SECS/
 013044                                64$:
 013044  104401  013052                        TYPE    ,67$            ;;TYPE ASCIZ STRING
 013050  000421                                BR      66$             ;;GET OVER THE ASCIZ
                                       ;;67$:  .ASCIZ  <15><12><12>/ #  OF    SEEK   #  OF   SEEK/
 013114                                66$:
 013114  104401  013122                        TYPE    ,69$            ;;TYPE ASCIZ STRING
 013120  000421                                BR      68$             ;;GET OVER THE ASCIZ
                                       ;;69$:  .ASCIZ  <15><12>/ SEEKS    TIME   SEEKS   TIME/<15><12>
 013164                                68$:

 013164  012737  001542  001260                MOV     #SIAD,INADR     ;INITLZE PTR TO INNER ADRES
 013172  012737  001524  001262              MOV     #SOAD,OUTADR       ;INITLZE PTR TO OUTER ADRES

 013200  017777  166056  166256  REPTIM: MOV     @OUTADR,@RKDA      ;POSITION HEADS TO OUTER CYLINDER
                                                                    ;BEFORE STARTING TO TIME
 013206  053777  001230  166250          BIS     DRIVAD,@RKDA       ;SET DRIVE # BITS
 013214  012777  000011  166234          MOV     #11,@RKCS                 ;SEEK, GO
 013222  104421                          CON.RDY                    ;WAIT FOR CNTRL RDY
 013224  104422                          TST.RWS                    ;WAIT FOR R/W/S RDY

 013226  005037  001474                  CLR     INDX1              ;INDX1 = 0, GOING IN; OTHERWISE OUT
 013232  012704  027026                  MOV     #BUFR10,R4         ;STORE FWRD SEEK TIMES IN THIS BUFR
 013236  012705  027426                  MOV     #BUFR11,R5         ;STORE REVRSE "       "
 013242  012737  177634  001476          MOV     #-144,INDX2        ;SET COUNT FOR # OF SEEKS


 013250  013702  001464          BEGSK:  MOV     RKDA,R2
 013254  005737  001474                  TST     INDX1              ;GOING FWRD OR REVRSE?
 013260  001005                          BNE     1$                 ;REVRSE, BRANCH

 013262  017712  165772                  MOV     @INADR,@R2         ;FWRD, SET INNER CYL ADRES
 013266  053712  001230                  BIS     DRIVAD,@R2         ;SET DRIVE # BITS
 013272  000404                          BR      2$

 013274  017712  165762          1$:     MOV     @OUTADR,@R2        ;SET OUTER CYL ADRES
 013300  053712  001230                  BIS     DRIVAD,@R2         ;SET DRIVE # BITS
 013304  004737  014776          2$:     JSR     PC,@#TIMSEK        ;GO, TIME THE SEEK FROM CYLINDER
                                                                    ;0 TO THE ABOVE CYL. RETURN WITH
                                                                    ;R3 CONTAINING THE TIME (MS, SCALE
                                                                    ;FACTOR= 0.01) REQUIRED FOR THE SEEK.
 013310  005737  001474                  TST     INDX1
 013314  001004                          BNE     3$
 013316  010324                          MOV     R3,(R4)+           ;STORE TIME TAKEN FOR FRWRD SEEK
 013320  005237  001474                  INC     INDX1              ;SET FLAG FOR DOING REVRSE SEEK
 013324  000751                          BR      BEGSK              ;GO DO IT

 013326  010325                  3$:     MOV     R3,(R5)+           ;STORE TIME TAKEN FOR REVRSE SEEK
 013330  005037  001474                  CLR     INDX1              ;CLR FLG FOR DOING FRWRD SEEK

 013334  005237  001476                  INC     INDX2              ;RECORDED 144 SEEK TIMES
 013340  001343                          BNE     BEGSK              ;IF NOT, GO BAK

                                         ;AT THIS POINT 100 SEEKS HAVE BEEK PERFORMED BETWEEN TWO
                                         ;CYLINDERS (FORWARD & REVERSE DIRECTION).  FORWARD SEEK
                                         ;TIMES ARE STORED IN TABLE STARTING AT 'BUFR10' REVERSE
                                         ;STARTING AT 'BUFR11'.  THE FOLLOWING CODE FINDS OUT THE
                                         ;NUMBERS OF TIMES A PARTICULAR 'SEEK TIME' WAS OBTAINED.
                                         ;EXAMPLE: OUT OF 100 TIMES THE SEEK WAS DONE BETWEEN
                                         ;CYLINDER 0 & LAST.
                                         ;70 TIMES IT TOOK 95 MILI SECS
                                         ;20 TIMES IT TOOK 85 MILI SECS
                                         ;10 TIMES IT TOOK 100 MILI SECS
                                         ;THIS INDICATES HOW CONSISTENT WAS THE SEEKING TIME.
                                         ;NOTE THAT ONLY 5 DIFFERENT "SEEK TIMES" WILL BE TYPED
                                         ;OUT.


                                         ;SORTING ROUTINE
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013342  012705  177776          SORT:   MOV     #-2,R5              ;COUNT FOR FRWRD, REVRSE
013346  012737  027026  001162          MOV     #BUFR10,$REG0       ;INTLZE PTR TO 'SEEK TIME'
013354  012737  027030  001164          MOV     #BUFR10+2,$REG1
013362  012737  026526  001166          MOV     #BUFR4,$REG2
013370  012737  026606  001170          MOV     #BUFR5,$REG3        ;INTLZE PTR TO '# OF TIMES'

013376  013700  001162          1$:     MOV     $REG0,R0            ;PTR T 'SEEK TIME'
013402  013701  001164                  MOV     $REG1,R1
013406  012702  177635                  MOV     #-143,R2            ;COUNT FOR 143 ITEMS TO SORT
013412  005003                          CLR     R3

013414  021011                  2$:     CMP     (R0),(R1)           ;SORT THE ITEMS & PUT THEM
013416  003404                          BLE     3$                  ;IN DESCENDING ORDER
013420  011004                          MOV     (R0),R4             ;LARGER ITEMS AT TOP OF LIST,
013422  011110                          MOV     (R1),(R0)           ;SMALLER AT THE BOTTOM
013424  010411                          MOV     R4,(R1)
013426  005203                          INC     R3
013430  005720                  3$:     TST     (R0)+
013432  005721                          TST     (R1)+
013434  005202                          INC     R2
013436  001366                          BNE     2$
013440  005703                          TST     R3                  ;SORTED ALL ITEMS?
013442  001355                          BNE     1$                  ;IF NOT LOOP BACK

013444  013700  001162                  MOV     $REG0,R0            ;PTR TO 'SEEK TIME'
013450  013701  001166                  MOV     $REG2,R1            ;SAVE 'SEEK TIME' HERE
013454  013702  001170                  MOV     $REG3,R2            ;SAVE '# OF TIMES' HERE
013460  010204                          MOV     R2,R4
013462  005024                          CLR     (R4)+               ;CLR OUT 5 WORDS OF
013464  005024                          CLR     (R4)+               ;'# OF TIMES'BUFR
013466  005024                          CLR     (R4)+
013470  005024                          CLR     (R4)+
013472  005024                          CLR     (R4)+
013474  012703  177773                  MOV     #-5,R3              ;SAVE ONLY 5 DIFRNT 'SEEK TIMES'

013500  011011                          MOV     (R0),(R1)           ;FIND OUT THE '# OF TIMES'
013502  012703  177634                  MOV     #-144,R3            ;EACH 'SEEK TIME' WAS
013506  022011                  4$:     CMP     (R0)+,(R1)
013510  001411                          BEQ     5$                  ;OBTAINED

013512  005721                          TST     (R1)+
013514  016011  177776                  MOV     -2(R0),(R1)         ;SAVE 'SEEK TIME'
013520  005722                          TST     (R2)+
013522  012712  000001                  MOV     #1,(R2)             ;KEEP '# OF TIMES'
013526  005203                          INC     R3
013530  001404                          BEQ     6$
013532  000765                          BR      4$

013534  005212                  5$:     INC     (R2)                ;INCRMNT '# OF TIMES'
013536  005203                          INC     R3                  ;ALL DONE?
013540  001362                          BNE     4$                  ;IF NOT, GO BAK

013542  005205                  6$:     INC     R5                  ;SORTED BOTH FRWRD, REVRSE
013544  001415                          BEQ     GOTYPE              ;'SEEK TIMES', IF YES GO TYPE

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013546  012737  027426  001162                 MOV     #BUFR11,$REG0   ;IF NOT, INITLZE PTR TO 'SEEK TIME'
013554  012737  027430  001164                 MOV     #BUFR11+2,$REG1
013562  012737  026666  001166                 MOV     #BUFR6,$REG2    ;SAVE 'SEEK TIME'
013570  012737  026746  001170                 MOV     #BUFR7,$REG3    ;SAVE '# OF TIMES' HERE

013576  000677                                 BR      1$              ;GO BAK & DO SORTING FOR REVRSE SEEK TIMES

                                                               ;TYPE OUT CYL #'S BETWEEN WHICH SEEK
                                                               ;WAS TIMED.  'OUTADR' TO 'INADR' 'INADR' TO 'OUTADR'
013600  104401                         COTYPE: TYPE
013602  001213                                 $CRLF
013604  104401  013612                         TYPE    ,65$            ;;TYPE ASCIZ STRING
013610  000403                                 BR      64$             ;;GET OVER THE ASCIZ
                                       ;;65$:  .ASCIZ  /CYLS:/
013620                                 64$:

013620  017700  165436                         MOV     @OUTADR,R0      ;GET OUTER CYL #
013624  006200                                 ASR     R0
013626  006200                                 ASR     R0
013630  006200                                 ASR     R0
013632  006200                                 ASR     R0
013634  006200                                 ASR     R0
013636  010046                                 MOV     R0,-(SP)
013640  104424                                 TYPDSS                  ;TYPE IT OUT IN DECIMAL
013642  104401  013650                         TYPE    ,67$            ;;TYPE ASCIZ STRING
013646  000401                                 BR      66$             ;;GET OVER THE ASCIZ
                                       ;;67$:  .ASCIZ  /-/
013652                                 66$:
013652  017701  165402                         MOV     @INADR,R1       ;GET INNER CYL #
013656  006201                                 ASR     R1
013660  006201                                 ASR     R1
013662  006201                                 ASR     R1
013664  006201                                 ASR     R1
013666  006201                                 ASR     R1
013670  010146                                 MOV     R1,-(SP)
013672  104424                                 TYPDSS                  ;TYPE IT OUT IN DECIMAL
013674  104401  013702                         TYPE    ,69$            ;;TYPE ASCIZ STRING
013700  000405                                 BR      68$             ;;GET OVER THE ASCIZ
                                       ;;69$:  .ASCIZ  <15><12>/  FRWRD/
013714                                 68$:
013714  104401  002101                         TYPE    ,BLNKS9
013720  104401  013726                         TYPE    ,71$            ;;TYPE ASCIZ STRING
013724  000404                                 BR      70$             ;;GET OVER THE ASCIZ
                                       ;;71$:  .ASCIZ  /REVRSE/
013736                                 70$:


                                                               ;TYPE OUT THE '# OF SEEKS' & 'SEEK
                                                               ;TIME' OBTAINED FOR EACH OF THOSE
                                                               ;SEEKS
013736  005000                         TYPTIM: CLR     R0
013740  005005                                 CLR     R5
013742  104401                         1$:     TYPE
013744  001213                                 $CRLF
013746  016046  026606                         MOV     BUFR5(R0),-(SP) ;GET '# OF SEEKS', IF NONE (0)
013752  001424                                 BEQ     3$              ;SKIP TYPING (FRWRD SEEK)
013754  104405                                 TYPDS                   ;GO TYPE OUT DECIMAL '# OF SEEKS'
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013756  104401                                   TYPE
013760  002110                                   BLNKS2
013762  016046  026526                           MOV     BUFR4(R0),-(SP)  ;GET 'SEEK TIME' FOR EACH OF
013766  104405                                   TYPDS                    ;OF THAT '# OF SEEKS'. 'GO
                                                                          ;TYPE OUT IN DECIMAL

013770  016046  026746                   2$:     MOV     BUFR7(R0),-(SP)  ;GET '# OF SEEKS', IF NONE (0)
013774  001416                                   BEQ     4$               ;SKIP TYPING (REVRSE SEEK)
013776  005705                                   TST     R5
014000  001402                                   BEQ     6$
014002  104401  002075                           TYPE    ,BLNK13
014006  104405                           6$:     TYPDS                    ;TYPE OUT IN DECIMAL
014010  104401                                   TYPE
014012  002110                                   BLNKS2
014014  016046  026666                           MOV     BUFR6(R0),-(SP)  ;GET 'SEEK TIME' & TYPE IT
014020  104405                                   TYPDS                    ;OUT IN DECIMAL
014022  000406                                   BR      5$

014024  005726                           3$:     TST     (SP)+            ;POP STACK
014026  005205                                   INC     R5
014030  000757                                   BR      2$

014032  005726                           4$:     TST     (SP)+            ;POP STACK
014034  005705                                   TST     R5
014036  001004                                   BNE     TIMDON

014040  005720                           5$:     TST     (R0)+            ;INCREMENT PTR TO TABLES
014042  020027  000012                           CMP     R0,#12           ;ALL DONE?
014046  001335                                   BNE     1$               ;IF NOT GO BAK

014050  062737  000002  001260   TIMDON: ADD     #2,INADR         ;INCRMNT POINTER TO NEXT
014056  062737  000002  001262           ADD     #2,OUTADR        ;INNER & OUTER ADRES
014064  005237  001252                   INC     RETRY1           ;ALL DONE?
014070  001406                           BEQ     PLTGRPH
014072  032777  000100  165040           BIT     #SW6,@SWR        ;INHIBIT TIMER? FURTHER ?
014100  001402                           BEQ     PLTGRPH          ;YES, BRANCH
014102  000137  013200                   JMP     REPTIM           ;GO, BACK AND TIME REST
                                                                  ;OF SEEKS




                                 ;PLOT GRAPH OF 'SEEK TIME' V/S 'CYLIDERS SEEKED'

                                         ;PERFORM SEEK FROM CYLINDER 0 TO EVERY OTHER CYLINDER AND TIME IT.
                                         ;0       0,0       1,----0 312. NOTE 'SECTOR COUNTER' IS USED AS A READ
                                         ;TIME CLOCK TO TIME THERE SEEKS.  AFTER OBTAINING THE SEEK TIMES A
                                         ;GRAPH IS PLOTTED OF 'SEEK TIME' V/S 'CYLINDER'.

                                         ;TIME THE SEEKS
014106  032777  000040  165024   PLTGRPH: BIT #SW5,@SWR           ;SKIP THE GRAPH?
014114  001002                           BNE     .+6
014116  000137  015224                   JMP     TST12            ;YES, BRANCH
014122  104415                           CON.RESET
014124  104416                           DRV.RESET
014126  012737  177465  001500           MOV     #-312,INDX3      ;PERFORM 313 SEEKS 0-0,0-1,0-312
014134  012704  027026                   MOV     #BUFR10,R4       ;STORE 'SEEK TIME' HERE
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014140  005037  001260                       CLR     INADR             ;CLR CYL ADRES BITS

014144  013777  001260  165312   1$:         MOV     INADR,@RKDA       ;ADRES THE RIGHT CYLINDER
014152  053777  001230  165304               BIS     DRIVAD,@RKDA      ;ADRES THE RIGHT DRIVE

014160  004737  014776                       JSR     PC,TIMSEK         ;GO TIME THE SEEK FROM CYL 0
                                                                       ;TO THE ABOVE CYL. RETURN WITH
                                                                       ;R3 CONTAINING 'SEEK TIME' IN MS
                                                                       ;SCALE FACTOR OF 0.01
014164  010324                               MOV     R3,(R4)+          ;STORE 'SEEK TIME'
014166  042777  017777  165270               BIC     #17777,@RKDA           ;SEEK BACK TO CYL 0 FOR
014174  012777  000011  165254               MOV     #11,@RKCS         ;TIMING NXT CYL SEEK
014202  104421                               CON.RDY                   ;WAIT FOR CNTRL RDY?
014204  104422                               TST.RWS                   ;WAIT FOR R/W/S RDY
014206  062737  000040  001260               ADD     #40,INADR         ;FORM NXT CYL ADRES
014214  005237  001500                       INC     INDX3
014220  001351                               BNE     1$

                                     ;PLOT A GRAPH USING 'SEEK TIMES' RECORDED BEFORE

014222                           PLOT:
014222  104401  014230                       TYPE    ,65$              ;;TYPE ASCIZ STRING
014226  000422                               BR      64$               ;;GET OVER THE ASCIZ
                                 ;;65$:      .ASCIZ  <15><12><12><12>/X AXIS - SEEK TIME - MILI SECS/
014274                           64$:
014274  104401  014302                       TYPE    ,67$              ;;TYPE ASCIZ STRING
014300  000423                               BR      66$               ;;GET OVER THE ASCIZ
                                 ;;67$:      .ASCIZ  <15><12>/Y AXIS - CYLINDER SEEKED FROM 0/<15><12><12>
014350                           66$:

014350  104401                               TYPE
014352  002103                               BLNKS7
014354  005000                               CLR     R0                ;TYPE OUT THE TIME UNITS
014356  010046                   1$:         MOV     R0,-(SP)          ;(MILI SECS) FOR THE X-AXIS
014360  104424                               TYPDSS                    ;LIKE THIS:
014362  005700                               TST     R0                ;0    20    30    40.....
014364  001411                               BEQ     2$
014366  022700  000144                       CMP     #144,R0
014372  003010                               BGT     4$
014374  022700  000170                       CMP     #170,R0
014400  002412                               BLT     5$
014402  104401                               TYPE
014404  002110                               BLNKS2
014406  000404                               BR      3$
014410  104401                   2$:         TYPE
014412  002111                               BLNKS1
014414  104401                   4$:         TYPE
014416  002107                               BLNKS3
014420  062700  000012           3$:         ADD     #12,R0
014424  000754                               BR      1$

014426  104401                   5$:         TYPE
014430  001213                               $CRLF
014432  104401                               TYPE
014434  002103                               BLNKS7
```

```
014436  012700  177763              PLT1:   MOV     #-15,R0         ;TYPE OUT THE X-AXIS MARKERS
014442                              1$:
014442  104401  014450                      TYPE    ,65$            ;;TYPE ASCIZ STRING
014446  000403                              BR      64$             ;;GET OVER THE ASCIZ
                                    ;;65$:  .ASCIZ  /I----/
014456                              64$:
014456  005200                              INC     R0              ;I----I----I----
014460  001370                              BNE     1$

                                    ;IF SW 4 IS SET THEN TYPE THE COMPLETE GRAPH. IF NOT TYPE THE SMALL GRAPH.

