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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZRKL-E-D
PRODUCT NAME:	RK11/RK05 DYNAMIC TEST
DATE CREATED:	APRIL, 1977
MAINTAINER:	DIAGNOSTIC GROUP
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REVISED BY:	PERVEZ ZAKI TOM SAWYER CHUCK HESS

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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
MAINDEC-11-DZRKL-E

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

DRIVES PRESENT
0
1

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

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

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

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

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

4.2 RKDP DUMP MODE

4.2.1 THE PROGRAM IS LOADED BY THE RKDP MONITOR.

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

4.2.3 THE PROGRAM IDENTIFIES ITSELF AND PRINTS OUT:

'TO TEST DRIVE 'N' HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM'

4.3 RKDP CHAIN MODE

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

'DRIVE 'N' NOT TESTED'

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

4.4 ACT11 MODE

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

5.0 DRIVE SELECTION

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

6.0 SWITCH OPTIONS

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

'SWR = NNNNNN NEW ='

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

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

'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

SW<15>=1		HALT ON ERROR
SW<14>=1		LOOP ON TEST
SW<13>=1		INHIBIT ERROR PRINTOUTS
SW<12>=1		CYCLE ON ERROR TO THE PREVIOUS 'SCOPE' STATEMENT
SW<11>=1		DUMP ALL RK11 REGISTERS ON ERROR
SW<10>=1		RING BELL ON ERROR
SW<09>=1		LOOP ON SPECIFIC ERROR
SW<08>=1	400	LOOP ON TEST INDICATED BY USER (SEE SEC. 6.8)
SW<06>=1	100	TYPE SEEK TIMER
SW<05>=1	40	TYPE THE GRAPHS
SW<04>=1	20	PRINT THE COMPLETE GRAPH
SW<03>=1	10	TERMINATE FUNCTION SELECTED BY USER
SW<02>=1	4	DROP THE DRIVE AFTER MAXIMUM ALLOWABLE NUMBER OF ERRORS OCCUR
SW<00>=1	1	ASK FOR PATTERN TO BE WRITTEN OR WRITE CHECKED (FUNCTION SELECTION PROGRAM)

6.1 SW<15>

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

6.2 SW<14>

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

6.3 SW<13>

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

6.4 SW<12>

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

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

6.5 SW<11>

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

6.6 SW<10>

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

6.7 SW<09>

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

6.8 SW<08>

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

OCTAL TEST#?

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

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

6.9 SW<06>

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

6.10 SW<05>

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

6.11 SW<04>

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

6.12 SW<03>

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

6.13 SW<02>

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

6.14 SW<00>

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

7.0 PROGRAM DESCRIPTION

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

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

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

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

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

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

THE SEEK TIMER PROVIDES SEEK TIMES AND GRAPHS AS

EXPLAINED IN SEC 8.0

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

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

7.1 PERMISSIBLE USER PROGRAM MODIFICATIONS

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

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

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

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

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

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

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

'SP12' TO CONTAIN PATTERNS YOU WANT.

8.0 SEEK TIMER & GRAPHS

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

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

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

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

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

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

9.0 FUNCTION SELECTION PROGRAM

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

STARTING ADDRESS=210

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

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

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

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

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

IF UPON EXECUTION OF A FUNCTION AN ERROR OCCURS IT IS REPORTED. ALL SWITCH OPTIONS WHICH APPLY TO ANY OTHER ERROR, ALSO APPLY TO THIS ERROR.

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.

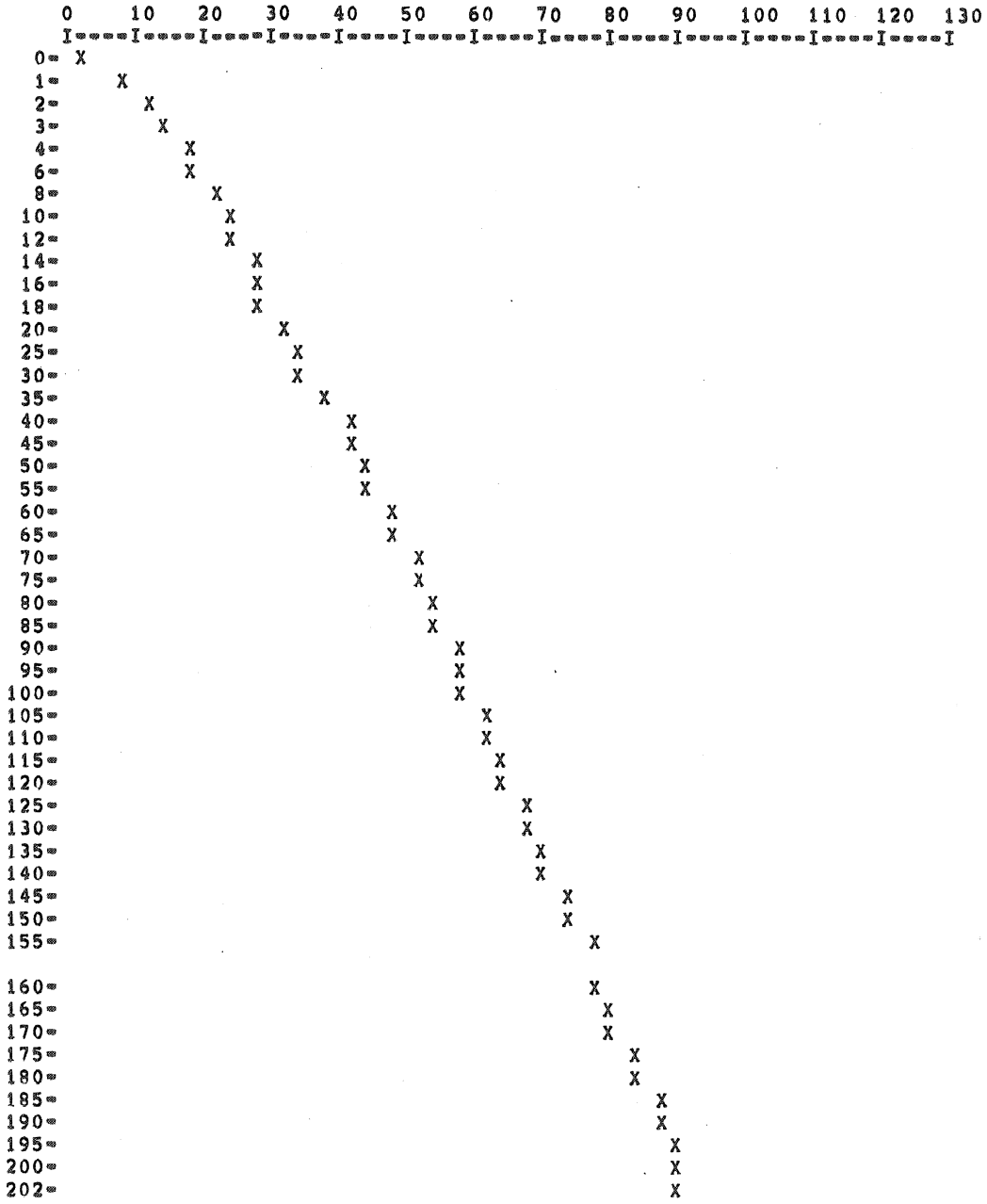
13.0 SAMPLE GRAPH AND SEEK TIMER OUTPUTS

'# 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



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                                ;TITLE  MD-11-DZRKL-E, RK11-RK05 DYNAMIC TEST
                                ;*COPYRIGHT (C) 1974,1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY JIM KAPADIA
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
                                ;*JANUARY 1975
                                ;*
                                ;*REVISED MARCH 1976 BY TOM SAWYER
                                ;*REVISED BY CHUCK HESS, AUGUST, 1976

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


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

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
000000 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
```

```
                        ;
                        ;SWITCH REGISTER DEFINITIONS
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0
                        ;
                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0
                        ;
                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
                        ;
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                        ;
                        .SBTTL  TRAP CATCHER
```



```
                        ;
000000                          .=0
                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ",+2,HALT"
                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
000174                          .=174
000174  000000         DISPREG:: .WORD   0               ;;SOFTWARE DISPLAY REGISTER
000176  000000         SWREG::   .WORD   0               ;;SOFTWARE SWITCH REGISTER
                        .SBTTL  STARTING ADDRESS(ES)
000200  000137  002462         JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
                        ;
000210                          .=210
000210  105237  001216         INCB    FFUNC           ;SET FLAG INDICATING SELECTION OF
000214  000137  002462         JMP     @#START         ;FUNCTION PROGRAM.
                        .SBTTL  ACT11 HOOKS
                        ;
                        ;;*****************************************************************
                        ;HOOKS REQUIRED BY ACT11
000220                          $SVPC=.                 ;SAVE PC
000046                          .=46
000046  015330                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                          .=52
000052  000000                  .WORD   0               ;;2)SET LOC.52 TO ZERO
000220                          .=@$SVPC                ;; RESTORE PC
                        ;
```

```
                                .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.
```

```
1117
1118                                    ;IN CASE, YOU WANT TO USE BUFFERS STARTING AT SOME OTHER MEMORY
1119                                    ;ADDRESS YOU CAN DO SO BY CHANGING THE FOLLOWING POINTERS.
1120                                    ;BOTH THE BUFFERS SHOULD BE 768 (DECIMAL) WORDS LONG.
1121
1122  001404  026446                    PBUF0:  IOBUF0          ;POINTER TO THE STARTING ADDRESS OF THE
1123                                                            ;BUFFER USED TO READ INTO FROM DIBK.
1124  001406  031446                    PBUF1:  IOBUF1          ;POINTER TO STARTING ADDRESS OF BUFFER
1125                                                            ;IN WHICH PATTERNS ARE GENERATED. (WRITING
1126                                                            ;IS DONE FROM THIS BUFFER)
1127  001410  000000                    BUFLG0: .WORD   0       ;FLAG FOR 'IOBUF0'
1128  001412  000000                    BUFLG1: .WORD   0       ;FLAG FOR 'IOBUF1'
1129
1130
1131  001414  010106                    PAT0:   PTGEN0          ;ADRES OF 'PATRN GENERATOR 0'
1132                                                            ;ROUTINE
1133  001416  010170                    PAT1:   PTGEN1          ;ADRES OF 'PATRN GENERATOR 1'
1134
1135  001420  010272                    PAT2:   PTGEN2          ;ADRES OF 'PATRN GENRATOR 2'
1136
1137  001422  010334                    PAT3:   PTGEN3          ;ADRES OF 'PATRN GENRATOR 3'
1138
1139  001424  000000                    PRSPAT: .WORD   0       ;CONTAINS THE POINTER TO THE
1140                                                            ;ADRES OF 1 OF THE 3 'PATRN
1141                                                            ;GENRATOR' ROUTINES
1142  001426  000000                    NXTPAT: .WORD   0       ;SAME AS ABOVE
1143
1144  001430  000000                    PGSUBR: .WORD   0
1145
1146  001432  000000                    DSKADR: .WORD   0       ;CONTAINS DISK ADRES (DA)
1147
1148  001434  000000                    BUSADR: .WORD   0       ;CONTAINS BUS ADRES (BA)
1149
1150  001436  000000                    WRDCNT: .WORD   0       ;CONTAINS WORD COUNT
1151
1152  001440  000000                    WDSKAD: .WORD   0       ;CONTAINS DISK ADRES
1153
1154  001442  000000                    WBUSAD: .WORD   0       ;CONTAINS BUS ADRES
1155
1156  001444  000000                    WWRDCN: .WORD   0       ;CONTAINS WORD COUNT
1157
1158  001446  000000                    BUFNO:  .WORD   0       ;CONTAINS STARTING ADRES
1159
1160  001450  000000                    ADRES:  .WORD   0       ;OF A BUFFER
1161
1162                                    ;RK11 REGISTERS

1163                                    ;IF FOR ANY REASON THE REGISTER ADDRESSES ARE DIFFERENT FROM
1164                                    ;THESE (BELOW), THE CONTENTS OF THE APPROPRIATE POINTERS SHOULD
1165                                    ;BE MODIFIED SO THAT THE CORRECT REGISTER ADDRESS IS USED.

1166
1167
1168  001452  177400                    RKDS:   177400
1169  001454  177402                    RKER:   177402
1170  001456  177404                    RKCS:   177404
1171  001460  177406                    RKWC:   177406
1172  001462  177410                    RKBA:   177410
```



```
1173  001464  177412                    RKDA:   177412
1174  001466  177416                    RKDB:   177416
1175
1176  001470  000200                    RKPRI:  200             ;CONTAINS THE CPU LEVEL (4) AT WHICH
1177                                                            ;RK11 NORMALLY INTERRUPTS.  THIS WORD
1178                                                            ;SHOULD BE CHANGED IF RK11 IS DESIGNATED
1179                                                            ;A BR LEVEL OTHER THAN 5,EXP: IF IT
1180                                                            ;IS CHANGED TO 6, THE CPU LEVEL WOULD
1181                                                            ;BE 1 LESS (5) & HENCE THIS WORD
1182                                                            ;SHOULD BE 240 (BIT POSITIONS ARE
1183                                                            ;IDENTICAL TO THE PRIORITY BITS IN PSW)
1184  001472  000220                    RKVEC:  220             ;CONTAINS THE NORMAL VECTOR ADDRESS
1185                                                            ;TO WHICH THE RK11 INTERRUPTS.  IF THE
1186                                                            ;VECTOR ADDRESS HAS BEEN CHANGED, MODIFY
1187                                                            ;THIS WORD.
1188
1189
1190
1191
1192  001474  000000                    INDX1:  0               ;GENERAL INDEX REGISTERS
1193  001476  000000                    INDX2:  0
1194  001500  000000                    INDX3:  0
1195  001502  000000                    INDX4:  0
1196
1197  001504  000000                    ERCNT1: 0               ;GENERAL REGISTERS
1198  001506  000000                    ERCNT2: 0               ;GENERAL REGISTERS
1199  001510  000000                    ERCNT3: 0               ;GENERAL REGISTERS
1200  001512  000000                    ERCNT4: 0
1201  001514  000000                    ERCNT5: 0
1202  001516  000000                    ERCNT6: 0
1203  001520  000000                    ERCNT7: 0
1204  001522  000000                    ERCNT8: 0
1205
1206
1207                                    ;*THE FOLLOWING TABLE CONTAINS THE CYLINDERS BETWEEN WHICH THE SEEKS WILL BE
1208                                    ;*TIMED. THEY HAVE BEEN SELECTED TO GIVE SOME TYPICAL SEEKS TIMES FOR THE
1209                                    ;*3 SEEK SPEEDS. IF FOR  ANY REASON YOU WANT  TO TIME SEEKS BETWEEN ANY
1210                                    ;*OTHER SET OF CYLINDERS, MAKE CHANGES IN THE CORRESPONDING SEEK CYLINDER
1211                                    ;*ADDRESSES.
1212
1213                                    ;*OUTER CYLINDER ADDRESS, FROM WHERE SEEK WILL BE DONE
1214  001524  000000                    SOAD:   0               ;CYLINDER 0
1215  001526  000000                            0               ;  "  0
1216  001530  013140                            13140           ;  "  179
1217  001532  000000                            0               ;  "  0
1218  001534  000000                            0               ;  "  0
1219  001536  000000                            0               ;  "  0
1220  001540  000000                            0               ;  "  0
1221
1222
1223  001542  014500                    SIAD:   14500           ;CYLINDDER 202, LAST
1224  001544  000040                            40              ;  "  1
1225  001546  013240                            13240           ;  "  181
1226  001550  000140                            140             ;  "  3
1227  001552  001000                            1000            ;  "  16
1228  001554  002000                            2000            ;  "  32
```

```
1229  001556  006200                          6200            ; " 100
1230
1231
1232
1233                                          ;FOLLOWING POINTERS ARE USED TO TRANSFER CONROL TO THE
1234                                          ;TEST SELECTED BY USING SW 8.  IF ANY MORE TESTS ARE
1235                                          ;ADDED TO THIS PROGRAM ADDITIONAL POINTERS SHOULD BE INSERTED.
1236  001560  004262                          PT1:    TST1+2
1237  001562  004626                          PT2:    TST2+2
1238  001564  005124                          PT3:    TST3+2
1239  001566  005614                          PT4:    TST4+2
1240  001570  006622                          PT5:    TST5+2
1241  001572  007360                          PT6:    TST6+2
1242  001574  010440                          PT7:    TST7+2
1243  001576  012176                          PT10:   TST10+2
1244  001600  012740                          PT11:   TST11+2
1245
1246
1247                                          ;MESSAGES & ASCII STRINGS
1248  001602  005015  044523  000116  MSG1:   .ASCIZ  <15><12>/SIN/
1249
1250  001610  005015  045523  000105  MSG2:   .ASCIZ  <15><12>/SKE/
1251
1252  001616  005015  042524  052123  MSG3:   .ASCIZ  <15><12>/TEST # ABORTED:/
1253  001624  021440  040440  047502
1254  001632  052122  042105  000072
1255
1256  001640  005015  051120  043517  MSG4:   .ASCIZ  <15><12>/PROG ABORTED/
1257  001646  040440  047502  052122
1258  001654  042105     000
1259
1260  001657     015  051012  040505  MSG5:   .ASCIZ  <15><12>/READ HDRS OK FROM CYLB ABOVE/
1261  001664  020104  042110  051522
1262  001672  047440  020113  051106
1263  001700  046517  041440  046131
1264  001706  020102  041101  053117
1265  001714  000105
1266
1267  001716  054105  041520  042124  MSG6:   .ASCIZ  /EXPCTD HDR= /
1268  001724  044040  051104  020075
1269  001732     000
1270
1271  001733     040  050040  036503  MSG7:   .ASCIZ  /  PC= /
1272  001740  000040
1273
1274  001742  005015  047103  051124  MSG10:  .ASCIZ  <15><12>/CNTRL RDY DIDN'T SET/

1275  001750  020114  042122  020131
1276  001756  044504  047104  052047
1277  001764  051440  052105     000
1278
1279  001771     123  041505  051124  MSG11:  .ASCIZ  /SECTR  EXPC P=HDR  RECV P=HDR/
1280  001776  020040  054105  041520
1281  002004  050040  044055  051104
1282  002012  020040  042522  053103
1283  002020  050040  044055  051104
1284  002026     000
```



```
1285
1286  002027     015  051012  053457  MSG12:  .ASCIZ  <15><12>"R/W/S RDY NOT SET"
1287  002034  051457  051040  054504
1288  002042  047040  052117  051440
1289  002050  052105     000
1290
1291  002053     040  052040  054522  MSG13:  .ASCIZ  /  TRY #:/
1292  002060  021440  000072
1293
1294
1295  002064  005015  051104  053111  MSG14:  .ASCIZ  <15><12>/DRIVE /
1296  002072  020105     000
1297
1298  002075     040  020040          BLNK13: .ASCII  /   /
1299  002100     040                  BLNK10: .ASCII  / /
1300  002101     040                  BLNK9:  .ASCII  / /
1301  002102     040                  BLNK8:  .ASCII  / /
1302  002103     040                  BLNK7:  .ASCII  / /
1303  002104     040                  BLNK6:  .ASCII  / /
1304  002105     040                  BLNK5:  .ASCII  / /
1305  002106     040                  BLNK4:  .ASCII  / /
1306  002107     040                  BLNK3:  .ASCII  / /
1307  002110     040                  BLNK2:  .ASCII  / /
1308  002111     040     000          BLNK1:  .ASCIZ  / /
1309
1310          002114                          .EVEN
1311  002114  000000                  FDRIVE: 0
1312  002116  000000                  FDRVE1: 0
1313  002120  000000                  DRHOLD: 0
```

```
                                ,SBTTL  ERROR POINTER TABLE

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

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


002122                          $ERRTB:


                                        ;ERROR ITEMS TABLE
                                        ;
                                        ;
                                        ;
                                ;ITEM   1

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

                                ;ITEM   2

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

                                ;ITEM   3

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

                                ;ITEM   4

002152  024423                          EM4     ;'ERR' ON SEEK
002154  025500                          DH1     ;PC     RKCS    RKER    RKDS    RKDA

002156  026334                          DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
002160  000000                          0

                                ;ITEM   5

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



```
                                ;ITEM   6

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

                                ;ITEM   7

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

                                ;ITEM   10

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

                                ;ITEM   11

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

                                ;ITEM   12

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

                                ;ITEM   13

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

                                ;ITEM   14

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

                                ;ITEM   15

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

```
1426  002270  015364                    ESR15   ;GO TO "ESR15" FOR TYPING OUT
1427
1428                                  ;ITEM   16
1429
1430  002272  025021                    EM16    ;READ WRONG, FIRST WORD FROM SECTOR 0, 'CYLB' (ON IMPLIED SEEK FROM CYLA
1431  002274  026046                    DH16    ;PC     CYLA    CYLB    EXPCT   RECVD   TRY#
1432  002276  026350                    DT7     ;$ERRPC $REG0   $REG1   $REG2   $REG3   $REG4
1433  002300  000000                    0
1434
1435                                  ;ITEM   17
1436
1437  002302  025126                    MS17    ;READ FIRST WORD FROM SECTOR 1, 'CYLB' ABOVE
1438  002304  026123                    DH17    ;PC     CYLB    EXPCT   RECVD
1439  002306  026410                    DT17    ;$ERRPC $REG0   $REG1   $REG2
1440  002310  000000                    0
1441
1442                                  ;ITEM   20
1443
1444  002312  025174                    EM20    ;READ WRONG HEADER ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'
1445  002314  025750                    DH13    ;SECTOR # HEADER RECVD
1446  002316  000000                    0
1447  002320  015532                    ESR20   ;USE THIS SUBROUTINE FOR TYPING OUT ERROR DATA
1448
1449
1450                                  ;ITEM   21
1451
1452  002322  025262                    EM21    ;EROR ON DOING WRITE ON DSK
1453  002324  025500                    DH1     ;PC     RKCS    RKER    RKDS    RKDA
1454  002326  026334                    DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
1455  002330  000000                    0
1456
1457                                  ;ITEM   22
1458
1459  002332  025316                    EM22    ;SIN ON DOING WRITE
1460  002334  025500                    DH1     ;PC     RKCS    RKER    RKDS    RKDA
1461  002336  026334                    DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
1462  002340  000000                    0
1463
1464                                  ;ITEM   23
1465
1466  002342  025341                    EM23    ;HE ON DOING READ
1467  002344  025653                    DH11    ;PC     RKCS    RKER    RKDS    RKDA:
1468                                            ;DRV#   CYL     SUR     SEC
1469  002346  026366                    DT11    ;$ERRPC $REG0   $REG1   $REG2
1470                                            ;$REG4  $REG5   $REG6   $REG7
1471  002350  000000                    0

1472
1473                                  ;ITEM   24
1474
1475  002352  025362                    EM24    ;CSE ON READ
1476  002354  026161                    DH24    ;PC     TRY#    RKCS    RKER    RKDS    RKDA:
1477                                            ;DRV#   CYL     SUR     SEC
1478  002356  026422                    DT24    ;$ERRPC $REG10  $REG0   $REG1   $REG2
1479                                            ;$REG4  $REG5   $REG6   $REG7
1480  002360  000000                    0
1481
```



```
1482                                  ;ITEM   25
1483
1484  002362  025376                    EM25    ;DATA ERROR ON READ FROM DISK ADDRESS
1485  002364  026266                    DH25    ;WORD#  EXPCT   RECVD   CYL     SUR     SEC
1486  002366  000000                    0
1487  002370  015620                    ESR25   ;USE THIS ROUTINE FOR ERROR REPORTING
1488
1489                                  ;ITEM   26
1490
1491  002372  025440                    EM26    ;HE ON WRT CHK
1492  002374  025653                    DH11    ;PC     RKCS    RKER    RKDS    RKDA:
1493                                            ;DRV#   CYL     SUR     SEC
1494  002376  026366                    DT11    ;$ERRPC $REG0   $REG1   $REG2
1495                                            ;$REG4  $REG5   $REG6   $REG7
1496  002400  000000                    0
1497
1498                                  ;ITEM   27
1499
1500  002402  025456                    EM27    ;WRT CHK EROR
1501  002404  026161                    DH24    ;PC     TRY#    RKCS    RKER    RKDS    RKDA:
1502                                            ;DRV#   CYL     SUR     SEC
1503  002406  026422                    DT24    ;$ERRPC $REG10  $REG0   $REG1   $REG2
1504                                            ;$REG4  $REG5   $REG6   $REG7
1505  002410  000000                    0
1506
1507                                  ;ITEM   30
1508
1509  002412  025473                    EM30    ;ERROR
1510  002414  025500                    DH1     ;PC     RKCS    RKER    RKDS    RKDA
1511  002416  026334                    DT1     ;$ERRPC $REG0   $REG1   $REG2   $REG3
1512  002420  000000                    0
1513
1514
1515
1516
1517
1518
```

```
                                        ;THIS IS THE HANDLER FOR UNEXPECTED TIME OUT, PRESSING CONTINUE WILL
                                        ;RESTART THE PROGRAM.
                                        
002422  011600                  BADTMO: MOV     (SP),R0 ;SAVE PC WHERE TIME OUT OCCURED
002424  005740                          TST     -(R0)
002426  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
002430  104401  002436                  TYPE    ,65$            ;;TYPE ASCIZ STRING
002434  000407                          BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>/TIMOUT:PC=/
002454                          64$:
002454  010046                          MOV     R0,-(SP)        ;SET UP FOR TYPING OUT PC
002456  104402                          TYPOC                   ;GO TYPE OUT OCTAL PC
002460  000000                          HALT
                                        
002462  000005                  START:  RESET                   ;CLEAR THE BUS
                                        ;;GIVE DRIVES TIME TO RELOAD HEADS IN CASE OF AN APT START
002464  023737  000042  000046          CMP     @#42,@#46               ;ARE WE IN ACT11 AUTO MODE?
002472  001016                          BNE     STARTA                  ;NO, SKIP DELAY
002474  005077  176764                  CLR     @RKDA                   ;SELECT UNIT 0
002500  012700  000250                  MOV     #250,R0                 ;WAIT FOR..
002504  032777  000200  176740  20$:    BIT     #200,@RKDS              ;DRIVE READY..
002512  001006                          BNE     STARTA                  ;IN CASE..
002514  005001                          CLR     R1                      ;OF APT..
002516  005301                          DEC     R1                      ;START, BUT..
002520  001376                          BNE     .-2                     ;DON'T WAIT..
002522  005300                          DEC     R0                      ;FOREVER.
002524  001367                          BNE     20$
002526  000000                          HALT                            ;RKDS BIT 7 (DIRVE READY) NEVER SET
002530                          STARTA:
                                        .SBTTL  INITIALIZE THE COMMON TAGS
                                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
002530  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
002534  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
002536  022706  001140                  CMP     #SWR,R6 ;;DONE?
002542  001374                          BNE     .-6             ;;LOOP BACK IF NO
002544  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                        ;;INITIALIZE A FEW VECTORS
002550  012737  017006  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
002556  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
002564  012737  017162  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
002572  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
002600  012737  022702  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
002606  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
002614  012737  023010  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR

002622  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
002630  005037  001204                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
002634  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
002642  012737  002642  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
002650  012737  002650  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER, IF NOT FOUND OR IT IS
                                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
002656  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
002662  012737  002716  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
002670  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
```



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

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

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

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

```
1631  003202  104401  003210                  TYPE    ,65$            ;;TYPE ASCIZ STRING
1632  003206  000413                          BR      64$             ;;GET OVER THE ASCIZ
1633                                  ;;65$:  .ASCIZ  <15><12>/NOT TESTING DRIVE /
1634  003236                          64$:
1635  003236  005046                          CLR     -(SP)           ;CLEAR WORD ON STACK
1636  003240  113716  001220                  MOVB    XXDPMD,(SP)     ;GET DRIVE ADDRESS
1637  003244  104403                          TYPOS                   ;TYPE THE ADDRESS
1638  003246     001                          .BYTE   1               ;ONLY 1 CHARACTER
1639  003247     000                          .BYTE   0               ;SUPRESS LEADING ZEROS
1640  003250  000520                          BR      ST2             ;GET NUMBER OF DRIVES
1641  003252  005227  177777          3$:     INC     #-1             ;FIRST TIME THROUGH HERE ?
1642  003256  001115                          BNE     ST2             ;BR IF NOT FIRST TIME
1643  003260  104401  003266                  TYPE    ,67$            ;;TYPE ASCIZ STRING
1644  003264  000411                          BR      66$             ;;GET OVER THE ASCIZ
1645                                  ;;67$:  .ASCIZ  <15><12>/TO TEST DRIVE /
1646  003310                          66$:
1647  003310  005046                          CLR     -(SP)           ;CLEAR WORD ON THE STACK
1648  003312  113716  001220                  MOVB    XXDPMD,(SP)     ;GET DRIVE ADDRESS
1649  003316  104403                          TYPOS                   ;TYPE THE DRIVE ADDRESS
1650  003320     001                          .BYTE   1               ;ONLY 1 CHARACTER
1651  003321     000                          .BYTE   0               ;SUPRESS LEADING ZEROS
1652  003322  104401  003330                  TYPE    ,69$            ;;TYPE ASCIZ STRING
1653  003326  000431                          BR      68$             ;;GET OVER THE ASCIZ
1654                                  ;;69$:  .ASCIZ  / HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT/<15><12>
1655  003412                          68$:
1656  003412  104401  003420                  TYPE    ,71$            ;;TYPE ASCIZ STRING
1657  003416  000435                          BR      70$             ;;GET OVER THE ASCIZ
1658                                  ;;71$:  .ASCIZ  /WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM/
1659  003512                          70$:
1660
1661
1662  003512  012737  002422  000004  ST2:    MOV     #BADTMO,ERRVEC  ;SET TIMEOUT VECTOR FOR
1663                                                                  ;UNEXPECTED TIME OUT
1664
1665                                  ;THIS CODE FINDS WHICH DRIVES ARE PRESENT & PRINTS OUT THE DRIVE
1666                                  ;DRIVE NUMBERS THAT WERE FOUND ON LINE.
1667
1668  003520  104401  003526                  TYPE    ,65$            ;;TYPE ASCIZ STRING
1669  003524  000411                          BR      64$             ;;GET OVER THE ASCIZ
1670                                  ;;65$:  .ASCIZ  <15><12>/DRIVES PRESENT/
1671  003550                          64$:
1672  003550  105037  001224                  CLRB    DRIVS           ;INITIALIZE NO. OF DRVS PRESENT
1673  003554  005001                          CLR     R1
1674  003556  012702  001232                  MOV     #DRIV0,R2
1675  003562  005003                          CLR     R3              ;INITIALIZE COUNT TO 0
1676  003564  005737  001220          1$:     TST     XXDPMD          ;LOADED FROM AN RK05 ?

