RK11/RK05

DYNAMIC TEST

MD-11-DZRKL-D

EP-DZRKL-D-DL-B

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IDENTIFICATION

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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

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
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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:

'TO TEST DRIVE 'N' HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT WITH A WORK PACK, CLEAR LOCATION 4C, 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:

'SWR = YNNNNN NEW ='

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

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

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 PK11 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 PK11 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:

FUNCTION?

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 SWO 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.

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 SEEKS	SEEK TIME	# OF SEEKS	SEEK 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

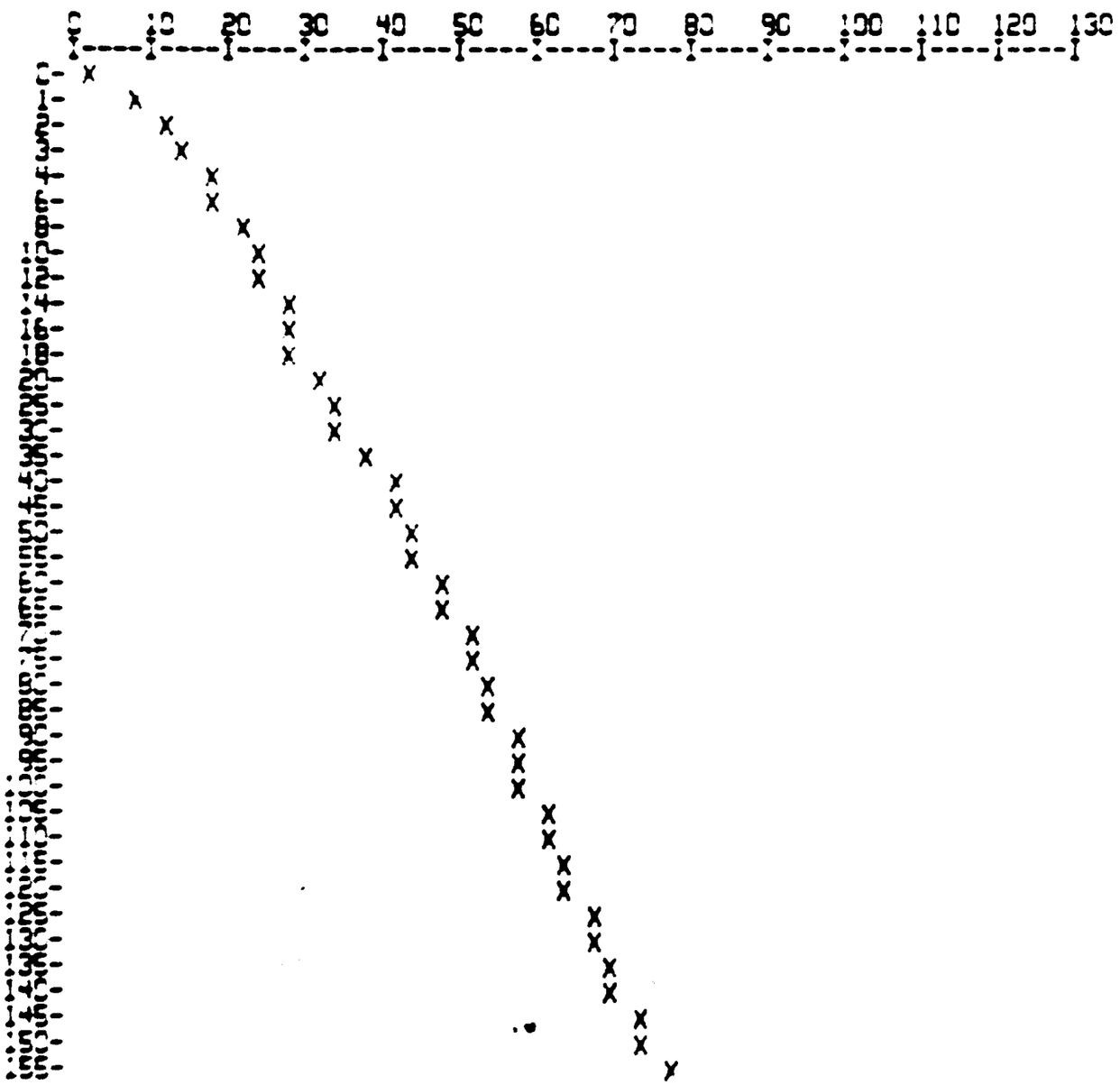
CYLS:0-32

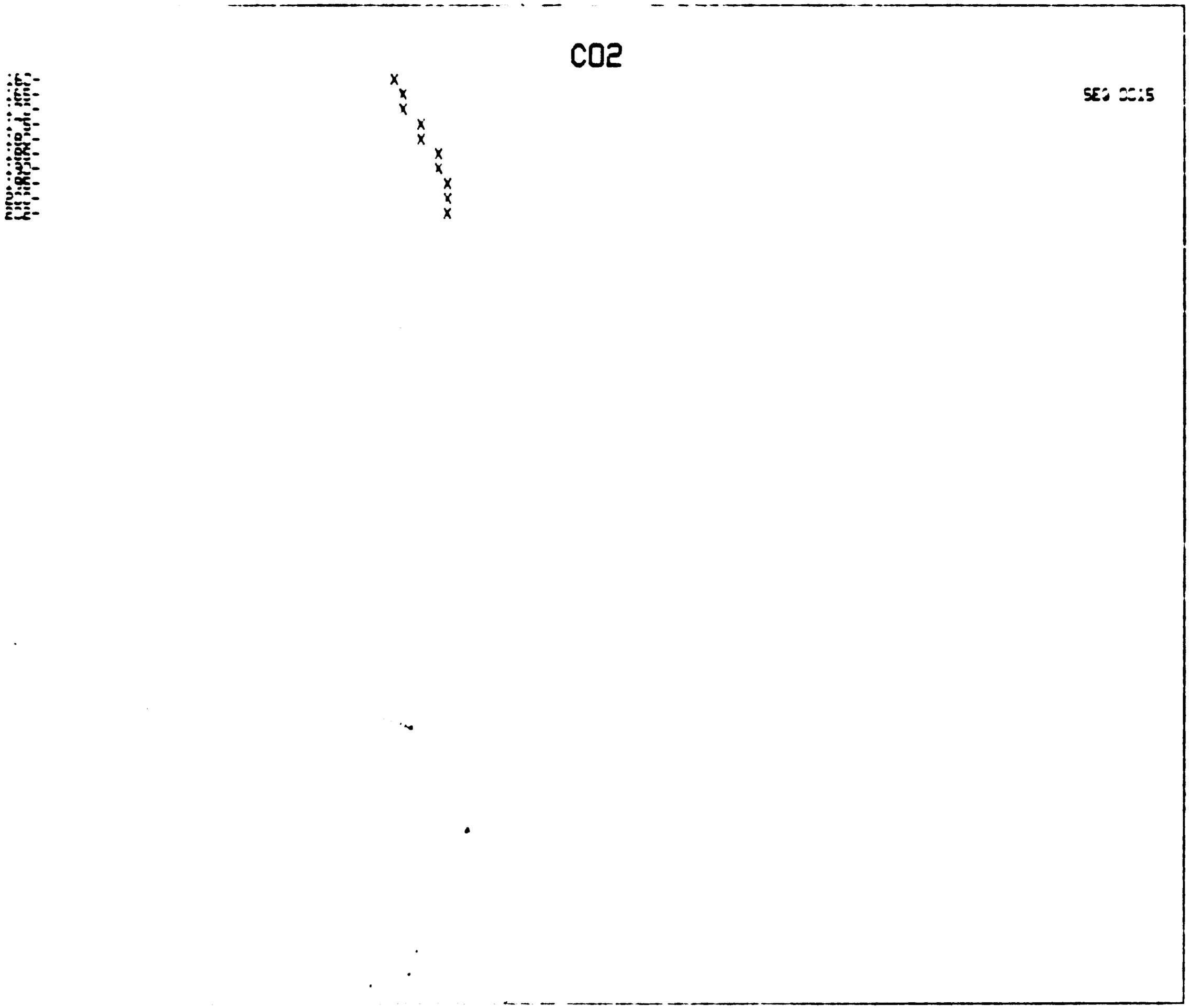
FRWRD		REVRSE	
100	3795	100	3795

CYLS:0-100

FRWRD		REVRSE	
100	5775	100	5775

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




CO2
SEQ 0015

OPERATIONAL SWITCH SETTINGS
BASIC DEFINITIONS
TRAP CATCHER
STARTING ADDRESS(ES)
ADDRESS HOOKS
COMMON TAGS
ERROR POINTER TABLE
INITIALIZE THE COMMON TAGS
TYPE PROGRAM NAME
SET VALUE FOR SOFTWARE SWITCH REGISTER
CHECK INNER LIMIT SWITCH & ELECTROMECHANICAL INTEGRITY
FORMAT THE DISK
READ FORMAT OF THE DISK
SEEK PATTERNS: 0-312-0-311-...,USING IMPLIED SEEK
PERFORM CONVERGING-DIVERGING (IMPLIED) SEEKS
WRITE PATTERNS ON THE DISK
READ, SOFTWARE COMPARE, WRITE CHECK OF THE PATTERNS
WRITE, WRITE CHECK ON CYLINDERS 127, 128
SEEK FUNCTION TIMER
END OF PROGRAM
END OF PASS ROUTINE
[illegible]
[illegible]
[illegible]

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                        .TITLE  MAINDEC-11-DZRKL-D
                        ;*COPYRIGHT (C) 1974,1976
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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-C2), SEPT 14, 1976.
                        ;*
                        ;*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'
                        ;*        11            BELL ON ERROR
                        ;*        10            LOOP ON ERROR
                        ;*         9            SELECT TEST TYPED IN BY USER
                        ;*         8            EXECUTE THE SEEK TIMER (TEST 11)
                        ;*         7            TYPE THE SEEK TIMER GRAPHS (TEST 11)
                        ;*         6            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
```

```
                        SWC1=   2
                        SWC0=   1
                        .EQUIV  SWD9,SW9
                        .EQUIV  SWD8,SW8
                        .EQUIV  SWD7,SW7
                        .EQUIV  SWD6,SW6
                        .EQUIV  SWD5,SW5
                        .EQUIV  SWD4,SW4
                        .EQUIV  SWD3,SW3
                        .EQUIV  SWD2,SW2
                        .EQUIV  SWD1,SW1
                        .EQUIV  SWD0,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  015254                          $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
```

```
                                .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
                                ;;*****************************************************************
```

```
                                ;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  026362          PBUF0:  IOBUF0          ;POINTER TO THE STARTING ADDRESS OF THE
                                                ;BUFFER USED TO READ INTO FROM DIBK.
001406  031362          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  010032          PAT0:   PTGEN0          ;ADRES OF 'PATRN GENERATOR 0'
                                                ;ROUTINE
001416  010124          PAT1:   PTGEN1          ;ADRES OF 'PATRN GENERATOR 1'
001420  010216          PAT2:   PTGEN2          ;ADRES OF 'PATRN GENRATOR 2'
001422  010260          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          WWRCCN: .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
```

```
                        RKDA:   177412
                        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          SCAD:   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 CONRO. TO THE
                                ;TEST SELECTED BY USING SW 8.  IF ANY MORE TESTS ARE
                                ;ADDED TO THIS PROGRAM ADDITIONAL POINTERS SHOULD BE INSERTED.
001560  004206                  PT1:    TST1+2
001562  004552                  PT2:    TST2+2
001564  005050                  PT3:    TST3+2
001566  005540                  PT4:    TST4+2
001570  006546                  PT5:    TST5+2
001572  007304                  PT6:    TST6+2
001574  010364                  PT7:    TST7+2
001576  012122                  PT10:   TST10+2
001600  012664                  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 SITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                        ;*NOTE1:        IF SITEMB IS 0 THE ONLY PERTINENT DATA IS (SERRPC).
                        ;*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                SERRTB:

                                ;ERROR ITEMS TABLE
                                ;
                                ;
                        ;ITEM   1

  002122  024250                EM1     ;CNTRL RDY DIDN'T SET AFTER SEEK
  002124  002406                DH1     ;PC     RKCS    RKER    RKDS    RKDA
  002126  000000                DT1     ;SERRPC SREG0   SREG1   SREG2   SREG3
  002130  000000                0

                        ;ITEM   2

  002132  024307                EM2     ;SIN ON SEEK
  002134  002454                DH1     ;PC     RKCS    RKER    RKDS    RKDA
  002136  000000                DT1     ;SERRPC SREG0   SREG1   SREG2   SREG3
  002140  000000                0

                        ;ITEM   3

  002142  024323                EM3     ;DRE ON SEEK
  002144  002454                DH1     ;PC     RKCS    RKER    RKDS    RKDA
  002146  000000                DT1     ;SERRPC SREG0   SREG1   SREG2   SREG3
  002150  000000                0

                        ;ITEM   4

  002152  024337                EM4     ;'ERR' ON SEEK
  002154  002454                DH1     ;PC     RKCS    RKER    RKDS    RKDA
  002156  000000                DT1     ;SERRPC SREG0   SREG1   SREG2   SREG3
  002160  000000                0

                        ;ITEM   5

  002162  024355                EM5     ;'DRU' ON SEEK; PUT DRIVE ON 'LOAD' BACK TO 'RUN'
  002164  002454                DH1     ;PC     RKCS    RKER    RKDS    RKDA
  002166  000000                DT1     ;SERRPC SREG0   SREG1   SREG2   SREG3
  002170  000000                0
```

```
                                ;ITEM   6

002172  024424                          EM6     ;R/W/S RDY NOT SET AFTER SEEK
002174  025414                          DH1     ;PC     RKCS    RKER    RKDS    RKDA
002176  026260                          DT1     ;SERRPC $REG0   $REG1   $REG2   $REG3
002200  000000                          0

                                ;ITEM   7

002202  024461                          EM7     ;SIN ON WRITE FMT
002204  025512                          DH7     ;PC     RKCS    RKER    RKDS    RKDA    CYLINDER
002206  026264                          DT7     ;SERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002210  000000                          0

                                ;ITEM   10

002212  024500                          EM10    ;'ERR' ON DOING WRITE FMT
002214  025512                          DH7     ;PC     RKCS    RKER    RKDS    RKDA    CYLINDER
002216  026264                          DT7     ;SERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002220  000000                          0

                                ;ITEM   11

002222  024533                          EM11    ;SIN ON READ FMT
002224  025567                          DH11    ;PC     RKCS    RKER    RKDS    RKDA:
                                                ;DRV#   CYL     SUR     SEC
002226  026302                          DT11    ;SERRPC $REG0   $REG1   $REG2
                                                ;$REG4  $REG5   $REG6   $REG7
002230  000000                          0

                                ;ITEM   12

002232  024547                          EM12    ;'ERR' ON READ FMT
002234  025512                          DH7     ;PC     RKCS    RKER    RKDS    RKDA    CYLINDER
002236  026264                          DT7     ;SERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002240  000000                          0

                                ;ITEM   13

002242  024571                          EM13    ;WRONG HEADERS FROM 'SEC #
002244  025664                          DH13    ;SECTOR #       HEADER RECVD
002246  000000                          0
002250  015452                          ESR13   ;USE THIS SUBROUTINE FOR TYPING OUT ERROR DATA

                                ;ITEM   14

002252  024620                          EM14    ;ERROR ON IMPLIED SEEK FROM CYLA TO CYLB
002254  025703                          DH14    ;PC     CYLA    CYLB    RKER    RKDS    TRY#
002256  026264                          DT7     ;SERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002260  000000                          0

                                ;ITEM   15

002262  024673                          MS15    ;READ WRONG HDRS FROM CYLB ABOV
002264  025664                          DH13    ;SEC#   HEADER RECVD
002266  000000                          0
```

```
002270  015310                  ESR15   ;GO TO "ESR15" FOR TYPING OUT

                        ;ITEM   16

002272  024735                  EM16    ;READ WRONG, FIRST WORD FROM SECTOR 0, 'CYLB' ON IMPLIED SEEK FROM CYLA
002274  025762                  DH16    ;PC     CYLA    CYLB    EXPCT   RECVD   TRY#
002276  026264                  DT7     ;SERRPC $REG0   $REG1   $REG2   $REG3   $REG4
002300  000000                  0

                        ;ITEM   17

002302  025046                  MS17    ;READ FIRST WORD FROM SECTOR 1, 'CYLB' ABOVE
002304  026037                  DH17    ;PC     CYLB    EXPCT   RECVD
002306  026324                  DT17    ;SERRPC $REG0   $REG1   $REG2
002310  000000                  0

                        ;ITEM   20

002312  025110                  EM20    ;READ WRONG HEADER ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'
002314  025664                  DH13    ;SECTOR # HEADER RECVD
002316  000000                  0
002320  015456                  ESR20   ;USE THIS SUBROUTINE FOR TYPING OUT ERROR DATA

                        ;ITEM   21

002322  025176                  EM21    ;EROR ON DOING WRITE ON DSK
002324  025414                  DH1     ;PC     RKCS    RKER    RKDS    RKDA
002326  026250                  DT1     ;SERRPC $REG0   $REG1   $REG2   $REG3
002330  000000                  0

                        ;ITEM   22

002332  025232                  EM22    ;SIN ON DOING WRITE
002334  025414                  DH1     ;PC     RKCS    RKER    RKDS    RKDA
002336  026250                  DT1     ;SERRPC $REG0   $REG1   $REG2   $REG3
002340  000000                  0

                        ;ITEM   23

002342  025255                  EM23    ;HE ON DOING READ
002344  025567                  DH11    ;PC     RKCS    RKER    RKDS    RKDA:
                                        ;DRV#   CYL     SUR     SEC
002346  026302                  DT11    ;SERRPC $REG0   $REG1   $REG2
                                        ;$REG4  $REG5   $REG6   $REG7
002350  000000                  0

                        ;ITEM   24

002352  025276                  EM24    ;CSE ON READ
002354  026075                  DH24    ;PC     TRY#    RKCS    RKER    RKDS    RKDA:
                                        ;DRV#   CYL     SUR     SEC
002356  026336                  DT24    ;SERRPC $REG10  $REG0   $REG1   $REG2
                                        ;$REG4  $REG5   $REG6   $REG7
002360  000000                  0
```

```
                                        ;ITEM   25

002362  025312                                  EM25    ;DATA ERROR ON READ FROM DISK ADDRESS
002364  026202                                  DH25    ;WORD#  EXPCT   RECVD   CYL     SUR     SEC
002366  000000                                  0
002370  015544                                  ESR25   ;USE THIS ROUTINE FOR ERROR REPORTING

                                        ;ITEM   26

002372  025354                                  EM26    ;HE ON WRT CHK
002374  025567                                  DH11    ;PC     RKCS    RKER    RKDS    RKDA:
                                                        ;DRV#   CYL     SUR     SEC
002376  026302                                  DT11    ;$ERRPC $REG0   $REG1   $REG2
                                                        ;$REG4  $REG5   $REG6   $REG7
002400  000000                                  0

                                        ;ITEM   27

002402  025372                                  EM27    ;WRT CHK EROR
002404  026075                                  DH24    ;PC     TRY#    RKCS    RKER    RKDS    RKDA:
                                                        ;DRV#   CYL     SUR     SEC
002406  026336                                  DT24    ;$ERRPC $REG10  $REG0   $REG1   $REG2
                                                        ;$REG4  $REG5   $REG6   $REG7
002410  000000                                  0

                                        ;ITEM   30

002412  025407                                  EM30    ;ERROR
002414  025414                                  DH1     ;PC     RKCS    RKER    RKDS    RKDA
002416  026250                                  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  000403                          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
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
002464  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
002470  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
002472  022706  001140                  CMP     #SWR,R6 ;;DONE?
002476  001374                          BNE     .-6             ;;LOOP BACK IF NO
002500  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
002504  012737  016732  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
002512  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
002520  012737  017106  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
002526  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
002534  012737  022616  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
002542  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
002550  012737  022724  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
002556  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
002564  005037  001204                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
002570  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
002576  012737  002576  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
002604  012737  002604  001110          MOV     #.,$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.
002612  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
002616  012737  002652  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
002624  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
002632  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
002640  022777  177777  176272          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
002646  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
002650  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
002652  012716  002660          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
002656  000002                          RTI
002660  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
002666  012737  000174  001142          MOV     #DISPREG,DISPLAY
002674  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

002700  004737  020536                  JSR     PC,$TKINT       ;INITIALIZE THE TTY HANDLER
                                .SBTTL  TYPE PROGRAM NAME
                                ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
```

```
                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
002704 005227 177777            INC     #-1             ;;FIRST TIME?
002710 001043                   BNE     67$             ;;BRANCH IF NO
002712 104401 002750            TYPE    ,68$            ;;TYPE ASCIZ STRING
002716 005737 000042            TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
002722 001006                   BNE     69$             ;;BRANCH IF YES
002724 023727 001140 000176     CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
002732 001005                   BNE     70$             ;;BRANCH IF NO
002734 104406                   GTSWR                   ;;GET SOFT-SWR SETTINGS
002736 000403                   BR      70$
002740 112737 000001 001134 69$:MOVB    #1,$AUTCB       ;;SET AUTO-MODE INDICATOR
002746                  70$:
002746 000424                   BR      67$             ;;GET OVER THE ASCIZ
                        ;;68$:  .ASCIZ  <CRLF>/RK11 DYNAMIC TEST/<15><12>/MAINDEC-11-DZRKL-D/<CRLF>
003020                  67$:
003020 105737 001216    START1: TSTB    FFUNC           ;FUNCTION PROGRAM SELECTED?
003024 001404                   BEQ     7$              ;NO
003026 105037 001216            CLRB    FFUNC           ;YES, CLEAR THE FLAG
003032 000137 023106            JMP     @#FUNBEG        ;GO TO 'FUNTION SELECTION PROGRAM'
003036 012700 001220    7$:     MOV     #XXDPMD,R0      ;CLEAR FLAGS FROM
003042 105020           5$:     CLRB    (R0)+           ;'XXDPMD' TO 'DRIVAD'
003044 020027 001232            CMP     R0,#DRIVAD+2
003050 001374                   BNE     5$
003052 012701 177770            MOV     #-10,R1
003056 042720 000003    6$:     BIC     #3,(R0)+        ;CLEAR BIT 0'S IN 'DRIVE
003062 005201                   INC     R1              ;PRESENT' FLAGS.
003064 001374                   BNE     6$

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

003066 122737 000002 000041     CMPB    #2,41           ;LOADED FROM AN RK05 ?
003074 001160                   BNE     ST2             ;BR IF NOT
003076 013737 000040 001220     MOV     40,XXDPMD       ;GET DEVICE INDICATOR AND DRIVE ADDRESS OF
                                                        ;LOADING RK05
003104 122737 000010 001220     CMPB    #10,XXDPMD      ;DRIVE ADDRESS 7 OR LESS ?
003112 101002                   BHI     2$              ;BR IF YES
003114 105037 001220            CLRB    XXDPMD          ;DRIVE ZERO LOADED THE PROGRAM
003120 005737 000042    2$:     TST     42              ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
003124 001424                   BEQ     3$              ;BR IF NEITHER
003126 104401 003134            TYPE    ,65$            ;;TYPE ASCIZ STRING
003132 000413                   BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  <15><12>/NOT TESTING DRIVE /
003162                  64$:
003162 005046                   CLR     -(SP)           ;CLEAR WORD ON STACK
003164 113716 001220            MOVB    XXDPMD,(SP)     ;GET DRIVE ADDRESS
003170 104403                   TYPOS                   ;TYPE THE ADDRESS
003172    001                   .BYTE   1               ;ONLY 1 CHARACTER
003173    000                   .BYTE   0               ;SUPRESS LEADING ZEROS
003174 000520                   BR      ST2             ;GET NUMBER OF DRIVES
003176 005227 177777    3$:     INC     #-1             ;FIRST TIME THROUGH HERE ?
003202 001115                   BNE     ST2             ;BR IF NOT FIRST TIME
003204 104401 003212            TYPE    ,67$            ;;TYPE ASCIZ STRING
003210 000411                   BR      66$             ;;GET OVER THE ASCIZ
                        ;;67$:  .ASCIZ  <15><12>/TO TEST DRIVE
003234                  66$:
```

```
                                CLR     -(SP)           ;CLEAR WORD ON THE STACK
                                MOVB    XXDPMD,(SP)     ;GET DRIVE ADDRESS
                                TYPOS                   ;TYPE THE DRIVE ADDRESS
                                .BYTE   1               ;ONLY 1 CHARACTER
                                .BYTE   0               ;SUPRESS LEADING ZEROS
                                TYPE    ,69$            ;;TYPE ASCIZ STRING
                                BR      68$             ;;GET OVER THE ASCIZ
                        ;;69$:  .ASCIZ  / HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT/<15><12>
                        68$:
                                TYPE    ,71$            ;;TYPE ASCIZ STRING
                                BR      70$             ;;GET OVER THE ASCIZ
                        ;;71$:  .ASCIZ  /WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM/
                        70$:

003436  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.

003444  104401  003452                TYPE    ,65$            ;;TYPE ASCIZ STRING
003450  000411                        BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  <15><12>/DRIVES PRESENT/
003474                  64$:
003474  105037  001224                CLRB    DRIVS           ;INITIALIZE NO. OF DRVS PRESENT
003500  005001                        CLR     R1
003502  012702  001232                MOV     #DRIVD,R2
003506  005003                        CLR     R3              ;INITIALIZE COUNT TO 0
003510  005737  001220        1$:     TST     XXDPMD          ;LOADED FROM AN RKDS ?
003514  001403                        BEQ     6$              ;BR IF NOT
003516  120337  001220                CMPB    R3,XXDPMD       ;CHECKING THE LOAD DRIVE ?
003522  001411                        BEQ     2$              ;BR IF YES
003524  010177  175734        6$:     MOV     R1,@RKDA        ;ADRES A DRIVE
003530  105777  175716                TSTB    @RKDS           ;IS IT PRESENT?
003534  100004                        BPL     2$              ;NO, BRANCH
003536  105237  001224                INCB    DRIVS           ;INCREMENT TOTAL # OF DRVS
003542  052712  000001                BIS     #1,(R2)         ;SET FLAG INDICATING THIS DRV PRSNT
003546  005722          2$:     TST     (R2)+
003550  005203                        INC     R3              ;INCREMENT COUNT
003552  062701  020000                ADD     #20000,R1       ;ADRES THE NXT DRV
                                                                ;CHKD ALL 8 DRIVES?
003556  001354                        BNE     1$              ;IF NOT, GO CHK IF NEXT DRV PRSNT

003560  004737  024164                JSR     PC,SIZEF        ;FIND WHICH ARE FS
003564  105737  001224                TSTB    DRIVS           ;WERE ANY DRIVES FOUND?
003570  001010                        BNE     3$              ;YES, BRANCH
003572  104401  003600                TYPE    ,67$            ;;TYPE ASCIZ STRING
003576  000403                        BR      66$             ;;GET OVER THE ASCIZ
                        ;;67$:  .ASCIZ  / NONE/
003606                  66$:
003606  000137  015172                JMP     $EOP            ;IF NONE WERE FOUND, GO
                                                                ;TO THE END OF PROGRAM
003612  005002          3$:     CLR     R2              ;DRIVE NUMBER
003614  012700  001232                MOV     #DRIVD,R0       ;TABLE OF AVAIL DRIVES
003620  105710          5$:     TSTB    (R0)            ;DRIVE HERE?
```

```
                        003622  001414                          BEQ     4$              ;NO
                        003624  104401                          TYPE
                        003626  001213                          $CRLF
                        003630  010246                          MOV     R2,-(SP)        ;PUSH NO ON THE STACK
                        003632  104403                          TYPOS                   ;TO TYPE OCTAL NO.
                        003634     001                          .BYTE   1               ;TYPE 1 DIGIT, SUPRESS LOG 0'S
                        003635     000                          .BYTE   0
                        003636  032710  000002                  BIT     #2,(R0)         ;IS IT RK05F?
                        003642  001404                          BEQ     4$              ;NO
                        003644  104401  003652                  TYPE    ,69$            ;;TYPE ASCIZ STRING
                        003650  000401                          BR      68$             ;;GET OVER THE ASCIZ
                                                        ;;69$:  .ASCIZ  /F/
                        003654                          68$:
                        003654  005202                  4$:     INC     R2              ;POINT TO NEXT DRIVE #
                        003656  005720                          TST     (R0)+           ;NEXT DRIVE IN TABLE
                        003660  020027  001251                  CMP     R0,#DRIV7+1     ;ALL DONE?
                        003664  002755                          BLT     5$              ;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.

                        003666  012737  001232  001226  ST3:    MOV     #DRIV0,DRVPTR
                        003674  105037  001223                  CLRB    DRVDON
                        003700  005037  001230                  CLR     DRIVAD
                        003704  105037  001102          NXTDRV: CLRB    $TSTNM          ;RESET TEST NUMBER TO 1
                        003710  005037  001112                  CLR     $ERTTL          ;CLEAR ERROR COUNT FOR THIS DRIVE
                        003714  013701  001226                  MOV     DRVPTR,R1
                        003720  032721  000001          1$:     BIT     #1,(R1)+        ;IS THIS DRIVE PRESENT?
                        003724  001005                          BNE     2$              ;YES, BRANCH
                        003726  020127  001252          4$:     CMP     R1,#DRIV7+2     ;CHECKED THE WHOLE LIST?
                        003732  001372                          BNE     1$              ;NO
                        003734  000137  015172                  JMP     $EOP            ;YES, EXIT
                        003740  010137  001226          2$:     MOV     R1,DRVPTR       ;NO, GO AHEAD
                        003744  014104                          MOV     -(R1),R4        ;GET DRIVE NO. TO BE TESTED
                        003746  005037  002116                  CLR     FDRVE1
                        003752  005037  002114                  CLR     FDRIVE          ;SHOWS F IF -1
                        003756  032704  000002                  BIT     #2,R4           ;RK-05F?
                        003762  001410                          BEQ     7$              ;NO
                        003764  005237  002116                  INC     FDRVE1          ;SHOWS F
                        003770  032704  020000                  BIT     #20000,R4       ;EVEN DRIVE?
                        003774  001003                          BNE     7$              ;NO
                        003776  012737  177777  002114          MOV     #-1,FDRIVE      ;RK05F AND EVEN
                        004004  042704  000003          7$:     BIC     #3,R4
                        004010  010437  001230                  MOV     R4,DRIVAD       ;SET UP DRIVE ADRES
                        004014  104401  002064                  TYPE    ,MSG14
                        004020  000241                          CLC
                        004022  006104                          ROL     R4              ;TYPE OUT THE DRIVE NO.
                        004024  006104                          ROL     R4
                        004026  006104                          ROL     R4
                        004030  006104                          ROL     R4
                        004032  010446                          MOV     R4,-(SP)
                        004034  104403                          TYPOS
                        004036     001                          .BYTE   1
                        004037     000                          .BYTE   0
```

```
                        TST     FDRVE1          ;RK-05F?
                        BEQ     6$              ;NO
                        TYPE    ,65$            ;;TYPE ASCIZ STRING
                        BR      64$             ;;GET OVER THE ASCIZ
                ;;65$:  .ASCIZ  /F/
                64$:
                6$:
                ;IF SW 8 IS SET THEN FIND OUT WHICH TEST NUMBER IS
                ;SELECTED AND JUMP TO THAT TEST.