014462  032777  000020  164450              BIT     #SW4,@SWR       ;TYPE COMPLETE GRAPH?
014470  001054                              BNE     CMPGRP          ;YES BRANCH
                                                                    ;IF NOT, TYPE SMALL GRAPH



014472  005000                      SMGRP:  CLR     R0
014474  032777  000040  164436      1$:     BIT     #SW5,@SWR       ;SKIP REST OF GRAPH?
014502  001445                              BEQ     5$              ;YES
014504  104401                              TYPE                    ;IN THIS GRAPH SEEK TIMES ARE
014506  001213                              $CRLF                ;PLOTTED ONLY FOR SELECTED
                                                                 ;CYLINDERS (NOT ALL) SHOWN BELOW:
                                                                 ;0,1,2,3,4,  6,8,10,12,14,16,18,20,
                                                                 ;25,30,35,...,190,195,200,  203
014510  010046                              MOV     R0,-(SP)                ;TYPE THE MARKERS
014512  104405                              TYPDS
014514  104401  014522                      TYPE    ,65$            ;;TYPE ASCIZ STRING
014520  000401                              BR      64$             ;;GET OVER THE ASCIZ
                                    ;;65$:  .ASCIZ  /-/
014524                              64$:
014524  010001                              MOV     R0,R1           ;FORM THE ADRES OF 'SEEK TIME'
014526  006301                              ASL     R1
014530  016103  027026                      MOV     BUFR10(R1),R3   ;GET THE SEEK TIME
014534  004737  014736                      JSR     PC,PLTPT                ;GO PLOT IT
014540  022700  000004                      CMP     #4,R0           ;PLOTTED UPTO CYL 4?
014544  003402                              BLE     2$              ;YES
014546  005200                              INC     R0
014550  000751                              BR      1$
014552  022700  000024              2$:     CMP     #24,R0  ;PLOTTED UPTO CYL 20?
014556  003403                              BLE     3$
014560  062700  000002                      ADD     #2,R0
014564  000743                              BR      1$
014566  022700  000310              3$:     CMP     #310,R0         ;PLOTTED UPTO CYL 200?
014572  003403                              BLE     4$
014574  062700  000005                      ADD     #5,R0
014600  000735                              BR      1$
014602  022700  000312              4$:     CMP     #312,R0         ;PLOTTED ALL CYLS?
014606  001403                              BEQ     5$
014610  062700  000002                      ADD     #2,R0
014614  000727                              BR      1$
014616  000137  015224              5$:     JMP     TST12



                                    ;IF SW 4 IS SET THE COMPLETE GRAPH IS PRINTED OUT. IT GIVES TIMES FOR
                                    ;SEEKS FROM CYLINDER 0 TO ALL OTHER CYLINDERS (0,1,2,3...202).
```

```

014622  005000                          CMPGRP: CLR     R0                      ;INITLZE COUNT
014624  012701  177773                          MOV     #-5,R1                  ;INITLZE COUNT FOR Y-AXIS MARKER
014630  012702  027026                          MOV     #BUFR10,R2              ;INITLZE PTR TO SEEK TIMES
014634  104401                                  TYPE
014636  001213                                  $CRLF
014640  000412                                  BR      3$

014642  032777  000040  164270  2$:     BIT     #SW5,@SWR                       ;SKIP REST OF GRAPH?
014650  001002                                  BNE     .+6
014652  000137  015224                          JMP     TST12
014656  005201                                  INC     R1                      ;TYPE OUT Y-AXIS MARKER 'CYL #'
014660  001005                                  BNE     4$                      ;IF REQUIRED
014662  012701  177773                          MOV     #-5,R1
014666  010046                          3$:     MOV     R0,-(SP)                ;TYPE 'CYL #' ON Y-AXIS
014670  104405                                  TYPDS                           ;(IN DECIMAL)
014672  000402                                  BR      5$
014674  104401                          4$:     TYPE
014676  002104                                  BLNKS6
014700                                  5$:
014700  104401  014706                          TYPE    ,65$                    ;;TYPE ASCIZ STRING
014704  000401                                  BR      64$                     ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  /-/
014710                                  64$:

014710  012203                                  MOV     (R2)+,R3                        ;GET SEEK TIME
014712  004737  014736                          JSR     PC,PLTPT                ;GO PLOT THE POINT


014716  104401                                  TYPE
014720  001213                                  $CRLF
014722  005200                                  INC     R0                      ;ALL DONE?
014724  022700  000312                          CMP     #312,R0
014730  001344                                  BNE     2$                      ;IF NOT, GO BAK
014732  000137  015224                  6$:     JMP     TST12

                                        ;PLTPT
                                        ;THE ROUTINE IS ENTERED WITH R3 CONTAINING HORIZONTAL AXIS
                                        ;COORDINATE- SEEK TIME
                                        ;PLOT THE ACTUAL TIME ON THE GRAPH.  IN KEEPING WITH NORMAL
                                        ;CONVENTION A NUMBER LESS THAN HALF THE CELL WIDTH IS
                                        ;CONSIDERED AS FALLING UNDER THE PREVIOUS CELL, A NUMBER
                                        ;GREATER THAN OR EQUAL TO HALF THE CELL WIDTH FALLS UNDER THE NEXT CELL
                                        ;EX: IF SEEK TIME IS 11.5 MS, IT'S BETW'N 10 & 12, BUT > 11
                                        ;HENCE IT WILL BE PLOTTED AS 12 IF SEEK TIME IS 10.8 MS,
                                        ;IT'S BETW'N 10 & 12, BUT < 11 HENCE IT WILL BE PLOTTED
                                        ;AS 10.0 MS

014736  162703  000310                  PLTPT:  SUB     #310,R3                 ;FIND OUT HOW MANY BLANKS TO
014742  002403                                  BLT     7$                      ;INSERT TO PLOT THE POINT
                                                                                ;NOTE THE FIRST CELL = 0 MS
014744  104401                                  TYPE
014746  002111                                  BLNKS1
014750  000772                                  BR      PLTPT
014752  062703  000144                  7$:     ADD     #144,R3
014756  002402                                  BLT     8$
```

```
014760  104401                            TYPE
014762  002111                            BLNKS1

014764                            8$:
014764  104401  014772                    TYPE    ,65$                  ;;TYPE ASCIZ STRING
014770  000401                            BR      64$                   ;;GET OVER THE ASCIZ
                                  ;;65$:  .ASCIZ  /X/
014774                            64$:
014774  000207                            RTS     PC

                                  ;TIMSEK
                                  ;THIS ROUTINE FINDS OUT THE TIME REQUIRED TO SEEK TO THE CYLINDER
                                  ;INDICATED IN RKDA.
                                  ;***CAUTION*** SECTOR COUNTER IS USED AS A REAL TIME CLOCK TO KEEP TIME.
                                  ;ENTRY: JSR       PC,TIMSEK
                                  ;       RKDA CONTAINS THE CYLINDER TO BE SEEKED FROM THE PRESENT POSITION.
                                  ;RETURN:          R3 CONTAINS THE SEEK TIME IN MILI SECS. SCALE FACTOR = 0.01


                                                                        ;R3 WILL COUNT REVOLUTIONS OF
014776  010246                    TIMSEK: MOV     R2,-(SP)              ;DISK (FROM INDEX MARK TO INDEX MARK)
015000  005003                            CLR     R3                    ;40 MILI SECS FOR EACH REV
015002  013701  001452                    MOV     RKDS,R1
015006  011102                    1$:     MOV     @R1,R2
015010  032702  000400                    BIT     #400,R2               ;WAIT FOR SOK
015014  001774                            BEQ     1$

015016  032702  000010                    BIT     #BIT3,R2                      ;WAIT FOR SECTOR 10 SO THAT
015022  001771                            BEQ     1$                    ;U CAN START WAITING FOR
                                                                        ;INDEX, SEC 0

015024  011102                    2$:     MOV     @R1,R2
015026  032702  000400                    BIT     #400,R2               ;WAIT FOR SEC OK
015032  001774                            BEQ     2$
015034  021102                            CMP     @R1,R2
015036  001372                            BNE     2$
015040  032702  000017                    BIT     #17,R2                        ;WAIT FOR SEC 0, INDEX MARK
015044  001367                            BNE     2$                    ;AS SOON AS IT IS SEC 0, ISSUE
                                                                        ;A SEEK & START TIMING
                                                                        ;
015046  012777  000011  164402            MOV     #11,@RKCS             ;ISSUE A SEEK, START TIMING
                                                                        ;THE SEC COUNTER
015054  104421                            CON.RDY                       ;WAIT FOR CNTRL RDY

015056  011102                    3$:     MOV     @R1,R2                ;GET RKDS
015060  032702  000400                    BIT     #400,R2               ;WAIT FOR SOK
015064  001774                            BEQ     3$
015066  020211                            CMP     R2,@R1                ;INFO CORRECT?
015070  001372                            BNE     3$                    ;NO
015072  032702  000100                    BIT     #100,R2               ;R/W/S RDY SET?
015076  001025                            BNE     SKDON                 ;IF YES, BRANCH
015100  032702  000017                    BIT     #17,R2                ;WAIT FOR SEC CNTR TO MOVE
015104  001764                            BEQ     3$                    ;FROM 0 TO 1

015106  011102                    4$:     MOV     @R1,R2
015110  032702  000400                    BIT     #400,R2               ;WAIT FOR SOK
```

```
015114  001774                          BEQ     4$
015116  020211                          CMP     R2,@R1
015120  001372                          BNE     4$
015122  032702  000100                  BIT     #100,R2         ;R/W/S RDY SET, SEEK DONE?
015126  001005                          BNE     5$              ;YES, BRANCH
015130  032702  000017                  BIT     #17,R2                  ;IF NOT KEEP TRACK OF SEC
015134  001364                          BNE     4$              ;COUNTER. INCREMENT R3 AT
                                                                ;EVERY INDEX MARK,EVERY
015136  005203                          INC     R3              ;40 MILI SECS
015140  000746                          BR      3$              ;GO BAK, KEEP TIME

015142  032702  000017          5$:     BIT     #17,R2          ;CHECK, IS IT INDEX MARK -SEC 0
015146  001001                          BNE     SKDON           ;IF NOT, SKIP
015150  005203                          INC     R3              ;IF YES, INCREMENT COUNT

                                                                        ;SEEK DONE, SAVE RKDS-SEC COUNTER.
015152                          SKDON:
015152  012746  000014                  MOV     #14,-(SP)               ;;PUT THE MULTIPLER ON THE STACK
015156  010346                          MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
015160  004737  020500                  JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
015164  012616                          MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
015166  012603                          MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
015170  042702  177760                  BIC     #177760,R2      ;SEEK. TOTAL TIME=(IN DECIMAL)
015174  060203                          ADD     R2,R3           ;[(R3)X12+SEC COUNTER]X330X0.01
                                                                ;NOTE THERE IS A SCALE FACTOR
015176  012746  000512                  MOV     #512,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
015202  010346                          MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
015204  004737  020500                  JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
015210  012616                          MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
015212  012603                          MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
015214  062703  000245                  ADD     #245,R3         ;ASSUMPTION THAT EACH SECTOR
                                                                ;TAKES 3.3 MILI SECS. IF THE
                                                                ;DISK SPEED IS VERY MUCH DIFRNT
                                                                ;FROM THE SPEC SPEED OF
                                                                ;1500 RPM (40 MS/REV), THEN
                                                                ;SEC COUNTER WOULD NOT BE AN
                                                                ;ACCURATE TIME CLOCK.
015220  012602                          MOV     (SP)+,R2        ;POP R2 BAK
015222  000207                          RTS     PC              ;RETURN


                                ;;*************************************************************
                                ;*TEST 12       END OF PROGRAM
                                        ;*THIS IS NOT A TEST BUT IS JUST A LINKAGE
                                        ;*PROVIDED TO TEST ALL THE DRIVES.
                                ;;*************************************************************
015224  000004                  TST12:  SCOPE
015226  105237  001223                  INCB    DRVDON
015232  123737  001223  001224  BTEOP:  CMPB    DRVDON,DRIVS
015240  001402                          BEQ     .+6
015242  000137  003760                  JMP     NXTDRV

                                .SBTTL  END OF PASS ROUTINE

                                ;;*************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
```

```
                                      ;*INDICATE END-OF-PROGRAM AFTER 1 PASSES THRU THE PROGRAM
                                      ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                      ;*IF THERES A MONITOR GO TO IT
                                      ;*IF THERE ISN'T JUMP TO ST3

015246                                $EOP:
015246  000004                                SCOPE
015250  005037  001102                        CLR     $TSTNM            ;;ZERO THE TEST NUMBER
015254  005237  001100                        INC     $PASS             ;;INCREMENT THE PASS NUMBER
015260  042737  100000  001100                BIC     #100000,$PASS     ;;DON'T ALLOW A NEG. NUMBER
015266  005327                                DEC     (PC)+             ;;LOOP?
015270  000001                        $EOPCT: .WORD   1
015272  003022                                BGT     $DOAGN            ;;YES
015274  012737                                MOV     (PC)+,@(PC)+      ;;RESTORE COUNTER
015276  000001                        $ENDCT: .WORD   1
015300  015270                                $EOPCT
015302  104401  015347                        TYPE    ,$ENDMG           ;;TYPE "END PASS #"
015306  013746  001100                        MOV     $PASS,-(SP)       ;;SAVE $PASS FOR TYPEOUT
015312  104405                                TYPDS                     ;;GO TYPE--DECIMAL ASCII WITH SIGN
015314  104401  015344                        TYPE    ,$ENULL           ;;TYPE A NULL CHARACTER
015320  013700  000042                $GET42: MOV     @#42,R0           ;;GET MONITOR ADDRESS
015324  001405                                BEQ     $DOAGN            ;;BRANCH IF NO MONITOR
015326  000005                                RESET                     ;;CLEAR THE WORLD
015330  004710                        $ENDAD: JSR     PC,(R0)           ;;GO TO MONITOR
015332  000240                                NOP                       ;;SAVE ROOM
015334  000240                                NOP                       ;;FOR
015336  000240                                NOP                       ;;ACT11
015340                                $DOAGN:
015340  000137                                JMP     @(PC)+            ;;RETURN
015342  003742                        $RTNAD: .WORD   ST3
015344     377     377     000        $ENULL: .BYTE   -1,-1,0           ;;NULL CHARACTER STRING
015347     015  042412  042116        $ENDMG: .ASCIZ  <15><12>/END PASS #/
015354  050040  051501  020123
015362  000043
```

```
                                 ;COMMON SUBROUTINES AND HANDLERS



                                         .SBTTL  ESR15
                                 ;ESR15
                                 ;THIS ROUTINE IS USED TO TYPE OUT ERROR DATA FOR ITEM 15
                                 ;OF THE ERROR TABLE.  AT THE TIME OF ENTRY INTO THIS
                                 ;ROUTINE R5 CONTAINS THE DISK ADDRESS FROM WHICH THE 12
                                 ;HEADERS WERE READ. THE SECTOR #'S WHICH GAVE BAD HEADERS HAVE
                                 ;BEEN STORED STARTING AT 'BUFR'.  THE CORRESPONDING BAD HEADERS
                                 ;HAVE BEEN STORED STARTING AT 'BUFR1'.

                                 ;THE PRINTOUT LOOKS LIKE:
                                 ;SEC#   HDR RECVD
                                 ;AA     BBBBBB           AA=BAD SEC #  BBBBBB=BAD HEADER
                                 ;
                                 ;EXPCTD HDR=XXXXXX       TRY#=  Y

 015364                          ESR15:
 015364  010146                          MOV     R1,-(SP)                ;;PUSH R1 ON STACK
 015366  010246                          MOV     R2,-(SP)                ;;PUSH R2 ON STACK
 015370  012701  001266                  MOV     #BUFR,R1                ;SEC #'S STORED HERE PREVIOUSLY
 015374  012702  001320                  MOV     #BUFR1,R2               ;BAD HDRS STORED HERE PRVSLY
 015400  012146                  1$:     MOV     (R1)+,-(SP)
 015402  104403                          TYPOS                           ;GO TYPE OUT BAD SEC # (OCTAL)
 015404     002                          .BYTE   2                       ;ONLY 2 DIGITS
 015405     000                          .BYTE   0                       ;SUPRES LDG 0'S
 015406  104401                          TYPE                            ;TYPE 3 BLNKS
 015410  002107                          BLNKS3
 015412  012246                          MOV     (R2)+,-(SP)             ;GO TYPE OUT BAD HEADER
 015414  104402                          TYPOC
 015416  104401                          TYPE
 015420  002106                          BLNKS4
 015422  104401                          TYPE
 015424  001213                          $CRLF
 015426  022711  177777                  CMP     #177777,(R1)            ;ALL BAD SEC #'S TYPD OUT?
 015432  001362                          BNE     1$                      ;IF NOT GO BAK

 015434  104401                          TYPE
 015436  001716                          MSG6
 015440  010546                          MOV     R5,-(SP)                ;TYPE OUT EXPCTD HEADER FOR
 015442  042716  160037                  BIC     #160037,(SP)
 015446  104402                          TYPOC                           ;THAT CYLINDER

 015450  012602                          MOV     (SP)+,R2                ;;POP STACK INTO R2
 015452  012601                          MOV     (SP)+,R1                ;;POP STACK INTO R1
 015454  000207                          RTS     PC



                                         .SBTTL  ESR13
                                 ;ESR13
                                 ;THIS ROUTINE IS USED WITH 'ERROR 13"' TO TYPEOUT OUT ERROR
                                 ;DATA.  THE SECTOR #'S WHICH GAVE BAD HEADERS HAVE BEEN STORED
                                 ;STARTING AT 'BUFR'.  THE CORRESPONDING BAD HEADERS HAVE
                                 ;BEEN STORED STARTING AT 'BUFR1'.  R5 CONTAINS THE EXPECTED
```

```
                                ;HEADER FOR THAT CYLINDER.  THE TYPEOUT LOOKS LIKE

                                ;SEC#   HDR RCVD
                                ;AA     BBBBBB           AA=BAD SEC #
                                ;.                       BBBBBB=BAD HEADER
                                ;EXPCTD HDR=XXXXXX       TRY#:  Y          SUR=Z

015456  004737  015364          ESR13:  JSR     PC,ESR15
015462  104401  015470                  TYPE    ,65$            ;;TYPE ASCIZ STRING
015466  000404                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /  SUR=/
015500                          64$:
015500  005046                          CLR     -(SP)
015502  032705  000020                  BIT     #20,R5          ;SUR 0 OR 1?
015506  001401                          BEQ     1$
015510  005216                          INC     (SP)
015512  104402                  1$:     TYPOC

015514  104401  002053                  TYPE    ,MSG13
015520  013746  001254                  MOV     RETRY2,-(SP)
015524  005216                          INC     (SP)
015526  104402                          TYPOC
015530  000207                          RTS     PC



                                        .SBTTL  ESR20
                                ;ESR20
                                ;SUBROUTINE TO TYPE OUT ERROR DATA FOR 'ERROR 20'.  AT THE TIME
                                ;OF ENTRY, TABLE STARTING AT 'BUFR' CONTAINS SECTOR #'S THAT GAVE BAD
                                ;HEADERS.  TABLE AT 'BUFR1' CONTAINS BAD HEADERS, R5 CONTAINS EXPECTED
                                ;HEADER FOR THE CYLINDER.  'INADR' AND 'OUTADR' CONTAIN THE CYLINDER
                                ;ADDRESSES BETWEEN WHICH THE IMPLIED SEEK WAS TRIED.