1677  003570  001403                          BEQ     6$              ;BR IF NOT
1678  003572  120337  001220                  CMPB    R3,XXDPMD       ;CHECKING THE LOAD DRIVE ?
1679  003576  001411                          BEQ     2$              ;BR IF YES

1680  003600  010177  175660          6$:     MOV     R1,@RKDA        ;ADRES A DRIVE
1681  003604  105777  175642                  TSTB    @RKDS           ;IS IT PRESENT?
1682  003610  100004                          BPL     2$              ;NO, BRANCH
1683  003612  105237  001224                  INCB    DRIVS           ;INCREMENT TOTAL # OF DRVS
1684  003616  052712  000001                  BIS     #1,(R2)         ;SET FLAG INDICATING THIS DRV PRSNT
1685  003622  005722                  2$:     TST     (R2)+
1686  003624  005203                          INC     R3              ;INCREMENT COUNT
```



```
1687  003626  062701  020000                  ADD     #20000,R1       ;ADRES THE NXT DRV
1688                                                                  ;CHKD ALL 8 DRIVES?
1689  003632  001354                          BNE     1$              ;IF NOT, GO CHK IF NEXT DRV PRSNT
1690
1691  003634  004737  024250                  JSR     PC,SIZEF        ;FIND WHICH ARE FS
1692  003640  105737  001224                  TSTB    DRIVS           ;WERE ANY DRIVES FOUND?
1693  003644  001010                          BNE     3$              ;YES, BRANCH
1694  003646  104401  003654                  TYPE    ,67$            ;;TYPE ASCIZ STRING
1695  003652  000403                          BR      66$             ;;GET OVER THE ASCIZ
1696                                  ;;67$:  .ASCIZ  / NONE/
1697  003662                          66$:
1698  003662  000137  015246                  JMP     $EOP            ;IF NONE WERE FOUND, GO
1699                                                                  ;TO THE END OF PROGRAM
1700  003666  005002                  3$:     CLR     R2              ;DRIVE NUMBER
1701  003670  012700  001232                  MOV     #DRIV0,R0       ;TABLE OF AVAIL DRIVES
1702  003674  105710                  5$:     TSTB    (R0)            ;DRIVE HERE?
1703  003676  001414                          BEQ     4$              ;NO
1704  003700  104401                          TYPE
1705  003702  001213                          $CRLF
1706  003704  010246                          MOV     R2,-(SP)        ;PUSH NO ON THE STACK
1707  003706  104403                          TYPOS                   ;TO TYPE OCTAL NO.
1708  003710     001                          .BYTE   1               ;TYPE 1 DIGIT, SUPRESS LDG 0'S
1709  003711     000                          .BYTE   0
1710  003712  032710  000002                  BIT     #2,(R0)         ;IS IT RK05F?
1711  003716  001404                          BEQ     4$              ;NO
1712  003720  104401  003725                  TYPE    ,69$            ;;TYPE ASCIZ STRING
1713  003724  000401                          BR      68$             ;;GET OVER THE ASCIZ
1714                                  ;;69$:  .ASCIZ  /F/
1715  003730                          68$:
1716  003730  005202                  4$:     INC     R2              ;POINT TO NEXT DRIVE #
1717  003732  005720                          TST     (R0)+           ;NEXT DRIVE IN TABLE
1718  003734  020027  001251                  CMP     R0,#DRIV7+1     ;ALL DONE?
1719  003740  002755                          BLT     5$              ;NO, CHECK REST
1720
1721                                  ;FIND OUT THE FIRST (FROM 0-7) DRIVE THAT IS PRESENT.  PUT THE ADDRESS
1722                                  ;OF THAT DRIVE IN 'DRIVAD'.  INDICATE THAT DRIVE # WILL
1723                                  ;BE TESTED.
1724
1725  003742  012737  001232  001226  ST3:    MOV     #DRIV0,DRVPTR
1726  003750  105037  001223                  CLRB    DRVDON
1727  003754  005037  001230                  CLR     DRIVAD
1728  003760  105037  001102          NXTDRV: CLRB    $TSTNM          ;RESET TEST NUMBER TO 1
1729  003764  005037  001112                  CLR     $ERTTL          ;CLEAR ERROR COUNT FOR THIS DRIVE
1730  003770  013701  001226                  MOV     DRVPTR,R1
1731  003774  032721  000001          1$:     BIT     #1,(R1)+        ;IS THIS DRIVE PRESENT?
1732  004000  001005                          BNE     2$              ;YES, BRANCH
1733  004002  020127  001252          4$:     CMP     R1,#DRIV7+2     ;CHECKED THE WHOLE LIST?
1734  004006  001372                          BNE     1$              ;NO
1735  004010  000137  015246                  JMP     $EOP            ;YES, EXIT
1736  004014  010137  001226          2$:     MOV     R1,DRVPTR       ;NO, GO AHEAD
1737  004020  014104                          MOV     -(R1),R4        ;GET DRIVE NO. TO BE TESTED
1738  004022  005037  002116                  CLR     FDRVE1
1739  004026  005037  002114                  CLR     FDRIVE          ;SHOWS F IF -1
1740  004032  032704  000002                  BIT     #2,R4           ;RK-05F?
1741  004036  001410                          BEQ     7$              ;NO
1742  004040  005237  002116                  INC     FDRVE1          ;SHOWS F
```

```
1743  004044  032704  020000              BIT     #20000,R4       ;EVEN DRIVE?
1744  004050  001003                      BNE     7$              ;NO
1745  004052  012737  177777  002114      MOV     #-1,FDRIVE      ;RK05F AND EVEN
1746  004060  042704  000003          7$: BIC     #3,R4
1747  004064  010437  001230              MOV     R4,DRIVAD       ;SET UP DRIVE ADRES
1748  004070  104401  002064              TYPE    ,MSG14
1749  004074  000241                      CLC
1750  004076  006104                      ROL     R4              ;TYPE OUT THE DRIVE NO.
1751  004100  006104                      ROL     R4
1752  004102  006104                      ROL     R4
1753  004104  006104                      ROL     R4
1754  004106  010446                      MOV     R4,-(SP)
1755  004110  104403                      TYPOS
1756  004112     001                      .BYTE   1
1757  004113     000                      .BYTE   0
1758
1759  004114  005737  002116              TST     FDRVE1          ;RK-05F?
1760  004120  001404                      BEQ     6$              ;NO
1761  004122  104401  004130              TYPE    ,65$            ;;TYPE ASCIZ STRING
1762  004126  000401                      BR      64$             ;;GET OVER THE ASCIZ
1763                                  ;;65$:  .ASCIZ  /F/
1764  004132                          64$:
1765  004132                          6$:
1766                                  ;IF SW 8 IS SET THEN FIND OUT WHICH TEST NUMBER IS
1767                                  ;SELECTED AND JUMP TO THAT TEST.
1768
1769  004132  105037  001222              CLRB    LUPSW           ;CLEAR FLAG INDICATING SW8 SET
1770  004136  032777  000400  174774      BIT     #SW8,@SWR       ;SW 8 SET?
1771  004144  001445                      BEQ     TST1            ;NO, BRANCH
1772  004146                          5$:
1773  004146  104401  004154              TYPE    ,67$            ;;TYPE ASCIZ STRING
1774  004152  000410                      BR      66$             ;;GET OVER THE ASCIZ
1775                                  ;;67$:  .ASCIZ  <15><12>/OCTAL TEST#?/
1776  004174                          66$:
1777  004174  104412                      RDOCT
1778  004176  012600                      MOV     (SP)+,R0
1779  004200  001762                      BEQ     5$
1780  004202  020027  000011              CMP     R0,#11          ;CHECK TYPED IN TEST #
1781  004206  003357                      BGT     5$              ;IS LEGAL, IF NOT ASK
1782  004210  110037  001102              MOVB    R0,$TSTNM
1783  004214  005300                      DEC     R0              ;FORM POINTERS FOR THE TEST #
1784  004216  006300                      ASL     R0
1785  004220  016037  001560  001106      MOV     PT1(R0),$LPADR  ;ADJUST POINTERS FOR SCOPE
1786  004226  013737  001106  001110      MOV     $LPADR,$LPERR   ;LOOP, ETC.
1787  004234  105237  001222              INCB    LUPSW           ;SET FLAG INDICATING TEST #
1788                                                              ;SELECTED

1789  004240  000177  174642              JMP     @$LPADR         ;GO TO THE TEST SELECTED
1790
1791
1792
1793
1794
1795                                  ;ON RECOVERY FROM POWER FALIURE RETURN HERE
1796
1797  004244  005000                  PWRFL:  CLR     R0
1798  004246  005001                          CLR     R1
```



```
1799  004250  005201                  1$:     INC     R1
1800  004252  001376                          BNE     1$
1801  004254  105200                          INCB    R0
1802  004256  001374                          BNE     1$
1803
1804
1805
1806                                  ;;*****************************************************************
1807                                  ;*TEST 1         CHECK INNER LIMIT SWITCH & ELECTROMECHANICAL INTEGRITY
1808                                          ;*THIS TEST PERFORMS 200(8) PURE SEEKS FROM CYLINDER 0
1809                                          ;*TO CYLINDER 312 AND BACK TO 0.  IT IS SUPPOSED TO
1810                                          ;*CHECK THE INNER LIMIT SWITCH AND THE MECHANICAL
1811                                          ;*INTEGRITY OF THE DRIVE.  NOTE THAT A VISUAL CHECK FOR
1812                                          ;ANY MECHANICAL FAILURES WOULD BE VERY HELPFUL.
1813                                  ;;*****************************************************************
1814  004260  000004                  TST1:   SCOPE
1815  004262  005000                          CLR     R0              ;INITIALIZE COUNT
1816  004264  005001                          CLR     R1              ;INITIALIZE COUNT FOR # OF SEEKS
1817  004266  005002                          CLR     R2              ;CONTAINS SEEK ADRES
1818  004270  012737  004322  001110          MOV     #20$,$LPERR     ;SET RETURN ADRES FOR LUPING
1819                                                                  ;ON ERROR
1820  004276  012703  001266                  MOV     #BUFR,R3        ;INITIALIZE POINTER TO THE TABLE
1821  004302  012704  177767                  MOV     #-11,R4         ;ALLOW ONLY 9 CNTRL-RDY, SIN, OR R/W/S RDY ERORS
1822  004306  012705  177770                  MOV     #-10,R5         ;ALLOW ONLY 8 DRU+DRE+ERR+DRY ERRORS
1823  004312  000402                          BR      2$
1824
1825  004314  005703                  1$:     TST     R3              ;WAS THERE ANY ERROR?
1826  004316  001403                          BEQ     3$              ;NO, BRANCH
1827  004320  005003                  2$:     CLR     R3              ;CLR EROR FLAG
1828  004322  104415                  20$:    CON.RESET               ;GO DO CNTRL RESET. SUB ROUTINE
1829                                                                  ;AT 'CNT.RST'
1830  004324  104416                          DRV.RESET               ;GO TO 'DRV.RST' & DO DRV RESET
1831
1832  004326  013777  001230  175130  3$:     MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
1833  004334  050277  175124                  BIS     R2,@RKDA        ;SET SEEK ADRES
1834  004340  105777  175106                  TSTB    @RKDS           ;DRIVE RDY?
1835  004344  100406                          BMI     21$             ;YES
1836  004346  004737  016162                  JSR     PC,GT4RG        ;NO, GET RKCS, ER, DS, DA
1837  004352  104030                          ERROR   30              ;DRIVE RDY BIT IS NOT SET
1838                                                                  ;IN RKDS
1839  004354  005203                          INC     R3              ;SET ERROR FLAG
1840  004356  005205                          INC     R5              ;ALLOW ONLY 5 ERORS, IF MORE
1841  004360  001515                          BEQ     18$             ;ABORT
1842
1843  004362  012777  000011  175066  21$:     MOV     #11,@RKCS       ;GO, SEEK
1844  004370  005200                  4$:     INC     R0              ;WAIT FOR CNTRL RDY
1845  004372  001007                          BNE     5$              ;WAITED LONG?
1846                                                                  ;IF YES, ERROR
1847  004374  004737  016162                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1848  004400  104001                          ERROR   1               ;CNTRL RDY DIDN'T SET AFTER
1849                                                                  ;SEEK WAS DONE TO CYLINDER
1850                                                                  ;SHOWN IN RKDA. GO TO 'RK11 LOGIC TESTS'
1851  004402  005203                          INC     R3              ;SET ERROR FLAG
1852  004404  005204                          INC     R4              ;EXIT THIS TEST IF THERE R 5 OR MORE ERRORS
1853  004406  001502                          BEQ     18$
1854  004410  000403                          BR      6$
```

```
1855  004412  105777  175040          5$:   TSTB    @RKCS           ;DID CNTRL RDY SET?
1856  004416  100364                        BPL     4$              ;IF NOT WAIT FOR IT
1857
1858  004420  005000                  6$:   CLR     R0              ;INITIALIZE COUNT
1859  004422  032777  000100  175022        BIT     #100,@RKDS      ;R/W/S RDY SET?
1860  004430  001010                        BNE     7$              ;YES
1861  004432  005200                        INC     R0              ;WAIT FOR R/W/S RDY
1862  004434  001372                        BNE     6$+2
1863  004436  004737  016162                JSR     PC,GT4RG        ;GET RKCS, ER, DS, DA
1864  004442  104006                        ERROR   6               ;R/W/S RDY DID NOT SET WHEN SEEK
1865                                                                ;WAS DONE TO CYLINDER INDICATED IN RKDA
1866  004444  005203                        INC     R3              ;SET ERROR FLAG
1867  004446  005204                        INC     R4              ;IF MAXM EROR COUNT, ABORT
1868  004450  001461                        BEQ     18$
1869  004452  032777  001000  174772  7$:   BIT     #1000,@RKDS     ;SIN ERROR?
1870  004460  001406                        BEQ     8$              ;NO, BRANCH
1871  004462  004737  016162                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1872  004466  104002                        ERROR   2               ;SIN ERROR, ON DOING SEEK TO
1873                                                                ;CYL AS SHOWN IN RKDA
1874  004470  005203                        INC     R3              ;SET ERROR FLAG
1875  004472  005204                        INC     R4              ;IF MAXM EROR COUNT REACHED,
1876  004474  001447                        BEQ     18$             ;ABORT THE TEST
1877  004476  005777  174752          8$:   TST     @RKER           ;DRE ERROR?
1878  004502  100006                        BPL     10$             ;NO, BRANCH
1879
1880  004504  004737  016162                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1881  004510  104003                        ERROR   3               ;DRE ON DOING SEEK TO CYLINDER
1882                                                                ;AS SHOWN IN RKDA
1883  004512  005203                        INC     R3              ;SET ERROR FLAG
1884  004514  005205                        INC     R5              ;IF MAXM EROR COUNT REACHED,
1885  004516  001767                        BEQ     8$              ;ABORT THE TEST
1886
1887  004520  005777  174732          10$:  TST     @RKCS           ;'ERR' BIT IN RKCS SET?
1888  004524  100006                        BPL     12$             ;NO, BRANCH
1889  004526  004737  016162                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1890  004532  104004                        ERROR   4               ;'ERR' IN RKCS SET, ON DOING SEEK
1891                                                                ;TO CYL AS SHOWN IN RKDA, NOTE
1892                                                                ;WHICH BIT IN RKER SET?
1893  004534  005203                        INC     R3              ;SET ERROR FLAG
1894  004536  005205                        INC     R5              ;IF MAXM EROR COUNT REACHED,
1895  004540  001425                        BEQ     18$             ;ABORT THE TEST
1896
1897  004542  032777  002000  174702  12$:  BIT     #2000,@RKDS     ;DRU SET?
1898  004550  001406                        BEQ     15$             ;NO, BRANCH
1899  004552  004737  016162                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
1900  004556  104005                        ERROR   5               ;DRU SET, THIS IS AN IRRECOVERABLE

1901                                                                ;ERROR,  HENCE PUT THE DRIVE ON
1902                                                                ;LOAD, BACK TO RUN,  DRU ERROR
1903                                                                ;SHOULD BE CLEARED, IF IT IS NOT
1904                                                                ;1) THE HEAD POSITION TRANSDVCER LAMP
1905                                                                ;IS INOPERATIVE
1906                                                                ;2) OR ERASE OR WRT CURRENT PRESENT
1907                                                                ;WITHOUT 'WRT GATE'
1908  004560  005203                        INC     R3              ;SET EROR FLAG
1909  004562  005205                        INC     R5              ;ALLOW ONLY 5 ERRORS
1910  004564  001413                        BEQ     18$             ;IF MORE THAN 5
```



```
1911                                                                ;GO TO THE END OF THE PROGRAM
1912
1913  004566  005702                  15$:  TST     R2              ;WAS SEEKING TO 0 OR 312?
1914  004570  001402                        BEQ     16$             ;TO 0, BRANCH
1915                                                                ;TO 312,
1916  004572  005002                        CLR     R2              ;SEEK NXT TIME TO 0
1917  004574  000647                        BR      1$              ;GO BAK & SK TO 0
1918
1919  004576  012702  014500          16$:  MOV     #14500,R2       ;SEEK NXT TIME TO 312
1920
1921  004602  005201                        INC     R1              ;DONE SEEKS 200 TIMES?
1922  004604  022701  000200                CMP     #200,R1
1923
1924  004610  001241                        BNE     1$              ;IF NOT, GO BAK
1925  004612  000404                        BR      TST2            ;;EXIT
1926
1927
1928  004614  104401  001640          18$:  TYPE    ,MSG4
1929  004620  000137  015224                JMP     TST12
1930
1931                                  ;;*****************************************************************
1932                                  ;*TEST 2        FORMAT THE DISK
1933                                          ;*THIS PROGRAM ASSUMES AN UNFORMATTED DISK AND ITS
1934                                          ;*FORMATTING IS DONE IN THIS TEST. A SECTOR IS FORMATTED
1935                                          ;*AT A TIME,  THE FIRST OWRD OF EVERY SECTOR IS WRITTEN
1936                                          ;*TO BE A PSUEDO-HEADER CONTAINING THE DRIVE #, CYLINDER
1937                                          ;**, SURFACE AND SECTOR #.  THE FOLLOWING IS CHECKED
1938                                          ;*1.  'SIN' IF 'SIN' OCCURS, A DRIVE RESET IS DONE
1939                                          ;*AND THE SAME SECTOR IS FORMATTED AGAIN,  THREE
1940                                          ;*RETRIES ARE DONE BEFORE AN ERROR MESSAGE IS PRINTED.
1941                                          ;*2.  'ERR' ON FINDING THAT THE 'ERR' BIT SET, RKER
1942                                          ;*SCANNED TO FIND OUT WHAT CAUSED IT AND THE
1943                                          ;*ERROR IS REPORTED.
1944                                  ;;*****************************************************************
1945  004624  000004                  TST2:  SCOPE
1946  004626  013737  001230  002120        MOV     DRIVAD,DRHOLD   ;SAVE DRIVE NUMBER
1947  004634  005737  002114                TST     FDRIVE          ;SEE IF EVEN RK-05F DRIVE
1948  004640  001003                        BNE     11$             ;YES
1949  004642  005737  002116                TST     FDRVE1          ;ODD RK-05F?
1950  004646  001125                        BNE     TST3            ;DO NOT FORMAT IF ODD RK-05F
1951  004650                          11$:
1952  004650  012702  177152                MOV     #-626,R2        ;203 CYLINDERS, (406 TRAKS)
1953  004654  012703  177764                MOV     #-14,R3         ;12 SECTORS
1954  004660  012701  177773                MOV     #-5,R1          ;ALLOW ONLY 5 'SIN' ERRORS
1955  004664  012705  177773                MOV     #-5,R5          ;ALLOW ONLY 5 'ERR'S
1956  004670  013704  001230                MOV     DRIVAD,R4       ;STORE ADRES OF DRIVE.
1957  004674  104415                  4$:   CON.RESET
1958  004676  104416                        DRV.RESET               ;GO TO 'DR-RST' & DO DRIVE RESET
1959  004700  005000                  1$:   CLR     R0              ;KEEP COUNT OF 'SIN' ERORS
1960                                                                ;ALLOW 3 RETRIES ON SIN
1961  004702  005777  174550                TST     @RKCS           ;ERR?
1962  004706  100001                        BPL     3$              ;NO
1963
1964  004710  104415                        CON.RESET               ;GO TO 'CN-RST' & DO CONTROL RESET
1965
1966  004712  005046                  3$:   CLR     -(SP)
```

```
1967  004714  012746  004722                  MOV     #128.,-(SP)
1968  004720  000002                          RTI                     ;SET PRIORITY TO ZERO
1969  004722  010437  026446          128:    MOV     R4,OUTBUF       ;WRITE THIS WORD
1970  004726  012777  026446  174526          MOV     #OUTBUF,@RKBA   ;FROM THIS ADRES
1971  004734  010477  174524                  MOV     R4,@RKDA        ;ON THIS DISK SECTOR
1972  004740  012777  177777  174512          MOV     #-1,@RKWC       ;WRITE 1 WORD
1973  004746  012737  004674  001110          MOV     #4$,$LPERR      ;SET RETURN ADDRESS FOR
1974                                                                  ;LUPING ON ERROR
1975
1976  004754  012777  002003  174474          MOV     #2003,@RKCS     ;GO WRT FMT
1977
1978  004762  104421                          CON.RDY                 ;WAIT FOR CONTROL READY
1979  004764  032777  001000  174460  58:     BIT     #1000,@RKDS     ;WAS THERE A SIN?
1980  004772  001413                          BEQ     6$              ;NO, SKIP DOING DRV RESET
1981  004774  004737  016136                  JSR     PC,GT5RG        ;GO, GET RKCS, ER, DS, DA, CYLINDER
1982  005000  104007                          ERROR   7               ;SIN ERROR ON TRYING TO
1983                                                                  ;WRT FMT ON CYLINDER AS
1984                                                                  ;INDICATED IN RKDA.  3 RETRIES
1985                                                                  ;ARE DONE
1986                                                                  ;NOTE THAT BEFORE
1987  005002  104415                          CON.RESET               ;RETRYING A DRIVE RESET WAS DONE
1988  005004  104416                          DRV.RESET               ;GO TO 'DR-RST' & DO DRV RESET
1989  005006  005200                          INC     R0              ;INCRMNT SIN COUNT
1990  005010  022700  000003                  CMP     #3,R0           ;ALLOW 3 RETRIES WERE THERE 3?
1991  005014  001332                          BNE     1$+2            ;IF NOT, GO & RETRY
1992
1993  005016  005201                          INC     R1              ;ALLOW ONLY 12 SIN ERRORS
1994                                                                  ;IF MORE THAN 5 EXIT THIS TEST
1995  005020  001436                          BEQ     9$              ;IF MORE THAN 5 EXIT THIS TEST
1996  005022  005777  174430          68:     TST     @RKCS           ;DID 'ERR' BIT SET IN RKCS?
1997  005026  100005                          BPL     7$              ;NO, BRANCH
1998  005030  004737  016136                  JSR     PC,GT5RG        ;GO, GET RKCS, ER, DS,DA,CYL
1999  005034  104010                          ERROR   10              ;'ERR' OCCURED WHILE DOING
2000                                                                  ;WRT FMT ON SECTOR, CYLINDER
2001                                                                  ;AS INDICATED IN RKDA.
2002  005036  005205                          INC     R5              ;ALLOW ONLY 5 'ERR'S. IF
2003  005040  001426                          BEQ     9$              ;MORE THAN 5 EXIT THIS TEST
2004  005042  005204                  78:     INC     R4              ;INCRMNT DISK ADRES TO NXT SCTR
2005  005044  005203                          INC     R3              ;ALL 12 SECTORS DONE?
2006  005046  001314                          BNE     1$              ;IF NOT, GO BAK & FMT NXT SCTR
2007                                                                  ;IF YES
2008  005050  012703  177764                  MOV     #-14,R3         ;RESET COUNT FOR 12 SECTORS
2009  005054  042704  000017                  BIC     #17,R4          ;CLR OUT SEC BITS
2010
2011  005060  062704  000020          88:     ADD     #20,R4          ;ADRES THE NXT TRAK TO B FMTED
2012  005064  005202                          INC     R2              ;ALL TRAKS FMTED?

2013  005066  001304                          BNE     1$              ;IF NOT GO BAK B FMT NXT CYL, SUR 0
2014  005070  005237  002114                  INC     FDRIVE          ;EVEN RK05F?
2015  005074  001004                          BNE     10$             ;NO
2016  005076  062737  020000  001230          ADD     #20000,DRIVAD   ;FORMAT ODD DRIVE OF F
2017  005104  000661                          BR      11$
2018  005106  013737  002120  001230  10$:    MOV     DRHOLD,DRIVAD   ;RESTORE DRIVE ADDR
2019  005114  000402                          BR      TST3            ;;EXIT
2020
2021  005116  004737  016772          98:     JSR     PC,ABRT
2022
```