004056  105037  001222          CLRB    LUPSW           ;CLEAR FLAG INDICATING SW8 SET
004062  032777  000400  175050  BIT     #SW8,@SWR       ;SW 8 SET?
004070  001445                  BEQ     TST1            ;NO, BRANCH
004072                  5$:
004072  104401  004100          TYPE    ,67$            ;;TYPE ASCIZ STRING
004076  000410                  BR      66$             ;;GET OVER THE ASCIZ
                ;;67$:  .ASCIZ  <15><12>/OCTAL TEST#?/
004120                  66$:
004120  104412                  RDOCT
004122  012600                  MOV     (SP)+,R0
004124  001762                  BEQ     5$
004126  020027  000011          CMP     R0,#11          ;CHECK TYPED IN TEST #
004132  003357                  BGT     5$              ;IS LEGAL, IF NOT ASK
004134  110037  001102          MOVB    R0,$TSTNM
004140  005300                  DEC     R0              ;FORM POINTERS FOR THE TEST #
004142  006300                  ASL     R0
004144  016037  001560  001106  MOV     PT1(R0),$LPADR  ;ADJUST POINTERS FOR SCOPE
004152  013737  001106  001110  MOV     $LPADR,$LPERR   ;LOOP, ETC.
004160  105237  001222          INCB    LUPSW           ;SET FLAG INDICATING TEST #
                                                        ;SELECTED
004164  000177  174716          JMP     @$LPADR         ;GO TO THE TEST SELECTED


                ;ON RECOVERY FROM POWER FALIURE RETURN HERE

004170  005000          PWRFL:  CLR     R0
004172  005001                  CLR     R1
004174  005201          1$:     INC     R1
004176  001376                  BNE     1$
004200  105200                  INCB    R0
004202  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.
                ;;*****************************************************************
004204  000004          ST1:    SCOPE
```

```
004206  005000                          CLR     R0              ;INITIALIZE COUNT
004210  005001                          CLR     R1              ;INITIALIZE COUNT FOR # OF SEEKS
004212  005002                          CLR     R2              ;CONTAINS SEEK ADRES
004214  012737  004246  001110          MOV     #20$,$LPERR     ;SET RETURN ADRES FOR LUPING
                                                                ;ON ERROR
004222  012703  001266                  MOV     #BUFR,R3        ;INITIALIZE POINTER TO THE TABLE
004226  012704  177767                  MOV     #-11,R4         ;ALLOW ONLY 9 CNTRL-RDY, SIN, OR R/W/S RDY ERORS
004232  012705  177770                  MOV     #-10,R5         ;ALLOW ONLY 8 DRU+DRE+ERR+DRY ERRORS
004236  000402                          BR      2$

004240  005703                  1$:     TST     R3              ;WAS THERE ANY ERROR?
004242  001403                          BEQ     3$              ;NO, BRANCH
004244  005003                  2$:     CLR     R3              ;CLR EROR FLAG
004246  104415                  20$:    CON.RESET               ;GO DO CNTRL RESET. SUB ROUTINE
                                                                ;AT 'CNT.RST'
004250  104416                          DRV.RESET               ;GO TO 'DRV.RST' & DO DRV RESET

004252  013777  001230  175204  3$:     MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
004260  050277  175200                  BIS     R2,@RKDA        ;SET SEEK ADRES
004264  105777  175162                  TSTB    @RKDS           ;DRIVE RDY?
004270  100406                          BMI     21$             ;YES
004272  004737  016106                  JSR     PC,GT4RG        ;NO, GET RKCS, ER, DS, DA
004276  104030                          ERROR   30              ;DRIVE RDY BIT IS NOT SET
                                                                ;IN RKDS
004300  005203                          INC     R3              ;SET ERROR FLAG
004302  005205                          INC     R5              ;ALLOW ONLY 5 ERORS, IF MORE
004304  001515                          BEQ     18$             ;ABORT

004306  012777  000011  175142  21$:    MOV     #11,@RKCS       ;GO, SEEK
004314  005200                  4$:     INC     R0              ;WAIT FOR CNTRL RDY
004316  001007                          BNE     5$              ;WAITED LONG?
                                                                ;IF YES, ERROR
004320  004737  016106                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
004324  104001                          ERROR   1               ;CNTRL RDY DIDN'T SET AFTER
                                                                ;SEEK WAS DONE TO CYLINDER
                                                                ;SHOWN IN RKDA. GO TO 'RK11 LOGIC TESTS'
004326  005203                          INC     R3              ;SET ERROR FLAG
004330  005204                          INC     R4              ;EXIT THIS TEST IF THERE R 5 OR MORE ERRORS
004332  001502                          BEQ     18$
004334  000403                          BR      6$
004336  105777  175114          5$:     TSTB    @RKCS           ;DID CNTRL RDY SET?
004342  100364                          BPL     4$              ;IF NOT WAIT FOR IT

004344  005000                  6$:     CLR     R0              ;INITIALIZE COUNT
004346  032777  000100  175076          BIT     #100,@RKDS      ;R/W/S RDY SET?
004354  001010                          BNE     7$              ;YES
004356  005200                          INC     R0              ;WAIT FOR R/W/S RDY
004360  001372                          BNE     6$+2
004362  004737  016106                  JSR     PC,GT4RG        ;GET RKCS, ER, DS, DA
004366  104006                          ERROR   6               ;R/W/S RDY DID NOT SET WHEN SEEK
                                                                ;WAS DONE TO CYLINDER INDICATED IN RKDA
004370  005203                          INC     R3              ;SET ERROR FLAG
004372  005204                          INC     R4              ;IF MAXM EROR COUNT, ABORT
004374  001461                          BEQ     18$
004376  032777  001000  175046  7$:     BIT     #1000,@RKDS     ;SIN ERROR?
004404  001406                          BEQ     8$              ;NO, BRANCH
```

```
1031  004406  004737  016106              JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1032  004412  104002                      ERROR   2               ;SIN ERROR, ON DOING SEEK TO
1033                                                              ;CYL AS SHOWN IN RKDA
1034  004414  005203                      INC     R3              ;SET ERROR FLAG
1035  004416  005204                      INC     R4              ;IF MAXM EROR COUNT REACHED,
1036  004420  001447                      BEQ     18$             ;ABORT THE TEST
1037  004422  005777  175026        9$:   TST     @RKER           ;DRE ERROR?
1038  004426  100006                      BPL     10$             ;NO, BRANCH
1039
1040  004430  004737  016106              JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1041  004434  104003                      ERROR   3               ;DRE ON DOING SEEK TO CYLINDER
1042                                                              ;AS SHOWN IN RKDA
1043  004436  005203                      INC     R3              ;SET ERROR FLAG
1044  004440  005205                      INC     R5              ;IF MAXM EROR COUNT REACHED,
1045  004442  001767                      BEQ     8$              ;ABORT THE TEST
1046
1047  004444  005777  175006        10$:  TST     @RKCS           ;'ERR' BIT IN RKCS SET?
1048  004450  100006                      BPL     12$             ;NO, BRANCH
1049  004452  004737  016106              JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1050  004456  104004                      ERROR   4               ;'ERR' IN RKCS SET, ON DOING SEEK
1051                                                              ;TO CYL AS SHOWN IN RKDA. NOTE
1052                                                              ;WHICH BIT IN RKER SET?
1053  004460  005203                      INC     R3              ;SET ERROR FLAG
1054  004462  005205                      INC     R5              ;IF MAXM EROR COUNT REACHED,
1055  004464  001425                      BEQ     18$             ;ABORT THE TEST
1056
1057  004466  032777  002000  174756  12$:  BIT     #2000,@RKDS     ;DRU SET?
1058  004474  001406                      BEQ     15$             ;NO, BRANCH
1059  004476  004737  016106              JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1060  004502  104005                      ERROR   5               ;DRU SET, THIS IS AN IRRECOVERABLE
1061                                                              ;ERROR.  HENCE PUT THE DRIVE ON
1062                                                              ;LOAD, BACK TO RUN.  DRU ERROR
1063                                                              ;SHOULD BE CLEARED, IF IT IS NOT
1064                                                              ;1) THE HEAD POSITION TRANSDUCER LAMP
1065                                                              ;IS INOPERATIVE
1066                                                              ;2) OR ERASE OR WRT CURRENT PRESENT
1067                                                              ;WITHOUT 'WRT GATE'
1068  004504  005203                      INC     R3              ;SET EROR FLAG
1069  004506  005205                      INC     R5              ;ALLOW ONLY 5 ERRORS
1070  004510  001413                      BEQ     18$             ;IF MORE THAN 5
1071                                                              ;GO TO THE END OF THE PROGRAM
1072
1073  004512  005702                  15$:  TST     R2              ;WAS SEEKING TO 0 OR 312?
1074  004514  001402                      BEQ     16$             ;TO 0, BRANCH
1075                                                              ;TO 312,
1076  004516  005002                      CLR     R2              ;SEEK NXT TIME TO 0
1077  004520  000647                      BR      1$              ;GO BAK & SK TO 0
1078
1079  004522  012702  014500          16$:  MOV     #14500,R2       ;SEEK NXT TIME TO 312
1080
1081  004526  005201                      INC     R1              ;DONE SEEKS 200 TIMES?
1082  004530  022701  000200              CMP     #200,R1
1083
1084  004534  001241                      BNE     1$              ;IF NOT, GO BAK
1085  004536  000404                      BR      TST2            ;;EXIT
1086
```

```
1087
1088  004540  104401  001640          18$:    TYPE    ,MSG4
1089  004544  000137  015150                  JMP     @#TST12
1090
1091                                  ;;*****************************************************************
1092                                  ;*TEST 2         FORMAT THE DISK
1093                                          ;*THIS PROGRAM ASSUMES AN UNFORMATTED DISK AND ITS
1094                                          ;*FORMATTING IS DONE IN THIS TEST. A SECTOR IS FORMATTED
1095                                          ;*AT A TIME.  THE FIRST OWRD OF EVERY SECTOR IS WRITTEN
1096                                          ;*TO BE A PSUEDO-HEADER CONTAINING THE DRIVE #, CYLINDER
1097                                          ;**, SURFACE AND SECTOR #.  THE FOLLOWING IS CHECKED
1098                                          ;*1.  'SIN' IF 'SIN' OCCURS, A DRIVE RESET IS DONE
1099                                          ;*AND THE SAME SECTOR IS FORMATTED AGAIN.  THREE
1100                                          ;*RETRIES ARE DONE BEFORE AN ERROR MESSAGE IS PRINTED.
1101                                          ;*2.  'ERR' ON FINDING THAT THE 'ERR' BIT SET, RKER
1102                                          ;*SCANNED TO FIND OUT WHAT CAUSED IT AND THE
1103                                          ;*ERROR IS REPORTED.
1104                                  ;;*****************************************************************
1105  004550  000004                  TST2:   SCOPE
1106  004552  013737  001230  002120          MOV     DRIVAD,DRHOLD   ;SAVE DRIVE NUMBER
1107  004560  005737  002114                  TST     FDRIVE          ;SEE IF EVEN RK-05F DRIVE
1108  004564  001003                          BNE     11$             ;YES
1109  004566  005737  002116                  TST     FDRVE1          ;ODD RK-05F?
1110  004572  001125                          BNE     TST3            ;DO NOT FORMAT IF ODD RK-05F
1111  004574                          11$:
1112  004574  012702  177152                  MOV     #-626,R2        ;203 CYLINDERS, (406 TRAKS)
1113  004600  012703  177764                  MOV     #-14,R3         ;12 SECTORS
1114  004604  012701  177773                  MOV     #-5,R1          ;ALLOW ONLY 5 'SIN' ERRORS
1115  004610  012705  177773                  MOV     #-5,R5          ;ALLOW ONLY 5 'ERR'S
1116  004614  013704  001230                  MOV     DRIVAD,R4       ;STORE ADRES OF DRIVE.
1117  004620  104415                  4$:     CON.RESET
1118  004622  104416                          DRV.RESET               ;GO TO 'DR-RST' & DO DRIVE RESET
1119  004624  005000                  1$:     CLR     R0              ;KEEP COUNT OF 'SIN' ERORS
1120                                                                  ;ALLOW 3 RETRIES ON SIN
1121  004626  005777  174624                  TST     @RKCS           ;ERR?
1122  004632  100001                          BPL     3$              ;NO
1123
1124  004634  104415                          CON.RESET               ;GO TO 'CN-RST' & DO CONTROL RESET
1125
1126  004636  005046                  3$:     CLR     -(SP)
1127  004640  012746  004646                  MOV     #12$,-(SP)
1128  004644  000002                          RTI                     ;SET PRIORITY TO ZERO
1129  004646  010437  026362          12$:    MOV     R4,OUTBUF       ;WRITE THIS WORD
1130  004652  012777  026362  174602          MOV     #OUTBUF,@RKBA   ;FROM THIS ADRES
1131  004660  010477  174600                  MOV     R4,@RKDA        ;ON THIS DISK SECTOR
1132  004664  012777  177777  174566          MOV     #-1,@RKWC       ;WRITE 1 WORD
1133  004672  012737  004620  001110          MOV     #4$,$LPERR      ;SET RETURN ADDRESS FOR
1134                                                                  ;LUPING ON ERROR
1135
1136  004700  012777  002003  174550          MOV     #2003,@RKCS     ;GO WRT FMT
1137
1138  004706  104421                          CON.RDY                 ;WAIT FOR CONTROL READY
1139  004710  032777  001000  174534  5$:     BIT     #1000,@RKDS     ;WAS THERE A SIN?
1140  004716  001413                          BEQ     6$              ;NO, SKIP DOING DRV RESET
1141  004720  004737  016062                  JSR     PC,GTSRG        ;GO, GET RKCS, ER, DS, DA, CYLINDER
1142  004724  104007                          ERROR   7               ;SIN ERROR ON TRYING TO
```

```
                                                        ;WRT FMT ON CYLINDER AS
                                                        ;INDICATED IN RKDA.  3 RETRIES
                                                        ;ARE DONE
                                                        ;NOTE THAT BEFORE
004726  104415                      CON.RESET             ;RETRYING A DRIVE RESET WAS DONE
004730  104416                      DRV.RESET             ;GO TO 'DR-RST' & DO DRV RESET
004732  005200                      INC     R0            ;INCRMNT SIN COUNT
004734  022700  000003              CMP     #3,R0         ;ALLOW 3 RETRIES WERE THERE 3?
004740  001332                      BNE     1$+2          ;IF NOT, GO & RETRY

004742  005201                      INC     R1            ;ALLOW ONLY 12 SIN ERRORS
                                                        ;IF MORE THAN 5 EXIT THIS TEST
004744  001436                      BEQ     9$            ;IF MORE THAN 5 EXIT THIS TEST
004746  005777  174504      6$:     TST     @RKCS         ;DID 'ERR' BIT SET IN RKCS?
004752  100005                      BPL     7$            ;NO, BRANCH
004754  004737  016062              JSR     PC,GTSRG      ;GO, GET RKCS, ER, DS,DA,CYL
004760  104010                      ERROR   10            ;'ERR' OCCURED WHILE DOING
                                                        ;WRT FMT ON SECTOR, CYLINDER
                                                        ;AS INDICATED IN RKDA.
004762  005205                      INC     R5            ;ALLOW ONLY 5 'ERR'S, IF
004764  001426                      BEQ     9$            ;MORE THAN 5 EXIT THIS TEST
004766  005204              7$:     INC     R4            ;INCRMNT DISK ADRES TO NXT SCTR
004770  005203                      INC     R3            ;ALL 12 SECTORS DONE?
004772  001314                      BNE     1$            ;IF NOT, GO BAK & FMT NXT SCTR
                                                        ;IF YES
004774  012703  177764              MOV     #-14,R3       ;RESET COUNT FOR 12 SECTORS
005000  042704  000017              BIC     #17,R4        ;CLR OUT SEC BITS

005004  062704  000020      5$:     ADD     #20,R4        ;ADRES THE NXT TRAK TO B FMTED
005010  005202                      INC     R2            ;ALL TRAKS FMTED?
005012  001304                      BNE     1$            ;IF NOT GO BAK B FMT NXT CYL, SUR 0
005014  005237  002114              INC     FDRIVE        ;EVEN RKOSF?
005020  001004                      BNE     10$           ;NO
005022  062737  020000  001230      ADD     #20000,DRIVAD ;FORMAT ODD DRIVE OF F
005030  000661                      BR      11$
005032  013737  002120  001230 10$: MOV     DRHOLD,DRIVAD ;RESTORE DRIVE ADDR
005040  000402                      BR      TST3          ;;EXIT

005042  004737  016716          9$: JSR     PC,ABRT

                                    ;;*****************************************************************
                                    ;*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
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                                        ;* 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
                                        ;;*************************************************************
005046  000004                    ST3:    SCOPE

005050  012737  177773  001504          MOV     #-5,ERCNT1      ;ALLOW ONLY 5 ERRORS (OF BAD HEADER
                                                                ;KIND FROM 5 CYLINDERS)
005056  012737  177766  001506          MOV     #-12,ERCNT2     ;ALLOW ONLY 12 'ERR'S
005064  012737  177773  001510          MOV     #-5,ERCNT3      ;ALLOW ONLY 5 ERRORS
005072  013705  001230                  MOV     DRIVAD,R5       ;SET DRIVE # CYL ADRES=0
005076  012737  177152  001476          MOV     #-626.,INDX2    ;313 CYLS (626 TRAKS) TO B READ
005104  104415                  4$:     CON.RESET               ;GO DO CONTROL RESET
005106  104416                          DRV.RESET               ;GO DO DRIVE RESET

005110  005037  001264          1$:     CLR     RETRY2          ;ALLOW 2 RETRIES IF HDRS READ WRONG
005114  005037  001252          2$:     CLR     RETRY1          ;ALLOW 2 RETRIES FOR 'SINS'

005120  012777  026362  174334  3$:     MOV     #OUTBUF,@RKBA   ;RD HDRS INTO LOC STARTING AT THIS
005126  010577  174332                  MOV     R5,@RKDA        ;FROM THIS DSK ADRES
005132  012777  177764  174320          MOV     #-14.,@RKWC     ;12 HDRS TO BE READ
005140  012737  005154  001110          MOV     #4$,$_PERR      ;SET RETURN ADRES FOR LOPING ON ERROR

005146  012777  002005  174302          MOV     #2005,@RKCS     ;GO, RD FMT OF THIS CYLINDER

005154  104421                          CON.RDY                 ;WAIT FOR CNTRL RDY TO SET

005156  032777  001000  174266  5$:     BIT     #1000,@RKCS     ;'SIN' ERROR?
005164  001420                          BEQ     6$              ;NO, BRANCH
005166  004737  016140                  JSR     PC,GETINF

005172  104011                          ERROR   11              ;'SIN' OCCURED WHEN DOING RD FMT
                                                                ;FROM CYL SHOWN IN RKDA.  IT
005174  104415                          CON.RESET               ;DO CNTRL RESET
005176  104416                          DRV.RESET               ;GO, DO DRIVE RESET
005200  005237  001252                  INC     RETRY1          ;ALLOW ONLY 2 RETRIES FOR THIS  ERROR
005204  022737  000002  001252          CMP     #2,RETRY1       ;IF TRIED 2 TIMES REPORT
005212  001342                          BNE     3$              ;ERROR, OTHERWISE GO BAK & RETRY
                                                                ;WAS TRIED TWICE, BUT 'SIN'.
005214  005237  001510                  INC     ERCNT3          ;ALLOW 5 ERRORS AT MOST
005220  001002                          BNE     5$
005222  000137  005532                  JMP     16$

005226  005777  174224          6$:     TST     @RKCS           ;'ERR' IN RKCS?
005232  100010                          BPL     7$              ;NO, BRANCH
005234  004737  016062                  JSR     PC,GTSRG        ;GO, GET RKCS, ER,DS,DA,CYLNDR
005240  104012                          ERROR   12              ;'ERR' SET WHILE DOING RD FMT
                                                                ;FROM CYL SHOWN IN RKDA
005242  104415                          CON.RESET               ;GO DO CNTRL RESET
```

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                                                                        ;ALLOW ONLY 12 ERRORS OF THIS
005244  005237  001506                  INC     ERCNT2                  ;KIND. IF MORE THAN FIVE ERRORS
                                                                        ;SKIP THIS TEST
005250  001532                          BEQ     TST4                    ;;EXIT
005252  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

005254  004737  007204          7$:     JSR     PC,CHKHDRS              ;GO CHECK IF CORRECT HEADERS WERE READ

005260  005737  001500                  TST     INDX3                   ;WAS THERE A MISCOMPARISON?
005264  001513                          BEQ     14$                     ;IF NOT, GO SET UP TO RD FMT
                                                                        ;NXT CYL IN LINE
005266  012737  005114  001110          MOV     #2$,$LPERR
005274  104013                          ERROR   13                      ;CORRECT HDRS WERE NOT RECVD
                                                                        ;FROM SECTRS AS TYPED OUT.
                                                                        ;THE SAME CYLINDER WAS READ TWICE
005276  005237  001254                  INC     RETRY2                  ;RETRY RD FMT ON SAME CYL AGAIN
005302  022737  000002  001254          CMP     #2,RETRY2               ;TRIED RDING SAME CYL TWICE
005310  001301                          BNE     2$                      ;IF NOT, GO RD AGAIN
                                                                        ;YES, REPORT ERROR
005312  005237  001504                  INC     ERCNT1                  ;ALLOW ONLY 5 ERRORS OF THE
                                                                        ;ABOVE TYPE.  IF MORE THAN 12
                                                                        ;EXIT THIS TEST
005316  001505                          BEQ     16$

005320                          20$:                                    ;THE PSUEDO-HEADERS (FIRST WORD OF EVERY
                                                                        ;SECTOR) FROM THIS CYLINDER (ABOVE,
                                                                        ;THE CYLINDER THAT GAVE WRONG HEADERS)
                                                                        ;WILL BE READ, NOW.  FOLLOWING WILL B TYPD OUT:
                                                                        ;SEC#, EXPCTD PSUEDO-HDR, RECVD PHDR.
                                                                        ;IF "INHIBIT TYPEOUT" SW IS SET THIS ENTIRE
                                                                        ;READING & TYPING WILL BE SKIPPED
005320  032777  020000  173612          BIT     #20000,@SWR             ;INHIBIT TYPEOUT?
005326  001072                          BNE     14$                     ;YES, SKIP THE FOLLOWING & GO
                                                                        ;SET UP TO RD FMT NXT CYL IN LINE

005330  012701  177764                  MOV     #-14,R1                 ;READ FROM 12 SECTRS
005334  010577  174124                  MOV     R5,@RKDA                ;FROM THIS DSK-ADRES
005340  012777  026362  174114          MOV     #OUTBUF,@RKBA           ;INTO THIS BUS-ADRES
005346  012777  177777  174104  10$:    MOV     #-1,@RKWC               ;RD 1 WRD

005354  012777  000005  174074          MOV     #5,@RKCS                ;GO, RD
005362  104421                          CON.RDY                         ;WAIT FOR CNTRL RDY
005364  005777  174066                  TST     @RKCS                   ;ANY EROR?
005370  100002                          BPL     15$                     ;NO, PROCEED
005372  104415                          CON.RESET                       ;CLEAR THE EROR
005374  000447                          BR      14$                     ;EROR, SO COULDN'T READ PSUEDO-HDRS

005376  005201                  15$:    INC     R1                      ;READ FROM ALL 12 SECS
005400  001362                          BNE     10$                     ;IF NOT GO RD THE NXT ONE

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

005402  104401                      TYPE                ;TYPE OUT
005404  001771                      MSG11
005406  012701  001266              MOV     #BUFR,R1    ;SEC #'S ARE STORED HERE

005412  104401              11$:    TYPE                ;TYPE CR, LF
005414  001213                      $CRLF

005416  011102                      MOV     (R1),R2
005420  012703  026362              MOV     #OUTBUF,R3  ;PSUEDO-HEADERS WHICH WERE
                                                        ;READ ARE STORED HERE

005424  005702              12$:    TST     R2          ;IS THIS SEC # CORRESPONDING TO THE
005426  001403                      BEQ     13$         ;ONE IN ERROR
005430  005302                      DEC     R2          ;R2 CONTAINS THE SEC #
005432  005723                      TST     (R3)+
005434  000773                      BR      12$

005436  011146              13$:    MOV     (R1),-(SP)  ;GO TYPEOUT SEC # GIVING
005440  104403                      TYPOS               ;MISCOMPARISON OF HEADERS
005442  000002                      .BYTE   2
005443  000000                      .BYTE   0           ;SUPRES LDG 0'S

005444  104401                      TYPE                ;TYPE 2 BLANKS
005446  002135                      BLNKS5

005450  010546                      MOV     R5,-(SP)    ;GO TYPE EXPCTD PSUEDO HEADER
005452  051116                      BIS     (R1),(SP)
005454  104402                      TYPOC

005456  104401                      TYPE                ;TYPE 2 BLNKS
005460  002133                      BLNKS7

005462  011346                      MOV     (R3),-(SP)  ;GO TYPE PSJEDO-HEADER RECVD
005464  104402                      TYPOC

005466  005721                      TST     (R1)+       ;TYPED OUT ALL SEC #'S IN ERROR.
005470  021127  177777              CMP     (R1),#177777
005474  001346                      BNE     11$         ;IF NOT GO BAK & TYPE NXT

005476  104401  001733              TYPE    ,MSG7       ;TYPE OUT PC
005502  012746  005320              MOV     #20$,-(SP)
005506  104402                      TYPOC
005510  104401  001213              TYPE    ,$CRLF
                                                        ;TYPE ROUTINE ENDS HERE

                                                        ;FIND OUT NXT TRAK TO B READ
                                                        ;FORMATTED

005514  062705  000020      14$:    ADD     #20,R5      ;SET ADRES FOR SUR 0, NXT CYL IN LINE
005520  005237  001476              INC     INDX2       ;READ ALL 313 CYLINDERS (626 TRAKS)?
005524  001404                      BEQ     TST4        ;;EXIT
005526  000137  005110              JMP     1$          ;IF NOT, GO BAK & READ NXT

005532  004737  016716      16$:    JSR     PC,ABRT
```

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                        ;;**********************************************************************
                        ;*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 DEST
                                ;*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.
                        ;;**********************************************************************
005536  000004                  T4T4:   SCOPE
005540  104415                          CON.RESET               ;GO DO CONTROL RESET
005542  104416                          DRV.RESET               ;GO DO DRIVE RESET

005544  005004                          CLR     R4              ;FLAG, CLR IF DOING IMPLIED
                                                                ;SEEK IN FROM 0 TO 'INADR'
                                                                ;=1, IF GOING FROM 'INADR'
                                                                ;OUT TO CYL 0
005546  012737  177465  001476          MOV     #-313,INDX2     ;313 SEEK PATTERNS
005554  012700  177764                  MOV     #-14,R0
005560  010037  001504                  MOV     R0,ERCNT1       ;ALLOW ONLY 12 ERRORS
005564  010037  001506                  MOV     R0,ERCNT2       ;OF THESE KINDS
005570  010037  001510                  MOV     R0,ERCNT3

005574  012737  014500  001260          MOV     #14500,INADR    ;'INADR' CONTAINS THE INER
                                                                ;CYL TO WHICH IMPLIED SEEK WILL
                                                                ;BE DONE
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1423  005602  005704                  1$:   TST     R4              ;GOING IN OR OUT?
1424  005604  001005                        BNE     2$              ;GOING OUT, BRANCH
1425  005606  013705  001260                MOV     INADR,R5        ;SET CYL ADRES BITS FOR GOING IN
1426  005612  053705  001230                BIS     DRIVAD,R5       ;FORM DISK ADRES FOR INNER
1427  005616  000402                        BR      3$              ;CYLINDER
1428  005620  013705  001230          2$:   MOV     DRIVAD,R5       ;FORM DISK ADRES FOR OUTER
1429                                                                ;CYLINDER - 0
1430                                                                ;ALLOW 2 TRIES WHEN
1431  005624  012737  177776  001254  3$:   MOV     #-2,RETRY2      ;ERRORS OCCUR
1432  005632  012737  177776  001252  13$:  MOV     #-2,RETRY1
1433  005640  012737  177777  001256  4$:   MOV     #-1,RETRY3
1434  005646  000404                        BR      5$
1435  005650  104415                  6$:   CON.RESET
1436  005652  104416                        DRV.RESET
1437  005654  004737  006452                JSR     PC,SBR1         ;REPOSITION HEADS TO PRE-ERROR CYL
1438
1439  005660  012777  177777  173572  5$:   MOV     #-1,@RKWC       ;READ 1 WORD
1440  005666  010577  173572                MOV     R5,@RKDA        ;FROM THIS CYLINDER, SEC 0
1441  005672  012777  026362  173562        MOV     #OUTBUF,@RKBA   ;INTO THIS BUS ADRES
1442  005700  012737  005650  001110        MOV     #6$,$LPERR      ;SET RETURN ADRES FOR LUPING
1443                                                                ;ON 'ERROR'
1444
1445  005706  012777  000005  173542        MOV     #5,@RKCS        ;GO, READ
1446
1447  005714  104421                        CON.RDY                 ;WAIT FOR CNTRL RDY
1448
1449  005716  032777  001000  173526        BIT     #1000,@RKDS     ;SIN?
1450  005724  001434                        BEQ     8$              ;NO, BRANCH
1451                                                                ;YES, THERE WAS A SIN
1452  005726  004737  016322                JSR     PC,ERR1         ;GO GET, CYLS BETW'N WHICH SK WAS TRIED
1453  005732  017737  173514  001170        MOV     @RKDS,$REG3
1454  005740  017737  173510  001166        MOV     @RKER,$REG2
1455  005746  104420  001602                TYPMSG  ,MSG1
1456  005752  013737  001256  001172        MOV     RETRY3,$REG4    ;SAVE TRY # ON 'SIN'
1457  005760  062737  000002  001172        ADD     #2,$REG4
1458  005766  104014                        ERROR   14              ;AN IMPLIED SEEK WAS TRIED
1459                                                                ;FROM 'CYLA' TO 'CYLB' (INDICATED
1460                                                                ;IN EROR MESAGE), 'SIN' OCCURRED.
1461                                                                ;2 TRIES ARE DONE BEFORE
1462                                                                ;ABORTING
1463  005770  005737  001256                TST     RETRY3          ;DONE RETRIES
1464  005774  001403                        BEQ     7$              ;YES, BRANCH
1465  005776  005237  001256                INC     RETRY3          ;GO DO 2ND TRY
1466  006002  000722                        BR      6$
1467
1468  006004  005237  001504          7$:   INC     ERCNT1          ;ALLOW LESS THAN 12 ERORS OF THIS TYPE
1469  006010  001103                        BNE     19$             ;IF MORE SKIP THIS TEST
1470  006012  000137  006540                JMP     EXT4            ;EXIT THIS TEST
1471
1472  006016  032777  010000  173430  8$:   BIT     #10000,@RKER    ;SKE?
1473  006024  001506                        BEQ     20$
1474  006026  004737  016322          15$:  JSR     PC,ERR1         ;GO GET 2 CYL NOS. BETWEEN WHICH
1475  006032  017737  173416  001166        MOV     @RKER,$REG2     ;IMPLIED SEEK WAS DONE
1476  006040  017737  173406  001170        MOV     @RKDS,$REG3
1477  006046  013737  001252  001172        MOV     RETRY1,$REG4    ;GET TRY # ON 'SKE'
1478  006054  062737  000003  001172        ADD     #3,$REG4
```

```
006062  104420  001610          TYPMSG  ,MSG2           ;GO PRINT 'SKE'
006066  104014                  ERROR   14              ;IMPLIED SEEK WAS TRIED FROM
                                                        ;'CYLA' TO 'CYLB' (INDICATED
                                                        ;IN EROR MESAGE); 'SKE' OCCURRED.
                                                        ;2 TRIES ARE DONE.
006070  104415                  CON.RESET               ;DO CONTROL RESET

006072  004737  006476  9$:     JSR     PC,SBR2         ;GO READ 12 HEADERS FROM
                                                        ;THIS CYLINDER & COMPARE
                                                        ;THEM.  NOTE R5 CONTAINS THE
                                                        ;DISK ADRES THAT WILL BE USED.