015532  004737  015456          ESR20:  JSR     PC,ESR13        ;GO TYPE OUT SEC #'S, BAD HDRS
015536  004737  016320                  JSR     PC,ERR2         ;GET CYL #'S BETWN WHICH SEEK
                                                                ;WAS TRIED
015542  104401  015550                  TYPE    ,65$            ;;TYPE ASCIZ STRING
015546  000404                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /  CYLA=/
015560                          64$:
015560  013746  001162                  MOV     $REG0,-(SP)     ;GO TYPE CYL # FROM WHERE
015564  104403                          TYPOS                   ;SEEK BEGAN
015566     003                          .BYTE   3               ;TYPE 3 DIGITS
015567     000                          .BYTE   0               ;SUPRES LDG 0'S
015570  104401  015576                  TYPE    ,67$            ;;TYPE ASCIZ STRING
015574  000404                          BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  /  CYLB=/
015606                          66$:
015606  013746  001164                  MOV     $REG1,-(SP)     ;TYPE CYL # TO WHICH SEEK
015612  104403                          TYPOS                   ;WAS DONE
015614     003                          .BYTE   3               ;TYPE 3 DIGITS
015615     000                          .BYTE   0               ;SUPRES LDG 0'S
015616  000207                          RTS     PC              ;RETURN



                                        .SBTTL  ESR25
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```
015620  010205                    ESR25:  MOV     R2,R5           ;SAVE ADRES OF TERMINATOR

015622  012702  001266                    MOV     #BUFR,R2        ;INITLZE PTR TO TABLE STORING
                                                                  ;ADRES OF BAD DATA
015626  012703  001320                    MOV     #BUFR1,R3       ;INITLZE PTR TO 'EXPCTD' DATA
015632  012704  001352                    MOV     #BUFR2,R4       ;INITLZE PTR TO 'RECVD' DATA

015636  032777  020000  163274    1$:     BIT     #SW13,@SWR      ;INHIBIT TYPE OUT?
015644  001076                            BNE     4$              ;YES, EXIT
015646  104401                            TYPE                    ;TYPE CR,LF
015650  001213                            $CRLF

015652  163712  001404                    SUB     PBUFO,(R2)      ;GET WORD # IN BUFR (0,1,2...)
015656  006212                            ASR     (R2)
015660  011246                            MOV     (R2),-(SP)      ;WHICH WAS BAD.  NOTE YOU
                                                                  ;CAN HAVE THE ACTUAL MEMORY
                                                                  ;ADRES BY ADDING 'IOBUFO'
                                                                  ;TO THIS
015662  104403                            TYPOS                   ;GO TYPE WORD # THAT WAS BAD
015664     004                            .BYTE   4
015665     000                            .BYTE   0
015666  104401                            TYPE
015670  002107                            BLNKS3                  ;2 BLANKS

015672  012346                            MOV     (R3)+,-(SP)     ;GET EXPCTD DATA
015674  104402                            TYPOC                   ;GO TYPE IT
015676  104401                            TYPE
015700  002110                            BLNKS2
015702  012446                            MOV     (R4)+,-(SP)     ;GET RECVD DATA (BAD)
015704  104402                            TYPOC                   ;GO TYPE IT
015706  104401                            TYPE
015710  002110                            BLNKS2

015712  012700  000400                    MOV     #400,R0         ;GET THE DISK ADRES FROM
015716  021200                    2$:     CMP     (R2),R0         ;WHICH THIS (BAD) DATA WAS
015720  002405                            BLT     3$              ;READ
015722  062700  000400                    ADD     #400,R0
015726  022700  002400                    CMP     #2400,R0
015732  001371                            BNE     2$

015734  000300                    3$:     SWAB    R0
015736  005300                            DEC     R0
015740  063700  001450                    ADD     ADRES,R0        ;R0 CONTAINS THE DISK
                                                                  ;ADRES FROM WHICH THE (BAD)
015744  010037  001170                    MOV     R0,$REG3        ;DATA WAS READ

015750  004737  016220                    JSR     PC,BRKDA        ;GO BREAK ABOVE DISK ADRES
                                                                  ;INTO CYL#, SUR#, SEC#

015754  013746  001174                    MOV     $REG5,-(SP)     ;GET THE CYL#
015760  104403                            TYPOS                   ;TYPE IT
015762     003                            .BYTE   3               ;ONLY 3 DIGITS
015763     000                            .BYTE   0               ;NO LEADING 0'S
015764  104401                            TYPE
015766  002107                            BLNKS3

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```
015770  013746  001176                    MOV     $REG6,-(SP)       ;GET SUR #
015774  104403                            TYPOS                     ;TYPE
015776     001                            .BYTE   1                 ;1 DIGIT ONLY
015777     000                            .BYTE   0

016000  104401                            TYPE
016002  002106                            BLNKS4

016004  013746  001200                    MOV     $REG7,-(SP)       ;GET SEC#
016010  104403                            TYPOS                     ;TYPE
016012     002                            .BYTE   2                 ;2 DIGITS
016013     000                            .BYTE   0

016014  005722                            TST     (R2)+             ;INCREMNT PTR
016016  020205                            CMP     R2,R5             ;TYPED OUT ALL BAD DATA
                                                                    ;INFO?
016020  001306                            BNE     1$                ;IF NOT LUP BAK
016022  104401                            TYPE
016024  002053                            MSG13                     ;'   TRY #:'
016026  013746  001254                    MOV     RETRY2,-(SP)      ;GET RETRY COUNT
016032  062716  000003                    ADD     #3,(SP)           ;FORM THE RETRY NO.
016036  104403                            TYPOS                     ;TYPE IT OUT
016040     001                            .BYTE   1
016041     000                            .BYTE   0

016042  000207                    4$:     RTS     PC                ;IF YES, RETURN
                                  ;MESSAGE HANDLER
                                  ;THE MESSAGE HANDLER IS USED FOR TYPING OUT MESSAGES & DATA
                                  ;RELATED TO THE MESSAGE. IF SW13 IS SET, THE TYPEOUT IS
                                  ;INHIBITED. THE CALL IS:
                                  ;                 MESAGE    ,XX
                                  ;XXX IS THE MESSAGE NUMBER & PROVIDES AN INDEX TO THE
                                  ;'ERROR ITEMS TABLE' WHERE THAT MESAGE ITEM
                                  ;IS LOCATED.
                                  ;THE MESAGE ITEM CONTAINS:
                                  ;       MS:     POINTER TO THE ASCII MESAGE
                                  ;       DH:     POINTER TO THE DATA HEADER
                                  ;       DT:     POINTER TO THE DATA
                                  ;       0       TERMINATOR
                                  ;IF 'DT' IS 0 THE DATA IS TO BE PRINTED USING THE SUBROUTINE
                                  ;INDICATED IN PLACE OF THE TERMINATOR

016044  032777  020000  163066    MSGE:   BIT     #SW13,@SWR        ;INHIBIT TYPEOUT?
016052  001012                            BNE     1$                ;IF YES, EXIT
016054  011637  001116                    MOV     (SP),$ERRPC       ;GET ADRES OF 'MESAGE' CALL
016060  162737  000002  001116            SUB     #2,$ERRPC         ;STORE IT
016066  117637  000000  001114            MOVB    @(SP),$ITEMB      ;GET MESAGE # (INDEX TO ITEM TABLE)
016074  004737  017446                    JSR     PC,@#ERRTYP       ;GO TO 'ERRTYP' & TYPE OUT
                                                                    ;INFO
016100  062716  000002            1$:     ADD     #2,(SP)           ;ADJUST RETURN ADDRES
016104  000002                            RTI                       ;EXIT

                                  ;THIS ROUTINE IS USED FOR TYPING OUT ASCII MESSAGES. BEFORE
                                  ;THE MESSAGE IS TYPED SW13 IS CHECKED & IF SET THE
                                  ;TYPEOUT IS INHIBITED & AN EXIT IS MADE.
                                  ;THE CALL FOR THIS ROUTINE IS "TYPMSG", AN ENCODED
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                                       ;TRAP INSTRUCTION.
                                       ;THE POINTER TO THE ASCII MESSAGE TO BE TYPED IS LOCATED IN  THE
                                       ;WORD FOLLOWING THE "TYPMSG" CALL.

016106  032777  020000  163024  TY.MSG: BIT     #SW13,@SWR          ;INHIBIT TYPEOUT?
016114  001005                          BNE     2$                  ;YES, EXIT
016116  017637  000000  016126          MOV     @(SP),1$            ;GET POINTER TO ASCII MESSAGE
016124  104401                          TYPE                        ;GO TYPE ASCII STRING
016126  000000                  1$:     0
016130  062716  000002          2$:     ADD     #2,(SP)             ;ADJUST RETURN ADRES, SKIP OVER
                                                                    ;POINTER ON RETURN
016134  000002                          RTI                         ;EXIT




                                       ;GT5RG
                                       ;THIS ROUTINE EXTRACTS THE CYLINDER # FROM RKDA AND STORES IT
                                       ;IN $REG4. THEN TRANSFERS RKCS, ER, DS, DA TO $REG0, $REG1, $REG2, $REG3
016136  017746  163322          GT5RG:  MOV     @RKDA,-(SP)         ;PUSH RKDA ONTO STACK
016142  042716  160037                  BIC     #160037,(SP)        ;MASK OUT NON-CYLINDER BITS
016146  006316                          ASL     (SP)                ;SHIFT 8 BITS OF CYL ADRES TO LO BYTE
016150  006316                          ASL     (SP)
016152  006316                          ASL     (SP)
016154  000316                          SWAB    (SP)
016156  112637  001172                  MOVB    (SP)+,$REG4         ;UP STACK




                                       ;GT4RG
                                       ;THIS ROUTINE TRANSFERS THE CONTENTS OF RKCS, RKER, RKDS
                                       ;RKDA TO $REG0, $REG1, $REG2, $REG3 RESPECTIVELY. $REG'S
                                       ;ARE USED FOR TYPING OUT THERE CONTENTS AT THE TIME OF ERROR

016162  017737  163270  001162  GT4RG:  MOV     @RKCS,$REG0         ;GET RKCS
016170  017737  163260  001164          MOV     @RKER,$REG1         ;    RKER
016176  017737  163250  001166          MOV     @RKDS,$REG2         ;    RKDS
016204  017737  163254  001170          MOV     @RKDA,$REG3         ;    RKDA
016212  000207                          RTS     PC                  ;EXIT FROM THIS ROUTINE

                                       ;GETINF
                                       ;THIS ROUTINE SAVES THE CONTENTS OF RKCS IN $REG0
                                       ;RKER IN $REG1, RKDS IN $REG2.  THEN IT BREAKS RKDA
                                       ;INTO DRIVE NO, CYLINDER #, SURFACE AND SECTOR #.
                                       ;AND SAVES THEM IN $REG4, $REG5, $REG6, $REG7.

016214  004737  016162          GETINF: JSR     PC,GT4RG
016220  010046                  BRKDA:  MOV     R0,-(SP)
016222  010146                          MOV     R1,-(SP)
016224  010246                          MOV     R2,-(SP)
016226  012700  001202                  MOV     #$REG7+2,R0
016232  013701  001170                  MOV     $REG3,R1
016236  010102                          MOV     R1,R2
016240  042702  177760                  BIC     #177760,R2
016244  010240                          MOV     R2,-(R0)
016246  006201                          ASR     R1
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016250  006201                          ASR     R1
016252  006201                          ASR     R1
016254  006201                          ASR     R1
016256  010102                          MOV     R1,R2
016260  042702  177776                  BIC     #177776,R2
016264  010240                          MOV     R2,-(R0)
016266  006201                          ASR     R1
016270  010102                          MOV     R1,R2
016272  042702  177400                  BIC     #177400,R2
016276  010240                          MOV     R2,-(R0)
016300  000301                          SWAB    R1
016302  042701  177770                  BIC     #177770,R1
016306  010140                          MOV     R1,-(R0)
016310  012602                          MOV     (SP)+,R2
016312  012601                          MOV     (SP)+,R1
016314  012600                          MOV     (SP)+,R0
016316  000207                          RTS     PC







                                        .SBTTL  ERR2
                                ;ERR2
                                ;THIS ROUTINE GETS THE CYLINDER NUMBERS BETWEEN WHICH (IMPLIED) SEEK
                                ;WAS DONE.  (R4)=0 INDICATES SEEK FROM 'OUTADR' TO 'INADR'
                                ;(R4)=1 INDICATES SEEK TO 'OUTADR'.  ON EXIT $REG0 CONTAINS CYL #
                                ;FROM WHICH SEEK WAS INITIATED, $REG1 CONTAINS CYL # TO WHICH SEEK WAS DONE
016320  013737  001260  001162  ERR2:   MOV     INADR,$REG0             ;GET CYL ADRES
016326  004737  016434                  JSR     PC,GCYL                 ;GO GET CYL# FROM IT
016332  013737  001162  001164          MOV     $REG0,$REG1             ;SAVE
016340  013737  001262  001162          MOV     OUTADR,$REG0            ;GET CYL ADRES
016346  004737  016434                  JSR     PC,GCYL                 ;GO GET CYL # FROM IT
016352  005704                          TST     R4                      ;GOING WHICH WAY?
016354  001407                          BEQ     1$                      ;'OUTADR' TO 'INADR', BRANCH
016356  013746  001162                  MOV     $REG0,-(SP)             ;EXCHANG CYL" TO GET
016362  013737  001164  001162          MOV     $REG1,$REG0             ;CORRECT 'TO' & 'FROM' CYLS
016370  012637  001164                  MOV     (SP)+,$REG1
016374  000207                  1$:     RTS     PC                      ;RETURN

                                        .SBTTL  ERR1
                                ;ERR1
                                ;THIS SUBROUTINE FINDS OUT THE CYLINDER NOS. BETWEEN WHICH THE SEEK
                                ;IS DONE.THE CYLINDER # WHERE THE  HEADS WHERE PRIOR TO MOVING, IS
                                ;DEPOSITED IN $REG0. THE CYLINDER # WHERE THE HEADS SHOULD BE AFTER
                                ;MOVEMENT, IS DEPOSITED IN $REG1.  R4 INDICATES WHICH DIRECTION THE
                                ;HEADS WERE MOVING, IN OR OUT. R5 CONTAINS THE
                                ;DISK ADDRESS (IN OR OUT AS THE CASE MAY BE).

016376  010537  001162          ERR1:   MOV     R5,$REG0
016402  004737  016434                  JSR     PC,GCYL ;GO GET CYL #
016406  005704                          TST     R4              ;WAS GOING IN OR OUT?
016410  001006                          BNE     1$              ;OUT
016412  013737  001162  001164          MOV     $REG0,$REG1
016420  005037  001162                  CLR     $REG0
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016424  000207                                  RTS     PC
016426  005037  001164                  1$:     CLR     $REG1
016432  000207                                  RTS     PC


                                                .SBTTL  GCYL
                                        ;GCYL
                                        ;THIS ROUTINE EXTRACTS THE CYLINDER NO. FROM THE DISK ADDRESS
                                        ;CONTAINED IN '$REGO', AND THEN STORES IT BACK IN '$REGO'
016434  010046                          GCYL:   MOV     RO,-(SP)                ;PUSH RO ONTO STACK
016436  013700  001162                          MOV     $REGO,RO
016442  042700  160037                          BIC     #160037,RO              ;MASK OUT DRV # BITS &
                                                                                ;SUR, SEC BITS IF PRESENT
016446  006200                                  ASR     RO
016450  006200                                  ASR     RO                      ;SHIFT CYL BITS RIGHT
016452  006200                                  ASR     RO                      ;BY 5
016454  006200                                  ASR     RO
016456  006200                                  ASR     RO
016460  010037  001162                          MOV     RO,$REGO                ;STORE CYL # IN $REGO
016464  012600                                  MOV     (SP)+,RO                ;POP RO FROM STACK
016466  000207                                  RTS     PC                      ;EXIT


                                                .SBTTL  DRV.RESET - DRIVE RESET ROUTINE
                                                .SBTTL  RESDON - WAIT FOR DRIVE RESET TO BE DONE
                                        ;DR.RST
                                        ;THIS ROUTINE DOES A DRIVE RESET ON THE DRIVE WHOOSE ADDRESS IS IN
                                        ;RKDA. MULTIPLE RETURN ADDRESSES FOR THIS ROUTINE ARE PROVIDED.
                                        ;IF THERE IS NO ERROR (R/W/S RDY SETS WITHIN CERTAIN TIME) , THEN
                                        ;A NORMAL EXIT IS MADE. IF R/W/S RDY DOES NOT SET ERROR IS REPORTED.


016470  005037  001174                  DR.RST: CLR     $REG5                   ;INITIALIZE THE COUNT
016474  013777  001230  162762                  MOV     DRIVAD,@RKDA
016502  012777  000015  162746                  MOV     #15,@RKCS               ;DRIVE RESET, GO
016510  104421                                  CON.RDY
016512  000402                                  BR      RES.DO+4
016514  005037  001174                  RES.DO: CLR     $REG5
016520  032777  000100  162724          1$:     BIT     #100,@RKDS                      ;DID R/W/S RDY SET?
016526  001024                                  BNE     2$
016530  012746  177770                          MOV     #-10,-(SP)              ;PUSH COUNT ON SP
016534  005216                                  INC     (SP)                    ;COU! T IT DOW
016536  001376                                  BNE     .-2
016540  005726                                  TST     (SP)+                   ;POP UP SP
016542  005237  001174                          INC     $REG5                           ;IF NOT WAIT
016546  001364                                  BNE     1$                              ;WAITED LONG?
016550  032777  020000  162362                  BIT     #SW13,@SWR
016556  001010                                  BNE     2$
016560  104420                                  TYPMSG
016562  002027                                  MSG12
016564  104420  001733                          TYPMSG  ,MSG7
016570  011646                                  MOV     (SP),-(SP)
016572  162716  000002                          SUB     #2,(SP)
016576  104402                                  TYPOC
016600  000002                          2$:     RTI
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                                              .SBTTL  CON.RESET - CONTROL RESET ROUTINE
                                              .SBTTL  CON.RDY - WAIT FOR CONTROL READY
                                      ;CON.RESET
                                      ;CON.RDY
                                      ;THIS ROUTINE IS CALLED BY USING 'CNT.RESET' WHICH IS ACTUALLY
                                      ;'TRAP' INSTRUCTION WITH THE LOWER BYTE ENCODED TO PROVIDE
                                      ;AN INDEX TO THE CONTROL-RESET ROUTINE BELOW.
                                      ;THE ROUTINE ISSUES A CONTROL RESET AND WAITS FOR
                                      ;THE 'CNTRL RDY' FLAG TO SET.  WHEN THE FLAG SETS
                                      ;AN EXIT IS MADE OUT OF THE ROUTINE.  IF 'CNTRL-RDY'
                                      ;DOES NOT SET WITHIN A CERTAIN TIME AN ERROR MESSAGE
                                      ;        CNT RDY DIDN'T SET
                                      ;        PC=XXXXXX RKCS=XXXXXX
                                      ;IS GIVEN.
                                      ;THIS ROUTINE IS CALLED THROUGH THE 'TRAP' INSTRUCTION
                                      ;USING THE LOWER BYTE AS AN INDEX TO THIS ROUTINE.
                                      ;THE TRAP DECODER LOCATED AT '$TRAP'.