```
2023                                    ;;*************************************************************
2024                                    ;*TEST 3        READ FORMAT OF THE DISK
2025                                            ;* IN THIS TEST, THE HEADERS FROM ALL THE SECTORS ARE READ
2026                                            ;* & CHECKED IF THEY ARE CORRECT.  THE FOLLOWING IS THE
2027                                            ;* TEST SEQUENCE.
2028                                            ;* 1.  READ 12 SECTORS (HDRS ONLY) AT A TIME
2029                                            ;* 2.  IF THERE IS A 'SIN' ERROR RETRY ONCE MORE, IF SAW AGAIN
2030                                            ;* REPORT ERROR & READ HEADER FROM NEXT CYLINDER
2031                                            ;* 3.  IF THERE IS 'ERR' IN RKCS, DO A CONTROL RESET, REPORT
2032                                            ;* ERROR & READ HEADER FROM NEXT CYLINDER.  IF THERE ARE
2033                                            ;* MORE THAN 5 ERRORS OF THIS KIND, THIS TEST WILL BE EXITED
2034                                            ;* 4.  THE 12 HEADERS ARE CHECKED.  IF THEY ARE CORRECT THE
2035                                            ;* NEXT CYLINDER IS READ.
2036                                            ;* IF THEY ARE NOT CORRECT, A RETRY IS DONE; IF AGAIN CORRECT
2037                                            ;* HEADERS ARE NOT RECIEVED, AN ERROR IS REPORTED.  THE
2038                                            ;* SECTOR #'S GIVING THE BAD HEADERS, & THE BAD HEADERS ARE
2039                                            ;* STORED.
2040                                            ;* 5.  IF INHIBIT TYPEOUT' SWITCH IS NOT SET, THE FIRST WORDS OF
2041                                            ;* THE 12 SECTORS (PSUEDO-HEADERS) ARE READ.  IN A PREVIOUS
2042                                            ;* TEST THE FIRST WORD OF EVERY SECTOR WAS WRITTEN
2043                                            ;* AS A SOFTWARE HEADER (CONSISTING OF DRIVE #, CYL#, SUR,SEC#)
2044                                            ;* THEN THE SECTOR # GIVING BAD HEADER, EXPECTED PSUEDO-HEADER,
2045                                            ;* & THE PS-HEADER RECIEVED ARE TYPED OUT.  THIS WOULD
2046                                            ;* WRONG, HEADER WAS READ WRONG, ETC.
2047                                            ;* 6.  THE NEXT CYLINDER IN LINE IS READ.  ORDER OF READING IS
2048                                            ;* CYL0,SUR0    CYL0,SUR1   -   CYL312,SUR1
2049                                    ;;*************************************************************
2050  005122  000004                  TST3:   SCOPE
2051
2052  005124  012737  177773  001304          MOV     #-5,ERCNT1      ;ALLOW ONLY 5 ERRORS (OF BAD HEADER
2053                                                                  ;KIND FROM 5 CYLINDERS)
2054  005132  012737  177766  001306          MOV     #-12,ERCNT2     ;ALLOW ONLY 12 'ERR'S
2055  005140  012737  177773  001310          MOV     #-5,ERCNT3      ;ALLOW ONLY 5 ERRORS
2056  005146  013705  001230                  MOV     DRIVAD,R5       ;SET DRIVE #,CYL ADRES=0
2057  005152  012737  177152  001476          MOV     #-626,INDX2     ;313 CYLS (626 TRAKS) TO B READ
2058  005160  104415                  48:     CON.RESET               ;GO DO CONTROL RESET
2059  005162  104416                          DRV.RESET               ;GO DO DRIVE RESET
2060
2061  005164  005037  001254          18:     CLR     RETRY2          ;ALLOW 2 RETRIES IF HDRS READ WRONG
2062  005170  005037  001252          28:     CLR     RETRY1          ;ALLOW 2 RETRIES FOR 'SINS'
2063
2064  005174  012777  026446  174260  38:     MOV     #OUTBUF,@RKBA   ;RD HDRS INTO LOC STARTING AT THIS
2065  005202  010577  174256                  MOV     R5,@RKDA        ;FROM THIS DSK ADRES
2066  005206  012777  177764  174244          MOV     #-14,@RKWC      ;12 HDRS TO BE READ
2067  005214  012737  005160  001110          MOV     #4$,$LPERR      ;SET RETURN ADRES FOR LUPING ON ERROR
2068
2069  005222  012777  002005  174226          MOV     #2005,@RKCS     ;GO, RD FMT OF THIS CYLINDER
2070
2071  005230  104421                          CON.RDY                 ;WAIT FOR CNTRL RDY TO SET
2072
2073  005232  032777  001000  174212  58:     BIT     #1000,@RKDS     ;'SIN' ERROR?
2074  005240  001420                          BEQ     6$              ;NO, BRANCH
2075  005242  004737  016214                  JSR     PC,GETINF
2076
2077  005246  104011                          ERROR   11              ;'SIN' OCCURED WHEN DOING RD FMT
2078                                                                  ;FROM CYL SHOWN IN RKDA.  IT
```

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2079  005250  104415                          CON,RESET               ;DO CNTRL RESET
2080  005252  104416                          DRV,RESET               ;GO, DO DRIVE RESET
2081  005254  005237  001252                  INC     RETRY1          ;ALLOW ONLY 2 RETRIES FOR THIS  ERROR
2082  005260  022737  000002  001252          CMP     #2,RETRY1       ;IF TRIED 2 TIMES REPORT
2083  005266  001342                          BNE     3$              ;ERROR, OTHERWISE GO BAK & RETRY
2084                                                                  ;WAS TRIED TWICE, BUT 'SIN'.
2085  005270  005237  001510                  INC     ERCNT3          ;ALLOW 5 ERRORS AT MOST
2086  005274  001002                          BNE     6$
2087  005276  000137  005606                  JMP     16$
2088
2089  005302  005777  174150          6$:     TST     @RKCS           ;'ERR' IN RKCS?
2090  005306  100010                          BPL     7$              ;NO, BRANCH
2091  005310  004737  016136                  JSR     PC,GTSRG        ;GO, GET RKCS, ER,DS,DA,CYLNDR
2092  005314  104012                          ERROR   12              ;'ERR' SET WHILE DOING RD FMT
2093                                                                  ;FROM CYL SHOWN IN RKDA
2094  005316  104415                          CON,RESET               ;GO DO CNTRL RESET
2095                                                                  ;ALLOW ONLY 12 ERRORS OF THIS
2096  005320  005237  001506                  INC     ERCNT2          ;KIND, IF MORE THAN FIVE ERRORS
2097                                                                  ;SKIP THIS TEST
2098  005324  001532                          BEQ     TST4            ;;EXIT
2099  005326  000520                          BR      14$             ;GO SET UP TO RD FMT FROM NXT
2100                                                                  ;CYL IN LINE
2101                                                                  ;CHECK THAT CORRECT HEADERS WERE RECVD,
2102                                                                  ;SECTR # HAVING BAD HDR IS STORED ALONG
2103                                                                  ;WITH BAD HDR
2104
2105  005330  004737  007260          7$:     JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ
2106
2107  005334  005737  001500                  TST     INDX3           ;WAS THERE A MISCOMPARISON?
2108  005340  001513                          BEQ     14$             ;IF NOT, GO SET UP TO RD FMT
2109                                                                  ;NXT CYL IN LINE
2110  005342  012737  005170  001110          MOV     #2$,$LPERR
2111  005350  104013                          ERROR   13              ;CORRECT HDRS WERE NOT RECVD
2112                                                                  ;FROM SECTRS AS TYPED OUT,
2113                                                                  ;THE SAME CYLINDER WAS READ TWICE
2114  005352  005237  001254                  INC     RETRY2          ;RETRY RD FMT ON SAME CYL AGAIN
2115  005356  022737  000002  001254          CMP     #2,RETRY2       ;TRIED RDING SAME CYL TWICE
2116  005364  001301                          BNE     2$              ;IF NOT, GO RD AGAIN
2117                                                                  ;YES, REPORT ERROR
2118  005366  005237  001504                  INC     ERCNT1          ;ALLOW ONLY 5 ERRORS OF THE
2119                                                                  ;ABOVE TYPE,  IF MORE THAN 12
2120                                                                  ;EXIT THIS TEST
2121  005372  001505                          BEQ     16$
2122
2123  005374                          20$:                            ;THE PSUEDO-HEADERS (FIRST WORD OF EVERY
2124                                                                  ;SECTOR) FROM THIS CYLINDER (ABOVE,

2125                                                                  ;THE CYLINDER THAT GAVE WRONG HEADERS)
2126                                                                  ;WILL BE READ, NOW,  FOLLOWING WILL B TYPD OUT:
2127                                                                  ;SEC#, EXPCTD PSUEDO-HDR, RECVD PHDR,
2128                                                                  ;IF "INHIBIT TYPEOUT" SW IS SET THIS ENTIRE
2129                                                                  ;READING & TYPING WILL BE SKIPPED
2130  005374  032777  020000  173536          BIT     #20000,@SWR     ;INHIBIT TYPEOUT?
2131  005402  001072                          BNE     14$             ;YES, SKIP THE FOLLOWING & GO
2132                                                                  ;SET UP TO RD FMT NXT CYL IN LINE
2133
2134  005404  012701  177764                  MOV     #-14,R1         ;READ FROM 12 SECTRS
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2135  005410  010577  174050                  MOV     R5,@RKDA        ;FROM THIS DSK-ADRES
2136  005414  012777  026446  174040          MOV     #OUTBUF,@RKBA   ;INTO THIS BUS-ADRES
2137  005422  012777  177777  174030  10$:    MOV     #-1,@RKWC       ;RD 1 WRD
2138
2139  005430  012777  000005  174020          MOV     #5,@RKCS        ;GO, RD
2140  005436  104421                          CON,RDY                 ;WAIT FOR CNTRL RDY
2141  005440  005777  174012                  TST     @RKCS           ;ANY EROR?
2142  005444  100002                          BPL     15$             ;NO, PROCEED
2143  005446  104415                          CON,RESET               ;CLEAR THE EROR
2144  005450  000447                          BR      14$             ;EROR, SO COULDN'T READ PSUEDO-HDRS
2145
2146  005452  005201                  15$:    INC     R1              ;READ FROM ALL 12 SECS
2147  005454  001362                          BNE     10$             ;IF NOT GO RD THE NXT ONE
2148
2149                                                                  ;TYPE OUT PSUEDO-HDRS CORRESPONDING TO
2150                                                                  ;THE SECTORS WHICH GAVE BAD HEADERS
2151                                                                  ;TYPE: SEC #, EXPC P-HDR, RECVD P-HDR
2152
2153  005456  104401                          TYPE                    ;TYPE OUT
2154  005460  001771                          MSG11
2155  005462  012701  001266                  MOV     #BUFR,R1        ;SEC #'S ARE STORED HERE
2156
2157  005466  104401                  11$:    TYPE                    ;TYPE CR, LF
2158  005470  001213                          $CRLF
2159
2160  005472  011102                          MOV     (R1),R2
2161  005474  012703  026446                  MOV     #OUTBUF,R3      ;PSUEDO-HEADERS WHICH WERE
2162                                                                  ;READ ARE STORED HERE
2163
2164  005500  005702                  12$:    TST     R2              ;IS THIS SEC # CORRESPONDING TO THE
2165  005502  001403                          BEQ     13$             ;ONE IN ERROR
2166  005504  005302                          DEC     R2              ;R2 CONTAINS THE SEC #
2167  005506  005723                          TST     (R3)+
2168  005510  000773                          BR      12$
2169
2170  005512  011146                  13$:    MOV     (R1),-(SP)      ;GO TYPEOUT SEC # GIVING
2171  005514  104403                          TYPOS                   ;MISCOMPARISON OF HEADERS
2172  005516     002                          .BYTE   2
2173  005517     000                          .BYTE   0               ;SUPRES LDG 0'S
2174
2175  005520  104401                          TYPE                    ;TYPE 2 BLANKS
2176  005522  002105                          BLNKS5
2177
2178  005524  010546                          MOV     R5,-(SP)        ;GO TYPE EXPCTD PSUEDO HEADER
2179  005526  051116                          BIS     (R1),(SP)
2180  005530  104402                          TYPOC
2181
2182  005532  104401                          TYPE                    ;TYPE 2 BLNKS
2183  005534  002103                          BLNKS7
2184
2185  005536  011346                          MOV     (R3),-(SP)      ;GO TYPE PSUEDO-HEADER RECVD
2186  005540  104402                          TYPOC
2187
2188  005542  005721                          TST     (R1)+           ;TYPED OUT ALL SEC #'S IN ERROR,
2189  005544  021127  177777                  CMP     (R1),#177777
2190  005550  001346                          BNE     11$             ;IF NOT GO BAK & TYPE NXT
```

```
2191
2192  005552  104401  001733          TYPE    ,MSG7           ;TYPE OUT PC
2193  005556  012746  005374          MOV     #20$,-(SP)
2194  005562  104402                  TYPOC
2195  005564  104401  001213          TYPE    ,$CRLF
2196                                                          ;TYPE ROUTINE ENDS HERE
2197
2198                                                          ;FIND OUT NXT TRAK TO B READ
2199                                                          ;FORMATTED
2200
2201  005570  062705  000020  14$:    ADD     #20,R5          ;SET ADRES FOR SUR 0, NXT CYL IN LINE
2202  005574  005237  001476          INC     INDX2           ;READ ALL 313 CYLINDERS (626 TRAKS)?
2203  005600  001404                  BEQ     TST4            ;;EXIT
2204  005602  000137  005164          JMP     1$              ;IF NOT, GO BAK & READ NXT
2205
2206  005606  004737  016772  16$:    JSR     PC,ABRT
2207
2208                                  ;;*************************************************************
2209                                  ;*TEST 4         SEEK PATTERNS: 0-312-0-311-...,USING IMPLIED SEEK
2210
2211                                          ;****TEST 2 (WRITING PSUEDO-HEADERS) SHOULD HAVE BEEN DONE BEFORE****
2212                                          ;**** DOING THIS TEST****
2213                                          ;*THIS TEST PERFORMS SEEKS (IMPLIED SEEKS USING 'READS') IN THE
2214                                          ;*FOLLOWING PATTERN,
2215                                          ;*0-312-0-311-0-310-....0-1-0-0
2216
2217                                          ;*THE FIRST WORD OF EVERY SECTOR IS A PSEUDO-HEADER (WRITTEN IN
2218                                          ;*A PREVIOUS TEST) CONSISTING OF DRIVE NO, CYLINDER NO., SURFACE
2219                                          ;*AND SECTOR NO.  AN IMPLIED SEEK IS DONE BY ISSUING A 'READ' FOR
2220                                          ;*THE PSEUDO-HEADER OF SECTOR 0, SURFACE 0.
2221
2222                                          ;*IF A 'SIN' OCCURS TWO TRIES ARE DONE BEFORE ABORTING.  IF A 'SKE'
2223                                          ;*OCCURS IT COULD MEAN THAT 1) EITHER THE HEADERS WAS READ WRONG
2224                                          ;*OR 2) THE HEADS GOT POSITIONED ON THE WRONG CYLINDER.  IN
2225                                          ;*ORDER TO PROVIDE A FURTHER INSIGHT INTO THE PROBLEM, THE FOLLOWING
2226                                          ;*IS DONE:
2227                                          ;*THE HEADERS ARE READ FROM THE CYLINDER THAT GAVE 'SKE'.  IF THE HEADERS
2228                                          ;*ARE CORRECT IT IS SO REPORTED.  IF THE HEADERS ARE INCORECT, THEN THE
2229                                          ;*EXPECTED HEADERS AND THE RECEIVED ONES ARE REPORTED.  ONE MORE TRY IS
2230                                          ;*DONE (THE IMPLIED SEEK IS TRIED AGAIN BETWEEN THE CYLINDERS THAT GAVE RISE
2231                                          ;*TO 'SKE')
2232
2233                                          ;*THE FOLLOWING ACTION IS TAKEN WHEN THERE IS NO 'SKE' OR 'SIN' BUT STILL THE
2234                                          ;*PSEUDO-HEADER IS READ WRONG:
2235                                          ;*FIRST THE HEADERS ARE READ FROM THAT CYLINDER AND CHECKED.  IF THEY ARE
2236                                          ;**CORRECT, IT IS SO REPORTED.  IF THEY ARE WRONG THEN THE EXPECTED AND RECEIVED

2237                                          ;*HEADERS ARE REPORTED.  THEN THE PSEUDO-HEADER FROM SECTOR 1 IS READ AND REPORT
2238                                          ;*ONE MORE TRY IS DONE BY REPEATING THE WHOLE PROCESS. (IMPLIED SEEK
2239                                          ;*BETWEEN THE TWO CYLINDEPS AND READING PSEUDO-HEADER FROM SECTOR 0 OF THE DESTI
2240                                          ;*CYLINDER).
2241
2242                                          ;*UP TO 12 ERRORS OF EACH KIND (SIN, SKE, BAD PSEUDO-HEADER) ARE ALLOWED.
2243                                          ;*IF ANY ERROR OCCURS MORE THAN 12 TIMES THE TEST IS ABORTED.
2244                                  ;;*************************************************************
2245  005612  000004          TST4:   SCOPE
2246  005614  104415                  CON.RESET               ;GO DO CONTROL RESET
```



```
2247  005616  104416                  DRV.RESET               ;GO DO DRIVE RESET
2248
2249  005620  005004                  CLR     R4              ;FLAG, CLR IF DOING IMPLIED
2250                                                          ;SEEK IN FROM 0 TO 'INADR'
2251                                                          ;=1, IF GOING FROM 'INADR'
2252                                                          ;OUT TO CYL 0
2253  005622  012737  177465  001476          MOV     #-313,INDX2     ;313 SEEK PATTERNS
2254  005630  012700  177764                  MOV     #-14,R0
2255  005634  010037  001504                  MOV     R0,ERCNT1       ;ALLOW ONLY 12 ERRORS
2256  005640  010037  001506                  MOV     R0,ERCNT2       ;OF THESE KINDS
2257  005644  010037  001510                  MOV     R0,ERCNT3
2258
2259  005650  012737  014500  001260          MOV     #14500,INADR    ;'INADR' CONTAINS THE INER
2260                                                          ;CYL TO WHICH IMPLIED SEEK WILL
2261                                                          ;BE DONE
2262
2263  005656  005704          18:     TST     R4              ;GOING IN OR OUT?
2264  005660  001005                  BNE     2$              ;GOING OUT, BRANCH
2265  005662  013705  001260                  MOV     INADR,R5        ;SET CYL ADRES BITS FOR GOING IN
2266  005666  053705  001230                  BIS     DRIVAD,R5       ;FORM DISK ADRES FOR INNER
2267  005672  000402                  BR      3$              ;CYLINDER
2268  005674  013705  001230  2$:     MOV     DRIVAD,R5       ;FORM DISK ADRES FOR OUTER
2269                                                          ;CYLINDER = 0
2270                                                          ;ALLOW 2 TRIES WHEN
2271  005700  012737  177776  001254  3$:     MOV     #-2,RETRY2      ;ERRORS OCCUR
2272  005706  012737  177776  001252  13$:    MOV     #-2,RETRY1
2273  005714  012737  177777  001256  4$:     MOV     #-1,RETRY3
2274  005722  000404                  BR      5$
2275  005724  104415          6$:     CON.RESET
2276  005726  104416                  DRV.RESET
2277  005730  004737  006526                  JSR     PC,SBR1         ;REPOSITION HEADS TO PRE-ERROR CYL
2278
2279  005734  012777  177777  173516  5$:     MOV     #-1,@RKWC       ;READ 1 WORD
2280  005742  010577  173516                  MOV     R5,@RKDA        ;FROM THIS CYLINDER, SEC 0
2281  005746  012777  026446  173506          MOV     #OUTBUF,@RKBA   ;INTO THIS BUS ADRES
2282  005754  012737  005724  001110          MOV     #6$,$LPERR      ;SET RETURN ADRES FOR LUPING
2283                                                          ;ON 'ERROR'
2284
2285  005762  012777  000005  173466          MOV     #5,@RKCS        ;GO, READ
2286
2287  005770  104421                  CON.RDY                 ;WAIT FOR CNTRL RDY
2288
2289  005772  032777  001000  173452          BIT     #1000,@RKDS     ;SIN?
2290  006000  001434                  BEQ     8$              ;NO, BRANCH
2291                                                          ;YES, THERE WAS A SIN
2292  006002  004737  016376                  JSR     PC,ERR1         ;GO GET, CYLS BETW'N WHICH SK WAS TRIED
2293  006006  017737  173440  001170          MOV     @RKDS,$REG3
2294  006014  017737  173434  001166          MOV     @RKER,$REG2
2295  006022  104420  001602                  TYPMSG  ,MSG1
2296  006026  013737  001256  001172          MOV     RETRY3,$REG4    ;SAVE TRY # ON 'SIN'
2297  006034  062737  000002  001172          ADD     #2,$REG4
2298  006042  104014                  ERROR   14              ;AN IMPLIED SEEK WAS TRIED
2299                                                          ;FROM 'CYLA' TO 'CYLB' (INDICATED
2300                                                          ;IN EROR MESAGE), 'SIN' OCCURRED,
2301                                                          ;2 TRIES ARE DONE BEFORE
2302                                                          ;ABORTING
```

```
2303  006044  005737  001256          TST     RETRY3          ;DONE RETRIES
2304  006050  001403                  BEQ     7$              ;YES, BRANCH
2305  006052  005237  001256          INC     RETRY3          ;GO DO 2ND TRY
2306  006056  000722                  BR      6$
2307
2308  006060  005237  001504  7$:     INC     ERCNT1          ;ALLOW LESS THAN 12 ERORS OF THIS TYPE
2309  006064  001103                  BNE     19$             ;IF MORE SKIP THIS TEST
2310  006066  000137  006614          JMP     EXT4            ;EXIT THIS TEST
2311
2312  006072  032777  010000  173354  8$:     BIT     #10000,@RKER    ;SKE?
2313  006100  001506                  BEQ     20$
2314  006102  004737  016376  15$:     JSR     PC,ERR1         ;GO GET 2 CYL NOS. BETWEEN WHICH
2315  006106  017737  173342  001166          MOV     @RKER,$REG2     ;IMPLIED SEEK WAS DONE
2316  006114  017737  173332  001170          MOV     @RKDS,$REG3
2317  006122  013737  001252  001172          MOV     RETRY1,$REG4    ;GET TRY # ON 'SKE'
2318  006130  062737  000003  001172          ADD     #3,$REG4
2319  006136  104420  001610                  TYPMSG  ,MSG2           ;GO PRINT 'SKE'
2320  006142  104014                          ERROR   14              ;IMPLIED SEEK WAS TRIED FROM
2321                                                                  ;'CYLA' TO 'CYLB' (INDICATED
2322                                                                  ;IN EROR MESAGE); 'SKE' OCCURRED.
2323                                                                  ;2 TRIES ARE DONE.
2324  006144  104415                          CON,RESET               ;DO CONTROL RESET
2325
2326  006146  004737  006552  9$:     JSR     PC,SBR2         ;GO READ 12 HEADERS FROM
2327                                                          ;THIS CYLINDER & COMPARE
2328                                                          ;THEM.  NOTE R5 CONTAINS THE
2329                                                          ;DISK ADRES THAT WILL BE USED.
2330
2331  006152  012777  000015  173276          MOV     #15,@RKCS       ;GO DO DRIVE RESET
2332                                                                  ;WHILE THE DRIVE IS DOING RESET
2333                                                                  ;THE HDRS THAT WERE READ
2334                                                                  ;ABOVE ARE CHECKED, PRINTED
2335
2336  006160  005737  001500          TST     INDX3           ;WAS THERE A MISCOMPARISON
2337                                                          ;IN ANY HEADER?
2338  006164  001006                  BNE     10$             ;IF INDX3>0, THERE WAS.
2339                                                          ;NO, THERE WASN'T. HDRS OK
2340  006166  005237  001252          INC     RETRY1          ;ONLY 2 TRIES FOR SKE
2341  006172  001414                  BEQ     12$             ;BRANCH IF THIS WAS A 2ND TRY
2342  006174  104420  001657          TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE READ
2343                                                          ;CORRECTLY.  THIS WAS TRY # 1
2344
2345  006200  000405                  BR      11$
2346
2347                                                          ;HDRS WERE READ INCORRECT.
2348  006202  005237  001252  10$:     INC     RETRY1          ;ALLOW 2 TRIES FOR SKE

2349  006206  001411                  BEQ     14$             ;BRANCH, IF THIS WAS 2ND TRY
2350
2351                                                          ;THERE WAS SKE ON DOING IMPLIED
2352  006210  104417  000015          MESAGE  ,15             ;SEEK TO 'CYL B', THEN HDRS WERE
2353                                                          ;READ FROM CYL B, WRONG HDRS
2354                                                          ;RECVD
2355
2356  006214  104423  11$:     RESDON                  ;WAIT FOR PREVIOUS DRIVE RESET
2357                                                  ;TO BE DONE
2358  006216  004737  006526          JSR     PC,SBR1         ;GO, REPOSITION HEADS
```



```
2359  006222  000634          BR      4$
2360
2361                                                          ;2ND TRY, SKE THIS TIME ALSO. BUT
2362                                                          ;READ HDRS CORRECTLY FROM
2363                                                          ;CYLINDER THAT GAVE SKE
2364                                                          ;NOTE THIS WAS THE 2ND TRY
2365  006224  104420  001657  12$:     TYPMSG  ,MSG5           ;TYPE OUT THAT HDRS WERE
2366                                                          ;READ CORRECTLY.
2367
2368  006230  000402                  BR      16$
2369
2370                                                          ;2ND TRY, SKE THIS TIME ALSO.
2371  006232  104417  000015  14$:     MESAGE  ,15             ;READ HDRS FROM CYL THAT
2372                                                          ;GAVE SKE, THEY WERE INCORRECT.
2373
2374  006236  104423  16$:     RESDON                  ;WAIT FOR PREVIOUS DRIVE RESET
2375                                                  ;TO BE DONE
2376
2377  006240  005237  001506          INC     ERCNT2          ;ALLOW ONLY LESS THAN 10 ERRORS OF
2378                                                          ;THIS TYPE (SKE)
2379  006244  001002                  BNE     17$
2380  006246  000137  006614          JMP     EXT4            ;EXIT THIS TEST IF MORE
2381
2382  006252  005704          17$:    TST     R4              ;WENT LAST TIME IN OR OUT?
2383  006254  001007                  BNE     19$             ;OUT
2384                                                          ;IN
2385  006256  005703                  TST     R3              ;WERE HDRS CORRECT?
2386  006260  001005                  BNE     19$             ;NO
2387                                                          ;YES
2388
2389  006262  005204          18$:    INC     R4
2390  006264  004737  006526          JSR     PC,SBR1         ;GO POSITION HEADS BAK ON INNER
2391                                                          ;CYL
2392  006270  000137  005656          JMP     1$              ;GO BAK & SEEK OUT NOW
2393
2394  006274  005237  001476  19$:     INC     INDX2           ;ALL SEEK PATTERNS DONE?
2395  006300  001547                  BEQ     TST5            ;;EXIT
2396
2397  006302  162737  000040  001260          SUB     #40,INADR       ;SET ADDRESS FOR THE NXT
2398                                                                  ;INNER CYLINDER
2399  006310  005004                          CLR     R4              ;INDICATE THAT NOW SEEK IS GOING
2400                                                                  ;TO BE IN
2401  006312  000137  005656                  JMP     1$              ;GO BAK & SEEK IN TO 'INADR'
2402
2403  006316                          20$:                            ;IF THERE WAS NO SIN OR SKE
2404                                                                  ;ENTER HERE
2405
2406  006316  012737  005700  001110          MOV     #3$,$LPERR      ;SET RETURN ADRES FOR LUPING
2407                                                                  ;ON ERROR
2408  006324  020537  026446                  CMP     R5,OUTBUF       ;CORRECT PSUEDO-HEADER READ?
2409  006330  001471                          BEQ     24$             ;YES, BRANCH
2410  006332  013737  001254  001172          MOV     RETRY2,$REG4    ;GET TRY #
2411  006340  062737  000003  001172          ADD     #3,$REG4
2412  006346  004737  016376                  JSR     PC,ERR1         ;GO GET CYL #'S BETW'N
2413                                                                  ;WHICH IMPLIED SEEK (READ)
2414                                                                  ;WAS DONE
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2415  006352  010537  001166          MOV     R5,$REG2        ;GET EXPCTD PSUEDO-HDR
2416  006356  013737  026446  001170  MOV     OUTBUF,$REG3    ;GET PSUEDO-HDR RECVD
2417  006364  104016                  ERROR   16              ;IMPLIED SEEK FROM CYLA TO CYLB WAS DONE,
2418                                                          ;READ PSEUDO-HEADER OF SEC 0,
2419                                                          ;CYLB (IN EROR MESAGE), BUT
2420                                                          ;THE WRONG PSEUDO-HEADER WAS
2421                                                          ;RECEIVED
2422  006366  005237  001254          INC     RETRY2
2423  006372  001402                  BEQ     21$
2424  006374  000137  005706          JMP     13$
2425
2426
2427  006400  004737  006552  21$:    JSR     PC,SBR2         ;GO READ HEADERS (12) FROM
2428                                                          ;THIS CYLINDER, & CHECK THEM,
2429                                                          ;IF MISCOMPARISON INDX3 WILL
2430                                                          ;BE > 0.
2431  006404  005737  001500          TST     INDX3
2432  006410  001003                  BNE     22$
2433  006412  104420  001657          TYPMSG  ,MSG5           ;WRONG PSUEDO-HDR WAS READ
2434                                                          ;BUT WHEN HDRS WERE READ
2435                                                          ;FROM THE SAME CYLINDER, THEY
2436  006416  000402                  BR      23$             ;WERE CORRECT
2437
2438  006420  104417  000015  22$:    MESAGE  ,15             ;WRONG PSUEDO-HDR WAS READ
2439                                                          ;FROM 'CYLB' (IN ERROR MESAGE),
2440                                                          ;THEN HEADERS WERE READ FROM THE
2441                                                          ;SAME CYLINDER.  THEY WERE ALSO
2442                                                          ;WRONG.
2443  006424  010500          23$:    MOV     R5,R0           ;NOW READ THE PSUEDO-HEADER
2444  006426  005200                  INC     R0              ;FROM THE NEXT SECTOR (1)
2445  006430  010077  173030          MOV     R0,@RKDA        ;SAME CYLINDER
2446  006434  012777  026446  173020  MOV     #OUTBUF,@RKBA
2447  006442  012777  177777  173010  MOV     #-1,@RKWC
2448  006450  012777  000005  173000  MOV     #5,@RKCS
2449  006456  104421                  CON.RDY
2450  006460  010537  001162          MOV     R5,$REG0
2451  006464  004737  016434          JSR     PC,GCYL         ;GO GET CYL # & STORE IT IN $REG0
2452  006470  010037  001164          MOV     R0,$REG1        ;GET EXPCT PSUEDO-HDR FROM SEC 1
2453  006474  013737  026446  001166  MOV     OUTBUF,$REG2
2454  006502  104417  000017          MESAGE  ,17             ;PSUEDO-HEADER FROM SEC 1, CYLB
2455                                                          ;(IN MESAGE) WAS READ.  THE EXPCTD
2456                                                          ;& RECVD DATA WORDS ARE REPORTED.
2457  006506  005237  001510          INC     ERCNT3          ;ALLOW ONLY LESS THAN 10 ERRORS
2458                                                          ;OF THIS TYPE (WRONG PS-HDRS)
2459  006512  001440                  BEQ     EXT4
2460

2461  006514  005704          24$:    TST     R4              ;SEEKED IN OR OUT LAST TIME?
2462  006516  001266                  BNE     19$             ;IF OUT, GO SEEK NXT INNER CYL
2463                                                          ;IF IN, GO SEEK BAK TO 0
2464  006520  005204                  INC     R4              ;INDICATE THAT SEEK OUT (0)
2465  006522  000137  005656          JMP     1$              ;WILL BE DONE NOW
2466
2467
2468                                          ;THIS ROUTINE IS USED IN THIS TEST ONLY.
2469                                          ;R4=0 INDICATES SEEK BEING DONE FROM
2470                                          ;CYL 0 TO INNER CYL.
```



```
2471                                          ;R4=1 INDICATES SEEK BEING DONE FROM
2472                                          ;INNER CYL TO 0, THIS ROUTINE POSITIONS
2473                                          ;THE HEADS ON 'INADR' CYL IF R4=1
2474
2475  006526  005704          SBR1:   TST     R4
2476  006530  001407                  BEQ     1$
2477  006532  013777  001260  172724  MOV     INADR,@RKDA
2478  006540  012777  000011  172710  MOV     #11,@RKCS
2479  006546  104422                  TST.RWS
2480  006550  000207          1$:     RTS     PC
2481
2482                                          ;THIS ROUTINE IS USED IN THIS TEST
2483                                          ;ONLY, IT READS 12 HEADERS FROM CYLINDER
2484                                          ;WHOSE ADRES IS IN R5, THEN IT CHECKS
2485                                          ;IF THE EXPECTED HEADER IS RECEIVED,
2486                                          ;IF IT IS NOT, INDX3 IS INCREMENTED INDICATING
2487                                          ;THE ERROR
2488
2489  006552  012700  177764  SBR2:   MOV     #-14,R0
2490  006556  012701  026446          MOV     #OUTBUF,R1
2491  006562  010077  172672          MOV     R0,@RKWC        ;READ 12 HDRS
2492  006566  010177  172670          MOV     R1,@RKBA        ;INTO THIS ADRES
2493  006572  010577  172666          MOV     R5,@RKDA        ;FROM THIS CYLINDER
2494  006576  012777  002005  172652  MOV     #2005,@RKCS     ;RD FMT, GO
2495  006604  104421                  CON.RDY
2496
2497  006606  004737  007260          JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ
2498
2499  006612  000207                  RTS     PC              ;EXIT
2500
2501  006614  004737  016772  EXT4:   JSR     PC,ABRT
2502
2503                                  ;;*************************************************************
2504                                  ;*TEST 5         PERFORM CONVERGING-DIVERGING (IMPLIED) SEEKS
2505                                  ;*THIS TEST PERFORMS A CONVERGING-DIVERGING SEEK PATTERN
2506                                  ;*USING IMPLIED SEEK (READ FORMAT),  THE SEEK SEQUENCE IS:
2507                                  ;*0-312-1-311-2-310-3-307-------310-2-311-1-312
2508                                  ;ALL READ FORMATS ARE DONE FROM SURFACE 0.
2509                                  ;*THE CYLINDER ADDRESSES, BETWEEN WHICH THE IMPLIED SEEK IS
2510                                  ;*PERFRORMED, ARE CONTAINED IN 'OUTADR' & 'INADR'.  IF 'SIN' OCCURS
2511                                  ;*AN ERROR IS REPORTED AND A RETRY IS DONE.  ON READING INCORRECT
2512                                  ;*HEADERS AN ERROR IS REPORTED AND A RETRY IS DONE.  NOTE THAT IF
2513                                  ;*ALL THE 12 HEADERS ARE INCORRECT, IT COULD MEAN THAT THE HEADS
2514                                  ;*COULD NOT POSITION CORRECTLY.  THIS WOULD BE CONFIRMED IF IN
2515                                  ;*PREVIOUS TESTS BAD HEADERS WERE NOT RECIEVED FROM THE SAME
2516                                  ;*CYLINDER.  IF THAT CYLINDER GAVE BAD HEADERS IN ALL THE PREVIOUS
2517                                  ;*TESTS THE PROBLEM COULD BE DIFFERENT.
2518                                  ;*MAXIMUM 12 ERRORS OF ANY KIND ARE ALLOWED.
2519                                  ;*IF MORE THAN 12 ERRORS OCCUR THE TEST IS ABORTED.
2520                                  ;;*************************************************************
2521  006620  000004          TST5:   SCOPE
2522  006622  104415                  CON.RESET               ;GO,DO CONTROL RESET
2523  006624  104416                  DRV.RESET               ;GO,DO DRIVE RESET
2524
2525  006626  005004                  CLR     R4              ;(R4)=0 SEEKING FROM 'OUTADR' TO 'INADR'
2526                                                          ;(R4)=1 SEEKING FROM 'INADR' TO 'OUTADR'
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2527
2528  006630  012737  177466  001476          MOV     #-312,INDX2     ;SET COUNT FOR DOING 312 TIMES
2529  006636  012700  177764                  MOV     #-14,R0
2530  006642  010037  001504                  MOV     R0,ERCNT1       ;ALLOW ONLY 12 ERRORS
2531  006646  010037  001506                  MOV     R0,ERCNT2
2532
2533  006652  005037  001262                  CLR     OUTADR          ;INITIALIZE 'OUTADR' TO 0
2534  006656  012737  014500  001260          MOV     #14500,INADR    ;INITIALIZE 'INADR' TO 312
2535
2536  006664  005704                  1$:     TST     R4              ;GOING IN OR OUT?
2537  006666  001005                          BNE     2$              ;GOING OUT,BRANCH
2538  006670  013705  001260                  MOV     INADR,R5        ;SET CYL ADRES BITS FOR GOING IN
2539  006674  053705  001230                  BIS     DRIVAD,R5       ;FORM DISK ADRES FOR INNER CYLINDER
2540  006700  000404                          BR      3$
2541
2542  006702  013705  001262          2$:     MOV     OUTADR,R5       ;SET CYL ADRES BITS FOR GOING OUT
2543  006706  053705  001230                  BIS     DRIVAD,R5       ;FORM DISK ADRES FOR GOING OUT
2544
2545  006712  005037  001254          3$:     CLR     RETRY2          ;ALLOW 2 RETRIES
2546  006716  012737  177777  001252  4$:     MOV     #-1,RETRY1      ;WHEN ERRORS OCCUR
2547  006724  000404                          BR      7$
2548  006726  104415                  5$:     CON,RESET
2549  006730  104416                          DRV,RESET
2550  006732  004737  007224                  JSR     PC,SBR3         ;GO REPOSITION HEADS
2551
2552  006736  012777  177764  172514  7$:     MOV     #-14,@RKWC      ;READ ALL HDRS FROM THIS CYLINDER
2553  006744  010577  172514                  MOV     R5,@RKDA        ;FROM THIS CYL, SEC 0
2554  006750  012777  026446  172504          MOV     #OUTBUF,@RKBA   ;INTO THIS BUS ADRES
2555  006756  012737  006726  001110          MOV     #5$,$LPERR      ;SET RETURN ADRES FOR LOOPING ON ERROR
2556
2557  006764  012777  002005  172464          MOV     #2005,@RKCS     ;READ FORMAT,GO
2558
2559  006772  104421                          CON,RDY                 ;WAIT FOR CONTRL RDY
2560
2561  006774  032777  001000  172450          BIT     #1000,@RKDS     ;SIN?
2562  007002  001443                          BEQ     8$              ;NO, BRANCH
2563  007004  017737  172444  001166          MOV     @RKER,$REG2     ;SAVE RKER
2564  007012  017737  172434  001170          MOV     @RKDS,$REG3     ;SAVE RKDS
2565  007020  013737  001252  001172          MOV     RETRY1,$REG4    ;GET RETRY #
2566  007026  062737  000002  001172          ADD     #2,$REG4
2567  007034  004737  016320                  JSR     PC,ERR2         ;GET CYL #'S BELOW 'N WHICH
2568                                                                  ;SEEK WAS TRIED
2569  007040  104420  001602                  TYPMSG  ,MSG1           ;TYPE 'SIN'
2570  007044  104014                          ERROR   14
2571                                                                  ;'SIN' OCCURRED ON DOING IMPLIED
2572                                                                  ;SEEK FROM 'CYLA' TO 'CYLB' (IN

2573                                                                  ;EROR MESAGE).
2574  007046  005737  001252                  TST     RETRY1          ;DONE 2 TRIES?
2575  007052  001403                          BEQ     6$              ;YES, BRANCH
2576  007054  005237  001252                  INC     RETRY1          ;NO, RETRY
2577  007060  000722                          BR      5$
2578  007062  104415                  6$:     CON,RESET
2579  007064  104416                          DRV,RESET
2580
2581
2582  007066  005237  001504                  INC     ERCNT1          ;ALLOW LESS THAN 12 ERORS OF THE
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2583  007072  001527                          BEQ     EXT5            ;ABOVE KIND
2584                                                                  ;IF MORE SKIP THIS TEST
2585                                                                  ;SIN OCCURED WHEN GOING TO CYL (IN
2586                                                                  ;R5).  A DRVE RESET HAS BEEN DONE,
2587                                                                  ;NOW TRY POSITIONING HEADS ON
2588                                                                  ;THAT CYL.
2589  007074  010577  172364                  MOV     R5,@RKDA        ;SET CYL ADRES
2590  007100  012777  000011  172350          MOV     #11,@RKCS       ;SEEK,GO
2591  007106  104422                          TST,RWS
2592  007110  000424                          BR      11$
2593                                                                  ;IF NO SIN, ENTER HERE
2594  007112  004737  007260          8$:     JSR     PC,CHKHDRS      ;GO CHECK IF CORRECT HEADERS WERE READ
2595
2596  007116  012737  006716  001110          MOV     #4$,$LPERR      ;SET LUP ADDRESS
2597  007124  005737  001500                  TST     INDX3           ;WAS THERE A BAD HDR?
2598  007130  001414                          BEQ     11$             ;NO, BRANCH
2599  007132  104020                          ERROR   20              ;WRONG HEADERS WERE READ FROM
2600                                                                  ;'SEC #'S, ON DOING AN IMPLIED
2601                                                                  ;SEEK (RDFMT) FROM 'CYLA' TO 'CYLB'
2602  007134  005237  001254                  INC     RETRY2          ;ALLOW 2 TRIES
2603  007140  022737  000002  001254          CMP     #2,RETRY2
2604  007146  001263                          BNE     4$              ;GO TRY 2ND TIME
2605  007150  005237  001506                  INC     ERCNT2          ;ALLOW ONLY 12 ERRORS
2606  007154  001002                          BNE     11$
2607  007156  000137  007352                  JMP     EXT5            ;IF MORE, EXIT THIS TEST
2608
2609  007162  005704                  11$:    TST     R4              ;GOING WHICH WAY?
2610  007164  001006                          BNE     12$             ;'INADR' TO 'OUTADR', BRANCH
2611                                                                  ;'OUTADR' TO 'INADR'
2612  007166  005204                          INC     R4              ;INDICATE THAT NXT TIME GOING
2613                                                                  ;FROM 'INADR' TO 'OUTADR'
2614  007170  062737  000040  001262          ADD     #40,OUTADR      ;INCREMENT CYCLINDER ADRES
2615  007176  000137  006664                  JMP     1$              ;GO BAK & DO IMPLIED SEEK
2616                                                                  ;FROM 'INADR' TO 'OUTADR'
2617
2618  007202  005004                  12$:    CLR     R4              ;INDICATE THAT NXT TIME GOING
2619                                                                  ;FROM 'OUTADR' TO 'INADR'
2620  007204  162737  000040  001260          SUB     #40,INADR       ;DECREMENT CYLINDER ADRES
2621  007212  005237  001476                  INC     INDX2           ;DONE ALL 312 FORWARD-BACKWARD
2622                                                                  ;SEEK PATTERNS
2623  007216  001457                          BEQ     TST6            ;;IF YES, EXIT
2624
2625  007220  000137  006664                  JMP     1$              ;IF NOT, GO BAK & DO IMPLIED
2626                                                                  ;SEEK FROM 'OUTADR' TO 'INADR'
2627
2628                                  ;THIS SUBROUTINE IS ENTERED AFTER A 'SIN' ERROR OCCURED ON GOING FROM
2629                                  ;'CYLA' TO 'CYLB' AS INDICATED IN THE ERROR MESSAGE. BEFORE RETRYING THE
2630                                  ;HEADS HAVE TO BE POSITIONED BACK TO 'CYLA'. NOTE THAT A DRIVE RESET
2631                                  ;WAS DONE TO CLEAR SIN.
2632                                  ;R4=0, INDICATES SEEK IS BEING DONE FROM 'OUTADR' CYLINDER TO 'INADR'CYLINDER.
2633                                  ;R4=1, INDICATES THAT SEEK IS BEING DONE FROM 'INADR' TO 'OUTADR'.
2634  007224  005704                  SBR3:   TST     R4              ;GOING WHICH WAY?
2635  007226  001404                          BEQ     1$              ;IF FROM 'OUTADR' TO 'INADR', BRANCH.
2636  007230  013777  001260  172226          MOV     INADR,@RKDA
2637  007236  000403                          BR      2$
2638  007240  013777  001262  172216  1$:     MOV     OUTADR,@RKDA
```