006076  012777  000015  173352  MOV     #15,@RKCS       ;GO DO DRIVE RESET
                                                        ;WHILE THE DRIVE IS DOING RESET
                                                        ;THE HDRS THAT WERE READ
                                                        ;ABOVE ARE CHECKED, PRINTED

006104  005737  001500          TST     INDX3           ;WAS THERE A MISCOMPARISON
                                                        ;IN ANY HEADER?
006110  001006                  BNE     10$             ;IF INDX3>0, THERE WAS.
                                                        ;NO, THERE WASN'T. HDRS OK
006112  005237  001252          INC     RETRY1          ;ONLY 2 TRIES FOR SKE
006116  001414                  BEQ     12$             ;BRANCH IF THIS WAS A 2ND TRY
006120  104420  001657          TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE READ
                                                        ;CORRECTLY.  THIS WAS TRY # 1

006124  000405                  BR      11$

                                                        ;HDRS WERE READ INCORRECT.
006126  005237  001252  10$:     INC     RETRY1          ;ALLOW 2 TRIES FOR SKE
006132  001411                  BEQ     14$             ;BRANCH, IF THIS WAS 2ND TRY

                                                        ;THERE WAS SKE ON DOING IMPLIED
006134  104417  000015          MESAGE  ,15             ;SEEK TO 'CYL B'. THEN HDRS WERE
                                                        ;READ FROM CYL B, WRONG HDRS
                                                        ;RECVD

006140  104423  11$:     RESDON                          ;WAIT FOR PREVIOUS DRIVE RESET
                                                        ;TO BE DONE
006142  004737  006452          JSR     PC,SBR1         ;GO, REPOSITION HEADS
006146  000634                  BR      4$

                                                        ;2ND TRY, SKE THIS TIME ALSO. BUT
                                                        ;READ HDRS CORRECTLY FROM
                                                        ;CYLINDER THAT GAVE SKE
                                                        ;NOTE THIS WAS THE 2ND TRY
006150  104420  001657  12$:     TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE
                                                        ;READ CORRECTLY.

006154  000402                  BR      16$

                                                        ;2ND TRY, SKE THIS TIME ALSO.
006156  104417  000015  14$:     MESAGE  ,15             ;READ HDRS FROM CYL THAT
                                                        ;GAVE SKE, THEY WERE INCORRECT.

006162  104423  16$:     RESDON                          ;WAIT FOR PREVIOUS DRIVE RESET
```

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                                                        ;TO BE DONE
                                                        ;
006164  005237  001506          INC     ERCNT2        ;ALLOW ONLY LESS THAN 10 ERRORS OF
                                                        ;THIS TYPE (SKE)
006170  001002                  BNE     17$
006172  000137  006540          JMP     EXT4          ;EXIT THIS TEST IF MORE
                                                        ;
006176  005704          17$:    TST     R4            ;WENT LAST TIME IN OR OUT?
006200  001007                  BNE     19$           ;OUT
                                                        ;IN
006202  005703                  TST     R3            ;WERE HDRS CORRECT?
006204  001005                  BNE     19$           ;NO
                                                        ;YES
                                                        ;
006206  005204          18$:    INC     R4
006210  004737  006452          JSR     PC,SBR1       ;GO POSITION HEADS BAK ON INNER
                                                        ;CYL
006214  000137  005602          JMP     1$            ;GO BAK & SEEK OUT NOW
                                                        ;
006220  005237  001476          INC     INDX2         ;ALL SEEK PATTERNS DONE?
006224  001547                  BEQ     TST5          ;;EXIT
                                                        ;
006226  162737  000040  001260  SUB     #40.INADR     ;SET ADDRESS FOR THE NXT
                                                        ;INNER CYLINDER
006234  005004                  CLR     R4            ;INDICATE THAT NOW SEEK IS GOING
                                                        ;TO BE IN
006236  000137  005602          JMP     1$            ;GO BAK & SEEK IN TO 'INADR'
                                                        ;
006242                  20$:                          ;IF THERE WAS NO SIN OR SKE
                                                        ;ENTER HERE
                                                        ;
006242  012737  005624  001110  MOV     #3$,$LPERR    ;SET RETURN ADRES FOR LUPING
                                                        ;ON ERROR
006250  020537  026362          CMP     R5,OUTBUF     ;CORRECT PSUEDO-HEADER READ?
006254  001471                  BEQ     24$           ;YES, BRANCH
006256  013737  001254  001172  MOV     RETRY2,$REG4  ;GET TRY #
006264  062737  000003  001172  ADD     #3,$REG4
006272  004737  016322          JSR     PC,ERR1       ;GO GET CYL #'S BETW'N
                                                        ;WHICH IMPLIED SEEK (READ)
                                                        ;WAS DONE
006276  010537  001166          MOV     R5,$REG2      ;GET EXPCTD PSUEDO-HDR
006302  013737  026362  001170  MOV     OUTBUF,$REG3  ;GET PSUEDO-HDR RECVD
006310  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
006312  005237  001254          INC     RETRY2
006316  001402                  BEQ     21$
006320  000137  005632          JMP     13$
                                                        ;
006324  004737  006476  21$:    JSR     PC,SBR2       ;GO READ HEADERS (12) FROM
                                                        ;THIS CYLINDER, & CHECK THEM.
                                                        ;IF MISCOMPARISON INDX3 WILL
                                                        ;BE > 0.
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1591  006330  005737  001500          TST     INDX3
1592  006334  001003                  BNE     22$
1593  006336  104420  001657          TYPMSG  .MSGS           ;WRONG PSUEDO-HDR WAS READ
1594                                                           ;BUT WHEN HDRS WERE READ
1595                                                           ;FROM THE SAME CYLINDER, THEY
1596  006342  000402                  BR      23$              ;WERE CORRECT
1597
1598  006344  104417  000015  22$:    MESAGE  .15              ;WRONG PSJEDO-HDR WAS READ
1599                                                           ;FROM 'CYLB' (IN ERROR MESAGE).
1600                                                           ;THEN HEADERS WERE READ FROM THE
1601                                                           ;SAME CYLINDER.  THEY WERE ALSO
1602                                                           ;WRONG.
1603  006350  010500          23$:    MOV     R5,R0            ;NOW READ THE PSJEDO-HEADER
1604  006352  005200                  INC     R0               ;FROM THE NEXT SECTOR (1)
1605  006354  010077  173104          MOV     R0,@RKDA         ;SAME CYLINDER
1606  006360  012777  026362  173074  MOV     #OUTBUF,@RKBA
1607  006366  012777  177777  173064  MOV     #-1,@RKWC
1608  006374  012777  000005  173054  MOV     #5,@RKCS
1609  006402  104421                  CON.RDY
1610  006404  010537  001162          MOV     R5,$REG0
1611  006410  004737  016360          JSR     PC,GCYL          ;GO GET CYL # & STORE IT IN $REG0
1612  006414  010037  001164          MOV     R0,$REG1         ;GET EXPCT PSUEDO-HDR FROM SEC 1
1613  006420  013737  026362  001166  MOV     OUTBUF,$REG2
1614  006426  104417  000017          MESAGE  ,17              ;PSUEDO-HEADER FROM SEC 1, CYLB
1615                                                           ;(IN MESAGE) WAS READ.  THE EXPCTD
1616                                                           ;& RECVD DATA WORDS ARE REPORTED.
1617  006432  005237  001510          INC     ERCNT3           ;ALLOW ONLY LESS THAN 10 ERRORS
1618                                                           ;OF THIS TYPE (WRONG PS-HDRS)
1619  006436  001440                  BEQ     EXT4
1620
1621  006440  005704          24$:    TST     R4               ;SEEKED IN OR OUT LAST TIME?
1622  006442  001266                  BNE     19$              ;IF OUT, GO SEEK NXT INNER CYL
1623                                                           ;IF IN, GO SEEK BAK TO 0
1624  006444  005204                  INC     R4               ;INDICATE THAT SEEK OUT (0)
1625  006446  000137  005602          JMP     1$               ;WILL BE DONE NOW
1626
1627
1628                                                   ;THIS ROUTINE IS USED IN THIS TEST ONLY.
1629                                                   ;R4=0 INDICATES SEEK BEING DONE FROM
1630                                                   ;CYL 0 TO INNER CYL.
1631                                                   ;R4=1 INDICATES SEEK BEING DONE FROM
1632                                                   ;INNER CYL TO 0. THIS ROUTINE POSITIONS
1633                                                   ;THE HEADS ON 'INADR' CYL IF R4=1
1634
1635  006452  005704          SBR1:   TST     R4
1636  006454  001407                  BEQ     1$
1637  006456  013777  001260  173000  MOV     INADR,@RKDA
1638  006464  012777  000011  172764  MOV     #11,@RKCS
1639  006472  104422                  TST.RWS
1640  006474  000207          1$:     RTS     PC
1641
1642                                                   ;THIS ROUTINE IS USED IN THIS TEST
1643                                                   ;ONLY. IT READS 12 HEADERS FROM CYLINDER
1644                                                   ;WHOSE ADRES IS IN R5. THEN IT CHECKS
1645                                                   ;IF THE EXPECTED HEADER IS RECEIVED.
1646                                                   ;IF IT IS NOT, INDX3 IS INCREMENTED INDICATING
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                                                        ;THE ERROR

006476  012700  177764          SBR2:   MOV     #-14,R0
006502  012701  026362                  MOV     #OUTBUF,R1
006506  010077  172746                  MOV     R0,@RKWC        ;READ 12 HDRS
006512  010177  172744                  MOV     R1,@RKBA        ;INTO THIS ADRES
006516  010577  172742                  MOV     R5,@RKDA        ;FROM THIS CYLINDER
006522  012777  002005  172726          MOV     #2005,@RKCS     ;RD FMT, GO
006530  104421                        CON.RDY

006532  004737  007204                  JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ

006536  000207                        RTS     PC              ;EXIT

006540  004737  016716          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
                                ;*PERFRORMED, 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.
                                ;;**************************************************************
006544  000004          TST5:   SCOPE
006546  104415                  CON.RESET               ;GO,DO CONTROL RESET
006550  104416                  DRV.RESET               ;GO,DO DRIVE RESET

006552  005004                  CLR     R4              ;(R4)=0 SEEKING FROM 'OUTADR' TO 'INADR'
                                                        ;(R4)=1 SEEKING FROM 'INADR' TO 'OUTADR'

006554  012737  177466  001476          MOV     #-312,INDX2     ;SET COUNT FOR DOING 312 TIMES
006562  012700  177764                  MOV     #-14,R0
006566  010037  001504                  MOV     R0,ERCNT1       ;ALLOW ONLY 12 ERRORS
006572  010037  001506                  MOV     R0,ERCNT2

006576  005037  001262                  CLR     OUTADR          ;INITIALIZE 'OUTADR' TO 0
006602  012737  014500  001260          MOV     #14500,INADR    ;INITIALIZE 'INADR' TO 312

006610  005704                  1$:     TST     R4              ;GOING IN OR OUT?
006612  001005                          BNE     2$              ;GOING OUT,BRANCH
006614  013705  001260                  MOV     INADR,R5        ;SET CYL ADRES BITS FOR GOING IN
006620  053705  001230                  BIS     DRIVAD,R5       ;FORM DISK ADRES FOR INNER CYLINDER
006624  000404                          BR      3$

006626  013705  001262          2$:     MOV     OUTADR,R5       ;SET CYL ADRES BITS FOR GOING OUT
```

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                006632  053705  001230                  BIS     DRIVAD,R5       ;FORM DISK ADRES FOR GOING OUT
                                                        
                006636  005037  001254          3$:     CLR     RETRY2          ;ALLOW 2 RETRIES
                006642  012737  177777  001252  4$:     MOV     #-1,RETRY1      ;WHEN ERRORS OCCUR
                006650  000404                  BR      7$
                006652  104415                  5$:     CON.RESET
                006654  104416                  DRV.RESET
                006656  004737  007150                  JSR     PC,SBR3         ;GO REPOSITION HEADS
                                                        
                006662  012777  177764  172570  7$:     MOV     #-14,@RKWC      ;READ ALL HDRS FROM THIS CYLINDER
                006670  010577  172570                  MOV     R5,@RKDA        ;FROM THIS CYL, SEC 0
                006674  012777  026362  172560          MOV     #OUTBUF,@RKBA   ;INTO THIS BUS ADRES
                006702  012737  006652  001110          MOV     #5$,$LPERR      ;SET RETURN ADRES FOR LOOPING ON ERROR
                                                        
                006710  012777  002005  172540          MOV     #2005,@RKCS     ;READ FORMAT,GO
                                                        
                006716  104421                          CON.RDY                 ;WAIT FOR CONTRL RDY
                                                        
                006720  032777  001000  172524          BIT     #1000,@RKDS     ;SIN?
                006726  001443                          BEQ     8$              ;NO, BRANCH
                006730  017737  172520  001166          MOV     @RKER,$REG2     ;SAVE RKER
                006736  017737  172510  001170          MOV     @RKDS,$REG3     ;SAVE RKDS
                006744  013737  001252  001172          MOV     RETRY1,$REG4    ;GET RETRY #
                006752  062737  000002  001172          ADD     #2,$REG4
                006760  004737  016244                  JSR     PC,ERR2         ;GET CYL #'S BELOW 'N WHICH
                                                                                ;SEEK WAS TRIED
                006764  104420  001602                  TYPMSG  ,MSG1           ;TYPE 'SIN'
                006770  104014                          ERROR   14
                                                                                ;'SIN' OCCURRED ON DOING IMPLIED
                                                                                ;SEEK FROM 'CYLA' TO 'CYLB' (IN
                                                                                ;EROR MESAGE).
                006772  005737  001252                  TST     RETRY1          ;DONE 2 TRIES?
                006776  001403                          BEQ     6$              ;YES, BRANCH
                007000  005237  001252                  INC     RETRY1          ;NO, RETRY
                007004  000722                          BR      5$
                007006  104415                  6$:     CON.RESET
                007010  104416                          DRV.RESET
                                                        
                                                        
                007012  005237  001504                  INC     ERCNT1          ;ALLOW LESS THAN 12 ERORS OF THE
                007016  001527                          BEQ     EXT5            ;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.
                007020  010577  172440                  MOV     R5,@RKDA        ;SET CYL ADRES
                007024  012777  000011  172424          MOV     #11,@RKCS       ;SEEK,GO
                007032  104422                          TST.RWS
                007034  000424                          BR      11$
                                                                                ;IF NO SIN, ENTER HERE
                007036  004737  007204          8$:     JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ
                                                        
                007042  012737  006642  001110          MOV     #4$,$LPERR      ;SET LUP ADDRESS
                007050  005737  001500                  TST     INDX3           ;WAS THERE A BAD HDR?
                007054  001414                          BEQ     11$             ;NO, BRANCH
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                                ERROR   20              ;WRONG HEADERS WERE READ FROM
                                                        ;'SEC #'S, ON DOING AN IMPLIED
                                                        ;SEEK (RDFMT) FROM 'CYLA' TO 'CYLB'
007060  005237  001254          INC     RETRY2          ;ALLOW 2 TRIES
007064  022737  000002  001254  CMP     #2,RETRY2
007072  001263                  BNE     4$              ;GO TRY 2ND TIME
007074  005237  001506          INC     ERCNT2          ;ALLOW ONLY 12 ERRORS
007100  001002                  BNE     11$
007102  000137  007276          JMP     EXT5            ;IF MORE, EXIT THIS TEST

007106  005704          11$:    TST     R4              ;GOING WHICH WAY?
007110  001006                  BNE     12$             ;'INADR' TO 'OUTADR', BRANCH
                                                        ;'OUTADR' TO 'INADR'
007112  005204                  INC     R4              ;INDICATE THAT NXT TIME GOING
                                                        ;FROM 'INADR' TO 'OUTADR'
007114  062737  000040  001262  ADD     #40,OUTADR      ;INCREMENT CYCLINDER ADRES
007122  000137  006610          JMP     1$              ;GO BAK & DO IMPLIED SEEK
                                                        ;FROM 'INADR' TO 'OUTADR'

007126  005004          12$:    CLR     R4              ;INDICATE THAT NXT TIME GOING
                                                        ;FROM 'OUTADR' TO 'INADR'
007130  162737  000040  001260  SUB     #40,INADR       ;DECREMENT CYLINDER ADRES
007136  005237  001476          INC     INDX2           ;DONE ALL 312 FORWARD-BACKWARD
                                                        ;SEEK PATTERNS
007142  001457                  BEQ     TST6            ;;IF YES, EXIT

007144  000137  006610          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'.
007150  005704          SBR3:   TST     R4              ;GOING WHICH WAY?
007152  001404                  BEQ     1$              ;IF FROM 'OUTADR' TO 'INADR', BRANCH.
007154  013777  001260  172302  MOV     INADR,@RKDA
007162  000403                  BR      2$
007164  013777  001262  172272  1$:     MOV     OUTADR,@RKDA
007172  012777  000011  172256  2$:     MOV     #11,@RKCS
007200  104422                  TST.RWS
007202  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.

007204  005000                  CHKHDRS: CLR     R0              ;INITIALIZE FOR 14 HDRS
007206  012701  026362                   MOV     #OUTBUF,R1      ;INITIZLIZE PTR TO HDRS REC'D
007212  012702  001266                   MOV     #BUFR,R2        ;INITIALIZE PTR TO SECTOR TABLE
007216  012703  001320                   MOV     #BUFR1,R3       ;INITIALIZE PTR TO BAD HDR TABLE
007222  010537  001120                   MOV     R5,$GDADR
007226  042737  160037  001120           BIC     #160037,$GDADR  ;GET EXPCTD HEADER
007234  005037  001500                   CLR     INDX3           ;CLR FLG INDICATING BAD HDRS

007240  023711  001120          9$:      CMP     $GDADR,(R1)     ;HEADER OK?
007244  001406                           BEQ     1C$             ;YES,BRANCH
007246  011123                           MOV     (R1),(R3)+      ;SAVE BAD HDR
007250  010022                           MOV     R0,(R2)+        ;SAVE BAD SECTR #

007252  012712  177777                   MOV     #177777,(R2)    ;PUT TERMINATR ON SECTR TABLE
007256  005237  001500                   INC     INDX3           ;SET FLG INDICATING BAD HDR
007262  005721                  1C$:     TST     (R1)+           ;INCRMNT PTR TO NXT HDR
007264  005200                           INC     R0              ;ALL HDRS CHKD?
007266  022700  000014                   CMP     #14,R0
007272  001362                           BNE     9$              ;IF NOT, LUP BAK
007274  000207                           RTS     PC

007276  004737  016716          EXIT5:   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.
```

```
1871                                            ;*IF YOU WANT TO WRITE YOUR OWN PATTERNS USING PATTERN GENERATOR 'PTGEN0'
1872                                            ;*CHANGE 'PTRN01' AND 'PTRN02' TO THE PATTERNS YOU WANT.
1873
1874                                            ;*TO WRITE THE SAME TWO (OR ONE) PATTERNS ON THE ENTIRE DISK CHANGE
1875                                            ;*LOCATION 'PAT1' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
1876                                            ;*LOCATION 'PAT2' TO 'PTGEN0' THE STARTING ADDRES OF PAT-GENERATOR 0
1877                                            ;*LOCATION 'PAT3' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
1878                                    ;;**************************************************************
1879  007302  000004                   T5T6:   SCOPE
1880  007304  012737  177764  001504           MOV     #-14,ERCNT1
1881  007312  012737  177764  001506           MOV     #-14,ERCNT2
1882  007320  012737  177152  001474           MOV     #-626,INDX1     ;SET COUNT FOR 313X2 TRACKS
1883  007326  005037  001410                   CLR     BUFLG0          ;CLR FLAG FOR BUFR 0
1884  007332  005037  001412                   CLR     BUFLG1          ;CLR FLAG FOR BUFR 1
1885                                                                    ;BIT 7 OF ABOVE FLAGS WHEN SET
1886                                                                    ;INDICATES, THAT BUFR TO BE USED
1887                                                                    ;FOR WRITING ON DSK
1888  007336  013737  001230  001432           MOV     DRIVAD,DSKADR   ;GET DRIVE #, DISK ADRES
1889  007344  012737  001414  001424           MOV     #PAT0,PRSPAT    ;INITIALIZE PTR TO THE FIRST
1890                                                                    ;PATRN GENERATOR
1891  007352  004737  007770                   JSR     PC,GETBUF
1892  007356  017737  172042  001430           MOV     @PRSPAT,PGSUBR
1893  007364  004777  172040                   JSR     PC,@PGSUBR      ;GO GENERATE PATRNS FOR
1894                                                                    ;3 SECTOR (400X3)
1895  007370  005005                   1$:     CLR     R5              ;INITIALIZE COUNT FOR 4 BLOCKS
1896  007372  005737  001410           2$:     TST     BUFLG0          ;FIND OUT WHICH BUFR TO USE
1897  007376  100407                           BMI     3$              ;FOR WRITING ON DSK
1898  007400  013737  001406  001434           MOV     PBUF1,BUSADR    ;USE 'IOBUF1' FOR TRANSFER
1899                                                                    ;OR THE ONE INDICATED BY THE USER
1900  007406  052737  000200  001412           BIS     #BIT7,BUFLG1    ;SET FLAG TO INDICATE THAT
1901                                                                    ;WRTING ON DSK WILL B DONE FROM
1902                                                                    ;THIS BUFR (BUF 1)
1903  007414  000406                           BR      13$
1904
1905  007416  013737  001404  001434  3$:     MOV     PBUF0,BUSADR    ;USE 'IOBUF0' FOR TRANSFER
1906                                                                    ;OR THE ONE INDICATED BY THE USER
1907
1908  007424  052737  000200  001410           BIS     #BIT7,BUFLG0    ;INDICATE THAT 'IOBUF0' WILL
1909                                                                    ;B USED FOR WRTING ON DISK
1910  007432  012737  007440  001110  13$:     MOV     #4$,$LPERR
1911  007440  013777  001432  172016  4$:     MOV     DSKADR,@RKDA    ;SET RKDA
1912  007446  013777  001434  172006           MOV     BUSADR,@RKBA
1913  007454  012777  176400  171776           MOV     #-1400,@RKWC
1914  007462  012777  000003  171766           MOV     #3,@RKCS        ;WRITE THE 4 SECTORS ON
1915                                                                    ;DISK
1916  007470  013737  001424  001426           MOV     PRSPAT,NXTPAT   ;WHILE THE PATRNS R BEING WRITTEN
1917  007476  023727  001424  001422           CMP     PRSPAT,#PAT3    ;GO GENERATE THE NXT PATRNS
1918  007504  001004                           BNE     5$              ;TO B WRITTEN
1919  007506  012737  001414  001426           MOV     #PAT0,NXTPAT    ;KEEP GENERATING PATRNS IN THIS
1920  007514  000403                           BR      6$              ;WAY "PAT0"-"PAT1"-"PAT2"-"PAT3"-"PAT0"-
1921  007516  062737  000002  001426  5$:     ADD     #2,NXTPAT
1922  007524  004737  007770          6$:     JSR     PC,GETBUF
1923  007530  017737  171672  001430           MOV     @NXTPAT,PGSUBR
1924  007536  004777  171666                   JSR     PC,@PGSUBR      ;GO GENERATE THESE PATRNS.
1925                                                                    ;3 X 400. WORDS
1926  007542  104421                           CON.RDY
```

```
007544  032777  140000  171704          BIT     #140000,@RKCS   ;ANY ERROR?
007552  001411                          BEQ     12$             ;GET RKCS,ER,DS,DA
007554  004737  016106                  JSR     PC,GT4RG
007560  104021                          ERROR   21              ;ERROR ON DOING WRITE
007562  104415                          CON.RESET               ;CLEAR IT
007564  005237  001504                  INC     ERCNT1          ;ALLOW 12 ERRORS AT MOST
007570  001002                          BNE     12$
007572  000137  010356                  JMP     EXT6            ;IF MORE, EXIT
007576  032777  001000  171646  12$:    BIT     #BIT9,@RKDS     ;SIN, ON DOING WRITE?
007604  001412                          BEQ     7$
007606  004737  016106                  JSR     PC,GT4RG
007612  104022                          ERROR   22              ;SIN ERROR ON DOING WRITE
007614  104415                          CON.RESET
007616  104416                          DRV.RESET
007620  005237  001506                  INC     ERCNT2          ;ALLOW 12 ERRORS AT MOST
007624  001002                          BNE     7$
007626  000137  010356                  JMP     EXT6
                                                                ;FIGURE OUT WHICH BUFFER IS
                                                                ;AVAILABLE FOR USE
007632  105737  001410          7$:     TSTB    BUFLG0          ;WAS PREVIOUS DSK-WRITE DONE
007636  100003                          BPL     8$              ;USING BUFR 0?
007640  005037  001410                  CLR     BUFLG0          ;YES, CLR FLAG INDICATING IT'S
                                                                ;AVAILABLE NOW
007644  000402                          BR      9$
007646  005037  001412          8$:     CLR     BUFLG1          ;CLR FLAG INDICATING BUFR1
                                                                ;IS AVAILABLE NOW
007652  013737  001426  001424  9$:     MOV     NXTPAT,PRSPAT   ;'PRSPAT'S PATRNS WILL BE USED
                                                                ;ON NEXT WRITE
007660  010500                          MOV     R5,R0           ;FORM SEC # TO BE USED NXT TIME
007662  116000  010352                  MOVB    SECPTR(R0),R0   ;GET SEC #
007666  042737  000017  001432  10$:    BIC     #17,DSKADR      ;MASK SECTOR BITS FROM DSK-ADRES
007674  050037  001432                  BIS     R0,DSKADR       ;FORM NXT DSK-ADRES
007700  005205                          INC     R5              ;DONE WITH 12 SECTRS (3 BLOCKS)?
007702  022705  000004                  CMP     #4,R5
007706  001231                          BNE     2$              ;ON THIS SURFACE? IF NOT, GO
                                                                ;DO NXT 4 SECTRS
007710  032737  000001  001474          BIT     #BIT0,INDX1     ;WHICH SURFACE WAS DONE, 0 OR 1?
007716  001415                          BEQ     11$             ;IF 0, GO DO SURFACE 1
007720  005237  001474                  INC     INDX1           ;COUNT # OF TRACKS
007724  001002                          BNE     .+6
007726  000137  010362                  JMP     TST7            ;EXIT IF DONE
007732  042737  000020  001432          BIC     #20,DSKADR      ;GO TO SUR 0, NEXT CYLINDER
007740  062737  000040  001432          ADD     #40,DSKADR
007746  000137  007370                  JMP     1$              ;GO BACK AND DO WRITE
007752  005237  001474          11$:    INC     INDX1           ;COUNT # OF TRACKS
007756  052737  000020  001432          BIS     #20,DSKADR      ;SET BIT FOR SUR 1
007764  000137  007370                  JMP     1$              ;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 #'.

007770  005737  001410          GETBUF: TST     BUFLG0          ;BUFR 0 AVAILABLE FOR USE?
007774  100007                          BPL     1$              ;YES, BRANCH
```

```
 1983  007776  052737  100000  001412          BIS     #BIT15,BUFLG1   ;NO, USE BUFR 1, INDICATE SO
 1984  010004  013737  001436  001446          MOV     PBUF1,BUFNO     ;SAVE STARTING ADRES OF BUFR1
 1985  010012  000207                          RTS     PC
 1986  010014  052737  100000  001410  1$:     BIS     #BIT15,BUFLG0   ;INDICATED, USING BUF 0
 1987  010022  013737  001434  001446          MOV     PBUF0,BUFNO     ;SAVE STARTING ADRES OF BUFR 0
 1988  010030  000207                          RTS     PC              ;RETURN
 1989                                  ;#PTGEN0
 1990                                  ;#THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
 1991                                  ;#BUFFER CONTAINING THE FOLLOWING PATTERNS
 1992                                  ;#FIRST BLOCK OF 256 WORDS:     125252
 1993                                  ;#SECOND BLOCK OF 256 WORDS:    052525 (COMPLEMENT OF ABOVE)
 1994                                  ;#THIRD BLOCK OF 256 WORDS:     010421
 1995                                  ;#YOU CAN USE ANY OTHER PATTERNS (& ITS COMPLEMENT)
 1996                                  ;#MAKING THE CHANGES IN THE 2 LOCATIONS SHOWN BELOW.
 1997
 1998  010032  013700  001446          PTGEN0: MOV     BUFNO,R0                ;GET STARTING ADRES OF BUFR
 1999  010036  013701  010110                  MOV     PTRN01,R1       ;GET PATRN TO BE GENERATED
 2000  010042  012702  177400                  MOV     #-400,R2        ;IN THE FIRST 400 WORD BLOCK
 2001
 2002  010046  010120                  1$:     MOV     R1,(R0)+        ;GENERATE THE FIRST BLOCK
 2003  010050  005202                          INC     R2              ;WITH 'PAT01' PATRN
 2004  010052  001375                          BNE     1$              ;ALL DONE?
 2005
 2006  010054  012702  177400                  MOV     #-400,R2
 2007  010060  005101                          COM     R1              ;COMPLEMENT 'PAT01' PATAN
 2008  010062  010120                  2$:     MOV     R1,(R0)+        ;GENERATE 2ND BLOCK WITH
 2009  010064  005202                          INC     R2              ;'PAT01'S COMPLEMENT PATRN
 2010  010066  001375                          BNE     2$              ;ALL DONE?
 2011  010070  012702  177400                  MOV     #-400,R2
 2012  010074  013701  010112                  MOV     PTRN02,R1       ;GET PATRN TO BE GENERATED
 2013                                                                  ;FOR 3RD BLOCK
 2014  010100  010120                  3$:     MOV     R1,(R0)+        ;GENERATE 3RD BLOCK USING
 2015                                                                  ;'PAT02' PATRN
 2016  010102  005202                          INC     R2
 2017  010104  001375                          BNE     3$              ;ALL DONE?
 2018
 2019  010106  000207                          RTS     PC              ;RETURN
 2020
 2021  010110  125252          PTRN01: 125252                          ;CHANGE THESE LOCATIONS IF
 2022  010112  010421          PTRN02: 010421                          ;YOU WANT ANY OTHER PATTERNS
 2023
 2024                                  ;#PTGEN1
 2025                                  ;#THIS ROUTINE GENERATES A 768 (3X256) WORDS
 2026                                  ;#LONG BUFFER CONTAINING THE FOLLOWING PATTERNS:
 2027
 2028                                  ;#FIRST BLOCK-256 WORDS 000001  FILL 1'S
 2029                                  ;#                      000003
 2030                                  ;#                      .
 2031                                  ;#                      177777
 2032
 2033                                  ;#SECOND BLOCK          177776  FILL 0'S
 2034                                  ;#                      177774
 2035                                  ;#                      .
 2036                                  ;#                      000000
 2037
 2038                                  ;#THIRD BLOCK           000001  FLOAT A 1
```

```
                                        ;*                      000020
                                        ;*                      .
                                        ;*                      100000

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

010114  012703  000001          PTGEN1: MOV     #1,R3           ;INITIALIZE PATRNS
010120  012704  177776                  MOV     #177776,R4
010124  013700  001446                  MOV     BUFNO,R0                ;GET STARTING ADRES OF BUFR
010130  012702  177760                  MOV     #-20,R2         ;SET COUNT
010134  010301                  1$:     MOV     R3,R1           ;INITIALIZE PATRN
010136  010120                  2$:     MOV     R1,(R0)+        ;GENERATE THE FIRST
010140  000261                          SEC                     ;BLOCK USING "FILL 1'S"
010142  006101                          ROL     R1
010144  103374                          BCC     2$
010146  005202                          INC     R2
010150  001371                          BNE     1$              ;ALL DONE?