                                      ;CN.RDY
                                      ;THE CN.RDY ROUTINE IS CALLED BY USING CNT.RDY WHICH IS A TRAP
                                      ;INSTRUCTION WITH ITS LOWER BYTE ENCODED.
                                      ;THIS ROUTINE WAITS FOR THE CONTROL READY BIT TO SET AND WHEN IT
                                      ;SETS EXITS OUT. IF WITHIN A CERTAIN TIME CNTRL RDY DOES
                                      ;NOT SET AN ERROR IS REPORTED. WAITING TIME IS 883 MS FOR 11/20
                                      ;175 MS FOR 11/45 WITH BIPOLAR MEMORY.
016602  012777  000001  162646        CN.RST: MOV     #1,@RKCS              ;ISSUE A CONTROL RESET
016610  012737  177500  001170                MOV     #-300,$REG3           ;SET UP COUNT
016616  000402                                BR      CN.RDY+4                        ;SKIP OVER CN.RDY
016620  005037  001170                CN.RDY: CLR     $REG3
016624  105777  162626                1$:     TSTB    @RKCS                 ;DID CNTRL-RDY SET?
016630  100431                                BMI     2$                    ;YES, EXIT
016632  005237  001170                        INC     $REG3                 ;WAITED LONG?
016636  001372                                BNE     1$                    ;IF NOT, GO BAK & WAIT
016640  104420                                TYPMSG
016642  001742                                MSG10
016644  104401  016652                        TYPE    ,65$                  ;;TYPE ASCIZ STRING
016650  000403                                BR      64$                   ;;GET OVER THE ASCIZ
                                      ;;65$:  .ASCIZ  <15><12>/PC=/
016660                                64$:
016660  011646                                MOV     (SP),-(SP)
016662  162716  000002                        SUB     #2,(SP)
016666  104402                                TYPOC                         ;GO TYPE PC IN THE MAIN PROGRAM,
                                                                            ; WHERE ERROR OCCURRED
016670  104401  016676                        TYPE    ,67$                  ;;TYPE ASCIZ STRING
016674  000404                                BR      66$                   ;;GET OVER THE ASCIZ
                                      ;;67$:  .ASCIZ  / RKCS=/
016706                                66$:
016706  017746  162544                        MOV     @RKCS,-(SP)           ;GET RKCS
016712  104402                                TYPOC                         ;GO TYPE IT

016714  000002                        2$:     RTI                           ;RETURN FROM THIS
                                                                            ;ROUTINE TO THE MAIN
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                                                                  ;PROGRAM

                                            .SBTTL  TST.RWS - WAIT FOR R/W/S RDY
                                    ;TST.RWS
                                    ;THIS ROUTINE WAITS FOR THE R/W/S READY TO  ET AND RETURNS
                                    ;TO THE MAIN PROGRAM WHEN IT SETS.  IF IT DOES NOT SET
                                    ;WITHIN A CERTAIN TIME  AN ERROR IS REPORTED.
                                    ;WAITING TIME APPROX. 1040 MS FOR 11/20. 208 MS FOR 11/45

016716  005037  001264              TSTRWS: CLR     TIMER
016722  032777  000100  162522      1$:     BIT     #100,@RKDS
016730  001017                              BNE     2$
016732  005237  001264                      INC     TIMER
016736  001371                              BNE     1$
016740  032777  020000  162172              BIT     #BIT13,@SWR
016746  001010                              BNE     2$
016750  104420  002027                      TYPMSG  ,MSG12
016754  104420  001733                      TYPMSG  ,MSG7
016760  011646                              MOV     (SP),-(SP)
016762  162716  000002                      SUB     #2,(SP)
016766  104402                              TYPOC
016770  000002                      2$:     RTI

                                            .SBTTL  TEST ABORT ROUTINE
                                    ;ABRT

016772  104401  001616              ABRT:   TYPE    ,MSG3
016776  113746  001102                      MOVB    $TSTNM,-(SP)
017002  104402                              TYPOC
017004  000207                              RTS     PC


                                    ;COMMON SUBROUTINES & HANDLERS

                                    .SBTTL  SCOPE HANDLER ROUTINE

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

017006                              $SCOPE:
017006  104407                              CKSWR                       ;;TEST  FOR CHANGE IN SOFT-SWR
017010  032777  000400  162122              BIT     #SW8,@SWR              ;WAS SW8 USED TO SELECT
017016  001053                              BNE     $OVER               ;A TEST? IF YES, SKIP OVER
                                                                        ;THE REST, U ARE LOOPING ON
017020  032777  040000  162112      1$:     BIT     #BIT14,@SWR         ;;LOOP ON PRESENT TEST?
017026  001047                              BNE     $OVER               ;;YES IF SW14=1
                                    ;#####START OF CODE FOR THE XOR TESTER#####
017030  000416                      $XTSTR: BR      6$                  ;;IF RUNNING ON THE "XOR" TESTER CHANGE
```

```
                                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
017032  013746  000004                      MOV     @#ERRVEC,-(SP)      ;;SAVE THE CONTENTS OF THE ERROR VECTOR
017036  012737  017056  000004              MOV     #5$,@#ERRVEC        ;;SET FOR TIMEOUT
017044  005737  177060                      TST     @#177060            ;;TIME OUT ON XOR?
017050  012637  000004                      MOV     (SP)+,@#ERRVEC      ;;RESTORE THE ERROR VECTOR
017054  000421                              BR      $SVLAD              ;;GO TO THE NEXT TEST
017056  022626                      5$:     CMP     (SP)+,(SP)+         ;;CLEAR THE STACK AFTER A TIME OUT
017060  012637  000004                      MOV     (SP)+,@#ERRVEC      ;;RESTORE THE ERROR VECTOR
017064  000407                              BR      7$                  ;;LOOP ON THE PRESENT TEST
017066                              6$:;#####END OF CODE FOR THE XOR TESTER#####
017066  105737  001103              2$:     TSTB    $ERFLG              ;;HAS AN ERROR OCCURRED?
017072  001412                              BEQ     $SVLAD              ;;BR IF NO
017074  032777  001000  162036              BIT     #BIT09,@SWR         ;;LOOP ON ERROR?
017102  001404                              BEQ     4$                  ;;BR IF NO
017104  013737  001110  001106      7$:     MOV     $LPERR,$LPADR       ;;SET LOOP ADDRESS TO LAST SCOPE
017112  000415                              BR      $OVER
017114  105037  001103              4$:     CLRB    $ERFLG              ;;ZERO THE ERROR FLAG
017120  105237  001102              $SVLAD: INCB    $TSTNM              ;;COUNT TEST NUMBERS
017124  011637  001106                      MOV     (SP),$LPADR         ;;SAVE SCOPE LOOP ADDRESS
017130  011637  001110                      MOV     (SP),$LPERR         ;;SAVE ERROR LOOP ADDRESS
017134  005037  001204                      CLR     $ESCAPE             ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
017140  112737  000001  001115              MOVB    #1,$ERMAX           ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
017146  013777  001102  161766      $OVER:  MOV     $TSTNM,@DISPLAY     ;;DISPLAY TEST NUMBER
017154  013716  001106                      MOV     $LPADR,(SP)         ;;FUDGE RETURN ADDRESS
017160  000002                              RTI                         ;;FIXES PS

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



                                    .SBTTL  ERROR HANDLER ROUTINE

                                    ;*SW15=1         HALT ON ERROR
                                    ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                    ;*SW10=1         BELL ON ERROR
                                    ;*SW09=1         LOOP ON ERROR
                                    ;*SW12=1         CYCLE ON ERROR TO PREVIOS 'SCOPE' STATEMENT
                                    ;*GO TO ERRTYP ON ERROR
                                    ;*NOT FROM SYSMAC

017162  104407                      $ERROR: CKSWR                              ;CHECK FOR SOFTWARE SWITCH REGISTER REQUEST
017164  105237  001103              7$:     INCB    $ERFLG              ;SET THE ERROR FLAG
017170  001775                              BEQ     7$                  ;DON'T LET THE FLAG GO TO ZERO
017172  013777  001102  161742              MOV     $TSTNM,@DISPLAY
017200  032777  002000  161732              BIT     #SW10,@SWR
017206  001402                              BEQ     1$
017210  104401  001206                      TYPE    ,$BELL
017214  005237  001112              1$:     INC     $ERTTL
017220  011637  001116                      MOV     (SP),$ERRPC

017224  032777  000004  161706              BIT     #SW2,@SWR           ;DROP THE DRIVE?
017232  001404                              BEQ     5$                  ;SW NOT SET, SKIP
017234  023727  001112  000006              CMP     $ERTTL,#6           ;MORE THAN 6 ERRORS ON THIS DRIVE?
017242  101044                              BHI     6$                  ;YES, DROP THE DRIVE

017244  162737  000002  001116      5$:     SUB     #2,$ERRPC
017252  117737  161640  001114              MOVB    @$ERRPC,$ITEMB
```

```
017260  032777  020000  161652          BIT     #SW13,@SWR
017266  001004                          BNE     2$
017270  004737  017446                  JSR     PC,@#ERRTYP
017274  104401  001213                  TYPE    ,$CRLF
017300  023737  000042  000046  2$:     CMP     @#42,@#46                       ;ARE WE IN ACT11 AUTO MODE?
017306  001403                          BEQ     .+10                            ;YES, HALT ON ERROR
017310  005777  161624                  TST     @SWR                            ;SWR15 (HALT ON ERROR) SET?
017314  100002                          BPL     3$                              ;BRANCH IF NOT
017316  000000                          HALT                                    ;HALT ON ERROR
017320  104407                          CKSWR                                   ;CHECK FOR SOFTWARE SWITCH REGISTER REQUEST
017322  032777  010000  161610  3$:     BIT     #SW12,@SWR
017330  001402                          BEQ     .+6
017332  013716  001106                  MOV     $LPADR,(SP)
017336  032777  001000  161574          BIT     #SW09,@SWR
017344  001402                          BEQ     4$
017346  013716  001110                  MOV     $LPERR,(SP)
017352  000002                  4$:     RTI

017354  013746  001226          6$:     MOV     DRVPTR,-(SP)        ;GET POINTER TO DRIVE #
017360  162716  000002                  SUB     #2,(SP)
017364  042736  000377                  BIC     #377,@(SP)+         ;CLEAR THE DRIVE PRESENT FLAG
017370  104401  002064                  TYPE    ,MSG14
017374  013746  001230                  MOV     DRIVAD,-(SP)
017400  000241                          CLC                         ;GET THE DRIVE #
017402  006116                          ROL     (SP)
017404  006116                          ROL     (SP)
017406  006116                          ROL     (SP)
017410  006116                          ROL     (SP)
017412  104402                          TYPOC                       ;TYPE IT OUT
017414  104401  017422                  TYPE    ,65$                ;;TYPE ASCIZ STRING
017420  000405                          BR      64$                 ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  / DROPPED/
017434                          64$:
017434  105337  001224                  DECB    DRIVS               ;DECRMNT # OF DRIVS PRESENT
017440  022626                          CMP     (SP)+,(SP)+         ;RESTORE STACK
017442  000137  015232                  JMP     BTEOP               ;EXIT

017446                          ERRTYP:
017446  104401  001213                  TYPE    ,$CRLF              ;"CARRIAGE RETURN" & LINE FEED"
017452  010046                          MOV     R0,-(SP)            ;SAVE R0
017454  005000                          CLR     R0                  ;PICKUP THE ITEM INDEX
017456  153700  001114                  BISB    @#$ITEMB,R0
017462  001011                          BNE     1$                  ;IF ITEM NUMBER IS ZERO, JUST

                                                                    ;TYPE THE PC OF THE ERROR
017464  013746  001116                  MOV     $ERRPC,-(SP)        ;SAVE $ERRPC FOR TYPEOUT
                                                                    ;ERROR ADDRESS
017470  104402                          TYPOC                       ;GO TYPE--OCTAL ASCII(ALL DIGITS)
017472  104401                          TYPE
017474  001733                          MSG7
017476  013746  001116                  MOV     $ERRPC,-(SP)
017502  104402                          TYPOC
017504  000440                          BR      6$                  ;GET OUT
017506  005300                  1$:     DEC     R0                  ;ADJUST THE INDEX SO THAT IT WILL
017510  006300                          ASL     R0                  ;       WORK FOR THE ERROR TABLE
017512  006300                          ASL     R0
```

```
017514  006300                            ASL     R0
017516  062700  002122                    ADD     #$ERRTB,R0        ;FORM TABLE POINTER
017522  012037  017532                    MOV     (R0)+,2$          ;PICKUP "ERROR MESSAGE" POINTER
017526  001404                            BEQ     3$                ;SKIP TYPEOUT IF NOT POINTER
017530  104401                            TYPE                      ;TYPE THE "ERROR MESSAGE"
017532  000000                    2$:     .WORD   0                 ;"CARRIAGE RETURN" & LINE FEED"
017534  104401  001213                    TYPE    ,$CRLF            ;PICKUP "DATA HEADER" POINTER
017540  032777  004000  161372    3$:     BIT     #SW11,@SWR        ;DUMP OUT ALL RK REGISTERS
017546  001042                            BNE     10$               ;YES, BRANCH
017550  012037  017560                    MOV     (R0)+,4$          ;PICKUP "DATA HEADER" POINTER
017554  001412                            BEQ     5$                ;SKIP TYPEOUT IF 0
017556  104401                            TYPE                      ;TYPE THE "DATA HEADER"
017560  000000                    4$:     .WORD   0                 ;"DATA HEADER" POINTER GOES HERE
017562  104401  001213                    TYPE    ,$CRLF            ;"CARRIAGE RETURN" & LINE FEED"
017566  062700  000002                    ADD     #2,R0             ;FORM POINTER TO TERMINATOR
017572  005710                            TST     (R0)              ;IS THE TERMINATOR 0?
017574  001017                            BNE     9$                ;IF NOT, BRANCH
017576  162700  000002                    SUB     #2,R0             ;YES, IT IS 0.  REPOINT TO "DATA"
                                                                    ;GO TYPE OUT DATA AS USUAL
017602  011000                    5$:     MOV     (R0),R0           ;PICKUP "DATA TABLE" POINTER
017604  001004                            BNE     7$                ;GO TYPE THE DATA
017606  012600                    6$:     MOV     (SP)+,R0          ;RESTORE R0
017610  104401  001213                    TYPE    ,$CRLF            ;"CARRIAGE RETURN" & LINE FEED"
017614  000207                            RTS     PC                ;RETURN
017616                            7$:
017616  013046                            MOV     @(R0)+,-(SP)      ;SAVE @(R0)+ FOR TYPEOUT
017620  104402                            TYPOC                     ;GO TYPE--OCTAL ASCII(ALL DIGITS)
017622  005710                            TST     (R0)              ;IS THERE ANOTHER NUMBER?
017624  001770                            BEQ     6$                ;BR IF NO
017626  104401  002110                    TYPE    ,BLNKS2
017632  000771                            BR      7$
017634  004770  000000            9$:     JSR     PC,@(R0)          ;GO TO THE SPECIAL ERROR
                                                                    ;DATA HANDLING SUBROUTINE
                                                                    ;NOTE THAT THIS ROUTINE IS
                                                                    ;THE ONE INDICATED IN THE
                                                                    ;LAST WORD OF AN ERROR
                                                                    ;ITEM IN THE ERROR TABLE
                                                                    ;(STARTING AT $ERRTB)
017640  104401                            TYPE
017642  001733                            MSG7
017644  013746  001116                    MOV     $ERRPC,-(SP)
017650  104402                            TYPOC
017652  000755                            BR      6$                ;GO BACK, TO THE EXIT POINT
                                                                    ;FOR 'ERRTYP'

017654  004737  017662            10$:    JSR     PC,DMPREG
017660  000752                            BR      6$



                                  ;DMPREG
                                  ;DUMPS OUT ALL RK REGISTERS WHEN SW 11 IS SET

017662                            DMPREG:
017662  104401  017670                    TYPE    ,65$              ;;TYPE ASCIZ STRING
017666  000441                            BR      64$               ;;GET OVER THE ASCIZ
```

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                                ;;65$:  .ASCIZ  <15><12>/  PC     RKDS    RKER    RKCS    RKWC    RKBA    RKDA    RKDB/<
017772                          64$:
017772  013746  001116                  MOV     $ERRPC,-(SP)
017776  104402                          TYPOC
020000  104401  002110                  TYPE    ,BLNKS2
020004  010046                          MOV     R0,-(SP)
020006  012700  001452                  MOV     #RKDS,R0
020012  013046                  1$:     MOV     @(R0)+,-(SP)
020014  104402                          TYPOC
020016  104401  002110                  TYPE    ,BLNKS2
020022  020027  001466                  CMP     R0,#RKDB
020026  003771                          BLE     1$
020030  012600                          MOV     (SP)+,R0
020032  000207                          RTS     PC





                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

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

020034                          $TYPDS:
020034  010046                          MOV     R0,-(SP)                ;;PUSH R0 ON STACK
020036  010146                          MOV     R1,-(SP)                ;;PUSH R1 ON STACK
020040  010246                          MOV     R2,-(SP)                ;;PUSH R2 ON STACK
020042  010346                          MOV     R3,-(SP)                ;;PUSH R3 ON STACK
020044  010546                          MOV     R5,-(SP)                ;;PUSH R5 ON STACK
020046  012746  020200                  MOV     #20200,-(SP)            ;;SET BLANK SWITCH AND SIGN
020052  016605  000020                  MOV     20(SP),R5               ;;GET THE INPUT NUMBER
020056  100004                          BPL     1$                      ;;BR IF INPUT IS POS.
020060  005405                          NEG     R5                      ;;MAKE THE BINARY NUMBER POS.
020062  112766  000055  000001          MOVB    #'-,1(SP)               ;;MAKE THE ASCII NUMBER NEG.
020070  005000                  1$:     CLR     R0                      ;;ZERO THE CONSTANTS INDEX
020072  012703  020250                  MOV     #$DBLK,R3               ;;SETUP THE OUTPUT POINTER
020076  112723  000040                  MOVB    #' ,(R3)+               ;;SET THE FIRST CHARACTER TO A BLANK
020102  005002                  2$:     CLR     R2                      ;;CLEAR THE BCD NUMBER
020104  016001  020240                  MOV     $DTBL(R0),R1            ;;GET THE CONSTANT
020110  160105                  3$:     SUB     R1,R5                   ;;FORM THIS BCD DIGIT
020112  002402                          BLT     4$                      ;;BR IF DONE
020114  005202                          INC     R2                      ;;INCREASE THE BCD DIGIT BY 1
020116  000774                          BR      3$
020120  060105                  4$:     ADD     R1,R5                   ;;ADD BACK THE CONSTANT
020122  005702                          TST     R2                      ;;CHECK IF BCD DIGIT=0
020124  001002                          BNE     5$                      ;;FALL THROUGH IF 0
020126  105716                          TSTB    (SP)                    ;;STILL DOING LEADING 0'S?
020130  100407                          BMI     7$                      ;;BR IF YES
```

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020132  106316                    5$:     ASLB    (SP)                    ;;MSD?
020134  103003                            BCC     6$                      ;;BR IF NO
020136  116663  000001  177777            MOVB    1(SP),-1(R3)            ;;YES--SET THE SIGN
020144  052702  000060            6$:     BIS     #'0,R2                  ;;MAKE THE BCD DIGIT ASCII
020150  052702  000040            7$:     BIS     #' ,R2                  ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
020154  110223                            MOVB    R2,(R3)+                ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
020156  005720                            TST     (R0)+                   ;;JUST INCREMENTING
020160  020027  000010                    CMP     R0,#10                  ;;CHECK THE TABLE INDEX
020164  002746                            BLT     2$                      ;;GO DO THE NEXT DIGIT
020166  003002                            BGT     8$                      ;;GO TO EXIT
020170  010502                            MOV     R5,R2                   ;;GET THE LSD
020172  000764                            BR      6$                      ;;GO CHANGE TO ASCII
020174  105726                    8$:     TSTB    (SP)+                   ;;WAS THE LSD THE FIRST NON-ZERO?
020176  100003                            BPL     9$                      ;;BR IF NO
020200  116663  177777  177776            MOVB    -1(SP),-2(R3)           ;;YES--SET THE SIGN FOR TYPING
020206  105013                    9$:     CLRB    (R3)                    ;;SET THE TERMINATOR
020210  012605                            MOV     (SP)+,R5                ;;POP STACK INTO R5
020212  012603                            MOV     (SP)+,R3                ;;POP STACK INTO R3
020214  012602                            MOV     (SP)+,R2                ;;POP STACK INTO R2
020216  012601                            MOV     (SP)+,R1                ;;POP STACK INTO R1
020220  012600                            MOV     (SP)+,R0                ;;POP STACK INTO R0
020222  104401  020250                    TYPE    ,$DBLK                  ;;NOW TYPE THE NUMBER
020226  016666  000002  000004            MOV     2(SP),4(SP)             ;;ADJUST THE STACK
020234  012616                            MOV     (SP)+,(SP)
020236  000002                            RTI                             ;;RETURN TO USER
020240  023420                    $DTBL:  10000.
020242  001750                            1000.
020244  000144                            100.
020246  000012                            10.
020250  000004                    $DBLK:  .BLKW   4