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2639  007246  012777  000011  172202  2$:     MOV     #11,@RKCS
2640  007254  104422                          TST,RWS
2641  007256  000207                          RTS     PC
2642
2643
2644                                  ;CHKHDRS
2645                                  ;THIS ROUTINE CHECKS THAT THE HEADERS READ PREVIOUSLY WERE CORRECT,
2646                                  ;IF NOT, THE BAD HEADERS AND THE SECTOR #'S FROM WHICH THEY WERE READ
2647                                  ;ARE STORED.
2648                                  ;ON ENTRY:
2649                                  ;R5 CONTAINS DISK ADDRESS FROM WHERE HEADERS WERE READ,
2650                                  ;OUTBUF = 12 HEADRERS READ PREVIOUSLY ARE STORED STARTING 'OUTBUF'.
2651                                  ;ON EXIT:
2652                                  ;INDX3=0, IF THE HEADERS WERE CORRECT
2653                                  ;INDX3=1, IF THE HEADERS WERE INCORRECT
2654                                  ;BUFR = SECTOR #'S GIVING BAD HEADRERS ARE STORED STARTING AT 'BUFR',
2655                                  ;BUFR1 = BAD HEADERS FOR THE ABOVE SECTORS ARE STORED STARTING 'BUFR1'.
2656                                  ;THE BAD SECTOR TABLE IS TERMINATED BY A '177777' WORD.
2657
2658  007260  005000                  CHKHDRS: CLR    R0              ;INITIALIZE FOR 14 HDRS
2659  007262  012701  026446                  MOV     #OUTBUF,R1      ;INITIZLIZE PTR TO HDRS RECVD
2660  007266  012702  001266                  MOV     #BUFR,R2        ;INITIALIZE PTR TO SECTOR TABLE
2661  007272  012703  001320                  MOV     #BUFR1,R3       ;INITIALIZE PTR TO BAD HDR TABLE
2662  007276  010537  001120                  MOV     R5,$GDADR
2663  007302  042737  160037  001120          BIC     #160037,$GDADR  ;GET EXPCTD HEADER
2664  007310  005037  001500                  CLR     INDX3           ;CLR FLG INDICATING BAD HDRS
2665
2666  007314  023711  001120          9$:     CMP     $GDADR,(R1)     ;HEADER OK?
2667  007320  001406                          BEQ     10$             ;YES,BRANCH
2668  007322  011123                          MOV     (R1),(R3)+      ;SAVE BAD HDR
2669  007324  010022                          MOV     R0,(R2)+        ;SAVE BAD SECTR #
2670
2671  007326  012712  177777                  MOV     #177777,(R2)    ;PUT TERMINATR ON SECTR TABLE
2672  007332  005237  001500                  INC     INDX3           ;SET FLG INDICATING BAD HDR
2673  007336  005721                  10$:    TST     (R1)+           ;INCRMNT PTR TO NXT HDR
2674  007340  005200                          INC     R0              ;ALL HDRS CHKD?
2675  007342  022700  000014                  CMP     #14,R0
2676  007346  001362                          BNE     9$              ;IF NOT, LUP BAK
2677  007350  000207                          RTS     PC
2678
2679  007352  004737  016772          EXT5$:  JSR     PC,ABRT
2680
2681                                  ;;*****************************************************************
2682                                  ;*TEST 6         WRITE PATTERNS ON THE DISK
2683                                          ;*IN THIS TEST DIFFERENT PATTERNS ARE WRITTEN ON THE ENTIRE DISK,  768
2684                                          ;*WORDS (3 SECTORS) ARE WRITTEN AT A TIME,  TWO 768 WORDS LONG

2685                                          ;*BUFFERS HAVE BEEN USED IN THIS TEST.  WHILE ONE BUFFER IS
2686                                          ;*USED TO WRITE ON THE DISK, THE OTHER BUFFER GETS FILLED UP WITH
2687                                          ;*PATTERNS TO BE USED NEXT!  THIS OVERLAPPING IS DONE TO SAVE TIME.
2688
2689                                          ;*THREE PATTERN-GENERATOR SUB-ROUTINES ARE USED:
2690                                          ;*1.  PTGEN0    2.  PTGEN1      3.  PTGEN2      4.  PTGEN3
2691                                          ;*THESE THREE ROUTINES ARE CALLED IN A CYCLIC ORDER:
2692                                          ;*      PTGEN0-PTGEN1-PTGEN2-PTGEN3-PTGEN0-PTGEN1.......
2693                                          ;*THE FOLLOWING ORDER IS MAINTAINED IN WRITING BLOCKS (EACH
2694                                          ;*3 SECTORS LONG) USING ONE OF THE FOUR PATTERN GENERATORS:
```



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2695
2696                                          ;*CYL   SECTORS       CYL   SECTORS       CYL   SECTORS       CYL   SECTORS
2697                                          ;*   SUR       ROUTINE   SUR       ROUTINE   SUR       ROUTINE   SUR       ROUTI
2698                                          ;* 0  0   0-2  PTGEN0  0  0   6-10  PTGEN1  0  0   3-5  PTGEN2  0  0 11-13 PTGEN3
2699                                          ;* 0  1   0-2  PTGEN0  0  1   6-10  PTGEN1  0  1   3-5  PTGEN2  0  1 11-13 PTGEN3
2700                                          ;* 1  0   0-2  PTGEN0  1  0   6-10  PTGEN1  1  0   3-5  PTGEN2  1  0 11-13 PTGEN3
2701                                          ;* 1  1   0-2  PTGEN0  1  1   6-10  PTGEN1  1  1   3-5  PTGEN2  1  1 11-13 PTGEN3
2702                                          ;* 2  0   0-2  PTGEN0  2  0   6-10  PTGEN1  2  0   3-5  PTGEN2  2  0 11-13 PTGEN3
2703                                          ;*ETC, ETC.....
2704                                          ;*THE ABOVE SHOWN STAGGERING (OF SECTORS TO BE WRITTEN) IS DONE TO
2705                                          ;*SAVE ONE REV (40MS) EVERY TIME A BLOCK (3 SECTORS) IS WRITTEN.
2706                                          ;*IF YOU WANT TO USE BUFFERS STARTING AT SOME OTHER MEMORY ADDRESS
2707                                          ;*MAKE THE FOLLOWING CHANGES:
2708                                          ;*CHANGE 'PBUF0' TO STARTING ADDRESS OF THE FIRST 768 WORDS LONG BUFFER.
2709                                          ;*CHANGE 'PBUF1' TO STARTING ADDRESS OF SECOND 768 WORDS LONG BUFFER.
2710
2711                                          ;*IF YOU WANT TO WRITE YOUR OWN PATTERNS USING PATTERN GENERATOR 'PTGEN0'
2712                                          ;*CHANGE 'PTRN01' AND 'PTRN02' TO THE PATTERNS YOU WANT.
2713
2714                                          ;*TO WRITE THE SAME TWO (OR ONE) PATTERNS ON THE ENTIRE DISK CHANGE
2715                                          ;*LOCATION 'PAT1' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
2716                                          ;*LOCATION 'PAT2' TO 'PTGEN0' THE STARTING ADDRES OF PAT-GENERATOR 0
2717                                          ;*LOCATION 'PAT3' TO 'PTGEN0' THE STARTING ADDRESS OF PAT-GENERATOR 0
2718                                  ;;*****************************************************************
2719  007356  000004                  TST6:   SCOPE
2720  007360  012737  177764  001504          MOV     #-14,ERCNT1
2721  007366  012737  177764  001506          MOV     #-14,ERCNT2
2722  007374  012737  177152  001474          MOV     #-626,INDX1     ;SET COUNT FOR 313X2 TRACKS
2723  007402  005037  001410                  CLR     BUFLG0          ;CLR FLAG FOR BUFR 0
2724  007406  005037  001412                  CLR     BUFLG1          ;CLR FLAG FOR BUFR 1
2725                                                                  ;BIT 7 OF ABOVE FLAGS WHEN SET
2726                                                                  ;INDICATES, THAT BUFR TO BE USED
2727                                                                  ;FOR WRITING ON DSK
2728  007412  013737  001230  001432          MOV     DRIVAD,DSKADR   ;GET DRIVE #, DISK ADRES
2729  007420  012737  001414  001424          MOV     #PAT0,PRSPAT    ;INITIALIZE PTR TO THE FIRST
2730                                                                  ;PATRN GENERATOR
2731  007426  004737  010044                  JSR     PC,GETBUF
2732  007432  017737  171766  001430          MOV     @PRSPAT,PGSUBR
2733  007440  004777  171764                  JSR     PC,@PGSUBR      ;GO GENERATE PATRNS FOR
2734                                                                  ;3 SECTOR (400X3)
2735  007444  005005                  18$:    CLR     R5              ;INITIALIZE COUNT FOR 4 BLOCKS
2736  007446  005737  001410          28$:    TST     BUFLG0          ;FIND OUT WHICH BUFR TO USE
2737  007452  100407                          BMI     38$             ;FOR WRITING ON DSK
2738  007454  013737  001406  001434          MOV     PBUF1,BUSADR    ;USE 'IOBUF1' FOR TRANSFER
2739                                                                  ;OR THE ONE INDICATED BY THE USER
2740  007462  052737  000200  001412          BIS     #BIT7,BUFLG1    ;SET FLAG TO INDICATE THAT
2741                                                                  ;WRTING ON DSK WILL B DONE FROM
2742                                                                  ;THIS BUFR (BUF 1)
2743  007470  000406                          BR      13$
2744
2745  007472  013737  001404  001434  38$:    MOV     PBUF0,BUSADR    ;USE 'IOBUF0' FOR TRANSFER
2746                                                                  ;OR THE ONE INDICATED BY THE USER
2747
2748  007500  052737  000200  001410          BIS     #BIT7,BUFLG0    ;INDICATE THAT 'IOBUF0' WILL
2749                                                                  ;B USED FOR WRTING ON DISK
2750  007506  012737  007514  001110  13$:    MOV     #4$,$LPERR
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2751  007514  013777  001432  171742  4$:     MOV     DSKADR,@RKDA    ;SET RKDA
2752  007522  013777  001434  171732          MOV     BUSADR,@RKBA
2753  007530  012777  176400  171722          MOV     #-1400,@RKWC
2754  007536  012777  000003  171712          MOV     #3,@RKCS        ;WRITE THE 4 SECTORS ON
2755                                                                  ;DISK
2756  007544  013737  001424  001426          MOV     PRSPAT,NXTPAT   ;WHILE THE PATRNS R BEING WRITTEN
2757  007552  023727  001424  001422          CMP     PRSPAT,#PAT3    ;GO GENERATE THE NXT PATRNS
2758  007560  001004                           BNE     5$              ;TO B WRITTEN
2759  007562  012737  001414  001426          MOV     #PAT0,NXTPAT    ;KEEP GENERATING PATRNS IN THIS
2760  007570  000403                           BR      6$              ;WAY "PAT0"-"PAT1"-"PAT2"-"PAT3"-"PAT0"-
2761  007572  062737  000002  001426  5$:     ADD     #2,NXTPAT
2762  007600  004737  010044          6$:     JSR     PC,GETBUF
2763  007604  017737  171616  001430          MOV     @NXTPAT,PGSUBR
2764  007612  004777  171612                  JSR     PC,@PGSUBR      ;GO GENERATE THESE PATRNS,
2765                                                                  ;(3 X 400) WORDS
2766  007616  104421                          CON,RDY
2767  007620  032777  140000  171630          BIT     #140000,@RKCS   ;ANY ERROR?
2768  007626  001411                          BEQ     12$             ;GET RKCS,ER,DS,DA
2769  007630  004737  016162                  JSR     PC,GT4RG
2770  007634  104021                          ERROR   21              ;ERROR ON DOING WRITE
2771  007636  104415                          CON,RESET               ;CLEAR IT
2772  007640  005237  001504                  INC     ERCNT1          ;ALLOW 12 ERRORS AT MOST
2773  007644  001002                          BNE     12$
2774  007646  000137  010432                  JMP     EXT6            ;IF MORE, EXIT
2775  007652  032777  001000  171572  12$:    BIT     #BIT9,@RKDS     ;SIN, ON DOING WRITE?
2776  007660  001412                          BEQ     7$
2777  007662  004737  016162                  JSR     PC,GT4RG
2778  007666  104022                          ERROR   22              ;SIN ERROR ON DOING WRITE
2779  007670  104415                          CON,RESET
2780  007672  104416                          DRV,RESET
2781  007674  005237  001506                  INC     ERCNT2          ;ALLOW 12 ERRORS AT MOST
2782  007700  001002                          BNE     7$
2783  007702  000137  010432                  JMP     EXT6
2784                                                                  ;FIGURE OUT WHICH BUFFER IS
2785                                                                  ;AVAILABLE FOR USE
2786  007706  105737  001410          7$:     TSTB    BUFLG0          ;WAS PREVIOUS DSK-WRITE DONE
2787  007712  100003                          BPL     8$              ;USING BUFR 0?
2788  007714  005037  001410                  CLR     BUFLG0          ;YES, CLR FLAG INDICATING IT'S
2789                                                                  ;AVAILABLE NOW
2790  007720  000402                          BR      9$
2791  007722  005037  001412          8$:     CLR     BUFLG1          ;CLR FLAG INDICATING BUFR1
2792                                                                  ;IS AVAILABLE NOW
2793  007726  013737  001426  001424  9$:     MOV     NXTPAT,PRSPAT   ;'PRSPAT'S PATRNS WILL BE USED
2794                                                                  ;ON NEXT WRITE
2795  007734  010500                          MOV     R5,R0           ;FORM SEC # TO BE USED NXT TIME
2796  007736  116000  010426                  MOVB    SECPTR(R0),R0   ;GET SEC #

2797  007742  042737  000017  001432  10$:    BIC     #17,DSKADR      ;MASK SECTOR BITS FROM DSK-ADRES
2798  007750  050037  001432                  BIS     R0,DSKADR       ;FORM NXT DSK-ADRES
2799  007754  005205                          INC     R5              ;DONE WITH 12 SECTRS (3 BLOCKS)?

2800  007756  022705  000004                  CMP     #4,R5
2801  007762  001231                          BNE     2$              ;ON THIS SURFACE? IF NOT, GO
2802                                                                  ;DO NXT 4 SECTRS
2803  007764  032737  000001  001474          BIT     #BIT0,INDX1     ;WHICH SURFACE WAS DONE, 0 OR 1?
2804  007772  001415                          BEQ     11$             ;IF 0, GO DO SURFACE 1
2805  007774  005237  001474                  INC     INDX1           ;COUNT # OF TRACKS
2806  010000  001002                          BNE     .+6
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2807  010002  000137  010436                  JMP     TST7            ;EXIT IF DONE
2808  010006  042737  000020  001432          BIC     #20,DSKADR      ;GO TO SUR 0, NEXT CYLINDER
2809  010014  062737  000040  001432          ADD     #40,DSKADR
2810  010022  000137  007444                  JMP     1$              ;GO BACK AND DO WRITE
2811  010026  005237  001474  11$:    INC     INDX1           ;COUNT # OF TRACKS
2812  010032  052737  000020  001432          BIS     #20,DSKADR      ;SET BIT FOR SUR 1
2813  010040  000137  007444                  JMP     1$              ;GO, WRITE PATRNS ON SURFACE 1
2814                                  ;*GET BUF#
2815                                  ;*THIS ROUTINE FINDS OUT  WHICH BUFFER (IOBUF0, IOBUF1) OR ONE OF
2816                                  ;*THE TWO BUFFERS SELECTED BY THE USER) TO USE
2817                                  ;*FOR GENERATING PATTERNS, THEN IT SETS UP A FLAG INDICATING THAT
2818                                  ;*BUFFER HAS TO BE FILLED UP, THE STARTING ADDRESS OF THE
2819                                  ;*BUFFER IS STORED IN 'BUF #'.
2820
2821  010044  005737  001410          GETBUF: TST     BUFLG0          ;BUFR 0 AVAILABLE FOR USE?
2822  010050  100007                          BPL     1$              ;YES, BRANCH
2823  010052  052737  100000  001412          BIS     #BIT15,BUFLG1   ;NO, USE BUFR 1, INDICATE SO,
2824  010060  013737  001406  001446          MOV     PBUF1,BUFNO     ;SAVE STARTING ADRES OF BUFR1
2825  010066  000207                          RTS     PC
2826  010070  052737  100000  001410  1$:     BIS     #BIT15,BUFLG0   ;INDICATED, USING BUF 0
2827  010076  013737  001404  001446          MOV     PBUF0,BUFNO     ;SAVE STARTING ADRES OF BUFR 0
2828  010104  000207                          RTS     PC              ;RETURN
2829                                  ;*PTGEN0
2830                                  ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS LONG
2831                                  ;*BUFFER CONTAINING THE FOLLOWING PATTERNS
2832                                  ;*FIRST BLOCK OF 256 WORDS:     125252
2833                                  ;*SECOND BLOCK OF 256 WORDS:    052525 (COMPLEMENT OF ABOVE)
2834                                  ;*THIRD BLOCK OF 256 WORDS:     010421
2835                                  ;*YOU CAN USE ANY OTHER PATTERN/S (& ITS COMPLEMENT)
2836                                  ;*MAKING THE CHANGES IN THE 2 LOCATIONS SHOWN BELOW,
2837
2838  010106  013700  001446          PTGEN0: MOV     BUFNO,R0                ;GET STARTING ADRES OF BUFR
2839  010112  013701  010164                  MOV     PTRN01,R1       ;GET PATRN TO BE GENERATED
2840  010116  012702  177400                  MOV     #-400,R2        ;IN THE FIRST 400 WORD BLOCK
2841
2842  010122  010120                  1$:     MOV     R1,(R0)+        ;GENERATE THE FIRST BLOCK
2843  010124  005202                          INC     R2              ;WITH 'PAT01' PATRN
2844  010126  001375                          BNE     1$              ;ALL DONE?
2845
2846  010130  012702  177400                  MOV     #-400,R2
2847  010134  005101                          COM     R1              ;COMPLEMENT 'PAT01' PATAN
2848  010136  010120                  2$:     MOV     R1,(R0)+        ;GENERATE 2ND BLOCK WITH
2849  010140  005202                          INC     R2              ;'PAT01'S COMPLEMENT PATRN
2850  010142  001375                          BNE     2$              ;ALL DONE?
2851  010144  012702  177400                  MOV     #-400,R2
2852  010150  013701  010166                  MOV     PTRN02,R1       ;GET PATRN TO BE GENERATED
2853                                                                  ;FOR 3RD BLOCK
2854  010154  010120                  3$:     MOV     R1,(R0)+        ;GENERATE 3RD BLOCK USING
2855                                                                  ;'PAT02' PATRN
2856  010156  005202                          INC     R2
2857  010160  001375                          BNE     3$              ;ALL DONE?
2858
2859  010162  000207                          RTS     PC              ;RETURN
2860
2861  010164  125252          PTRN01: 125252                  ;CHANGE THESE LOCATIONS IF
2862  010166  010421          PTRN02: 010421                  ;YOU WANT ANY OTHER PATTERNS
```

```
                                ;*PTGEN1
                                ;*THIS ROUTINE GENERATES A 768 (3X256) WORDS
                                ;*LONG BUFFER CONTAINING THE FOLLOWING PATTERNS:

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

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

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

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

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

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

010250  012702  177760                 MOV     #-20,R2         ;SET COUNT
010254  010301                 5$:     MOV     R3,R1           ;INITIALIZE PATRN

010256  010120                 6$:     MOV     R1,(R0)+        ;GENERATE THE 3RD BLOCK
010260  006301                         ASL     R1              ;USING "FLOAT A 1"
010262  103375                         BCC     6$
010264  005202                         INC     R2
010266  001372                         BNE     5$              ;DONE?
010270  000207                         RTS     PC              ;RETURN

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



```
                                ;*FIRST BLOCK=256 WORDS 000000  COUNT PATRN=LOWER BYTE
                                ;*                      000001  0-377
                                ;*                      000002
                                ;*                      :
                                ;*                      000377