010152  012702  177760                  MOV     #-20,R2
010156  010401                  3$:     MOV     R4,R1           ;INITIALIZE PATRN
010160  010120                  4$:     MOV     R1,(R0)+        ;GENERATE 2ND BLOCK
010162  000241                          CLC                     ;USING "FILL 0'S"
010164  006101                          ROL     R1
010166  103774                          BCS     4$
010170  005202                          INC     R2
010172  001371                          BNE     3$              ;DONE?

010174  012702  177760                  MOV     #-20,R2         ;SET COUNT
010200  010301                  5$:     MOV     R3,R1           ;INITIALIZE PATRN
010202  010120                  6$:     MOV     R1,(R0)+        ;GENERATE THE 3RD BLOCK
010204  006301                          ASL     R1              ;USING "FLOAT A 1"
010206  103375                          BCC     6$
010210  005202                          INC     R2
010212  001372                          BNE     5$              ;DONE?
010214  000207                          RTS     PC              ;RETURN

                                        ;*PTGEN2
                                        ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
                                        ;*BUFFER CONTAINING THE FOLLOWING PATTERNS:

                                        ;*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.
010216  005001                      PTGEN2: CLR     R1              ;INITIALIZE PATRN
010220  013700  001446                      MOV     BUFNO,R0
010224  010120                      1$:     MOV     R1,(R0)+        ;GENERATE 1ST BLOCK USING
010226  105201                              INCB    R1              ;USING 'COUNT UP LOWER BYTE'
010230  001375                              BNE     1$              ;DONE?
010232  005001                              CLR     R1
010234  010120                      2$:     MOV     R1,(R0)+        ;GENERATE 2ND BLOCK
010236  062701  000400                      ADD     #400,R1         ;USING 'COUNT UP HIGHER BYTE'
010242  103374                              BCC     2$              ;DONE?
010244  005001                              CLR     R1
010246  010120                      3$:     MOV     R1,(R0)+        ;GENERATE 3RD BLOCK USING
010250  062701  000401                      ADD     #401,R1         ;'COUNT UP HIGHER & LOWER BYTE'
010254  103374                              BCC     3$              ;ALL DONE?
010256  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.
010260  013700  001446                PTGEN3: MOV     BUFNO,R0
010264  012702  177400                        MOV     #-400,R2
010270  013701  010112                        MOV     PTRN02,R1       ;GET PATTERN
010274  005101                              COM     R1              ;COMPLEMENT 'PAT02' PATRN
010276  010120                      4$:     MOV     R1,(R0)+        ;GENERATE 1ST BLOCK
010300  005202                              INC     R2
010302  001375                              BNE     4$              ;ALL DONE?

                                                                    ;2ND BLOCK
010304  012702  177760                        MOV     #-20,R2
010310  000261                      7$:     SEC
010312  012701  177776                        MOV     #177776,R1
010316  010120                      8$:     MOV     R1,(R0)+
010320  006101                              ROL     R1
010322  103775                              BCS     8$
010324  005202                              INC     R2
```

```
010326  001370                  BNE     7$              ;ALL DONE?
                                                        ;3RD BLOCK
010330  012701  000377          MOV     #377,R1
010334  010102                  MOV     R1,R2           ;GENERATE 3RD BLOCK USING
010336  010120          9$:     MOV     R1,(R0)+        ;'COUNT DOWN LOWER BYTE'
010340  060201                  ADD     R2,R1           ;'COUNT UP HIGHER BYTE'
010342  022701  177777          CMP     #-1,R1
010346  001373                  BNE     9$              ;ALL DONE?
010350  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.
010352      006         SECPTR: .BYTE   6
010353      003                 .BYTE   3
010354      011                 .BYTE   11
010355      000                 .BYTE   0

010356  004737  016716  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
                                ;*'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.
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                                        ;*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.
                                ;;*****************************************************************
010362  000004                  TST:    SCOPE
010364  012737  177764  001510          MOV     #-14,ERCNT3     ;ALLOW 12 ERRORS AT THE MOST
010372  012737  177773  001512          MOV     #-5,ERCNT4      ;ALLOW 5 ERRORS AT THE MOST
010400  012737  177742  001514          MOV     #-36,ERCNT5     ;ALLOW 10 ERRORS AT THE MOST
010406  012737  177742  001516          MOV     #-36,ERCNT6     ;ALLOW 10 ERRORS AT THE MOST
010414  012737  177764  001520          MOV     #-14,ERCNT7     ;ALLOW 12 ERRORS AT THE MOST
010422  012737  177742  001522          MOV     #-36,ERCNT8     ;ALLOW 10 ERRORS AT THE MOST
010430  012737  177152  001474          MOV     #-626,INDX1     ;SET COUNT FOR 625 TRACKS
010436  005037  001476                  CLR     INDX2           ;CLR COUNT FOR 4 BLOCKS ON A TRACK

010442  012737  001414  001424          MOV     #PAT0,PRSPAT    ;INITLZE PTR TO PATRN GENRTR
010450  013737  001230  001450          MOV     DRIVAD,ADRES    ;INITLZE DRV#,ADRES

010456  005037  001504          BEGIN:  CLR     ERCNT1          ;IF > 0, MEANS THAT RETRIES
010462  005037  001506                  CLR     ERCNT2          ;DONE AFTER CSE OR CSE CHKD
010466  012737  177775  001252          MOV     #-3,RETRY1      ;RETRY COUNT FOR CSE
010474  012737  177776  001254          MOV     #-2,RETRY2      ;RETRY COUNT FOR SFTWRE MISCMP'N
010502  012737  000003  001256          MOV     #3,RETRY3       ;RETRY COUNT FOR WCE

010510  013737  001450  001440          MOV     ADRES,WDSKAD    ;DISK ADRES TO WRT CHK WITH
010516  013737  001406  001442          MOV     PBUF1,WBUSAD    ;USE THIS BUFR 1 TO WRT CHK
                                                                ;OR THE BUFR INDICATED BY THE USER
010524  012737  176400  001444          MOV     #-1400,WWRDCN   ;WRT CHK 1 BLOCK=3SECS=1400 WRDS

010532  013737  001450  001432  READ:   MOV     ADRES,DSKADR    ;DISK ADRES TO READ FROM
010540  012737  176400  001436          MOV     #-1400,WRDCNT   ;1 BLOCK = 3 SECTORS = 1400 WRDS
010546  013737  001404  001434          MOV     PBUF0,BUSADR    ;USE 'IOBUF0' TO READ INTO
                                                                ;OR THE BUFR INDICATED BY THE USER

010554  000404                          BR      RDAGAIN

010556  104415                  LUPSIN: CON.RESET
010560  104416                          DRV.RESET
010562  000401                          BR      RDAGAIN

010564  104415                  LUPHE:  CON.RESET

010566  013777  001432  170670  RDAGAIN:        MOV     DSKADR,@RKDA    ;READ FROM THIS DSK-ADRES
010574  013777  001436  170656          MOV     WRDCNT,@RKWC    ;THIS # OF WORDS
010602  013777  001434  170652          MOV     BUSADR,@RKBA    ;INTO THIS BUFR