                                  .SBTTL  TYPE ROUTINE

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

020260  105737  001157            $TYPE:  TSTB    $TPFLG                  ;;IS THERE A TERMINAL?
020264  100002                            BPL     1$                      ;;BR IF YES
020266  000000                            HALT                            ;;HALT HERE IF NO TERMINAL
020270  000407                            BR      3$                      ;;LEAVE
020272  010046                    1$:     MOV     R0,-(SP)                ;;SAVE R0
020274  017600  000002                    MOV     @2(SP),R0               ;;GET ADDRESS OF ASCIZ STRING
020300  112046                    2$:     MOVB    (R0)+,-(SP)             ;;PUSH CHARACTER TO BE TYPED ONTO STACK
020302  001005                            BNE     4$                      ;;BR IF IT ISN'T THE TERMINATOR
```

```
020304  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
020306  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
020310  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
020314  000002                          RTI                     ;;RETURN
020316  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
020322  001430                          BEQ     8$
020324  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
020330  001006                          BNE     5$
020332  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
020334  104401                          TYPE                    ;;TYPE A CR AND LF
020336  001213                          $CRLF
020340  105037  020474                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
020344  000755                          BR      2$              ;;GET NEXT CHARACTER
020346  004737  020430          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
020352  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
020356  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
020360  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
020364  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
020370  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
020372  004737  020430                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
020376  105337  020474                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
020402  000770                          BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

020404  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
020410  004737  020430          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
020414  132737  000007  020474          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
020422  001372                          BNE     9$              ;;TAB STOP
020424  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
020426  000724                          BR      2$              ;;GET NEXT CHARACTER
020430  105777  160514          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
020434  100375                          BPL     $TYPEC
020436  116677  000002  160506          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
020444  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
020452  001003                          BNE     1$              ;;BRANCH IF NO
020454  105037  020474                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
020460  000406                          BR      $TYPEX          ;;EXIT
020462  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
020470  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
020472  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
020474  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
020476  000207                  $TYPEX: RTS     PC



                                .SBTTL  INTEGER MULTIPLY ROUTINE

                                ;;************************************************************
                                ;*CALL
                                ;*      MOV     MULTIPLER,-(SP)
                                ;*      MOV     MULTIPLICAND,-(SP)
                                ;*      JSR     PC,@#$MULT
                                ;*      RETURN  ;;PRODUCT IS ON THE STACK
                                ;*
```

```
                                     ;*      STACK   PRODUCT
                                     ;*      -----   -------
                                     ;*      TOP     LSB'S
                                     ;*      +2      MSB'S

       020500                        $MULT:
       020500  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
       020502  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
       020504  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
       020506  005046                        CLR     -(SP)           ;;CLEAR THE SIGN KEY
       020510  016601  000012                MOV     12(SP),R1       ;;GET THE MULTIPLICAND
       020514  100002                        BPL     1$              ;;BR IF PLUS
       020516  005216                        INC     (SP)            ;;SET THE SIGN KEY
       020520  005401                        NEG     R1              ;;MAKE THE MULTIPLICAND POSTIVE
       020522  016602  000014        1$:     MOV     14(SP),R2       ;;GET THE MULTIPLIER
       020526  100002                        BPL     2$              ;;BR IF PLUS
       020530  005316                        DEC     (SP)            ;;UPDATE THE SIGN KEY
       020532  005402                        NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
       020534  012746  000021        2$:     MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
       020540  005000                        CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
       020542  103001                3$:     BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
       020544  060200                        ADD     R2,R0
       020546  006000                4$:     ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
       020550  006001                        ROR     R1              ;;THE MULTIPLICAND
       020552  005316                        DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
       020554  001372                        BNE     3$              ;;BR IF NO
       020556  022616                        CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
       020560  001403                        BEQ     5$              ;;GO TO EXIT IF NO
       020562  005400                        NEG     R0              ;;YES--SO MAKE IT SO
       020564  005401                        NEG     R1
       020566  005600                        SBC     R0
       020570  005726                5$:     TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
       020572  010066  000012                MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
       020576  010166  000010                MOV     R1,10(SP)       ;;LSB'S
       020602  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
       020604  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
       020606  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
       020610  000207                        RTS     PC


                                     .SBTTL  TTY INPUT ROUTINE

                                     ;;*************************************************************
                                     .ENABL  LSB
       020612  000000                $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
       020614  000000                $TKQIN: .WORD   0               ;;INPUT POINTER
       020616  000000                $TKQOUT: .WORD  0               ;;OUTPUT POINTER
       020620  000001                $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
               020621                $TKQEND=.
               020622                .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
```

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                                        ;*      RETURN
                                        ;
020622  005037  020612                  $TKINT: CLR     $TKCNT            ;;CLEAR COUNT OF ITEMS IN QUEUE
020626  012737  020620  020614                  MOV     #$TKQSRT,$TKQIN   ;;MOVE THE STARTING ADDRESS OF THE
020634  013737  020614  020616                  MOV     $TKQIN,$TKQOUT    ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
020642  012737  020672  000060                  MOV     #$TKSRV,@#TKVEC   ;;INITIALIZE THE KEYBOARD VECTOR
020650  012737  000200  000062                  MOV     #200,@#TKVEC+2    ;;"BR" LEVEL 4
020656  005777  160264                          TST     @$TKB             ;;CLEAR DONE FLAG
020662  012777  000100  160254                  MOV     #100,@$TKS        ;;ENABLE TTY KEYBOARD INTERRUPT
020670  000207                                  RTS     PC                ;;RETURN TO CALLER

                                        ;*TK SERVICE ROUTINE
                                        ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                        ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                        ;*IT IN THE QUEUE.

020672  117746  160250                  $TKSRV: MOVB    @$TKB,-(SP)       ;;PICKUP THE CHARACTER
020676  042716  177600                          BIC     #^C177,(SP)       ;;STRIP THE JUNK
020702  021627  000007                  1$:     CMP     (SP),#7           ;;IS IT A CONTROL G?
020706  001004                                  BNE     2$                ;;BRANCH IF NO
020710  022737  000176  001140                  CMP     #SWREG,SWR        ;;IS SOFT-SWR SELECTED?
020716  001500                                  BEQ     6$                ;;GO TO SWR CHANGE

020720                                  2$:
020720  022737  000001  020612                  CMP     #1,$TKCNT         ;;IS THE QUEUE FULL?
020726  001004                                  BNE     3$                ;;BRANCH IF NO
020730  104401  001206                          TYPE    ,$BELL            ;;RING THE TTY BELL
020734  005726                                  TST     (SP)+             ;;CLEAN CHARACTER OFF OF STACK
020736  000451                                  BR      5$                ;;EXIT
020740  021627  000023                  3$:     CMP     (SP),#23          ;;IS IT A CONTROL-S?
020744  001021                                  BNE     32$               ;;BRANCH IF NO
020746  005077  160172                          CLR     @$TKS             ;;DISABLE TTY KEYBOARD INTERRUPTS
020752  005726                                  TST     (SP)+             ;;CLEAN CHAR OFF STACK
020754  105777  160164                  31$:    TSTB    @$TKS             ;;WAIT FOR A CHAR
020760  100375                                  BPL     31$               ;;LOOP UNTIL ITS THERE
020762  117746  160160                          MOVB    @$TKB,-(SP)       ;;GET THE CHARACTER
020766  042716  177600                          BIC     #^C177,(SP)       ;;MAKE IT 7-BIT ASCII
020772  022627  000021                          CMP     (SP)+,#21         ;;IS IT A CONTROL-Q?
020776  001366                                  BNE     31$               ;;BRANCH IF NO
021000  012777  000100  160136                  MOV     #100,@$TKS        ;;REENABLE TTY KEYBOARD INTERRUPTS
021006  000002                                  RTI                       ;;RETURN
021010  005237  020612                  32$:    INC     $TKCNT            ;;COUNT THIS CHARACTER
021014  021627  000140                          CMP     (SP),#140         ;;IS IT UPPER CASE?
021020  002405                                  BLT     4$                ;;BRANCH IF YES
021022  021627  000175                          CMP     (SP),#175         ;;IS IT A SPECIAL CHAR?
021026  003002                                  BGT     4$                ;;BRANCH IF YES
021030  042716  000040                          BIC     #40,(SP)          ;;MAKE IT UPPER CASE
021034  112677  177554                  4$:     MOVB    (SP)+,@$TKQIN     ;;AND PUT IT IN QUEUE
021040  005237  020614                          INC     $TKQIN            ;;UPDATE THE POINTER
021044  023727  020614  020621                  CMP     $TKQIN,#$TKQEND   ;;GO OFF THE END?
021052  001003                                  BNE     5$                ;;BRANCH IF NO
021054  012737  020620  020614                  MOV     #$TKQSRT,$TKQIN   ;;RESET THE POINTER
021062  000002                          5$:     RTI                       ;;RETURN

                                        ;;*************************************************************
                                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                        ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
                                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
                                        ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
021064  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR              ;;IS THE SOFT-SWR SELECTED
021072  001104                          BNE     15$                     ;;EXIT IF NOT
021074  105777  160044                  TSTB    @$TKS                   ;;IS A CHAR WAITING?
021100  100101                          BPL     15$                     ;;IF NOT, EXIT
021102  117746  160040                  MOVB    @$TKB,-(SP)             ;;YES
021106  042716  177600                  BIC     #↑C177,(SP)             ;;MAKE IT  7-BIT ASCII
021112  021627  000007                  CMP     (SP),#7                 ;;IS IT A CONTROL-G?
021116  001300                          BNE     2$                      ;;IF NOT, PUT IT IN THE TTY QUEUE
                                                                        ;;AND EXIT


                                        ;;*********************************************************
                                        ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
                                        ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
                                        ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
021120  123727  001134  000001  6$:     CMPB    $AUTOB,#1               ;;ARE WE RUNNING IN AUTO-MODE?
021126  001674                          BEQ     2$                      ;;BRANCH IF YES
021130  005726                          TST     (SP)+                   ;;CLEAR CONTROL-G OFF STACK
021132  004737  020622                  JSR     PC,$TKINT               ;;FLUSH THE TTY INPUT QUEUE
021136  005077  160002                  CLR     @$TKS                   ;;DISABLE TTY KEYBOARD INTERRUPTS
021142  112737  000001  001135          MOVB    #1,$INTAG               ;;SET INTERRUPT MODE INDICATOR

021150  104401  021727                  TYPE    ,$CNTLG                 ;;ECHO THE CONTROL-G (↑G)
021154  104401  021734          $GTSWR: TYPE    ,$MSWR                  ;;TYPE CURRENT CONTENTS
021160  013746  000176                  MOV     SWREG,-(SP)             ;;SAVE SWREG FOR TYPEOUT
021164  104402                          TYPOC                           ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
021166  104401  021745                  TYPE    ,$MNEW                  ;;PROMPT FOR NEW SWR
021172  005046                  19$:    CLR     -(SP)                   ;;CLEAR COUNTER
021174  005046                          CLR     -(SP)                   ;;THE NEW SWR
021176  105777  157742          7$:     TSTB    @$TKS                   ;;CHAR THERE?
021202  100375                          BPL     7$                      ;;IF NOT TRY AGAIN

021204  117746  157736                  MOVB    @$TKB,-(SP)             ;;PICK UP CHAR
021210  042716  177600                  BIC     #↑C177,(SP)             ;;MAKE IT 7-BIT ASCII



021214  021627  000025          9$:     CMP     (SP),#25                ;;IS IT A CONTROL-U?
021220  001005                          BNE     10$                     ;;BRANCH IF NOT
021222  104401  021722                  TYPE    ,$CNTLU                 ;;YES, ECHO CONTROL-U (↑U)
021226  062706  000006          20$:    ADD     #6,SP                   ;;IGNORE PREVIOUS INPUT
021232  000757                          BR      19$                     ;;LET'S TRY IT AGAIN


021234  021627  000015          10$:    CMP     (SP),#15                ;;IS IT A <CR>?
021240  001022                          BNE     16$                     ;;BRANCH IF NO
021242  005766  000004                  TST     4(SP)                   ;;YES, IS IT THE FIRST CHAR?
021246  001403                          BEQ     11$                     ;;BRANCH IF YES
021250  016677  000002  157662          MOV     2(SP),@SWR              ;;SAVE NEW SWR
021256  062706  000006          11$:    ADD     #6,SP                   ;;CLEAR UP STACK
021262  104401  001213          14$:    TYPE    ,$CRLF                  ;;ECHO <CR> AND <LF>
021266  123727  001135  000001          CMPB    $INTAG,#1               ;;RE-ENABLE TTY KBD INTERRUPTS?
021274  001003                          BNE     15$                     ;;BRANCH IF NOT
021276  012777  000100  157640          MOV     #100,@$TKS              ;;RE-ENABLE TTY KBD INTERRUPTS
```

```
021304  000002                        15$:    RTI                         ;;RETURN
021306  004737  020430                16$:    JSR     PC,$TYPEC           ;;ECHO CHAR
021312  021627  000060                        CMP     (SP),#60            ;;CHAR < 0?
021316  002420                                BLT     18$                 ;;BRANCH IF YES
021320  021627  000067                        CMP     (SP),#67            ;;CHAR > 7?
021324  003015                                BGT     18$                 ;;BRANCH IF YES
021326  042726  000060                        BIC     #60,(SP)+           ;;STRIP-OFF ASCII
021332  005766  000002                        TST     2(SP)               ;;IS THIS THE FIRST CHAR
021336  001403                                BEQ     17$                 ;;BRANCH IF YES
021340  006316                                ASL     (SP)                ;;NO, SHIFT PRESENT
021342  006316                                ASL     (SP)                ;;    CHAR OVER TO MAKE
021344  006316                                ASL     (SP)                ;;    ROOM FOR NEW ONE.
021346  005266  000002                17$:    INC     2(SP)               ;;KEEP COUNT OF CHAR
021352  056616  177776                        BIS     -2(SP),(SP)         ;;SET IN NEW CHAR
021356  000707                                BR      7$                  ;;GET THE NEXT ONE
021360  104401  001212                18$:    TYPE    ,$QUES              ;;TYPE ?<CR><LF>
021364  000720                                BR      20$                 ;;SIMULATE CONTROL-U
                                      .DSABL  LSB


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

021366  011646                        $RDCHR: MOV     (SP),-(SP)          ;;PUSH DOWN THE PC AND
021370  016666  000004  000002                MOV     4(SP),2(SP)         ;;THE PS
021376  005066  000004                        CLR     4(SP)               ;;GET READY FOR A CHARACTER
021402  005046                                CLR     -(SP)               ;;PUT NEW PS ON STACK
021404  012746  021412                        MOV     #64$,-(SP)          ;;PUT NEW PC ON  STACK
021410  000002                                RTI                         ;;POP NEW PC AND PS
021412                                64$:
021412  005737  020612                1$:     TST     $TKCNT              ;;WAIT ON A CHARACTER
021416  001775                                BEQ     1$
021420  005337  020612                        DEC     $TKCNT              ;;DECREMENT THE COUNTER
021424  117766  177166  000004                MOVB    @$TKQOUT,4(SP)      ;;GET ONE CHARACTER
021432  005237  020616                        INC     $TKQOUT             ;;UPDATE THE POINTER
021436  023727  020616  020621                CMP     $TKQOUT,#$TKQEND    ;;DID IT GO OFF OF THE END?
021444  001003                                BNE     2$                  ;;BRANCH IF NO
021446  012737  020620  020616                MOV     #$TKQSRT,$TKQOUT    ;;RESET THE POINTER
021454  000002                        2$:     RTI                         ;;RETURN
                                      ;;*************************************************************
                                      ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                      ;*CALL:
                                      ;*       RDLIN                       ;;INPUT A STRING FROM THE TTY
                                      ;*       RETURN HERE                 ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                      ;*                                   ;;TERMINATOR WILL BE A BYTE OF ALL 0'S

021456  010346                        $RDLIN: MOV     R3,-(SP)            ;;SAVE R3
021460  005046                                CLR     -(SP)               ;;CLEAR THE RUBOUT KEY
021462  012703  021712                1$:     MOV     #$TTYIN,R3          ;;GET ADDRESS
021466  022703  021722                2$:     CMP     #$TTYIN+8.,R3       ;;BUFFER FULL?
021472  101456                                BLOS    4$                  ;;BR IF YES
```

```
021474  104410                             RDCHR                          ;;GO READ ONE CHARACTER FROM THE TTY
021476  112613                             MOVB    (SP)+,(R3)             ;;GET CHARACTER
021500  122713  000177            10$:     CMPB    #177,(R3)              ;;IS IT A RUBOUT
021504  001022                             BNE     5$                     ;;BR IF NO
021506  005716                             TST     (SP)                   ;;IS THIS THE FIRST RUBOUT?
021510  001007                             BNE     6$                     ;;BR IF NO
021512  112737  000134  021710             MOVB    #'\,9$                 ;;TYPE A BACK SLASH
021520  104401  021710                     TYPE    ,9$
021524  012716  177777                     MOV     #-1,(SP)               ;;SET THE RUBOUT KEY
021530  005303                    6$:      DEC     R3                     ;;BACKUP BY ONE
021532  020327  021712                     CMP     R3,#$TTYIN             ;;STACK EMPTY?
021536  103434                             BLO     4$                     ;;BR IF YES
021540  111337  021710                     MOVB    (R3),9$                ;;SETUP TO TYPEOUT THE DELETED CHAR.
021544  104401  021710                     TYPE    ,9$                    ;;GO TYPE
021550  000746                             BR      2$                     ;;GO READ ANOTHER CHAR.
021552  005716                    5$:      TST     (SP)                   ;;RUBOUT KEY SET?
021554  001406                             BEQ     7$                     ;;BR IF NO
021556  112737  000134  021710             MOVB    #'\,9$                 ;;TYPE A BACK SLASH
021564  104401  021710                     TYPE    ,9$
021570  005016                             CLR     (SP)                   ;;CLEAR THE RUBOUT KEY
021572  122713  000025            7$:      CMPB    #25,(R3)               ;;IS CHARACTER A CTRL U?
021576  001003                             BNE     8$                     ;;BR IF NO
021600  104401  021722                     TYPE    ,$CNTLU                ;;TYPE A CONTROL "U"
021604  000726                             BR      1$                     ;;GO START OVER
021606  122713  000022            8$:      CMPB    #22,(R3)               ;;IS CHARACTER A "↑R"?
021612  001011                             BNE     3$                     ;;BRANCH IF NO
021614  105013                             CLRB    (R3)                   ;;CLEAR THE CHARACTER
021616  104401  001213                     TYPE    ,$CRLF                 ;;TYPE A "CR" & "LF"
021622  104401  021712                     TYPE    ,$TTYIN                ;;TYPE THE INPUT STRING
021626  000717                             BR      2$                     ;;GO PICKUP ANOTHER CHACTER
021630  104401  001212            4$:      TYPE    ,$QUES                 ;;TYPE A '?'
021634  000712                             BR      1$                     ;;CLEAR THE BUFFER AND LOOP
021636  111337  021710            3$:      MOVB    (R3),9$                ;;ECHO THE CHARACTER
021642  104401  021710                     TYPE    ,9$
021646  122723  000015                     CMPB    #15,(R3)+              ;;CHECK FOR RETURN
021652  001305                             BNE     2$                     ;;LOOP IF NOT RETURN
021654  105063  177777                     CLRB    -1(R3)                 ;;CLEAR RETURN (THE 15)
021660  104401  001214                     TYPE    ,$LF                   ;;TYPE A LINE FEED
021664  005726                             TST     (SP)+                  ;;CLEAN RUBOUT KEY FROM THE STACK
021666  012603                             MOV     (SP)+,R3               ;;RESTORE R3
021670  011646                             MOV     (SP),-(SP)             ;;ADJUST THE STACK AND PUT ADDRESS OF THE
021672  016666  000004  000002             MOV     4(SP),2(SP)            ;;      FIRST ASCII CHARACTER ON IT
021700  012766  021712  000004             MOV     #$TTYIN,4(SP)
021706  000002                             RTI                            ;;RETURN
021710     000                    9$:      .BYTE   0                      ;;STORAGE FOR ASCII CHAR. TO TYPE
021711     000                             .BYTE   0                      ;;TERMINATOR
021712  000010                    $TTYIN:  .BLKB   8.                     ;;RESERVE 8 BYTES FOR TTY INPUT
021722  052536  005015     000    $CNTLU:  .ASCIZ  /↑U/<15><12>           ;;CONTROL "U"
021727     136  006507  000012    $CNTLG:  .ASCIZ  /↑G/<15><12>           ;;CONTROL "G"
021734  005015  053523  020122    $MSWR:   .ASCIZ  <15><12>/SWR = /
021742  020075     000
021745     040  047040  053505    $MNEW:   .ASCIZ  /  NEW = /
021752  036440  000040

                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY

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```
                                         ;;*************************************************************
                                         ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                         ;*CHANGE IT TO BINARY.
                                         ;*CALL:
                                         ;*       RDOCT                          ;;READ AN OCTAL NUMBER
                                         ;*       RETURN HERE                    ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                         ;*                                      ;;HIGH ORDER BITS ARE IN $HIOCT

021756  011646                           $RDOCT: MOV     (SP),-(SP)             ;;PROVIDE SPACE FOR THE
021760  016666  000004  000002                   MOV     4(SP),2(SP)            ;;INPUT NUMBER
021766  010046                                   MOV     R0,-(SP)               ;;PUSH R0 ON STACK
021770  010146                                   MOV     R1,-(SP)               ;;PUSH R1 ON STACK
021772  010246                                   MOV     R2,-(SP)               ;;PUSH R2 ON STACK
021774  104411                           1$:     RDLIN                          ;;READ AN ASCIZ LINE
021776  012600                                   MOV     (SP)+,R0               ;;GET ADDRESS OF 1ST CHARACTER
022000  005001                                   CLR     R1                     ;;CLEAR DATA WORD
022002  005002                                   CLR     R2
022004  112046                           2$:     MOVB    (R0)+,-(SP)            ;;PICKUP THIS CHARACTER
022006  001412                                   BEQ     3$                     ;;IF ZERO GET OUT
022010  006301                                   ASL     R1                     ;;*2
022012  006102                                   ROL     R2
022014  006301                                   ASL     R1                     ;;*4
022016  006102                                   ROL     R2
022020  006301                                   ASL     R1                     ;;*8
022022  006102                                   ROL     R2
022024  042716  177770                           BIC     #↑C7,(SP)              ;;STRIP THE ASCII JUNK
022030  062601                                   ADD     (SP)+,R1               ;;ADD IN THIS DIGIT
022032  000764                                   BR      2$                     ;;LOOP
022034  005726                           3$:     TST     (SP)+                  ;;CLEAN TERMINATOR FROM STACK
022036  010166  000012                           MOV     R1,12(SP)              ;;SAVE THE RESULT
022042  010237  022056                           MOV     R2,$HIOCT
022046  012602                                   MOV     (SP)+,R2               ;;POP STACK INTO R2
022050  012601                                   MOV     (SP)+,R1               ;;POP STACK INTO R1
022052  012600                                   MOV     (SP)+,R0               ;;POP STACK INTO R0
022054  000002                                   RTI                            ;;RETURN
022056  000000                           $HIOCT: .WORD   0                      ;;HIGH ORDER BITS GO HERE

                                         .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

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