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

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

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

010272  005001                 PTGEN2: CLR     R1              ;INITIALIZE PATRN

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

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

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

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

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

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

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

```
 2975  010334  013700  001446          PTGEN3: MOV     BUFNO,R0
 2976  010340  012702  177400                  MOV     #-400,R2
 2977  010344  013701  010166                  MOV     PTRN02,R1       ;GET PATTERN
 2978  010350  005101                          COM     R1              ;COMPLEMENT 'PAT02' PATRN
 2979  010352  010120                  4$:     MOV     R1,(R0)+        ;GENERATE 1ST BLOCK
 2980  010354  005202                          INC     R2
 2981  010356  001375                          BNE     4$              ;ALL DONE?
 2982
 2983                                                                  ;2ND BLOCK
 2984  010360  012702  177760                  MOV     #-20,R2
 2985  010364  000261                  7$:     SEC
 2986  010366  012701  177776                  MOV     #177776,R1
 2987  010372  010120                  8$:     MOV     R1,(R0)+
 2988  010374  006101                          ROL     R1
 2989  010376  103775                          BCS     8$
 2990  010400  005202                          INC     R2
 2991  010402  001370                          BNE     7$              ;ALL DONE?
 2992
 2993                                                                  ;3RD BLOCK
 2994  010404  012701  000377                  MOV     #377,R1
 2995  010410  010102                          MOV     R1,R2           ;GENERATE 3RD BLOCK USING
 2996  010412  010120                  9$:     MOV     R1,(R0)+        ;'COUNT DOWN LOWER BYTE'
 2997  010414  060201                          ADD     R2,R1           ;'COUNT UP HIGHER BYTE'
 2998  010416  022701  177777                  CMP     #-1,R1
 2999  010422  001373                          BNE     9$              ;ALL DONE?
 3000  010424  000207                          RTS     PC              ;RETURN
 3001
 3002                                  ;SECTOR POINTER TABLE, DATA TRANSFERS ARE DONE IN BLOCKS (3 SECTORS
 3003                                  ;EACH) IN THE CYCLIC ORDER:  0-2, 6-10, 3-5, 11-13, 0-2, AND SO ON.
 3004  010426      006                 SECPTR: .BYTE   6
 3005  010427      003                         .BYTE   3
 3006  010430      011                         .BYTE   11
 3007  010431      000                         .BYTE   0
 3008
 3009  010432  004737  016772          EXT6:   JSR     PC,ABRT
 3010
 3011
 3012                                  ;;**************************************************************
 3013                                  ;*TEST 7         READ, SOFTWARE COMPARE, WRITE CHECK OF THE PATTERNS
 3014
 3015                                          ;****TEST 6 (WRITING PATTERNS ON DISK) SHOULD BE DONE BEFORE DOING****
 3016                                          ;****THIS TEST.****
 3017
 3018                                          ;*IN THIS TEST THE PATTERNS THAT WERE WRITTEN BEFORE (IN THE
 3019                                          ;*PREVIOUS TEST) ARE READ BACK AND SOFTWARE COMPARED,
 3020                                          ;*WHILE THE SOFTWARE COMPARISON IS TAKING PLACE, AN OVERLAPPING

 3021                                          ;*'WRITE CHECK' IS DONE FOR THE SAME BLOCK.  THE READING
 3022                                          ;*BACK OF EACH BLOCK (4 SECTORS) IS DONE IN THE SAME
 3023                                          ;*MANNER AS DESCRIBED IN THE BEGINNING OF PREVIOUS TEST.
 3024                                          ;*OVERLAPPING OPERATIONS AND STAGGERING OF BLOCKS ARE DONE IN
 3025                                          ;*A SIMILIAR MANNER.
 3026                                          ;*THE FOLLOWING IS A DESCRIPTION OF HOW ERRORS ARE HANDLED.
 3027                                          ;*IF A 'SIN' OR 'HE' OCCURS IT IS REPORTED AND THAT BLOCK
 3028                                          ;*IS SKIPPED.  IN THIS STAGE OF TESTING THESE ERRORS SHOULD NOT
 3029                                          ;*NORMALLY OCCUR.
 3030                                          ;*IF A CHECKSUM ERROR OCCURS, CONTROL IS TRANSFERRED TO
```



```
 3031                                          ;*'CSERROR'.  FIRST THE CSE IS REPORTED.  THE SECTOR GIVING
 3032                                          ;*CSE IS READ AGAIN.  IN ALL 3 TRIES ARE DONE.  IF STILL
 3033                                          ;*THE ERROR PRESISTS THAT SECTOR IS ABORTED AND THE REST
 3034                                          ;*OF THE SECTORS ARE READ AND CHECKED FOR CSE.  IF
 3035                                          ;*AGAIN SOME OTHER SECTOR GIVES CSE, REPORTING AND RETRIES
 3036                                          ;*ARE DONE AGAIN.
 3037                                          ;*NEXT SOFTWARE COMPARISON IS DONE OF THE DATA THAT WAS
 3038                                          ;*READ BACK.  ON GETTING A DATA MISCOMPARISON
 3039                                          ;*THE RELEVANT INFO(GOOD DATA, BAD DATA, ADDRESS ETC.) IS
 3040                                          ;*STORED.  AFTER THE WHOLE BLOCK HAS BEEN CHECKED, THE DATA
 3041                                          ;*ERROR/S IS/ARE REPORTED.  THEN THE BLOCK IS READ AGAIN.  IN ALL
 3042                                          ;*THREE TRIES ARE DONE.
 3043                                          ;*WHILE THE DATA COMPARISON (SOFTWARE) IS GOING ON THE 'WRITE
 3044                                          ;*CHECK' IS ALSO IN PROGRESS.  IF A WRITE CHECK ERROR OCCURS THE
 3045                                          ;*CONTROL IS TRANSFERRED TO 'WCEROR'.  WRITE CHECK OF THE SECTOR
 3046                                          ;*THAT GAVE WCE IS DONE AGAIN.  IN ALL THREE TRIES ARE DONE.
 3047                                          ;*NOTE THAT EVERY WCE IS REPORTED. IF ALL THE 4 SECTOR OF
 3048                                          ;*A BLOCK GAVE WCE'S, ALL 4 WILL BE REPORTED AND RETRIED.
 3049
 3050                                          ;*DEPENDING ON THE NATURE OF THE PROBLEM, THE ABOVE ERRORS
 3051                                          ;*CAN OCCUR IN ANY COMBINATION.  IT IS RECOMMENDED THAT ALL
 3052                                          ;*THE ERROR MESSAGE BE CAREFULLY CO-RELATED AND EXAMINED.  IT
 3053                                          ;*WILL PROVIDE A DEEP INSIGHT INTO THE PROBLEM.
 3054                                  ;;**************************************************************
 3055  010436  000004                  TST7:   SCOPE
 3056  010440  012737  177764  001510          MOV     #-14,ERCNT3     ;ALLOW 12 ERRORS AT THE MOST
 3057  010446  012737  177773  001512          MOV     #-5,ERCNT4      ;ALLOW 5 ERRORS AT THE MOST
 3058  010454  012737  177742  001514          MOV     #-36,ERCNT5     ;ALLOW 10 ERRORS AT THE MOST
 3059  010462  012737  177742  001516          MOV     #-36,ERCNT6     ;ALLOW 10 ERRORS AT THE MOST
 3060  010470  012737  177764  001520          MOV     #-14,ERCNT7     ;ALLOW 12 ERRORS AT THE MOST
 3061  010476  012737  177742  001522          MOV     #-36,ERCNT8     ;ALLOW 10 ERRORS AT THE MOST
 3062  010504  012737  177152  001474          MOV     #-626,INDX1     ;SET COUNT FOR 626 TRACKS
 3063  010512  005037  001476                  CLR     INDX2           ;CLR COUNT FOR 4 BLOCKS ON A TRACK
 3064
 3065  010516  012737  001414  001424          MOV     #PAT0,PRSPAT    ;INITLZE PTR TO PATRN GENRTR
 3066  010524  013737  001230  001450          MOV     DRIVAD,ADRES    ;INITLZE DRV#,ADRES
 3067
 3068
 3069  010532  005037  001504          BEGIN:  CLR     ERCNT1          ;IF > 0, MEANS THAT RETRIES
 3070  010536  005037  001506                  CLR     ERCNT2          ;DONE AFTER CSE OR CSE CHKD
 3071  010542  012737  177775  001252          MOV     #-3,RETRY1      ;RETRY COUNT FOR CSE
 3072  010550  012737  177776  001254          MOV     #-2,RETRY2      ;RETRY COUNT FOR SFTWRE MISCMP'N
 3073  010556  012737  000003  001256          MOV     #3,RETRY3       ;RETRY COUNT FOR WCE
 3074
 3075  010564  013737  001450  001440          MOV     ADRES,WDSKAD    ;DISK ADRES TO WRT CHK WITH
 3076  010572  013737  001406  001442          MOV     PBUF1,WBUSAD    ;USE THIS BUFR 1 TO WRT CHK
 3077                                                                  ;OR THE BUFR INDICATED BY THE USER
 3078  010600  012737  176400  001444          MOV     #-1400,WWRDCN   ;WRT CHK 1 BLOCK-3SECS-1400 WRDS
 3079
 3080  010606  013737  001450  001432  READ:   MOV     ADRES,DSKADR    ;DISK ADRES TO READ FROM
 3081  010614  012737  176400  001436          MOV     #-1400,WRDCNT   ;1 BLOCK = 3 SECTORS = 1400 WRDS
 3082  010622  013737  001404  001434          MOV     PBUF0,BUSADR    ;USE 'IOBUF0' TO READ INTO
 3083                                                                  ;OR THE BUFR INDICATED BY THE USER
 3084
 3085  010630  000404                          BR      RDAGAIN
 3086
```

```
3087  010632  104415                  LUPSIN: CON,RESET
3088  010634  104416                          DRV,RESET
3089  010636  000401                          BR      RDAGAIN
3090
3091  010640  104415                  LUPHE:  CON,RESET
3092
3093  010642  013777  001432  170614  RDAGAIN:        MOV     DSKADR,@RKDA    ;READ FROM THIS DSK-ADRES
3094  010650  013777  001436  170602          MOV     WRDCNT,@RKWC    ;THIS # OF WORDS
3095  010656  013777  001434  170576          MOV     BUSADR,@RKBA    ;INTO THIS BUFR
3096
3097  010664  012777  000405  170564          MOV     #405,@RKCS      ;READ,SSE,GO
3098
3099
3100  010672  013737  001406  001446          MOV     PBUF1,BUFNO     ;SET UP STARTING ADRES
3101  010700  017737  170520  001430          MOV     @PRSPAT,PGSUBR
3102  010706  004777  170516                  JSR     PC,@PGSUBR      ;GO GENERATE A BUFFER
3103                                                                  ;OF 1400 WORDS USING THIS
3104                                                                  ;PATRN GENRATR
3105
3106  010712  104421                          CON,RDY                 ;DONE WITH PATRN GENRTNG,
3107                                                                  ;WAIT FOR CNT RDY TO SET
3108                                                                  ;(FROM PREVIOUS READ)
3109
3110                                                                  ;CNT RDY SET
3111  010714  032777  040000  170534          BIT     #BIT14,@RKCS    ;HARD ERROR?
3112  010722  001416                          BEQ     NOHE
3113
3114  010724  012737  010640  001110          MOV     #LUPHE,$LPERR
3115  010732  004737  016214                  JSR     PC,GETINF
3116  010736  104023                          ERROR   23              ;HARD ERROR
3117  010740  104415                          CON,RESET
3118  010742  005237  001510                  INC     ERCNT3          ;ALLOW 12 ERRORS AT MOST
3119  010746  001002                          BNE     1$
3120  010750  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
3121  010754  000137  011512          1$:     JMP     FINISH
3122  010760  032777  001000  170464  NOHE:   BIT     #BIT9,@RKDS     ;SIN SET?
3123  010766  001417                          BEQ     NOSIN           ;NO
3124
3125  010770  012737  010632  001110          MOV     #LUPSIN,$LPERR
3126  010776  004737  016214                  JSR     PC,GETINF
3127  011002  104011                          ERROR   11              ;SIN ON READ
3128  011004  104415                          CON,RESET
3129  011006  104416                          DRV,RESET
3130  011010  005237  001512                  INC     ERCNT4          ;ALLOW 5 ERRORS AT MOST
3131  011014  001002                          BNE     1$
3132  011016  000137  012170                  JMP     EXT7            ;IF MORE, EXIT

3133  011022  000137  011512          1$:     JMP     FINISH
3134
3135  011026  005737  001504          NOSIN:  TST     ERCNT1          ;CHECKING CSE FOR 1ST TIME
3136  011032  001031                          BNE     WRTCHK          ;NO,BRANCH
3137  011034  005237  001504                  INC     ERCNT1          ;INDICATE THAT CSE HAS BEEN
3138                                                                  ;CHECKED ONCE
3139
3140  011040  032777  000002  170406          BIT     #BIT1,@RKER     ;CHECK SUM EROR?
3141  011046  001423                          BEQ     WRTCHK
3142  011050  012737  010532  001110          MOV     #BEGIN,$LPERR
```



```
3143  011056  004737  016214                  JSR     PC,GETINF
3144  011062  013737  001252  001202          MOV     RETRY1,$REG10   ;GET THE RETRY #
3145  011070  062737  000004  001202          ADD     #4,$REG10       ;SAVE IT FOR TYPEOUT
3146  011076  104024                          ERROR   24              ;CSE
3147  011100  005237  001514                  INC     ERCNT5          ;ALLOW 10 ERRORS AT MOST
3148  011104  001002                          BNE     1$
3149  011106  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
3150  011112  000137  011654          1$:     JMP     CSEROR          ;GO, SERVICE CSE
3151                                                                  ;
3152  011116  005037  001506          WRTCHK: CLR     ERCNT2          ;CLR FLAG INDICATING SOFTWARE
3153                                                                  ;COMPARE DONE
3154  011122  022737  000003  001256          CMP     #3,RETRY3       ;WRT CHK DONE BEFORE OR
3155  011130  001016                          BNE     SFTCMP          ;IT'S 1ST TIME?
3156                                                                  ;IF DONE,BRANCH OTHERWISE DO IT
3157  011132  013777  001440  170324  WCAGAIN: MOV    WDSKAD,@RKDA    ;WRT CHK FROM THIS DSK-ADRES
3158  011140  013777  001444  170312          MOV     WWRDCN,@RKWC    ;THIS # FO WORDS
3159  011146  013777  001442  170306          MOV     WBUSAD,@RKBA    ;WITH THIS BUFFER
3160
3161  011154  012777  000407  170274          MOV     #407,@RKCS      ;WRT CHK,GO,SSE
3162
3163  011162  005337  001256                  DEC     RETRY3          ;INDICATE WRT CHK DONE
3164
3165  011166  005737  001506          SFTCMP: TST     ERCNT2          ;SFTWARE CMPARE DONE ONCE BEFORE?
3166  011172  001060                          BNE     WCREPT          ;IF SFTWARE CMPARE HAS BEEN DONE
3167                                                                  ;ONCE DON'T DO IT AGAIN, OTHERWISE,
3168  011174  005237  001506                  INC     ERCNT2          ;DO IT, INDICATE IT IS DONE.
3169                                                                  ;MORE THAN ONCE BEFORE.
3170                                                                  ;IF THIS IS 1ST TIME THRU &
3171                                                                  ;WRT CHK WAS DONE ONCE BEFORE
3172                                                                  ;DO SOFTWARE COMPARISON OF
3173                                                                  ;THE DATA THAT WAS READ FROM
3174                                                                  ;THE DISK
3175
3176  011200  012702  001266                  MOV     #BUFR,R2        ;INITLZE PTR TO BUFR STORING
3177                                                                  ;ADRES OF BAD DATA
3178  011204  012703  001320                  MOV     #BUFR1,R3       ;STORE EXPCTD DATA STARTING HERE
3179  011210  012704  001352                  MOV     #BUFR2,R4       ;STORE RECVD (BAD) DATA
3180                                                                  ;STARTING HERE
3181
3182  011214  005037  001500                  CLR     INDX3           ;CLR FLAG INDICATING MISCMPRE
3183
3184  011220  013700  001404          COMPAR: MOV     PBUF0,R0        ;INITLZE PTR TO 'RECVD DATA' BUFR
3185  011224  012737  177764  001502          MOV     #-14,INDX4      ;STORE AND REPORT 12 OR LESS DATA ERRORS
3186  011232  013701  001406                  MOV     PBUF1,R1        ;INITLZE PTR TO 'EXPCTD DATA' BUFR
3187  011236  012737  176400  001260          MOV     #-1400,INADR    ;SET COUNT
3188  011244  021011                  CMPAGAN: CMP    (R0),(R1)       ;CORRECT WORD READ FROM DISK?
3189  011246  001402                          BEQ     1$
3190  011250  000137  012016                  JMP     MISCMP          ;BRANCH IF MISCMPRE ERROR
3191  011254  005720                  1$:     TST     (R0)+           ;INCRMNT PTRS
3192  011256  005721                          TST     (R1)+           ;TO NXT WORDS
3193  011260  005237  001260                  INC     INADR           ;DONE WITH CMPRISON?
3194  011264  001367                          BNE     CMPAGAN         ;IF NOT, COMPARE THE REST
3195
3196  011266  005737  001500                  TST     INDX3           ;WAS THERE A BAD DATA WORD
3197                                                                  ;(EVEN AFTR RETRYING)
3198  011272  001420                          BEQ     WCREPT          ;NO, BRANCH
```

```
3199  011274  012737  010606  001110  REPMSC: MOV     #READ,$LPERR
3200  011302  104025                          ERROR   25              ;DATA ERROR
3201  011304  005237  001516                  INC     ERCNT6          ;ALLOW 10 ERRORS AT MOST
3202  011310  001002                          BNE     1$
3203  011312  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
3204  011316  005737  001254          1$:     TST     RETRY2
3205  011322  001404                          BEQ     WCREPT
3206  011324  005237  001254                  INC     RETRY2
3207  011330  000137  010606                  JMP     READ
3208
3209  011334  104421                  WCREPT: CON.RDY                 ;WAIT FOR CNTRL RDY FROM
3210                                                                  ;PREVIOUS WRT CHK
3211  011336  022737  177776  001254          CMP     #-2,RETRY2      ;IF THERE WAS A RETRY AFTER MISC
3212                                                                  ;-OMPARISON, DO WRT CHK AGAIN
3213  011344  001417                          BEQ     ERWCHK
3214  011346  000401                          BR      LUPWCE+2
3215  011350  104415                  LUPWCE: CON.RESET
3216  011352  013777  001440  170104          MOV     WD$KAD,@RKDA    ;WRT CHK WITH THIS DSK-ADRES
3217  011360  013777  001444  170072          MOV     WWRDCN,@RKWC    ;THIS # OF WORDS
3218  011366  013777  001442  170066          MOV     WBUSAD,@RKBA    ;THIS BUS ADRES
3219  011374  012777  000407  170054          MOV     #407,@RKCS
3220
3221  011402  104421                          CON.RDY
3222  011404  012737  011350  001110  ERWCHK: MOV     $LUPWCE,$LPERR
3223  011412  032777  040000  170032          BIT     #BIT14,@RKDS    ;HARD EROR?(FROM WRT CHK)
3224  011420  001410                          BEQ     XHE             ;NO,BRANCH
3225
3226  011422  004737  016214                  JSR     PC,GETINF
3227  011426  104026                          ERROR   26              ;HE ON WRT CHK
3228  011430  005237  001520                  INC     ERCNT7          ;ALLOW 12 ERRORS AT MOST
3229  011434  001002                          BNE     XHE
3230  011436  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
3231
3232  011442  032777  000001  170004  XHE:    BIT     #BIT0,@RKER     ;WRITE CHECK EROR?
3233  011450  001420                          BEQ     FINISH
3234  011452  004737  016214                  JSR     PC,GETINF
3235  011456  012737  000003  001202          MOV     #3,$REG10       ;GET TRY #
3236  011464  163737  001256  001202          SUB     RETRY3,$REG10   ;SAVE IT FOR TYPEOUT
3237  011472  104027                          ERROR   27              ;WRT CHK EROR
3238  011474  005237  001522                  INC     ERCNT8          ;ALLOW 10 ERRORS AT MOST
3239  011500  001002                          BNE     1$
3240  011502  000137  012170                  JMP     EXT7            ;IF MORE, EXIT
3241  011506  000137  012062          1$:     JMP     WCEROR
3242
3243
3244                                                                  ;THERE WAS NO WCE. DONE

3245                                                                  ;WITH ALL CHECKING FOR SOFT
3246                                                                  ;ERORS,ETC. MODIFY PARAMETERS
3247                                                                  ;TO CHECK NXT BLOCK ON
3248                                                                  ;THE DISK
3249
3250  011512  022737  001422  001424  FINISH: CMP     #PAT3,PRSPAT    ;FIND OUT THE NXT PATRN GENRATR
3251  011520  001404                          BEQ     1$              ;TO USE FOR GENRATING THE
3252  011522  062737  000002  001424          ADD     #2,PRSPAT       ;BUFR,STORE POINTER TO
3253  011530  000403                          BR      2$              ;GENRATR ROUTINE IN 'PRSPAT'
3254  011532  012737  001414  001424  1$:     MOV     #PAT0,PRSPAT    ;NOTE THER R 4 PAT-GENRATRS
```



```
3255                                                                  ;PAT0-PAT1-PAT2-PAT3----PAT0-
3256  011540  013701  001476          2$:     MOV     INDX2,R1        ;FORM SECTR # TO BE USED NEXT
3257  011544  116101  010426                  MOVB    SECPTR(R1),R1   ;GET SECTR #
3258  011550  042737  000017  001450  3$:     BIC     #17,ADRES       ;MASK SECTR BITS
3259  011556  050137  001450                  BIS     R1,ADRES        ;FORM THE NEW DISK-ADRES
3260                                                                  ;FORM THE NXT BLOCK TO BE
3261                                                                  ;CHECKED.
3262  011562  005237  001476                  INC     INDX2           ;DONE ALL 4 BLOCKS(3 SECS
3263                                                                  ;EACH) ON THIS TRACK?
3264  011566  022737  000004  001476          CMP     #4,INDX2
3265  011574  001025                          BNE     GOBAK           ;IF NOT, GO BAK & DO THE
3266                                                                  ;NXT BLOCK ON THIS TRACK
3267
3268  011576  005037  001476          DONTRK: CLR     INDX2           ;REINITLZE COUNT FOR
3269                                                                  ;4 BLOCKS ON THIS TRACK
3270  011602  032737  000001  001474          BIT     #BIT0,INDX1     ;WHICH SUR TO DO NXT? 0 OR 1
3271  011610  001407                          BEQ     DOSUR1          ;BRANCH, DO SUR 1 NXT
3272
3273  011612  062737  000040  001450          ADD     #40,ADRES
3274
3275  011620  042737  000020  001450          BIC     #20,ADRES       ;CLR SUR BIT, DO SUR 0 NXT
3276  011626  000403                          BR      DONE
3277
3278  011630  052737  000020  001450  DOSUR1: BIS     #20, ADRES      ;SET SUR BIT, DO SUR 1 NXT
3279
3280  011636  005237  001474          DONE:   INC     INDX1           ;DONE WITH ALL 626 TRACKS?
3281  011642  001002                          BNE     GOBAK
3282  011644  000137  012174                  JMP     TST10
3283
3284  011650  000137  010532          GOBAK:  JMP     BEGIN           ;IF NOT, GO BAK & CHECK
3285                                                                  ;THE NXT TRACK
3286
3287                                  ;CSEROR                         ;THIS IS THE ENTRY POINT
3288                                                                  ;FOR SERVICE ROUTINE FOR CHECK
3289  011654                          CSEROR:                         ;SUM EROR. CONTROL IS XFERED
3290                                                                  ;HERE ONCE CSE OCCURS
3291
3292  011654  017700  167604                  MOV     @RKDA,R0        ;GET RKDA AFTER CSE
3293  011660  010001                          MOV     R0,R1           ;SAVE RKDA
3294  011662  032700  000017                  BIT     #17,R0          ;FORM THE ADRES OF THE SECTR
3295  011666  001002                          BNE     1$              ;WHICH GAVE CSE
3296  011670  162700  000004                  SUB     #4,R0
3297  011674  005300                  1$:     DEC     R0              ;R0 CONTAINS DSK-ADRES WHERE
3298                                                                  ;CSE OCURED
3299  011676  020037  001432                  CMP     R0,DSKADR       ;DID A PREVIOUS RETRY (IF ANY)
3300                                                                  ;GIVE CSE ON SAME ADRES
3301  011702  001021                          BNE     2$              ;NO, THIS IS A FRESH CSE, BRANCH.
3302                                                                  ;IF THIS WAS A CSE ON A
3303  011704  005237  001252                  INC     RETRY1          ;RETRY INCMNT RETRY COUNT.
3304                                                                  ;BRANCH IF 3 RETRIES HAVEN'T
3305  011710  001021                          BNE     3$              ;BEEN DONE
3306                                                                  ;GO REPORT CSE
3307                                                                  ;IF CSE WAS IN THE LAST SECTR OF
3308                                                                  ;THE 3 SEC BLOCK, GO TO 'WRTCHK'
3309                                                                  ;OTHERWISE CHECK THE REST OF
3310                                                                  ;THE SECTORS FOR CSE.
```

```
3311  011712  010102                    MOV     R1,R2
3312  011714  042702  177760            BIC     #177760,R2
3313  011720  001002                7$:  BNE     8$
3314  011722  000137  011116            JMP     WRTCHK
3315  011726  162702  000003        8$: SUB     #3,R2
3316  011732  100372                    BPL     7$
3317
3318  011734  010100                6$: MOV     R1,R0
3319  011736  012737  177775  001252    MOV     #-3,RETRY1
3320  011744  000403                    BR      3$
3321
3322  011746  012737  177776  001252 2$: MOV     #-2,RETRY1      ;ALLOW 2 MORE TRIES FOR
3323                                                            ;THE CSE ON SAME DISK-ADRES
3324
3325  011754  010037  001432        3$: MOV     R0,DSKADR       ;SAVE DSK-ADRES FOR DOING
3326                                                            ;THE RETRY-READ
3327  011760  163700  001450            SUB     ADRES,R0        ;MODIFY THE
3328  011764  005200                    INC     R0              ;BUS ADRES & WORD COUNT
3329  011766  005300                4$: DEC     R0              ;TO BE USE ON RETRY-
3330  011770  001407                    BEQ     5$              ;READ
3331  011772  062737  001000  001434    ADD     #1000,BUSADR
3332  012000  062737  000400  001436    ADD     #400,WRDCNT
3333  012006  000767                    BR      4$
3334
3335  012010  104415                5$: CON,RESET               ;CLR THE CSE IN RKER
3336  012012  000137  010642            JMP     RDAGAIN         ;GO BACK, READ AGAIN
3337                                                            ;RETRY
3338
3339
3340
3341                                ;MISCMP                     ;THIS IS THE ENTRY POINT
3342                                                            ;FOR SERVICE ROUTINE, FOR
3343                                                            ;DATA EROR (MISCOMPARISON)
3344                                                            ;ON SOFTWARE COMPARISON
3345                                                            ;OF DATA READ FROM THE DISK BLOCK
3346
3347
3348  012016  104421                MISCMP: CON,RDY             ;WAIT FOR CNTRL RDY FROM
3349                                                            ;PREVIOUS WRT CHK
3350  012020  032777  040000  167430    BIT     #BIT14,@RKCS
3351  012026  001401                    BEQ     1$
3352  012030  104415                    CON,RESET               ;CLR WCE IN RKER
3353                                                            ;BUT STILL DATA EROR ENTER HERE
3354  012032  010022                1$: MOV     R0,(R2)+        ;STORE MEM ADRES WHERE
3355                                                            ;DATA EROR OCCURED
3356  012034  012123                    MOV     (R1)+,(R3)+     ;SAVE EXPCTD DATA

3357  012036  012024                    MOV     (R0)+,(R4)+     ;SAVE DATA RECVD (BAD)
3358  012040  005237  001500            INC     INDX3           ;INDICATE MISCMPRISON
3359

3360  012044  005237  001502            INC     INDX4           ;STORE ONLY 12(DEC) ERORS
3361  012050  001402                    BEQ     4$              ;IF 12 ERORS, GO REPORT THEM
3362
3363  012052  000137  011244            JMP     CMPAGAN         ;GO BACK & CMPARE THE REST
3364
3365  012056  000137  011274        4$: JMP     REPMSC
3366
```



```
3367
3368
3369                                                            ;THIS THE ENTRY POINT FOR
3370                                                            ;EROR SERVICE ON GETTING A
3371                                                            ;WRITE CHECK EROR.
3372
3373  012062  005737  001256  WCEROR: TST     RETRY3          ;DONE 3 TRIES?
3374  012066  003035                    BGT     CLRERR          ;IF NOT SKIP, OTHERWISE REPORT
3375                                                            ;W C EROR
3376
3377  012070  012737  000003  001256    MOV     #3,RETRY3       ;SET CONT FOR RETRIES
3378
3379  012076  017700  167362            MOV     @RKDA,R0        ;IF WCE WAS IN THE LAST SECTOR
3380  012102  010002                    MOV     R0,R2           ;OF THE BLOCK, NO MORE SECS
3381  012104  042702  177760            BIC     #177760,R2      ;TO CHECK, GO TO 'FINISH'
3382  012110  001002                3$: BNE     4$              ;IF IT WASN'T LAST SECTOR OF THE
3383  012112  000137  011512            JMP     FINISH          ;BLOCK, THEN CHECK REMAINING
3384  012116  162702  000003        4$: SUB     #3,R2           ;SECTORS. (STARTING FROM THE
3385  012122  100372                    BPL     3$              ;SEC AFTER THE ONE GIVING WCE)
3386  012124  010001                1$: MOV     R0,R1           ;SAVE DISK ADRES
3387  012126  163700  001440            SUB     WDSKAD,R0
3388  012132  010137  001440            MOV     R1,WDSKAD       ;GET SAVED DISK ADRES
3389  012136  005200                    INC     R0
3390  012140  005300                2$: DEC     R0
3391  012142  001407                    BEQ     CLRERR
3392  012144  062737  001000  001442    ADD     #1000,WBUSAD    ;FORM THE NEW BUS ADRES
3393  012152  062737  000400  001444    ADD     #400,WWRDCN     ;FORM THE NEW WORD COUNT
3394  012160  000767                    BR      2$
3395  012162  104415            CLRERR: CON,RESET
3396  012164  000137  011132            JMP     WCAGAIN
3397
3398  012170  004737  016772    EXT7:   JSR     PC,ABRT
3399
3400
3401                                ;;*****************************************************************
3402                                ;*TEST 10        WRITE, WRITE CHECK ON CYLINDERS 127, 128
3403                                        ;*THIS TEST WRITES 12 UNIQUE PATTERNS (ONE FOR EACH
3404                                        ;*SECTOR) ON CYLINDERS 127 AND 128, THEN WRITE
3405                                        ;*CHECK IS DONE TO SEE IF THEY WERE WRITTEN
3406                                        ;*CORRECTLY.  IT SHOULD BE NOTED THAT THERE IS
3407                                        ;*CHANGE IN 'WRITE' CURRENT AT THIS CYLINDER.
3408                                        ;*PATTERNS ARE RELOCATED ON THE CYLINDERS AFTER EACH
3409                                        ;*WRITE/WRITE CHECK CYCLE.  THUS THE FIRST TIME
3410                                        ;*PATTERN 'SP1' IS WRITTEN ON SECTOR 0, PATTERN 'SP2' ON
3411                                        ;*SECTOR 2, ETC.  AFTER THIS WRITE/WRITE CHECK CYCLE
3412                                        ;*IS OVER PATTERN 'SP2' IS WRITTEN ON SECTOR 0, PATTERN
3413                                        ;*;'SP3' ON SECTOR 1 AND SO ON.  THIS WRITE/WRITE
3414                                        ;*CHECK CYCLE IS REPEATED 12 TIMES, THUS
3415                                        ;*THE LAST WRITE/WRITE CHECK IS DONE USING
3416                                        ;*PATTERN 'SP12' ON SECTOR 0, PATTERN 'SP1' IS
3417                                        ;*WRITTEN ON SECTOR 1, PATTERN 'SP2' ON SECTOR 2,
3418                                        ;*ETC.  IF YOU WANT TO WRITE ANY OTHER PATTERNS
3419                                        ;*FILL IN THE PATTERNS YOU WANT IN LOCATIONS
3420                                        ;*'SP1', 'SP2',...ETC.
3421                                ;;*****************************************************************
3422  012174  000004                TST10:  SCOPE
```

```
3423
3424  012176  012737  177764  001504          MOV     #-14,ERCNT1     ;ALLOW 12 ERRORS AT MOST
3425  012204  012737  177764  001506          MOV     #-14,ERCNT2     ;ALLOW 12 ERRORS AT MOST
3426  012212  012737  177723  001510          MOV     #-55,ERCNT3     ;ALLOW 15 ERRORS AT MOST
3427  012220  012702  012702                  MOV     #SP1,R2         ;INITIALIZE POINTER TO PATRN
3428  012224  010201                  DOWRT:  MOV     R2,R1
3429  012226  012700  007740                  MOV     #7740,R0        ;SET UP CYL ADRES BITS (127)
3430  012232  053700  001230                  BIS     DRIVAD,R0       ;SET UP DRIVE # BITS
3431  012236  005003                  WRLO1:  CLR     R3
3432  012240  104415                  WRERR:  CON.RESET
3433
3434  012242  010077  167216          WRLO:   MOV     R0,@RKDA        ;ADRES THE DRIVE
3435  012246  012777  177400  167204          MOV     #-400,@RKWC     ;WRITE 1 SECTOR
3436  012254  010177  167202                  MOV     R1,@RKBA        ;USE THIS PATTERN
3437  012260  012777  004003  167170          MOV     #4003,@RKCS     ;WRITE, GO
3438  012266  104421                          CON.RDY
3439  012270  032777  140000  167160          BIT     #140000,@RKCS   ;ANY ERROR?
3440  012276  001414                          BEQ     4$
3441  012300  012737  012240  001110          MOV     #WRERR,$LPERR   ;SET ADRES FOR LOOPING ON ERROR
3442  012306  004737  016162                  JSR     PC,GT4RG        ;GET TKCS, ER, DS, DA
3443  012312  104021                          ERROR   21              ;ERROR OCCURRED ON DOING A WRITE
3444  012314  104415                          CON.RESET               ;CLEAR THE ERROR
3445  012316  005237  001504                  INC     ERCNT1          ;ALLOW 12 ERRORS ONLY
3446  012322  001002                          BNE     4$
3447  012324  000137  012732                  JMP     EXT10
3448
3449  012330  005200                  4$:     INC     R0
3450  012332  005203                          INC     R3              ;KEEP COUNT
3451  012334  022701  012730                  CMP     #SP12,R1        ;USE PATTERNS IN A CYCLIC FASHION
3452  012340  001002                          BNE     3$
3453  012342  012701  012700                  MOV     #SP1-2,R1
3454  012346  005721                  3$:     TST     (R1)+           ;INCREMENT POINTERS TO NEXT PATTERN
3455  012350  020327  000014                  CMP     R3,#14          ;DONE SURFACE 0?
3456  012354  002732                          BLT     WRLO            ;NO
3457  012356  001005                          BNE     2$              ;YES, IF CHANGING HEADS
3458  012360  010201                          MOV     R2,R1
3459  012362  042700  000017                  BIC     #17,R0          ;SET UP CORRECT ADDRESS ETC.
3460  012366  052700  000020                  BIS     #20,R0
3461
3462  012372  020327  000030          2$:     CMP     R3,#30          ;DONE WITH WRITING SURFACE 1?
3463  012376  001321                          BNE     WRLO            ;NO, BRANCH
3464
3465  012400  032700  007700          WRHI:   BIT     #7700,R0        ;DONE WITH BOTH CYLINDERS = 127 & 128?
3466  012404  001405                          BEQ     DOWCHK          ;YES
3467  012406  012700  010000                  MOV     #10000,R0       ;NO, DO CYLINDER 128
3468  012412  053700  001230                  BIS     DRIVAD,R0

3469  012416  000707                          BR      WRLO1           ;GO BACK
3470                                                                  ;CYLINDERS 127 AND 128 HAVE BEEN
3471
3472
3473  012420  010201                  DOWCHK: MOV     R2,R1           ;WRITTEN, NOW DO WRITE CHECK
3474  012422  012737  177775  001252          MOV     #-3,RETRY1      ;INITIALIZE POINTER TO FIRST PATTERN
3475  012430  012700  010000                  MOV     #10000,R0       ;RETRY COUNT
3476  012434  053700  001230                  BIS     DRIVAD,R0       ;DO CYLINDER 128 FIRST
3477  012440  005003                  WCHI1:  CLR     R3
3478  012442  010077  167016          WCERR:  MOV     R0,@RKDA        ;ADRES THE DRIVE
```



```
3479
3480  012446  012777  177400  167004  WCHI:   MOV     #-400,@RKWC     ;WRITE CHECK 1 SECTOR
3481  012454  010177  167002                  MOV     R1,@RKBA        ;WITH THIS PATTERN
3482  012460  012777  004007  166770          MOV     #4007,@RKCS     ;WRITE CHECK, GO
3483  012466  104421                          CON.RDY
3484
3485  012470  032777  040000  166754          BIT     #40000,@RKDS    ;HE?
3486  012476  001406                          BEQ     1$              ;NO
3487  012500  004737  016214                  JSR     PC,GETINF
3488  012504  104026                          ERROR   26              ;HE ON DOING WRT CHK
3489  012506  005237  001506                  INC     ERCNT2          ;ALLOW 12 ERRORS ONLY
3490  012512  001507                          BEQ     EXT10           ;IF MORE, EXIT
3491  012514  032777  000001  166732  1$:     BIT     #BIT0,@PKER     ;WCE?
3492  012522  001425                          BEQ     4$              ;NO
3493  012524  012737  012442  001110          MOV     #WCERR,$LPERR   ;SET ADRES FOR LOOPING ON ERROR
3494  012532  004737  016214                  JSR     PC,GETINF       ;GET INFO ON ERROR
3495  012536  013737  001252  001202          MOV     RETRY1,$REG10
3496  012544  062737  000004  001202          ADD     #4,$REG10       ;WCE ON DOING WRITE CHECK, WITH
3497  012552  104027                          ERROR   27              ;PATTERN STORED IN R1
3498  012554  005237  001252                  INC     RETRY1          ;DO 3 TIMES IN ALL
3499  012560  001330                          BNE     WCERR
3500  012562  005237  001510                  INC     ERCNT3          ;ALLOW 15 ERRORS ONLY
3501  012566  001461                          BEQ     EXT10           ;IF MORE, EXIT
3502  012570  012737  177775  001252          MOV     #-3,RETRY1
3503
3504  012576  005200                  4$:     INC     R0              ;KEEP TRACK OF DISK-ADRES
3505  012600  005203                          INC     R3              ;AND COUNT
3506  012602  022701  012730                  CMP     #SP12,R1        ;USE PATTERNS IN CYCLIC
3507  012606  001002                          BNE     3$
3508  012610  012701  012700                  MOV     #SP1-2,R1       ;FASHION
3509  012614  005721                  3$:     TST     (R1)+           ;INCREMENT POINTER TO NEXT PATTERN
3510  012616  020327  000014                  CMP     R3,#14          ;DONE SURFACE 0?
3511  012622  002711                          BLT     WCHI            ;NO
3512  012624  001005                          BNE     2$
3513  012626  010201                          MOV     R2,R1           ;IF CHANGING HEADS (0-1), SET CORRECT
3514  012630  042700  000017                  BIC     #17,R0          ;ADRES BITS
3515  012634  052700  000020                  BIS     #20,R0
3516
3517  012640  020327  000030          2$:     CMP     R3,#30          ;DONE WRITE CHECKING SURFACE 1?
3518  012644  001300                          BNE     WCHI            ;NO, GO BACK
3519
3520  012646  032700  007700          WCLO:   BIT     #7700,R0        ;DONE BOTH CYLINDERS - 127, 128?
3521  012652  001005                          BNE     REPEAT          ;YES, BRANCH
3522  012654  012700  007740                  MOV     #7740,R0        ;DO CYLINDER 127 NOW
3523  012660  053700  001230                  BIS     DRIVAD,R0
3524  012664  000665                          BR      WCHI1
3525
3526
3527  012666  005722                  REPEAT: TST     (R2)+           ;RELOCATE THE PATTERNS ON THE
3528  012670  020227  012732                  CMP     R2,#SP12+2      ;CYLINDERS AND DO IT AGAIN
3529  012674  001420                          BEQ     TST11           ;;EXIT
3530  012676  000137  012224                  JMP     DOWRT           ;THIS TEXT)
3531
3532
3533
3534                                  ;PATTERNS TO BE USED
```

```
3535
3536  012702  177777                SP1:    .WORD   177777          ;IF YOU WANT TO WRITE ANY
3537  012704  052525                SP2:    .WORD   052525          ;OTHER PATTERNS, CHANGE THESE
3538  012706  111111                SP3:    .WORD   111111          ;12 LOCATIONS TO ANY PATTERN
3539  012710  010421                SP4:    .WORD   010421          ;YOU WANT.
3540  012712  102041                SP5:    .WORD   102041
3541  012714  010101                SP6:    .WORD   010101
3542  012716  040201                SP7:    .WORD   040201
3543  012720  000401                SP8:    .WORD   000401
3544  012722  031463                SP9:    .WORD   031463
3545  012724  070707                SP10:   .WORD   070707
3546  012726  007417                SP11:   .WORD   007417
3547  012730  041020                SP12:   .WORD   041020
3548
3549  012732  004737  016772        EXT10:  JSR     PC,ABRT
3550
3551
3552
3553
3554
3555                                ;;*************************************************************
3556                                ;*TEST 11        SEEK FUNCTION TIMER
3557                                ;*SEEK TIMER
3558                                ;*IN THIS PART OF THE PROGRAM SEEKS ARE TIMED BETWEEN A PARTICULAR SET
3559                                ;*OF CYLINDERS, BOTH IN THE FORWRAD  DIRECTION (0-312) AND REVERSE(312-0).
3560                                ;*******CAUTION******
3561                                ;*IT SHOULD BE NOTED THAT THE SECTOR COUNTER (IN RKDS) IS USED AS THE REAL
3562                                ;*TIME CLOCK TO DO THE SEEK TIMING. FOR THE TIMES TO BE RELIABLE, THE
3563                                ;*SECTOR COUNTER SHOULD BE ACCURATE WITHIN THE SPECIFICATIONS OF THE DISK
3564                                ;*SPEED:     1500 RPM = 40 MILI SECS/REV =3.33 MILI SECS/SECTOR.
3565                                ;*VARIATION: +-30  RPM
3566                                ;;*************************************************************
3567  012736  000004                TST11:  SCOPE
3568  012740  032777  000100  166172        BIT     #SW6,@SWR       ;INHIBIT TIMER?
3569  012746  001002                        BNE     .+6
3570  012750  000137  014106                JMP     PLTGRPH
3571  012754  104415                        CON.RESET
3572  012756  104416                        DRV.RESET
3573
3574  012760  012737  177771  001252        MOV     #-7,RETRY1      ;COUNT FOR 7 DIFRNT SEEK TIMES
3575                                                                ;TO BE RECORDED
3576
3577  012766  104401  012774                TYPE    ,65$            ;;TYPE ASCIZ STRING
3578  012772  000424                        BR      64$             ;;GET OVER THE ASCIZ
3579                                ;;65$:  .ASCIZ  <15><12>/SEEK TIME SCALE FACTOR=0.01 MILI SECS/
3580  013044                        64$:
3581  013044  104401  013052                TYPE    ,67$            ;;TYPE ASCIZ STRING
3582  013050  000421                        BR      66$             ;;GET OVER THE ASCIZ
3583                                ;;67$:  .ASCIZ  <15><12><12>/ #  OF    SEEK   #  OF   SEEK/
3584  013114                        66$:
3585  013114  104401  013122                TYPE    ,69$            ;;TYPE ASCIZ STRING
3586  013120  000421                        BR      68$             ;;GET OVER THE ASCIZ
3587                                ;;69$:  .ASCIZ  <15><12>/ SEEKS    TIME   SEEKS   TIME/<15><12>
3588  013164                        68$:
3589
3590  013164  012737  001542  001260        MOV     #SIAD,INADR     ;INITLZE PTR TO INNER ADRES
```



```
3591  013172  012737  001524  001262        MOV     #SOAD,OUTADR    ;INITLZE PTR TO OUTER ADRES
3592
3593  013200  017777  166056  166256  REPTIM: MOV     @OUTADR,@RKDA   ;POSITION HEADS TO OUTER CYLINDER
3594                                                                ;BEFORE STARTING TO TIME
3595  013206  053777  001230  166250        BIS     DRIVAD,@RKDA    ;SET DRIVE # BITS
3596  013214  012777  000011  166234        MOV     #11,@RKCS               ;SEEK, GO
3597  013222  104421                        CON.RDY                 ;WAIT FOR CNTRL RDY
3598  013224  104422                        TST.RWS                 ;WAIT FOR R/W/S RDY
3599                                                                /
3600  013226  005037  001474                CLR     INDX1           ;INDX1 = 0, GOING IN; OTHERWISE OUT
3601  013232  012704  027026                MOV     #BUFR10,R4      ;STORE FWRD SEEK TIMES IN THIS BUFR
3602  013236  012705  027426                MOV     #BUFR11,R5      ;STORE REVRSE "   "
3603  013242  012737  177634  001476        MOV     #-144,INDX2     ;SET COUNT FOR # OF SEEKS
3604
3605
3606  013250  013702  001464        BEGSK:  MOV     RKDA,R2
3607  013254  005737  001474                TST     INDX1           ;GOING FWRD OR REVRSE?
3608  013260  001005                        BNE     1$              ;REVRSE, BRANCH
3609
3610  013262  017712  165772                MOV     @INADR,@R2      ;FWRD, SET INNER CYL ADRES
3611  013266  053712  001230                BIS     DRIVAD,@R2      ;SET DRIVE # BITS
3612  013272  000404                        BR      2$
3613
3614  013274  017712  165762        1$:     MOV     @OUTADR,@R2     ;SET OUTER CYL ADRES
3615  013300  053712  001230                BIS     DRIVAD,@R2      ;SET DRIVE # BITS
3616  013304  004737  014776        2$:     JSR     PC,@#TIMSEK     ;GO,-TIME THE SEEK FROM CYLINDER
3617                                                                ;0 TO THE ABOVE CYL. RETURN WITH
3618                                                                ;R3 CONTAINING THE TIME (MS, SCALE
3619                                                                ;FACTOR= 0.01) REQUIRED FOR THE SEEK.
3620  013310  005737  001474                TST     INDX1
3621  013314  001004                        BNE     3$
3622  013316  010324                        MOV     R3,(R4)+        ;STORE TIME TAKEN FOR FRWRD SEEK
3623  013320  005237  001474                INC     INDX1           ;SET FLAG FOR DOING REVRSE SEEK
3624  013324  000751                        BR      BEGSK           ;GO DO IT
3625
3626  013326  010325                3$:     MOV     R3,(R5)+        ;STORE TIME TAKEN FOR REVRSE SEEK
3627  013330  005037  001474                CLR     INDX1           ;CLR FLG FOR DOING FRWRD SEEK
3628
3629  013334  005237  001476                INC     INDX2           ;RECORDED 144 SEEK TIMES
3630  013340  001343                        BNE     BEGSK           ;IF NOT, GO BAK
3631
3632                                        ;AT THIS POINT 100 SEEKS HAVE BEEK PERFORMED BETWEEN TWO
3633                                        ;CYLINDERS (FORWARD & REVERSE DIRECTION).  FORWARD SEEK
3634                                        ;TIMES ARE STORED IN TABLE STARTING AT 'BUFR10' REVERSE
3635                                        ;STARTING AT 'BUFR11'.  THE FOLLOWING CODE FINDS OUT THE
3636                                        ;NUMBERS OF TIMES A PARTICULAR 'SEEK TIME' WAS OBTAINED.
3637                                        ;EXAMPLE: OUT OF 100 TIMES THE SEEK WAS DONE BETWEEN
3638                                        ;CYLINDER 0 & LAST.
3639                                        ;70 TIMES IT TOOK 95 MILI SECS
3640                                        ;20 TIMES IT TOOK 85 MILI SECS
3641                                        ;10 TIMES IT TOOK 100 MILI SECS
3642                                        ;THIS INDICATES HOW CONSISTENT WAS THE SEEKING TIME.
3643                                        ;NOTE THAT ONLY 5 DIFFERENT "SEEK TIMES" WILL BE TYPED
3644                                        ;OUT.
3645
3646                                        ;SORTING ROUTINE
```