010610  012777  000405  170640          MOV     #405,@RKCS      ;READ,SSE,GO

010616  013737  001406  001446          MOV     PBUF1,BUFNO     ;SET UP STARTING ADRES
010624  017737  170574  001430          MOV     @PRSPAT,PGSUBR
010632  004777  170572                  JSR     PC,@PGSUBR      ;GO GENERATE A BUFFER
```

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                                                        ;OF 1400 WORDS USING THIS
                                                        ;PATRN GENRATR

010636  104421                  CON.RDY                ;DONE WITH PATRN GENRTNG,
                                                        ;WAIT FOR CNT RDY TO SET
                                                        ;(FROM PREVIOUS READ)

                                                        ;CNT RDY SET
010640  032777  040000  170610  BIT     #BIT14,@RKCS   ;HARD ERROR?
010646  001416                  BEQ     NOHE

010650  012737  010564  001110  MOV     #LUPHE,$LPERR
010656  004737  016140          JSR     PC,GETINF
010662  104023                  ERROR   23             ;HARD ERROR
010664  104415                  CON.RESET
010666  005237  001510          INC     ERCNT3         ;ALLOW 12 ERRORS AT MOST
010672  001002                  BNE     1$
010674  000137  012114          JMP     EXT7           ;IF MORE, EXIT
010700  000137  011436      1$: JMP     FINISH
010704  032777  001000  170540  NOHE:   BIT     #BIT9,@RKDS    ;SIN SET?
010712  001417                  BEQ     NOSIN          ;NO

010714  012737  010556  001110  MOV     #LUPSIN,$LPERR
010722  004737  016140          JSR     PC,GETINF
010726  104011                  ERROR   11             ;SIN ON READ
010730  104415                  CON.RESET
010732  104416                  DRV.RESET
010734  005237  001512          INC     ERCNT4         ;ALLOW 5 ERRORS AT MOST
010740  001002                  BNE     1$
010742  000137  012114          JMP     EXT7           ;IF MORE, EXIT
010746  000137  011436      1$: JMP     FINISH

010752  005737  001504  NOSIN:  TST     ERCNT1         ;CHECKING CSE FOR 1ST TIME
010756  001031                  BNE     WRTCHK         ;NO,BRANCH
010760  005237  001504          INC     ERCNT1         ;INDICATE THAT CSE HAS BEEN
                                                        ;CHECKED ONCE

010764  032777  000002  170462  BIT     #BIT1,@RKER    ;CHECK SUM EROR?
010772  001423                  BEQ     WRTCHK
010774  012737  010456  001110  MOV     #BEGIN,$LPERR
011002  004737  016140          JSR     PC,GETINF
011006  013737  001252  001202  MOV     RETRY1,$REG10  ;GET THE RETRY #
011014  062737  000004  001202  ADD     #4,$REG10      ;SAVE IT FOR TYPEOUT
011022  104024                  ERROR   24             ;CSE
011024  005237  001514          INC     ERCNT5         ;ALLOW 10 ERRORS AT MOST
011030  001002                  BNE     1$
011032  000137  012114          JMP     EXT7           ;IF MORE, EXIT
011036  000137  011630      1$: JMP     CSEROR         ;GO, SERVICE CSE

011042  005037  001506  WRTCHK: CLR     ERCNT2         ;CLR FLAG INDICATING SOFTWARE
                                                        ;COMPARE DONE
011046  022737  000003  001256      CMP     #3,RETRY3      ;WRT CHK DONE BEFORE OR
011054  001016                  BNE     SFTCMP         ;IT'S 1ST TIME?
                                                        ;IF DONE,BRANCH OTHERWISE DO IT
011056  013777  001440  170400  WCAGAIN: MOV    WDSKAD,@RKDA   ;WRT CHK FROM THIS DSK-ADRES
011064  013777  001444  170366          MOV     WWRCCN,@RKWC   ;THIS # FO WORDS
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2319  011072  013777  001442  170362          MOV     WBUSAD,@RKBA    ;WITH THIS BUFFER
2320
2321  011100  012777  000407  170350          MOV     #407,@RKCS      ;WRT CHK,GO,SSE
2322
2323  011106  005337  001256                  DEC     RETRY3          ;INDICATE WRT CHK DONE
2324
2325  011112  005737  001506          SFTCMP: TST     ERCNT2          ;SFTWARE CMPARE DONE ONCE BEFORE?
2326  011116  001060                  BNE     WCREPT          ;IF SFTWARE CMPARE HAS BEEN DONE
2327                                                          ;ONCE DON'T DO IT AGAIN, OTHERWISE,
2328  011120  005237  001506                  INC     ERCNT2          ;DO IT. INDICATE IT IS DONE.
2329                                                          ;MORE THAN ONCE BEFORE.
2330                                                          ;IF THIS IS 1ST TIME THRU &
2331                                                          ;WRT CHK WAS DONE ONCE BEFORE
2332                                                          ;DO SOFTWARE COMPARISON OF
2333                                                          ;THE DATA THAT WAS READ FROM
2334                                                          ;THE DISK
2335
2336  011124  012702  001266                  MOV     #BUFR,R2        ;INITLZE PTR TO BUFR STORING
2337                                                          ;ADRES OF BAD DATA
2338  011130  012703  001320                  MOV     #BUFR1,R3       ;STORE EXPCTD DATA STARTING HERE
2339  011134  012704  001352                  MOV     #BUFR2,R4       ;STORE RECVD (BAD) DATA
2340                                                          ;STARTING HERE
2341
2342  011140  005037  001500                  CLR     INDX3           ;CLR FLAG INDICATING MISCMPRE
2343
2344  011144  013700  001404          COMPAR: MOV     PBUF0,R0        ;INITLZE PTR TO 'RECVD DATA' BUFR
2345  011150  012737  177764  001502          MOV     #-14,INDX4      ;STORE AND REPORT 12 OR LESS DATA ERRORS
2346  011156  013701  001406                  MOV     PBUF1,R1        ;INITLZE PTR TO 'EXPCTD DATA' BUFR
2347  011162  012737  176400  001260          MOV     #-1400,INADR    ;SET COUNT
2348  011170  021011                  CMPAGAN: CMP    (R0),(R1)       ;CORRECT WORD READ FROM DISK?
2349  011172  001402                  BEQ     1$
2350  011174  000137  011742                  JMP     MISCMP          ;BRANCH IF MISCMPRE ERROR
2351  011200  005720                  1$:     TST     (R0)+           ;INCRMNT PTRS
2352  011202  005721                  TST     (R1)+           ;TO NXT WORDS
2353  011204  005237  001260                  INC     INADR           ;DONE WITH CMPRISON?
2354  011210  001367                  BNE     CMPAGAN         ;IF NOT, COMPARE THE REST
2355
2356  011212  005737  001500                  TST     INDX3           ;WAS THERE A BAD DATA WORD
2357                                                          ;(EVEN AFTR RETRYING)
2358  011216  001420                  BEQ     WCREPT          ;NO, BRANCH
2359  011220  012737  010532  001110  REPMSC: MOV     #READ,$LPERR
2360  011226  104025                  ERROR   25              ;DATA ERROR
2361  011230  005237  001516                  INC     ERCNT6          ;ALLOW 10 ERRORS AT MOST
2362  011234  001002                  BNE     1$
2363  011236  000137  012114                  JMP     EXT7            ;IF MORE, EXIT
2364  011242  005737  001254          1$:     TST     RETRY2
2365  011246  001404                  BEQ     WCREPT
2366  011250  005237  001254                  INC     RETRY2
2367  011254  000137  010532                  JMP     READ
2368
2369  011260  104421          WCREPT: CON.RDY                 ;WAIT FOR CNTRL RDY FROM
2370                                                          ;PREVIOUS WRT CHK
2371  011262  022737  177776  001254          CMP     #-2,RETRY2      ;IF THERE WAS A RETRY AFTER MISC
2372                                                          ;-OMPARISON, DO WRT CHK AGAIN
2373  011270  001417                  BEQ     ERWCHK
2374  011272  000401                  BR      LUPWCE+2
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011274  104415                  LUPWCE: CON.RESET
011276  013777  001440  170160          MOV     WDSKAD,@RKDA    ;WRT CHK WITH THIS DSK-ADRES
011304  013777  001444  170146          MOV     WWRDCN,@RKWC    ;THIS # OF WORDS
011312  013777  001442  170142          MOV     WBUSAD,@RKBA    ;THIS BUS ADRES
011320  012777  000407  170130          MOV     #407,@RKCS

011326  104421                          CON.RDY
011330  012737  011274  001110  ERWCHK: MOV     #LUPWCE,$LPERR
011336  032777  040000  170106          BIT     #BIT14,@RKDS    ;HARD EROR?(FROM WRT CHK)
011344  001410                          BEQ     XHE             ;NO,BRANCH

011346  004737  016140                  JSR     PC,GETINF
011352  104026                          ERROR   26              ;HE ON WRT CHK
011354  005237  001520                  INC     ERCNT7          ;ALLOW 12 ERRORS AT MOST
011360  001002                          BNE     XHE
011362  000137  012114                  JMP     EXT7            ;IF MORE, EXIT

011366  032777  000001  170060  XHE:    BIT     #BIT0,@RKER     ;WRITE CHECK EROR?
011374  001420                          BEQ     FINISH
011376  004737  016140                  JSR     PC,GETINF
011402  012737  000003  001202          MOV     #3,$REG10       ;GET TRY #
011410  163737  001256  001202          SUB     RETRY3,$REG10   ;SAVE IT FOR TYPEOUT
011416  104027                          ERROR   27              ;WRT CHK EROR
011420  005237  001522                  INC     ERCNT8          ;ALLOW 10 ERRORS AT MOST
011424  001002                          BNE     1$
011426  000137  012114                  JMP     EXT7            ;IF MORE, EXIT
011432  000137  012006          1$:     JMP     WCEROR


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

011436  022737  001422  001424  FINISH: CMP     #PAT3,PRSPAT    ;FIND OUT THE NXT PATRN GENRATR
011444  001404                          BEQ     1$              ;TO USE FOR GENRATING THE
011446  062737  000002  001424          ADD     #2,PRSPAT       ;BUFR,STORE POINTER TO
011454  000403                          BR      2$              ;GENRATR ROUTINE IN 'PRSPAT'
011456  012737  001414  001424  1$:     MOV     #PAT0,PRSPAT    ;NOTE THER R 4 PAT-GENRATRS
                                                                ;PAT0-PAT1-PAT2-PAT3----PAT0-
011464  013701  001476          2$:     MOV     INDX2,R1        ;FORM SECTR # TO BE USED NEXT
011470  116101  010352                  MOVB    SECPTR(R1),R1   ;GET SECTR #
011474  042737  000017  001450  3$:     BIC     #17,ADRES       ;MASK SECTR BITS
011502  050137  001450                  BIS     R1,ADRES        ;FORM THE NEW DISK-ADRES
                                                                ;FORM THE NXT BLOCK TO BE
                                                                ;CHECKED.
011506  005237  001476                  INC     INDX2           ;DONE ALL 4 BLOCKS(3 SECS
                                                                ;EACH) ON THIS TRACK?
011512  022737  000004  001476          CMP     #4,INDX2
011520  001025                          BNE     GOBAK           ;IF NOT, GO BAK & DO THE
                                                                ;NXT BLOCK ON THIS TRACK

011522  005037  001476          DONTRK: CLR     INDX2           ;REINITLZE COUNT FOR
                                                                ;4 BLOCKS ON THIS TRACK
011526  032737  000001  001474          BIT     #BIT0,INDX1     ;WHICH SUR TO DO NXT? 0 OR 1
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2431  011534  001407                          BEQ     DOSUR1          ;BRANCH, DO SUR 1 NXT
2432
2433  011536  062737  000040  001450          ADD     #40,ADRES
2434
2435  011544  042737  000020  001450          BIC     #20,ADRES       ;CLR SUR BIT, DO SJR 0 NXT
2436  011552  000403                          BR      DONE
2437
2438  011554  052737  000020  001450  DOSUR1: BIS     #20, ADRES      ;SET SJR BIT, DO SUR 1 NXT
2439
2440  011562  005237  001474          DONE:   INC     INDX1           ;DONE WITH ALL 626 TRACKS?
2441  011566  001002                          BNE     GOBAK
2442  011570  000137  012120                  JMP     TST10
2443
2444  011574  000137  010456          GOBAK:  JMP     BEGIN           ;IF NOT, GO BAK & CHECK
2445                                                                  ;THE NX+ TRACK
2446
2447                                  ;CSEROR                         ;THIS IS THE ENTRY POINT
2448                                                                  ;FOR SERVICE ROUTINE FOR CHECK
2449  011600                          CSEROR:                         ;SUM EROR. CONTROL IS XFERED
2450                                                                  ;HERE ONCE CSE OCCURS
2451
2452  011600  017700  167660                  MOV     @RKDA,R0        ;GET RKDA AFTER CSE
2453  011604  010001                          MOV     R0,R1           ;SAVE RKDA
2454  011606  032700  000017                  BIT     #17,R0          ;FORM THE ADRES OF THE SECTR
2455  011612  001002                          BNE     1$              ;WHICH GAVE CSE
2456  011614  162700  000004                  SUB     #4,R0
2457  011620  005300                  1$:     DEC     R0              ;R0 CONTAINS DSK-ADRES WHERE
2458                                                                  ;CSE OCURED
2459  011622  020037  001432                  CMP     R0,DSKADR       ;DID A PREVIOUS RETRY (IF ANY)
2460                                                                  ;GIVE CSE ON SAME ADRES
2461  011626  001021                          BNE     2$              ;NO, THIS IS A FRESH CSE, BRANCH.
2462                                                                  ;IF THIS WAS A CSE ON A
2463  011630  005237  001252                  INC     RETRY1          ;RETRY INCMNT RETRY COUNT.
2464                                                                  ;BRANCH IF 3 RETRIES HAVEN'T
2465  011634  001021                          BNE     3$              ;BEEN DONE
2466                                                                  ;GO REPORT CSE
2467                                                                  ;IF CSE WAS IN THE LAST SECTR OF
2468                                                                  ;THE 3 SEC BLOCK, GO TO 'WRTCHK'
2469                                                                  ;OTHERWISE CHECK THE REST OF
2470                                                                  ;THE SECTORS FOR CSE.
2471  011636  010102                          MOV     R1,R2
2472  011640  042702  177760                  BIC     #177760,R2
2473  011644  001002                  7$:     BNE     8$
2474  011646  000137  011042                  JMP     WRTCHK
2475  011652  162702  000003          8$:     SUB     #3,R2
2476  011656  100372                          BPL     7$
2477
2478  011660  010100                  6$:     MOV     R1,R0
2479  011662  012737  177775  001252          MOV     #-3,RETRY1
2480  011670  000403                          BR      3$
2481
2482  011672  012737  177776  001252  2$:     MOV     #-2,RETRY1      ;ALLOW 2 MORE TRIES FOR
2483                                                                  ;THE CSE ON SAME DISK-ADRES
2484
2485  011700  010037  001432          3$:     MOV     R0,DSKADR       ;SAVE DSK-ADRES FOR DOING
2486                                                                  ;THE RETRY-READ
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002487  011704  163700  001450          SUB     ADRES,R0        ;MODIFY THE
002488  011710  005200                  INC     R0              ;BUS ADRES & WORD COUNT
002489  011712  005300          4$:     DEC     R0              ;TO BE USE ON RETRY-
002490  011714  001407                  BEQ     5$              ;READ
002491  011716  062737  001000  001434  ADD     #1000,BUSADR
002492  011724  062737  000400  001436  ADD     #400,WRDCNT
002493  011732  000767                  BR      4$
002494
002495  011734  104415          5$:     CON.RESET               ;CLR THE CSE IN RKER
002496  011736  000137  010566          JMP     RDAGAIN         ;GO BACK, READ AGAIN
                                                                ;RETRY
002497
002498
002499
002500
002501
002502
002503
002504
002505
002506
002507
002508  011742  104421          MISCMP: CON.RDY                 ;WAIT FOR CNTRL RDY FROM
002509                                                          ;PREVIOUS WRT CHK
002510  011744  032777  040000  167504  BIT     #BIT14,@RKCS
002511  011752  001401                  BEQ     1$
002512  011754  104415                  CON.RESET               ;CLR WCE IN RKER
002513                                                          ;BLT STILL DATA EROR ENTER HERE
002514  011756  010022          1$:     MOV     R0,(R2)+        ;STORE MEM ADRES WHERE
002515                                                          ;DATA EROR OCCURED
002516  011760  012123                  MOV     (R1)+,(R3)+     ;SAVE EXPCTD DATA
002517  011762  012024                  MOV     (R0)+,(R4)+     ;SAVE DATA RECVD (BAD)
002518  011764  005237  001500          INC     INDX3           ;INDICATE MISCMPRISON
002519
002520  011770  005237  001502          INC     INDX4           ;STORE ONLY 12(DEC) ERORS
002521  011774  001402                  BEQ     4$              ;IF 12 ERORS, GO REPORT THEM
002522
002523  011776  000137  011170          JMP     CMPAGAN         ;GO BACK & CMPARE THE REST
002524
002525  012002  000137  011220          4$:     JMP     REPMSC
002526
002527
002528
002529                                                          ;THIS THE ENTRY POINT FOR
002530                                                          ;EROR SERVICE ON GETTING A
002531                                                          ;WRITE CHECK EROR.
002532
002533  012006  005737  001256  WCEROR: TST     RETRY3          ;DONE 3 TRIES?
002534  012012  003035                  BGT     CLRERR          ;IF NOT SKIP, OTHERWISE REPORT
002535                                                          ;W C EROR
002536
002537  012014  012737  000003  001256  MOV     #3,RETRY3       ;SET CONT FOR RETRIES
002538
002539  012022  017700  167436          MOV     @RKDA,R0        ;IF WCE WAS IN THE LAST SECTOR
002540  012026  010002                  MOV     R0,R2           ;OF THE BLOCK, NO MORE SECS
002541  012030  042702  177760          BIC     #177760,R2      ;TO CHECK, GO TO 'FINISH'
002542  012034  001002          3$:     BNE     4$              ;IF IT WASN'T LAST SECTOR OF THE
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2543  012036  000137  011436            JMP     FINISH          ;BLOCK, THEN CHECK REMAINING
2544  012042  162702  000003    4$:     SUB     #3,R2           ;SECTORS, (STARTING FROM THE
2545  012046  100372                    BPL     3$              ;SEC AFTER THE ONE GIVING WCE.
2546  012050  010001            1$:     MOV     R0,R1           ;SAVE DISK ADRES
2547  012052  163700  001440            SUB     WDSKAD,R0
2548  012056  010137  001440            MOV     R1,WDSKAD       ;GET SAVED DISK ADRES
2549  012062  005200                    INC     R0
2550  012064  005300            2$:     DEC     R0
2551  012066  001407                    BEQ     CLRERR
2552  012070  062737  001000  001442    ADD     #1000,WBUSAD    ;FORM THE NEW BUS ADRES
2553  012076  062737  000400  001444    ADD     #400,WWRDCN     ;FORM THE NEW WORD COUNT
2554  012104  000767                    BR      2$
2555  012106  104415            CLRERR: CON.RESET
2556  012110  000137  011056            JMP     WCAGAIN
2557
2558  012114  004737  016716    EXT7:   JSR     PC,ABRT
2559
2560
2561                            ;;*****************************************************************
2562                            ;*TEST 10       WRITE, WRITE CHECK ON CYLINDERS 127, 128
2563                                    ;*THIS TEST WRITES 12 UNIQUE PATTERNS (ONE FOR EACH
2564                                    ;*SECTOR) ON CYLINDERS 127 AND 128, THEN WRITE
2565                                    ;*CHECK IS DONE TO SEE IF THEY WERE WRITTEN
2566                                    ;*CORRECTLY.  IT SHOULD BE NOTED THAT THERE IS
2567                                    ;*CHANGE IN 'WRITE' CURRENT AT THIS CYLINDER.
2568                                    ;*PATTERNS ARE RELOCATED ON THE CYLINDERS AFTER EACH
2569                                    ;*WRITE/WRITE CHECK CYCLE.  THUS THE FIRST TIME
2570                                    ;*PATTERN 'SP1' IS WRITTEN ON SECTOR 0, PATTERN 'SP2' ON
2571                                    ;*SECTOR 2, ETC.  AFTER THIS WRITE/WRITE CHECK CYCLE
2572                                    ;*IS OVER PATTERN 'SP2' IS WRITTEN ON SECTOR 0, PATTERN
2573                                    ;*:'SP3' ON SECTOR 1 AND SO ON.  THIS WRITE/WRITE
2574                                    ;*CHECK CYCLE IS REPEATED 12 TIMES, THUS
2575                                    ;*THE LAST WRITE/WRITE CHECK IS DONE USING
2576                                    ;*PATTERN 'SP12' ON SECTOR 0, PATTERN 'SP1' IS
2577                                    ;*WRITTEN ON SECTOR 1, PATTERN 'SP2' ON SECTOR 2,
2578                                    ;*ETC.  IF YOU WANT TO WRITE ANY OTHER PATTERNS
2579                                    ;*FILL IN THE PATTERNS YOU WANT IN LOCATIONS
2580                                    ;*'SP1', 'SP2',...ETC.
2581                            ;;*****************************************************************
2582  012120  000004            TST10:  SCOPE
2583
2584  012122  012737  177764  001504    MOV     #-14,ERCNT1     ;ALLOW 12 ERRORS AT MOST
2585  012130  012737  177764  001506    MOV     #-14,ERCNT2     ;ALLOW 12 ERRORS AT MOST
2586  012136  012737  177723  001510    MOV     #-55,ERCNT3     ;ALLOW 15 ERRORS AT MOST
2587  012144  012702  012626            MOV     #SP1,R2         ;INITIALIZE POINTER TO PATRN
2588  012150  010201            DOWRT:  MOV     R2,R1
2589  012152  012700  007740            MOV     #7740,R0        ;SET UP CYL ADRES BITS (127)
2590  012156  053700  001230            BIS     DRIVAD,R0       ;SET UP DRIVE # BITS
2591  012162  005003            WRL01:  CLR     R3
2592  012164  104415            WRERR:  CON.RESET
2593
2594  012166  010077  167272    WRL0:   MOV     R0,@RKDA        ;ADRES THE DRIVE
2595  012172  012777  177400  167260    MOV     #-400,@RKWC     ;WRITE 1 SECTOR
2596  012200  010177  167256            MOV     R1,@RKBA        ;USE THIS PATTERN
2597  012204  012777  004003  167244    MOV     #4003,@RKCS     ;WRITE, GO
2598  012212  104421                    CON.RDY
```

```
2599  012214  032777  140000  167234          BIT     #140000,@RKCS   ;ANY ERROR?
2600  012222  001414                          BEQ     4$
2601  012224  012737  012164  001110          MOV     #WRERR,$LPERR   ;SET ADRES FOR LOOPING ON ERROR
2602  012232  004737  016106                  JSR     PC,GT4RG        ;GET TKCS, ER, DS, DA
2603  012236  104021                          ERROR   21              ;ERROR OCCURRED ON DOING A WRITE
2604  012240  104415                          CON.RESET               ;CLEAR THE ERROR
2605  012242  005237  001504                  INC     ERCNT1          ;ALLOW 12 ERRORS ONLY
2606  012246  001002                          BNE     4$
2607  012250  000137  012656                  JMP     EXT10
2608
2609  012254  005200                  4$:     INC     R0
2610  012256  005203                          INC     R3              ;KEEP COUNT
2611  012260  022701  012654                  CMP     #SP12,R1        ;USE PATTERNS IN A CYCLIC FASHION
2612  012264  001002                          BNE     3$
2613  012266  012701  012624                  MOV     #SP1-2,R1
2614  012272  005721                  3$:     TST     (R1)+           ;INCREMENT POINTERS TO NEXT PATTERN
2615  012274  020327  000014                  CMP     R3,#14          ;DONE SURFACE 0?
2616  012300  002732                          BLT     WRLO            ;NO
2617  012302  001005                          BNE     2$              ;YES, IF CHANGING HEADS
2618  012304  010201                          MOV     R2,R1
2619  012306  042700  000017                  BIC     #17,R0          ;SET UP CORRECT ADDRESS ETC.
2620  012312  052700  000020                  BIS     #20,R0
2621
2622  012316  020327  000030          2$:     CMP     R3,#30          ;DONE WITH WRITING SURFACE 1?
2623  012322  001321                          BNE     WRLO            ;NO, BRANCH
2624
2625  012324  032700  007700          WRHI:   BIT     #7700,R0        ;DONE WITH BOTH CYLINDERS - 127 & 129?
2626  012330  001405                          BEQ     DOWCHK          ;YES
2627  012332  012700  010000                  MOV     #10000,R0       ;NO. DO CYLINDER 128
2628  012336  053700  001230                  BIS     DRIVAD,R0
2629  012342  000707                          BR      WRLO1           ;GO BACK
2630                                                                  ;CYLINDERS 127 AND 128 HAVE BEEN
2631
2632
2633  012344  010201          DOWCHK: MOV     R2,R1           ;WRITTEN, NOW DO WRITE CHECK
2634  012346  012737  177775  001252          MOV     #-3,RETRY1      ;INITIALIZE POINTER TO FIRST PATTERN
2635  012354  012700  010000                  MOV     #10000,R0       ;RETRY COUNT
2636  012360  053700  001230                  BIS     DRIVAD,R0       ;DO CYLINDER 128 FIRST
2637  012364  005003          WCHI1:  CLR     R3
2638  012366  010077  167072  WCERR:  MOV     R0,@RKDA        ;ADRES THE DRIVE
2639
2640  012372  012777  177400  167060  WCHI:   MOV     #-400,@RKWC     ;WRITE CHECK 1 SECTOR
2641  012400  010177  167056                  MOV     R1,@RKBA        ;WITH THIS PATTERN
2642  012404  012777  004007  167044          MOV     #4007,@RKCS     ;WRITE CHECK, GO
2643  012412  104421                          CON.RDY
2644
2645  012414  032777  040000  167030          BIT     #40000,@RKDS    ;HE?
2646  012422  001406                          BEQ     1$              ;NO
2647  012424  004737  016140                  JSR     PC,GETINF
2648  012430  104026                          ERROR   26              ;HE ON DOING WRT CHK
2649  012432  005237  001506                  INC     ERCNT2          ;ALLOW 12 ERRORS ONLY
2650  012436  001507                          BEQ     EXT10           ;IF MORE, EXIT
2651  012440  032777  000001  167006  1$:     BIT     #BIT0,@RKER     ;WCE?
2652  012446  001426                          BEQ     4$              ;NO
2653  012450  012737  012366  001110          MOV     #WCERR,$LPERR   ;SET ADRES FOR LOOPING ON ERROR
2654  012456  004737  016140                  JSR     PC,GETINF       ;GET INFO ON ERROR
```

```
012462  013737  001252  001202          MOV     RETRY1,$REG10
012470  062737  000004  001202          ADD     #4,$REG10       ;WCE ON DOING WRITE CHECK, WITH
012476  104027                          ERROR   27              ;PATTERN STORED IN R1
012500  005237  001252                  INC     RETRY1          ;DO 3 TIMES IN ALL
012504  001330                          BNE     WCERR
012506  005237  001510                  INC     ERCNT3          ;ALLOW 15 ERRORS ONLY
012512  001461                          BEQ     EXT10           ;IF MORE, EXIT
012514  012737  177775  001252          MOV     #-3,RETRY1

012522  005200                  4$:     INC     R0              ;KEEP TRACK OF DISK-ADRES
012524  005203                          INC     R3              ;AND COUNT
012526  022701  012654                  CMP     #SP12,R1        ;USE PATTERNS IN CYCLIC
012532  001002                          BNE     3$
012534  012701  012624                  MOV     #SP1-2,R1       ;FASHION
012540  005721                  3$:     TST     (R1)+           ;INCREMENT POINTER TO NEXT PATTERN
012542  020327  000014                  CMP     R3,#14          ;DONE SURFACE 0?
012546  002711                          BLT     WCHI            ;NO
012550  001005                          BNE     2$
012552  010201                          MOV     R2,R1           ;IF CHANGING HEADS (0-1), SET CORRECT
012554  042700  000017                  BIC     #17,R0          ;ADRES BITS
012560  052700  000020                  BIS     #20,R0

012564  020327  000030          2$:     CMP     R3,#30          ;DONE WRITE CHECKING SURFACE 1?
012570  001300                          BNE     WCHI            ;NO, GO BACK

012572  032700  007700          WCLO:   BIT     #7700,R0        ;DONE BOTH CYLINDERS - 127, 128?
012576  001005                          BNE     REPEAT          ;YES, BRANCH
012600  012700  007740                  MOV     #7740,R0        ;DO CYLINDER 127 NOW
012604  053700  001230                  BIS     DRIVAD,R0
012610  000665                          BR      WCHI1


012612  005722                  REPEAT: TST     (R2)+           ;RELOCATE THE PATTERNS ON THE
012614  020227  012656                  CMP     R2,#SP12+2      ;CYLINDERS AND DO IT AGAIN
012620  001420                          BEQ     TST11           ;;EXIT
012622  000137  012150                  JMP     DOWRT           ;THIS TEXT)



                                ;PATTERNS TO BE USED

012626  177777                  SP1:    .WORD   177777          ;IF YOU WANT TO WRITE ANY
012630  052525                  SP2:    .WORD   052525          ;OTHER PATTERNS, CHANGE THESE
012632  111111                  SP3:    .WORD   111111          ;12 LOCATIONS TO ANY PATTERN
012634  010421                  SP4:    .WORD   010421          ;YOU WANT.
012636  102041                  SP5:    .WORD   102041
012640  010101                  SP6:    .WORD   010101
012642  040201                  SP7:    .WORD   040201
012644  000401                  SP8:    .WORD   000401
012646  031463                  SP9:    .WORD   031463
012650  070707                  SP10:   .WORD   070707
012652  007417                  SP11:   .WORD   007417
012654  041020                  SP12:   .WORD   041020

012656  004737  016716          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 RKDS) 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
                                        ;**********************************************************************
012662  000004                TST11:  SCOPE
012664  032777  000100  166246          BIT     #SW6,@SWR       ;INHIBIT TIMER?
012672  001002                        BNE     .+6
012674  000137  014032                JMP     PLTGRPH
012700  104415                        CON.RESET
012702  104416                        DRV.RESET

012704  012737  177771  001252        MOV     #-7,RETRY1      ;COUNT FOR 7 DIFRNT SEEK TIMES
                                                                ;TO BE RECORDED

012712  104401  012720                TYPE    ,65$            ;;TYPE ASCIZ STRING
012716  000424                        BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <15><12> SEEK TIME SCALE FACTOR=0.01 MILI SECS/
012770                          64$:
012770  104401  012776                TYPE    ,67$            ;;TYPE ASCIZ STRING
012774  000421                        BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  <15><12><12>/ #  OF    SEEK   # OF   SEEK/
013040                          66$:
013040  104401  013046                TYPE    ,69$            ;;TYPE ASCIZ STRING
013044  000421                        BR      68$             ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  <15><12>/ SEEKS    TIME   SEEKS   TIME/<15><12>
013110                          68$:

013110  012737  001542  001260        MOV     #SIAD,INADR     ;INITLZE PTR TO INNER ADRES
013116  012737  001524  001262        MOV     #SOAD,OUTADR    ;INITLZE PTR TO OUTER ADRES

013124  017777  166132  166332  REPTIM: MOV     @OUTADR,@RKDA   ;POSITION HEADS TO OUTER CYLINDER
                                                                ;BEFORE STARTING TO TIME
013132  053777  001230  166324        BIS     DRIVAD,@RKDA    ;SET DRIVE # BITS
013140  012777  000011  166310        MOV     #11,@RKCS               ;SEEK, GO
013146  104421                        CON.RDY                 ;WAIT FOR CNTRL RDY
013150  104422                        TST.RWS                 ;WAIT FOR R/W/S RDY

013152  005037  001474                CLR     INDX1           ;INDX1 = 0, GOING IN; OTHERWISE OUT
013156  012704  026742                MOV     #BUFR10,R4      ;STORE FWRD SEEK TIMES IN THIS BUFR
013162  012705  027342                MOV     #BUFR11,R5      ;STORE REVRSE   "
013166  012737  177634  001476        MOV     #-144,INDX2     ;SET COUNT FOR # OF SEEKS


013174  013702  001464        BEGSK:  MOV     RKDA,R2
```

```
013200  005737  001474          TST     INDX1           ;GOING FWRD OR REVRSE?
013204  001005                  BNE     1$              ;REVRSE, BRANCH

013206  017712  166046          MOV     @INADR,@R2      ;FWRD, SET INNER CYL ADRES
013212  053712  001230          BIS     DRIVAD,@R2      ;SET DRIVE # BITS
013216  000404                  BR      2$

013220  017712  166036  1$:     MOV     @OUTADR,@R2     ;SET OUTER CYL ADRES
013224  053712  001230          BIS     DRIVAD,@R2      ;SET DRIVE # BITS
013230  004737  014722  2$:     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.

013234  005737  001474          TST     INDX1
013240  001004                  BNE     3$
013242  010324                  MOV     R3,(R4)+        ;STORE TIME TAKEN FOR FRWRD SEEK
013244  005237  001474          INC     INDX1           ;SET FLAG FOR DOING REVRSE SEEK
013250  000751                  BR      BEGSK           ;GO DO IT

013252  010325  3$:     MOV     R3,(R5)+        ;STORE TIME TAKEN FOR REVRSE SEEK
013254  005037  001474          CLR     INDX1           ;CLR FLG FOR DOING FRWRD SEEK

013260  005237  001476          INC     INDX2           ;RECORDED 144 SEEK TIMES
013264  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

013266  012705  177776  SORT:   MOV     #-2,R5          ;COUNT FOR FRWRD, REVRSE
013272  012737  026742  001162  MOV     #BUFR10,$REG0   ;INTLZE PTR TO 'SEEK TIME'
013300  012737  026744  001164  MOV     #BUFR10+2,$REG1
013306  012737  026442  001166  MOV     #BUFR4,$REG2
013314  012737  026522  001170  MOV     #BUFR5,$REG3    ;INTLZE PTR TO '# OF TIMES'

013322  013700  001162  1$:     MOV     $REG0,R0        ;PTR T 'SEEK TIME'
013326  013701  001164          MOV     $REG1,R1
013332  012702  177635          MOV     #-143.,R2       ;COUNT FOR 143 ITEMS TO SORT
013336  005003                  CLR     R3

013340  021011  2$:     CMP     (R0),(R1)       ;SORT THE ITEMS & PUT THEM
013342  003404                  BLE     3$              ;IN DESCENDING ORDER
013344  011004                  MOV     (R0),R4         ;LARGER ITEMS AT TOP OF LIST,
013346  011110                  MOV     (R1),(R0)       ;SMALLER AT THE BOTTOM
```

```
013350  010411                          MOV     R4,(R1)
013352  005203                          INC     R3
013354  005720                  3$:     TST     (R0)+
013356  005721                          TST     (R1)+
013360  005202                          INC     R2
013362  001366                          BNE     2$
013364  005703                          TST     R3              ;SORTED ALL ITEMS?
013366  001355                          BNE     1$              ;IF NOT LOOP BACK

013370  013700  001162                  MOV     $REG0,R0        ;PTR TO 'SEEK TIME'
013374  013701  001166                  MOV     $REG2,R1        ;SAVE 'SEEK TIME' HERE
013400  013702  001170                  MOV     $REG3,R2        ;SAVE '# OF TIMES' HERE
013404  010204                          MOV     R2,R4
013406  005024                          CLR     (R4)+           ;CLR OUT 5 WORDS OF
013410  005024                          CLR     (R4)+           ;'# OF TIMES'BUFR
013412  005024                          CLR     (R4)+
013414  005024                          CLR     (R4)+
013416  005024                          CLR     (R4)+
013420  012703  177773                  MOV     #-5,R3          ;SAVE ONLY 5 DIFRNT 'SEEK TIMES'

013424  011011                          MOV     (R0),(R1)       ;FIND OUT THE '# OF TIMES'
013426  012703  177634                  MOV     #-144,R3        ;EACH 'SEEK TIME' WAS
013432  022011                  4$:     CMP     (R0)+,(R1)
013434  001411                          BEQ     5$              ;OBTAINED

013436  005721                          TST     (R1)+
013440  016011  177776                  MOV     -2(R0),(R1)     ;SAVE 'SEEK TIME'
013444  005722                          TST     (R2)+
013446  012712  000001                  MOV     #1,(R2)         ;KEEP '# OF TIMES'
013452  005203                          INC     R3
013454  001404                          BEQ     6$
013456  000765                          BR      4$

013460  005212                  5$:     INC     (R2)            ;INCRMNT '# OF TIMES'
013462  005203                          INC     R3              ;ALL DONE?
013464  001362                          BNE     4$              ;IF NOT, GO BAK

013466  005205                  6$:     INC     R5              ;SORTED BOTH FRWRD, REVRSE
013470  001415                          BEQ     GOTYPE          ;'SEEK TIMES', IF YES GO TYPE

013472  012737  027342  001162          MOV     #BUFR11,$REG0   ;IF NOT, INITLZE PTR TO 'SEEK TIME'
013500  012737  027344  001164          MOV     #BUFR11+2,$REG1
013506  012737  026602  001166          MOV     #BUFR6,$REG2    ;SAVE 'SEEK TIME'
013514  012737  026662  001170          MOV     #BUFR7,$REG3    ;SAVE '# OF TIMES' HERE

013522  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'
013524  104401                  GOTYPE: TYPE
013526  001213                          $CRLF
013530  104401  013536                  TYPE    ,65$            ;;TYPE ASCIZ STRING
013534  000403                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /CYLS:/
013544                          64$:
```

```
                        MOV     @OUTADR,R0      ;GET OUTER CYL #
                        ASR     R0
                        ASR     R0
                        ASR     R0
                        ASR     R0
                        ASR     R0
                        MOV     R0,-(SP)
                        TYPDSS                  ;TYPE IT OUT IN DECIMAL
                        TYPE    ,67$            ;;TYPE ASCIZ STRING
                        BR      66$             ;;GET OVER THE ASCIZ
                ;;67$:  .ASCIZ  /-/
                66$:
                        MOV     @INADR,R1       ;GET INNER CYL #
                        ASR     R1
                        ASR     R1
                        ASR     R1
                        ASR     R1
                        ASR     R1
                        MOV     R1,-(SP)
                        TYPDSS                  ;TYPE IT OUT IN DECIMAL
                        TYPE    ,69$            ;;TYPE ASCIZ STRING
                        BR      68$             ;;GET OVER THE ASCIZ
                ;;69$:  .ASCIZ  <15><12>/  FRWRD/
                69$:
                        TYPE    ,BLNKS9
                        TYPE    ,71$            ;;TYPE ASCIZ STRING
                        BR      70$             ;;GET OVER THE ASCIZ
                ;;71$:  .ASCIZ  /REVRSE/
                70$:


                                                ;TYPE OUT THE '# OF SEEKS' & 'SEEK
                                                ;TIME' OBTAINED FOR EACH OF THOSE
                                                ;SEEKS
                TYPTIM: CLR     R0
                        CLR     R5
                1$:     TYPE
                        $CRLF
                        MOV     BUFR5(R0),-(SP) ;GET '# OF SEEKS', IF NONE (0)
                        BEQ     3$              ;SKIP TYPING (FRWRD SEEK)
                        TYPDS                   ;GO TYPE OUT DECIMAL '# OF SEEKS'
                        TYPE
                        BLNKS2
                        MOV     BUFR4(R0),-(SP) ;GET 'SEEK TIME' FOR EACH OF
                        TYPDS                   ;OF THAT '# OF SEEKS'. 'GO
                                                ;TYPE OUT IN DECIMAL

                2$:     MOV     BUFR7(R0),-(SP) ;GET '# OF SEEKS', IF NONE (0)
                        BEQ     4$              ;SKIP TYPING (REVRSE SEEK)
                        TST     R5
                        BEQ     6$
                        TYPE    ,BLNK13
                6$:     TYPDS                   ;TYPE OUT IN DECIMAL
                        TYPE
                        BLNKS2
                        MOV     BUFR6(R0),-(SP) ;GET 'SEEK TIME' & TYPE IT
                        TYPDS                   ;OUT IN DECIMAL
```

```
                013746  000406                  BR      5$

                013750  005726          3$:     TST     (SP)+           ;POP STACK
                013752  005205                  INC     R5
                013754  000757                  BR      2$

                013756  005726          4$:     TST     (SP)+           ;POP STACK
                013760  005705                  TST     R5
                013762  001004                  BNE     TIMDON

                013764  005720          5$:     TST     (R0)+           ;INCREMENT PTR TO TABLES
                013766  020027  000012          CMP     R0,#12          ;ALL DONE?
                013772  001335                  BNE     1$              ;IF NOT GO BAK

                013774  062737  000002  001260  TIMDON: ADD     #2,INADR        ;INCRMNT POINTER TO NEXT
                014002  062737  000002  001262          ADD     #2,OUTADR       ;INNER & OUTER ADRES
                014010  005237  001252                  INC     RETRY1          ;ALL DONE?
                014014  001406                  BEQ     PLTGRPH
                014016  032777  000100  165114          BIT     #SW6,@SWR       ;INHIBIT TIMER? FURTHER ?
                014024  001402                  BEQ     PLTGRPH         ;YES, BRANCH
                014026  000137  013124          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
                014032  032777  000040  165100  PLTGRPH: BIT #SW5,@SWR          ;SKIP THE GRAPH?
                014040  001002                  BNE     .+6
                014042  000137  015150          JMP     TST12           ;YES, BRANCH
                014046  104415                  CON.RESET
                014050  104416                  DRV.RESET
                014052  012737  177465  001500  MOV     #-313,INDX3     ;PERFORM 313 SEEKS 0-0,0-1,0-312
                014060  012704  026742          MOV     #BUFR10,R4      ;STORE 'SEEK TIME' HERE
                014064  005037  001260          CLR     INADR           ;CLR CYL ADRES BITS

                014070  013777  001260  165366  1$:     MOV     INADR,@RKDA     ;ADRES THE RIGHT CYLINDER
                014076  053777  001230  165360          BIS     DRIVAD,@RKDA    ;ADRES THE RIGHT DRIVE

                014104  004737  014722          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
                014110  010324                  MOV     R3,(R4)+        ;STORE 'SEEK TIME'
                014112  042777  017777  165344  BIC     #17777,@RKDA            ;SEEK BACK TO CYL 0 FOR
                014120  012777  000011  165330  MOV     #11,@RKCS       ;TIMING NXT CYL SEEK
                014126  104421                  CON.RDY                 ;WAIT FOR CNTRL RDY?
                014130  104422                  TST.RWS                 ;WAIT FOR R/W/S RDY
                014132  062737  000040  001260  ADD     #40,INADR       ;FORM NXT CYL ADRES
                014140  005237  001500          INC     INDX3
```

```
                                        BNE     1$

                                        ;PLOT A GRAPH USING 'SEEK TIMES' RECORDED BEFORE

014146                          PLOT:
014146  104401  014154                TYPE    ,65$            ;;TYPE ASCIZ STRING
014152  000422                    BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <15><12><12><12>/X AXIS - SEEK TIME - MILI SECS
                                64$:
014220                                  TYPE    ,67$            ;;TYPE ASCIZ STRING
014220  104401  014226                BR      66$             ;;GET OVER THE ASCIZ
014224  000423                ;;67$:  .ASCIZ  <15><12>/Y AXIS - CYLINDER SEEKED FROM 0/<15><12><12>
014274                          66$:
014274  104401                        TYPE
014276  002103                        BLNKS7
014300  005000                        CLR     R0              ;TYPE OUT THE TIME UNITS
014302  013046                1$:     MOV     R0,-(SP)        ;(MILI SECS) FOR THE X-AXIS
014304  104424                        TYPDSS                  ;LIKE THIS:
014306  005700                        TST     R0              ;0   20   30   40.....
014310  001411                        BEQ     2$
014312  022700  000144                CMP     #144,R0
014316  003010                        BGT     4$
014320  022700  000170                CMP     #170,R0
014324  002412                        BLT     5$
014326  104401                        TYPE
014330  002110                        BLNKS2
014332  000404                        BR      3$
014334  104401                2$:     TYPE
014336  002111                        BLNKS1
014340  104401                4$:     TYPE
014342  002107                        BLNKS3
014344  062700  000012        3$:     ADD     #12,R0
014350  000754                        BR      1$

014352  104401                5$:     TYPE
014354  001213                        $CRLF
014356  104401                        TYPE
014360  002103                        BLNKS7

014362  012700  177763        PLT1:   MOV     #-15,R0         ;TYPE OUT THE X-AXIS MARKERS
014366                          1$:
014366  104401  014374                TYPE    ,65$            ;;TYPE ASCIZ STRING
014372  000403                    BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /I----/
014402                          64$:
014402  005200                        INC     R0              ;I----I----I----
014404  001370                        BNE     1$

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

014406  032777  000020  164524        BIT     #SW4,@SWR       ;TYPE COMPLETE GRAPH?
014414  001054                        BNE     CMPGRP          ;YES BRANCH
                                                            ;IF NOT, TYPE SMALL GRAPH
```

```
014416  005000                  SMGRP:  CLR     R0
014420  032777  000040  164512  1$:     BIT     #SW5,@SWR       ;SKIP REST OF GRAPH?
014426  001445                          BEQ     5$              ;YES
014430  104401                          TYPE                    ;IN THIS GRAPH SEEK TIMES ARE
014432  001213                          $CRLF           ;PLOTTED ONLY FOR SELECTED
                                                        ;CYLINDERS (NOT ALL) SHOWN BELOW:
                                                        ;0,1,2,3,4,  6,8,10,12,14,16,18,20,
                                                        ;25,30,35,...,190,195,200,  203
014434  010046                          MOV     R0,-(SP)                ;TYPE THE MARKERS
014436  104405                          TYPDS
014440  104401  014446                  TYPE    ,65$            ;;TYPE ASCIZ STRING
014444  000401                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /-/
014450                          64$:
014450  010001                          MOV     R0,R1           ;FORM THE ADRES OF 'SEEK TIME'
014452  006301                          ASL     R1
014454  016103  026742                  MOV     BUFR10(R1),R3   ;GET THE SEEK TIME
014460  004737  014662                  JSR     PC,PLTPT                ;GO PLOT IT
014464  022700  000004                  CMP     #4,R0           ;PLOTTED UPTO CYL 4?
014470  003402                          BLE     2$              ;YES
014472  005200                          INC     R0
014474  000751                          BR      1$
014476  022700  000024          2$:     CMP     #24,R0  ;PLOTTED UPTO CYL 20?
014502  003403                          BLE     3$
014504  062700  000002                  ADD     #2,R0
014510  000743                          BR      1$
014512  022700  000310          3$:     CMP     #310,R0         ;PLOTTED UPTO CYL 200?
014516  003403                          BLE     4$
014520  062700  000005                  ADD     #5,R0
014524  000735                          BR      1$
014526  022700  000312          4$:     CMP     #312,R0         ;PLOTTED ALL CYLS?
014532  001403                          BEQ     5$
014534  062700  000002                  ADD     #2,R0
014540  000727                          BR      1$
014542  000137  015150          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).

014546  005000                  CMPGRP: CLR     R0              ;INITLZE COUNT
014550  012701  177773                  MOV     #-5,R1          ;INITLZE COUNT FOR Y-AXIS MARKER
014554  012702  026742                  MOV     #BUFR10,R2      ;INITLZE PTR TO SEEK TIMES
014560  104401                          TYPE
014562  001213                          $CRLF
014564  000412                          BR      3$

014566  032777  000040  164344  2$:     BIT     #SW5,@SWR               ;SKIP REST OF GRAPH?
014574  001002                          BNE     .+6
014576  000137  015150                  JMP     TST12
014602  005201                          INC     R1              ;TYPE OUT Y-AXIS MARKER 'CYL #'
014604  001005                          BNE     4$              ;IF REQUIRED
014606  012701  177773                  MOV     #-5,R1
014612  010046                  3$:     MOV     R0,-(SP)        ;TYPE 'CYL #' ON Y-AXIS
014614  104405                          TYPDS                   ;(IN DECIMAL)
```

```
                        014616  000402                  BR      5$
                        014620  104401          4$:     TYPE
                        014622  002104                  BLNKS6
                        014624                  5$:             .
                        014624  104401  014632          TYPE    ,65$            ;;TYPE ASCIZ STRING
                        014630  000401                  BR      64$             ;;GET OVER THE ASCIZ
                                                ;;65$:  .ASCIZ  /-/
                        014634                  64$:

                        014634  012203                  MOV     (R2)+,R3                ;GET SEEK TIME
                        014636  004737  014662          JSR     PC,PLTPT        ;GO PLOT THE POINT


                        014642  104401                  TYPE
                        014644  001213                  $CRLF
                        014646  005200                  INC     R0              ;ALL DONE?
                        014650  022700  000312          CMP     #312,R0
                        014654  001344                  BNE     2$              ;IF NOT, GO BAK
                        014656  000137  015150  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

                        014662  162703  000310  PLTPT:  SUB     #310,R3         ;FIND OUT HOW MANY BLANKS TO
                        014666  002403                  BLT     7$              ;INSERT TO PLOT THE POINT
                                                                                ;NOTE THE FIRST CELL = 0 MS
                        014670  104401                  TYPE
                        014672  002111                  BLNKS1
                        014674  000772                  BR      PLTPT
                        014676  062703  000144  7$:     ADD     #144,R3
                        014702  002402                  BLT     8$
                        014704  104401                  TYPE
                        014706  002111                  BLNKS1

                        014710                  8$:
                        014710  104401  014716          TYPE    ,65$            ;;TYPE ASCIZ STRING
                        014714  000401                  BR      64$             ;;GET OVER THE ASCIZ
                                                ;;65$:  .ASCIZ  /X/
                        014720                  64$:
                        014720  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
014722  010246                  TIMSEK: MOV     R2,-(SP)        ;DISK (FROM INDEX MARK TO INDEX MARK)
014724  005003                          CLR     R3              ;40 MILI SECS FOR EACH REV
014726  013701  001452                  MOV     RKDS,R1
014732  011102                  1$:     MOV     @R1,R2
014734  032702  000400                  BIT     #400,R2         ;WAIT FOR SOK
014740  001774                          BEQ     1$

014742  032702  000010                  BIT     #BIT3,R2                ;WAIT FOR SECTOR 10 SO THAT
014746  001771                          BEQ     1$              ;U CAN START WAITING FOR
                                                                ;INDEX, SEC 0

014750  011102                  2$:     MOV     @R1,R2
014752  032702  000400                  BIT     #400,R2         ;WAIT FOR SEC OK
014756  001774                          BEQ     2$
014760  021102                          CMP     @R1,R2
014762  001372                          BNE     2$
014764  032702  000017                  BIT     #17,R2                  ;WAIT FOR SEC 0, INDEX MARK
014770  001367                          BNE     2$              ;AS SOON AS IT IS SEC 0, ISSUE
                                                                ;A SEEK & START TIMING
                                                                ;
014772  012777  000011  164456          MOV     #11,@RKCS       ;ISSUE A SEEK, START TIMING
                                                                ;THE SEC COUNTER
015000  104421                          CON.RDY                 ;WAIT FOR CNTRL RDY

015002  011102                  3$:     MOV     @R1,R2          ;GET RKDS
015004  032702  000400                  BIT     #400,R2         ;WAIT FOR SOK
015010  001774                          BEQ     3$
015012  020211                          CMP     R2,@R1          ;INFO CORRECT?
015014  001372                          BNE     3$              ;NO
015016  032702  000100                  BIT     #100,R2         ;R/W/S RDY SET?
015022  001025                          BNE     SKDON           ;IF YES, BRANCH
015024  032702  000017                  BIT     #17,R2          ;WAIT FOR SEC CNTR TO MOVE
015030  001764                          BEQ     3$              ;FROM 0 TO 1

015032  011102                  4$:     MOV     @R1,R2
015034  032702  000400                  BIT     #400,R2         ;WAIT FOR SOK
015040  001774                          BEQ     4$
015042  020211                          CMP     R2,@R1
015044  001372                          BNE     4$
015046  032702  000100                  BIT     #100,R2         ;R/W/S RDY SET, SEEK DONE?
015052  001005                          BNE     5$              ;YES, BRANCH
015054  032702  000017                  BIT     #17,R2                  ;IF NOT KEEP TRACK OF SEC
015060  001364                          BNE     4$              ;COUNTER. INCREMENT R3 AT
                                                                ;EVERY INDEX MARK,EVERY
015062  005203                          INC     R3              ;40 MILI SECS
015064  000746                          BR      3$              ;GO BAK, KEEP TIME

015066  032702  000017          5$:     BIT     #17,R2          ;CHECK, IS IT INDEX MARK -SEC 0
015072  001001                          BNE     SKDON           ;IF NOT, SKIP
015074  005203                          INC     R3              ;IF YES, INCREMENT COUNT


                                                                ;SEEK DONE, SAVE RKDS-SEC COUNTER.
```

```
                                SKDON:
                                        MOV     #14.,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
                                        MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
                                        JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
                                        MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
                                        MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
                                        BIC     #177760,R2      ;SEEK. TOTAL TIME=(IN DECIMAL)
                                        ADD     R2,R3           ;[(R3)X12+SEC COUNTER]X330X0.01
                                                                ;NOTE THERE IS A SCALE FACTOR
                                        MOV     #512.,-(SP)             ;;PUT THE MULTIPLER ON THE STACK
                                        MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
                                        JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
                                        MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
                                        MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
                                        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.
                                        MOV     (SP)+,R2        ;POP R2 BAK
                                        RTS     PC              ;RETURN


                                ;;*****************************************************************
                                ;*TEST 12       END OF PROGRAM
                                        ;*THIS IS NOT A TEST BUT IS JUST A LINKAGE
                                        ;*PROVIDED TO TEST ALL THE DRIVES.
                                ;;*****************************************************************
                                TST12:  SCOPE
                                        INCB    DRVDON
                                BTEOP:  CMPB    DRVDON,DRIVS
                                        BEQ     .+6
                                        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

                                $EOP:
                                        SCOPE
                                        CLR     $TSTNM          ;;ZERO THE TEST NUMBER
                                        INC     $PASS           ;;INCREMENT THE PASS NUMBER
                                        BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
                                        DEC     (PC)+           ;;LOOP?
                                $EOPCT: .WORD   1
                                        BGT     $DOAGN          ;;YES
                                        MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
                                $ENDCT: .WORD   1
                                        $EOPCT
```

```
                                        TYPE    $ENDMG          ;;TYPE "END PASS #"
                                        MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                        TYPE    $ENULL          ;;TYPE A NULL CHARACTER
                        $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
                                        BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
                                        RESET                   ;;CLEAR THE WORLD
                        $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
                                        NOP                     ;;SAVE ROOM
                                        NOP                     ;;FOR
                                        NOP                     ;;ACT11
                        $DOAGN:
                                        JMP     @(PC)+          ;;RETURN
                        $RTNAD: .WORD   ST3
015270  377     377     000     $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
015273  015  042412  042116     $ENDMG: .ASCIZ  <15><12>/END PASS #/
015300  050040  051501  020123
015306  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

015310                                  ESR15:
015310  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
015312  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
015314  012701  001266                          MOV     #BUFR,R1        ;SEC #'S STORED HERE PREVIOUSLY
015320  012702  001320                          MOV     #BUFR1,R2       ;BAD HDRS STORED HERE PRVSLY
015324  012146                          1$:     MOV     (R1)+,-(SP)
015326  104403                                  TYPOS                   ;GO TYPE OUT BAD SEC # (OCTAL)
015330     002                                  .BYTE   2               ;ONLY 2 DIGITS
015331     000                                  .BYTE   0               ;SUPRES LDG 0'S
015332  104401                                  TYPE                    ;TYPE 3 BLNKS
015334  002107                                  BLNKS3
015336  012246                                  MOV     (R2)+,-(SP)     ;GO TYPE OUT BAD HEADER
015340  104402                                  TYPOC
015342  104401                                  TYPE
015344  002106                                  BLNKS4
015346  104401                                  TYPE
015350  001213                                  $CRLF
015352  022711  177777                         CMP     #177777,(R1)    ;ALL BAD SEC #'S TYPD OUT?
015356  001362                                  BNE     1$              ;IF NOT GO BAK

015360  104401                                  TYPE
015362  001716                                  MSGB
015364  010546                                  MOV     R5,-(SP)        ;TYPE OUT EXPCTD HEADER FOR
015366  042716  160037                         BIC     #160037,(SP)
015372  104402                                  TYPOC                   ;THAT CYLINDER

015374  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
015376  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
015400  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

015402  004737  015310                  ESR13:  JSR     PC,ESR15
015406  104401  015414                          TYPE    ,65$            ;;TYPE ASCIZ STRING
015412  000404                                  BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  /  SUR=/
015424                                  64$:
015424  005046                                  CLR     -(SP)
015426  032705  000020                          BIT     #20,R5          ;SUR 0 OR 11?
015432  001401                                  BEQ     1$
015434  005216                                  INC     (SP)
015436  104402                          1$:     TYPOC

015440  104401  002053                          TYPE    ,MSG13
015444  013746  001254                          MOV     RETRY2,-(SP
015450  005216                                  INC     (SP)
015452  104402                                  TYPOC
015454  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.

015456  004737  015402                  ESR20:  JSR     PC,ESR13        ;GO TYPE OUT SEC #'S, BAD HDRS
015462  004737  016244                          JSR     PC,ERR2         ;GET CYL #'S BETWN WHICH SEEK
                                                                        ;WAS TRIED
015466  104401  015474                          TYPE    ,65$            ;;TYPE ASCIZ STRING
015472  000404                                  BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ     CYLA=/
015504                                  64$:
015504  013746  001162                          MOV     $REG0,-(SP)     ;GO TYPE CYL # FROM WHERE
015510  104403                                  TYPOS                   ;SEEK BEGAN
015512     003                                  .BYTE   3               ;TYPE 3 DIGITS
015513     000                                  .BYTE   0               ;SUPRES LDG 0'S
015514  104401  015522                          TYPE    ,67$            ;;TYPE ASCIZ STRING
015520  000404                                  BR      66$             ;;GET OVER THE ASCIZ
                                        ;;67$:  .ASCIZ  /  CYLB=/
015532                                  66$:
015532  013746  001164                          MOV     $REG1,-(SP)     ;TYPE CYL # TO WHICH SEEK
015536  104403                                  TYPOS                   ;WAS DONE
015540     003                                  .BYTE   3               ;TYPE 3 DIGITS
015541     000                                  .BYTE   0               ;SUPRES LDG 0'S
015542  000207                                  RTS     PC              ;RETURN


                                                .SBTTL  ESR25
```

```
015544  010205                  ESR25:  MOV     R2,R5           ;SAVE ADRES OF TERMINATOR

015546  012702  001266                  MOV     #BUFR,R2        ;INITLZE PTR TO TABLE STORING
                                                                ;ADRES OF BAD DATA
015552  012703  001320                  MOV     #BUFR1,R3       ;INITLZE PTR TO 'EXPCTD' DATA
015556  012704  001352                  MOV     #BUFR2,R4       ;INITLZE PTR TO 'RECVD' DATA

015562  032777  020000  163350  1$:     BIT     #SW13,@SWR      ;INHIBIT TYPE OUT?
015566  001076                          BNE     4$              ;YES, EXIT
015572  104401                          TYPE                    ;TYPE CR,LF
015574  001213                          $CRLF

015576  163712  001404                  SUB     PBUF0,(R2)      ;GET WORD # IN BUFR (0,1,2...)
016022  006212                          ASR     (R2)
016024  011246                          MOV     (R2),-(SP)      ;WHICH WAS BAD.  NOTE YOU
                                                                ;CAN HAVE THE ACTUAL MEMORY
                                                                ;ADRES BY ADDING 'IOBUF0'
                                                                ;TO THIS
016026  104403                          TYPOS                   ;GO TYPE WORD # THAT WAS BAD
016032  000004                          .BYTE   4
016033  000000                          .BYTE   0
016034  104400                          TYPE
016036  001210                          BLNKS3                  ;2 BLANKS

016040  012346                          MOV     (R3)+,-(SP)     ;GET EXPCTD DATA
016042  104402                          TYPOC                   ;GO TYPE IT
016044  104400                          TYPE
016046  002110                          BLNKS2
016050  012446                          MOV     (R4)+,-(SP      ;GET RECVD DATA (BAD)
016052  104402                          TYPOC                   ;GO TYPE IT
016054  104400                          TYPE
016056  002110                          BLNKS2

016060  012700  000400                  MOV     #400,R0         ;GET THE DISK ADRES FROM
016064  021205                  2$:     CMP     (R2),R0         ;WHICH THIS (BAD) DATA WAS
016066  002405                          BLT     3$              ;READ
016070  062700  000400                  ADD     #400,R0
016074  022700  002400                  CMP     #2400,R0
016100  001371                          BNE     2$

016102  000300                  3$:     SWAB    R0
016104  005300                          DEC     R0
016106  063700  001450                  ADD     ADRES,R0        ;R0 CONTAINS THE DISK
                                                                ;ADRES FROM WHICH THE (BAD)
016112  010037  001170                  MOV     R0,$REG3        ;DATA WAS READ

016116  004737  016144                  JSR     PC,BRKDA        ;GO BREAK ABOVE DISK ADRES
                                                                ;INTO CYL#, SUR#, SEC#

016122  013746  001174                  MOV     $REG5,-(SP)     ;GET THE CYL#
016126  104403                          TYPOS                   ;TYPE IT
016130  003                             .BYTE   3               ;ONLY 3 DIGITS
016131  000                             .BYTE   0               ;NO LEADING 0'S
016132  104401                          TYPE
016134  002107                          BLNKS3
```

```
 3458  015714  013746  001176          MOV     $REG6,-(SP)     ;GET SJR #
 3459  015720  104403                  TYPOS                   ;TYPE
 3460  015722     001                  .BYTE   1               ;1 DIGIT ONLY
 3461  015723     000                  .BYTE   0
 3462
 3463  015724  104401                  TYPE
 3464  015726  002106                  BLNKS4
 3465
 3466  015730  013746  001200          MOV     $REG7,-(SP)     ;GET SEC#
 3467  015734  104403                  TYPOS                   ;TYPE
 3468  015736     002                  .BYTE   2               ;2 DIGITS
 3469  015737     000                  .BYTE   0
 3470
 3471  015740  005722                  TST     (R2)+           ;INCREMNT PTR
 3472  015742  020205                  CMP     R2,R5           ;TYPED OUT ALL BAD DATA
 3473                                                          ;INFO?
 3474  015744  001306                  BNE     1$              ;IF NOT LUP BAK
 3475  015746  104401                  TYPE
 3476  015750  002053                  MSG13                   ;'  TRY #:'
 3477  015752  013746  001254          MOV     RETRY2,-(SP)    ;GET RETRY COUNT
 3478  015756  062716  000003          ADD     #3,(SP)         ;FORM THE RETRY NO.
 3479  015762  104403                  TYPOS                   ;TYPE IT OUT
 3480  015764     001                  .BYTE   1
 3481  015765     000                  .BYTE   0
 3482
 3483  015766  000207          4$:     RTS     PC              ;IF YES, RETURN
 3484                          ;MESSAGE HANDLER
 3485                          ;THE MESSAGE HANDLER IS USED FOR TYPING OUT MESSAGES & DATA
 3486                          ;RELATED TO THE MESSAGE. IF SW13 IS SET, THE TYPEOUT IS
 3487                          ;INHIBITED. THE CALL IS:
 3488                          ;               MESAGE  ,XX
 3489                          ;XXX IS THE MESSAGE NUMBER & PROVIDES AN INDEX TO THE
 3490                          ;'ERROR ITEMS TABLE' WHERE THAT MESAGE ITEM
 3491                          ;IS LOCATED.
 3492                          ;THE MESAGE ITEM CONTAINS:
 3493                          ;       MS:     POINTER TO THE ASCII MESAGE
 3494                          ;       DH:     POINTER TO THE DATA HEADER
 3495                          ;       DT:     POINTER TO THE DATA
 3496                          ;       0       TERMINATOR
 3497                          ;IF 'DT' IS 0 THE DATA IS TO BE PRINTED USING THE SUBROUTINE
 3498                          ;INDICATED IN PLACE OF THE TERMINATOR
 3499
 3500  015770  032777  020000  163142  MSGE:   BIT     #SW13,@SWR      ;INHIBIT TYPEOUT?
 3501  015776  001012                  BNE     1$              ;IF YES, EXIT
 3502  016000  011637  001116          MOV     (SP),$ERRPC     ;GET ADRES OF 'MESAGE' CALL
 3503  016004  162737  000002  001116  SUB     #2,$ERRPC       ;STORE IT
 3504  016012  117637  000000  001114  MOVB    @(SP),$ITEMB    ;GET MESAGE # (INDEX TO ITEM TABLE)
 3505  016020  004737  017362          JSR     PC,@#ERRTYP     ;GO TO 'ERRTYP' & TYPE OUT
 3506                                                          ;INFO
 3507  016024  062716  000002  1$:     ADD     #2,(SP)         ;ADJUST RETURN ADDRES
 3508  016030  000002                  RTI                     ;EXIT
 3509
 3510                          ;THIS ROUTINE IS USED FOR TYPING OUT ASCII MESSAGES. BEFORE
 3511                          ;THE MESSAGE IS TYPED SW13 IS CHECKED & IF SET THE
 3512                          ;TYPEOUT IS INHIBITED & AN EXIT IS MADE.
 3513                          ;THE CALL FOR THIS ROUTINE IS "" 'PMSG", AN ENCODED
```

```
                                ;TRAP INSTRUCTION.
                                ;THE POINTER TO THE ASCII MESSAGE TO BE TYPED IS LOCATED IN  THE
                                ;WORD FOLLOWING THE "TYPMSG" CALL.

016032  032777  020000  163100  TY.MSG: BIT     @#SW13,@SWR     ;INHIBIT TYPEOUT?
016040  001005                          BNE     2$              ;YES. EXIT
016042  017637  000000  016052          MOV     @(SP)+,1$       ;GET POINTER TO ASCII MESSAGE
016050  104401                          TYPE                    ;GO TYPE ASCII STRING
016052  000000                  1$:     0
016054  062716  000002          2$:     ADD     #2, SP          ;ADJUST RETURN ADRES, SKIP OVER
                                                                ;POINTER ON RETURN
016060  000002                          RTI                     ;EXIT


                                ;GTSRG
                                ;THIS ROUTINE EXTRACTS THE CYLINDER # FROM RKDA AND STORES IT
                                ;IN $REG4. THEN TRANSFERS RKCS, ER, DS, DA TO $REG0, $REG1, $REG2, $REG3
016062  017746  163376          GTSRG:  MOV     @RKDA,-(SP)     ;PUSH RKDA ONTO STACK
016066  042716  160037                  BIC     #160037,(SP)    ;MASK OUT NON-CYLINDER BITS
016072  006316                          ASL     (SP)            ;SHIFT 8 BITS OF CYL ADRES TO LO BYTE
016074  006316                          ASL     (SP)
016076  006316                          ASL     (SP)
016100  006316                          SWAB    (SP)
016102  112634  001172                  MOVB    (SP)+,$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

016106  017737  163344  001162  GT4RG:  MOV     @RKCS,$REG0     ;GET RKCS
016114  017737  163334  001164          MOV     @RKER,$REG1     ;    RKER
016122  017737  163324  001166          MOV     @RKDS,$REG2     ;    RKDS
016130  017737  163330  001170          MOV     @RKDA,$REG3     ;    RKDA
016136  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.

016140  004737  016106  GETINF: JSR     PC,GT4RG
016144  010046          BRKDA:  MOV     R0,-(SP)
016146  010146                  MOV     R1,-(SP)
016150  010246                  MOV     R2,-(SP)
016152  012700  001202          MOV     #$REG7+2,R0
016156  013701  001170          MOV     $REG3,R1
016162  010102                  MOV     R1,R2
016164  042702  177760          BIC     #177760,R2
016170  010240                  MOV     R2,-(R0)
016172  006201                  ASR     R1
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016174  006201                          ASR     R1
016176  006201                          ASR     R1
016200  006201                          ASR     R1
016202  010102                          MOV     R1,R2
016204  042702  177776                  BIC     #177776,R2
016210  010240                          MOV     R2,-(R0)
016212  006201                          ASR     R1
016214  010102                          MOV     R1,R2
016216  042702  177400                  BIC     #177400,R2
016222  010240                          MOV     R2,-(R0)
016224  000301                          SWAB    R1
016226  042701  177770                  BIC     #177770,R1
016232  010140                          MOV     R1,-(R0)
016234  012602                          MOV     (SP)+,R2
016236  012601                          MOV     (SP)+,R1
016240  012600                          MOV     (SP)+,R0
016242  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, $REG1 CONTAINS CYL # TO WHICH SEEK WAS DONE
016244  013737  001260  001162  ERR2:   MOV     INADR,$REG0     ;GET CYL ADRES
016252  004737  016360                  JSR     PC,GCYL         ;GO GET CYL# FROM IT
016256  013737  001162  001164          MOV     $REG0,$REG1     ;SAVE
016264  013737  001262  001162          MOV     OUTADR,$REG0    ;GET CYL ADRES
016272  004737  016360                  JSR     PC,GCYL         ;GO GET CYL # FROM IT
016276  005704                          TST     R4              ;GOING WHICH WAY?
016300  001407                          BEQ     1$              ;'OUTADR' TO 'INADR', BRANCH
016302  013746  001162                  MOV     $REG0,-(SP)     ;EXCHANG CYL# TO GET
016306  013737  001164  001162          MOV     $REG1,$REG0     ;CORRECT 'TO' & 'FROM' CYLS
016314  012637  001164                  MOV     (SP)+,$REG1
016320  000207                  1$:     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).

016322  010537  001162          ERR1:   MOV     R5,$REG0
016326  004737  016360                  JSR     PC,GCYL ;GO GET CYL #
016332  005704                          TST     R4              ;WAS GOING IN OR OUT?
016334  001006                          BNE     1$              ;OUT
016336  013737  001162  001164          MOV     $REG0,$REG1
016344  005037  001162                  CLR     $REG0
```