```
                                       ;*
                                       ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                       ;*CALL:
                                       ;*       MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                       ;*       TYPOC                   ;;CALL FOR TYPEOUT

022060  017646  000000                 $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
022064  116637  000001  022303                 MOVB    1(SP),$0FILL    ;;LOAD ZERO FILL SWITCH
022072  112637  022305                         MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
022076  062716  000002                         ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
022102  000406                                 BR      $TYPON
022104  112737  000001  022303 $TYPOC: MOVB    #1,$0FILL       ;;SET THE ZERO FILL SWITCH
022112  112737  000006  022305                 MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
022120  112737  000005  022302 $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
022126  010346                                 MOV     R3,-(SP)        ;;SAVE R3
022130  010446                                 MOV     R4,-(SP)        ;;SAVE R4
022132  010546                                 MOV     R5,-(SP)        ;;SAVE R5
022134  113704  022305                         MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
022140  005404                                 NEG     R4
022142  062704  000006                         ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
022146  110437  022304                         MOVB    R4,$OMODE       ;;SAVE IT FOR USE
022152  113704  022303                         MOVB    $0FILL,R4       ;;GET THE ZERO FILL SWITCH
022156  016605  000012                         MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
022162  005003                                 CLR     R3              ;;CLEAR THE OUTPUT WORD
022164  006105                         1$:     ROL     R5              ;;ROTATE MSB INTO "C"
022166  000404                                 BR      3$              ;;GO DO MSB
022170  006105                         2$:     ROL     R5              ;;FORM THIS DIGIT
022172  006105                                 ROL     R5
022174  006105                                 ROL     R5
022176  010503                                 MOV     R5,R3
022200  006103                         3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
022202  105337  022304                         DECB    $OMODE          ;;TYPE THIS DIGIT?
022206  100016                                 BPL     7$              ;;BR IF NO
022210  042703  177770                         BIC     #177770,R3      ;;GET RID OF JUNK
022214  001002                                 BNE     4$              ;;TEST FOR 0
022216  005704                                 TST     R4              ;;SUPPRESS THIS 0?
022220  001403                                 BEQ     5$              ;;BR IF YES
022222  005204                         4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
022224  052703  000060                         BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
022230  052703  000040                 5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
022234  110337  022300                         MOVB    R3,8$           ;;SAVE FOR TYPING
022240  104401  022300                         TYPE    ,8$             ;;GO TYPE THIS DIGIT
022244  105337  022302                 7$:     DECB    $OCNT           ;;COUNT BY 1
022250  003347                                 BGT     2$              ;;BR IF MORE TO DO
022252  002402                                 BLT     6$              ;;BR IF DONE
022254  005204                                 INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
022256  000744                                 BR      2$              ;;GO DO THE LAST DIGIT
022260  012605                         6$:     MOV     (SP)+,R5        ;;RESTORE R5
022262  012604                                 MOV     (SP)+,R4        ;;RESTORE R4
022264  012603                                 MOV     (SP)+,R3        ;;RESTORE R3
022266  016666  000002  000004                 MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
022274  012616                                 MOV     (SP)+,(SP)
022276  000002                                 RTI                     ;;RETURN
022300     000                         8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
022301     000                                 .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
022302     000                         $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
```

```
022303      000                        $OFILL: .BYTE   0                       ;;ZERO FILL SWITCH
022304  000000                         $OMODE: .WORD   0                       ;;NUMBER OF DIGITS TO TYPE


                                               .SBTTL  TYPDSS - TYPE DECIMAL, LEADING ZEROES SUPPRESSED
                                       ;TYPDSS
                                       ;ROUTINE FOR TYPING OUT DECIMAL NUMBERS, LEADING 0'S ARE SUPPRESSED
                                       ;THE NUMBER IS LEFT JUSTIFIED. NOTE THE 16 BIT BINARY NUMBER SHOULD
                                       ;BE POSITIVE (BIT 15= 0).
                                       ;CALL:   MOV     NUMBER,-(SP)     ;PUT BINARY NUMBER ON STACK
                                       ;        TYPDSS                   ;GO TYPE DECIMAL
                                       ;
022306  016637  000004  022346         TYPDES: MOV     4(SP),1$                        ;GET THE NUMBER
022314  012746  022346                         MOV     #1$,-(SP)                       ;PUT PTR ON THE STACK
022320  004737  022506                         JSR     PC,@#$DB2D                      ;GO CONVERT BINARY NO. TO
                                                                                       ;ASCII STRING
022324  004737  022352                         JSR     PC,@#$SUPRS                     ;GO TYPE OUT DECIMAL STRING
                                                                                       ;SUPRESING LEADING 0'S
022330  016666  000002  000004                 MOV     2(SP),4(SP)                     ;ADJUST RETURN
022336  011666  000002                         MOV     (SP),2(SP)                      ;ADJUST RETURN ADRES
022342  005726                                 TST     (SP)+                           ;POP STACK
022344  000002                                 RTI                                     ;RETURN

022346  000000  000000                 1$:     .WORD   0,0


                                       .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS

                                       ;;*************************************************************
                                       ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
                                       ;*LEADING NUMBERS.
                                       ;*CALL
                                       ;*       MOV     #NUMADR,-(SP)    ;;FIRST ADDRESS OF ASCIZ STRING
                                       ;*       JSR     PC,@#$SUPRS


022352  010046                         $SUPRS: MOV     R0,-(SP)                ;;SAVE R0
022354  016600  000004                         MOV     4(SP),R0                ;;PICKUP THE POINTER
022360  105710                         1$:     TSTB    (R0)                    ;;TERMINATEOR?
022362  001403                                 BEQ     2$                      ;;BR IF YES
022364  122720  000060                         CMPB    #'0,(R0)+               ;;IS THIS AN ASCII "0" ?
022370  001773                                 BEQ     1$                      ;;BR IF YES
022372  005300                         2$:     DEC     R0                      ;;BACKUP BY "1"
022374  010037  022402                         MOV     R0,3$                   ;;SAVE FOR TYPING
022400  104401                                 TYPE                            ;;GO TYPE
022402  000000                         3$:     .WORD   0                       ;;ASCIZ POINTER GOES HERE
022404  012600                                 MOV     (SP)+,R0                ;;RESTORE R0
022406  012616                                 MOV     (SP)+,(SP)              ;;RESTORE THE STACK
022410  000207                                 RTS     PC                      ;;RETURN