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

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

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

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

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

013512  005721                          TST     (R1)+
013514  016011  177776                  MOV     -2(R0),(R1)     ;SAVE 'SEEK TIME'
013520  005722                          TST     (R2)+
013522  012712  000001                  MOV     #1,(R2)         ;KEEP '# OF TIMES'
013526  005203                          INC     R3

013530  001404                          BEQ     6$
013532  000765                          BR      4$

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

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



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

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

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

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

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

```
3759  013756  104401                        TYPE
3760  013760  002110                        BLNKS2
3761  013762  016046  026526                MOV     BUFR4(R0),-(SP) ;GET 'SEEK TIME' FOR EACH OF
3762  013766  104405                        TYPDS                   ;OF THAT '# OF SEEKS', 'GO
3763                                                                 ;TYPE OUT IN DECIMAL
3764
3765  013770  016046  026746          2$:   MOV     BUFR7(R0),-(SP) ;GET '# OF SEEKS', IF NONE (0)
3766  013774  001416                        BEQ     4$              ;SKIP TYPING (REVRSE SEEK)
3767  013776  005705                        TST     R5
3768  014000  001402                        BEQ     6$
3769  014002  104401  002075                TYPE    ,BLNK13
3770  014006  104405                  6$:   TYPDS                   ;TYPE OUT IN DECIMAL
3771  014010  104401                        TYPE
3772  014012  002110                        BLNKS2
3773  014014  016046  026666                MOV     BUFR6(R0),-(SP) ;GET 'SEEK TIME' & TYPE IT
3774  014020  104405                        TYPDS                   ;OUT IN DECIMAL
3775  014022  000406                        BR      5$
3776
3777  014024  005726                  3$:   TST     (SP)+           ;POP STACK
3778  014026  005205                        INC     R5
3779  014030  000757                        BR      2$
3780
3781  014032  005726                  4$:   TST     (SP)+           ;POP STACK
3782  014034  005705                        TST     R5
3783  014036  001004                        BNE     TIMDON
3784
3785  014040  005720                  5$:   TST     (R0)+           ;INCREMENT PTR TO TABLES
3786  014042  020027  000012                CMP     R0,#12          ;ALL DONE?
3787  014046  001335                        BNE     1$              ;IF NOT GO BAK
3788
3789  014050  062737  000002  001260  TIMDON: ADD     #2,INADR        ;INCRMNT POINTER TO NEXT
3790  014056  062737  000002  001262          ADD     #2,OUTADR       ;INNER & OUTER ADRES
3791  014064  005237  001252                INC     RETRY1          ;ALL DONE?
3792  014070  001406                        BEQ     PLTGRPH
3793  014072  032777  000100  165040        BIT     #SW6,@SWR       ;INHIBIT TIMER? FURTHER ?
3794  014100  001402                        BEQ     PLTGRPH         ;YES, BRANCH
3795  014102  000137  013200                JMP     REPTIM          ;GO, BACK AND TIME REST
3796                                                                 ;OF SEEKS
3797
3798
3799
3800                                  ;PLOT GRAPH OF 'SEEK TIME' V/S 'CYLIDERS SEEKED'
3801
3802                                          ;PERFORM SEEK FROM CYLINDER 0 TO EVERY OTHER CYLINDER AND TIME IT.
3803                                          ;0       0,0     1,----0 312. NOTE 'SECTOR COUNTER' IS USED AS A READ
3804                                          ;TIME CLOCK TO TIME THERE SEEKS.  AFTER OBTAINING THE SEEK TIMES A

3805                                          ;GRAPH IS PLOTTED OF 'SEEK TIME' V/S 'CYLINDER'.
3806
3807                                          ;TIME THE SEEKS
3808  014106  032777  000040  165024  PLTGRPH: BIT #SW5,@SWR          ;SKIP THE GRAPH?
3809  014114  001002                        BNE     .+6
3810  014116  000137  015224                JMP     TST12           ;YES, BRANCH
3811  014122  104415                        CON,RESET
3812  014124  104416                        DRV,RESET
3813  014126  012737  177465  001500        MOV     #-313,INDX3     ;PERFORM 313 SEEKS 0-0,0-1,0-312
3814  014134  012704  027026                MOV     #BUFR10,R4      ;STORE 'SEEK TIME' HERE
```



```
3815  014140  005037  001260                CLR     INADR           ;CLR CYL ADRES BITS
3816
3817  014144  013777  001260  165312  1$:   MOV     INADR,@RKDA     ;ADRES THE RIGHT CYLINDER
3818  014152  053777  001230  165304        BIS     DRIVAD,@RKDA    ;ADRES THE RIGHT DRIVE
3819
3820  014160  004737  014776                JSR     PC,TIMSEK       ;GO TIME THE SEEK FROM CYL 0
3821                                                                 ;TO THE ABOVE CYL, RETURN WITH
3822                                                                 ;R3 CONTAINING 'SEEK TIME' IN MS
3823                                                                 ;SCALE FACTOR OF 0.01
3824  014164  010324                        MOV     R3,(R4)+        ;STORE 'SEEK TIME'
3825  014166  042777  017777  165270        BIC     #17777,@RKDA            ;SEEK BACK TO CYL 0 FOR
3826  014174  012777  000011  165254        MOV     #11,@RKCS       ;TIMING NXT CYL SEEK
3827  014202  104421                        CON,RDY                 ;WAIT FOR CNTRL RDY?
3828  014204  104422                        TST,RWS                 ;WAIT FOR R/W/S RDY
3829  014206  062737  000040  001260        ADD     #40,INADR       ;FORM NXT CYL ADRES
3830  014214  005237  001500                INC     INDX3
3831  014220  001351                        BNE     1$
3832
3833                                  ;PLOT A GRAPH USING 'SEEK TIMES' RECORDED BEFORE
3834
3835  014222                          PLOT:
3836  014222  104401  014230                TYPE    ,65$            ;;TYPE ASCIZ STRING
3837  014226  000422                        BR      64$             ;;GET OVER THE ASCIZ
3838                                  ;;65$:  .ASCIZ  <15><12><12><12>/X AXIS - SEEK TIME - MILI SECS/
3839  014274                          64$:
3840  014274  104401  014302                TYPE    ,67$            ;;TYPE ASCIZ STRING
3841  014300  000423                        BR      66$             ;;GET OVER THE ASCIZ
3842                                  ;;67$:  .ASCIZ  <15><12>/Y AXIS - CYLINDER SEEKED FROM 0/<15><12><12>
3843  014350                          66$:
3844
3845  014350  104401                        TYPE
3846  014352  002103                        BLNKS7
3847  014354  005000                        CLR     R0              ;TYPE OUT THE TIME UNITS
3848  014356  010046                  1$:   MOV     R0,-(SP)        ;(MILI SECS) FOR THE X-AXIS
3849  014360  104424                        TYPDSS                  ;LIKE THIS:
3850  014362  005700                        TST     R0              ;0   20   30   40.....
3851  014364  001411                        BEQ     2$
3852  014366  022700  000144                CMP     #144,R0
3853  014372  003010                        BGT     4$
3854  014374  022700  000170                CMP     #170,R0
3855  014400  002412                        BLT     5$
3856  014402  104401                        TYPE    ,
3857  014404  002110                        BLNKS2
3858  014406  000404                        BR      3$
3859  014410  104401                  2$:   TYPE
3860  014412  002111                        BLNKS1
3861  014414  104401                  4$:   TYPE
3862  014416  002107                        BLNKS3
3863  014420  062700  000012            3$: ADD     #12,R0
3864  014424  000754                        BR      1$
3865
3866  014426  104401                  5$:   TYPE
3867  014430  001213                        $CRLF
3868  014432  104401                        TYPE
3869  014434  002103                        BLNKS7
3870
```

```
3871  014436  012700  177763          PLT1:   MOV     #-15,R0         ;TYPE OUT THE X-AXIS MARKERS
3872  014442                          1$:
3873  014442  104401  014450                  TYPE    ,65$            ;;TYPE ASCIZ STRING
3874  014446  000403                          BR      64$             ;;GET OVER THE ASCIZ
3875                                  ;;65$:  .ASCIZ  /I----/
3876  014456                          64$:
3877  014456  005200                          INC     R0              ;I----I----I----
3878  014460  001370                          BNE     1$
3879
3880                                  ;IF SW 4 IS SET THEN TYPE THE COMPLETE GRAPH, IF NOT TYPE THE SMALL GRAPH.
3881
3882  014462  032777  000020  164450          BIT     #SW4,@SWR       ;TYPE COMPLETE GRAPH?
3883  014470  001054                          BNE     CMPGRP          ;YES BRANCH
3884                                                                  ;IF NOT, TYPE SMALL GRAPH
3885
3886
3887
3888  014472  005000                  SMGRP:  CLR     R0
3889  014474  032777  000040  164436  1$:     BIT     #SW5,@SWR       ;SKIP REST OF GRAPH?
3890  014502  001445                          BEQ     5$              ;YES
3891  014504  104401                          TYPE                    ;IN THIS GRAPH SEEK TIMES ARE
3892  014506  001213                          $CRLF           ;PLOTTED ONLY FOR SELECTED
3893                                                          ;CYLINDERS (NOT ALL) SHOWN BELOW:
3894                                                          ;0,1,2,3,4,  6,8,10,12,14,16,18,20,
3895                                                          ;25,30,35,...,190,195,200,  203
3896  014510  010046                          MOV     R0,-(SP)                ;TYPE THE MARKERS
3897  014512  104405                          TYPDS
3898  014514  104401  014522                  TYPE    ,65$            ;;TYPE ASCIZ STRING
3899  014520  000401                          BR      64$             ;;GET OVER THE ASCIZ
3900                                  ;;65$:  .ASCIZ  /-/
3901  014524                          64$:
3902  014524  010001                          MOV     R0,R1           ;FORM THE ADRES OF 'SEEK TIME'
3903  014526  006301                          ASL     R1
3904  014530  016103  027026                  MOV     BUFR10(R1),R3   ;GET THE SEEK TIME
3905  014534  004737  014736                  JSR     PC,PLTPT                ;GO PLOT IT
3906  014540  022700  000004                  CMP     #4,R0           ;PLOTTED UPTO CYL 4?
3907  014544  003402                          BLE     2$              ;YES
3908  014546  005200                          INC     R0
3909  014550  000751                          BR      1$
3910  014552  022700  000024          2$:     CMP     #24,R0  ;PLOTTED UPTO CYL 20?
3911  014556  003403                          BLE     3$
3912  014560  062700  000002                  ADD     #2,R0
3913  014564  000743                          BR      1$
3914  014566  022700  000310          3$:     CMP     #310,R0         ;PLOTTED UPTO CYL 200?
3915  014572  003403                          BLE     4$
3916  014574  062700  000005                  ADD     #5,R0

3917  014600  000735                          BR      1$
3918  014602  022700  000312          4$:     CMP     #312,R0         ;PLOTTED ALL CYLS?
3919  014606  001403                          BEQ     5$

3920  014610  062700  000002                  ADD     #2,R0
3921  014614  000727                          BR      1$
3922  014616  000137  015224          5$:     JMP     TST12
3923
3924
3925                                  ;IF SW 4 IS SET THE COMPLETE GRAPH IS PRINTED OUT, IT GIVES TIMES FOR
3926                                  ;SEEKS FROM CYLINDER 0 TO ALL OTHER CYLINDERS (0,1,2,3,...202).
```



```
3927
3928  014622  005000                  CMPGRP: CLR     R0              ;INITLZE COUNT
3929  014624  012701  177773                  MOV     #-5,R1          ;INITLZE COUNT FOR Y-AXIS MARKER
3930  014630  012702  027026                  MOV     #BUFR10,R2      ;INITLZE PTR TO SEEK TIMES
3931  014634  104401                          TYPE
3932  014636  001213                          $CRLF
3933  014640  000412                          BR      3$
3934
3935  014642  032777  000040  164270  2$:     BIT     #SW5,@SWR               ;SKIP REST OF GRAPH?
3936  014650  001002                          BNE     .+6
3937  014652  000137  015224                  JMP     TST12
3938  014656  005201                          INC     R1              ;TYPE OUT Y-AXIS MARKER 'CYL #'
3939  014660  001005                          BNE     4$              ;IF REQUIRED
3940  014662  012701  177773                  MOV     #-5,R1
3941  014666  010046                  3$:     MOV     R0,-(SP)        ;TYPE 'CYL #' ON Y-AXIS
3942  014670  104405                          TYPDS                   ;(IN DECIMAL)
3943  014672  000402                          BR      5$
3944  014674  104401                  4$:     TYPE
3945  014676  002104                          BLNKS6
3946  014700                          5$:
3947  014700  104401  014706                  TYPE    ,65$            ;;TYPE ASCIZ STRING
3948  014704  000401                          BR      64$             ;;GET OVER THE ASCIZ
3949                                  ;;65$:  .ASCIZ  /-/
3950  014710                          64$:
3951
3952  014710  012203                          MOV     (R2)+,R3                ;GET SEEK TIME
3953  014712  004737  014736                  JSR     PC,PLTPT        ;GO PLOT THE POINT
3954
3955
3956  014716  104401                          TYPE
3957  014720  001213                          $CRLF
3958  014722  005200                          INC     R0              ;ALL DONE?
3959  014724  022700  000312                  CMP     #312,R0
3960  014730  001344                          BNE     2$              ;IF NOT, GO BAK
3961  014732  000137  015224          6$:     JMP     TST12
3962
3963                                  ;PLTPT
3964                                  ;THE ROUTINE IS ENTERED WITH R3 CONTAINING HORIZONTAL AXIS
3965                                  ;COORDINATE- SEEK TIME
3966                                  ;PLOT THE ACTUAL TIME ON THE GRAPH,  IN KEEPING WITH NORMAL
3967                                  ;CONVENTION A NUMBER LESS THAN HALF THE CELL WIDTH IS
3968                                  ;CONSIDERED AS FALLING UNDER THE PREVIOUS CELL, A NUMBER
3969                                  ;GREATER THAN OR EQUAL TO HALF THE CELL WIDTH FALLS UNDER THE NEXT CELL
3970                                  ;EX: IF SEEK TIME IS 11.5 MS, IT'S BETW'N 10 & 12, BUT > 11
3971                                  ;HENCE IT WILL BE PLOTTED AS 12 IF SEEK TIME IS 10.8 MS,
3972                                  ;IT'S BETW'N 10 & 12, BUT < 11 HENCE IT WILL BE PLOTTED
3973                                  ;AS 10.0 MS
3974
3975  014736  162703  000310          PLTPT:  SUB     #310,R3         ;FIND OUT HOW MANY BLANKS TO
3976  014742  002403                          BLT     7$              ;INSERT TO PLOT THE POINT
3977                                                                  ;NOTE THE FIRST CELL = 0 MS
3978  014744  104401                          TYPE
3979  014746  002111                          BLNKS1
3980  014750  000772                          BR      PLTPT
3981  014752  062703  000144          7$:     ADD     #144,R3
3982  014756  002402                          BLT     8$
```

```
                                TYPE
                                BLNKS1

                        8$:
                                TYPE    ,65$            ;;TYPE ASCIZ STRING
                                BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  /X/
                        64$:
                                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
015776  010246          TIMSEK: MOV     R2,-(SP)        ;DISK (FROM INDEX MARK TO INDEX MARK)
016000  005003                  CLR     R3              ;40 MILI SECS FOR EACH REV
016002  013701  001452          MOV     RKDS,R1
016006  011102          1$:     MOV     @R1,R2
016010  032702  000400          BIT     #400,R2         ;WAIT FOR SOK
016014  001774                  BEQ     1$

016016  032702  000010          BIT     #BIT3,R2                ;WAIT FOR SECTOR 10 SO THAT
016022  001771                  BEQ     1$              ;U CAN START WAITING FOR
                                                        ;INDEX, SEC 0

016024  011102          2$:     MOV     @R1,R2
016026  032702  000400          BIT     #400,R2         ;WAIT FOR SEC OK
016032  001774                  BEQ     2$
016034  021102                  CMP     @R1,R2
016036  001372                  BNE     2$
016040  032702  000017          BIT     #17,R2                  ;WAIT FOR SEC 0, INDEX MARK
016044  001367                  BNE     2$              ;AS SOON AS IT IS SEC 0, ISSUE
                                                        ;A SEEK & START TIMING

016046  012777  000011  164402  MOV     #11,@RKCS       ;ISSUE A SEEK, START TIMING
                                                        ;THE SEC COUNTER
016054  104421                  CON.RDY                 ;WAIT FOR CNTRL RDY

016056  011102          3$:     MOV     @R1,R2          ;GET RKDS
016060  032702  000400          BIT     #400,R2         ;WAIT FOR SOK

016064  001774                  BEQ     3$
016066  020211                  CMP     R2,@R1          ;INFO CORRECT?
016070  001372                  BNE     3$              ;NO
016072  032702  000100          BIT     #100,R2         ;R/W/S RDY SET?
016076  001025                  BNE     SKDON           ;IF YES, BRANCH
016100  032702  000017          BIT     #17,R2          ;WAIT FOR SEC CNTR TO MOVE
016104  001764                  BEQ     3$              ;FROM 0 TO 1

016106  011102          4$:     MOV     @R1,R2
016110  032702  000400          BIT     #400,R2         ;WAIT FOR SOK
```



```
016114  001774                  BEQ     4$
016116  020211                  CMP     R2,@R1
016120  001372                  BNE     4$
016122  032702  000100          BIT     #100,R2         ;R/W/S RDY SET, SEEK DONE?
016126  001005                  BNE     5$              ;YES, BRANCH
016130  032702  000017          BIT     #17,R2                  ;IF NOT KEEP TRACK OF SEC
016134  001364                  BNE     4$              ;COUNTER, INCREMENT R3 AT
                                                        ;EVERY INDEX MARK,EVERY
016136  005203                  INC     R3              ;40 MILI SECS
016140  000746                  BR      3$              ;GO BAK, KEEP TIME

016142  032702  000017          BIT     #17,R2          ;CHECK, IS IT INDEX MARK =SEC 0
016146  001001                  BNE     SKDON           ;IF NOT, SKIP
016150  005203                  INC     R3              ;IF YES, INCREMENT COUNT

                                                                ;SEEK DONE, SAVE RKDS-SEC COUNTER.
016152                  SKDON:
016152  012746  000014          MOV     #14,-(SP)               ;;PUT THE MULTIPLER ON THE STACK
016156  010346                  MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
016160  004737  020500          JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
016164  012616                  MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
016166  012603                  MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
016170  042702  177760          BIC     #177760,R2      ;SEEK, TOTAL TIME=(IN DECIMAL)
016174  060203                  ADD     R2,R3           ;[(R3)X12+SEC COUNTER]X330X0.01
                                                        ;NOTE THERE IS A SCALE FACTOR
016176  012746  000512          MOV     #512,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
016202  010346                  MOV     R3,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
016204  004737  020500          JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
016210  012616                  MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
016212  012603                  MOV     (SP)+,R3                ;;GET THE LSB'S OF THE PRODUCT
016214  062703  000245          ADD     #245,R3         ;ASSUMPTION THAT EACH SECTOR
                                                        ;TAKES 3.3 MILI SECS. IF THE
                                                        ;DISK SPEED IS VERY MUCH DIFRNT
                                                        ;FROM THE SPEC SPEED OF
                                                        ;1500 RPM (40 MS/REV), THEN
                                                        ;SEC COUNTER WOULD NOT BE AN
                                                        ;ACCURATE TIME CLOCK.
016220  012602                  MOV     (SP)+,R2        ;POP R2 BAK
016222  000207                  RTS     PC              ;RETURN


                        ;;*************************************************************
                        ;*TEST 12        END OF PROGRAM
                                ;*THIS IS NOT A TEST BUT IS JUST A LINKAGE
                                ;*PROVIDED TO TEST ALL THE DRIVES.
                        ;;*************************************************************
016224  000004          TST12:  SCOPE
016226  105237  001223          INCB    DRVDON
016232  123737  001223  001224  BTEOP:  CMPB    DRVDON,DRIVS
016240  001402                  BEQ     .+6
016242  000137  003760          JMP     NXTDRV

                        .SBTTL  END OF PASS ROUTINE

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

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

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



```
                                        ;COMMON SUBROUTINES AND HANDLERS



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

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

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

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

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


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

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

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

015456  004737  015364         ESR13:  JSR     PC,ESR15
015462  104401  015470                 TYPE    ,65$            ;;TYPE ASCIZ STRING
015466  000404                         BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  /  SUR=/
015500                          64$:
015500  005046                         CLR     -(SP)
015502  032705  000020                 BIT     #20,R5          ;SUR 0 OR 11?
015506  001401                         BEQ     1$
015510  005216                         INC     (SP)
015512  104402                 1$:     TYPOC

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


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

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

                                ;;67$:  .ASCIZ  /  CYLB=/
015606                          66$:
015606  013746  001164                 MOV     $REG1,-(SP)     ;TYPE CYL # TO WHICH SEEK
015612  104403                         TYPOS                   ;WAS DONE
015614     003                         .BYTE   3               ;TYPE 3 DIGITS
015615     000                         .BYTE   0               ;SUPRES LDG 0'S
015616  000207                         RTS     PC              ;RETURN