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016350  000207                          RTS     PC
016352  005037  001164         1$:      CLR     $REG1
016356  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'
016360  010046                  GCYL:   MOV     R0,-(SP)        ;PUSH R0 ONTO STACK
016362  013700  001162                  MOV     $REGO,R0
016366  042700  160037                  BIC     #160037,R0      ;MASK OUT DRV # BITS &
                                                                ;SUR, SEC BITS IF PRESENT
016372  006200                          ASR     R0
016374  006200                          ASR     R0              ;SHIFT CYL BITS RIGHT
016376  006200                          ASR     R0              ;BY 5
016400  006200                          ASR     R0
016402  006200                          ASR     R0
016404  010037  001162                  MOV     R0,$REGO        ;STORE CYL # IN $REGO
016410  012600                          MOV     (SP)+,R0        ;POP R0 FROM STACK
016412  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.


016414  005037  001174  DR.RST:  CLR     $REG5           ;INITIALIZE THE COUNT
016420  013777  001230  163036          MOV     DRIVAD,@RKDA
016426  012777  000015  163022          MOV     #15,@RKCS       ;DRIVE RESET, GO
016434  104421                          CON.RDY
016436  000402                          BR      RES.D0+4
016440  005037  001174  RES.D0: CLR     $REG5
016444  032777  000100  163000  1$:     BIT     #100,@RKDS              ;DID R/W/S RDY SET?
016452  001024                          BNE     2$
016454  012746  177770                  MOV     #-10.,-(SP)     ;PUSH COUNT ON SP
016460  005216                          INC     (SP)            ;COUNT IT DOW
016462  001376                          BNE     .-2
016464  005726                          TST     (SP)+           ;POP UP SP
016466  005237  001174                  INC     $REG5                   ;IF NOT WAIT
016472  001364                          BNE     1$                      ;WAITED LONG?
016474  032777  020000  162436          BIT     #SW13,@SWR
016502  001010                          BNE     2$
016504  104420                          TYPMSG
016506  002027                          MSG12
016510  104420  001733                  TYPMSG  ,MSG7
016514  011646                          MOV     (SP),-(SP)
016516  162716  000002                  SUB     #2,(SP)
016522  104402                          TYPOC
016524  000002                  2$:     RTI
```

```
                                        .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.
016526  012777  000001  162722  CN.RST: MOV     #1,@RKCS        ;ISSUE A CONTROL RESET
016534  012737  177500  001170          MOV     #-300,$REG3     ;SET UP COUNT
016542  000402                          BR      CN.RDY+4                ;SKIP OVER CN.RDY
016544  005037  001170          CN.RDY: CLR     $REG3
016550  105777  162702          1$:     TSTB    @RKCS           ;DID CNTRL-RDY SET?
016554  100431                          BMI     2$              ;YES, EXIT
016556  005237  001170                  INC     $REG3           ;WAITED LONG?
016562  001372                          BNE     1$              ;IF NOT, GO BAK & WAIT
016564  104420                          TYPMSG
016566  001742                          MSG10
016570  104401  016576                  TYPE    ,65$            ;;TYPE ASCIZ STRING
016574  000403                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <15><12>/PC=/
016604                          64$:
016604  011646                          MOV     (SP),-(SP)
016606  162716  000002                  SUB     #2,(SP)
016612  104402                          TYPOC                   ;GO TYPE PC IN THE MAIN PROGRAM,
                                                                ; WHERE ERROR OCCURRED
016614  104401  016622                  TYPE    ,67$            ;;TYPE ASCIZ STRING
016620  000404                          BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  / RKCS=/
016632                          66$:
016632  017746  162620                  MOV     @RKCS,-(SP)     ;GET RKCS
016636  104402                          TYPOC                   ;GO TYPE IT

016640  000002          2$:     RTI                             ;RETURN FROM THIS
                                                                ;ROUTINE TO THE MAIN
```

```
                                                        ;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

016642  005037  001264          TSTRWS: CLR     TIMER
016646  032777  000100  162576  1$:     BIT     #100,@RKDS
016654  001017                        BNE     2$
016656  005237  001264                INC     TIMER
016662  001371                        BNE     1$
016664  032777  020000  162246        BIT     #BIT13,@SWR
016672  001010                        BNE     2$
016674  104420  002027                TYPMSG  ,MSG12
016700  104420  001733                TYPMSG  ,MSG7
016704  011646                        MOV     (SP),-(SP)
016706  162716  000002                SUB     #2,(SP)
016712  104402                        TYPOC
016714  000002                  2$:   RTI

                                .SBTTL  TEST ABORT ROUTINE
                                ;ABRT

016716  104401  001616          ABRT:   TYPE    ,MSG3
016722  113746  001102                MOVB    $TSTNM,-(SP)
016726  104402                        TYPOC
016730  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

016732                          $SCOPE:
016732  104407                        CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
016734  032777  000400  162176        BIT     #SW8,@SWR               ;WAS SW8 USED TO SELECT
016742  001053                        BNE     $OVER           ;A TEST? IF YES, SKIP OVER
                                                                ;THE REST, U ARE LOOPING ON
016744  032777  040000  162166  1$:   BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
016752  001047                        BNE     $OVER           ;;YES IF SW14=1
                                ;*****START OF CODE FOR THE XOR TESTER*****
016754  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
```

```
                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
016756  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
016762  012737  017002  000004  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
016770  005737  177060          TST     @#177060        ;;TIME OUT ON XOR?
016774  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
017000  000421                  BR      $SVLAD          ;;GO TO THE NEXT TEST
017002  022626          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
017004  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
017010  000407                  BR      7$              ;;LOOP ON THE PRESENT TEST
017012                  6$:;*****END OF CODE FOR THE XOR TESTER*****
017012  105737  001103  2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
017016  001412                  BEQ     $SVLAD          ;;BR IF NO
017020  032777  001000  162112  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
017026  001404                  BEQ     4$              ;;BR IF NO
017030  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
017036  000415                  BR      $OVER
017040  105037  001103  4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
017044  105237  001102  $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
017050  011637  001106          MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
017054  011637  001110          MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
017060  005037  001224          CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
017064  112737  000001  001115  MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
017072  013777  001102  162042  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
017100  013716  001106          MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
017104  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

017106  104407          $ERROR: CKSWR                   ;CHECK FOR SOFTWARE SWITCH REGISTER REQUEST
017110  105237  001103  7$:     INCB    $ERFLG          ;SET THE ERROR FLAG
017114  001775                  BEQ     7$              ;DON'T LET THE FLAG GO TO ZERO
017116  013777  001102  162016  MOV     $TSTNM,@DISPLAY
017124  032777  002000  162006  BIT     #SW10,@SWR
017132  001402                  BEQ     1$
017134  104401  001206          TYPE    ,$BELL
017140  005237  001112  1$:     INC     $ERTTL
017144  011637  001116          MOV     (SP),$ERRPC

017150  032777  000004  161762  BIT     #SW2,@SWR       ;DROP THE DRIVE?
017156  001404                  BEQ     5$              ;SW NOT SET, SKIP
017160  023727  001112  000006  CMP     $ERTTL,#6       ;MORE THAN 6 ERRORS ON THIS DRIVE?
017166  101040                  BHI     6$              ;YES, DROP THE DRIVE

017170  162737  000002  001116  5$:     SUB     #2,$ERRPC
017176  117737  161714  001114          MOVB    @$ERRPC,$ITEMB
```

```
 3850  017204  032777  020000  161726          BIT     #SW13,@SWR
 3851  017212  001004                          BNE     2$
 3852  017214  004737  017362                  JSR     PC,@#ERRTYP
 3853  017220  104401  001213                  TYPE    ,$CRLF
 3854  017224  005777  161710          2$:     TST     @SWR
 3855  017230  100002                          BPL     3$
 3856  017232  000000                          HALT
 3857  017234  104407                          CKSWR                   ;CHECK FOR SOFTWARE SWITCH REGISTER REQUEST
 3858  017236  032777  010000  161674  3$:     BIT     #SW12,@SWR
 3859  017244  001402                          BEQ     .+6
 3860  017246  013716  001106                  MOV     $LPADR,(SP)
 3861  017252  032777  001000  161660          BIT     #SW09,@SWR
 3862  017260  001402                          BEQ     4$
 3863  017262  013716  001110                  MOV     $LPERR,(SP)
 3864  017266  000002                  4$:     RTI
 3865
 3866  017270  013746  001226          6$:     MOV     DRVPTR,-(SP)    ;GET POINTER TO DRIVE #
 3867  017274  162716  000002                  SUB     #2,(SP)
 3868  017300  042736  000377                  BIC     #377,@(SP)+     ;CLEAR THE DRIVE PRESENT FLAG
 3869  017304  104401  002064                  TYPE    ,MSG14
 3870  017310  013746  001230                  MOV     DRIVAD,-(SP)
 3871  017314  000241                          CLC                     ;GET THE DRIVE #
 3872  017316  006116                          ROL     (SP)
 3873  017320  006116                          ROL     (SP)
 3874  017322  006116                          ROL     (SP)
 3875  017324  006116                          ROL     (SP)
 3876  017326  104402                          TYPOC                   ;TYPE IT OUT
 3877  017330  104401  017336                  TYPE    ,65$            ;;TYPE ASCIZ STRING
 3878  017334  000405                          BR      64$             ;;GET OVER THE ASCIZ
 3879                          ;;65$:  .ASCIZ  / DROPPED/
 3880  017350                  64$:
 3881  017350  105337  001224                  DECB    DRIVS           ;DECRMNT # OF DRIVS PRESENT
 3882  017354  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK
 3883  017356  000137  015156                  JMP     BTEOP           ;EXIT
 3884
 3885  017362                  ERRTYP:
 3886  017362  104401  001213                  TYPE    ,$CRLF          ;"CARRIAGE RETURN" & LINE FEED"
 3887  017366  010046                          MOV     R0,-(SP)        ;SAVE R0
 3888  017370  005000                          CLR     R0              ;PICKUP THE ITEM INDEX
 3889  017372  153700  001114                  BISB    @#$ITEMB,R0
 3890  017376  001011                          BNE     1$              ;IF ITEM NUMBER IS ZERO, JUST
 3891
 3892                                                                  ;TYPE THE PC OF THE ERROR
 3893  017400  013746  001116                  MOV     $ERRPC,-(SP)    ;SAVE $ERRPC FOR TYPEOUT
 3894                                                                  ;ERROR ADDRESS
 3895  017404  104402                          TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS)
 3896  017406  104401                          TYPE
 3897  017410  001733                          MSG7
 3898  017412  013746  001116                  MOV     $ERRPC,-(SP)
 3899  017416  104402                          TYPOC
 3900  017420  000440                          BR      6$              ;GET OUT
 3901  017422  005300                  1$:     DEC     R0              ;ADJUST THE INDEX SO THAT IT WILL
 3902  017424  006300                          ASL     R0              ;       WORK FOR THE ERROR TABLE
 3903  017426  006300                          ASL     R0
 3904  017430  006300                          ASL     R0
 3905  017432  062700  002122                  ADD     #$ERRTB,R0      ;FORM TABLE POINTER
```

```
3906  017436  012037  017446          MOV     (R0)+,2$        ;PICKUP "ERROR MESSAGE" POINTER
3907  017442  001404                  BEQ     3$              ;SKIP TYPEOUT IF NOT POINTER
3908  017444  104401                  TYPE                    ;TYPE THE "ERROR MESSAGE"
3909  017446  000000          2$:     .WORD   0               ;"CARRIAGE RETURN" & LINE FEED"
3910  017450  104401  001213          TYPE    ,$CRLF          ;PICKUP "DATA HEADER" POINTER
3911  017454  032777  004000  161456  3$:     BIT     #SW11,@SWR      ;DUMP OUT ALL RK REGISTERS
3912  017462  001042                  BNE     10$             ;YES, BRANCH
3913  017464  012037  017474          MOV     (R0)+,4$        ;PICKUP "DATA HEADER" POINTER
3914  017470  001412                  BEQ     5$              ;SKIP TYPEOUT IF 0
3915  017472  104401                  TYPE                    ;TYPE THE "DATA HEADER"
3916  017474  000000          4$:     .WORD   0               ;"DATA HEADER" POINTER GOES HERE
3917  017476  104401  001213          TYPE    ,$CRLF          ;"CARRIAGE RETURN" & LINE FEED"
3918  017502  062700  000002          ADD     #2,R0           ;FORM POINTER TO TERMINATOR
3919  017506  005710                  TST     (R0)            ;IS THE TERMINATOR 0?
3920  017510  001017                  BNE     9$              ;IF NOT, BRANCH
3921  017512  162700  000002          SUB     #2,R0           ;YES, IT IS 0.  REPOINT TO "DATA"
3922                                                          ;GO TYPE OUT DATA AS USUAL
3923  017516  011000          5$:     MOV     (R0),R0         ;PICKUP "DATA TABLE" POINTER
3924  017520  001004                  BNE     7$              ;GO TYPE THE DATA
3925  017522  012600          6$:     MOV     (SP)+,R0        ;RESTORE R0
3926  017524  104401  001213          TYPE    ,$CRLF          ;"CARRIAGE RETURN" & LINE FEED"
3927  017530  000207                  RTS     PC              ;RETURN
3928  017532          7$:
3929  017532  013046                  MOV     @(R0)+,-(SP)    ;SAVE @(R0)+ FOR TYPEOUT
3930  017534  104402                  TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS
3931  017536  005710                  TST     (R0)            ;IS THERE ANOTHER NUMBER?
3932  017540  001770                  BEQ     6$              ;BR IF NO
3933  017542  104401  002110          TYPE    ,BLNKS2
3934  017546  000771                  BR      7$
3935  017550  004770  000000          9$:     JSR     PC,@(R0)        ;GO TO THE SPECIAL ERROR
3936                                                          ;DATA HANDLING SUBROUTINE
3937                                                          ;NOTE THAT THIS ROUTINE IS
3938                                                          ;THE ONE INDICATED IN THE
3939                                                          ;LAST WORD OF AN ERROR
3940                                                          ;ITEM IN THE ERROR TABLE
3941                                                          ;(STARTING AT $ERRTB)
3942  017554  104401                  TYPE
3943  017556  001733                  MSG7
3944  017560  013746  001116          MOV     $ERRPC,-(SP)
3945  017564  104402                  TYPOC
3946  017566  000755                  BR      6$              ;GO BACK, TO THE EXIT POINT
3947                                                          ;FOR 'ERRTYP'
3948
3949  017570  004737  017576  10$:    JSR     PC,DMPREG
3950  017574  000752                  BR      6$
3951
3952
3953
3954                          ;DMPREG
3955                          ;DUMPS OUT ALL RK REGISTERS WHEN SW 11 IS SET
3956
3957  017576          DMPREG:
3958  017576  104401  017604          TYPE    ,65$            ;;TYPE ASCIZ STRING
3959  017602  000441                  BR      64$             ;;GET OVER THE ASCIZ
3960                  ;;65$:  .ASCIZ  <15><12>/  PC    RKDS    RKER    RKCS    RKWC    RKBA    RkDA    RKDB/<
3961  017706          64$:
```