                                       .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                       ;;*************************************************************
                                       ;*SAVE R0-R5
                                       ;*CALL:
                                       ;*       SAVREG
```

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

022412                          $SAVREG:
022412  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
022414  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
022416  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
022420  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
022422  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
022424  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
022426  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
022432  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
022436  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
022442  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
022446  000002                          RTI

                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
022450                          $RESREG:
022450  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
022454  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
022460  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
022464  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
022470  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
022472  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
022474  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
022476  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
022500  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
022502  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
022504  000002                          RTI

                                .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

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

022506  104413                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
022510  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
022514  012700  022666                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
```

```
 022520  010066  000002                     MOV     R0,2(SP)               ;;PUT ADDRESS OF ASCIZ STRING ON STACK
 022524  012201                             MOV     (R2)+,R1               ;;PICKUP THE BINARY NUMBER
 022526  012202                             MOV     (R2)+,R2
 022530  012737  000012  022604             MOV     #10.,4$                ;;SET UP TO DO 10 CONVERSIONS
 022536  012704  022616                     MOV     #$TNPWR,R4             ;;ADDRESS OF TEN POWER
 022542  012705  022620                     MOV     #$TNPWR+2,R5
 022546  005003                     1$:     CLR     R3                     ;;CLEAR PARTIAL
 022550  161401                     2$:     SUB     (R4),R1                ;;SUBTRACT TEN POWER
 022552  005602                             SBC     R2
 022554  161502                             SUB     (R5),R2
 022556  002402                             BLT     3$                     ;;BR IF TEN POWER TO LARGE
 022560  005203                             INC     R3                     ;;ADD 1 TO PARTIAL
 022562  000772                             BR      2$                     ;;LOOP
 022564  062401                     3$:     ADD     (R4)+,R1               ;;RESTORE SUBTRACTED VALUE
 022566  005502                             ADC     R2
 022570  062402                             ADD     (R4)+,R2
 022572  022525                             CMP     (R5)+,(R5)+            ;;MOVE TO NEXT TEN POWER
 022574  052703  000060                     BIS     #'0,R3                 ;;CHANGE PARTIAL TO ASCII
 022600  110320                             MOVB    R3,(R0)+               ;;SAVE IT
 022602  005327                             DEC     (PC)+                  ;;DONE?
 022604  000000                     4$:     .WORD   0
 022606  001357                             BNE     1$                     ;;BR IF NO
 022610  105020                             CLRB    (R0)+                  ;;TERMINATOR
 022612  104414                             RESREG                         ;;RESTORE REGISTERS
 022614  000207                             RTS     PC                     ;;RETURN
 022616  145000                     $TNPWR: 145000                         ;;1.0E09
 022620  035632                             35632
 022622  160400                             160400                         ;;1.0E08
 022624  002765                             2765
 022626  113200                             113200                         ;;1.0E07
 022630  000230                             230
 022632  041100                             041100                         ;;1.0E06
 022634  000017                             17
 022636  103240                             103240                         ;;1.0E05
 022640  000001                             1
 022642  023420                             23420                          ;;1.0E04
 022644  000000                             0
 022646  001750                             1750                           ;;1.0E03
 022650  000000                             0
 022652  000144                             144                            ;;1.0E02
 022654  000000                             0
 022656  000012                             12                             ;;1.0E01
 022660  000000                             0
 022662  000001                             1                              ;;1.0E00
 022664  000000                             0
 022666  000014                     $DECVL: .BLKB   12.                    ;;RESERVE STORAGE FOR ASCIZ STRING



                                    .SBTTL  TRAP DECODER

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

 022702  010046                   $TRAP:  MOV     R0,-(SP)         ;;SAVE R0
 022704  016600  000002                   MOV     2(SP),R0         ;;GET TRAP ADDRESS
 022710  005740                           TST     -(R0)            ;;BACKUP BY 2
 022712  111000                           MOVB    (R0),R0          ;;GET RIGHT BYTE OF TRAP
 022714  006300                           ASL     R0               ;;POSITION FOR INDEXING
 022716  016000  022736                   MOV     $TRPAD(R0),R0    ;;INDEX TO TABLE
 022722  000200                           RTS     R0               ;;GO TO ROUTINE


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

 022724  011646                   $TRAP2: MOV     (SP),-(SP)       ;;MOVE THE PC DOWN
 022726  016666  000004  000002           MOV     4(SP),2(SP)      ;;MOVE THE PSW DOWN
 022734  000002                           RTI                      ;;RESTORE THE PSW

                                  .SBTTL  TRAP TABLE

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

                                  ;       ROUTINE
                                  ;       -------
 022736  022724                   $TRPAD: .WORD   $TRAP2
 022740  020260                           $TYPE   ;;CALL=TYPE      TRAP+1(104401)  TTY TYPEOUT ROUTINE
 022742  022104                           $TYPOC  ;;CALL=TYPOC     TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 022744  022060                           $TYPOS  ;;CALL=TYPOS     TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 022746  022120                           $TYPON  ;;CALL=TYPON     TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 022750  020034                           $TYPDS  ;;CALL=TYPDS     TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

 022752  021154                           $GTSWR  ;;CALL=GTSWR     TRAP+6(104406)  GET SOFT-SWR SETTING

 022754  021064                           $CKSWR  ;;CALL=CKSWR     TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 022756  021366                           $RDCHR  ;;CALL=RDCHR     TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 022760  021456                           $RDLIN  ;;CALL=RDLIN     TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 022762  021756                           $RDOCT  ;;CALL=RDOCT     TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 022764  022412                           $SAVREG ;;CALL=SAVREG    TRAP+13(104413) SAVE R0-R5 ROUTINE
 022766  022450                           $RESREG ;;CALL=RESREG    TRAP+14(104414) RESTORE R0-R5 ROUTINE

 022770  016602                           CN.RST  ;;CALL=CON.RESET         TRAP+15(104415) CONTROL RESET ROUTINE

 022772  016470                           DR.RST  ;;CALL=DRV.RESET         TRAP+16(104416) DRIVE RESET ROUTINE

 022774  016044                           MSGE    ;;CALL=MESAGE    TRAP+17(104417) MESSAGE HANDLER

 022776  016106                           TY.MSG  ;;CALL=TYPMSG    TRAP+20(104420) MESSAGE TYPEOUT ROUTINE

 023000  016620                           CN.RDY  ;;CALL=CON.RDY   TRAP+21(104421) WAIT FOR CONTROL READY

 023002  016716                           TSTRWS  ;;CALL=TST.RWS   TRAP+22(104422) TEST R/W/S RDY SET

 023004  016514                           RES.DO  ;;CALL=RESDON    TRAP+23(104423) DRIVE RESET DONE?

 023006  022306                           TYPDES  ;;CALL=TYPDSS    TRAP+24(104424) TYPE DECIMAL, SUPRES LDG 0'S


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                                        .SBTTL  POWER DOWN AND UP ROUTINES

                                        ;;*****************************************************************
                                        ;POWER DOWN ROUTINE
023010  012737  023154  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC  ;;SET FOR FAST UP
023016  012737  000340  000026          MOV     #340,@#PWRVEC+2   ;;PRIO:7
023024  010046                          MOV     R0,-(SP)          ;;PUSH R0 ON STACK
023026  010146                          MOV     R1,-(SP)          ;;PUSH R1 ON STACK
023030  010246                          MOV     R2,-(SP)          ;;PUSH R2 ON STACK
023032  010346                          MOV     R3,-(SP)          ;;PUSH R3 ON STACK
023034  010446                          MOV     R4,-(SP)          ;;PUSH R4 ON STACK
023036  010546                          MOV     R5,-(SP)          ;;PUSH R5 ON STACK
023040  017746  156074                  MOV     @SWR,-(SP)        ;;PUSH @SWR ON STACK
023044  010637  023160                  MOV     SP,$SAVR6         ;;SAVE SP
023050  012737  023062  000024          MOV     #$PWRUP,@#PWRVEC  ;;SET UP VECTOR
023056  000000                          HALT
023060  000776                          BR      .-2               ;;HANG UP

                                        ;;*****************************************************************
                                        ;POWER UP ROUTINE
023062  012737  023154  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC  ;;SET FOR FAST DOWN
023070  013706  023160                  MOV     $SAVR6,SP         ;;GET SP
023074  005037  023160                  CLR     $SAVR6            ;;WAIT LOOP FOR THE TTY
023100  005237  023160          1$:     INC     $SAVR6            ;;WAIT FOR THE INC
023104  001375                          BNE     1$                ;;OF  WORD
023106  012677  156026                  MOV     (SP)+,@SWR        ;;POP STACK INTO @SWR
023112  012605                          MOV     (SP)+,R5          ;;POP STACK INTO R5
023114  012604                          MOV     (SP)+,R4          ;;POP STACK INTO R4
023116  012603                          MOV     (SP)+,R3          ;;POP STACK INTO R3
023120  012602                          MOV     (SP)+,R2          ;;POP STACK INTO R2
023122  012601                          MOV     (SP)+,R1          ;;POP STACK INTO R1
023124  012600                          MOV     (SP)+,R0          ;;POP STACK INTO R0
023126  012737  023010  000024          MOV     #$PWRDN,@#PWRVEC  ;;SET UP THE POWER DOWN VECTOR
023134  012737  000340  000026          MOV     #340,@#PWRVEC+2   ;;PRIO:7
023142  104401                          TYPE                      ;REPORT THE POWER FAILURE
023144  023162                  $PWRMG: .WORD   $POWER            ;;POWER FAIL MESSAGE POINTER
023146  012716                          MOV     (PC)+,(SP)        ;;RESTART AT PWRFL
023150  004244                  $PWRAD: .WORD   PWRFL             ;;RESTART ADDRESS
023152  000002                          RTI
023154  000000                  $ILLUP: HALT                      ;;THE POWER UP SEQUENCE WAS STARTED
023156  000776                          BR      .-2               ;; BEFORE THE POWER DOWN WAS COMPLETE
023160  000000                  $SAVR6: 0                         ;;PUT THE SP HERE
023162  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
023170  000122
                                        .EVEN


                                        .SBTTL  FUNCTION SELECTION PROGRAM

                                ;THIS IS THE FUNCTION SELECTION PROGRAM.
                                ;ON ENTERING THIS SUB-PROGRAM THE FIRST QUESTION ASKED IS
                                ;       FUNCTION?       IN REPLY TYPE IN ONE OF THE FOLLOWING COMMANDS.
                                ;COMMANDS:      CR - CONTROL RESET
                                ;               DR - DRIVE RESET
                                ;               SK - SEEK
                                ;               WR - WRITE
                                ;               RD - READ
                                ;               WC - WRITE CHECK
                                ;               RC - READ CHECK
                                ;TERMINATE EVERY COMMAND WITH <CR>. FURTHER QUESTIONS (RKBA? , RKDA?
                                ;#WORDS? ) WILL BE ASKED. TYPE IN THE BUS ADDRESS (OCTAL), DISK ADDRESS
                                ;(OCTAL), AND NUMBER OF WORDS TO BE TRANSFERRED (OCTAL). IF A NON-EXISTENT
                                ;CYLINDER OR A NON-EXISTENT SECTOR IS TYPED IN, THE QUESTION (RKDA?) WILL
                                ;BE ASKED AGAIN.

                                ;IN CASE OF SEEK FUNCTION, SEEK IS DONE BETWEEN A SET OF CYLINDERS GIVEN
                                ;BY THE USER  (CYL1? , CYL2?). IN REPLY TO (CYL1?, CYL2?) TYPE IN THE OCTAL
                                ;CYLINDER NUMBERS BETWEEN WHICH THE SEEK IS TO BE DONE. SET SWITCH
                                ;REGISTER BITS <15-13> TO THE DRIVE # ON WHICH SEEK IS TO BE DONE.

                                ;IN CASE OF A WRITE FUNCTION IF SW 0 IS SET TO 1 THE PROGRAM WILL ASK
                                ;THE USER FOR THE PATTERN TO BE WRITTEN:
                                ;       PATRN?125252<CR>
                                ;THE USER SHOULD TYPE IN THE (OCTAL) PATTERN HE WANTS TO WRITE.
                                ;NOTE THAT THE NUMBER OF WORDS TRANSFERRED SHOULD BE WITHIN THE
                                ;BOUNDS OF THE SYSTEM.

                                ;IN CASE OF A WRITE CHECK FUNCTION IF SW0 IS SET TO 1 THE PROGRAM
                                ;WILL ASK THE USER FOR THE PATTERN TO BE WRITE CHECKED:
                                ;       PATRN?125252<CR>
                                ;THE USER SHOULD TYPE IN THE (OCTAL) PATTERN TO BE WRITE CHECKED.

                                ;LOCATIONS "IOBUF0" ONWARDS  ARE RESERVED FOR DATA BUFFERS. YOU CAN USE
                                ;THESE LOCATIONS FOR DOING DATA TRANSFERS IN THIS PROGRAM (OR YOU CAN
                                ;USE ANY OTHER BUFFER FOR DATA TRANSFER AS LONG AS IT DOES NOT OVERLAY
                                ;THE PROGRAM).

                                ;THE SAME FUNCTION IS PERFORMED AGAIN AND AGAIN, THUS PROVIDING
                                ;A VERY GOOD SCOPE LOOP. IF YOU WANT TO GIVE A NEW FUNCTION PUT SW 3 UP.
                                ;THE QUESTION (FUNCTION?) WILL BE ASKED AND YOU CAN START ALL OVER AGAIN.
                                ;IF ON EXECUTING A FUNCTION AN ERROR OCCURS, IT IS REPOTRED , WITH
                                ; RELEVANT REGISTER CONTENTS GIVEN.

                                                                ;R2 CONTAINS RKCS CONTENTS
                                                                ;R3 CONTAINS RKDA CONTENTS
                                                                ;R4,R5 CONTAIN THE CYLINDER #S BETWEEN
                                                                ;WHICH SEEK IS  TO BE DONE.
023172                          FUNBEG:
023172  104401  023200                  TYPE    ,65$            ;;TYPE ASCIZ STRING
023176  000407                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <15><12>/FUNCTION? /
023216                          64$:
023216  104411                          RDLIN
```

```
023220  012600                          MOV     (SP)+,R0
023222  112001                          MOVB    (R0)+,R1
023224  120127  000127                  CMPB    R1,#'W
023230  001026                          BNE     2$
023232  121027  000122                  CMPB    (R0),#'R
023236  001010                          BNE     1$
023240  004737  024064                  JSR     PC,CHKSW0               ;CHECK SW 0 SET?
023244  012702  004003                  MOV     #4003,R2
023250  000536                          BR      NXTDA

023252  012702  000003          9$:     MOV     #3,R2
023256  000521                          BR      NXTBA
023260  121027  000103          1$:     CMPB    (R0),#'C
023264  001342                          BNE     FUNBEG
023266  004737  024064                  JSR     PC,CHKSW0               ;CHECK SW 0 SET?
023272  012702  004007                  MOV     #4007,R2
023276  000523                          BR      NXTDA

023300  012702  000007                  MOV     #7,R2
023304  000506                          BR      NXTBA

023306  120127  000122          2$:     CMPB    R1,#'R
023312  001014                          BNE     3$
023314  121027  000104                  CMPB    (R0),#'D
023320  001003                          BNE     8$
023322  012702  000005                  MOV     #5,R2
023326  000475                          BR      NXTBA
023330  121027  000103          8$:     CMPB    (R0),#'C
023334  001316                          BNE     FUNBEG
023336  012702  000013                  MOV     #13,R2
023342  000501                          BR      NXTDA

023344  120127  000104          3$:     CMPB    R1,#'D
023350  001006                          BNE     4$
023352  121027  000122                  CMPB    (R0),#'R
023356  001305                          BNE     FUNBEG
023360  012702  000015                  MOV     #15,R2
023364  000470                          BR      NXTDA

023366  120127  000103          4$:     CMPB    R1,#'C
023372  001006                          BNE     5$
023374  121027  000122                  CMPB    (R0),#'R
023400  001274                          BNE     FUNBEG
023402  012702  000001                  MOV     #1,R2
023406  000533                          BR      EXEC

023410  120127  000123          5$:     CMPB    R1,#'S
023414  001266                          BNE     FUNBEG
023416  121027  000113                  CMPB    (R0),#'K
023422  001263                          BNE     FUNBEG
023424  012702  000011                  MOV     #11,R2

023430                          6$:
023430  104401  023436                  TYPE    ,67$                    ;;TYPE ASCIZ STRING
023434  000404                          BR      66$                     ;;GET OVER THE ASCIZ
                                ;;67$:   .ASCIZ  /CYL1? /
```

```
023446                          66$:
023446  004737  024032                  JSR     PC,INPT
023452  000766                          BR      6$
023454  010004                          MOV     R0,R4

023456                          7$:
023456  104401  023464                  TYPE    ,69$                    ;;TYPE ASCIZ STRING
023462  000404                          BR      68$                     ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  /CYL2? /
023474                          68$:
023474  004737  024032                  JSR     PC,INPT
023500  000766                          BR      7$
023502  010005                          MOV     R0,R5
023504  017700  155430                  MOV     @SWR,R0                 ;GET DRIVE # FROM SW REG<15-13>
023510  042700  017777                  BIC     #17777,R0                       ;CLR UNWANTED BITS
023514  050004                          BIS     R0,R4                           ;SET DRIVE # IN DSK ADRES
023516  050005                          BIS     R0,R5
023520  000466                          BR      EXEC


023522                          NXTBA:
023522  104401  023530                  TYPE    ,65$                    ;;TYPE ASCIZ STRING
023526  000404                          BR      64$                     ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /RKBA? /
023540                          64$:
023540  104412                          RDOCT
023542  012637  001476                  MOV     (SP)+,INDX2

023546                          NXTDA:
023546  104401  023554                  TYPE    ,65$                    ;;TYPE ASCIZ STRING
023552  000404                          BR      64$                     ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /RKDA? /
023564                          64$:
023564  104412                          RDOCT
023566  012600                          MOV     (SP)+,R0
023570  010001                          MOV     R0,R1
023572  006201                          ASR     R1
023574  006201                          ASR     R1
023576  006201                          ASR     R1
023600  006201                          ASR     R1
023602  006201                          ASR     R1
023604  042701  177400                  BIC     #177400,R1
023610  020127  000312                  CMP     R1,#312
023614  003354                          BGT     NXTDA
023616  010001                          MOV     R0,R1
023620  042701  177760                  BIC     #177760,R1
023624  020127  000013                  CMP     R1,#13
023630  003346                          BGT     NXTDA
023632  010003                          MOV     R0,R3
023634  022702  000015                  CMP     #15,R2
023640  001416                          BEQ     EXEC


023642                          NXTWC:
023642  104401  023650                  TYPE    ,65$                    ;;TYPE ASCIZ STRING
023646  000405                          BR      64$                     ;;GET OVER THE ASCIZ
```

```
                                  ;;65$:  .ASCIZ  /#WORDS? /
023662                            64$:
023662  104412                            RDOCT
023664  005416                            NEG     (SP)
023666  012637  001502                    MOV     (SP)+,INDX4
023672  000401                            BR      EXEC

023674  104415                    EXEC1:  CON.RESET                       ;CLR EROR, CONTROL RESET
023676  022702  000011            EXEC:   CMP     #11,R2                  ;SEEK FUNCTION?
023702  001005                            BNE     2$                      ;NO
023704  020403                            CMP     R4,R3                   ;IF SEEK, INSERT THE RIGHT
023706  001402                            BEQ     3$              ;CYLINDER ADDRESS
023710  010403                            MOV     R4,R3
023712  000401                            BR      2$
023714  010503                    3$:     MOV     R5,R3
023716  013777  001476  155536    2$:     MOV     INDX2,@RKBA
023724  010377  155534                    MOV     R3,@RKDA
023730  013777  001502  155522            MOV     INDX4,@RKWC
023736  010277  155514                    MOV     R2,@RKCS
023742  105777  155510            1$:     TSTB    @RKCS           ;WAIT FOR CNTROL RDY
023746  100375                            BPL     1$
023750  022702  000001                    CMP     #1,R2           ;IF IT'S CON RESET FUNCTION
023754  001401                            BEQ     4$              ;DONT WAIT FOR R/W/S RDY
023756  104423                            RESDON                  ;R/W/S RDY?

023760  032777  140000  155470    4$:     BIT     #140000,@RKCS   ;ERROR?
023766  001006                            BNE     FUNERR          ;YES
023770  032777  000010  155142    CHSW:   BIT     #SW3,@SWR       ;TERMINATE THIS FUNCTION OR REPEAT?
023776  001737                            BEQ     EXEC            ;REPEAT
024000  000137  023172                    JMP     FUNBEG          ;TERMINATE


024004  012737  023674  001110    FUNERR: MOV     #EXEC1,$LPERR   ;SET UP FOR LUPING
024012  012737  023674  001106            MOV     #EXEC1,$LPADR
024020  004737  016162                    JSR     PC,GT4RG
024024  104030                            ERROR   30              ;REPORT ERROR
024026  104415                            CON.RESET               ;CLR ERROR
024030  000757                            BR      CHSW

024032  104412                    INPT:           RDOCT
024034  012600                            MOV     (SP)+,R0
024036  020027  000312                    CMP     R0,#312
024042  003007                            BGT     1$
024044  006300                            ASL     R0
024046  006300                            ASL     R0
024050  006300                            ASL     R0
024052  006300                            ASL     R0
024054  006300                            ASL     R0
024056  062716  000002                    ADD     #2,(SP)
024062  000207                    1$:     RTS     PC

024064  032777  000001  155046    CHKSW0: BIT     #SW0,@SWR       ;WRITE A PATTERN GIVEN BY USER?
024072  001416                            BEQ     1$              ;NO
                                                                  ;YES, ASK FOR PATTERN
024074  104401  024102                    TYPE    ,65$            ;;TYPE ASCIZ STRING
024100  000404                            BR      64$             ;;GET OVER THE ASCIZ
```

```
                                     ;;65$:  .ASCIZ  /PATRN?/
 024112                              64$:
 024112  104412                              RDOCT
 024114  012637  031446                      MOV     (SP)+,IOBUF1       ;SAVE THE PATTERN
 024120  012737  031446  001476              MOV     #IOBUF1,INDX2
 024126  000207                              RTS     PC
 024130  062716  000006              1$:     ADD     #6,(SP)            ;SKIP NXT 2 INST ON RETURN
 024134  000207                              RTS     PC

 024136  104416                      FCHECK: DRV.RESET
 024140  104415                              CON.RESET
 024142  013737  001230  002120              MOV     DRIVAD,DRHOLD              ;SAVE DRIVE ADRR
 024150  032737  020000  001230              BIT     #20000,DRIVAD              ;SEE IF ODD
 024156  001404                              BEQ     1$
 024160  042737  020000  001230              BIC     #20000,DRIVAD              ;MAKE EVEN
 024166  000403                              BR      2$
 024170  052737  020000  001230      1$:     BIS     #20000,DRIVAD              ;MAKE ODD
 024176  013777  001230  155260      2$:     MOV     DRIVAD,@RKDA       ;DRIVE ADDR
 024204  012777  000011  155244              MOV     #11,@RKCS                  ;DRIVE SEEK
 024212  104421                              CON.RDY
 024214  013777  002120  155242              MOV     DRHOLD,@RKDA               ;OTHER DRIVE
 024222  104421                              CON.RDY
 024224  032777  000100  155220              BIT     #100,@RKDS                 ;HEAEDS IN MOTIONN?
 024232  001001                              BNE     3$                         ;NO SO RK-05J
 024234  005725                              TST     (R5)+                      ;YES RK-05F
 024236  013737  002120  u01230      3$:     MOV     DRHOLD,DRIVAD              ;RESTORE ADDR
 024244  104416                              DRV.RESET
 024246  000205                              RTS     R5
 024250  005037  001230              SIZEF:  CLR     DRIVAD             ;START AT DR0
 024254  012700  001232                      MOV     #DRIV0,R0                  ;TABLE OF AVAIL DRIVES
 024260  105710                      4$:     TSTB    (R0)                       ;THIS DRIVE HERE?
 024262  001413                              BEQ     2$                         ;NO
 024264  105760  000002                      TSTB    2(R0)                      ;COMPLEMENT HERE?
 024270  001410                              BEQ     2$                         ;NO
 024272  004537  024136                      JSR     R5,FCHECK                  ;SEE IF F MODEL
 024276  000405                              BR      2$                         ;J MODEL
 024300  052710  000002                      BIS     #2,(R0)            ;SET SIGN FOR F
 024304  052760  000002  000002              BIS     #2,2(R0)                   ;BOTH DRIVES
 024312  005720                      2$:     TST     (R0)+
 024314  005720                              TST     (R0)+                      ;NEXT PAIR OF DRIVES
 024316  062737  040000  001230              ADD     #40000,DRIVAD              ;NEXT ACTUL ADDR
 024324  022700  001251                      CMP     #DRIV7+1,R0                ;CHECKED ALL?
 024330  003353                              BGT     4$                         ;NOT YET
 024332  000207                              RTS     PC

                                     ;ERROR MESSAGES


 024334  047103  051124  020114      EM1:    .ASCIZ  /CNTRL RDY DIDN'T SET AFTR SEEK/
 024342  042122  020131  044504
 024350  047104  052047  051440
 024356  052105  040440  052106
 024364  020122  042523  045505
 024372     000

 024373     123  047111  047440      EM2:    .ASCIZ  /SIN ON SEEK/
```

```
024400  020116  042523  045505
024406     000

024407     104  042522  047440  EM3:    .ASCIZ  /DRE ON SEEK/
024414  020116  042523  045505
024422     000

024423     047  051105  023522  EM4:    .ASCIZ  /'ERR' ON SEEK/
024430  047440  020116  042523
024436  045505     000

024441     104  052522  047440  EM5:    .ASCIZ  /DRU ON SEEK, PUT DRV ON 'LOAD' & 'RUN'/
024446  020116  042523  045505
024454  020054  052520  020124
024462  051104  020126  047117
024470  023440  047514  042101
024476  020047  020046  051047
024504  047125  000047

024510  027522  027527  020123  EM6:    .ASCIZ  "R/W/S RDY NOT SET AFTER SEEK"
024516  042122  020131  047516
024524  020124  042523  020124
024532  043101  042524  020122
024540  042523  045505     000

024545     123  047111  047440  EM7:    .ASCIZ  /SIN ON WRT FMT/
024552  020116  051127  020124
024560  046506  000124

024564  042447  051122  020047  EM10:   .ASCIZ  /'ERR' ON DOING WRITE FMT/
024572  047117  042040  044517
024600  043516  053440  044522
024606  042524  043040  052115
024614     000
024615     123  047111  047440  EM11:   .ASCIZ  "SIN ON RD/FMT"
024622  020116  042122  043057
024630  052115     000
024633     047  051105  023522  EM12:   .ASCIZ  /'ERR' ON READ FMT/
024640  047440  020116  042522
024646  042101  043040  052115
024654     000
024655     127  047522  043516  EM13:   .ASCIZ  /WRONG HDRS FROM 'SEC#'/
024662  044040  051104  020123
024670  051106  046517  023440
024676  042523  021503  000047

024704  051105  051117  047440  EM14:   .ASCIZ  /EROR ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'/
024712  020116  046511  046120
024720  042511  020104  042523
024726  045505  043040  047522
024734  020115  041447  046131
024742  023501  052040  020117
024750  041447  046131  023502
024756     000

024757     122  040505  020104  MS15:   .ASCIZ  /READ WRONG HDRS FROM 'CYLB' ABOVE/
```

```
024764  051127  047117  020107
024772  042110  051522  043040
025000  047522  020115  041447
025006  046131  023502  040440
025014  047502  042526     000

025021     122  040505  020104  EM16:   .ASCIZ  /READ WRONG, 1ST WRD FROM SEC 0, 'CYLB' (ON IMPLIED SEEK FROM 'CYLA')/
025026  051127  047117  026107
025034  030440  052123  053440
025042  042122  043040  047522
025050  020115  042523  020103
025056  026060  023440  054503
025064  041114  020047  047450
025072  020116  046511  046120
025100  042511  020104  042523
025106  045505  043040  047522
025114  020115  041447  046131
025122  023501  000051

025126  042522  042101  030440  MS17:   .ASCIZ  /READ 1ST WRD FROM SEC 1, 'CYLB' ABOVE/
025134  052123  053440  042122
025142  043040  047522  020115
025150  042523  020103  026061
025156  023440  054503  041114
025164  020047  041101  053117
025172  000105

025174  042522  042101  053440  EM20:   .ASCIZ  /READ WRONG HDRS ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'/
025202  047522  043516  044040
025210  051104  020123  047117
025216  044440  050115  044514
025224  042105  051440  042505
025232  020113  051106  046517
025240  023440  054503  040514
025246  020047  047524  023440
025254  054503  041114  000047

025262  051105  051117  047440  EM21:   .ASCIZ  /EROR ON DOING WRITE ON DISK/
025270  020116  047504  047111
025276  020107  051127  052111
025304  020105  047117  042040
025312  051511  000113

025316  044523  020116  047117  EM22:   .ASCIZ  /SIN ON DOING WRITE/
025324  042040  044517  043516
025332  053440  044522  042524
025340     000

025341     110  020105  047117  EM23:   .ASCIZ  /HE ON DOING READ/
025346  042040  044517  043516
025354  051040  040505  000104

025362  051503  020105  047117  EM24:   .ASCIZ  /CSE ON READ/
025370  051040  040505  000104

025376  040504  040524  042440  EM25:   .ASCIZ  /DATA EROR ON READ FROM DISK ADRES/
```

```
 025404  047522  020122  047117
 025412  051040  040505  020104
 025420  051106  046517  042040
 025426  051511  020113  042101
 025434  042522  000123

 025440  042510  047440  020116  EM26:   .ASCIZ  /HE ON WRT CHK/
 025446  051127  020124  044103
 025454  000113

 025456  051127  020124  044103  EM27:   .ASCIZ  /WRT CHK EROR/
 025464  020113  051105  051117
 025472     000

 025473     105  047522  000122  EM30:   .ASCIZ  /EROR/

                                 ;DATA HEADERS


 025500  020040  041520  020040  DH1:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA/
 025506  020040  051040  041513
 025514  020123  020040  051040
 025522  042513  020122  020040
 025530  051040  042113  020123
 025536  020040  051040  042113
 025544  000101

 025546  042523  045505  021440  DH6:    .ASCIZ  /SEEK #  SEEKING  ERRORS/
 025554  020040  042523  045505
 025562  047111  020107  042440
 025570  051122  051117  000123

 025576  020040  041520  020040  DH7:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA    CYL/
 025604  020040  051040  041513
 025612  020123  020040  051040
 025620  042513  020122  020040
 025626  051040  042113  020123
 025634  020040  051040  042113
 025642  020101  020040  041440
 025650  046131     000

 025653     040  050040  020103  DH11:   .ASCIZI/  PC    RKCS    RKER    RKDS   RKDA: DR  CYL     SUR     SEC/
 025660  020040  051040  041513
 025666  020123  020040  051040
 025674  042513  020122  020040
 025702  051040  042113  020123
 025710  020040  045522  040504
 025716  020072  051104  020040
 025724  054503  020114  020040
 025732  020040  052523  020122
 025740  020040  020040  042523
 025746  000103
 025750  042523  021503  020040  DH13:   .ASCIZ  /SEC#  HDR RCVD/
 025756  042110  020122  041522
 025764  042126     000
```

```
026767       040  050040  020103  DH14:   .ASCIZ  /  PC     CYLA    CYLB     RKER   RKDS      TRY#/
025774    020040  020040  054503
026002    040514  020040  020040
026010    054503  041114  020040
026016    020040  051040  042513
026024    020122  020040  045522
026032    051504  020040  020040
026040    052040  054522  000043

026046    020040  041520  020040  DH16:   .ASCIZ  /  PC     CYLA   CYLB     EXPCT   RECVD   TRY#/
026054    020040  041440  046131
026062    020101  020040  054503
026070    041114  020040  020040
026076    054105  041520  020124
026104    020040  042522  053103
026112    020104  020040  051124
026120    021531     000

026123       040  050040  020103  DH17:   .ASCIZ  /  PC     CYLB   EXPCT    RECVD/
026130    020040  020040  054503
026136    041114  020040  042440
026144    050130  052103  020040
026152    051040  041505  042126
026160       000

026161       040  050040  020103  DH24:   .ASCIZ/  PC      TRY#    RKCS     RKER     RKDS  RKDA: DR  CYL      SUR       SEC/
026166    020040  020040  051124
026174    021531  020040  051040
026202    041513  020123  020040
026210    051040  042513  020122
026216    020040  051040  042113
026224    020123  051040  042113
026232    035101  042040  020122
026240    041440  046131  020040
026246    020040  051440  051125
026254    020040  020040  020040
026262    042523  000103

026266    047527  042122  020043  DH25:   .ASCIZ  /WORD#  EXPCT    RECVD    CYL  SUR  SEC/
026274    042440  050130  052103
026302    020040  051040  041505
026310    042126  020040  041440
026316    046131  020040  052523
026324    020122  051440  041505
026332       000


                                  ;ERROR DATA POINTERS


          026334                  .EVEN

026334    001116  001162  001164  DT1:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,0
026342    001166  001170  000000

026350    001116  001162  001164  DT7:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,$REG4,0
```

```
6137  026356  001166  001170  001172
6138  026364  000000
6139
6140  026366  001116  001162  001164  DT11:    .WORD    $ERRPC,$REG0,$REG1,$REG2,$REG4,$REG5,$REG6,$REG7,0
6141  026374  001166  001172  001174
6142  026402  001176  001200  000000
6143
6144  026410  001116  001162  001164  DT17:    .WORD    $ERRPC,$REG0,$REG1,$REG2,0
6145  026416  001166  000000
6146
6147  026422  001116  001202  001162  DT24:    .WORD    $ERRPC,$REG10,$REG0,$REG1,$REG2,$REG4,$REG5,$REG6,$REG7,0
6148  026430  001164  001166  001172
6149  026436  001174  001176  001200
6150  026444  000000
6151
6152                                   ;DATA BUFFERS
6153
6154  026446                           IOBUF0:
6155  026446  000030                   OUTBUF: .BLKW    24.       ;IOBUF0 AND IOBUF1 ARE
6156  026526  000030                   BUFR4:  .BLKW    24.       ;TWO - 768 WORDS LONG BUFFERS
6157  026606  000030                   BUFR5:  .BLKW    24.       ;NORMALLY USED FOR DATA TRANSFERS
6158  026666  000030                   BUFR6:  .BLKW    24.       ;TO AND FROM DISK
6159  026746  000030                   BUFR7:  .BLKW    24.
6160  027026  000200                   BUFR10: .BLKW    128.
6161  027426  000200                   BUFR11: .BLKW    128.
6162  030026  000200                   BUFR12: .BLKW    128.
6163  030426  000200                   BUFR13: .BLKW    128.
6164  031026  000210                   BUFR14: .BLKW    136.
6165
6166  031446  001400                   IOBUF1: .BLKW    768.
6167
6168
6169
6170          000001                           .END
```