                                        .SBTTL  ESR25
```



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

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

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

015652  163712  001404                 SUB     PBUF0,(R2)      ;GET WORD # IN BUFR (0,1,2...)
015656  006212                         ASR     (R2)
015660  011246                         MOV     (R2),-(SP)      ;WHICH WAS BAD.  NOTE YOU
                                                                ;CAN HAVE THE ACTUAL MEMORY
                                                                ;ADRES BY ADDING 'IOBUF0'
                                                                ;TO THIS
015662  104403                         TYPOS                   ;GO TYPE WORD # THAT WAS BAD
015664     004                         .BYTE   4
015665     000                         .BYTE   0
015666  104401                         TYPE
015670  002107                         BLNKS3                  ;2 BLANKS

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

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

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

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

015754  013746  001174                 MOV     $REG5,-(SP)     ;GET THE CYL#
015760  104403                         TYPOS                   ;TYPE IT
015762     003                         .BYTE   3               ;ONLY 3 DIGITS
015763     000                         .BYTE   0               ;NO LEADING 0'S
015764  104401                         TYPE
015766  002107                         BLNKS3
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 4298  015770  013746  001176          MOV     $REG6,-(SP)     ;GET SUR #
 4299  015774  104403                  TYPOS                   ;TYPE
 4300  015776     001                  .BYTE   1               ;1 DIGIT ONLY
 4301  015777     000                  .BYTE   0
 4302
 4303  016000  104401                  TYPE
 4304  016002  002106                  BLNKS4
 4305
 4306  016004  013746  001200          MOV     $REG7,-(SP)     ;GET SEC#
 4307  016010  104403                  TYPOS                   ;TYPE
 4308  016012     002                  .BYTE   2               ;2 DIGITS
 4309  016013     000                  .BYTE   0
 4310
 4311  016014  005722                  TST     (R2)+           ;INCREMNT PTR
 4312  016016  020205                  CMP     R2,R5           ;TYPED OUT ALL BAD DATA
 4313                                                          ;INFO?
 4314  016020  001306                  BNE     1$              ;IF NOT LUP BAK
 4315  016022  104401                  TYPE
 4316  016024  002053                  MSG13                   ;'  TRY #:'
 4317  016026  013746  001254          MOV     RETRY2,-(SP)    ;GET RETRY COUNT
 4318  016032  062716  000003          ADD     #3,(SP)         ;FORM THE RETRY NO.
 4319  016036  104403                  TYPOS                   ;TYPE IT OUT
 4320  016040     001                  .BYTE   1
 4321  016041     000                  .BYTE   0
 4322
 4323  016042  000207          4$:     RTS     PC              ;IF YES, RETURN
 4324                                  ;MESSAGE HANDLER
 4325                                  ;THE MESSAGE HANDLER IS USED FOR TYPING OUT MESSAGES & DATA
 4326                                  ;RELATED TO THE MESSAGE, IF SW13 IS SET, THE TYPEOUT IS
 4327                                  ;INHIBITED. THE CALL IS:
 4328                                  ;               MESAGE  ,XX
 4329                                  ;XXX IS THE MESSAGE NUMBER & PROVIDES AN INDEX TO THE
 4330                                  ;'ERROR ITEMS TABLE' WHERE THAT MESAGE IIEM
 4331                                  ;IS LOCATED.
 4332                                  ;THE MESAGE ITEM CONTAINS:
 4333                                  ;       MS:     POINTER TO THE ASCII MESAGE
 4334                                  ;       DH:     POINTER TO THE DATA HEADER
 4335                                  ;       DT:     POINTER TO THE DATA
 4336                                  ;       0       TERMINATOR
 4337                                  ;IF 'DT' IS 0 THE DATA IS TO BE PRINTED USING THE SUBROUTINE
 4338                                  ;INDICATED IN PLACE OF THE TERMINATOR
 4339
 4340  016044  032777  020000  163066  MSGE:   BIT     #SW13,@SWR      ;INHIBIT TYPEOUT?
 4341  016052  001012                  BNE     1$              ;IF YES, EXIT
 4342  016054  011637  001116          MOV     (SP),$ERRPC     ;GET ADRES OF 'MESAGE' CALL
 4343  016060  162737  000002  001116  SUB     #2,$ERRPC       ;STORE IT

 4344  016066  117637  000000  001114          MOVB    @(SP),$ITEMB    ;GET MESAGE # (INDEX TO ITEM TABLE)
 4345  016074  004737  017446          JSR     PC,@#ERRTYP     ;GO TO 'ERRTYP' & TYPE OUT
 4346                                                          ;INFO
 4347  016100  062716  000002  1$:     ADD     #2,(SP)         ;ADJUST RETURN ADDRES
 4348  016104  000002                  RTI                     ;EXIT
 4349
 4350                                  ;THIS ROUTINE IS USED FOR TYPING OUT ASCII MESSAGES. BEFORE
 4351                                  ;THE MESSAGE IS TYPED SW13 IS CHECKED & IF SET THE
 4352                                  ;TYPEOUT IS INHIBITED & AN EXIT IS MADE.
 4353                                  ;THE CALL FOR THIS ROUTINE IS "TYPMSG", AN ENCODED
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 4354
 4355                                  ;TRAP INSTRUCTION.
 4356                                  ;THE POINTER TO THE ASCII MESSAGE TO BE TYPED IS LOCATED IN  THE
 4357                                  ;WORD FOLLOWING THE "TYPMSG" CALL.
 4358  016106  032777  020000  163024  TY.MSG: BIT     #SW13,@SWR      ;INHIBIT TYPEOUT?
 4359  016114  001005                  BNE     2$              ;YES, EXIT
 4360  016116  017637  000000  016126  MOV     @(SP),1$        ;GET POINTER TO ASCII MESSAGE
 4361  016124  104401                  TYPE                    ;GO TYPE ASCII STRING
 4362  016126  000000          1$:     0
 4363  016130  062716  000002          2$:     ADD     #2,(SP)         ;ADJUST RETURN ADRES, SKIP OVER
 4364                                                          ;POINTER ON RETURN
 4365  016134  000002                  RTI                     ;EXIT
 4366
 4367
 4368
 4369
 4370                                  ;GT5RG
 4371                                  ;THIS ROUTINE EXTRACTS THE CYLINDER # FROM RKDA AND STORES IT
 4372                                  ;IN $REG4. THEN TRANSFERS RKCS, ER, DS, DA TO $REG0, $REG1, $REG2, $REG3
 4373  016136  017746  163322  GT5RG:  MOV     @RKDA,-(SP)     ;PUSH RKDA ONTO STACK
 4374  016142  042716  160037          BIC     #160037,(SP)    ;MASK OUT NON-CYLINDER BITS
 4375  016146  006316                  ASL     (SP)            ;SHIFT 8 BITS OF CYL ADRES TO LO BYTE
 4376  016150  006316                  ASL     (SP)
 4377  016152  006316                  ASL     (SP)
 4378  016154  000316                  SWAB    (SP)
 4379  016156  112637  001172          MOVB    (SP)+,$REG4     ;UP STACK
 4380
 4381
 4382
 4383                                  ;GT4RG
 4384                                  ;THIS ROUTINE TRANSFERS THE CONTENTS OF RKCS, RKER, RKDS
 4385                                  ;RKDA TO $REG0, $REG1, $REG2, $REG3 RESPECTIVELY, $REG'S
 4386                                  ;ARE USED FOR TYPING OUT THERE CONTENTS AT THE TIME OF ERROR
 4387
 4388  016162  017737  163270  001162  GT4RG:  MOV     @RKCS,$REG0     ;GET RKCS
 4389  016170  017737  163260  001164          MOV     @RKER,$REG1     ;     RKER
 4390  016176  017737  163250  001166          MOV     @RKDS,$REG2     ;     RKDS
 4391  016204  017737  163254  001170          MOV     @RKDA,$REG3     ;     RKDA
 4392  016212  000207                  RTS     PC              ;EXIT FROM THIS ROUTINE
 4393
 4394                                  ;GETINF
 4395                                  ;THIS ROUTINE SAVES THE CONTENTS OF RKCS IN $REG0
 4396                                  ;RKER IN $REG1, RKDS IN $REG2.  THEN IT BREAKS RKDA
 4397                                  ;INTO DRIVE NO, CYLINDER #, SURFACE AND SECTOR #.
 4398                                  ;AND SAVES THEM IN $REG4, $REG5, $REG6, $REG7.
 4399
 4400  016214  004737  016162  GETINF: JSR     PC,GT4RG
 4401  016220  010046          BRKDA:  MOV     R0,-(SP)
 4402  016222  010146                  MOV     R1,-(SP)
 4403  016224  010246                  MOV     R2,-(SP)
 4404  016226  012700  001202          MOV     #$REG7+2,R0
 4405  016232  013701  001170          MOV     $REG3,R1
 4406  016236  010102                  MOV     R1,R2
 4407  016240  042702  177760          BIC     #177760,R2
 4408  016244  010240                  MOV     R2,-(R0)
 4409  016246  006201                  ASR     R1
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4410  016250  006201                          ASR     R1
4411  016252  006201                          ASR     R1
4412  016254  006201                          ASR     R1
4413  016256  010102                          MOV     R1,R2
4414  016260  042702  177776                  BIC     #177776,R2
4415  016264  010240                          MOV     R2,-(R0)
4416  016266  006201                          ASR     R1
4417  016270  010102                          MOV     R1,R2
4418  016272  042702  177400                  BIC     #177400,R2
4419  016276  010240                          MOV     R2,-(R0)
4420  016300  000301                          SWAB    R1
4421  016302  042701  177770                  BIC     #177770,R1
4422  016306  010140                          MOV     R1,-(R0)
4423  016310  012602                          MOV     (SP)+,R2
4424  016312  012601                          MOV     (SP)+,R1
4425  016314  012600                          MOV     (SP)+,R0
4426  016316  000207                          RTS     PC
4427
4428
4429
4430
4431
4432
4433                                          .SBTTL  ERR2
4434                                  ;ERR2
4435                                  ;THIS ROUTINE GETS THE CYLINDER NUMBERS BETWEEN WHICH (IMPLIED) SEEK
4436                                  ;WAS DONE.  (R4)=0 INDICATES SEEK FROM 'OUTADR' TO 'INADR'
4437                                  ;(R4)=1 INDICATES SEEK TO 'OUTADR'.  ON EXIT $REG0 CONTAINS CYL #
4438                                  ;FROM WHICH SEEK WAS INITIATED, $REG1 CONTAINS CYL # TO WHICH SEEK WAS DONE
4439  016320  013737  001260  001162  ERR2:   MOV     INADR,$REG0     ;GET CYL ADRES
4440  016326  004737  016434                  JSR     PC,GCYL         ;GO GET CYL# FROM IT
4441  016332  013737  001162  001164          MOV     $REG0,$REG1     ;SAVE
4442  016340  013737  001262  001162          MOV     OUTADR,$REG0    ;GET CYL ADRES
4443  016346  004737  016434                  JSR     PC,GCYL         ;GO GET CYL # FROM IT
4444  016352  005704                          TST     R4              ;GOING WHICH WAY?
4445  016354  001407                          BEQ     1$              ;'OUTADR' TO 'INADR', BRANCH
4446  016356  013746  001162                  MOV     $REG0,-(SP)     ;EXCHANG CYL" TO GET
4447  016362  013737  001164  001162          MOV     $REG1,$REG0     ;CORRECT 'TO' & 'FROM' CYLS
4448  016370  012637  001164                  MOV     (SP)+,$REG1
4449  016374  000207                  1$:     RTS     PC              ;RETURN
4450
4451                                          .SBTTL  ERR1
4452                                  ;ERR1
4453                                  ;THIS SUBROUTINE FINDS OUT THE CYLINDER NOS. BETWEEN WHICH THE SEEK
4454                                  ;IS DONE,THE CYLINDER # WHERE THE  HEADS WHERE PRIOR TO MOVING, IS
4455                                  ;DEPOSITED IN $REG0. THE CYLINDER # WHERE THE HEADS SHOULD BE AFTER

4456                                  ;MOVEMENT, IS DEPOSITED IN $REG1.  R4 INDICATES WHICH DIRECTION THE
4457                                  ;HEADS WERE MOVING, IN OR OUT. R5 CONTAINS THE
4458                                  ;DISK ADDRESS (IN OR OUT AS THE CASE MAY BE).

4459
4460  016376  010537  001162          ERR1:   MOV     R5,$REG0
4461  016402  004737  016434                  JSR     PC,GCYL ;GO GET CYL #
4462  016406  005704                          TST     R4              ;WAS GOING IN OR OUT?
4463  016410  001006                          BNE     1$              ;OUT
4464  016412  013737  001162  001164          MOV     $REG0,$REG1
4465  016420  005037  001162                  CLR     $REG0
```



```
4466  016424  000207                          RTS     PC
4467  016426  005037  001164          1$:     CLR     $REG1
4468  016432  000207                          RTS     PC
4469
4470
4471                                          .SBTTL  GCYL
4472                                  ;GCYL
4473                                  ;THIS ROUTINE EXTRACTS THE CYLINDER NO. FROM THE DISK ADDRESS
4474                                  ;CONTAINED IN '$REG0', AND THEN STORES IT BACK IN '$REG0'
4475  016434  010046                  GCYL:   MOV     R0,-(SP)        ;PUSH R0 ONTO STACK
4476  016436  013700  001162                  MOV     $REG0,R0
4477  016442  042700  160037                  BIC     #160037,R0      ;MASK OUT DRV # BITS &
4478                                                                  ;SUR, SEC BITS IF PRESENT
4479  016446  006200                          ASR     R0
4480  016450  006200                          ASR     R0              ;SHIFT CYL BITS RIGHT
4481  016452  006200                          ASR     R0              ;BY 5
4482  016454  006200                          ASR     R0
4483  016456  006200                          ASR     R0
4484  016460  010037  001162                  MOV     R0,$REG0        ;STORE CYL # IN $REG0
4485  016464  012600                          MOV     (SP)+,R0        ;POP R0 FROM STACK
4486  016466  000207                          RTS     PC              ;EXIT
4487
4488
4489                                          .SBTTL  DRV,RESET - DRIVE RESET ROUTINE
4490                                          .SBTTL  RESDON - WAIT FOR DRIVE RESET TO BE DONE
4491                                  ;DR,RST
4492                                  ;THIS ROUTINE DOES A DRIVE RESET ON THE DRIVE WHOOSE ADDRESS IS IN
4493                                  ;RKDA, MULTIPLE RETURN ADDRESSES FOR THIS ROUTINE ARE PROVIDED.
4494                                  ;IF THERE IS NO ERROR (R/W/S RDY SETS WITHIN CERTAIN TIME) , THEN
4495                                  ;A NORMAL EXIT IS MADE. IF R/W/S RDY DOES NOT SET ERROR IS REPORTED.
4496
4497
4498  016470  005037  001174  162762  DR,RST: CLR     $REG5           ;INITIALIZE THE COUNT
4499  016474  013777  001230          RES,D0: MOV     DRIVAD,@RKDA
4500  016502  012777  000015  162746          MOV     #15,@RKCS       ;DRIVE RESET, GO
4501  016510  104421                          CON,RDY
4502  016512  000402                          BR      RES,D0+4
4503  016514  005037  001174          RES,D0: CLR     $REG5
4504  016520  032777  000100  162724  1$:     BIT     #100,@RKDS              ;DID R/W/S RDY SET?
4505  016526  001024                          BNE     2$
4506  016530  012746  177770                  MOV     #-10,-(SP)      ;PUSH COUNT ON SP
4507  016534  005216                          INC     (SP)            ;COUNT IT DOW
4508  016536  001376                          BNE     .-2
4509  016540  005726                          TST     (SP)+           ;POP UP $P
4510  016542  005237  001174                  INC     $REG5                   ;IF NOT WAIT
4511  016546  001364                          BNE     1$              ;WAITED LONG?
4512  016550  032777  020000  162362          BIT     #SW13,@SWR
4513  016556  001010                          BNE     2$
4514  016560  104420                          TYPMSG
4515  016562  002027                          MSG12
4516  016564  104420  001733                  TYPMSG  ,MSG7
4517  016570  011646                          MOV     (SP),-(SP)
4518  016572  162716  000002                  SUB     #2,(SP)
4519  016576  104402                          TYPOC
4520  016600  000002                  2$:     RTI
4521
```

```
                                        .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 CEPTAIN TIME CNTRL RDY DOES
                                ;NOT SET AN ERROR IS REPORTED, WAITING TIME IS 883 MS FOR 11/20
                                ;175 MS FOR 11/45 WITH BIPOLAR MEMORY.
016602  012777  000001  162646 CN.RST: MOV     #1,@RKCS        ;ISSUE A CONTROL RESET
016610  012737  177500  001170         MOV     #-300,$REG3     ;SET UP COUNT
016616  000402                        BR      CN.RDY+4                ;SKIP OVER CN.RDY
016620  005037  001170         CN.RDY: CLR     $REG3
016624  105777  162626         1$:     TSTB    @RKCS           ;DID CNTRL-RDY SET?
016630  100431                        BMI     2$              ;YES, EXIT
016632  005237  001170                INC     $REG3           ;WAITED LONG?
016636  001372                        BNE     1$              ;IF NOT, GO BAK & WAIT
016640  104420                        TYPMSG
016642  001742                        MSG10
016644  104401  016652                TYPE    ,65$            ;;TYPE ASCIZ STRING
016650  000403                        BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <15><12>/PC=/
016660                          64$:
016660  011646                        MOV     (SP),-(SP)
016662  162716  000002                SUB     #2,(SP)
016666  104402                        TYPOC                   ;GO TYPE PC IN THE MAIN PROGRAM,

                                                                ; WHERE ERROR OCCURRED
016670  104401  016676                TYPE    ,67$            ;;TYPE ASCIZ STRING
016674  000404                        BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  / RKCS=/
016706                          66$:
016706  017746  162544                MOV     @RKCS,-(SP)     ;GET RKCS
016712  104402                        TYPOC                   ;GO TYPE IT

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



```
                                                               ;PROGRAM

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


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

                                        .SBTTL  TEST ABORT ROUTINE
                                ;ABRT

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


                                ;COMMON SUBROUTINES & HANDLERS

                                .SBTTL  SCOPE HANDLER ROUTINE

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

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

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

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

                        .SBTTL  ERROR HANDLER ROUTINE

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

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

017214  005237  001112  1$:     INC     $ERTTL
017220  011637  001116          MOV     (SP),$ERRPC

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

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



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

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

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

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

```
 4746  017514  006300                          ASL     R0
 4747  017516  062700  002122                  ADD     #$ERRTB,R0      ;FORM TABLE POINTER
 4748  017522  012037  017532                  MOV     (R0)+,2$        ;PICKUP "ERROR MESSAGE" POINTER
 4749  017526  001404                          BEQ     3$              ;SKIP TYPEOUT IF NOT POINTER
 4750  017530  104401                          TYPE                    ;TYPE THE "ERROR MESSAGE"
 4751  017532  000000                  2$:     .WORD   0               ;"CARRIAGE RETURN" & LINE FEED"
 4752  017534  104401  001213                  TYPE    ,$CRLF          ;PICKUP "DATA HEADER" POINTER
 4753  017540  032777  004000  161372  3$:     BIT     #SW11,@SWR      ;DUMP OUT ALL RK REGISTERS
 4754  017546  001042                          BNE     10$             ;YES, BRANCH
 4755  017550  012037  017560                  MOV     (R0)+,4$        ;PICKUP "DATA HEADER" POINTER
 4756  017554  001412                          BEQ     5$              ;SKIP TYPEOUT IF 0
 4757  017556  104401                          TYPE                    ;TYPE THE "DATA HEADER"
 4758  017560  000000                  4$:     .WORD   0               ;"DATA HEADER" POINTER GOES HERE
 4759  017562  104401  001213                  TYPE    ,$CRLF          ;"CARRIAGE RETURN" & LINE FEED"
 4760  017566  062700  000002                  ADD     #2,R0           ;FORM POINTER TO TERMINATOR
 4761  017572  005710                          TST     (R0)            ;IS THE TERMINATOR 0?
 4762  017574  001017                          BNE     9$              ;IF NOT, BRANCH
 4763  017576  162700  000002                  SUB     #2,R0           ;YES, IT IS 0.  REPOINT TO "DATA"
 4764                                                                  ;GO TYPE OUT DATA AS USUAL
 4765  017602  011000                  5$:     MOV     (R0),R0         ;PICKUP "DATA TABLE" POINTER
 4766  017604  001004                          BNE     7$              ;GO TYPE THE DATA
 4767  017606  012600                  6$:     MOV     (SP)+,R0        ;RESTORE R0
 4768  017610  104401  001213                  TYPE    ,$CRLF          ;"CARRIAGE RETURN" & LINE FEED"
 4769  017614  000207                          RTS     PC              ;RETURN
 4770  017616                          7$:
 4771  017616  013046                          MOV     @(R0)+,-(SP)    ;SAVE @(R0)+ FOR TYPEOUT
 4772  017620  104402                          TYPOC                   ;GO TYPE-OCTAL ASCII(ALL DIGITS)
 4773  017622  005710                          TST     (R0)            ;IS THERE ANOTHER NUMBER?
 4774  017624  001770                          BEQ     6$              ;BR IF NO
 4775  017626  104401  002110                  TYPE    ,BLNKS2
 4776  017632  000771                          BR      7$
 4777  017634  004770  000000          9$:     JSR     PC,@(R0)        ;GO TO THE SPECIAL ERROR
 4778                                                                  ;DATA HANDLING SUBROUTINE
 4779                                                                  ;NOTE THAT THIS ROUTINE IS
 4780                                                                  ;THE ONE INDICATED IN THE
 4781                                                                  ;LAST WORD OF AN ERROR
 4782                                                                  ;ITEM IN THE ERROR TABLE
 4783                                                                  ;(STARTING AT $ERRTB)
 4784  017640  104401                          TYPE
 4785  017642  001733                          MSG7
 4786  017644  013746  001116                  MOV     $ERRPC,-(SP)
 4787  017650  104402                          TYPOC
 4788  017652  000755                          BR      6$              ;GO BACK, TO THE EXIT POINT
 4789                                                                  ;FOR 'ERRTYP'
 4790
 4791  017654  004737  017662          10$:    JSR     PC,DMPREG

 4792  017660  000752                          BR      6$
 4793
 4794
 4795
 4796                                  ;DMPREG
 4797                                  ;DUMPS OUT ALL RK REGISTERS WHEN SW 11 IS SET
 4798
 4799  017662                          DMPREG:
 4800  017662  104401  017670                  TYPE    ,65$            ;;TYPE ASCIZ STRING
 4801  017666  000441                          BR      64$             ;;GET OVER THE ASCIZ
```



```
 4802                                  ;;65$:  .ASCIZ  <15><12>/  PC     RKDS    RKER    RKCS    RKWC    RKBA    RKDA    RKDB/<
 4803  017772                          64$:
 4804  017772  013746  001116                  MOV     $ERRPC,-(SP)
 4805  017776  104402                          TYPOC
 4806  020000  104401  002110                  TYPE    ,BLNKS2
 4807  020004  010046                          MOV     R0,-(SP)
 4808  020006  012700  001452                  MOV     #RKDS,R0
 4809  020012  013046                  1$:     MOV     @(R0)+,-(SP)
 4810  020014  104402                          TYPOC
 4811  020016  104401  002110                  TYPE    ,BLNKS2
 4812  020022  020027  001466                  CMP     R0,#RKDB
 4813  020026  003771                          BLE     1$
 4814  020030  012600                          MOV     (SP)+,R0
 4815  020032  000207                          RTS     PC
 4816
 4817
 4818
 4819
 4820
 4821                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 4822
 4823                                  ;;**************************************************************
 4824                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 4825                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 4826                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 4827                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 4828                                  ;*REPLACED WITH SPACES.
 4829                                  ;*CALL:
 4830                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 4831                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
 4832
 4833  020034                          $TYPDS:
 4834  020034  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 4835  020036  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4836  020040  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 4837  020042  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 4838  020044  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 4839  020046  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 4840  020052  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 4841  020056  100004                          BPL     1$              ;;BR IF INPUT IS POS.
 4842  020060  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 4843  020062  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 4844  020070  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 4845  020072  012703  020250                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 4846  020076  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 4847  020102  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 4848  020104  016001  020240                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 4849  020110  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 4850  020112  002402                          BLT     4$              ;;BR IF DONE
 4851  020114  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 4852  020116  000774                          BR      3$
 4853  020120  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 4854  020122  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
 4855  020124  001002                          BNE     5$              ;;FALL THROUGH IF 0
 4856  020126  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 4857  020130  100407                          BMI     7$              ;;BR IF YES
```

```
 4858  020132  106316                  5$:     ASLB    (SP)            ;;MSD?
 4859  020134  103003                          BCC     6$              ;;BR IF NO
 4860  020136  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 4861  020144  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 4862  020150  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 4863  020154  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 4864  020156  005720                          TST     (R0)+           ;;JUST INCREMENTING
 4865  020160  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
 4866  020164  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
 4867  020166  003002                          BGT     8$              ;;GO TO EXIT
 4868  020170  010502                          MOV     R5,R2           ;;GET THE LSD
 4869  020172  000764                          BR      6$              ;;GO CHANGE TO ASCII
 4870  020174  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 4871  020176  100003                          BPL     9$              ;;BR IF NO
 4872  020200  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 4873  020206  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 4874  020210  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 4875  020212  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 4876  020214  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 4877  020216  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 4878  020220  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 4879  020222  104401  020250                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 4880  020226  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 4881  020234  012616                          MOV     (SP)+,(SP)
 4882  020236  000002                          RTI                     ;;RETURN TO USER
 4883  020240  023420                  $DTBL:  10000.
 4884  020242  001750                          1000.
 4885  020244  000144                          100.
 4886  020246  000012                          10.
 4887  020250  000004                  $DBLK:  .BLKW   4
 4888
 4889                                  .SBTTL  TYPE ROUTINE
 4890
 4891                                  ;;*****************************************************************
 4892                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 4893                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 4894                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 4895                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 4896                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 4897                                  ;*
 4898                                  ;*CALL:
 4899                                  ;*1) USING A TRAP INSTRUCTION
 4900                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 4901                                  ;*OR
 4902                                  ;*      TYPE
 4903                                  ;*      MESADR
 4904                                  ;*
 4905
 4906  020260  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 4907  020264  100002                          BPL     1$              ;;BR IF YES
 4908  020266  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 4909  020270  000407                          BR      3$              ;;LEAVE
 4910  020272  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 4911  020274  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 4912  020300  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 4913  020302  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
```



```
 4914  020304  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 4915  020306  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 4916  020310  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 4917  020314  000002                          RTI                     ;;RETURN
 4918  020316  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 4919  020322  001430                          BEQ     8$
 4920  020324  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 4921  020330  001006                          BNE     5$
 4922  020332  005726                          TST     (SP)+           ;;POP <CR><LF> EQUIV
 4923  020334  104401                          TYPE                    ;;TYPE A CR AND LF
 4924  020336  001213                          $CRLF
 4925  020340  105037  020474                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 4926  020344  000755                          BR      2$              ;;GET NEXT CHARACTER
 4927  020346  004737  020430          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 4928  020352  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 4929  020356  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
 4930  020360  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 4931                                                                  ;;AND THE NULL CHAR.
 4932  020364  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 4933  020370  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 4934  020372  004737  020430                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
 4935  020376  105337  020474                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 4936  020402  000770                          BR      7$              ;;LOOP
 4937
 4938                                  ;HORIZONTAL TAB PROCESSOR
 4939
 4940  020404  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 4941  020410  004737  020430          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
 4942  020414  132737  000007  020474          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 4943  020422  001372                          BNE     9$              ;;TAB STOP
 4944  020424  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
 4945  020426  000724                          BR      2$              ;;GET NEXT CHARACTER
 4946  020430  105777  160514          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 4947  020434  100375                          BPL     $TYPEC
 4948  020436  116677  000002  160506          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 4949  020444  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 4950  020452  001003                          BNE     1$              ;;BRANCH IF NO
 4951  020454  105037  020474                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 4952  020460  000406                          BR      $TYPEX          ;;EXIT
 4953  020462  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 4954  020470  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
 4955  020472  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
 4956  020474  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
 4957  020476  000207          $TYPEX: RTS     PC
 4958
 4959
 4960
 4961                                  .SBTTL  INTEGER MULTIPLY ROUTINE
 4962
 4963                                  ;;*****************************************************************
 4964                                  ;*CALL
 4965                                  ;*      MOV     MULTIPLER,-(SP)
 4966                                  ;*      MOV     MULTIPLICAND,-(SP)
 4967                                  ;*      JSR     PC,@@$MULT
 4968                                  ;*      RETURN  ;;PRODUCT IS ON THE STACK
 4969                                  ;*
```

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

                                .SBTTL  TTY INPUT ROUTINE

                                ;;**************************************************************
                                .ENABL  LSB
020612  000000                  $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
020614  000000                  $TKQIN: .WORD   0               ;;INPUT POINTER
020616  000000                  $TKQOUT: .WORD  0               ;;OUTPUT POINTER

020620  000001                  $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
020621                          $TKQEND=.
020622                          .EVEN

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



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

                                ;*TK SERVICE ROUTINE
                                ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                ;*IT IN THE QUEUE.
                                ;
020672  117746  160250          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
020676  042716  177600                  BIC     #^C177,(SP)     ;;STRIP THE JUNK
020702  021627  000007          1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
020706  001004                          BNE     2$              ;;BRANCH IF NO
020710  022737  000176  001140          CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
020716  001500                          BEQ     6$              ;;GO TO SWR CHANGE

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

                                ;;**************************************************************
                                ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
```

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

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

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

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


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


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



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


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

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

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

```
 5194  021474  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 5195  021476  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
 5196  021500  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
 5197  021504  001022                          BNE     5$              ;;BR IF NO
 5198  021506  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
 5199  021510  001007                          BNE     6$              ;;BR IF NO
 5200  021512  112737  000134  021710         MOVB    #'\,9$          ;;TYPE A BACK SLASH
 5201  021520  104401  021710                  TYPE    ,9$
 5202  021524  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
 5203  021530  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
 5204  021532  020327  021712                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
 5205  021536  103434                          BLO     4$              ;;BR IF YES
 5206  021540  111337  021710                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
 5207  021544  104401  021710                  TYPE    ,9$             ;;GO TYPE
 5208  021550  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
 5209  021552  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
 5210  021554  001406                          BEQ     7$              ;;BR IF NO
 5211  021556  112737  000134  021710         MOVB    #'\,9$          ;;TYPE A BACK SLASH
 5212  021564  104401  021710                  TYPE    ,9$
 5213  021570  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
 5214  021572  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
 5215  021576  001003                          BNE     8$              ;;BR IF NO
 5216  021600  104401  021722                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
 5217  021604  000726                          BR      1$              ;;GO START OVER
 5218  021606  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "^R"?
 5219  021612  001011                          BNE     3$              ;;BRANCH IF NO
 5220  021614  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
 5221  021616  104401  001213                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
 5222  021622  104401  021712                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 5223  021626  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
 5224  021630  104401  001212          4$:     TYPE    ,$QUES          ;;TYPE A '?'
 5225  021634  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
 5226  021636  111337  021710          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
 5227  021642  104401  021710                  TYPE    ,9$
 5228  021646  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 5229  021652  001305                          BNE     2$              ;;LOOP IF NOT RETURN
 5230  021654  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 5231  021660  104401  001214                  TYPE    ,$LF            ;;TYPE A LINE FEED
 5232  021664  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 5233  021666  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 5234  021670  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 5235  021672  016666  000004  000002         MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 5236  021700  012766  021712  000004         MOV     #$TTYIN,4(SP)
 5237  021706  000002                          RTI                     ;;RETURN
 5238  021710     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 5239  021711     000                          .BYTE   0               ;;TERMINATOR

 5240  021712  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
 5241  021722  052536  005015     000 $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
 5242  021727     136  006507  000012 $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
 5243  021734  005015  053523  020122 $MSWR:  .ASCIZ  <15><12>/SWR = /
 5244  021742  020075     000
 5245  021745     040  047040  053505 $MNEW:  .ASCIZ  /  NEW = /
 5246  021752  036440  000040
 5247
 5248                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
 5249
```



```
 5250                                  ;;*****************************************************************
 5251                                  ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
 5252                                  ;*CHANGE IT TO BINARY.
 5253                                  ;*CALL:
 5254                                  ;*      RDOCT                   ;;READ AN OCTAL NUMBER
 5255                                  ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
 5256                                  ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
 5257
 5258  021756  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
 5259  021760  016666  000004  000002         MOV     4(SP),2(SP)     ;;INPUT NUMBER
 5260  021766  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 5261  021770  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 5262  021772  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 5263  021774  104411                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
 5264  021776  012600                          MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
 5265  022000  005001                          CLR     R1              ;;CLEAR DATA WORD
 5266  022002  005002                          CLR     R2
 5267  022004  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
 5268  022006  001412                          BEQ     3$              ;;IF ZERO GET OUT
 5269  022010  006301                          ASL     R1              ;;*2
 5270  022012  006102                          ROL     R2
 5271  022014  006301                          ASL     R1              ;;*4
 5272  022016  006102                          ROL     R2
 5273  022020  006301                          ASL     R1              ;;*8
 5274  022022  006102                          ROL     R2
 5275  022024  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
 5276  022030  062601                          ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
 5277  022032  000764                          BR      2$              ;;LOOP
 5278  022034  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
 5279  022036  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
 5280  022042  010237  022056                  MOV     R2,$HIOCT
 5281  022046  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 5282  022050  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 5283  022052  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 5284  022054  000002                          RTI                     ;;RETURN
 5285  022056  000000                  $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
 5286
 5287                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 5288
 5289                                  ;;*****************************************************************
 5290                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 5291                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 5292                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 5293                                  ;*CALL:
 5294                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 5295                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
 5296                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 5297                                  ;*      .BYTE   M               ;;M=1 OR 0
 5298                                  ;*                                      ;;1=TYPE LEADING ZEROS
 5299                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
 5300                                  ;*
 5301                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 5302                                  ;*$TYPOS OR $TYPOC
 5303                                  ;*CALL:
 5304                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 5305                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
```

```
                                        ;*
                                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT
                                        
022060  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
022064  116637  000001  022303          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
022072  112637  022305                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
022076  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
022102  000406                          BR      $TYPON
022104  112737  000001  022303  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
022112  112737  000006  022305          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
022120  112737  000005  022302  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
022126  010346                          MOV     R3,-(SP)        ;;SAVE R3
022130  010446                          MOV     R4,-(SP)        ;;SAVE R4
022132  010546                          MOV     R5,-(SP)        ;;SAVE R5
022134  113704  022305                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
022140  005404                          NEG     R4
022142  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
022146  110437  022304                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
022152  113704  022303                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
022156  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
022162  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
022164  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
022166  000404                          BR      3$              ;;GO DO MSB
022170  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
022172  006105                          ROL     R5
022174  006105                          ROL     R5
022176  010503                          MOV     R5,R3
022200  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
022202  105337  022304                  DECB    $OMODE          ;;TYPE THIS DIGIT?
022206  100016                          BPL     7$              ;;BR IF NO
022210  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
022214  001002                          BNE     4$              ;;TEST FOR 0
022216  005704                          TST     R4              ;;SUPPRESS THIS 0?
022220  001403                          BEQ     5$              ;;BR IF YES
022222  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
022224  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
022230  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
022234  110337  022300                  MOVB    R3,8$           ;;SAVE FOR TYPING
022240  104401  022300                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
022244  105337  022302          7$:     DECB    $OCNT           ;;COUNT BY 1
022250  003347                          BGT     2$              ;;BR IF MORE TO DO
022252  002402                          BLT     6$              ;;BR IF DONE
022254  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK

022256  000744                          BR      2$              ;;GO DO THE LAST DIGIT
022260  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
022262  012604                          MOV     (SP)+,R4        ;;RESTORE R4
022264  012603                          MOV     (SP)+,R3        ;;RESTORE R3
022266  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
022274  012616                          MOV     (SP)+,(SP)
022276  000002                          RTI                     ;;RETURN
022300     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
022301     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
022302     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
```



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


                                        .SBTTL  TYPDSS - TYPE DECIMAL, LEADING ZEROES SUPPRESSED
                                        ;TYPDSS
                                        ;ROUTINE FOR TYPING OUT DECIMAL NUMBERS, LEADING 0'S ARE SUPPRESSED
                                        ;THE NUMBER IS LEFT JUSTIFIED, NOTE THE 16 BIT BINARY NUMBER SHOULD
                                        ;BE POSITIVE (BIT 15= 0).
                                        ;CALL:  MOV     NUMBER,-(SP)    ;PUT BINARY NUMBER ON STACK
                                        ;       TYPDSS                  ;GO TYPE DECIMAL

022306  016637  000004  022346  TYPDES: MOV     4(SP),1$                ;GET THE NUMBER
022314  012746  022346                  MOV     #1$,-(SP)               ;PUT PTR ON THE STACK
022320  004737  022506                  JSR     PC,@#$DB2D              ;GO CONVERT BINARY NO. TO
                                                                        ;ASCII STRING
022324  004737  022352                  JSR     PC,@#$SUPRS             ;GO TYPE OUT DECIMAL STRING
                                                                        ;SUPRESING LEADING 0'S
022330  016666  000002  000004          MOV     2(SP),4(SP)             ;ADJUST RETURN
022336  011666  000002                  MOV     (SP),2(SP)              ;ADJUST RETURN ADRES
022342  005726                          TST     (SP)+                   ;POP STACK
022344  000002                          RTI                             ;RETURN

022346  000000  000000          1$:     .WORD   0,0


                                        .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS

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

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

                                        .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

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

```
                                        ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                        ;*
                                        ;*TOP-->(+16)
                                        ;* +2-->(+18)
                                        ;* +4-->R5
                                        ;* +6-->R4
                                        ;* +8-->R3
                                        ;*+10-->R2
                                        ;*+12-->R1
                                        ;*+14-->R0
                                        $SAVREG:
022412  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
022414  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
022416  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
022420  010346                                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
022422  010446                                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
022424  010546                                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
022426  016646  000022                          MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
022432  016646  000022                          MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
022436  016646  000022                          MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
022442  016646  000022                          MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
022446  000002                                  RTI

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

                                        .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                                        ;*DECTMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                                        ;*POSITIVE.