```
                                        MOV     $ERRPC,-(SP)
                                        TYPOC
                                        TYPE    ,BLNKS2
                                        MOV     R0,-(SP)
                                        MOV     #RKDS,R0
                                1$:     MOV     2(R0)+,-(SP)
                                        TYPOC
                                        TYPE    ,BLNKS2
                                        CMP     R0,#RKDB
                                        BLE     1$
                                        MOV     (SP)+,R0
                                        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

017750                          $TYPDS:
017750  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
017752  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
017754  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
017756  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
017760  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
017762  012746  020200                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
017766  016605  000020                 MOV     20(SP),R5       ;;GET THE INPUT NUMBER
017772  100004                         BPL     1$              ;;BR IF INPUT IS POS.
017774  005405                         NEG     R5              ;;MAKE THE BINARY NUMBER POS.
017776  112766  000055  000001         MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
020004  005000                 1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
020006  012703  020164                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
020012  112723  000040                 MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
020016  005002                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
020020  016001  020154                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
020024  160105                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
020026  002402                         BLT     4$              ;;BR IF DONE
020030  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
020032  000774                         BR      3$
020034  060105                 4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
020036  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
020040  001002                         BNE     5$              ;;FALL THROUGH IF 0
020042  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
020044  100407                         BMI     7$              ;;BR IF YES
020046  106316                 5$:     ASLB    (SP)            ;;MSD?
020050  103003                         BCC     6$              ;;BR IF NO
```

```
 4018  020052  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 4019  020056  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 4020  020062  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 4021  020066  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 4022  020070  005720                          TST     (R0)+           ;;JUST INCREMENTING
 4023  020072  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
 4024  020076  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
 4025  020100  003002                          BGT     8$              ;;GO TO EXIT
 4026  020102  010502                          MOV     R5,R2           ;;GET THE LSD
 4027  020104  000764                          BR      6$              ;;GO CHANGE TO ASCII
 4028  020106  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 4029  020110  100003                          BPL     9$              ;;BR IF NO
 4030  020112  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 4031  020120  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 4032  020122  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 4033  020124  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 4034  020126  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 4035  020130  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 4036  020132  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 4037  020134  104401  020164                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 4038  020140  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 4039  020146  012616                          MOV     (SP)+,(SP)
 4040  020150  000002                          RTI                     ;;RETURN TO USER
 4041  020152  023420                  $DTBL:  10000.
 4042  020154  001750                          1000.
 4043  020156  000144                          100.
 4044  020160  000012                          10.
 4045  020162  000004                  $DBLK:  .BLKW   4
 4046
 4047                                  .SBTTL  TYPE ROUTINE
 4048
 4049                                  ;;**************************************************************
 4050                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 4051                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 4052                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 4053                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 4054                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 4055                                  ;*
 4056                                  ;*CALL:
 4057                                  ;*1) USING A TRAP INSTRUCTION
 4058                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 4059                                  ;*OR
 4060                                  ;*      TYPE
 4061                                  ;*      MESADR
 4062                                  ;*
 4063
 4064  020174  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 4065  020200  100002                          BPL     1$              ;;BR IF YES
 4066  020202  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 4067  020204  000407                          BR      3$              ;;LEAVE
 4068  020206  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 4069  020210  016600  000002                  MOV     2(SP),R0        ;;GET ADDRESS OF ASCIZ STRING
 4070  020214  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 4071  020216  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 4072  020220  105726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 4073  020222  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
```

```
020324  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
020330  000002                          RTS                     ;;RETURN
020332  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
020336  001430                          BEQ     8$
020340  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
020344  001006                          BNE     5$
020346  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
020350  104401                          TYPE                    ;;TYPE A CR AND LF
020352  001213                          $CRLF
020354  105037  020410                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
020360  000755                          BR      2$              ;;GET NEXT CHARACTER
020362  004737  020344          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
020366  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
020372  001355                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
020374  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
020400  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
020404  002775                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
020406  004737  020344                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
020412  105337  020410                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
020416  000770                          BR      7$              ;;LOOP

                                        ;HORIZONTAL TAB PROCESSOR

020420  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
020424  004737  020344          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
020430  132737  000007  020410          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
020436  001372                          BNE     9$              ;;TAB STOP
020440  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
020442  000724                          BR      2$              ;;GET NEXT CHARACTER
020444  105777  160600          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
020450  100375                          BPL     $TYPEC
020452  116677  000002  160572          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
020460  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
020466  001003                          BNE     1$              ;;BRANCH IF NO
020470  105037  020410                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
020474  000406                          BR      $TYPEX          ;;EXIT
020476  122766  000012  000002  1$:     CMPB    #LF,2(SP        ;;IS CHARACTER A LINE FEED?
020504  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
020506  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
020510  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
020512  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

020414                                  $MULT:
020414  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
020416  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
020420  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
020422  005046                                  CLR     -(SP)           ;;CLEAR THE SIGN KEY
020424  016601  000012                          MOV     12(SP),R1       ;;GET THE MULTIPLICAND
020430  100002                                  BPL     1$              ;;BR IF PLUS
020432  005216                                  INC     (SP)            ;;SET THE SIGN KEY
020434  005401                                  NEG     R1              ;;MAKE THE MULTIPLICAND POSTIVE
020436  016602  000014                  1$:     MOV     14(SP),R2       ;;GET THE MULTIPLIER
020442  100002                                  BPL     2$              ;;BR IF PLUS
020444  005316                                  DEC     (SP)            ;;UPDATE THE SIGN KEY
020446  005402                                  NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
020450  012746  000021                  2$:     MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
020454  005000                                  CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
020456  103001                          3$:     BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
020460  060200                                  ADD     R2,R0
020462  006000                          4$:     ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
020464  006001                                  ROR     R1              ;;THE MULTIPLICAND
020466  005316                                  DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
020470  001372                                  BNE     3$              ;;BR IF NO
020472  022616                                  CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
020474  001403                                  BEQ     5$              ;;GO TO EXIT IF NO
020476  005400                                  NEG     R0              ;;YES--SO MAKE IT SO
020500  005401                                  NEG     R1
020502  005600                                  SBC     R0
020504  005726                          5$:     TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
020506  010066  000012                          MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
020512  010166  000010                          MOV     R1,10(SP)       ;;LSB'S
020516  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
020520  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
020522  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
020524  000207                                  RTS     PC

                                        .SBTTL  TTY INPUT ROUTINE

                                        ;;*****************************************************************
                                        .ENABL  LSB
020526  000000                          $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
020530  000000                          $TKQIN: .WORD   0               ;;INPUT POINTER
020532  000000                          $TKQOUT: .WORD  0               ;;OUTPUT POINTER
020534  000001                          $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
        020535                          $TKQEND=.
        020536                          .EVEN

                                        ;*TK INITIALIZE ROUTINE
                                        ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
                                        ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
                                        ;
                                        ;*CALL:
                                        ;*      JSR     PC,$TKINT
                                        ;*      RETURN
                                        ;
```

```
020536  005037  020526          $TKINT: CLR     $TKCNT              ;;CLEAR COUNT OF ITEMS IN QUEUE
020542  012737  020534  020530          MOV     #$TKQSRT,$TKQIN     ;;MOVE THE STARTING ADDRESS OF THE
020550  013737  020530  020532          MOV     $TKQIN,$TKQOUT      ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
020556  012737  020606  000060          MOV     #$TKSRV,@#TKVEC     ;;INITIALIZE THE KEYBOARD VECTOR
020564  012737  000200  000062          MOV     #200,@#TKVEC+2      ;;"BR" LEVEL 4
020572  005777  160350                  TST     @$TKB               ;;CLEAR DONE FLAG
020576  012777  000100  160340          MOV     #100,@$TKS          ;;ENABLE TTY KEYBOARD INTERRUPT
020604  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.
                                ;
020606  117746  160334          $TKSRV: MOVB    @$TKB,-(SP)         ;;PICKUP THE CHARACTER
020612  042716  177600                  BIC     #↑C177,(SP)         ;;STRIP THE JUNK
020616  021627  000007          1$:     CMP     (SP),#7             ;;IS IT A CONTROL G?
020622  001004                          BNE     2$                  ;;BRANCH IF NO
020624  022737  000176  001140          CMP     #SWREG,SWR          ;;IS SOFT-SWR SELECTED?
020632  001500                          BEQ     6$                  ;;GO TO SWR CHANGE

020634                          2$:
020634  022737  000001  020526          CMP     #1,$TKCNT           ;;IS THE QUEUE FULL?
020642  001004                          BNE     3$                  ;;BRANCH IF NO
020644  104401  001206                  TYPE    ,$BELL              ;;RING THE TTY BELL
020650  005726                          TST     (SP)+               ;;CLEAN CHARACTER OFF OF STACK
020652  000451                          BR      5$                  ;;EXIT
020654  021627  000023          3$:     CMP     (SP),#23            ;;IS IT A CONTROL-S?
020660  001021                          BNE     32$                 ;;BRANCH IF NO
020662  005077  160256                  CLR     @$TKS               ;;DISABLE TTY KEYBOARD INTERRUPTS
020666  005726                          TST     (SP)+               ;;CLEAN CHAR OFF STACK
020670  105777  160250          31$:    TSTB    @$TKS               ;;WAIT FOR A CHAR
020674  100375                          BPL     31$                 ;;LOOP UNTIL ITS THERE
020676  117746  160244                  MOVB    @$TKB,-(SP)         ;;GET THE CHARACTER
020702  042716  177600                  BIC     #↑C177,(SP)         ;;MAKE IT 7-BIT ASCII
020706  022627  000021                  CMP     (SP)+,#21           ;;IS IT A CONTROL-Q?
020712  001366                          BNE     31$                 ;;BRANCH IF NO
020714  012777  000100  160222          MOV     #100,@$TKS          ;;REENABLE TTY KEYBOARD INTERRUPTS
020722  000002                          RTI                         ;;RETURN
020724  005237  020526          32$:    INC     $TKCNT              ;;COUNT THIS CHARACTER
020730  021627  000140                  CMP     (SP),#140           ;;IS IT UPPER CASE?
020734  002405                          BLT     4$                  ;;BRANCH IF YES
020736  021627  000175                  CMP     (SP),#175           ;;IS IT A SPECIAL CHAR?
020742  003002                          BGT     4$                  ;;BRANCH IF YES
020744  042716  000040                  BIC     #40,(SP)            ;;MAKE IT UPPER CASE
020750  112677  177554          4$:     MOVB    (SP)+,@$TKQIN       ;;AND PUT IT IN QUEUE
020754  005237  020530                  INC     $TKQIN              ;;UPDATE THE POINTER
020760  023727  020530  020535          CMP     $TKQIN,#$TKQEND     ;;GO OFF THE END?
020766  001003                          BNE     5$                  ;;BRANCH IF NO
020770  012737  020534  020530          MOV     #$TKQSRT,$TKQIN     ;;RESET THE POINTER
020776  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.
021000  022737  000176  001140  $CKSWR: CMP     #SWREG,SWP      ;;IS THE SOFT-SWR SELECTED
021006  001104                         BNE     15$             ;;EXIT IF NOT
021010  105777  160130                 TSTB    @$TKS           ;;IS A CHAR WAITING?
021014  100101                         BPL     15$             ;;IF NOT, EXIT
021016  117746  160124                 MOVB    @$TKB,-(SP)     ;;YES
021022  042716  177600                 BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
021026  021627  000007                 CMP     (SP),#7         ;;IS IT A CONTROL-G?
021032  001300                         BNE     2$              ;;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.
021034  123727  001134  000001  6$:      CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
021042  001674                         BEQ     2$              ;;BRANCH IF YES
021044  005726                         TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
021046  004737  020536                 JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
021052  005077  160066                 CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
021056  112737  000001  001135         MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR

021064  104401  021643                 TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
021070  104401  021650         $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
021074  013746  000176                 MOV     $WREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
021100  104402                         TYPOC                   ;;GO TYPE--OCTAL ASCII ALL DIGITS
021102  104401  021661                 TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
021106  005046                 19$:    CLR     -(SP)           ;;CLEAR COUNTER
021110  005046                         CLR     -(SP)           ;;THE NEW SWR
021112  105777  160026         7$:     TSTB    @$TKS           ;;CHAR THERE?
021116  100375                         BPL     7$              ;;IF NOT TRY AGAIN

021120  117746  160022                 MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
021124  042716  177600                 BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII


021130  021627  000025         9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
021134  001005                         BNE     10$             ;;BRANCH IF NOT
021136  104401  021636                 TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
021142  062706  000006         20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
021146  000757                         BR      19$             ;;LET'S TRY IT AGAIN


021150  021627  000015         10$:    CMP     (SP),#15        ;;IS IT A <CR>?
021154  001022                         BNE     16$             ;;BRANCH IF NO
021156  005766  000004                 TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
021162  001403                         BEQ     11$             ;;BRANCH IF YES
021164  016677  000002  157746         MOV     2(SP),@SWR      ;;SAVE NEW SWR
021172  062706  000006         11$:    ADD     #6,SP           ;;CLEAR UP STACK
021176  104401  001213         14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
021202  123727  001135  000001         CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
021210  001003                         BNE     15$             ;;BRANCH IF NOT
021212  012777  000100  157724         MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
021220  000002                 15$:    RTI                     ;;RETURN
021222  004737  020344         16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
```

```
 4298  021226  021627  000060              CMP     (SP),#60        ;;CHAR < 0?
 4299  021232  002420                      BLT     18$             ;;BRANCH IF YES
 4300  021234  021627  000067              CMP     (SP),#67        ;;CHAR > 7?
 4301  021240  003015                      BGT     18$             ;;BRANCH IF YES
 4302  021242  042726  000060              BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 4303  021246  005766  000002              TST     2(SP)           ;;IS THIS THE FIRST CHAR
 4304  021252  001403                      BEQ     17$             ;;BRANCH IF YES
 4305  021254  006316                      ASL     (SP)            ;;NO. SHIFT PRESENT
 4306  021256  006316                      ASL     (SP)            ;;   CHAR OVER TO MAKE
 4307  021260  006316                      ASL     (SP)            ;;   ROOM FOR NEW ONE.
 4308  021262  005266  000002      17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 4309  021266  056616  177776              BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 4310  021272  000707                      BR      7$              ;;GET THE NEXT ONE
 4311  021274  104401  001212      18$:    TYPE    ,$QUES          ;;TYPE ?(CR)(LF)
 4312  021300  000725                      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
                                  ;

 4324  021302  011646              $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
 4325  021304  016666  000004  000002      MOV     4(SP),2(SP)     ;;THE PS
 4326  021312  005066  000004              CLR     4(SP)           ;;GET READY FOR A CHARACTER
 4327  021316  005046                      CLR     -(SP)           ;;PUT NEW PS ON STACK
 4328  021320  012746  021326              MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 4329  021324  000002                      RTI                     ;;POP NEW PC AND PS
 4330  021326                      64$:
 4331  021326  005737  020526      1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
 4332  021332  001775                      BEQ     1$
 4333  021334  005337  020526              DEC     $TKCNT          ;;DECREMENT THE COUNTER
 4334  021340  117766  177166  000004      MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
 4335  021346  005237  020532              INC     $TKQOUT         ;;UPDATE THE POINTER
 4336  021352  023727  020532  020535      CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
 4337  021360  001003                      BNE     2$              ;;BRANCH IF NO
 4338  021362  012737  020534  020532      MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
 4339  021370  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

 4347  021372  010346              $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
 4348  021374  005046                      CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
 4349  021376  012703  021626      1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
 4350  021402  022703  021636      2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
 4351  021406  101456                      BLOS    4$              ;;BR IF YES
 4352  021410  104410                      RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 4353  021412  112613                      MOVB    (SP)+,(R3)      ;;GET CHARACTER
```

```
 4354  021414  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
 4355  021420  001022                          BNE     5$              ;;BR IF NO
 4356  021422  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOJT?
 4357  021424  001007                          BNE     6$              ;;BR IF NO
 4358  021426  112737  000134  021624          MOVB    #'\,9$          ;;TYPE A BACK SLASH
 4359  021434  104401  021624                  TYPE    ,9$
 4360  021440  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
 4361  021444  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
 4362  021446  020327  021626                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
 4363  021452  103434                          BLO     4$              ;;BR IF YES
 4364  021454  111337  021624                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
 4365  021460  104401  021624                  TYPE    ,9$             ;;GO TYPE
 4366  021464  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
 4367  021466  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
 4368  021470  001406                          BEQ     7$              ;;BR IF NO
 4369  021472  112737  000134  021624          MOVB    #'\,9$          ;;TYPE A BACK SLASH
 4370  021500  104401  021624                  TYPE    ,9$
 4371  021504  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
 4372  021506  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
 4373  021512  001003                          BNE     8$              ;;BR IF NO
 4374  021514  104401  021636                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
 4375  021520  000726                          BR      1$              ;;GO START OVER
 4376  021522  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
 4377  021526  001011                          BNE     3$              ;;BRANCH IF NO
 4378  021530  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
 4379  021532  104401  001213                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
 4380  021536  104401  021626                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 4381  021542  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
 4382  021544  104401  001212          4$:     TYPE    ,$QUES          ;;TYPE A '?'
 4383  021550  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
 4384  021552  111337  021624          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
 4385  021556  104401  021624                  TYPE    ,9$
 4386  021562  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 4387  021566  001305                          BNE     2$              ;;LOOP IF NOT RETURN
 4388  021570  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 4389  021574  104401  001214                  TYPE    ,$LF            ;;TYPE A LINE FEED
 4390  021600  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 4391  021602  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 4392  021604  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 4393  021606  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 4394  021614  012766  021626  000004          MOV     #$TTYIN,4(SP)
 4395  021622  000002                          RTI                     ;;RETURN
 4396  021624     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 4397  021625     000                          .BYTE   0               ;;TERMINATOR
 4398  021626  000010          $TTYIN: .BLKB   8.                      ;;RESERVE 8 BYTES FOR TTY INPUT
 4399  021636  052536  005C15     000  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
 4400  021643     136  006507  000012  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
 4401  021650  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
 4402  021656  020075     000
 4403  021661     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
 4404  021666  036440  000040
 4405
 4406                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
 4407
 4408                                  ;;**************************************************************
 4409                                  ;*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

021672  011646                 $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
021674  016666  000004  000002         MOV     4(SP),2(SP)     ;;INPUT NUMBER
021702  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
021704  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
021706  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
021710  104411                 1$:     RDLIN                   ;;READ AN ASCIZ LINE
021712  012600                         MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
021714  005001                         CLR     R1              ;;CLEAR DATA WORD
021716  005002                         CLR     R2
021720  112046                 2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
021722  001412                         BEQ     3$              ;;IF ZERO GET OUT
021724  006301                         ASL     R1              ;;*2
021726  006102                         ROL     R2
021730  006301                         ASL     R1              ;;*4
021732  006102                         ROL     R2
021734  006301                         ASL     R1              ;;*8
021736  006102                         ROL     R2
021740  042716  177770                 BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
021744  062601                         ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
021746  000764                         BR      2$              ;;LOOP
021750  005726                 3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
021752  010166  000012                 MOV     R1,12(SP)       ;;SAVE THE RESULT
021756  012737  021772                 MOV     R2,$HIOCT
021762  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
021764  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
021766  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
021770  000002                         RTI                     ;;RETURN
021772  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
                                        ;
022774  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
022000  116637  000001  022217          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
022006  112637  022221                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
022012  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
022016  000406                          BR      $TYPON
022020  112737  000001  022217  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
022026  112737  000006  022221          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
022034  112737  000005  022216  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
022042  010346                          MOV     R3,-(SP)        ;;SAVE R3
022044  010446                          MOV     R4,-(SP)        ;;SAVE R4
022046  010546                          MOV     R5,-(SP)        ;;SAVE R5
022050  113704  022221                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
022054  005404                          NEG     R4
022056  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
022062  110437  022220                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
022066  113704  022217                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
022072  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
022076  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
022100  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
022102  000404                          BR      3$              ;;GO DO MSB
022104  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
022106  006105                          ROL     R5
022110  006105                          ROL     R5
022112  010503                          MOV     R5,R3
022114  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
022116  105337  022220                  DECB    $OMODE          ;;TYPE THIS DIGIT?
022122  100016                          BPL     7$              ;;BR IF NO
022124  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
022130  001002                          BNE     4$              ;;TEST FOR 0
022132  005704                          TST     R4              ;;SUPPRESS THIS 0?
022134  001403                          BEQ     5$              ;;BR IF YES
022136  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
022140  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
022144  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
022150  110337  022214                  MOVB    R3,8$           ;;SAVE FOR TYPING
022154  104401  022214                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
022160  105337  022216          7$:     DECB    $OCNT           ;;COUNT BY 1
022164  003347                          BGT     2$              ;;BR IF MORE TO DO
022166  002402                          BLT     6$              ;;BR IF DONE
022170  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
022172  000744                          BR      2$              ;;GO DO THE LAST DIGIT
022174  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
022176  012604                          MOV     (SP)+,R4        ;;RESTORE R4
022200  012603                          MOV     (SP)+,R3        ;;RESTORE R3
022202  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
022210  012616                          MOV     (SP)+,(SP)
022212  000002                          RTI                     ;;RETURN
022214  000                     8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
022215  000                             .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
022216  000                     $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
022217  000                     $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
022220  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

022222  016637  000004  022262  TYPDES: MOV     4(SP),1$                ;GET THE NUMBER
022230  012746  022262                  MOV     #1$,-(SP)               ;PUT PTR ON THE STACK
022234  004737  022422                  JSR     PC,@#$DB2D              ;GO CONVERT BINARY NO. TO
                                                                        ;ASCII STRING
022240  004737  022266                  JSR     PC,@#$SUPRS             ;GO TYPE OUT DECIMAL STRING
                                                                        ;SUPRESING LEADING 0'S
022244  016666  000002  000004          MOV     2(SP),4(SP)             ;ADJUST RETURN
022252  011666  000002                  MOV     (SP),2(SP)              ;ADJUST RETURN ADRES
022256  005726                          TST     (SP)+                   ;POP STACK
022260  000002                          RTI                             ;RETURN

022262  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

022266  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
022270  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
022274  105710          1$:     TSTB    (R0)            ;;TERMINATEOR?
022276  001403                  BEQ     2$              ;;BR IF YES
022300  122720  000060                  CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
022304  001773                  BEQ     1$              ;;BR IF YES
022306  005300          2$:     DEC     R0              ;;BACKUP BY "1"
022310  010037  022316                  MOV     R0,3$           ;;SAVE FOR TYPING
022314  104401                  TYPE                    ;;GO TYPE
022316  000000          3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
022320  012600                  MOV     (SP)+,R0        ;;RESTORE R0
022322  012616                  MOV     (SP)+,(SP)      ;;RESTORE THE STACK
022324  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
                                ;
022326                          $SAVREG:
022326  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
022330  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
022332  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
022334  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
022336  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
022340  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
022342  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
022346  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
022352  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
022356  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
022362  000002                          RTI
                                ;
                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
022364                          $RESREG:
022364  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
022370  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
022374  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
022400  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
022404  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
022406  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
022410  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
022412  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
022414  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
022416  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
022420  000002                          RTI
                                ;
                                .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
                                ;
                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                                ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                                ;*POSITIVE.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB2D
                                ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                ;;                              ;;IS ON THE STACK
                                ;
                                ;
022422  104413                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
022424  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
022430  012700  022602                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
022434  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
022440  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
```

```
 4634  022442  012202                        MOV     (R2)+,R2
 4635  022444  012737  000012  022520        MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
 4636  022452  012704  022532                MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
 4637  022456  012705  022534                MOV     #$TNPWR+2,R5
 4638  022462  005003                1$:     CLR     R3              ;;CLEAR PARTIAL
 4639  022464  161401                2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
 4640  022466  005602                        SBC     R2
 4641  022470  161502                        SUB     (R5),R2
 4642  022472  002402                        BLT     3$              ;;BR IF TEN POWER TO LARGE
 4643  022474  005203                        INC     R3              ;;ADD 1 TO PARTIAL
 4644  022476  000772                        BR      2$              ;;LOOP
 4645  022500  062401                3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
 4646  022502  005502                        ADC     R2
 4647  022504  062402                        ADD     (R4)+,R2
 4648  022506  022525                        CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
 4649  022510  052703  000060                BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
 4650  022514  110320                        MOVB    R3,(R0)+        ;;SAVE IT
 4651  022516  005327                        DEC     (PC)+           ;;DONE?
 4652  022520  000000                4$:     .WORD   0
 4653  022522  001357                        BNE     1$              ;;BR IF NO
 4654  022524  105020                        CLRB    (R0)+           ;;TERMINATOR
 4655  022526  104414                        RESREG                  ;;RESTORE REGISTERS
 4656  022530  000207                        RTS     PC              ;;RETURN
 4657  022532  145000                $TNPWR: 145000                  ;;1.0E09
 4658  022534  035632                        35632
 4659  022536  160400                        160400                  ;;1.0E08
 4660  022540  002765                        2765
 4661  022542  113200                        113200                  ;;1.0E07
 4662  022544  000230                        230
 4663  022546  041100                        041100                  ;;1.0E06
 4664  022550  000017                        17
 4665  022552  103240                        103240                  ;;1.0E05
 4666  022554  000001                        1
 4667  022556  023420                        23420                   ;;1.0E04
 4668  022560  000000                        0
 4669  022562  001750                        1750                    ;;1.0E03
 4670  022564  000000                        0
 4671  022566  000144                        144                     ;;1.0E02
 4672  022570  000000                        0
 4673  022572  000012                        12                      ;;1.0E01
 4674  022574  000000                        0
 4675  022576  000001                        1                       ;;1.0E00
 4676  022600  000000                        0
 4677  022602  000014                $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
 4678
 4679
 4680
 4681                                .SBTTL  TRAP DECODER
 4682
 4683                                ;;**************************************************************
 4684                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 4685                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 4686                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 4687                                ;*GO TO THAT ROUTINE.
 4688
 4689  022616  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
```

```
 4690  022620  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
 4691  022624  005740                  TST     -(R0)           ;;BACKUP BY 2
 4692  022626  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 4693  022630  006300                  ASL     R0              ;;POSITION FOR INDEXING
 4694  022632  016000  022652          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 4695  022636  000200                  RTS     R0              ;;GO TO ROUTINE
 4696
 4697
 4698                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 4699
 4700  022640  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 4701  022642  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 4702  022650  000002                  RTI                             ;;RESTORE THE PSW
 4703
 4704                                  .SBTTL  TRAP TABLE
 4705
 4706                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 4707                                  ;*BY THE "TRAP" INSTRUCTION.
 4708
 4709                                  ;       ROUTINE
 4710                                  ;       -------
 4711  022652  022640                  $TRPAD: .WORD   $TRAP2
 4712  022654  020174                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
 4713  022656  022020                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 4714  022660  021774                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 4715  022662  022034                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 4716  022664  017750                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
 4717
 4718  022666  021070                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
 4719
 4720  022670  021000                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 4721  022672  021302                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 4722  022674  021372                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 4723  022676  021672                          $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 4724  022700  022326                          $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
 4725  022702  022364                          $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
 4726
 4727  022704  016526                          CN.RST  ;;CALL=CON.RESET        TRAP+15(104415) CONTROL RESET ROUTINE
 4728
 4729  022706  016414                          DR.RST  ;;CALL=DRV.RESET        TRAP+16(104416) DRIVE RESET ROUTINE
 4730
 4731  022710  015770                          MSGE    ;;CALL=MESAGE   TRAP+17(104417) MESSAGE HANDLER
 4732
 4733  022712  016032                          TY.MSG  ;;CALL=TYPMSG   TRAP+20(104420) MESSAGE TYPEOUT ROUTINE
 4734
 4735  022714  016544                          CN.RDY  ;;CALL=CON.RDY  TRAP+21(104421) WAIT FOR CONTROL READY
 4736
 4737  022716  016642                          TSTRWS  ;;CALL=TST.RWS  TRAP+22(104422) TEST R/W/S RDY SET
 4738
 4739  022720  016440                          RES.DO  ;;CALL=RESDON   TRAP+23(104423) DRIVE RESET DONE?
 4740
 4741  022722  022222                          TYPDES  ;;CALL=TYPDSS   TRAP+24(104424) TYPE DECIMAL, SUPRES LDG 0'S
 4742
 4743
 4744                                  .SBTT   POWER DOWN AND UP ROUTINES
 4745
```

```
                                        ;;*****************************************************************
                                        ;POWER DOWN ROUTINE
022724  012737  023070  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
022732  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
022740  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
022742  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
022744  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
022746  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
022750  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
022752  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
022754  017746  156160                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
022760  010637  023074                  MOV     SP,$SAVR6       ;;SAVE SP
022764  012737  022776  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
022772  000000                          HALT
022774  000776                          BR      .-2             ;;HANG UP
                                        ;;*****************************************************************
                                        ;POWER UP ROUTINE
022776  012737  023070  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
023004  013706  023074                  MOV     $SAVR6,SP       ;;GET SP
023010  005037  023074                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
023014  005237  023074          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
023020  001375                          BNE     1$              ;;OF  WORD
023022  012677  156112                  MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
023026  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
023030  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
023032  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
023034  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
023036  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
023040  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
023042  012737  022724  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
023050  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
023056  104401                          TYPE                    ;REPORT THE POWER FAILURE
023060  023076                  $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
023062  012716                          MOV     (PC)+,(SP)      ;;RESTART AT PWRFL
023064  004170                  $PWRAD: .WORD   PWRFL            ;;RESTART ADDRESS
023066  000002                          RTI
023070  000000                  $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
023072  000776                          BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
023074  000000                  $SAVR6: 0                       ;;PUT THE SP HERE
023076  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
023104  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.
023106                  FUNBEG:
023106  104401  023114          TYPE    ,65$            ;;TYPE ASCIZ STRING
023112  000407              BR      64$             ;;GET OVER THE ASCIZ
023114                  ;;65$:  .ASCIZ  <15><12>/FUNCTION?/
023132                  64$:
023132  104411                  PDLIN
```