M09

```
MD-11-DZRKL-E, RK11-RK05 DYNAMIC TEST   MACY11 30(1046)  14-JUL-77  08:03  PAGE 117
DZRKLE.P11     26-APR-77 12:27          SYMBOL TABLE

ABRI      016772     BUFR13    030426     DRVDON    001223     EXT10     012732     NOSIN     011026
ADRES     001450     BUFR14    031026     DRVPTR    001226     EXT4      006614     NXTBA     023522
BADTMO    002422     BUFR2     001352     DRV.RE= 104416     EXT5      007352     NXTDA     023546
BEGIN     010532     BUFR4     026526     DR.RST    016470     EXT6      010432     NXTDRV    003760
BEGSK     013250     BUFR5     026606     DSKADR    001432     EXT7      012170     NXTPAT    001426
BIT0    = 000001     BUFR6     026666     DSWR    = 177570     FCHECK    024136     NXTWC     023642
BIT00   = 000001     BUFR7     026746     DT1       026334     FDRIVE    002114     OUTADR    001262
BIT01   = 000002     BUSADR    001434     DT11      026366     FDRVE1    002116     OUTBUF    026446
BIT02   = 000004     CHKHDR    007260     DT17      026410     FFUNC     001216     PAT0      001414
BIT03   = 000010     CHKSWD    024064     DT24      026422     FINISH    011512     PAT1      001416
BIT04   = 000020     CHSW      023770     DT7       026350     FUNBEG    023172     PAT2      001420
BIT05   = 000040     CKSWR   = 104407     EMTVEC= 000030     FUNERR    024004     PAT3      001422
BIT06   = 000100     CLRERR    012162     EM1       024334     GCYL      016434     PBUF0     001404
BIT07   = 000200     CMPAGA    011244     EM10      024564     GETBUF    010044     PBUF1     001406
BIT08   = 000400     CMPGRP    014622     EM11      024615     GETINF    016214     PGSUBR    001430
BIT09   = 001000     CN.RDY    016620     EM12      024633     GOBAK     011650     PIRQ    = 177772
BIT1    = 000002     CN.RST    016602     EM13      024655     GOTYPE    013600     PIRQVE= 000240
BIT10   = 002000     COMPAR    011220     EM14      024704     GTSWR   = 104406     PLOT      014222
BIT11   = 004000     CON.RD= 104421     EM16      025021     GT4RG     016162     PLTGRP    014106
BIT12   = 010000     CON.RE= 104415     EM2       024373     GT5RG     016136     PLTPT     014736
BIT13   = 020000     CR      = 000015     EM20      025174     HT      = 000011     PLT1      014436
BIT14   = 040000     CRLF    = 000200     EM21      025262     INADR     001260     PRSPAT    001424
BIT15   = 100000     CSEROR    011654     EM22      025316     INDX1     001474     PR0     = 000000
BIT2    = 000004     DDISP   = 177570     EM23      025341     INDX2     001476     PR1     = 000040
BIT3    = 000010     DH1       025500     EM24      025362     INDX3     001500     PR2     = 000100
BIT4    = 000020     DH11      025653     EM25      025376     INDX4     001502     PR3     = 000140
BIT5    = 000040     DH13      025750     EM26      025440     INPT      024032     PR4     = 000200
BIT6    = 000100     DH14      025767     EM27      025456     IOBUF0    026446     PR5     = 000240
BIT7    = 000200     DH16      026046     EM3       024407     IOBUF1    031446     PR6     = 000300
BIT8    = 000400     DH17      026123     EM30      025473     IOTVEC= 000020     PR7     = 000340
BIT9    = 001000     DH24      026161     EM4       024423     LF      = 000012     PS      = 177776
BLNKS1    002111     DH25      026266     EM5       024441     LUPHE     010640     PSW     = 177776
BLNKS2    002110     DH6       025546     EM6       024510     LUPSIN    010632     PTGEN0    010106
BLNKS3    002107     DH7       025576     EM7       024545     LUPSW     001222     PTGEN1    010170
BLNKS4    002106     DISPLA    001142     ERCNT1    001504     LUPWCE    011350     PTGEN2    010272
BLNKS5    002105     DISPRE    000174     ERCNT2    001506     MESAGE= 104417     PTGEN3    010334
BLNKS6    002104     DMPREG    017662     ERCNT3    001510     MISCMP    012016     PTRN01    010164
BLNKS7    002103     DONE      011636     ERCNT4    001512     MSGE      016044     PTRN02    010166
BLNKS8    002102     DONTRK    011576     ERCNT5    001514     MSG1      001602     PT1       001560
BLNKS9    002101     DOSUR1    011630     ERCNT6    001516     MSG10     001742     PT10      001576
BLNK10    002100     DOWCHK    012420     ERCNT7    001520     MSG11     001771     PT11      001600
BLNK13    002075     DOWRT     012224     ERCNT8    001522     MSG12     002027     PT2       001562
BPTVEC= 000014     DRHOLD    002120     ERRTYP    017446     MSG13     002053     PT3       001564
BRKDA     016220     DRIVAD    001230     ERRVEC= 000004     MSG14     002064     PT4       001566
BTEOP     015232     DRIVS     001224     ERR1      016376     MSG2      001610     PT5       001570
BUFLG0    001410     DRIV0     001232     ERR2      016320     MSG3      001616     PT6       001572
BUFLG1    001412     DRIV1     001234     ERWCHK    011404     MSG4      001640     PT7       001574
BUFNO     001446     DRIV2     001236     ESR13     015456     MSG5      001657     PWRFL     004244
BUFR      001266     DRIV3     001240     ESR15     015364     MSG6      001716     PWRVEC= 000024
BUFR1     001320     DRIV4     001242     ESR20     015532     MSG7      001733     RDAGAI    010642
BUFR10    027026     DRIV5     001244     ESR25     015620     MS15      024757     RDCHR   = 104410
BUFR11    027426     DRIV6     001246     EXEC      023676     MS17      025126     RDLIN   = 104411
BUFR12    030026     DRIV7     001250     EXEC1     023674     NOHE      010760     RDOCT   = 104412
```

N09

```
READ     010606      STKLMT= 177774      TST7     010436      $ENULL   015344      $REG3    001170
REPEAT   012666      ST2       003512    TYPDES   022306      $EOP     015246      $REG4    001172
REPMSC   011274      ST3       003742    TYPDS  = 104405      $EOPCT   015270      $REG5    001174
REPTIM   013200      SWR       001140    TYPDSS= 1J4424      $ERFLG   001103      $REG6    001176
RESDON= 104423      SWREG     000176    TYPE   = 104401      $ERMAX   001115      $REG7    001200
RESREG= 104414      SW0     = 000001    TYPMSG= 104420      $ERROR   017162      $RESRE   022450
RESVEC= 000010      SW00    = 000001    TYPOC  = 104402      $ERRPC   001116      $RTNAD   015342
RES.DO   016514      SW01    = 000002    TYPON  = 104404      $ERRTB   002122      $SAVRE   022412
RETRY1   001252      SW02    = 000004    TYPOS  = 104403      $ERTTL   001112      $SAVR6   023160
RETRY2   001254      SW03    = 000010    TYPTIM   013736      $ESCAP   001204      $SCOPE   017006
RETRY3   001256      SW04    = 000020    TY.MSG   016106      $FILLC   001156      $SETUP= 000117
RKBA     001462      SW05    = 000040    WBUSAD   001442      $FILLS   001155      $STUP  = 177777
RKCS     001456      SW06    = 000100    WCAGAI   011132      $GDADR   001120      $SUPRS   022352
RKDA     001464      SW07    = 000200    WCEROR   012062      $GDDAT   001124      $SVLAD   017120
RKDB     001466      SW08    = 000400    WCERR    012442      $GET42   015320      $SVPC  = 000220
RKDS     001452      SW09    = 001000    WCHI     012446      $GTSWR   021154      $SWR   = 163000
RKER     001454      SW1     = 000002    WCHI1    012440      $HD    = 000000      $SWRMK= 000000
RKPRI    001470      SW10    = 002000    WCLO     012646      $HIOCT   022056      $TKB     001146
RKVEC    001472      SW11    = 004000    WCREPT   011334      $ICNT    001104      $TKCNT   020612
RKWC     001460      SW12    = 010000    WDSKAD   001440      $ILLUP   023154      $TKINT   020622
R6     =%000006      SW13    = 020000    WRDCNT   001436      $INTAG   001135      $TKQEN= 020621
R7     =%000007      SW14    = 040000    WRERR    012240      $ITEMB   001114      $TKQIN   020614
SAVREG= 104413      SW15    = 100000    WRHI     012400      $LF      001214      $TKQOU   020616
SBR1     006526      SW2     = 000004    WRLO     012242      $LPADR   001106      $TKQSR   020620
SBR2     006552      SW3     = 000010    WRL01    012236      $LPERR   001110      $TKS     001144
SBR3     007224      SW4     = 000020    WRTCHK   011116      $MNEW    021745      $TKSRV   020672
SECPTR   010426      SW5     = 000040    WWRDCN   001444      $MSWR    021734      $TN    = 000013
SFTCMP   011166      SW6     = 000100    XHE      011442      $MUL   = 000003      $TNPWR   022616
SIAD     001542      SW7     = 000200    XXDPMD   001220      $MULT    020500      $TPB     001152
SIZEF    024250      SW8     = 000400    $AUTOB   001134      $NULL    001154      $TPFLG   001157
SKDON    015152      SW9     = 001000    $BDADR   001122      $NWTST= 000001      $TPS     001150
SMGRP    014472      TBITVE= 000014      $BDDAT   001126      $OCNT    022302      $TRAP    022702
SOAD     001524      TIMDON   014050      $BELL    001206      $OMODE   022304      $TRAP2   022724
SORT     013342      TIMER    001264      $CHARC   020474      $OVER    017146      $TRP   = 000025
SP1      012702      TIMSEK   014776      $CKSWR   021064      $PASS    001100      $TRPAD   022736
SP10     012724      TKVEC  = 000060      $CMTAG   001100      $POWER   023162      $TSTNM   001102
SP11     012726      TPVEC  = 000064      $CM1   = 000011      $PWRAD   023150      $TTYIN   021712
SP12     012730      TRAPVE= 000034      $CM2   = 000022      $PWRDN   023010      $TYPDS   020034
SP2      012704      TRTVEC= 000014      $CM3   = 000011      $PWRMG   023144      $TYPE    020260
SP3      012706      TSTRWS   016716      $CNTLG   021727      $PWRUP   023062      $TYPEC   020430
SP4      012710      TST.RW= 104422      $CNTLU   021722      $QUES    001212      $TYPEX   020476
SP5      012712      TST1     004260      $CRLF    001213      $RDCHR   021366      $TYPOC   022104
SP6      012714      TST10    012174      $DBLK    020250      $RDLIN   021456      $TYPON   022120
SP7      012716      TST11    012736      $DB2D    022506      $RDOCT   021756      $TYPOS   022060
SP8      012720      TST12    015224      $DECVL   022666      $RDSZ  = 000010      $XTSTR   017030
SP9      012722      TST2     004624      $DOAGN   015340      $REGAD   001160      $$GET4= 000000
STACK  = 001100      TST3     005122      $DTBL    020240      $REG0    001162      $OFILL   022303
START    002462      TST4     005612      $ENDAD   015330      $REG1    001164      .      = 034446
STARTA   002530      TST5     006620      $ENDCT   015276      $REG10   001202
START1   003J74      TST6     007356      $ENDMG   015347      $REG2    001166

. ABS.   034446      000

ERRORS DETECTED:  0
```

```
MD-11-DZRKL-E, RK11-RK05 DYNAMIC TEST   MACY11 30(1046)  14-JUL-77  08:03  PAGE 119
DZRKLE.P11    26-APR-77 12:27           SYMBOL TABLE

 DSKM:DZRKLE,DSKZ:DZRKLE/SOL=DSKZ:SYSMAC.SML,DSKZ:DZRKLE.P11
 RUN-TIME: 15 21 .5 SECONDS
 RUN-TIME RATIO: 124/37=3.3
 CORE USED:  35K  (69 PAGES)
```