                                        ;*CALL
                                        ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                        ;*      JSR     PC,@#$DB2D
                                        ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                                                        ;;IS ON THE STACK


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



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


                                        .SBTTL  TRAP DECODER

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

```
5530
5531  022702  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
5532  022704  016600  000002                MOV     2(SP),R0        ;;GET TRAP ADDRESS
5533  022710  005740                        TST     -(R0)           ;;BACKUP BY 2
5534  022712  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
5535  022714  006300                        ASL     R0              ;;POSITION FOR INDEXING
5536  022716  016000  022736                MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
5537  022722  000200                        RTS     R0              ;;GO TO ROUTINE
5538
5539
5540                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
5541
5542  022724  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
5543  022726  016666  000004  000002        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
5544  022734  000002                        RTI                     ;;RESTORE THE PSW
5545
5546                                .SBTTL  TRAP TABLE
5547
5548                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
5549                                ;*BY THE "TRAP" INSTRUCTION.
5550
5551                                ;       ROUTINE
5552                                ;       -------
5553  022736  022724                $TRPAD: .WORD   $TRAP2
5554  022740  020260                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
5555  022742  022104                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
5556  022744  022060                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
5557  022746  022120                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
5558  022750  020034                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
5559
5560  022752  021154                        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
5561
5562  022754  021064                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
5563  022756  021366                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
5564  022760  021456                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
5565  022762  021756                        $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) PEAD AN OCTAL NUMBER FROM TTY
5566  022764  022412                        $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
5567  022766  022450                        $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
5568
5569  022770  016602                        CN.RST  ;;CALL=CON.RESET        TRAP+15(104415) CONTROL RESET ROUTINE
5570
5571  022772  016470                        DR.RST  ;;CALL=DRV.RESET        TRAP+16(104416) DRIVE RESET ROUTINE
5572
5573  022774  016044                        MSGE    ;;CALL=MESAGE   TRAP+17(104417) MESSAGE HANDLER
5574
5575  022776  016106                        TY.MSG  ;;CALL=TYPMSG   TRAP+20(104420) MESSAGE TYPEOUT ROUTINE

5576
5577  023000  016620                        CN.RDY  ;;CALL=CON.RDY  TRAP+21(104421) WAIT FOR CONTROL READY
5578

5579  023002  016716                        TSTRWS  ;;CALL=TST.RWS  TRAP+22(104422) TEST R/W/S RDY SET
5580
5581  023004  016514                        RES.DO  ;;CALL=RESDON   TRAP+23(104423) DRIVE RESET DONE?
5582
5583  023006  022306                        TYPDES  ;;CALL=TYPDSS   TRAP+24(104424) TYPE DECIMAL, SUPRES LDG 0'S
5584
5585
```



```
5586                                .SBTTL  POWER DOWN AND UP ROUTINES
5587
5588                                ;;*************************************************************
5589                                ;POWER DOWN ROUTINE
5590  023010  012737  023154  000024 $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
5591  023016  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;PRIO:7
5592  023024  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5593  023026  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5594  023030  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5595  023032  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5596  023034  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
5597  023036  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5598  023040  017746  156074                MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
5599  023044  010637  023160                MOV     SP,$SAVR6       ;;SAVE SP
5600  023050  012737  023062  000024        MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
5601  023056  000000                        HALT
5602  023060  000776                        BR      .-2             ;;HANG UP
5603
5604                                ;;*************************************************************
5605                                ;POWER UP ROUTINE
5606  023062  012737  023154  000024 $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
5607  023070  013706  023160                MOV     $SAVR6,SP       ;;GET SP
5608  023074  005037  023160                CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
5609  023100  005237  023160        1$:     INC     $SAVR6          ;;WAIT FOR THE INC
5610  023104  001375                        BNE     1$              ;;OF  WORD
5611  023106  012677  156026                MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
5612  023112  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
5613  023114  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
5614  023116  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
5615  023120  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5616  023122  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5617  023124  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
5618  023126  012737  023010  000024        MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
5619  023134  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;PRIO:7
5620  023142  104401                        TYPE                    ;REPORT THE POWER FAILURE
5621  023144  023162                $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
5622  023146  012716                        MOV     (PC)+,(SP)      ;;RESTART AT PWRFL
5623  023150  004244                $PWRAD: .WORD   PWRFL            ;;RESTART ADDRESS
5624  023152  000002                        RTI
5625  023154  000000                $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
5626  023156  000776                        BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
5627  023160  000000                $SAVR6: 0                       ;;PUT THE SP HERE
5628  023162  005015  047520  042527 $POWER: .ASCIZ  <15><12>"POWER"
5629  023170  000122
5630                                .EVEN
5631
5632
```

```
                                        .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 WPITTEN:
                                ;       PATRN?125252<CR>
                                ;THE USER SHOULD TYPE IN THE (OCTAL) PATTERN HE WANTS TO WRITE.
                                ;NOTE THAT THE NUMBER OF WORDS TRANSFERRED SHOULD BE WITHIN THE
                                ;BOUNDS OF THE SYSTEM.

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

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

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


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



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

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

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

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

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

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

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

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

```
5745  023446                          66$:
5746  023446  004737  024032                  JSR     PC,INPT
5747  023452  000766                          BR      6$
5748  023454  010004                          MOV     R0,R4
5749
5750  023456                          7$:
5751  023456  104401  023464                  TYPE    ,69$            ;;TYPE ASCIZ STRING
5752  023462  000404                          BR      68$             ;;GET OVER THE ASCIZ
5753                                  ;;69$:  .ASCIZ  /CYL2? /
5754  023474                          68$:
5755  023474  004737  024032                  JSR     PC,INPT
5756  023500  000766                          BR      7$
5757  023502  010005                          MOV     R0,R5
5758  023504  017700  155430                  MOV     @SWR,R0         ;GET DRIVE # FROM SW REG<15:13>
5759  023510  042700  017777                  BIC     #17777,R0               ;CLR UNWANTED BITS
5760  023514  050004                          BIS     R0,R4                   ;SET DRIVE # IN DSK ADRES
5761  023516  050005                          BIS     R0,R5
5762  023520  000466                          BR      EXEC
5763
5764
5765  023522                          NXTBA:
5766  023522  104401  023530                  TYPE    ,65$            ;;TYPE ASCIZ STRING
5767  023526  000404                          BR      64$             ;;GET OVER THE ASCIZ
5768                                  ;;65$:  .ASCIZ  /RKBA? /
5769  023540                          64$:
5770  023540  104412                          RDOCT
5771  023542  012637  001476                  MOV     (SP)+,INDX2
5772
5773  023546                          NXTDA:
5774  023546  104401  023554                  TYPE    ,65$            ;;TYPE ASCIZ STRING
5775  023552  000404                          BR      64$             ;;GET OVER THE ASCIZ
5776                                  ;;65$:  .ASCIZ  /RKDA? /
5777  023564                          64$:
5778  023564  104412                          RDOCT
5779  023566  012600                          MOV     (SP)+,R0
5780  023570  010001                          MOV     R0,R1
5781  023572  006201                          ASR     R1
5782  023574  006201                          ASR     R1
5783  023576  006201                          ASR     R1
5784  023600  006201                          ASR     R1
5785  023602  006201                          ASR     R1
5786  023604  042701  177400                  BIC     #177400,R1
5787  023610  020127  000312                  CMP     R1,#312
5788  023614  003354                          BGT     NXTDA
5789  023616  010001                          MOV     R0,R1
5790  023620  042701  177760                  BIC     #177760,R1

5791  023624  020127  000013                  CMP     R1,#13
5792  023630  003346                          BGT     NXTDA
5793  023632  010003                          MOV     R0,R3
5794  023634  022702  000015                  CMP     #15,R2
5795  023640  001416                          BEQ     EXEC
5796
5797
5798  023642                          NXTWC:
5799  023642  104401  023650                  TYPE    ,65$            ;;TYPE ASCIZ STRING
5800  023646  000405                          BR      64$             ;;GET OVER THE ASCIZ
```



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5801                                  ;;65$:  .ASCIZ  /#WORDS? /
5802  023662                          64$:
5803  023662  104412                          RDOCT
5804  023664  005416                          NEG     (SP)
5805  023666  012637  001502                  MOV     (SP)+,INDX4
5806  023672  000401                          BR      EXEC
5807
5808  023674  104415                  EXEC1:  CON.RESET                       ;CLR ERROR, CONTROL RESET
5809  023676  022702  000011          EXEC:   CMP     #11,R2                  ;SEEK FUNCTION?
5810  023702  001005                          BNE     2$                      ;NO
5811  023704  020403                          CMP     R4,R3                   ;IF SEEK, INSERT THE RIGHT
5812  023706  001402                          BEQ     3$              ;CYLINDER ADDRESS
5813  023710  010403                          MOV     R4,R3
5814  023712  000401                          BR      2$
5815  023714  010503                  3$:     MOV     R5,R3
5816  023716  013777  001476  155536  2$:     MOV     INDX2,@RKBA
5817  023724  010377  155534                  MOV     R3,@RKDA
5818  023730  013777  001502  155522          MOV     INDX4,@RKWC
5819  023736  010277  155514                  MOV     R2,@RKCS
5820  023742  105777  155510          1$:     TSTB    @RKCS           ;WAIT FOR CNTROL RDY
5821  023746  100375                          BPL     1$
5822  023750  022702  000001                  CMP     #1,R2           ;IF IT'S CON RESET FUNCTION
5823  023754  001401                          BEQ     4$              ;DONT WAIT FOR R/W/S RDY
5824  023756  104423                          RESDON                  ;R/W/S RDY?
5825
5826  023760  032777  140000  155470  4$:     BIT     #140000,@RKCS   ;ERROR?
5827  023766  001006                          BNE     FUNERR          ;YES
5828  023770  032777  000010  155142  CHSW:   BIT     #SW3,@SWR       ;TERMINATE THIS FUNCTION OR REPEAT?
5829  023776  001737                          BEQ     EXEC            ;REPEAT
5830  024000  000137  023172                  JMP     FUNBEG          ;TERMINATE
5831
5832
5833  024004  012737  023674  001110  FUNERR: MOV     #EXEC1,$LPERR   ;SET UP FOR LUPING
5834  024012  012737  023674  001106          MOV     #EXEC1,$LPADR
5835  024020  004737  016162                  JSR     PC,GT4RG
5836  024024  104030                          ERROR   30              ;REPORT ERROR
5837  024026  104415                          CON.RESET               ;CLR ERROR
5838  024030  000757                          BR      CHSW
5839
5840  024032  104412                  INPT:   RDOCT
5841  024034  012600                          MOV     (SP)+,R0
5842  024036  020027  000312                  CMP     R0,#312
5843  024042  003007                          BGT     1$
5844  024044  006300                          ASL     R0
5845  024046  006300                          ASL     R0
5846  024050  006300                          ASL     R0
5847  024052  006300                          ASL     R0
5848  024054  006300                          ASL     R0
5849  024056  062716  000002                  ADD     #2,(SP)
5850  024062  000207                  1$:     RTS     PC
5851
5852  024064  032777  000001  155046  CHKSW0: BIT     #SW0,@SWR       ;WRITE A PATTERN GIVEN BY USER?
5853  024072  001416                          BEQ     1$              ;NO
5854                                                                  ;YES, ASK FOR PATTERN
5855  024074  104401  024102                  TYPE    ,65$            ;;TYPE ASCIZ STRING
5856  024100  000404                          BR      64$             ;;GET OVER THE ASCIZ
```

```
5857                                        ;;658:  .ASCIZ  /PATRN?/
5858  024112                                648:
5859  024112  104412                             RDOCT
5860  024114  012637  031446                    MOV     (SP)+,IOBUF1    ;SAVE THE PATTERN
5861  024120  012737  031446  001476            MOV     #IOBUF1,INDX2
5862  024126  000207                            RTS     PC
5863  024130  062716  000006            1$:     ADD     #6,(SP)         ;SKIP NXT 2 INST ON RETURN
5864  024134  000207                            RTS     PC
5865
5866  024136  104416                      FCHECK: DRV.RESET
5867  024140  104415                              CON.RESET
5868  024142  013737  001230  002120            MOV     DRIVAD,DRHOLD           ;SAVE DRIVE ADRR
5869  024150  032737  020000  001230            BIT     #20000,DRIVAD           ;SEE IF ODD
5870  024156  001404                            BEQ     1$
5871  024160  042737  020000  001230            BIC     #20000,DRIVAD           ;MAKE EVEN
5872  024166  000403                            BR      2$
5873  024170  052737  020000  001230    1$:     BIS     #20000,DRIVAD           ;MAKE ODD
5874  024176  013777  001230  155260    2$:     MOV     DRIVAD,@RKDA    ;DRIVE ADDR
5875  024204  012777  000011  155244            MOV     #11,@RKCS               ;DRIVE SEEK
5876  024212  104421                            CON.RDY
5877  024214  013777  002120  155242            MOV     DRHOLD,@RKDA            ;OTHER DRIVE
5878  024222  104421                            CON.RDY
5879  024224  032777  000100  155220            BIT     #100,@RKDS              ;HEAEDS IN MOTIONN?
5880  024232  001001                            BNE     3$                      ;NO SO RK-05J
5881  024234  005725                            TST     (R5)+                   ;YES RK-05F
5882  024236  013737  002120  001230    3$:     MOV     DRHOLD,DRIVAD           ;RESTORE ADDR
5883  024244  104416                            DRV.RESET
5884  024246  000205                            RTS     R5
5885  024250  005037  001230            SIZEF:  CLR     DRIVAD          ;START AT DR0
5886  024254  012700  001232                    MOV     #DRIV0,R0               ;TABLE OF AVAIL DRIVES
5887  024260  105710                    4$:     TSTB    (R0)                    ;THIS DRIVE HERE?
5888  024262  001413                            BEQ     2$                      ;NO
5889  024264  105760  000002                    TSTB    2(R0)                   ;COMPLEMENT HERE?
5890  024270  001410                            BEQ     2$                      ;NO
5891  024272  004537  024136                    JSR     R5,FCHECK               ;SEE IF F MODEL
5892  024276  000405                            BR      2$                      ;J MODEL
5893  024300  052710  000002                    BIS     #2,(R0)         ;SEI SIGN FOR F
5894  024304  052760  000002  000002            BIS     #2,2(R0)                ;BOTH DRIVES
5895  024312  005720                    2$:     TST     (R0)+
5896  024314  005720                            TST     (R0)+                   ;NEXT PAIR OF DRIVES
5897  024316  062737  040000  001230            ADD     #40000,DRIVAD           ;NEXT ACTUL ADDR
5898  024324  022700  001251                    CMP     #DRIV7+1,R0             ;CHECKED ALL?
5899  024330  003353                            BGT     4$                      ;NOT YET
5900  024332  000207                            RTS     PC
5901
5902                                        ;ERROR MESSAGES

5903
5904
5905  024334  047103  051124  020114    EM1:    .ASCIZ  /CNTRL RDY DIDN'T SET AFTR SEEK/
5906  024342  042122  020131  044504
5907  024350  047104  052047  051440
5908  024356  052105  040440  052106
5909  024364  020122  042523  045505
5910  024372     000
5911
5912  024373     123  047111  047440    EM2:    .ASCIZ  /SIN ON SEEK/
```



```
5913  024400  020116  042523  045505
5914  024406     000
5915
5916  024407     104  042522  047440    EM3:    .ASCIZ  /DRE ON SEEK/
5917  024414  020116  042523  045505
5918  024422     000
5919
5920  024423     047  051105  023522    EM4:    .ASCIZ  /'ERR' ON SEEK/
5921  024430  047440  020116  042523
5922  024436  045505     000
5923
5924  024441     104  052522  047440    EM5:    .ASCIZ  /DRU ON SEEK, PUT DRV ON 'LOAD' & 'RUN'/
5925  024446  020116  042523  045505
5926  024454  020054  052520  020124
5927  024462  051104  020126  047117
5928  024470  023440  047514  042101
5929  024476  020047  020046  051047
5930  024504  047125  000047
5931
5932  024510  027522  027527  020123    EM6:    .ASCIZ  "R/W/S RDY NOT SET AFTER SEEK"
5933  024516  042122  020131  047516
5934  024524  020124  042523  020124
5935  024532  043101  042524  020122
5936  024540  042523  045505     000
5937
5938  024545     123  047111  047440    EM7:    .ASCIZ  /SIN ON WRT FMT/
5939  024552  020116  051127  020124
5940  024560  046506  000124
5941
5942  024564  042447  051122  020047    EM10:   .ASCIZ  /'ERR' ON DOING WRITE FMT/
5943  024572  047117  042040  044517
5944  024600  043516  053440  044522
5945  024606  042524  043040  052115
5946  024614     000
5947  024615     123  047111  047440    EM11:   .ASCIZ  "SIN ON RD/FMT"
5948  024622  020116  042122  043057
5949  024630  052115     000
5950  024633     047  051105  023522    EM12:   .ASCIZ  /'ERR' ON READ FMT/
5951  024640  047440  020116  042522
5952  024646  042101  043040  052115
5953  024654     000
5954  024655     127  047522  043516    EM13:   .ASCIZ  /WRONG HDRS FROM 'SEC#'/
5955  024662  044040  051104  020123
5956  024670  051106  046517  023440
5957  024676  042523  021503  000047
5958
5959  024704  051105  051117  047440    EM14:   .ASCIZ  /EROR ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'/
5960  024712  020116  046511  046120
5961  024720  042511  020104  042523
5962  024726  045505  043040  047522
5963  024734  020115  041447  046131
5964  024742  023501  052040  020117
5965  024750  041447  046131  023502
5966  024756     000
5967
5968  024757     122  040505  020104    MS15:   .ASCIZ  /READ WRONG HDRS FROM 'CYLB' ABOVE/
```

```
5969  024764  051127  047117  020107
5970  024772  042110  051522  043040
5971  025000  047522  020115  041447
5972  025006  046131  023502  040440
5973  025014  047502  042526     000
5974
5975  025021     122  040505  020104  EM16:   .ASCIZ  /READ WRONG, 1ST WRD FROM SEC 0, 'CYLB' (ON IMPLIED SEEK FROM 'CYLA')/
5976  025026  051127  047117  026107
5977  025034  030440  052123  053440
5978  025042  042122  043040  047522
5979  025050  020115  042523  020103
5980  025056  026060  023440  054503
5981  025064  041114  020047  047450
5982  025072  020116  046511  046120
5983  025100  042511  020104  042523
5984  025106  045505  043040  047522
5985  025114  020115  041447  046131
5986  025122  023501  000051
5987
5988  025126  042522  042101  030440  MS17:   .ASCIZ  /READ 1ST WRD FROM SEC 1, 'CYLB' ABOVE/
5989  025134  052123  053440  042122
5990  025142  043040  047522  020115
5991  025150  042523  020103  026061
5992  025156  023440  054503  041114
5993  025164  020047  041101  053117
5994  025172  000105
5995
5996  025174  042522  042101  053440  EM20:   .ASCIZ  /READ WRONG HDRS ON IMPLIED SEEK FROM 'CYLA' TO 'CYLB'/
5997  025202  047522  043516  044040
5998  025210  051104  020123  047117
5999  025216  044440  050115  044514
6000  025224  042105  051440  042505
6001  025232  020113  051106  046517
6002  025240  023440  054503  040514
6003  025246  020047  047524  023440
6004  025254  054503  041114  000047
6005
6006  025262  051105  051117  047440  EM21:   .ASCIZ  /EROR ON DOING WRITE ON DISK/
6007  025270  020116  047504  047111
6008  025276  020107  051127  052111
6009  025304  020105  047117  042040
6010  025312  051511  000113
6011
6012  025316  044523  020116  047117  EM22:   .ASCIZ  /SIN ON DOING WRITE/
6013  025324  042040  044517  043516
6014  025332  053440  044522  042524

6015  025340     000
6016
6017  025341     110  020105  047117  EM23:   .ASCIZ  /HE ON DOING READ/
6018  025346  042040  044517  043516
6019  025354  051040  040505  000104
6020
6021  025362  051503  020105  047117  EM24:   .ASCIZ  /CSE ON READ/
6022  025370  051040  040505  000104
6023
6024  025376  040504  040524  042440  EM25:   .ASCIZ  /DATA EROR ON READ FROM DISK ADRES/
```



```
6025  025404  047522  020122  047117
6026  025412  051040  040505  020104
6027  025420  051106  046517  042040
6028  025426  051511  020113  042101
6029  025434  042522  000123
6030
6031  025440  042510  047440  020116  EM26:   .ASCIZ  /HE ON WRT CHK/
6032  025446  051127  020124  044103
6033  025454  000113
6034
6035  025456  051127  020124  044103  EM27:   .ASCIZ  /WRT CHK EROR/
6036  025464  020113  051105  051117
6037  025472     000
6038
6039  025473     105  047522  000122  EM30:   .ASCIZ  /EROR/
6040
6041                                  ;DATA HEADERS
6042
6043
6044  025500  020040  041520  020040  DH1:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA/
6045  025506  020040  051040  041513
6046  025514  020123  020040  051040
6047  025522  042513  020122  020040
6048  025530  051040  042113  020123
6049  025536  020040  051040  042113
6050  025544  000101
6051
6052  025546  042523  045505  021440  DH6:    .ASCIZ  /SEEK #  SEEKING  ERRORS/
6053  025554  020040  042523  045505
6054  025562  047111  020107  042440
6055  025570  051122  051117  000123
6056
6057  025576  020040  041520  020040  DH7:    .ASCIZ  /  PC     RKCS    RKER    RKDS    RKDA    CYL/
6058  025604  020040  051040  041513
6059  025612  020123  020040  051040
6060  025620  042513  020122  020040
6061  025626  051040  042113  020123
6062  025634  020040  051040  042113
6063  025642  020101  020040  041440
6064  025650  046131     000
6065
6066  025653     040  050040  020103  DH11:   .ASCIZI/  PC    RKCS    RKER    RKDS   RKDA: DR  CYL     SUR     SEC/
6067  025660  020040  051040  041513
6068  025666  020123  020040  051040
6069  025674  042513  020122  020040
6070  025702  051040  042113  020123
6071  025710  020040  045522  040504
6072  025716  020072  051104  020040
6073  025724  054503  020114  020040
6074  025732  020040  052523  020122
6075  025740  020040  020040  042523
6076  025746  000103
6077  025750  042523  021503  020040  DH13:   .ASCIZ  /SEC#  HDR RCVD/
6078  025756  042110  020122  041522
6079  025764  042126     000
6080
```

```
 6081  025767      040  050040  020103  DH14:   .ASCIZ  /  PC     CYLA    CYLB     RKER   RKDS     TRY#/
 6082  025774  020040  020040  054503
 6083  026002  040514  020040  020040
 6084  026010  054503  041114  020040
 6085  026016  020040  051040  042513
 6086  026024  020122  020040  045522
 6087  026032  051504  020040  020040
 6088  026040  052040  054522  000043
 6089
 6090  026046  020040  041520  020040  DH16:   .ASCIZ  /  PC     CYLA   CYLB    EXPCT   RECVD   TRY#/
 6091  026054  020040  041440  046131
 6092  026062  020101  020040  054503
 6093  026070  041114  020040  020040
 6094  026076  054105  041520  020124
 6095  026104  020040  042522  053103
 6096  026112  020104  020040  051124
 6097  026120  021531     000
 6098
 6099  026123      040  050040  020103  DH17:   .ASCIZ  /  PC     CYLB   EXPCT   RECVD/
 6100  026130  020040  020040  054503
 6101  026136  041114  020040  042440
 6102  026144  050130  052103  020040
 6103  026152  051040  041505  042126
 6104  026160     000
 6105
 6106  026161      040  050040  020103  DH24:   .ASCIZ/  PC     TRY#   RKCS    RKER    RKDS  RKDA: DR  CYL     SUR      SEC/
 6107  026166  020040  020040  051124
 6108  026174  021531  020040  051040
 6109  026202  041513  020123  020040
 6110  026210  051040  042513  020122
 6111  026216  020040  051040  042113
 6112  026224  020123  051040  042113
 6113  026232  035101  042040  020122
 6114  026240  041440  046131  020040
 6115  026246  020040  051440  051125
 6116  026254  020040  020040  020040
 6117  026262  042523  000103
 6118
 6119  026266  047527  042122  020043  DH25:   .ASCIZ  /WORD#  EXPCT   RECVD   CYL  SUR  SEC/
 6120  026274  042440  050130  052103
 6121  026302  020040  051040  041505
 6122  026310  042126  020040  041440
 6123  026316  046131  020040  052523
 6124  026324  020122  051440  041505
 6125  026332     000
 6126

 6127
 6128                                  ;ERROR DATA POINTERS
 6129
 6130
 6131          026334                  .EVEN
 6132
 6133  026334  001116  001162  001164  DT1:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,0
 6134  026342  001166  001170  000000
 6135
 6136  026350  001116  001162  001164  DT7:    .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,$REG4,0
```



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

```
ABRT    016772          BUFR13  030426          DRVDON  001223          EXT10   012732          NOSIN   011026
ADRES   001450          BUFR14  031026          DRVPTR  001226          EXT4    006614          NXTBA   023522
BADTMO  002422          BUFR2   001352          DRV.RE= 104416          EXT5    007352          NXTDA   023546
BEGIN   010532          BUFR4   026526          DR.RST  016470          EXT6    010432          NXTDRV  003760
BEGSK   013250          BUFR5   026606          DSKADR  001432          EXT7    012170          NXTPAT  001426
BIT0  = 000001          BUFR6   026666          DSWR  = 177570          FCHECK  024136          NXTWC   023642
BIT00 = 000001          BUFR7   026746          DT1     026334          FDRIVE  002114          OUTADR  001262
BIT01 = 000002          BUSADR  001434          DT11    026366          FDRVE1  002116          OUTBUF  026446
BIT02 = 000004          CHKHDR  007260          DT17    026410          FFUNC   001216          PAT0    001414
BIT03 = 000010          CHKSW0  024064          DT24    026422          FINISH  011512          PAT1    001416
BIT04 = 000020          CHSW    023770          DT7     026350          FUNBEG  023172          PAT2    001420
BIT05 = 000040          CKSWR = 104407          EMTVEC= 000030          FUNERR  024004          PAT3    001422
BIT06 = 000100          CLRERR  012162          EM1     024334          GCYL    016434          PBUF0   001404
BIT07 = 000200          CMPAGA  011244          EM10    024564          GETBUF  010044          PBUF1   001406
BIT08 = 000400          CMPGRP  014622          EM11    024615          GETINF  016214          PGSUBR  001430
BIT09 = 001000          CN.RDY  016620          EM12    024633          GOBAK   011650          PIRQ  = 177772
BIT1  = 000002          CN.RST  016602          EM13    024655          GOTYPE  013600          PIRQVE= 000240
BIT10 = 002000          COMPAR  011220          EM14    024704          GTSWR = 104406          PLOT    014222
BIT11 = 004000          CON.RD= 104421          EM16    025021          GT4RG   016162          PLTGRP  014106
BIT12 = 010000          CON.RE= 104415          EM2     024373          GT5RG   016136          PLTPT   014736
BIT13 = 020000          CR    = 000015          EM20    025174          HT    = 000011          PLT1    014436
BIT14 = 040000          CRLF  = 000200          EM21    025262          INADR   001260          PRSPAT  001424
BIT15 = 100000          CSEROR  011654          EM22    025316          INDX1   001474          PR0   = 000000
BIT2  = 000004          DDISP = 177570          EM23    025341          INDX2   001476          PR1   = 000040
BIT3  = 000010          DH1     025500          EM24    025362          INDX3   001500          PR2   = 000100
BIT4  = 000020          DH11    025653          EM25    025376          INDX4   001502          PR3   = 000140
BIT5  = 000040          DH13    025750          EM26    025440          INPT    024032          PR4   = 000200
BIT6  = 000100          DH14    025767          EM27    025456          IOBUF0  026446          PR5   = 000240
BIT7  = 000200          DH16    026046          EM3     024407          IOBUF1  031446          PR6   = 000300
BIT8  = 000400          DH17    026123          EM30    025473          IOTVEC= 000020          PR7   = 000340
BIT9  = 001000          DH24    026161          EM4     024423          LF    = 000012          PS    = 177776
BLNKS1  002111          DH25    026266          EM5     024441          LUPHE   010640          PSW   = 177776
BLNKS2  002110          DH6     025546          EM6     024510          LUPSIN  010632          PTGEN0  010106
BLNKS3  002107          DH7     025576          EM7     024545          LUPSW   001222          PTGEN1  010170
BLNKS4  002106          DISPLA  001142          ERCNT1  001504          LUPWCE  011350          PTGEN2  010272
BLNKS5  002105          DISPRE  000174          ERCNT2  001506          MESAGE= 104417          PTGEN3  010334
BLNKS6  002104          DMPREG  017662          ERCNT3  001510          MISCMP  012016          PTRN01  010164
BLNKS7  002103          DONE    011636          ERCNT4  001512          MSGE    016044          PTRN02  010166
BLNKS8  002102          DONTRK  011576          ERCNT5  001514          MSG1    001602          PT1     001560
BLNKS9  002101          DOSUR1  011630          ERCNT6  001516          MSG10   001742          PT10    001576
BLNK10  002100          DOWCHK  012420          ERCNT7  001520          MSG11   001771          PT11    001600
BLNK13  002075          DOWRT   012224          ERCNT8  001522          MSG12   002027          PT2     001562
BPTVEC= 000014          DRHOLD  002120          ERRTYP  017446          MSG13   002053          PT3     001564
BRKDA   016220          DRIVAD  001230          ERRVEC= 000004          MSG14   002064          PT4     001566
BTEOP   015232          DRIV5   001224          ERR1    016376          MSG2    001610          PT5     001570
BUFLG0  001410          DRIV0   001232          ERR2    016320          MSG3    001616          PT6     001572

BUFLG1  001412          DRIV1   001234          ERWCHK  011404          MSG4    001640          PT7     001574
BUFNO   001446          DRIV2   001236          ESR13   015456          MSG5    001657          PWRFL   004244
BUFR    001266          DRIV3   001240          ESR15   015364          MSG6    001716          PWRVEC= 000024
BUFR1   001320          DRIV4   001242          ESR20   015532          MSG7    001733          RDAGAI  010642
BUFR10  027026          DRIV5   001244          ESR25   015620          MS15    024757          RDCHR = 104410
BUFR11  027426          DRIV6   001246          EXEC    023676          MS17    025126          RDLIN = 104411
BUFR12  030026          DRIV7   001250          EXEC1   023674          NOHE    010760          RDOCT = 104412
```



```
READ    010606          STKLMT= 177774          TST7    010436          $ENULL  015344          $REG3   001170
REPEAT  012666          ST2     003512          TYPDES  022306          $EOP    015246          $REG4   001172
REPMSC  011274          ST3     003742          TYPDS = 104405          $EOPCT  015270          $REG5   001174
REPTIM  013200          SWR     001140          TYPDSS= 104424          $ERFLG  001103          $REG6   001176
RESDON= 104423          SWREG   000176          TYPE  = 104401          $ERMAX  001115          $REG7   001200
RESREG= 104414          SW0   = 000001          TYPMSG= 104420          $ERROR  017162          $RESRE  022450
RESVEC= 000010          SW00  = 000001          TYPOC = 104402          $ERRPC  001116          $RTNAD  015342
RES.DO  016514          SW01  = 000002          TYPON = 104404          $ERRTB  002122          $SAVRE  022412
RETRY1  001252          SW02  = 000004          TYPOS = 104403          $ERTTL  001112          $SAVR6  023160
RETRY2  001254          SW03  = 000010          TYPTIM  013736          $ESCAP  001204          $SCOPE  017006
RETRY3  001256          SW04  = 000020          TY.MSG  016106          $FILLC  001156          $SETUP= 000117
RKBA    001462          SW05  = 000040          WBUSAD  001442          $FILLS  001155          $STUP = 177777
RKCS    001456          SW06  = 000100          WCAGAI  011132          $GDADR  001120          $SUPRS  022352
RKDA    001464          SW07  = 000200          WCEROR  012062          $GDDAT  001124          $SVLAD  017120
RKDB    001466          SW08  = 000400          WCERR   012442          $GET42  015320          $SVPC = 000220
RKDS    001452          SW09  = 001000          WCHI    012446          $GTSWR  021154          $SWR  = 163000
RKER    001454          SW1   = 000002          WCHI1   012440          $HD   = 000000          $SWRMK= 000000
RKPRI   001470          SW10  = 002000          WCLO    012646          $HIOCT  022056          $TKB    001146
RKVEC   001472          SW11  = 004000          WCREPT  011334          $ICNT   001104          $TKCNT  020612
RKWC    001460          SW12  = 010000          WDSKAD  001440          $ILLUP  023154          $TKINT  020622
R6    =%000006          SW13  = 020000          WRDCNT  001436          $INTAG  001135          $TKQEN= 020621
R7    =%000007          SW14  = 040000          WRERR   012240          $ITEMB  001114          $TKQIN  020614
SAVREG= 104413          SW15  = 100000          WRHI    012400          $LF     001214          $TKQOU  020616
SBR1    006526          SW2   = 000004          WRLO    012242          $LPADR  001106          $TKQSR  020620
SBR2    006552          SW3   = 000010          WRLO1   012236          $LPERR  001110          $TKS    001144
SBR3    007224          SW4   = 000020          WRTCHK  011116          $MNEW   021745          $TKSRV  020672
SECPTR  010426          SW5   = 000040          WWRDCN  001444          $MSWR   021734          $TN   = 000013
SFTCMP  011166          SW6   = 000100          XHE     011442          $MUL  = 000003          $TNPWR  022616
SIAD    001542          SW7   = 000200          XXDPMD  001220          $MULT   020500          $TPB    001152
SIZEF   024250          SW8   = 000400          $AUTOB  001134          $NULL   001154          $TPFLG  001157
SKDON   015152          SW9   = 001000          $BDADR  001122          $NWTST= 000001          $TPS    001150
SMGRP   014472          TBITVE= 000014          $BDDAT  001126          $OCNT   022302          $TRAP   022702
SOAD    001524          TIMDON  014050          $BELL   001206          $OMODE  022304          $TRAP2  022724
SORT    013342          TIMER   001264          $CHARC  020474          $OVER   017146          $TRP  = 000025
SP1     012702          TIMSEK  014776          $CKSWR  021064          $PASS   001100          $TRPAD  022736
SP10    012724          TKVEC = 000060          $CMTAG  001100          $POWER  023162          $TSTNM  001102
SP11    012726          TPVEC = 000064          $CM1  = 000011          $PWRAD  023150          $TTYIN  021712
SP12    012730          TRAPVE= 000034          $CM2  = 000022          $PWRDN  023010          $TYPDS  020034
SP2     012704          TRTVEC= 000014          $CM3  = 000011          $PWRMG  023144          $TYPE   020260
SP3     012706          TSTRWS  016716          $CNTLG  021727          $PWRUP  023062          $TYPEC  020430
SP4     012710          TST.RW= 104422          $CNTLU  021722          $QUES   001212          $TYPEX  020476
SP5     012712          TST1    004260          $CRLF   001213          $RDCHR  021366          $TYPOC  022104
SP6     012714          TST10   012174          $DBLK   020250          $RDLIN  021456          $TYPON  022120
SP7     012716          TST11   012736          $DB2D   022506          $RDOCT  021756          $TYPOS  022060
SP8     012720          TST12   015224          $DECVL  022666          $RDSZ = 000010          $XTSTR  017030
SP9     012722          TST2    004624          $DOAGN  015340          $REGAD  001160          $$GET4= 000000
STACK = 001100          TST3    005122          $DTBL   020240          $REG0   001162          $0FILL  022303
START   002462          TST4    005612          $ENDAD  015330          $REG1   001164          .     = 034446
STARTA  002530          TST5    006620          $ENDCT  015276          $REG10  001202
START1  003074          TST6    007356          $ENDMG  015347          $REG2   001166

. ABS.  034446      000

 ERRORS DETECTED:  0
```

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