```
023134  012600                          MOV     (SP)+,R0
023136  112001                          MOVB    (R0)+,R1
023140  120127  000127                  CMPB    R1,#'W
023144  001026                          BNE     2$
023146  121027  000122                  CMPB    (R0),#'R
023152  001010                          BNE     1$
023154  004737  024000                  JSR     PC,CHKSW0       ;CHECK SW 0 SET?
023160  012702  004003                  MOV     #4003,R2
023164  000536                          BR      NXTDA

023166  012702  000003          9$:     MOV     #3,R2
023172  000521                          BR      NXTBA
023174  121027  000103          1$:     CMPB    (R0),#'C
023200  001342                          BNE     FUNBEG
023202  004737  024000                  JSR     PC,CHKSW0       ;CHECK SW 0 SET?
023206  012702  004007                  MOV     #4007,R2
023212  000523                          BR      NXTDA

023214  012702  000007                  MOV     #7,R2
023220  000506                          BR      NXTBA

023222  120127  000122          2$:     CMPB    R1,#'R
023226  001014                          BNE     3$
023230  121027  000104                  CMPB    (R0),#'D
023234  001003                          BNE     8$
023236  012702  000005                  MOV     #5,R2
023242  000475                          BR      NXTBA
023244  121027  000103          8$:     CMPB    (R0),#'C
023250  001316                          BNE     FUNBEG
023252  012702  000013                  MOV     #13,R2
023256  000501                          BR      NXTDA

023260  120127  000104          3$:     CMPB    R1,#'D
023264  001006                          BNE     4$
023266  121027  000122                  CMPB    (R0),#'R
023272  001305                          BNE     FUNBEG
023274  012702  000015                  MOV     #15,R2
023300  000470                          BR      NXTDA

023302  120127  000103          4$:     CMPB    R1,#'C
023306  001006                          BNE     5$
023310  121027  000122                  CMPB    (R0),#'R
023314  001274                          BNE     FUNBEG
023316  012702  000001                  MOV     #1,R2
023322  000533                          BR      EXEC

023324  120127  000123          5$:     CMPB    R1,#'S
023330  001266                          BNE     FUNBEG
023332  121027  000113                  CMPB    (R0),#'K
023336  001263                          BNE     FUNBEG
023340  012702  000011                  MOV     #11,R2

023344                          6$:
023344  104401  023352                  TYPE    ,67$            ;;TYPE ASCIZ STRING
023350  000404                          BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  /CYL1? /
```

```
023362                          66$:
023362  004737  023746                  JSR     PC,INPT
023366  000766                          BR      6$
023370  010004                          MOV     R0,R4

023372                          7$:
023372  104401  023400                  TYPE    ,69$            ;;TYPE ASCIZ STRING
023376  000404                          BR      68$             ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  /CYL2? /
023410                          68$:
023410  004737  023746                  JSR     PC,INPT
023414  000766                          BR      7$
023416  010005                          MOV     R0,R5
023420  017700  155514                  MOV     @SWR,R0         ;GET DRIVE # FROM SW REG(15-13)
023424  042700  017777                  BIC     #17777,R0               ;CLR UNWANTED BITS
023430  050004                          BIS     R0,R4                   ;SET DRIVE # IN DSK ADRES
023432  050005                          BIS     R0,R5
023434  000466                          BR      EXEC

023436                          NXTBA:
023436  104401  023444                  TYPE    ,65$            ;;TYPE ASCIZ STRING
023442  000404                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /RKBA? /
023454                          64$:
023454  104412                          RDOCT
023456  012637  001476                  MOV     (SP)+,INDX2

023462                          NXTDA:
023462  104401  023470                  TYPE    ,65$            ;;TYPE ASCIZ STRING
023466  000404                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /RKDA? /
023500                          64$:
023500  104412                          RDOCT
023502  012600                          MOV     (SP)+,R0
023504  010001                          MOV     R0,R1
023506  006201                          ASR     R1
023510  006201                          ASR     R1
023512  006201                          ASR     R1
023514  006201                          ASR     R1
023516  006201                          ASR     R1
023520  042701  177400                  BIC     #177400,R1
023524  020127  000312                  CMP     R1,#312
023530  003354                          BGT     NXTDA
023532  010001                          MOV     R0,R1
023534  042701  177760                  BIC     #177760,R1
023540  020127  000013                  CMP     R1,#13
023544  003346                          BGT     NXTDA
023546  010003                          MOV     R0,R3
023550  022702  000015                  CMP     #15,R2
023554  001416                          BEQ     EXEC

023556                          NXTWC:
023556  104401  023564                  TYPE    ,65$            ;;TYPE ASCIZ STRING
023562  000405                          BR      64$             ;;GET OVER THE ASCIZ
```

```
                                        ;;65$:  .ASCIZ  /#WORDS? /
                                        64$:
023576                                          RDOCT
023576  104412                                    NEG     (SP)
023600  005416                                    MOV     (SP)+,INDX4
023602  012637  001502                            BR      EXEC
023606  000401
023610  104415                          EXEC1:    CON.RESET                       ;CLR EROR, CONTROL RESET
023612  022702  000011                  EXEC:     CMP     #11,R2                  ;SEEK FUNCTION?
023616  001005                                    BNE     2$                      ;NO
023620  020403                                    CMP     R4,R3                   ;IF SEEK, INSERT THE RIGHT
023622  001402                                    BEQ     3$                  ;CYLINDER ADDRESS
023624  010403                                    MOV     R4,R3
023626  000401                                    BR      2$
023630  010503                          3$:       MOV     R5,R3
023632  013777  001476  155622          2$:       MOV     INDX2,@RKBA
023640  010377  155620                            MOV     R3,@RKDA
023644  013777  001502  155606                    MOV     INDX4,@RKWC
023652  010277  155600                            MOV     R2,@RKCS
023656  105777  155574                  1$:       TSTB    @RKCS                   ;WAIT FOR CNTROL RDY
023662  100375                                    BPL     1$
023664  022702  000001                            CMP     #1,R2                   ;IF IT'S CON RESET FUNCTION
023670  001401                                    BEQ     4$                      ;DONT WAIT FOR R/W/S RDY
023672  104423                                    RESDON                          ;R/W/S RDY?

023674  032777  140000  155554          4$:       BIT     #140000,@RKCS           ;ERROR?
023702  001006                                    BNE     FUNERR                  ;YES
023704  032777  000010  155526          CHSW:     BIT     #SW3,@SWR               ;TERMINATE THIS FUNCTION OR PEPEAT?
023712  001737                                    BEQ     EXEC                    ;REPEAT
023714  000137  023106                            JMP     FUNBEG                  ;TERMINATE

023720  012737  023610  001110          FUNERR:   MOV     #EXEC1,$LPERR           ;SET UP FOR LUPING
023726  012737  023610  001106                    MOV     #EXEC1,$LPADR
023734  004737  016106                            JSR     PC,GT4RG
023740  104030                                    ERROR   30                      ;REPORT ERROR
023742  104415                                    CON.RESET                       ;CLR ERROR
023744  000757                                    BR      CHSW

023746  104412                          INPT:     RDOCT
023750  012600                                    MOV     (SP)+,R0
023752  020027  000312                            CMP     R0,#312
023756  003007                                    BGT     1$
023760  006300                                    ASL     R0
023762  006300                                    ASL     R0
023764  006300                                    ASL     R0
023766  006300                                    ASL     R0
023770  006300                                    ASL     R0
023772  062716  000002                            ADD     #2,(SP)
023776  000207                          1$:       RTS     PC

024000  032777  000001  155132          CHKSWO:   BIT     #SW0,@SWR               ;WRITE A PATTERN GIVEN BY USER?
024006  001416                                    BEQ     1$                      ;NO
                                                                                ;YES, ASK FOR PATTERN
024010  104401  024016                            TYPE    ,65$                    ;;TYPE ASCIZ STRING
024014  000404                                    BR      64$                     ;;GET OVER THE ASCIZ
```

```
                                        ;;65$:  .ASCIZ  /PATRN?/
                                        64$:
                        104412                  RDOCT
                                                MOV     (SP)+,IOBUF1    ;SAVE THE PATTERN
                        012637  003362          MOV     (SP)+,IOBUF1+2
                        012737  031362  001476  MOV     #IOBUF1,IMDX2
                        000207                  RTS     PC
                        062716  000006  1$:     ADD     #6,(SP)         ;SKIP NXT 2 INST ON RETURN
                        000207                  RTS     PC

                        104416  FCHECK: DRV.RESET
                        104415          CON.RESET
                        013737  001230  002120  MOV     DRIVAD,DRHOLD           ;SAVE DRIVE ADRR
                        032737  020000  001230  BIT     #20000,DRIVAD           ;SEE IF ODD
                        001404                  BEQ     1$
                        042737  020000  001230  BIC     #20000,DRIVAD           ;MAKE EVEN
                        000403                  BR      2$
                        052737  020000  001230  1$:     BIS     #20000,DRIVAD           ;MAKE ODD
                        013777  001230  155344  2$:     MOV     DRIVAD,@RKDA    ;DRIVE ADDR
                        012777  000011  155330          MOV     #11,@RKCS               ;DRIVE SEEK
                        104421                  CON.RDY
                        013777  002120  155326          MOV     DRHOLD,@RkDA            ;OTHER DRIVE
                        104421                  CON.RDY
                        032777  000100  155304          BIT     #100,@RKDS              ;HEADS IN MOTIONN?
                        001001                  BNE     3$                      ;NO SO RK-05J
                        005725                  TST     (R5)+                   ;YES RK-05F
                        013737  002120  001230  3$:     MOV     DRHOLD,DRIVAD           ;RESTORE ADDR
                        104416                  DRV.RESET
                        000205                  RTS     R5
                        005037  001230  SIZEF:  CLR     DRIVAD          ;START AT DRO
                        012700  001232          MOV     #DRIVO,R0               ;TABLE OF AVAIL DRIVES
                        105710          4$:     TSTB    (R0)                    ;THIS DRIVE HERE?
                        001413                  BEQ     2$                      ;NO
                        105760  000002          TSTB    2(R0)                   ;COMPLEMENT HERE?
                        001410                  BEQ     2$                      ;NO
                        004537  024052          JSR     R5,FCHECK               ;SEE IF F MODEL
                        000405                  BR      2$                      ;J MODEL
                        052710  000002          BIS     #2,(R0)         ;SET SIGN FOR F
                        052760  000002  000002  BIS     #2,2(R0)                ;BOTH DRIVES
                        005720          2$:     TST     (R0)+
                        005720                  TST     (R0)+                   ;NEXT PAIR OF DRIVES
                        062737  040000  001230  ADD     #40000,DRIVAD           ;NEXT ACTUL ADDR
                        022700  001251          CMP     #DRIV7+1,R0             ;CHECKED ALL?
                        003353                  BGT     4$                      ;NOT YET
                        000207                  RTS     PC

                                        ;ERROR MESSAGES


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

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

```
024314  020116  042523  045505
024322     000

024323     104  042522  047440  EM3:    .ASCIZ  /DRE ON SEEK/
024330  020116  042523  045505
024336     000

024337     047  051105  023522  EM4:    .ASCIZ  /'ERR' ON SEEK/
024344  047440  020116  042523
024352  045505     000

024355     104  052522  047440  EM5:    .ASCIZ  /DRU ON SEEK, PUT DRV ON 'LOAD' & 'RUN'/
024362  020116  042523  045505
024370  020054  052520  020124
024376  051104  020126  047117
024404  023440  047514  042101
024412  020047  020046  051047
024420  047125  000047

024424  027522  027527  020123  EM6:    .ASCIZ  "R/W/S RDY NOT SET AFTER SEEK"
024432  042122  020131  047516
024440  020124  042523  020124
024446  043101  042524  020122
024454  042523  045505     000

024461     123  047111  047440  EM7:    .ASCIZ  /SIN ON WRT FMT/
024466  020116  051127  020124
024474  046506  000124

024500  042447  051122  020047  EM10:   .ASCIZ  /'ERR' ON DOING WRITE FMT/
024506  047117  042040  044517
024514  043516  053440  044522
024522  042524  043040  052115
024530     000
024531     123  047111  047440  EM11:   .ASCIZ  "SIN ON RD/FMT"
024536  020116  042122  043057
024544  052115     000
024547     047  051105  023522  EM12:   .ASCIZ  /'ERR' ON READ FMT/
024554  047440  020116  042522
024562  042101  043040  052115
024570     000
024571     127  047522  043516  EM13:   .ASCIZ  /WRONG HDRS FROM 'SEC#'/
024576  044040  051104  020123
024604  051106  046517  023440
024612  042523  021503  000047

024620  051105  051117  047440  EM14:   .ASCIZ  /EROR ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'/
024626  020116  046511  046120
024634  042511  020104  042523
024642  045505  043040  047522
024650  020115  041447  046131
024656  023501  052040  020117
024664  041447  046131  023502
024672     000

024673     122  040505  020104  MS15:   .ASCIZ  /READ WRONG HDRS FROM 'CYLB' ABOVE/
```

```
                                                
```

```
 5183  025320  047522  020122  047117
 5184  025326  051040  040505  020104
 5185  025334  051106  046517  042040
 5186  025342  051511  020113  042101
 5187  025350  042522  000123
 5188
 5189  025354  042510  047440  020116  EM26:   .ASCIZ  /HE ON WRT CHK/
 5190  025362  051127  020124  044103
 5191  025370  000113
 5192
 5193  025372  051127  020124  044103  EM27:   .ASCIZ  /WRT CHK EROR/
 5194  025400  020113  051105  051117
 5195  025406     000
 5196
 5197  025407     105  047522  000122  EM30:   .ASCIZ  /EROR/
 5198
 5199                                  ;DATA HEADERS
 5200
 5201
 5202  025414  020040  041520  020040  DH1:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA/
 5203  025422  020040  051040  041513
 5204  025430  020123  020040  051040
 5205  025436  042513  020122  020040
 5206  025444  051040  042113  020123
 5207  025452  020040  051040  042113
 5208  025460  000101
 5209
 5210  025462  042523  045505  021440  DH6:    .ASCIZ  /SEEK #  SEEKING  ERRORS/
 5211  025470  020040  042523  045505
 5212  025476  047111  020107  042440
 5213  025504  051122  051117  000123
 5214
 5215  025512  020040  041520  020040  DH7:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA    CYL/
 5216  025520  020040  051040  041513
 5217  025526  020123  020040  051040
 5218  025534  042513  020122  020040
 5219  025542  051040  042113  020123
 5220  025550  020040  051040  042113
 5221  025556  020101  020040  041440
 5222  025564  046131     000
 5223
 5224  025567     040  050040  020103  DH11:   .ASCIZI/  PC    RKCS    RKER    RKDS    RKDA: DR  CYL     SUR     SEC/
 5225  025574  020040  051040  041513
 5226  025602  020123  020040  051040
 5227  025610  042513  020122  020040
 5228  025616  051040  042113  020123
 5229  025624  020040  045522  040504
 5230  025632  020072  051104  020040
 5231  025640  054503  020114  020040
 5232  025646  020040  052523  020122
 5233  025654  020040  020040  042523
 5234  025662  000103
 5235  025664  042523  021503  020040  DH13:   .ASCIZ  /SEC#  HDR RCVD/
 5236  025672  042110  020122  041522
 5237  025700  042126     000
 5238
```

```
025703     040  050040  020103  DH14:   .ASCIZ  /  PC     CYLA    CYLB     RKER   RKDS     TRY#/
025710  020040  020040  054503
025716  040514  020040  020040
025724  054503  041114  020040
025732  020040  051040  042513
025740  020122  020040  045522
025746  051504  020040  020040
025754  052040  054522  000043

025762  020040  041520  020040  DH16:   .ASCIZ  /  PC     CYLA   CYLB    EXPCT   RECVD   TRY#/
025770  020040  041440  046131
025776  020101  020040  054503
026004  041114  020040  020040
026012  054105  041520  020124
026020  020040  042522  053103
026026  020104  020040  051124
026034  021531     000

026037     040  050040  020103  DH17:   .ASCIZ  /  PC     CYLB   EXPCT   RECVD/
026044  020040  020040  054503
026052  041114  020040  042440
026060  050130  052103  020040
026066  051040  041505  042126
026074     000

026075     040  050040  020103  DH24:   .ASCIZ/  PC     TRY#   RKCS    RKER    RKDS  RKDA: DR  CYL     SUR      SEC/
026102  020040  020040  051124
026110  021531  020040  051040
026116  041513  020123  020040
026124  051040  042513  020122
026132  020040  051040  042113
026140  020123  051040  042113
026146  035101  042040  020122
026154  041440  046131  020040
026162  020040  051440  051125
026170  020040  020040  020040
026176  042523  000103

026202  047527  042122  020043  DH25:   .ASCIZ  /WORD#  EXPCT   RECVD   CYL  SUR  SEC/
026210  042440  050130  052103
026216  020040  051040  041505
026224  042126  020040  041440
026232  046131  020040  052523
026240  020122  051440  041505
026246     000


                                ;ERROR DATA POINTERS


        026250                  .EVEN

026250  001116  001162  001164  DT1:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,0
026256  001166  001170  000000

026264  001116  001162  001164  DT7:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,$REG4,0
```

```
  5295  026272  001166  001170  001172
  5296  026300  000000
  5297
  5298  026302  001116  001162  001164  DT11:   .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG4,$REG5,$REG6,$REG7,0
  5299  026310  001166  001172  001174
  5300  026316  001176  001200  000000
  5301
  5302  026324  001116  001162  001164  DT17:   .WORD   $ERRPC,$REG0,$REG1,$REG2,0
  5303  026332  001166  000000
  5304
  5305  026336  001116  001202  001162  DT24:   .WORD   $ERRPC,$REG10,$REG0,$REG1,$REG2,$REG4,$REG5,$REG6,$REG7,0
  5306  026344  001164  001166  001172
  5307  026352  001174  001176  001200
  5308  026360  000000
  5309
  5310                                  ;DATA BUFFERS
  5311
  5312  026362                        IOBUF0:
  5313  026362  000030                OUTBUF: .BLKW   24.      ;IOBUF0 AND IOBUF1 ARE
  5314  026442  000030                BUFR4:  .BLKW   24.      ;TWO - 768 WORDS LONG BUFFERS
  5315  026522  000030                BUFR5:  .BLKW   24.      ;NORMALLY USED FOR DATA TRANSFERS
  5316  026602  000030                BUFR6:  .BLKW   24.      ;TO AND FROM DISK
  5317  026662  000030                BUFR7:  .BLKW   24.
  5318  026742  000200                BUFR10: .BLKW   128.
  5319  027342  000200                BUFR11: .BLKW   128.
  5320  027742  000200                BUFR12: .BLKW   128.
  5321  030342  000200                BUFR13: .BLKW   128.
  5322  030742  000210                BUFR14: .BLKW   136.
  5323
  5324  031362  001400                IOBUF1: .BLKW   768.
  5325
  5326
  5327          000001                        .END
```

```
ABRT    016716          BUFR13  030342          DRVDON  001223          EXT10   012656          NOSIN   010752
ACRES   001450          BUFR14  030742          DRVPTR  001226          EXT4    006540          NXTBA   023436
BADTMO  002422          BUFR2   001352          DRV.RE= 104416          EXT5    007276          NXTDA   023462
BEGIN   010456          BUFR4   026442          DR.RST  016414          EXT6    010356          NXTDRV  003704
BEGSK   013174          BUFR5   026522          DSKADR  001432          EXT7    012114          NXTPAT  001426
BIT0  = 000001          BUFR6   026602          DSWR  = 177570          FCHECK  024052          NXTWC   023556
BIT00 = 000001          BUFR7   026662          DT1     026250          FDRIVE  002114          OUTADR  001262
BIT01 = 000002          BUSADR  001434          DT11    026302          FDRVE1  002116          OUTBUF  026362
BIT02 = 000004          CHKHDR  007204          DT17    026324          FFUNC   001216          PAT0    001414
BIT03 = 000010          CHKSW0  024000          DT24    026336          FINISH  011436          PAT1    001416
BIT04 = 000020          CHSW    023704          DT7     026264          FUNBEG  023106          PAT2    001420
BIT05 = 000040          CKSWR = 104407          EMTVEC= 000030          FUNERR  023720          PAT3    001422
BIT06 = 000100          CLRERR  012106          EM1     024250          GCYL    016360          PBUF0   001404
BIT07 = 000200          CMPAGA  011170          EM10    024500          GETBUF  007770          PBUF1   001406
BIT08 = 000400          CMPGRP  014546          EM11    024531          GETINF  016140          PGSUBR  001430
BIT09 = 001000          CN.RDY  016544          EM12    024547          GOBAK   011574          PIRQ  = 177772
BIT1  = 000002          CN.RST  016526          EM13    024571          GOTYPE  013524          PIRQVE= 000240
BIT10 = 002000          COMPAR  011144          EM14    024620          GTSWR = 104406          PLOT    014146
BIT11 = 004000          CON.RD= 104421          EM16    024735          GT4RG   016106          PLTGRP  014032
BIT12 = 010000          CON.RE= 104415          EM2     024307          GT5RG   016062          PLTPT   014662
BIT13 = 020000          CR    = 000015          EM20    025110          HT    = 000011          PLT1    014362
BIT14 = 040000          CRLF  = 000200          EM21    025176          INADR   001260          PRSPAT  001424
BIT15 = 100000          CSEROR  011600          EM22    025232          INDX1   001474          PR0   = 000000
BIT2  = 000004          CDISP = 177570          EM23    025255          INDX2   001476          PR1   = 000040
BIT3  = 000010          DH1     025414          EM24    025276          INDX3   001500          PR2   = 000100
BIT4  = 000020          DH11    025567          EM25    025312          INDX4   001502          PR3   = 000140
BIT5  = 000040          DH13    025664          EM26    025354          INPT    023745          PR4   = 000200
BIT6  = 000100          DH14    025703          EM27    025372          IOBUF0  026362          PR5   = 000240
BIT7  = 000200          DH16    025762          EM3     024323          IOBUF1  031362          PR6   = 000300
BIT8  = 000400          DH17    026037          EM30    025407          IOTVEC= 000020          PR7   = 000340
BIT9  = 001000          DH24    026075          EM4     024337          LF    = 000012          PS    = 177776
BLNKS1  002111          DH25    026202          EM5     024355          LUPHE   010564          PSW   = 177776
BLNKS2  002110          DH6     025462          EM6     024424          LUPSIN  010556          PTGEN0  010032
BLNKS3  002107          DH7     025512          EM7     024461          LUPSW   001222          PTGEN1  010114
BLNKS4  002106          DISPLA  001142          ERCNT1  001504          LUPWCE  011274          PTGEN2  010216
BLNKS5  002105          DISPRE  000174          ERCNT2  001506          MESAGE= 104417          PTGEN3  010260
BLNKS6  002104          DMPREG  017576          ERCNT3  001510          MISCMP  011742          PTRN01  010110
BLNKS7  002103          DONE    011562          ERCNT4  001512          MSGE    015770          PTRN02  010112
BLNKS8  002102          DONTRK  011522          ERCNT5  001514          MSG1    001602          PT1     001560
BLNKS9  002101          DOSUR1  011554          ERCNT6  001516          MSG10   001742          PT10    001576
BLNK10  002100          DOWCHK  012344          ERCNT7  001520          MSG11   001771          PT11    001600
BLNK13  002075          DOWRT   012150          ERCNT8  001522          MSG12   002027          PT2     001562
BPTVEC= 000014          DRHOLD  002120          ERRTYP  017362          MSG13   002053          PT3     001564
BRKDA   016144          DRIVAD  001230          ERRVEC= 000004          MSG14   002064          PT4     001566
BYEOP   015156          DRIVS   001224          ERR1    016322          MSG2    001610          PT5     001570
BJFLG0  001410          DRIV0   001232          ERR2    016244          MSG3    001616          PT6     001572
BJFLG1  001412          DRIV1   001234          ERWCHK  011330          MSG4    001640          PT7     001574
BJFNO   001446          DRIV2   001236          ESR13   015402          MSG5    001657          PWRFL   004170
BJFR    001266          DRIV3   001240          ESR15   015310          MSG6    001716          PWRVEC= 000024
BJFR1   001320          DRIV4   001242          ESR20   015456          MSG7    001733          RDAGAI  013566
BJFR10  026742          DRIV5   001244          ESR25   015544          MS15    024673          RDCHR = 104410
BJFR11  027342          DRIV6   001246          EXEC    023612          MS17    025042          RDLIN = 104411
BJFR12  027742          DRIV7   001250          EXEC1   023610          NOHE    010704          RDOCT = 104412
```

```
READ    010532          ST2     003436          TYPDES  022222          $EOP    015172          $REG4   001172
REPEAT  012612          ST3     003666          TYPDS = 104405          $EOPCT  015214          $REG5   001174
REPMSC  011220          SWR     001140          TYPDSS= 104424          $ERFLG  001103          $REG6   001176
REPTIM  013124          SWREG   000176          TYPE  = 104401          $ERMAX  001115          $REG7   001200
RESDON= 104423          SW0   = 000001          TYPMSG= 104420          $ERROR  017106          $RESRE  022364
RESREG= 104414          SW00  = 000001          TYPOC = 104402          $ERRPC  001116          $RTNAD  015266
RESVEC= 000010          SW01  = 000002          TYPON = 104404          $ERRTB  002122          $SAVRE  022326
RES.DO  016440          SW02  = 000004          TYPOS = 104403          $ERTTL  001112          $SAVR6  023074
RETRY1  001252          SW03  = 000010          TYPTIM  013662          $ESCAP  001204          $SCOPE  016732
RETRY2  001254          SW04  = 000020          TY.MSG  016032          $FILLC  001156          $SETUP= 000117
RETRY3  001256          SW05  = 000040          WBUSAD  001442          $FILLS  001155          $STUP = 177777
RKBA    001462          SW06  = 000100          WCAGAI  011056          $GOADR  001120          $SUPRS  022266
RKCS    001456          SW07  = 000200          WCEROR  012006          $GODAT  001124          $SVLAD  017044
RKDA    001464          SW08  = 000400          WCERR   012366          $GET42  015244          $SVPC = 000220
RKDB    001466          SW09  = 001000          WCHI    012372          $GTSWR  021070          $SWR  = 163000
RKDS    001452          SW1   = 000002          WCHI1   012364          $HD   = 000000          $SWRMK= 000000
RKER    001454          SW10  = 002000          WCLO    012572          $HIOCT  021772          $TKB    001146
RKPRI   001470          SW11  = 004000          WCREPT  011260          $ICNT   001104          $TKCNT  020526
RKVEC   001472          SW12  = 010000          WDSKAD  001440          $ILLUP  023070          $TKINT  020536
RKWC    001460          SW13  = 020000          WRDCNT  001436          $INTAG  001135          $TKQEN= 020535
R6    =%000006          SW14  = 040000          WRERR   012164          $ITEMB  001114          $TKQIN  020530
R7    =%000007          SW15  = 100000          WRHI    012324          $_F     001214          $TKQOU  020532
SAVREG= 104413          SW2   = 000004          WRLO    012166          $LPADR  001106          $TKQSR  020534
SBR1    006452          SW3   = 000010          WRLO1   012162          $LPERR  001110          $TKS    001144
SBR2    006476          SW4   = 000020          WRTCHK  011042          $MNEW   021661          $TKSRV  020606
SBR3    007150          SW5   = 000040          WWRDCN  001444          $MSWR   021650          $TN   = 000013
SECPTR  010352          SW6   = 000100          XHE     011366          $MUL  = 000003          $TNPWR  022532
SFTCMP  011112          SW7   = 000200          XXDPMD  001220          $MULT   020414          $TPB    001152
SIAD    001542          SW8   = 000400          $AUTOB  001134          $MULL   001154          $TPFLG  001157
SIZEF   024164          SW9   = 001000          $BDADR  001122          $NWTST= 000001          $TPS    001150
SKDON   015076          TBITVE= 000014          $BDDAT  001126          $OCNT   022216          $TRAP   022616
SMGRP   014416          TIMDON  013774          $BELL   001206          $OMODE  022220          $TRAP2  022640
SOAD    001524          TIMER   001264          $CHARC  020410          $OVER   017072          $TRP  = 000025
SORT    013266          TIMSEK  014722          $CKSWR  021000          $PASS   001100          $TRPAD  022652
SP1     012626          TKVEC = 000060          $CMTAG  001100          $POWER  023076          $TSTNM  001102
SP10    012650          TPVEC = 000064          $CM1  = 000011          $PWRAD  023064          $TTYIN  021626
SP11    012652          TRAPVE= 000034          $CM2  = 000022          $PWRDN  022724          $TYPDS  017750
SP12    012654          TRTVEC= 000014          $CM3  = 000011          $PWRMG  023060          $TYPE   020174
SP2     012630          TSTRWS  016642          $CNTLG  021643          $PWRUP  022776          $TYPEC  020344
SP3     012632          TST.RW= 104422          $CNTLU  021636          $QUES   001212          $TYPEX  020412
SP4     012634          TST1    004204          $CRLF   001213          $RDCHR  021302          $TYPOC  022020
SP5     012636          TST10   012120          $DBLK   020164          $RDLIN  021372          $TYPON  022034
SP6     012640          TST11   012662          $DB2D   022422          $RDOCT  021672          $TYPOS  021774
SP7     012642          TST12   015150          $DECVL  022602          $RDSZ = 000010          $XTSTR  016754
SP8     012644          TST2    004550          $DOAGN  015264          $REGAD  001160          $$GET4= 000000
SP9     012646          TST3    005046          $DTBL   020154          $REG0   001162          $OFILL  022217
STACK = 001100          TST4    005536          $ENDAD  015254          $REG1   001164          .     = 034362
START   002462          TST5    006544          $ENDCT  015222          $REG10  001202
START1  003020          TST6    007302          $ENDMG  015273          $REG2   001166
STKLMT= 177774          TST7    010362          $ENULL  015270          $REG3   001170

. ABS.  034362      000

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0
```

DZRKLD,DZRKLD/LI:ME/NL:MC:MD:CND/SOL/NSQ←DZRKLD.P11
RUN-TIME: 62 43 1 SECONDS
RUN-TIME RATIO: 237/108=2.1
CORE USED: 27K (53 PAGES)

Scaler runtime 18 Seconds. 76 KCS, 490 disk reads, 4 disk writes, 117 pages
[redacted]
0000000000